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## Disentangling income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries

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# LIS

## Working Paper Series

No. 567

Disentangling Income Inequality and  
the Redistributive Effect of  
Social Transfers and Taxes in 36 LIS Countries

Chen Wang and Koen Caminada

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DATA CENTER  
*in Luxembourg*

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

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# Disentangling income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries

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Both this Working Paper and our dataset will become available at the LIS website as well.

## **Abstract**

The aim of this paper is to offer detailed information of fiscal redistribution in 36 countries, employing data that have been computed from the Luxembourg Income Study's micro-level database. LIS data are detailed enough to allow us to measure both overall redistribution, and the partial effects of redistribution by several taxes or transfers. We elaborate on the work of Jesuit and Mahler (2004) and Mahler and Jesuit (2006), and we refine, update and extend their Fiscal Redistribution approach. LIS data allow us to decompose the trajectory of the Gini coefficient from primary to disposable income inequality in several parts: we will distinguish 11 different benefits and several income taxes and social contributions in our empirical investigation across countries.

First, we use LIS data to analyze income inequality and the redistributive effect of social transfers across countries in a descriptive way. Then we proceed with a simulation approach for 36 countries for which we decompose income inequality through several taxes and transfers. We analyze the redistributive effect of several social programs, like unemployment benefits or pensions and income taxes. We develop a budget incidence simulation model to investigate to what extent several social transfers contribute to the overall redistribution in modern welfare states under a strong assumption that the absence of social transfers and taxes would not change individual behavior and labor supply.

Among all countries listed in this paper, Denmark and Sweden have the smallest income disparity, while Peru and Colombia have the largest. Nordic countries show the most equally distributed disposable incomes and primary incomes, comparing to the countries in other types of welfare states. On average, large primary income disparity exists in Anglo-Saxon countries. Generally speaking, European countries achieve lower levels of income inequality than other countries.

With respect to the redistributive effect, our budget incidence analysis indicates that the pattern is diverse across countries. The largest redistribution is found for Belgium, while Colombia and Peru show rather limited overall redistributive effects. On average, transfers reduce income inequality by over 85 percent, while taxes account for only 15 percent of total redistribution. Among all welfare states, Continental European countries (Belgium, France, Germany, and Luxembourg) achieve the highest level of the reduction of initial income inequality.

As far as social programs is concerned, in most countries two dominant income components account for above 50 percent of total reduction in income inequality: the public old age pensions and the survivors scheme, and the income taxes. For example, in Southern European Countries the public old age benefits account for over 80 percent of total redistribution, while these figures are much lower for Anglo-Saxon Countries (20-34%), for Nordic Countries (31-48%), for Continental European Countries (47-57%), and for Central Eastern European Countries (54-70%). In Anglo-Saxon Countries income taxes play a major role (above 30%) compare to other countries (with the exception the United Kingdom). Also the redistributive effect of social assistance and child and family benefits in the Anglo-Saxon Countries are relatively high in a comparative setting (9-28%). In Nordic Countries also a variety of other social programs contribute to the reduction of inequality, especially the disability scheme (9-15%). Remarkably, across countries all other social benefit programs seem to have rather limited redistributive effects, although the unemployment compensation benefits do have some effect too.

Key words: welfare states, social income transfers, inequality, Gini coefficient, LIS  
JEL-codes: H53, H55, and I32

## 1. Introduction

The growing interest in national and cross-national differences in earnings and income inequality has produced a wide range of studies (see Gottschalk et al, 1997; Brandolini and Smeeding, 2007; OECD, 2008; and Lambert et al, 2010). For many countries, studies are showing how income inequality has changed during recent years. An important development has been the launching of the Luxembourg Income Study (LIS) in which microdatasets from various countries have been "harmonised". Consequently it is possible to study income inequality across countries (see Atkinson et al, 1995). However, the improvement in methods of measurement and in empirical knowledge is in contrast with the lack of insight into causes of changes in equality over time.<sup>1</sup> This should perhaps not come as a surprise as the distribution of income in a country is the outcome of numerous decisions made over time by households, firms, organizations and the public sector. One could think of an almost infinite number of micro-level causes for differences and changes in income inequality (Gottschalk and Smeeding, 2000).

In this paper, we focus on the effect of taxes and transfers in redistributing income. Our expectation is that social transfers are mainly directed to lower income groups, while income taxes are mainly paid by the rich, and therefore both will have an impact on income (re)distribution. We use the traditional budget incidence approach—despite some methodological problems we will address—to study the combined effects of all taxes and transfers on the income (re)distribution. The distribution of primary or wage and salary income is compared with the distribution of income after tax and after social transfers.

We present empirical results by analysing absolute *levels* of income inequality across countries for the most recent data year available (around 2004). Many factors make it difficult to compare the redistributive effect of taxes and transfers across countries (differences in income concepts, the income units, (summary) measures, equivalence adjustments and other factors). Moreover, there are numerous possible ways to analyse the impact of taxes and transfers on the distribution of income; some of these approaches are listed in our references.<sup>2</sup> It is generally agreed upon that there is no single 'correct' methodology. However, the budget incidence approach is - still - a standard methodology for studying the combined effects of all taxes and transfers on the magnitude of (re)distributing income.

The increasing income inequality observed for most—but not all—Western economies over the last decades has coincided with many structural changes in the economic system. For many countries the main forces behind growing disposable income inequality are the growth of inequality of earned market income, demographic changes, changes in household size and composition, and other endogenous factors. Atkinson (2000:17) concludes that we should not expect the same development in all countries, because the distribution of income is subject to a wide variety of forces (which may differ over countries). The evolution of income inequality is not simply the product of common economic forces: it also represents the impact of institutions and national policies. We focus on the redistributive effect of taxes and transfers to that end.

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1 OECD (2008) summarizes trends and driving factors in income distribution and poverty on the basis of a harmonized questionnaire of OECD Member Countries (i.e., distribution indicators derived from national micro-economic data).

2 Among others, see Atkinson et al (2000), Gustafson and Johanson (1997), Lambert et (2010), Moene and Wallerstein (2003), Swabish et al (2006).

Our contribution to the literature is threefold.

First, we provide evidence on the redistributive effect of welfare state regimes by taxes and transfers across countries. Empirical data on the redistribution of income across countries is rare. Researchers conducting cross-national studies of the welfare state have until very recently been forced to rely on such proxies as the share of social benefits in gross domestic product. Even fewer cross-national studies have examined the redistributive role of taxes and transfers. The lack of cross-national data for so central a variable as state redistribution has been changed recently by the work of Mahler and Jesuit (2006) and Jesuit and Mahler (2010). We elaborate on and update the work of Jesuit and Mahler.

Secondly, we confront results obtained by OECD (2008) with the results of the LIS database on the redistributive effect of social transfers across countries. The Luxembourg Income Study (LIS) offers micro-data on public and private sources of income that are comparable, detailed and accurate. Specifically, the LIS offers data on a large number of individual sources of income from both the private and public sectors. Moreover, the LIS data permit researchers to adjust for taxes and social insurance contributions assessed on income recipients. Using the LIS data set, it is possible to estimate direct redistribution for most developed countries. The intention of this paper is to offer an empirical analysis of state redistribution in 36 countries, with reference to micro-data on household income available from the Luxembourg Income Study. Our aim is to offer data on income redistribution that are more accurate, comparable, detailed and recent than those that have been used in past work.

Finally, we refine the method of Jesuit and Mahler. We undertake a more detailed study containing a simulation approach using LIS micro data which allow us to decompose income inequality through several taxes and social transfers. We develop a budget incidence simulation model to investigate to what extent several social transfers and taxes reduce income inequality in 36 countries, under a strong assumption that the absence of social transfers and taxes would not change individual behavior and labor supply (Frick et al., 2000; Palme, 1996). With respect to the inequality index, we use the Gini coefficient, and decompose the Gini in a comparative setting. We apply the most straightforward—and most common—way of measuring government redistribution, simply by comparing the income households report that they receive from private-sector sources with the income they receive after government transfers have been added and taxes and social insurance contributions deducted. The change in summary measures of inequality between pre- and post-government income represents direct government redistribution. For example, the mean of pre-government Gini indices of income inequality of the 36 countries in this study around 2004 was 0.47. After adding government transfers and deducting income taxes and social insurance contributions the Gini fell to 0.33, representing a Gini reduction of 14 points or 30 percent.

The paper is organized as follows. In Section 2 we summarize literature on the redistributive effect of taxes and transfers in LIS countries. Section 3 presents our research method. Section 4 provides a descriptive analysis of inequality and redistribution across 36 countries. Section 5 presents the empirical results of our detailed decomposition of the redistributive effect of social transfers and taxes across countries. Section 6 provides a research agenda and section 7 concludes the paper.

## **2. Income inequality and the redistributive effects of taxes and transfers across countries**

The relationship between income inequality and redistribution in a cross-country perspective is not crystal clear (see on this Lambert et al, 2010). A large number of articles discuss the relationship between income inequality and redistribution among countries. Despite recent empirical evidence suggesting that there is more redistribution when pre-tax income inequality is high, it is claimed by others that societies with low pre-tax income inequality redistribute more than less equal societies. The main reason for the confusion stems from differences in measurement strategies. Indeed, with three distributions involved (pre-tax-transfer income, post-tax-transfer income, and the tax burden), and as there exist different inequality measures to sum up these distributions, not surprisingly the literature offers a plethora of research methods and empirical results. Below we shall briefly review the main ones, restricting us to Gini-based literature and applications, which are by far the most prevalent.

Vast literature analyze income distribution across countries, indicating that the role of social policy (taxes and transfers) is important in the magnitude of redistributing income.<sup>3</sup> Korpi and Palme (1998) used data from LIS to study different types of welfare states. They illustrated that both the level of transfers and the targeting to the poor are important for reducing income inequality. Bradley et al (2003) divide the welfare states into three categories (Social Democratic, Christian Democratic and Liberal Democratic) to study government redistribution and distributive profiles of taxes and transfers. Their results indicate that welfare generosity does not have a significant effect on pre-tax and pre-transfer income inequality, but does have a positive impact on the total redistribution of incomes. By using LIS data for the mid-2000s, Pressman (2009) finds a larger proportion of middle-class households in countries with rather progressive national tax systems and relative generous government spending programs. With respect to the relationship between inequality and redistribution, the results are not always in line with each other. Kenworthy and Pontusson (2005) examined the trend in market income inequality and redistribution in OECD countries in the 1980s and 1990s, indicating that redistribution increased in most countries. However, welfare state policies compensated for this rise in market inequality across countries. With respect to income mobility, Morillas (2009) finds that market income inequality is negatively associated with the level of the redistributive effect of taxes and transfers across countries. Goudswaard and Caminada (2010) and Caminada and Goudswaard (2005) studied the redistribution of public versus private social programs which have opposite distributional effects.

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

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<sup>3</sup> Among others, Brandolini and Smeeding (2007a and 2007b), Atkinson and Brandolini (2001), Smeeding (2000, 2004 and 2008), Gottschalk and Smeeding (1997, 1998 and 2000), Atkinson (2003), Ervik (1998), O'Higgins et al (1990), and Brady (2004).

decompose changes in overall inequality into a set of components (see on this Kristjánsson, 2011; Fuest et al, 2010; Paul, 2004). Despite the problem of tax shifting, analyses on statutory and budget incidence can be found for decades in literature on public finance.<sup>4</sup>

Most studies focus on overall redistribution; others have examined in more detail the redistributive effect of several social programs. For example, Plotnick (1984) calculates the redistributive impact of cash transfers in the US in 1967 and in 1974. Caminada and Goudswaard (2001 and 2002) performed a budget incidence analysis for the Netherlands to investigate the effect of transfers and taxes in 1981, 1991 and 1997. Ferraini and Nelson (2003) focus on the effects of taxation of social insurance in 10 countries around 1995, analyzing inter- and intra-country comparisons of income (re)distribution. Mahler and Jesuit (2006) divide government redistribution into several components: the redistributive effects from unemployment benefits, from pensions, and from taxes. They applied their empirical exercise for 13 countries with LIS-data around the years 1999/2000. We update and extend the analyses of Jesuit and Mahler by taking into account many more benefits and taxes, and we will apply a budget incidence analysis to a wider range of 36 countries with the most recent LIS data available (around 2004).

### 3. Research method

#### 3.1 Measuring the redistributive effects of taxes and social transfers

Usually, the impact of social policy on income inequality is calculated in line with the work of Musgrave, Case and Leonard (1974), i.e. statutory or budget incidence analysis. A standard analysis of the redistributive effect of taxes and income transfers is to compare pre-tax-transfer income inequality and post-tax-transfer income inequality (OECD 2008: 98). Our measure of the redistributive impact of social security on inequality is straightforwardly based on formulas developed by Kakwani (1986) and Ringen (1991):

$$\text{Redistribution by taxes and social transfers} = \text{primary income inequality} - \text{disposable income inequality}$$

This formula is used to estimate the reduction in inequality produced by taxes and social transfers, 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; see section 3.2 for more details. When calculating inequality indices for both primary and disposable income, people are ranked by their disposable incomes, so that the re-ranking effect is eliminated. Table 1 presents the framework of accounting income inequality and redistribution through various income sources; see Annex 1 for details on the LIS Household Income Components List.

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<sup>4</sup> See for example Dalton (1936), Musgrave and Tun Thin (1948), Gillespie (1965), Kakwani (1977a), Reynolds and Smolensky (1977a and 1977b), Kiefer (1984), Mitchell (1991), Silber (1994), OECD (2008) and analyses based on the Luxembourg Income Study database (some of them are listed in our references).



**Table 1 The income inequality and redistribution accounting framework**

Income components	Income inequality and redistributive effect
Gross wages and salaries + Self-employment income + cash property income + Occupational and private pensions + Private transfers + Other cash income = <b>Primary income</b>	<b>Income inequality before social transfers and taxes</b>
+ Social security cash benefits <b>= Gross income</b>	-/- Redistributive effect of social transfers <b>= Income inequality before taxes</b>
-/- Pay Roll (Mandatory payroll taxes) -/- Income taxes <b>= Disposable income</b>	-/- Redistributive effect of taxes <b>= Income inequality after social transfers and taxes</b>

*Note:* For France, Greece, Hungary, Italy, Mexico, Peru, Russia, Spain and Uruguay, the value of market income in the dataset is zero. Instead, we use net market income which is the sum of net wages and salaries, self-employment income and cash property income.

The measures of both pre- and post-social security income are far from ideal. At a conceptual level, no conceivable measure of pre-social security income could indicate what the income distribution would look like if social security did not exist. A comparison between the standard Gini index of post-tax-transfer income inequality and the hypothetical situation where social transfers are absent, other things being equal, shows that such transfers have an important redistributive effect that helps to reduce the number of people who are at risk of poverty.<sup>5</sup> In the absence of all social transfers, the average poverty risk would be considerably higher than it is in reality. It should however be noted that the indicator of income inequality before social transfers must be interpreted with caution (Kim, 2000b; Nell, 2005). First, it is not taken into account that measures, like social cash transfers, can have the effect of raising the disposable incomes of households and individuals, namely transfers in kind, tax credits and tax allowances. Second, the pre-transfer inequality is compared to the post-transfer inequality keeping all other things equal – namely, assuming unchanged household and labor market structures, thus disregarding any possible behavioral changes that the situation of absence of social transfers would involve. However, behavioral responses – with the strongest effects on reducing work effort – have been at the heart of the policy debates shaping the evolution of antipoverty policy.<sup>6</sup> Kim (2000b) showed that both the generosity and efficiency of the tax/transfer system may influence the level of pre-tax-transfer income inequality. Budget incidence calculations can only be seen as an approximation of the redistributive effects because the assumption that agents behave similar in situations with and without social transfers and social security. One may imagine the labor supply decision in absence of social transfers and social security. It is likely that in the absence of social transfers more people will work (more) thereby earning higher incomes and having consequences for income inequality. In essence, budget incidence analyses assume that labor supply decisions

<sup>5</sup> Among others, see Behrendt (2002), Smeeding (2005), Förster (2000), Förster and Pearson (2002) and Förster and Mira d’Ercole (2005).

<sup>6</sup> We refer to a seminal review by Danziger, Haveman and Plotnick (1981).

in a situation with social transfers and social security are equal to a situation without social transfers. So, this standard approach biases the redistributive effect of generous and/or targeted welfare systems. Our estimates for redistribution through taxes and transfers of each country should consequently be regarded as upper bounds.

### 3.2 Sequential decomposition of the Gini coefficient: partial effects of taxes and transfers

The Gini coefficient is expressed as follows (cf. Jenkins, 1999; updated 2010):

$$G = 1 + (1/n) - [2/n^2 \mu] \sum_{i=1}^n (n-i+1)y_i \quad , \quad i = 1, 2, \dots, n \quad (1)$$

In formula (1),  $n$  denotes number of individuals,  $\mu$  denotes average income of individuals, and  $y_i$  presents income of individual. The level of Gini coefficient is given by number of individuals, average income of individuals. Using expression (1), we are able to decompose the Gini coefficient of primary income into the Gini coefficient of disposable income and the redistributive effects of transfers and taxes. Income (inequality) can be measured with or without transfers and/or taxes.

$$y_i = y_i^{pri} + \alpha B_i - \beta T_i \quad , \quad i = 1, 2, \dots, n \quad , \quad \alpha, \beta \in \{0, 1\} \quad (2)$$

$y_i^{pri}$ ,  $B_i$  and  $T_i$  denote primary income of individual  $i$ , total transfer of individual  $i$  and total taxes of individual  $i$ , respectively. Depending on  $\alpha$  and  $\beta$ , Individual income is determined by the sum of all cash incomes, such as wages, salaries, welfare benefits, public and private pensions, child and family allowances and so on, where we focus on social transfers and direct taxes. When  $\alpha = 0$  and  $\beta = 0$ , the resulting inequality measure presents the Gini coefficient before taxes and transfers; if  $\alpha = 1$  and  $\beta = 1$ , the measure corresponds to the Gini coefficient after taxes and transfers; if  $\alpha = 0$  and  $\beta = 1$  the measure shows the Gini coefficient after taxes but before transfers, which displays a world without social transfers. For  $\alpha = 1$  and  $\beta = 0$ , inequality after transfers, but before taxes is measured.

In a more general expression, individual income can be shown as formula (3), consisting of primary income, at most  $m$  kinds of transfers and  $p$  types of taxes.  $B_{ik}$  show the  $k^{th}$  transfer of individual  $i$ , and  $T_{il}$  presents the  $l^{th}$  tax of individual  $i$ . When  $\alpha_k = 1$ ,  $\alpha_{-k} = 0$  ( $\alpha_j = 0$  ( $j \neq k$ )) and  $\beta_l = 0$ , individual income includes primary income plus the  $k^{th}$  transfer; when  $\alpha_k = 1$ ,  $\beta_l = 1$  and  $\beta_{-l} = 0$  ( $\beta_q = 0$  ( $q \neq l$ )), individual income contains primary income plus all the transfers and the  $l^{th}$  tax, we explain why we choose this order later in section 3.3.

$$y_i = y_i^{pri} + \sum_{k=1}^m \alpha_k B_{ik} - \sum_{l=1}^p \beta_l T_{il} \quad , \quad i = 1, 2, \dots, n \quad , \quad k = 1, 2, \dots, m \quad , \quad l = 1, 2, \dots, p \quad , \quad \alpha_k, \beta_l \in \{0, 1\} \quad (3)$$

This allows us to calculate inequality (Gini) without a certain kind of transfers or tax, and consequently the partial redistributive effect of that transfer or tax. Likewise the redistributive effects of all income components within the trajectory between primary income inequality and disposable income inequality (like unemployment benefits, old age pension benefits, disability benefits, social assistance, income taxes, mandatory social contributions) can be calculated based on this formula.

We take a budget incidence approach to measure the redistributive effect of the welfare state, and we focus on the redistribution between individuals or households at one moment in time (not over the lifecycle). We apply the Reynolds-Smolensky (1977a and 1977b) measure of the redistributive impact of taxes and transfers to present the reduction in Gini coefficient from primary income (pri) to disposable income (dpi). The redistributive effect  $L$  can be expressed as (c.f. Creedy and Ven, 2001):

$$L = G_{pri} - G_{dpi} \quad (4)$$

$L$  and  $G$  are the redistributive effect and the Gini coefficient of primary or disposable income. When moving from the pre-tax-transfer to the post-tax-transfer distribution, the re-ranking effect,  $R$ , is taken into account (Atkinson, 1979 and Plotnick, 1981).

$$R = G_{dpi} - C_{dpi} \quad (5)$$

Where  $C_{dpi}$  denotes the concentration coefficient. However, when income level is ranked by primary income rather than by disposable income, the re-ranking effect will be absent ( $R = 0$ ). The total redistributive effect can be disentangled in several partial effects:

$$L_B = G_{pri} - G_{pri+B} \quad (6)$$

$$L_T = G_{pri+B} - G_{dpi} \quad (7)$$

$L_B$  and  $L_T$  represent the partial redistributive effect of all benefit transfers  $B$ , and the partial redistributive effect of all taxes and social contributions  $T$ . Consequently, the decomposition in formula (6) and (7) will offer us a quantitative measure for the reduction in the Gini by social programs in a country.

In order to assess the effects of taxes and benefits on the overall redistribution we apply a sequential decomposition technique. This division is somewhat arbitrary since the choice of benchmark income affects the outcome. Applying the redistribution from, say, taxes on gross income rather than market income alters the outcome to some extent. Since taxes are levied on gross income (market income plus benefits), the redistributive effects may be underestimated. Nevertheless the logic of this decomposition of Gini is that taxes are applied to gross income and benefits to market income. This approach has been, among others, advocated by Kakwani (1986).

Our sequential decomposition approach of income inequality follows studies by Mahler and Jesuit (2004) and Mahler and Jesuit (2006), with inequality indices accounted sequentially in order to determine the effective distributional impact of different income sources. Other techniques of the decomposition of the Gini coefficient by income source can be found in the literature as well; see e.g. Lerman and Yitzhaki (1985), Stark et al (1986), Kim (2000a), Creedy and Ven (2001). For example the well-known Lerman and Yitzhaki's method derives the marginal impact of various income sources on overall income inequality.<sup>7</sup> Fuest et al (2010) explore the redistributive effects of different tax benefit instruments in the enlarged European Union (EU) based on two families of approaches. When comparing both approaches, they lead to the same estimates of disposable income inequality, however, both lead to somewhat contradictory results with respect to the importance of benefits for redistributing income. Inequality analysis based on the *sequential accounting decomposition* approach suggests that benefits are the most important factor

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<sup>7</sup> See for 'descogini' in STATA (Lopez-Feldman, 2006).

reducing inequality in the majority of countries (e.g. Immervoll et al, 2005; Mahler and Jesuit, 2006; Whiteford, 2008). The *factor source decomposition* approach, suggested by Shorrocks (1982), however, suggests that benefits play a negligible role and sometimes even contribute slightly positively to inequality (e.g., Jenkins 1995; Jäntti 1997; Burniaux et al. 1998). On the contrary, here taxes and social contributions are by far the most important contributors to income inequality reduction. Fuest et al (2010) explain these partly contradictory results. The most important difference between the two approaches is that the accounting approach applies tax benefit instruments sequentially, whereas, the decomposition approach accounts for them simultaneously.

Although both approaches are used in the literature, studies analyzing the impact of tax benefit instruments based on the standard sequential accounting approach generally find rather intuitively straight forward results, i.e. that benefits are the most important source of inequality reduction in European countries. In order to assess the effects of taxes and benefits on the overall redistribution we (therefore) apply the sequential decomposition technique in line with the comparative work of Mahler and Jesuit (2006), and recent studies by Kristjánsson (2011) and Kammer and Niehues (2011). This choice for an sequential approach is somewhat arbitrary, but fits in a strand of empirical literature that systematically illustrate that social transfers significantly improve the economic conditions of families, especially in European countries, and that the distribution of disposable incomes in these societies become more equal with the existence of these types of provisions.

### 3.3 Sequential decomposition of the Gini coefficient: partial effects of different income sources

In order to disentangle the inequality even further by income source, the redistributive effect of several benefit transfers and taxes can be represented by formula (8) and (9):

$$L = G_{pri} - G_{dpi} \quad (4)$$

$$L_{Bk} = G_{pri} - G_{pri+B_k} \quad (8)$$

$$L_{Tl} = G_{pri+B} - G_{pri+B-T_l} \quad (9)$$

$L$ ,  $L_{Bk}$  and  $L_{Tl}$  represent the overall redistributive effect, the partial redistributive effect of a specific kind of transfer  $B_k$ , and the partial redistributive effect of an income tax  $T_l$ . Consequently, the decomposition in formula (8), and (9) will offer us an quantitative measure for the reduction in the Gini by social programs in a country.

It should be noted that the results to be obtained could be affected by the ordering effect, but we will correct for this. For example, the partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program; see equation 3. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (= 100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

### 3.4 Choice of income unit

The unit of analysis is an important issue in income distribution studies. It is evident that the ultimate source of concern is the welfare of the individual. However, an individual is often not the appropriate unit of analysis. E.g. children and spouses working at home do not have recorded income, but may nevertheless be enjoying a high standard of living as a result of income sharing with parents/spouses. How to solve the problem of the key question of the unit of analysis?

Traditionally, studies have used the household income per capita (or per member) measure to adjust total incomes according to the number of persons in the household. The last decades, equivalence scales have been widely used in the literature on income distribution (see Figini, 1998). An equivalence scale is a function that calculates adjusted income from income and a vector of household characteristics. The general form of these equivalence scales is given by the following expression:  $W = \frac{D}{S^E}$ , where  $W$  is adjusted income,  $D$  is income (disposable income),  $S$  is size

(number of persons in households) and  $E$  is equivalence elasticity.  $E$  varies between 0 and 1. The larger  $E$ , the smaller are the economies of scale assumed by the equivalence scales. Equivalence scales range from  $E=0$  (no adjustment or full economics of scale) to  $E=1$  (zero economies of scale). Between these extremes, the range of values used in different studies is very large, strongly affecting measured inequality.

Equivalence scale elasticity for the LIS database is set around 0.5. This implies that in order to have an equivalent income of a household of one person where  $D$  is 100, a household of two persons must have an income of 140 to have equivalent incomes. Alternatively an one-person household must have 70 percent of the total income of a two-person household to have equivalent income. In our comparative analysis we use this equivalence scale of LIS, where  $E$  is around 0.5. However, it has been shown that the choice of equivalence scales affects international comparisons of income inequality to a wide extend. Alternatively adjustment methods would definitely affect the ranking of countries, although the broad pattern remains the same (Atkinson et al, 1995:52).

### 3.5 Countries and other measurement issues

In empirical literature, the selection of countries and data-years differ due to the consideration of data quality. We apply a cross-national analysis using comparable income surveys for all countries of LIS around 2004. LIS micro data seems to be the best available data for describing how income inequality and the redistributive effects of taxes and transfers vary across countries (Nolan and Marx, 2009; Smeeding, 2008). LIS data contains information for 36 countries for one or more than one year of data (from wave I to wave VI), allowing researchers to make comparisons in a straightforward manner, and the information is still updating and expanding. This paper uses the data of all countries in LIS. In this paper we restrict ourselves to the latest data year available (around 2004) to analyze redistribution of social transfers and taxes. Countries included in LIS come from Europe, North America, the Far East and Australia: Australia, Austria, Belgium, Brazil, Canada, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guatemala, Hungary, Ireland, Israel, Italy, Korea, Luxembourg, Mexico, Netherlands, Norway, Peru, Poland, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, the United Kingdom, the United States, and Uruguay.<sup>8</sup>

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<sup>8</sup> It should be noted that Taiwan is regarded as a district of China, while in this comparative study we simply refer to Taiwan (as coded by LIS).

From nearly 300 variables in the dataset, we choose those related to household income (all kinds of income sources), total number of persons in a household and household weight (in order to correct sample bias or non-sampling errors) to measure income inequality and the redistributive effect across countries. In line with LIS convention and the work of Mahler and Jesuit (2006), we have eliminated both observations with zero or a missing value of disposable income from LIS data. Household weights are applied for calculation of Gini coefficients.

It should be noted that there have been controversial arguments regarding the issues in the measurement of income inequality. These arguments have their own merits and shortcomings, and there has been little professional consensus among researchers with regard to the theoretical superiority of a particular way of measuring inequality. Moreover, the availability of reliable data restricts the possibilities for conducting empirical research, which is especially problematic in cross-national studies. The aim of this paper is *not* to review definitional issues that arise in assessing the extent of, and change in, income inequality in Western industrialized countries. We simply refer to a vast literature on the sensitivity of measured results to the choice of income definitions, inequality indices, appropriate equivalence scales, and other elements that may affect results in comparative research.<sup>9</sup>

#### **4. Inequality and redistribution across LIS countries: A descriptive analysis**

##### *4.1 Inequality across countries*

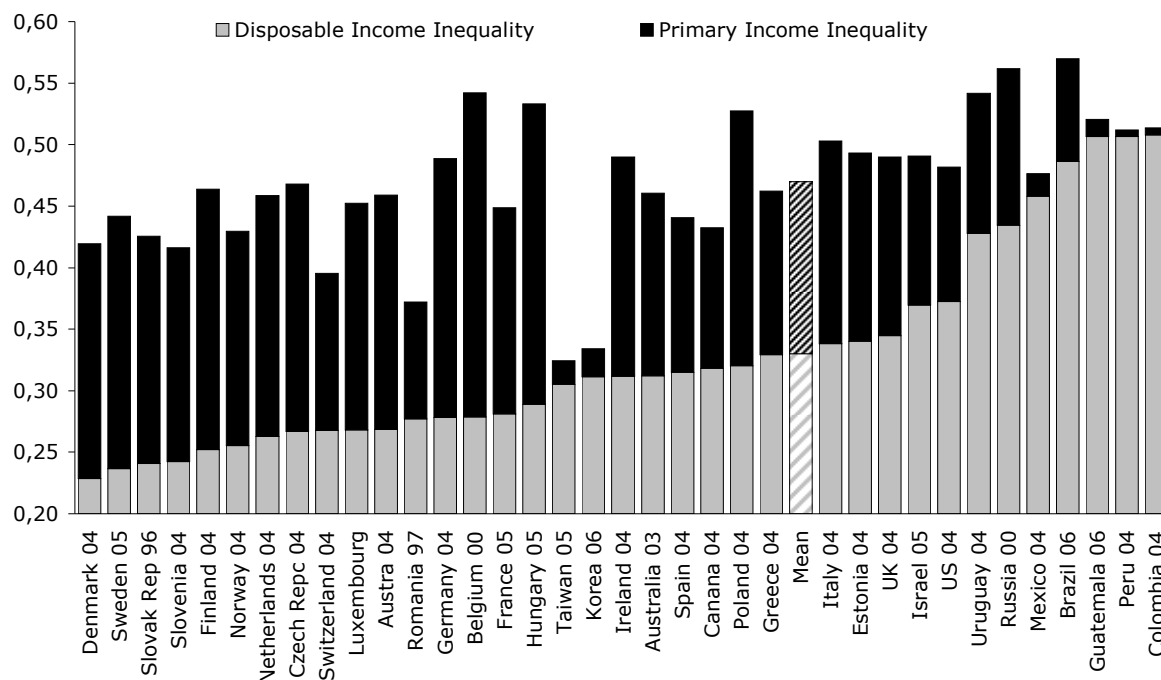
This section reviews the evidence on cross national comparisons of annual disposable income inequality over 36 nations. This section is mainly descriptive and relies on the empirical evidence LIS and from OECD (2008) for the levels of income inequality around the mid 2000s. Levels of inequality can be 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 LIS countries, but they do not always tell the same story.

Figure 1 shows the Gini coefficient. Countries are listed in order of their Gini of disposable income from smallest to largest. The obvious advantage of the presentation of inequality by summary statistics like the Gini coefficient is its ability to summarize several nations in one picture.

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<sup>9</sup> Among others, see Atkinson (1970, 1979, 1987 and 2003), Champernowne (1974), Kakwani (1977b), Hagenars and De Vos (1987), Coulter (1989), Atkinson et al (1995), Behrendt (2000), Gottschalk and Smeeding (1997 and 2000), Marcus and Danziger (2000), Atkinson and Brandolini (2001 and 2006), Caminada and Goudswaard (2001 and 2002), Förster and Pearson (2002), Smeeding (2005 and 2008), Förster and Mira d'Ercole (2005), OECD (2008) and (other) papers listed in our reference section using data from the Luxembourg Income Study. Recent comprehensive reviews on methodological assumptions underlying international levels and trends in inequality are found in Brandolini and Smeeding (2007 and 2008).

**Figure 1 Disposable and primary income inequality across LIS countries around 2004**



Source: own calculations based on LIS

The lowest income inequality is found in the Nordic countries, while Uruguay, Russia, Mexico, Guatemala, Peru and Columbia are the most unequal nations. Figure 1 indicates that a wide range of inequality exists across 36 LIS nations, with the nation with the highest inequality coefficient (Columbia) over twice as high as the nation with the lowest coefficient (Denmark).

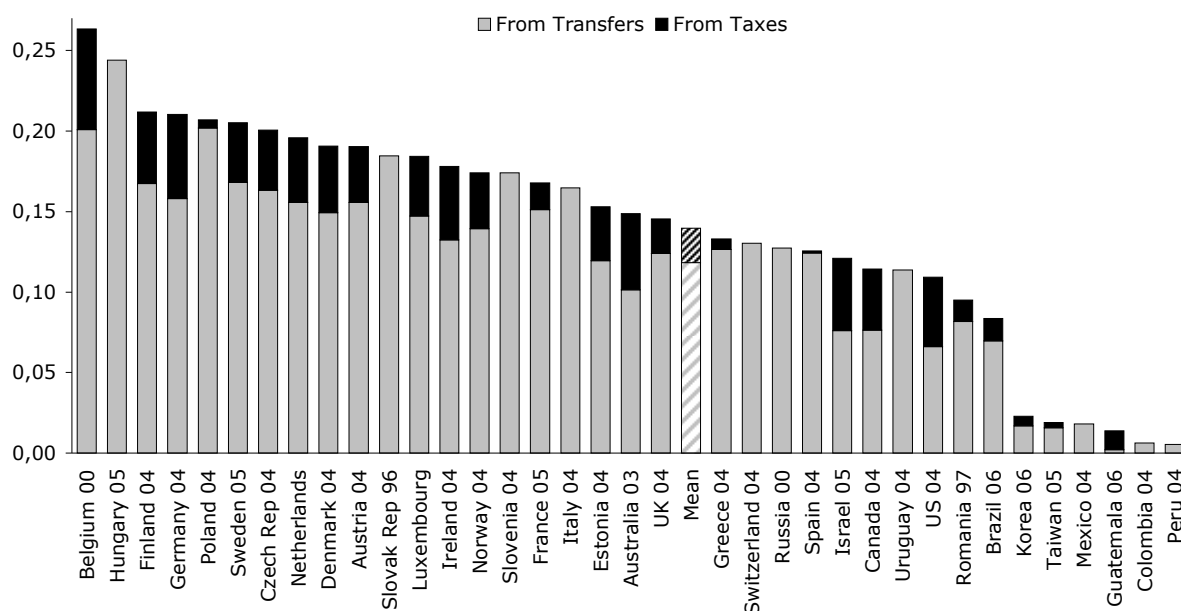
With respect to income inequality after social transfers and taxes, there are 24 countries with the Gini coefficient below average (0.33). Denmark, Sweden, Slovak Republic and Slovenia have rather low values around 0.24, in line with the results in OECD (2008), followed by other 12 countries (Finland, Norway, Netherlands, Czech Republic, Switzerland, Luxembourg, Austria, Romania, Germany, Belgium, France and Hungary) with Gini coefficients between 0.25 and 0.30. Above average inequality is found in 12 countries (Italy, Estonia, the United Kingdom, Israel, the United States, Uruguay, Russia, Mexico, Brazil, Guatemala, Peru and Colombia).

The pattern of primary income inequality (before social transfers and taxes) is quite different from disposable income inequality. Russia, Brazil, and Belgium have the highest level of primary income inequality, with values around 0.55. Taiwan, Korea, Romania and Switzerland have rather low levels of primary income inequality, below 0.40. The redistributive effect of taxes and social transfers differ considerably across countries. The highest level of redistribution is found in Belgium, Hungary and Finland, while redistribution is rather small in Peru and Colombia. This cross country difference in the redistributive effect will be analyzed in section 4.2.

#### 4.2 The redistributive effect of taxes and transfers

Several studies focused on the impact of income components on overall inequality (Shorrocks, 1983; Lerman and Yitzhaki, 1985; Jenkins, 1995; Breen et al, 2008). These suggest that income taxes and social benefits are important sources of reducing household income inequality. Figure 2 shows the overall redistribution across countries and the disaggregated effects of social transfers and taxes based on formula (6) and (7). On average, the share of social transfers play a major role of 85 percent in the total reduction of inequality, while taxes take account for 15 percent of total reduction of income inequality. According to LIS income surveys, income taxes and mandatory payroll taxes are involved in the redistribution of taxes, rather than indirect taxes. For some countries, such as Hungary, Italy, Mexico, Peru, Russia, Slovak Republic, Slovenia and Uruguay data of taxes are not available in the dataset.

**Figure 2 Redistributive effect of taxes and transfers across LIS countries around 2004**



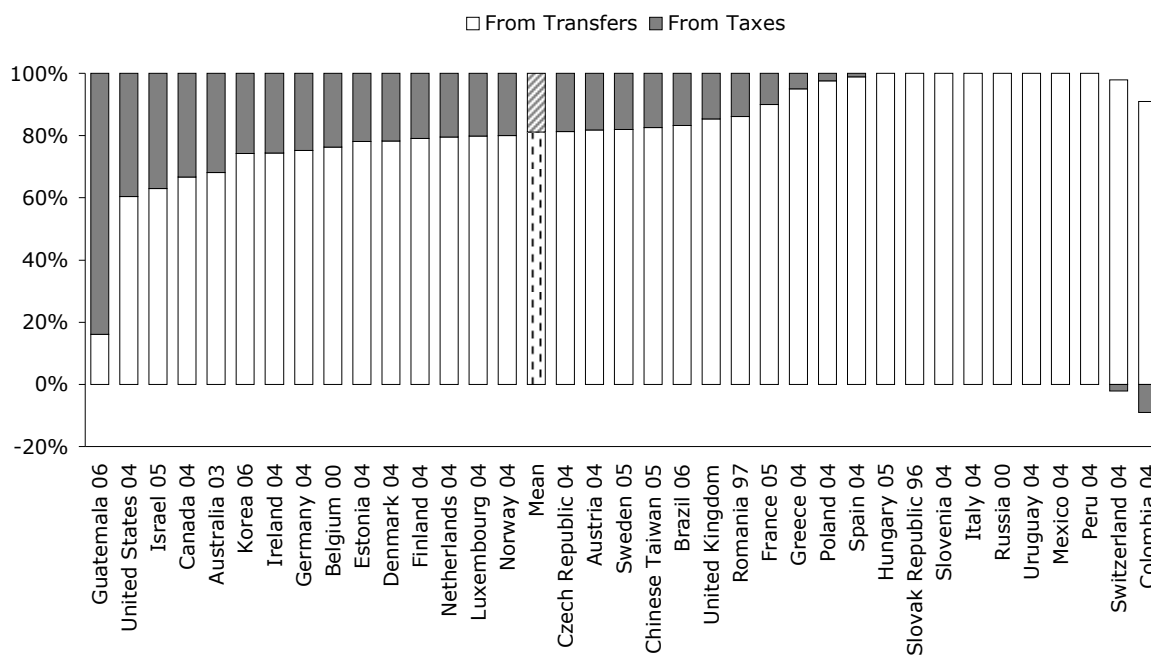
Note: For Hungary, Italy, Mexico, Peru, Russia, Slovak Republic, Slovenia and Uruguay data for taxes are not available.

Source: own calculations based on LIS

Belgium, Hungary, Finland, Germany, Poland, Sweden and Czech Republic have high levels of total redistribution, while Korea, Taiwan, Mexico, Guatemala, Colombia and Peru have a rather small extent of overall redistribution. In view of total redistribution, Guatemala is one of the countries having a rather low level of total redistribution. However, this inequality reduction is mainly achieved by taxes. Besides Guatemala, only in a few countries taxes are important in equalizing incomes: the United States, Israel, and Canada. Generally speaking, redistribution of income in most countries relies to a large extent on social transfers. This relative effect of social transfers and taxes in total redistribution is presented in Figure 3 (countries are listed according to the reduction of income inequality by taxes).



**Figure 3. Relative redistributive effect of taxes and transfers across countries around 2004**



Note: For Hungary, Italy, Mexico, Peru, Russia, Slovak Republic, Slovenia and Uruguay data for taxes are not available.

Source: own calculations based on LIS

Note that the partial effect of taxes is negative for Colombia and for Switzerland. The negative contribution for Switzerland is caused by tax competition (Kirchgässner and Pommerehne, 1996; Feld 1999). In this country it appears to be difficult to levy redistributive taxes from the rich and mobile persons to the poor. As a result the amount of taxes paid by rich people is relatively low.

#### 4.3 Redistribution, budget size and targeting

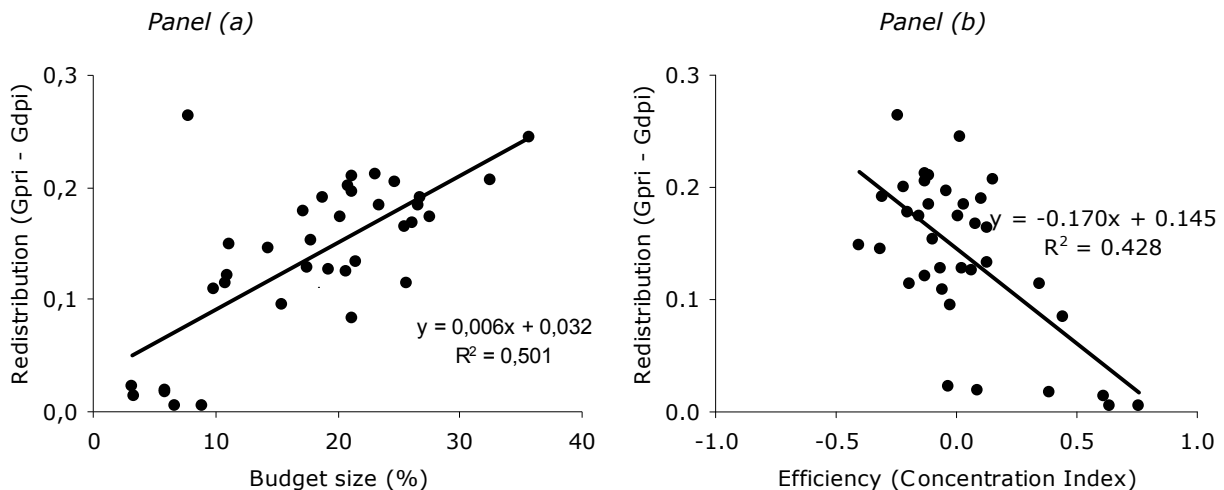
Considering the redistributive effect of social benefits, scholars have distinct between programs' size and the extent to which they are targeted toward low-income groups by means-testing. In a seminal paper by Korpi and Palme (1998: 663), they have posited a "paradox of redistribution" whereby "the more we target benefits to the poor . . . the less likely we are to reduce poverty and inequality." The paradox arises from the fact that highly targeted programs have the support of a small and isolated political base. As they put it, targeted programs offer "no rational base for a coalition between those above and below the poverty line. In effect, the poverty line splits the working class and tends to generate coalitions between better-off workers and the middle class against the lower sections of the working class" (Korpi and Palme, 1998: 663). Comprehensive programs, on the other hand, even when they are organized according to social insurance principles, tend to encourage coalitions between the working and middle classes that leave low-income groups less isolated.

With this background in mind, it is useful to explore empirically these two aspects of transfers with reference to the LIS database. Is redistribution associated with transfers' overall size or with their target efficiency? Is there, as is often suggested, a tradeoff between the two? Using LIS

micro data it is possible to calculate a measure of the average value of social transfers as a percentage of households' pre-tax income: the larger the value, the greater the share of total income that derives from transfers. It is also possible to calculate a summary index of the degree to which transfers are targeted toward low-income groups. This is done by applying Kakwani's (1986) 'index of concentration' to transfers. This index takes on the value of -1.0 if the poorest person gets all transfer income, 0 if everybody gets an equal amount, and +1.0 if the richest person gets all transfer income (cf. Korpi and Palme, 1998: 684). Figures for the size and target efficiency of social benefits are calculated for all 36 LIS countries are reported in Figure 4; see more details in Table 2.

As is shown, there is indeed considerable variance among developed countries in the average size of social benefits relative to total household income, ranging from 3.1% to 35.7%. In rich LIS countries, Austria, Finland and France achieve the highest budget size of transfers (above 25%), followed by Germany, Greece, Italy, Luxembourg, Netherlands, Norway, Spain and Sweden with values between 20% and 25%, while Belgium and the U.S. have the lowest level less than 10%. As for target efficiency, it is more diverse across countries. France and Italy have a rather high budget size of transfers with transfer programs slightly regressive. Finland, Germany, the Netherlands and Sweden have low target efficiency, but high social expenditures. Australia and the United Kingdom show high figures for transfer targeting although with a modest redistributive budget size (less than 15%). The United States is one of the countries with rather low social transfers, also with a quite low target efficiency. Interestingly, Canada, at the very bottom of our list of budget size, achieves a high target efficiency among rich countries.

**Figure 4. Redistribution, budget size and targeting across 36 LIS countries around 2004**

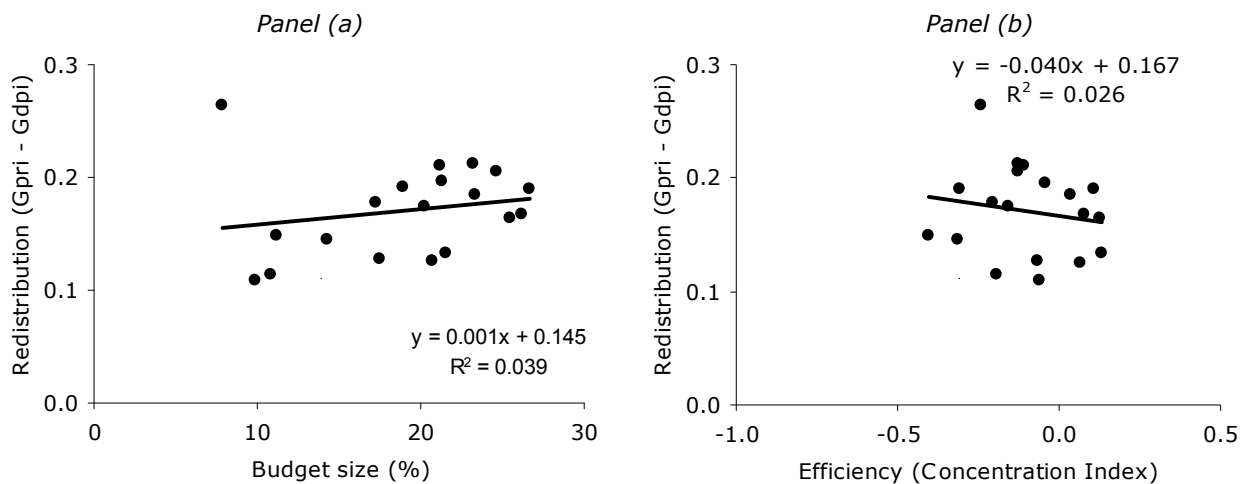


Source: own calculations based on LIS

The budget size of transfers plays a very important role on overall redistribution, which is confirmed by a simple regression analysis in Figure 4 Panel (a). The estimated coefficient of the budget size is statistically significant. Further more, target efficiency is also strongly and negatively significant with total redistribution (see Panel (b)), which is in line with the claim of

Korpi and Palme that greater use of transfer targeting yields less redistribution. However, it should be noted that our analysis is based on 36 LIS countries. When we restrict our analysis to the twenty wealthiest countries of LIS, both correlations disappear. Redistribution of incomes across countries does not correlate with both the budget size and the target efficiency. This little or no indication of a relationship between targeting and redistribution is in line with recent work of Kenworthy (2011: Chapter 6, page 2-4).

**Figure 5. Redistribution, budget size and targeting across 20 rich LIS countries around 2004**



Selected LIS countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Source: own calculations based on LIS

#### 4.4 Summing-up

Table 2 summarizes our results so far.

**Table 2 Redistributive effect of social transfers and taxes around 2004**

	Data year	GINI (pri)	GINI (dpi)	Redistribution	From transfers	From Taxes	Budget size (%)	Efficiency / targeting
Australia	2003	0.461	0.312	0.149	0.101	0.047	11.1	-0.404
Austria	2004	0.459	0.269	0.190	0.156	0.034	26.7	0.108
Belgium	2000	0.542	0.279	0.263	0.201	0.063	7.9	-0.244
Brazil	2006	0.570	0.486	0.084	0.070	0.014	21.2	0.443
Canada	2004	0.433	0.318	0.114	0.076	0.038	10.9	-0.193
Colombia	2004	0.514	0.508	0.006	0.006	-0.001	8.9	0.756
Czech Republic	2004	0.468	0.267	0.201	0.163	0.038	20.8	-0.218
Denmark	2004	0.419	0.228	0.191	0.149	0.042	18.9	-0.306
Estonia	2004	0.493	0.340	0.153	0.120	0.034	17.9	-0.099
Finland	2004	0.464	0.252	0.212	0.168	0.044	23.2	-0.127
France	2005	0.449	0.281	0.168	0.151	0.017	26.2	0.077
Germany	2004	0.489	0.278	0.210	0.158	0.052	21.2	-0.110
Greece	2004	0.462	0.329	0.133	0.127	0.007	21.5	0.132
Guatemala	2006	0.521	0.507	0.014	0.002	0.012	3.4	0.610
Hungary	2005	0.533	0.289	0.244	0.244	0.000	35.7	0.016
Ireland	2004	0.490	0.312	0.178	0.132	0.046	17.3	-0.205
Israel	2005	0.491	0.370	0.121	0.076	0.045	11.0	-0.125
Italy	2004	0.503	0.338	0.165	0.165	0.000	25.4	0.126
Korea	2006	0.334	0.311	0.023	0.017	0.006	3.1	-0.032
Luxembourg	2004	0.452	0.268	0.184	0.147	0.037	23.4	0.035
Mexico	2004	0.476	0.458	0.018	0.018	0.000	6.0	0.386
Netherlands	2004	0.459	0.263	0.196	0.156	0.040	21.3	-0.041
Norway	2004	0.430	0.256	0.174	0.139	0.035	20.2	-0.155
Peru	2004	0.512	0.507	0.005	0.005	0.000	6.7	0.634
Poland	2004	0.527	0.320	0.207	0.202	0.005	32.5	0.157
Romania	1997	0.372	0.277	0.095	0.082	0.013	15.4	-0.028
Russia	2000	0.562	0.434	0.127	0.127	0.000	19.3	0.028
Slovak Republic	1996	0.425	0.241	0.185	0.185	0.000	26.6	-0.109
Slovenia	2004	0.416	0.242	0.174	0.174	0.000	27.5	0.011
Spain	2004	0.441	0.315	0.126	0.124	0.001	20.7	0.068
Sweden	2005	0.442	0.237	0.205	0.168	0.037	24.6	-0.128
Switzerland	2004	0.395	0.268	0.128	0.130	-0.003	17.5	-0.066
Taiwan	2005	0.324	0.305	0.019	0.016	0.003	5.9	0.092
United Kingdom	2004	0.490	0.345	0.145	0.124	0.021	14.3	-0.313
United States	2004	0.482	0.372	0.109	0.066	0.043	9.9	-0.060
Uruguay	2004	0.542	0.428	0.114	0.114	0.000	25.7	0.350
Mean	2003.6	0.468	0.328	0.140	0.118	0.021	18.0	0.043

Source: own calculations based on LIS

#### 4.5 Sensitivity analysis

While even the LIS-data are by no means perfect, they produce some consistent patterns. The range of income inequality among LIS and OECD countries seems very wide at any point in time. Moreover, in spite of differences in the measurement of income inequality and the databases used, most studies have consistently found that there is a large difference in inequality among welfare states. Reports on inequality profiles for EU15 and other OECD countries for the latest data year available from OECD (2008) also consistently show – in general – Scandinavian and Benelux countries have the lowest income inequality, followed by continental European countries. Anglo Saxon welfare states have relatively higher inequality. Among them, the level of income inequality is high in the United States.

Table 3 compares Gini coefficients (before and after social transfers and taxes) around 2004 from the OECD database with figures from LIS (2011), which are completely in line with our calculations. From the 41 countries listed in Table 3, 20 countries are adopted in both the OECD-database and the LIS-database. Note that disposable income inequality data across countries of OECD-data and LIS-data are highly correlated (around 0.93). Correlation coefficients for primary income and for redistribution are somewhat lower (resp. 0.75 to 0.78). For most countries the difference in primary income inequality from OECD and from LIS do not exceed 3 percentage points, with exceptions for Belgium, Finland, Germany, Ireland, Italy, The Netherlands, Poland, Slovak Republic and the United Kingdom. What could explain these differences?

First and foremost, it is because the difference between income surveys. LIS micro data are predicated on different surveys across countries, for instance, Socio-Economic Panel (SEP) / NL ECHP (NL94, NL99, NL04) in the Netherlands, Current Population Survey (CPS) in United States, Survey of Income and Housing Costs (SIHC) in Australia. From those surveys, LIS staff refined and formalized rules used to classify variables, offering comparable micro dataset. Computations in OECD dataset are based on the OECD income distribution questionnaires. Therefore, the sample of surveys is not the same, leading to the different values of income inequality and the redistributive effect of taxes and transfers.

Second, there are minor differences with regard to the methodology applied. The concept of disposable income is quasi-identical between both data sources (OECD, 2008: 153). However, the equivalence scale used by LIS differs slightly from the one used by the OECD, giving a somewhat higher weight to additional household members and distinguishing between adults and children. LIS equivalent scale equals to the square root of the number of persons in the household while OECD modified equivalent scale =  $1 + 0.5 \times \text{number of other adult members} + 0.3 \times \text{number of children below 14}$  (OECD original equivalent scale =  $1 + 0.7 \times \text{number of other adult members} + 0.5 \times \text{number of child below 14}$ ).

Third, it is because the definition of primary income, and the way income inequality before transfers and taxes is measured. Using LIS data, the degree of redistribution is calculated by comparing Gini coefficients on the basis of primary income and on the basis of gross income, in which primary income is considered as the sum of market income, private transfers and other cash income. With respect to pre-government income inequality using OECD data, it depends on market income. Consequently, the level of income disparity and overall redistributive effect differs when data is used from the LIS dataset and from the OECD dataset.

**Table 3 OECD versus LIS: Income inequality and Redistribution across countries**

Country	OECD-data around 2004				LIS-data around 2004			
	Data year	GINI (pri)	GINI (dpi)	Redistribution	Data year	GINI (pri)	GINI (dpi)	Redistribution
Australia	2004	0.458	0.301	0.157	2003	0.461	0.312	0.149
Austria	2004	0.433	0.265	0.168	2004	0.459	0.269	0.190
Belgium	2004	0.494	0.271	0.223	2000	0.542	0.279	0.263
Brazil					2006	0.570	0.486	0.084
Canada	2005	0.436	0.317	0.119	2004	0.433	0.318	0.114
Colombia					2004	0.514	0.508	0.006
Czech Republic	2004	0.474	0.268	0.206	2004	0.468	0.267	0.201
Denmark	2004	0.417	0.232	0.184	2004	0.419	0.228	0.191
Estonia					2004	0.493	0.340	0.153
Finland	2004	0.386	0.269	0.117	2004	0.464	0.252	0.212
France	2004	0.471	0.270	0.201	2005	0.449	0.281	0.168
Germany	2004	0.507	0.298	0.209	2004	0.489	0.278	0.210
Greece	2004		0.321		2004	0.462	0.329	0.133
Guatemala					2006	0.521	0.507	0.014
Hungary	2005		0.291		2005	0.533	0.289	0.244
Iceland	2004	0.368	0.280	0.089				
Ireland	2004	0.416	0.328	0.088	2004	0.490	0.312	0.178
Israel					2005	0.491	0.370	0.121
Italy	2004	0.557	0.352	0.205	2004	0.503	0.338	0.165
Japan	2000	0.443	0.321	0.123				
Korea	2005	0.339	0.312	0.026	2006	0.334	0.311	0.023
Luxembourg	2004	0.454	0.258	0.196	2004	0.452	0.268	0.184
Mexico	2004		0.474		2004	0.476	0.458	0.018
Netherlands	2004	0.423	0.271	0.152	2004	0.459	0.263	0.196
New Zealand	2003	0.473	0.335	0.138				
Norway	2004	0.433	0.276	0.157	2004	0.430	0.256	0.174
Peru					2004	0.512	0.507	0.005
Poland	2004	0.568	0.372	0.196	2004	0.527	0.320	0.207
Portugal	2004		0.385					
Romania					1997	0.372	0.277	0.095
Russia					2000	0.562	0.434	0.127
Slovak Republic	2004	0.459	0.268	0.191	1996	0.425	0.241	0.185
Slovenia					2004	0.416	0.242	0.174
Spain	2004		0.319		2004	0.441	0.315	0.126
Sweden	2004	0.432	0.234	0.198	2005	0.442	0.237	0.205
Switzerland	2001		0.276		2004	0.395	0.268	0.128
Taiwan					2005	0.324	0.305	0.019
Turkey	2004		0.430					
United Kingdom	2005	0.460	0.335	0.125	2004	0.490	0.345	0.145
United States	2005	0.457	0.381	0.076	2004	0.482	0.372	0.109
Uruguay					2004	0.542	0.428	0.114
Mean (20 common countries)	2004.2	0.454	0.294	0.160	2003.6	0.461	0.287	0.173

Source: OECD (2008), LIS (2011) and own calculation.

Although the way of measuring income inequality differs to some extent in the LIS-dataset and the OECD-dataset, the general pictures from both datasets are almost the same. Table 4 ranks 20 common countries in LIS-data and OECD-data from low to high for all data variables around 2004. The smallest disposable income disparity exists in Denmark and Sweden, while the largest value is found for the United States, independent of the data source used. With respect to the reduction of income inequality by taxes and transfers, Belgium achieves the highest level, while Korea shows the lowest value, again independent of the data source used. Both data sets rank Korea on top the list for the lowest primary income inequality. The largest value for primary income inequality is found for Belgium according to LIS, while OECD-methodology points at Poland.

To conclude: relatively high levels of primary income inequality are found for Belgium, Poland, and Italy, while low values are found for Korea, Denmark, and Finland. With respect to disposable income inequality, high indices are found for the United States, the United Kingdom, Poland and Italy, while low Gini coefficients are found for Denmark and Sweden. The redistributive effect of taxes and transfers is relatively high in Belgium and Germany, while the redistributive effect is rather low for Korea and the United States.

**Table 4 Ranking of common countries in LIS and OECD dataset**

	GINI pri		GINI dpi		Redistribution	
	LIS	OECD	LIS	OECD	LIS	OECD
1	Korea	Korea	Denmark	Denmark	Korea	Korea
2	Denmark	Finland	Sweden	Sweden	US	US
3	Slovak Republic	Ireland	Slovak Republic	Luxembourg	Canada	Ireland
4	Norway	Denmark	Finland	Austria	UK	Finland
5	Canada	Netherlands	Norway	Slovak Republic	Australia	Canada
6	Sweden	Sweden	Netherlands	Czech Republic	Italy	UK
7	France	Austria	Czech Republic	Finland	France	Netherlands
8	Luxembourg	Norway	Luxembourg	France	Norway	Norway
9	Netherlands	Canada	Austria	Belgium	Ireland	Australia
10	Austria	Luxembourg	Germany	Netherlands	Luxembourg	Austria
11	Australia	US	Belgium	Norway	Slovak Republic	Denmark
12	Finland	Australia	France	Germany	Austria	Slovak Republic
13	Czech Republic	Slovak Republic	Korea	Australia	Denmark	Poland
14	US	UK	Ireland	Korea	Netherlands	Luxembourg
15	Germany	France	Australia	Canada	Czech Republic	Sweden
16	Ireland	Czech Republic	Canada	Ireland	Sweden	France
17	UK	Belgium	Poland	UK	Poland	Italy
18	Italy	Germany	Italy	Italy	Germany	Czech Republic
19	Poland	Italy	UK	Poland	Finland	Germany
20	Belgium	Poland	US	US	Belgium	Belgium

Note: Ranking by the value of GINI (pri), GINI (dpi) and redistribution, respectively, from low to high.

Source: LIS (2011), OECD (2008), and own calculations.

## **5. Decomposition of the redistributive effect of social transfers and taxes across LIS countries around 2004: an empirical analysis**

This section provides detailed results of the redistributive effect of welfare state regimes across a selection of our 36 countries based on the most recent wave of LIS. We elaborate on the work of Jesuit and Mahler (2006). However, we refine their Fiscal Redistribution approach. LIS data allow us to decompose the trajectory of the Gini coefficient from primary to disposable income inequality in several parts: we will distinguish 11 different social benefits and several income taxes and social contributions in our empirical investigation across countries. We calculate the following (partial) redistributive effects, based on formula (8) and (9) and based on the LIS household income components list (see Annex 1 for more details): sickness benefits, occupational injury and disease benefits, disability benefits, state old-age and survivors benefits, child/family benefits, unemployment compensation benefits, maternity and other family leave benefits, military/veterans/war benefits, other social insurance benefits, social assistance cash benefits, near-cash benefits, mandatory payroll taxes and income taxes.

Special attention needs the treatment of pensions. Public pension plans are generally seen as part of the safety net, generating large antipoverty effects through transfers and taxes (contributions). So, state old-age pension benefits will be included in our analysis on redistribution. But countries differ to a large extent in public versus private provision of their pensions (OECD, 2008:120). Occupational and private pensions are not antipoverty programs per se, although they too have a significant effect on redistribution when pre-tax-transfer inequality and post-tax-transfer inequality are measured at one moment in time, particularly among the elderly. The standard approach treats contributions to government pensions as a tax that finances the retirement pensions paid out in the same year, while contributions to private pensions are effectively treated as a form of private consumption. This may affect international comparisons of redistribution effects of social transfers and taxes. Overcoming this bias requires a choice: should pensions be earmarked as market income or as a transfer? We deal with this bias rather pragmatically by following LIS Household Income Variables List: occupational and private pensions are earmarked and threaded as market income (see Table 1, and Annex 1, Table A2).

To illustrate the idea of decomposition disposable income inequality, Table 5 presents the results of our accounting exercise for the mean of all 36 LIS countries. Interestingly, only three programs account for 62 percent of total redistribution: public old age pensions and the survivors scheme (46%), social assistance (7%) and the disability scheme (9%). Income taxes account for another 15 percent of total redistribution. Other social benefit programs and contributions seem to have a rather limited redistributive effect; together they account for only 23 percent of the reduction in income inequality through taxes and transfers.



**Table 5 Decomposition of disposable income inequality for LIS countries 2004**

	Gini	
(a) Gini primary income	0.468	
(b) Gini disposable income	0.328	
Overall redistribution (a-b)	0.140	
<i>Partial effects</i>		
		<i>share</i>
<i>Transfers</i>	<i>0.118</i>	<i>85%</i>
Sickness benefits	0.003	2%
Occupational injury and disease benefits <sup>a</sup>	0.001	1%
Disability benefits <sup>b</sup>	0.012	9%
State old-age and survivors benefits <sup>c</sup>	0.064	46%
Child/family benefits <sup>d</sup>	0.010	7%
Unemployment compensation benefits <sup>e</sup>	0.006	5%
Maternity and other family leave benefits <sup>f</sup>	0.004	3%
Military/veterans/war benefits	0.001	1%
Other social insurance benefits <sup>g</sup>	0.003	2%
Social assistance cash benefits <sup>h</sup>	0.010	7%
Near-cash benefits <sup>i</sup>	0.004	3%
<i>Taxes</i>	<i>0.021</i>	<i>15%</i>
Mandatory payroll taxes <sup>j</sup>	0.001	1%
Income taxes	0.021	15%
<i>Overall redistribution</i>	<i>0.140</i>	<i>100%</i>

- a Short-term occupational injury and disease benefits, Long-term occupational injury and disease benefits; Occupational injury and disease benefits n.e.c.
- b Disability pensions; Disability allowances; Disability benefits n.e.c.
- c Universal old-age pensions; Employment-related old-age pensions; Old-age pensions for public sector employees; Old-age pensions n.e.c.; Early retirement benefits; Survivors pensions; State old-age and survivors benefits n.e.c.
- d Child allowances; Advance maintenance; Orphans allowances; Child/family benefits n.e.c.
- e Unemployment insurance benefits; (Re)training allowances; Placement/resettlement benefits; Unemployment compensation benefits n.e.c.
- f Wage replacement; Birth grants; Child care leave benefits; Maternity and other family leave benefits n.e.c.
- g Invalid career benefits; Education benefits; Child care cash benefits; Other social insurance benefits n.e.c.
- h General social assistance benefits; Old-age and disability assistance benefits; Unemployment assistance benefits; Parents assistance benefits; Social assistance cash benefits n.e.c.
- i Near-cash food benefits; Near-cash housing benefits; Near-cash medical benefits; Near-cash heating benefits; Near-cash education benefits; Near-cash child care benefits; Near-cash benefits n.e.c.
- j Mandatory contributions for self-employment; Mandatory employee contributions.

Source: own calculations based on LIS

It should be noted that our results are hardly affected by the ordering effect. Following equation (8), the partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program; see section 3.3. A sensitivity analysis shows that changing the order of adding a specific benefit to primary income (or subtracting tax from gross income) does change the partial effect of this transfer (or tax) in total redistribution only slightly. In case we consider a specific social transfer as the last (instead of the first) program to be added to primary income distribution, the computed partial redistributive effect changes up to 1%-point at the highest.

We have done the accounting exercise presented in Table 5 for all 36 countries listed in the LIS database; see Annex 2 for details. Here we only present the results of the decomposition of the trajectory of the Gini coefficient from primary to disposable income inequality for groups of countries. We clustered all countries to be a representative for Anglo-Saxon countries, Continental European countries, Nordic countries, according to Esping-Anderson types of welfare states (Esping-Andersen and Myles, 2009; Arts and Gelissen, 2002; Bonoli, 1997; Ferrera, 1996). Anglo-Saxon countries have low social expenditure as a percentage of GDP and low contributions as a percentage of social expenditure. Interventions from government are limited in the free market and the influence of wage negotiation is rather weak, comparing with e.g. European countries. These countries have high social expenditures and high contributions; social insurance systems are mainly financed by income taxes. Social transfers are generous as a rule. Nordic countries have high social expenditures and low contributions. High income taxes are combined with high social transfers and public investment. Southern European countries have low social expenditures and high contributions. Their developments of economic systems are similar to continental European countries (social market economy model), while their welfare states are a bit more similar to Anglo-Saxon countries.

Table 6 presents the results of the decomposition of income inequality and the redistributive effect of several social transfers and taxes and contributions for 36 LIS countries around 2004. Some benefits or taxes do not have any redistributive effect. The meaning of this is twofold. First, such a benefit scheme does not exist in a specific country and/or data is not available in LIS (represented as '-'). Second, such a program exist, but does not have a redistributive effect, because the social expenditures of this program is rather low or the program is distributed equally among the population (noted as 0%).

**Table 6 Decomposition of income inequality and redistributive effect of social transfers and taxes around 2004**

	(a) Gini pri	(b) Gini dipi	Overall redistribution (a-b)	Partial effects (shares)														
				Transfers	Sickness benefits	Occupational injury and disease benefits	Disability benefits	State old-age and survivors benefits	Child/family benefits	Unemployment compensation benefits	Maternity and other family leave benefits	Military/veterans/war benefits	Other social insurance benefits	Social assistance cash benefits	Near-cash benefits	Taxes	Mandatory payroll taxes	Income taxes
<b>panel a: LIS Anglo-Saxon countries</b>																		
Australia	0.461	0.312	0.149	69%	0%	1%	8%	22%	13%	5%	8%	5%	5%	0%	-	31%	-	31%
Canada	0.433	0.318	0.114	68%	-	3%	-	33%	10%	8%	-	-	4%	9%	-	32%	-2%	33%
Ireland	0.490	0.312	0.178	76%	3%	0%	4%	20%	12%	4%	0%	-	1%	28%	5%	24%	2%	22%
UK	0.490	0.345	0.145	86%	0%	0%	12%	27%	6%	0%	0%	0%	2%	24%	15%	14%	3%	11%
USA	0.482	0.372	0.109	63%	-	1%	6%	34%	0%	2%	-	2%	0%	13%	5%	37%	0%	38%
<b>panel b: LIS Continental European countries</b>																		
Austria	0.459	0.269	0.190	82%	1%		7%	57%	11%	5%	-	-	1%	1%	1%	18%	0%	18%
Belgium	0.542	0.279	0.263	76%	1%	0%	2%	58%	5%	8%	0%	-	-	1%	0%	24%	-	
France	0.449	0.281	0.168	91%	2%	-	3%	47%	11%	9%	1%	1%	1%	7%	9%	9%	-	9%
Germany	0.489	0.278	0.210	77%	-	1%	4%	52%	6%	5%	1%	0%	1%	6%	2%	23%	1%	22%
Luxembourg	0.452	0.268	0.184	81%	0%	-	8%	53%	12%	4%	-	-	0%	2%	1%	19%	-	19%
Switzerland	0.395	0.268	0.128	102%	1%	2%	0%	79%	4%	8%	-	0%	1%	8%	0%	-2%	-8%	6%
<b>panel c: LIS Nordic countries</b>																		
Denmark	0.419	0.228	0.191	79%	3%	-	12%	33%	4%	8%	2%	0%	4%	9%	5%	21%	0%	21%
Finland	0.464	0.252	0.212	81%	1%	1%	9%	41%	5%	6%	3%	1%	2%	7%	3%	19%	2%	17%
Netherlands	0.459	0.263	0.196	80%	1%	-	9%	48%	3%	5%	-	-	2%	10%	3%	20%	-	20%
Norway	0.430	0.256	0.174	82%	13%	0%	15%	31%	7%	4%	5%	-	3%	3%	1%	18%	1%	16%
Sweden	0.442	0.237	0.205	84%	5%	1%	10%	38%	4%	8%	4%	-	6%	3%	5%	16%	1%	15%
<b>panel d: LIS Southern European countries</b>																		
Greece	0.462	0.329	0.133	95%	1%	-	5%	82%	3%	3%	-	-	0%	2%	0%	5%	-	5%
Italy	0.503	0.338	0.165	100%	-	1%	4%	83%	3%	2%	-	0%	0%	6%	-		-	
Spain	0.441	0.315	0.126	99%	2%	-	7%	80%	0%	8%	-	-	1%	0%	0%	1%	-	1%
mean LIS-36	0.468	0.328	0.140	85%	2%	1%	9%	46%	7%	5%	3%	1%	2%	7%	3%	15%	1%	15%

**Table 6 Decomposition of income inequality ..... (continued)**

	(a) Gini pri	(b) Gini dipi	Overall redistribution (a-b)	Partial effects (shares)													Taxes	Mandatory payroll taxes	Income taxes
				Transfers	Sickness benefits	Occupational injury and disease benefits	Disability benefits	State old-age and survivors benefits	Child/family benefits	Unemployment compensation benefits	Maternity and other family leave benefits	Military/veterans/war benefits	Other social insurance benefits	Social assistance cash benefits	Near-cash benefits				
<b>panel e: LIS Central Eastern European countries</b>																			
Czech Republic	0.468	0.267	0.201	83%	2%	-	8%	54%	5%	2%	3%	-	2%	5%	1%	17%	4%	13%	
Estonia	0.493	0.340	0.153	79%	0%	-	9%	56%	9%	1%	2%	-	0%	1%	-	21%	1%	20%	
Hungary	0.533	0.289	0.244	100%	1%	0%	14%	62%	7%	2%	6%	-	0%	7%	0%	-	-	-	
Poland	0.527	0.320	0.207	98%	0%	-	21%	61%	7%	3%	1%	-	-	4%	0%	2%	0%	2%	
Romania	0.372	0.277	0.095	85%	0%	-		64%	11%	4%	0%	1%	3%	1%	-	15%	2%	13%	
Slovak Republic	0.425	0.241	0.185	100%	2%	-	1%	70%	12%	8%	4%	-	0%	3%	-	-	-	-	
Slovenia	0.416	0.242	0.174	100%	1%	-	1%	79%	8%	3%	2%	-	2%	3%	0%	-	-	-	
<b>panel f: Other LIS countries</b>																			
Brazil	0.570	0.486	0.084	84%	-	-	-	58%	3%	4%		-	2%	18%	-	16%	2%	13%	
Colombia	0.514	0.508	0.006	111%	-	-	-	111%	-	-		-	-	-	-	-11%	-16%	4%	
Guatemala	0.521	0.507	0.014	17%	-	7%	-	5%	-	-		-	2%	-	3%	83%	8%	75%	
Israel	0.491	0.370	0.121	66%	-	0%	12%	21%	10%	3%		1%	2%	16%	-	34%	2%	32%	
Korea	0.334	0.311	0.023	75%	-	-	-	30%	-	-		-	45%	-	-	25%	3%	23%	
Mexico	0.476	0.458	0.018	100%	-	-	-	41%	-	-		-	19%	40%	-	-	-	-	
Peru	0.512	0.507	0.005	100%	-	-	-	100%	-	0%		-	-	-	-	-	-	-	
Russia	0.562	0.434	0.127	100%	-	-	10%	80%	4%	1%		-	1%	0%	4%	-	-	-	
Taiwan	0.324	0.305	0.019	84%	-	-	-	-7%	-	-		-	40%	51%	-	16%	-19%	35%	
Uruguay	0.542	0.428	0.114	100%	-	0%	-	73%	3%	2%		-	-	21%	-	-	-	-	
mean LIS-36	0.468	0.328	0.140	85%	2%	1%	9%	46%	7%	5%	3%	1%	2%	7%	3%	15%	1%	15%	

Source: own calculations based on LIS

In most countries two dominant income components account for above 50 to 60 percent of total reduction in income inequality: the public old age pensions and the survivors scheme, and the income taxes. Of course, the dominant effect of old age pensions makes sense, since the elderly have in general no income from work. However, cross country differences are huge. For example, in Southern European Countries the public old age benefits account for over 80 percent of total redistribution, while these figures are much lower for Anglo-Saxon Countries (20-34%), for Nordic Countries (31-48%), for Continental European Countries (47-57%) with the exception for Switzerland (79%), and for Central Eastern European Countries (54-70%) with the exception for Slovenia (79%).

In Anglo-Saxon Countries income taxes play a major role (above 30%) compare to other countries (with the exception the United Kingdom). The United States is a special case, because the income tax contributes for a relatively large part (38%) to the reduction of income inequality between primary and disposable incomes. Their earned income tax credit (EITC) is targeted towards the poor, which makes the US tax system rather progressive. Also the redistributive effect of social assistance in the Anglo-Saxon Countries is relatively high in a comparative setting (9-28%), with Australia as an exception.

Child and family benefits are important in Anglo-Saxon Countries (6-13%), in Continental European Countries (4-12%), and in Central Eastern European Countries (5-12%). In Nordic Countries also a variety of other social programs contribute to the reduction of inequality, especially the disability scheme (9-15%). Remarkably, across countries all other social benefit programs seems to have rather limited redistributive effects, although the unemployment compensation benefits do have some effect too.

The group of other LIS Countries is rather mixed. It is hard to draw a line through the observed decomposed elements of income inequality across these countries. See Table 6.

## 6. Future research

Our analysis on the disentanglement of income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries so far was restricted to one moment in time (Wave VI of LIS). However, LIS data allow us to compare fiscal redistribution across the developed countries over the last three decades. Our approach and the use of LIS data will be of additional value to future researchers after we have created time-series across countries of detailed fiscal redistribution between the 1970s and the mid-2000s. Our Annex 3 offers a data set with a number of measures of fiscal redistribution in the developed countries, drawing upon data from 177 Luxembourg Income Study surveys conducted in 36 countries between 1967 and 2006. In this dataset we have computed several results, namely income inequality before social transfers and taxes, income inequality after social transfers and taxes, the overall redistributive effect, the average size of social transfers as a proportion of households' pre-tax income, a summary index of the degree to which transfers are targeted toward low-income groups, the partial effect of redistribution by several social transfers, and the partial effect of redistribution by several income taxes.<sup>10</sup> Research can employ these data in addressing several important research issues. Among

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<sup>10</sup> Our results are in line with or within narrow bandwidths with results from LIS. LIS Key Figures presents slightly other figures for Gini disposable income for only 15 out of 177 datasets. The results on

the most commonly addressed questions in the empirical literature on the welfare state concerns the sources of variance across countries and over time in the extent and nature of fiscal redistribution. Changes (in the generosity) of welfare states can be linked to (changes in the fiscal redistribution). Best-practice among countries can be identified and analyzed in more detail. In exploring the causes and effects of welfare state redistribution in the developed world, the literature has increasingly moved towards more disaggregated measures of social policy, an enterprise in which the LIS, with its detailed data on taxes and a large number of individual social benefits, offers a rich source of information. LIS data are detailed enough to allow an in depth analysis on programs' size and the extent to which they are targeted toward low-income groups. Is redistribution associated with transfers' overall size or with their target efficiency? Is there, as is often suggested, a tradeoff between the two?

In near future research could focus on households with very low income as well—those in poverty. The budget incidence approach based on LIS data allows us to employ all kind of cross-national analyses.<sup>11</sup> How well is social expenditure targeted to the poor? Moreover, with LIS data on fiscal redistribution we are able to analyze differences in anti-poverty approaches of countries (Europe versus the United States) and/or to judge the effectiveness of poverty reduction by taxes and transfers across countries.

Over time the use of household income survey data in policy analyses increased. Today the capacity to describe and analyze the effects of existing policy and simulate the effects of changes in policy is well-established in most nations with elaborate welfare states. The next step in improving policy analysis can come from moving to a cross-national focus using comparable income surveys on fiscal redistribution in a number of countries. To this end, we are able to assemble a databank of fiscal redistribution that can be used by scholars and policy analysts to study the effects of different kinds of programs on poverty, income adequacy in retirement, and the distribution of financial well-being generally. This project is named Leiden LIS Budget Incidence Database on Fiscal Redistribution Across Countries and is available at [www.hsz.leidenuniv.nl](http://www.hsz.leidenuniv.nl).

## 7. Conclusion

In this paper, we have investigated income distribution and redistributive effect attributed to social transfers and taxes across 36 countries around 2004, based on the micro household income data from LIS. We have provided primary and disposable income inequality, total and disaggregated redistributions in a comparative way, across much more countries than that have been studied before, offering an accurate, detailed picture of redistribution of incomes through taxes and transfers across social welfare states.

Different social policies bring different types of welfare systems, leading to various outcomes in the income distribution. Among all LIS countries listed in this paper, Denmark and Sweden have the smallest income disparity, while Peru and Colombia have the largest. Nordic countries show the most equally distributed disposable incomes and primary incomes, comparing to the countries

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redistribution are in line with Jesuit and Mahler (2004), and Mahler and Jesuit (2006). See our downloadable Leiden LIS Budget Incidence Fiscal Redistribution Dataset.

11 In line with our earlier work. See Caminada and Goudswaard (2009 and 2010); Caminada et al (2011) and Caminada and Martin (2011).

in other kinds of welfare states. On average, large primary income disparity exists in Anglo-Saxon countries. Generally speaking, European countries achieve lower levels of income inequality than other countries.

With respect to redistributive effect, our budget incidence analysis indicates that the pattern is diverse across countries. The largest redistribution is found for Belgium, while Colombia and Peru show rather limited overall redistributive effects. On average transfers reduce income inequality by over 85 percent, while taxes account for 15 percent of redistribution. Tax systems in Switzerland and Colombia are regressive. Transfers still play a dominant role in most countries in reducing initial income disparities. Among all welfare states, Continental European countries (Belgium, France, Germany, Luxembourg and the Netherlands) achieve the highest level of the reduction of initial income inequality.

Mahler and Jesuit (2006) divided government redistribution only into three general components (from unemployment benefits, from pensions, and from taxes) and applied their analysis to 13 countries. We update and extent their analyses by taking into account many more benefits and taxes, and we have applied a budget incidence analysis to all 36 LIS countries with the most recent LIS data (around 2004). As far as social programs is concerned, in most countries two dominant income components account for above 50 to 60 percent of total reduction in income inequality: the public old age pensions and the survivors scheme, and the income taxes. For example, in Southern European Countries the public old age benefits account for over 80 percent of total redistribution, while these figures are much lower for Anglo-Saxon Countries (20-34%), for Nordic Countries (31-48%), for Continental European Countries (47-57%), and for Central Eastern European Countries (54-70%). In Anglo-Saxon Countries income taxes play a major role (above 30%) compare to other countries (with the exception the United kingdom). Also the redistributive effect of social assistance and child and family benefits in the Anglo-Saxon Countries are relatively high in a comparative setting (9-28%). In Nordic Countries also a variety of other social programs contribute to the reduction of inequality, especially the disability scheme (9-15%). Remarkably, across countries all other social benefit programs seem to have rather limited redistributive effects, although the unemployment compensation benefits do have some effect too.

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## Annex 1: LIS Household Income Components List

Luxembourg Income Study contains information for a large number of countries for one or more than one year of data from wave I (the earliest year is in 1967) to wave VI (the latest year is in 2006). LIS contains information of income microdata in LIS database, wealth microdata in LWS database and country-level poverty and inequality indicators in LIS Key Figures. Research on income distribution across countries attracted many attentions, with the rapid development of comparable data from LIS. As a “public good”, the LIS project is funded on a continuing basis by its member countries’ national science foundations and social science research foundations (Smeeding, 2008). LIS database contains variables both at a household level and at a personal level, in which personal files also include labor market variables. This paper focuses on income information at the household level.

Below we provide the household income components list, by variable name and meaning. More specific explanation of the data can be found in the user-friendly LIS website (<http://www.lisdatacenter.org/>). In Table A3 household income is divided into 8 parts: wages and salaries, self-employment income, property income, occupational and private pensions, social security cash benefits, private transfers, other cash income and income tax (and employee social security contributions). In each part, there are more specific income sources, which is very helpful for studies focusing on different elements of income. For instance, v4 and v5 show self-employment income; v16 – v26 report social security cash benefits; v7, v11 and v13 provide income taxes and mandatory payroll taxes. There are also four kinds of widely used income definitions: factor income, market income, gross income and disposable income. Table A2 provides household aggregated income sources. Using those aggregated variables, it is more convenient to process and present income distribution results.

In this paper we compute five kinds of results, namely income inequality before social transfers and taxes, income inequality after social transfers and taxes, the overall redistributive effect, the partial effect of redistribution by several social transfers and the partial effect of redistribution by several income taxes (see for a specification in Table A2). In calculating pre-government income inequality, we use primary income, which consists of market income (mi), Alimony/child support (v34), regular private transfers (v35) and other cash income (v36); in calculating post-government income, we use net disposable income (dpi). In order to obtain redistributive effect, besides the variables mentioned above, we use total social transfers (SOCTRANS), mandatory payroll taxes (PAYROLL) and income taxes (v11). For some countries (Belgium, France, Greece, Hungary, Italy, Mexico, Peru, Russia, Spain, Uruguay), we use net wages and salaries (v1net) instead of gross wages and salaries (v1) as a component of market income (v1+v4+v5+v8+v32+v33), due to v1 is not available in the dataset. In addition, we use the number of persons in a household (D4) and household weight (HWEIGHT) in LIS dataset so as to obtain equalised income and weighted results.

**Table A1 LIS income distribution indicator list**

Income Distribution Indicator	Redistribution Measurement	Specific Income Source
Gini (pri)		Primary Income (V1+V4+V5+V8+V32+V33+V34+V35+V36)
Transfers Redistribution	Gini (pri)-Gini (pri+trans)	
Gini (pri+trans)		Primary Income + social transfers (V1+V4+V5+V8+V32+V33+V34+V35+V36+V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26)
Taxes Redistribution	Gini (pri+trans)-Gini (dpi)	
Gini (dpi)		Net disposable Income (V1+V4+V5+V8+V32+V33+V34+V35+V36+V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26-V7+V13-V11)
Overall Redistribution	Gini (pri)-Gini (dpi)	

Source: LIS (2011)



**Table A2 Household income variables in LIS dataset**

<i>Wages and salaries</i>	V1/V1NET	<i>Gross wages and salaries / Net wages and salaries</i>	<b>V1 / V1NET</b>	
<i>Self-employment income</i>	V4	<i>Farm self-employment income</i>	<b>V4</b>	
	V5	<i>Non-farm self-employment income</i>	<b>V5</b>	
<i>Income tax and employee social security contributions</i>	V7	<i>Mandatory contributions for self-employment</i>	<b>V7 + V13</b> <i>Mandatory payroll taxes</i>	
	V13	<i>Mandatory employee contributions</i>		
	V11	<i>Income taxes</i>	<b>V11</b>	
<i>Property income</i>	V8S1	<i>Interest and dividends</i>	<b>V8</b> <i>Cash property income</i>	
	V8S2	<i>Rental income</i>		
	V8S3	<i>Private savings plans</i>		
	V8S4	<i>Royalties</i>		
	V8SR	<i>Cash property income n.e.c.</i>		
<i>Social security cash benefits</i>	V16	<i>Sickness benefits</i>	<b>V16</b>	
	V17S1	<i>Short-term occupational injury and disease benefits</i>	<b>V17</b> <i>Occupational injury and disease benefits</i>	
	V17S2	<i>Long-term occupational injury and disease benefits</i>		
	V17SR	<i>Occupational injury and disease benefits n.e.c.</i>		
	V18S1	<i>Disability pensions</i>	<b>V18</b> <i>Disability benefits</i>	
	V18S2	<i>Disability allowances</i>		
	V18SR	<i>Disability benefits n.e.c.</i>		
	V19S1a	<i>Universal old-age pensions</i>	<b>V19S1</b> <i>Old-age pensions</i>	<b>V19</b> <i>State old-age and survivors benefits</i>
	V19S1b	<i>Employment-related old-age pensions</i>		
	V19S1c	<i>Old-age pensions for public sector employees</i>		
	V19S1r	<i>Old-age pensions n.e.c.</i>		
	V19S3	<i>Early retirement benefits</i>		
	V19S4	<i>Survivors pensions</i>		
	V19SR	<i>State old-age and survivors benefits n.e.c.</i>		
	V20S1	<i>Child allowances</i>	<b>V20</b> <i>Child/family benefits</i>	
	V20S2	<i>Advance maintenance</i>		
	V20S3	<i>Orphans allowances</i>		
	V20SR	<i>Child/family benefits n.e.c.</i>		
	V21S1	<i>Unemployment insurance benefits</i>	<b>V21</b> <i>Unemployment compensation benefits</i>	
	V21S2	<i>(Re)training allowances</i>		
	V21S3	<i>Placement/resettlement benefits</i>		
	V21SR	<i>Unemployment compensation benefits n.e.c.</i>		
	V22S1	<i>Wage replacement</i>	<b>V22</b> <i>Maternity and other family leave benefits</i>	
	V22S2	<i>Birth grants</i>		
	V22S3	<i>Child care leave benefits</i>		
	V22SR	<i>Maternity and other family leave benefits n.e.c.</i>		
	V23	<i>Military/veterans/war benefits</i>	<b>V23</b>	
	V24S1	<i>Invalid carer benefits</i>	<b>V24</b> <i>Other social insurance benefits</i>	
	V24S2	<i>Education benefits</i>		
	V24S3	<i>Child care cash benefits</i>		
V24SR	<i>Other social insurance benefits n.e.c.</i>			
V25S1	<i>General social assistance benefits</i>	<b>V25</b> <i>Social assistance cash benefits</i>		
V25S2	<i>Old-age and disability assistance benefits</i>			
V25S3	<i>Unemployment assistance benefits</i>			

	V25S4	Parents assistance benefits	
	V25SR	Social assistance cash benefits n.e.c.	
	V26S1	Near-cash food benefits	<b>V26</b> Near-cash benefits
	V26S2	Near-cash housing benefits	
	V26S3	Near-cash medical benefits	
	V26S4	Near-cash heating benefits	
	V26S5	Near-cash education benefits	
	V26S6	Near-cash child care benefits	
	V26SR	Near-cash benefits n.e.c.	
Occupational and private pensions	V32S1a	Mandatory occupational pensions	
	V32S1b	Voluntary occupational pensions	
	V32S1r	Occupational pensions n.e.c.	
	V32S2	Mandatory individual retirement pensions	<b>V32</b> Private occupational and other pensions
	V32SR	Private occupational and other pensions n.e.c.	
	V33	Public sector occupational pensions	<b>V33</b>
Private transfers	V34	Alimony/child support	<b>V34</b>
	V35S1	Regular transfers from relatives	<b>V35</b> Regular private transfers
	V35S2	Regular transfers from private charity	
	V35SR	Regular private transfers n.e.c.	
Other cash income	V36	Other cash income	<b>V36</b>

Source: LIS (2011)

**Table A3 Household aggregated income variables in LIS dataset**

<b>SELFI</b>	<b>Self-employment income</b> V4 + V5
<b>EARNING</b>	<b>Earnings</b> V1 + SELFI (V4+V5)
<b>EARNNET</b>	<b>Net earnings</b> V1NET + SELFI (V4+V5)
<b>FI</b>	<b>Factor income</b> EARNING (V1+V4+V5) + V8
<b>FINET</b>	<b>Net factor income</b> EARNNET (V1NET+V4+V5) + V8
<b>PENSIOI</b>	<b>Occupational pensions</b> V32 + V33
<b>MI</b>	<b>Market income</b> FI (V1+V4+V5+V8) + PENSIOI (V32+V33)
<b>MINET</b>	<b>Net market income</b> FINET (V1NET+V4+V5+V8) + PENSIOI (V32+V33)
<b>OTHSOCI</b>	<b>Social insurance transfers excl V19-V21</b> V16 + V17 + V18 + V22 + V23 + V24
<b>SOCI</b>	<b>Social insurance transfers</b> OTHSOCI (V16+V17+V18+V22+V23+V24) + V19 + V20 + V21
<b>MEANSI</b>	<b>Social assistance transfers</b> V25 + V26
<b>SOCTRANS</b>	<b>Social transfers</b> SOCI (V16+V17+V18+V19+V20+V21+V22+V23+V24) + MEANSI (V25+V26)
<b>PRIVATI</b>	<b>Private transfers</b> V34 + V35
<b>TRANSI</b>	<b>Transfer income</b> SOCTRANS (V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26) + PRIVATI (V34+V35)
<b>GI</b>	<b>Gross income</b> MI (V1+V4+V5+V8+V32+V33) + TRANSI (V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26+V34+V35) + V36
<b>GINET</b>	<b>Net income</b> MINET (V1NET+V4+V5+V8+V32+V33) + TRANSI (V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26+V34+V35) + V36
<b>PAYROLL</b>	<b>Mandatory payroll taxes</b> V7 + V13
<b>DPI</b>	<b>Net disposable income</b> GI (V1+V4+V5+V8+V16+V17+V18+V19+V20+V21+V22+V23+V24+V25+V26+V32+V33+V34+V35+V36) - PAYROLL (V7+V13) - V11

Source: LIS (2011)

**Annex 2: Decomposition of income inequality and redistributive effect of social transfers and taxes in 36 LIS countries around 2004**

	<b>Australia 2003</b>		<b>Austria 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.461		0.459	
(b) Gini disposable income	0.312		0.269	
Overall redistribution (a-b)	0.149		0.190	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.000	0%	0.001	1%
Occupational injury and disease benefits	0.002	1%	-	-
Disability benefits	0.012	8%	0.013	7%
State old-age and survivors benefits	0.033	22%	0.112	57%
Child/family benefits	0.020	13%	0.022	11%
Unemployment compensation benefits	0.008	5%	0.010	5%
Maternity and other family leave benefits	0.013	8%	-	-
Military/veterans/war benefits	0.008	5%	-	-
Other social insurance benefits	0.008	5%	0.001	1%
Social assistance cash benefits	0.000	0%	0.001	1%
Near-cash benefits	-	-	0.001	1%
Mandatory payroll taxes	-	-	-	-
Income taxes	0.047	31%	0.034	18%
Other <sup>a</sup>	0.002		0.006	
Overall redistribution	0.151	100%	0.196	100%

	<b>Belgium 2000</b>		<b>Brazil 2006</b>	
	Gini		Gini	
(a) Gini primary income	0.542		0.570	
(b) Gini disposable income	0.279		0.486	
Overall redistribution (a-b)	0.263		0.084	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.003	1%	-	-
Occupational injury and disease benefits	0.001	0%	-	-
Disability benefits	0.006	2%	-	-
State old-age and survivors benefits	0.156	58%	0.050	58%
Child/family benefits	0.013	5%	0.002	3%
Unemployment compensation benefits	0.022	8%	0.004	4%
Maternity and other family leave benefits	0.001	0%	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	-	-	0.002	2%
Social assistance cash benefits	0.004	1%	0.016	18%
Near-cash benefits	0.001	0%	-	-
Mandatory payroll taxes	0.063	24%	0.002	2%
Income taxes			0.011	13%
Other <sup>a</sup>	0.005		0.003	
Overall redistribution	0.268	100%	0.086	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

**Annex 2: continued**

	<b>Canada 2004</b>		<b>Colombia 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.433		0.514	
(b) Gini disposable income	0.318		0.508	
Overall redistribution (a-b)	0.114		0.006	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	-	-
Occupational injury and disease benefits	0.004	3%	-	-
Disability benefits	-	-	-	-
State old-age and survivors benefits	0.038	33%	0.006	111%
Child/family benefits	0.012	10%	-	-
Unemployment compensation benefits	0.009	8%	-	-
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.005	4%	-	-
Social assistance cash benefits	0.011	9%	-	-
Near-cash benefits	-	-	-	-
Mandatory payroll taxes	-0.002	-2%	-0.001	-16%
Income taxes	0.039	33%	0.000	4%
Other <sup>a</sup>	0.002		0.000	
Overall redistribution	0.116	100%	0.006	100%
	<b>Czech Republic 2004</b>		<b>Denmark 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.468		0.419	
(b) Gini disposable income	0.267		0.228	
Overall redistribution (a-b)	0.201		0.191	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.005	2%	0.007	3%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	0.017	8%	0.024	12%
State old-age and survivors benefits	0.112	54%	0.066	33%
Child/family benefits	0.009	5%	0.008	4%
Unemployment compensation benefits	0.005	2%	0.015	8%
Maternity and other family leave benefits	0.006	3%	0.003	2%
Military/veterans/war benefits	-	-	0.000	0%
Other social insurance benefits	0.003	2%	0.008	4%
Social assistance cash benefits	0.011	5%	0.017	9%
Near-cash benefits	0.002	1%	0.010	5%
Mandatory payroll taxes	0.008	4%	0.000	0%
Income taxes	0.027	13%	0.041	21%
Other <sup>a</sup>	0.005		0.009	
Overall redistribution	0.206	100%	0.200	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

**Annex 2: continued**

	<b>Estonia 2004</b>		<b>Finland 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.493		0.464	
(b) Gini disposable income	0.340		0.252	
Overall redistribution (a-b)	0.153		0.212	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.001	0%	0.003	1%
Occupational injury and disease benefits	-	-	0.003	1%
Disability benefits	0.015	9%	0.021	9%
State old-age and survivors benefits	0.089	56%	0.092	41%
Child/family benefits	0.015	9%	0.011	5%
Unemployment compensation benefits	0.001	1%	0.014	6%
Maternity and other family leave benefits	0.003	2%	0.008	3%
Military/veterans/war benefits	-	-	0.002	1%
Other social insurance benefits	0.000	0%	0.004	2%
Social assistance cash benefits	0.002	1%	0.016	7%
Near-cash benefits	-	-	0.007	3%
Mandatory payroll taxes	0.002	1%	0.004	2%
Income taxes	0.031	20%	0.038	17%
Other <sup>a</sup>	0.004		0.010	
Overall redistribution	0.158	100%	0.222	100%
	<b>France 2005</b>		<b>Germany 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.449		0.489	
(b) Gini disposable income	0.281		0.278	
Overall redistribution (a-b)	0.168		0.210	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.003	2%	-	-
Occupational injury and disease benefits	-	-	0.001	1%
Disability benefits	0.006	3%	0.009	4%
State old-age and survivors benefits	0.084	47%	0.111	52%
Child/family benefits	0.019	11%	0.014	6%
Unemployment compensation benefits	0.016	9%	0.010	5%
Maternity and other family leave benefits	0.002	1%	0.002	1%
Military/veterans/war benefits	0.001	1%	0.001	0%
Other social insurance benefits	0.002	1%	0.002	1%
Social assistance cash benefits	0.012	7%	0.012	6%
Near-cash benefits	0.016	9%	0.005	2%
Mandatory payroll taxes	-	-	0.002	1%
Income taxes	0.017	9%	0.047	22%
Other <sup>a</sup>	0.011		0.003	
Overall redistribution	0.179	100%	0.214	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

## Annex 2: continued

	Greece 2004		Guatemala 2006	
	Gini		Gini	
(a) Gini primary income	0.462		0.521	
(b) Gini disposable income	0.329		0.507	
Overall redistribution (a-b)	0.133		0.014	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.001	1%	-	-
Occupational injury and disease benefits	-	-	0.001	7%
Disability benefits	0.006	5%	-	-
State old-age and survivors benefits	0.113	82%	0.001	5%
Child/family benefits	0.003	3%	-	-
Unemployment compensation benefits	0.004	3%	-	-
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.000	0%	0.000	2%
Social assistance cash benefits	0.003	2%	-	-
Near-cash benefits	0.000	0%	0.000	3%
Mandatory payroll taxes	-	-	0.001	8%
Income taxes	0.007	5%	0.011	75%
Other <sup>a</sup>	0.004		0.000	
Overall redistribution	0.137	100%	0.014	100%
	Hungary 2005		Ireland 2004	
	Gini		Gini	
(a) Gini primary income	0.533		0.490	
(b) Gini disposable income	0.289		0.312	
Overall redistribution (a-b)	0.244		0.178	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.002	1%	0.005	3%
Occupational injury and disease benefits	0.001	0%	0.000	0%
Disability benefits	0.039	14%	0.007	4%
State old-age and survivors benefits	0.165	62%	0.036	20%
Child/family benefits	0.018	7%	0.021	12%
Unemployment compensation benefits	0.006	2%	0.007	4%
Maternity and other family leave benefits	0.017	6%	0.000	0%
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.001	0%	0.002	1%
Social assistance cash benefits	0.019	7%	0.052	28%
Near-cash benefits	0.001	0%	0.008	5%
Mandatory payroll taxes	-	-	0.004	2%
Income taxes	-	-	0.041	22%
Other <sup>a</sup>	0.023		0.007	
Overall redistribution	0.268	100%	0.185	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

**Annex 2: continued**

	<b>Israel 2005</b>		<b>Italy 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.491		0.503	
(b) Gini disposable income	0.370		0.338	
Overall redistribution (a-b)	0.121		0.165	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	-	-
Occupational injury and disease benefits	0.001	0%	0.002	1%
Disability benefits	0.015	12%	0.007	4%
State old-age and survivors benefits	0.025	21%	0.143	83%
Child/family benefits	0.012	10%	0.005	3%
Unemployment compensation benefits	0.003	3%	0.003	2%
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	0.001	1%	0.001	0%
Other social insurance benefits	0.003	2%	0.000	0%
Social assistance cash benefits	0.020	16%	0.011	6%
Near-cash benefits	-	-	-	-
Mandatory payroll taxes	0.002	2%	-	-
Income taxes	0.039	32%	-	-
Other <sup>a</sup>	0.001		0.007	
Overall redistribution	0.122	100%	0.172	100%

	<b>Korea 2006</b>		<b>Luxembourg 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.334		0.452	
(b) Gini disposable income	0.311		0.268	
Overall redistribution (a-b)	0.023		0.184	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	0.001	0%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	-	-	0.016	8%
State old-age and survivors benefits	0.007	30%	0.101	53%
Child/family benefits	-	-	0.022	12%
Unemployment compensation benefits	-	-	0.008	4%
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.010	45%	0.000	0%
Social assistance cash benefits	-	-	0.005	2%
Near-cash benefits	-	-	0.001	1%
Mandatory payroll taxes	0.001	3%	-	-
Income taxes	0.005	23%	0.037	19%
Other <sup>a</sup>	0.000		0.006	
Overall redistribution	0.023	100%	0.190	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

## Annex 2: continued

	Mexico 2004		Netherlands 2004	
	Gini		Gini	
(a) Gini primary income	0.476		0.459	
(b) Gini disposable income	0.458		0.263	
Overall redistribution (a-b)	0.018		0.196	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	0.002	1%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	-	-	0.018	9%
State old-age and survivors benefits	0.008	41%	0.098	48%
Child/family benefits	-	-	0.006	3%
Unemployment compensation benefits	-	-	0.010	5%
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.003	19%	0.003	2%
Social assistance cash benefits	0.008	40%	0.020	10%
Near-cash benefits	-	-	0.006	3%
Mandatory payroll taxes	-	-	-	-
Income taxes	-	-	0.040	20%
Other <sup>a</sup>	0.001	-	0.008	-
Overall redistribution	0.019	100%	0.203	100%
	Norway 2004		Peru 2004	
	Gini		Gini	
(a) Gini primary income	0.430		0.512	
(b) Gini disposable income	0.256		0.507	
Overall redistribution (a-b)	0.174		0.005	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.024	13%	-	-
Occupational injury and disease benefits	0.000	0%	-	-
Disability benefits	0.028	15%	-	-
State old-age and survivors benefits	0.056	31%	0.005	100%
Child/family benefits	0.012	7%	-	-
Unemployment compensation benefits	0.007	4%	0.000	0%
Maternity and other family leave benefits	0.009	5%	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.005	3%	-	-
Social assistance cash benefits	0.006	3%	-	-
Near-cash benefits	0.002	1%	-	-
Mandatory payroll taxes	0.003	1%	-	-
Income taxes	0.030	16%	-	-
Other <sup>a</sup>	0.007	-	0.000	-
Overall redistribution	0.181	100%	0.005	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.



## Annex 2: continued

	Poland 2004		Romania 1997	
	Gini		Gini	
(a) Gini primary income	0.527		0.372	
(b) Gini disposable income	0.320		0.277	
Overall redistribution (a-b)	0.207		0.095	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.001	0%	0.000	0%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	0.048	21%	-	-
State old-age and survivors benefits	0.138	61%	0.063	64%
Child/family benefits	0.015	7%	0.011	11%
Unemployment compensation benefits	0.007	3%	0.004	4%
Maternity and other family leave benefits	0.002	1%	0.000	0%
Military/veterans/war benefits	-	-	0.001	1%
Other social insurance benefits	-	-	0.003	3%
Social assistance cash benefits	0.009	4%	0.001	1%
Near-cash benefits	0.000	0%	-	-
Mandatory payroll taxes	-	-	0.002	2%
Income taxes	0.005	2%	0.013	13%
Other <sup>a</sup>	0.018		0.003	
Overall redistribution	0.225	100%	0.098	100%
	Russia 2000		Slovak Republic 1996	
	Gini		Gini	
(a) Gini primary income	0.562		0.425	
(b) Gini disposable income	0.434		0.241	
Overall redistribution (a-b)	0.127		0.185	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	0.003	2%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	0.013	10%	0.002	1%
State old-age and survivors benefits	0.107	80%	0.136	70%
Child/family benefits	0.006	4%	0.024	12%
Unemployment compensation benefits	0.001	1%	0.015	8%
Maternity and other family leave benefits	-	-	0.009	4%
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.001	1%	0.001	0%
Social assistance cash benefits	0.000	0%	0.005	3%
Near-cash benefits	0.005	4%	-	-
Mandatory payroll taxes	-	-	-	-
Income taxes	-	-	-	-
Other <sup>a</sup>	0.006		0.011	
Overall redistribution	0.134	100%	0.196	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

## Annex 2: continued

	Slovenia 2004		Spain 2004	
	Gini		Gini	
(a) Gini primary income	0.416		0.441	
(b) Gini disposable income	0.242		0.315	
Overall redistribution (a-b)	0.174		0.126	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.002	1%	0.003	2%
Occupational injury and disease benefits	-	-	-	-
Disability benefits	0.001	1%	0.009	7%
State old-age and survivors benefits	0.143	79%	0.105	80%
Child/family benefits	0.015	8%	0.001	0%
Unemployment compensation benefits	0.006	3%	0.011	8%
Maternity and other family leave benefits	0.004	2%	-	-
Military/veterans/war benefits	-	-	-	-
Other social insurance benefits	0.004	2%	0.001	1%
Social assistance cash benefits	0.005	3%	0.000	0%
Near-cash benefits	0.000	0%	0.000	0%
Mandatory payroll taxes	-	-	-	-
Income taxes	-	-	0.001	1%
Other <sup>a</sup>	0.006		0.005	
Overall redistribution	0.180	100%	0.131	100%
	Sweden 2005		Switzerland 2004	
	Gini		Gini	
(a) Gini primary income	0.442		0.395	
(b) Gini disposable income	0.237		0.268	
Overall redistribution (a-b)	0.205		0.128	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	0.012	5%	0.002	1%
Occupational injury and disease benefits	0.002	1%	0.002	2%
Disability benefits	0.022	10%	0.000	0%
State old-age and survivors benefits	0.082	38%	0.103	79%
Child/family benefits	0.009	4%	0.006	4%
Unemployment compensation benefits	0.017	8%	0.010	8%
Maternity and other family leave benefits	0.009	4%	-	-
Military/veterans/war benefits	-	-	0.000	0%
Other social insurance benefits	0.013	6%	0.001	1%
Social assistance cash benefits	0.008	3%	0.010	8%
Near-cash benefits	0.010	5%	0.000	0%
Mandatory payroll taxes	0.001	1%	-0.011	-8%
Income taxes	0.033	15%	0.008	6%
Other <sup>a</sup>	0.013		0.003	
Overall redistribution	0.218	100%	0.131	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

**Annex 2: continued**

	<b>Taiwan 2005</b>		<b>United Kingdom 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.324		0.490	
(b) Gini disposable income	0.305		0.345	
Overall redistribution (a-b)	0.019		0.145	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	0.000	0%
Occupational injury and disease benefits	-	-	0.001	0%
Disability benefits	-	-	0.018	12%
State old-age and survivors benefits	-0.001	-7%	0.041	27%
Child/family benefits	-	-	0.009	6%
Unemployment compensation benefits	-	-	0.000	0%
Maternity and other family leave benefits	-	-	0.000	0%
Military/veterans/war benefits	-	-	0.001	0%
Other social insurance benefits	0.008	40%	0.003	2%
Social assistance cash benefits	0.010	51%	0.036	24%
Near-cash benefits	-	-	0.023	15%
Mandatory payroll taxes	-0.004	-19%	0.004	3%
Income taxes	0.007	35%	0.016	11%
Other <sup>a</sup>	0.001		0.008	
Overall redistribution	0.020	100%	0.154	100%
	<b>United States 2004</b>		<b>Uruguay 2004</b>	
	Gini		Gini	
(a) Gini primary income	0.482		0.542	
(b) Gini disposable income	0.372		0.428	
Overall redistribution (a-b)	0.109		0.114	
<i>Partial effects</i>		<i>Share<sup>a</sup></i>		<i>Share<sup>a</sup></i>
Sickness benefits	-	-	-	-
Occupational injury and disease benefits	0.001	1%	0.000	0%
Disability benefits	0.007	6%	-	-
State old-age and survivors benefits	0.037	34%	0.091	73%
Child/family benefits	0.000	0%	0.004	3%
Unemployment compensation benefits	0.002	2%	0.002	2%
Maternity and other family leave benefits	-	-	-	-
Military/veterans/war benefits	0.002	2%	-	-
Other social insurance benefits	0.000	0%	-	-
Social assistance cash benefits	0.014	13%	0.027	21%
Near-cash benefits	0.005	5%	-	-
Mandatory payroll taxes	0.000	0%	-	-
Income taxes	0.041	38%	-	-
Other <sup>a</sup>	0.000		0.011	
Overall redistribution	0.109	100%	0.125	100%

a Including ordering effect. The partial redistributive effect of a specific social transfer will be highest (smallest) when computed as the first (last) social program. The partial effects of these transfers in total redistribution could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution, and every direct tax as the first tax to be subtracted from gross income. In that case, the sum of all partial redistributive effects amount (a little) over 100 percent. We rescaled the redistributive effects of each program by applying an adjustment factor, which is defined as the overall redistribution given by formula (4) (100%) divided by sum of all partial redistributive effects of all programs (over 100%), in order to correct for an over-estimated effect.

Source: LIS (2011), and own calculations.

### **Annex 3 Budget Incidence Fiscal Redistribution Dataset – LIS Waves I – VI, 1970-2006**

#### **Aim**

Leiden Budget Incidence Fiscal Redistribution Dataset presents the disentanglement of income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries for the period 1970-2006 (Waves I - Wave VI of LIS). This dataset allow researchers and public policy analysts to compare fiscal redistribution across developed countries over the last three decades. Research may employ these data in addressing several important research issues. Among the most commonly addressed questions in the empirical literature on the welfare state concerns the sources of variance across countries and over time in the extent and nature of fiscal redistribution. Changes (in the generosity) of welfare states can be linked to (changes in the fiscal redistribution). Best-practice among countries can be identified and analyzed in more detail. In exploring the causes and effects of welfare state redistribution in the developed world, the literature has increasingly moved towards more disaggregated measures of social policy, an enterprise in which the Leiden Budget Incidence Fiscal Redistribution Dataset, with its detailed data on taxes and a large number of individual social benefits, offers a rich source of information. Research could focus on households with very low income as well—those in poverty. The budget incidence approach based on LIS data allow researchers to employ all kind of cross-national analyses. How well is social expenditure targeted to the poor? Moreover, with LIS data on fiscal redistribution research is able to analyze differences in anti-poverty approaches of countries (Europe versus the United States) and/or to judge the effectiveness of poverty reduction by taxes and transfers across countries.

The assembled databank of fiscal redistribution can be used by scholars and policy analysts to study the effects of different kind of programs on poverty, income adequacy in retirement, and the distribution of economic well-being generally.

#### **Origin of the idea**

The original database on Fiscal Redistribution based on LIS date was initiated by Jesuit and Mahler in 2004 ([LIS Working Paper #392](#)). Leiden Budget Incidence Fiscal Redistribution Dataset refines, updates and extent their Fiscal Redistribution approach. LIS data allowed us to decompose the trajectory of the Gini coefficient from primary to disposable income inequality in several parts: the dataset distinguish 11 different benefits and several income taxes and social contributions across countries.

Jesuit and Mahler divided overall government redistribution only into 3 components: the redistributive effects from unemployment benefits, from pensions, and from taxes. They applied their empirical exercise for 13 countries with LIS-data around the years 1999/2000. The launch of Leiden Budget Incidence Fiscal Redistribution Dataset covers many more benefits and taxes, is applied to a much wider range of 36 countries using the most recent LIS data available.

	LIS Fiscal Redistribution Dataset	Leiden Budget Incidence Fiscal Redistribution Dataset
Assembled Launch / Year	Jesuit & Mahler August 2005 -- updated July 2006	Wang & Caminada August 2011
Last update	February 2008	August 2011
# Countries	13	36
Countries	Australia, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States	Australia, Austria, Belgium, Brazil, Canada, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Guatemala, Hungary, Ireland, Israel, Italy, Korea, Luxembourg, Mexico, Netherlands, Norway, Peru, Poland, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom, United States, and Uruguay.
# LIS Waves	I, II, III, IV and V	I, II, III, IV, V and VI
Time-series	1979-2002	1979-2006
# LIS Datasets	59	177
Redistribution from	Unemployment benefits Pensions Direct taxes	Sickness benefits (v16) Occupational injury and disease benefits (v17) Disability benefits (v18) State old-age and survivors benefits (v19) Child/family benefits (v20) Unemployment compensation benefits (v21) Maternity and other family leave benefits (v22) Military/veterans/war benefits (v23) Other social insurance benefits (v24) Social assistance cash benefits (v25) Near-cash benefits (v26) Mandatory payroll taxes (v7+v13) Income taxes (v11)
LIS Working Paper Availability	<a href="http://www.lisdatacenter.org/resources/other-databases/">LIS Working Paper #392</a> <a href="http://www.lisdatacenter.org/resources/other-databases/">http://www.lisdatacenter.org/resources/other-databases/</a>	LIS Working Paper (forthcoming) <a href="http://www.hsz.leidenuniv.nl">www.hsz.leidenuniv.nl</a>
Reference	V.A. Mahler and D.K. Jesuit, 'Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study', <i>Socio-Economic Review</i> 4 (2006): 483-511.	Chen Wang and Koen Caminada, 'Disentangling income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries', <i>Leiden Department of Economics Research Memorandum</i> #2011.02.

## Dataset

This data set offers a number of measures of fiscal redistribution in the developed countries, drawing upon data from 177 Luxembourg Income Study surveys conducted in 36 countries between 1967 and 2006. In this dataset we have computed five kinds of results, namely income inequality before social transfers and taxes, income inequality after social transfers and taxes, the overall redistributive effect, the partial effect of redistribution by several social transfers and the partial effect of redistribution by several income taxes (see for a specification below). Specifically, we have computed:

- 1) A measure of overall fiscal redistribution, as reflected in the difference between the Gini indexes of pre-tax-transfer primary income and post-tax-transfer disposable income. We offer measures of both absolute fiscal redistribution ( $Gini_{pri} - Gini_{dpi}$ ) and relative fiscal redistribution ( $(Gini_{pri} - Gini_{dpi}) / Gini_{pri}$ ).  
[Table A1 in Excel Spreadsheet]
- 2) The shares of absolute and relative fiscal redistribution resulting from direct taxes and social transfers.  
[Table A2 in Excel Spreadsheet]
- 3) The average size of social transfers as a proportion of households' pre-tax income, and a summary index of the degree to which transfers are targeted toward low-income groups. Our measure ranges from -1.0 (the poorest recipient receives all transfer income) to +1.0 (the richest recipient receives all transfer income).  
[Table A3 in Excel Spreadsheet]
- 4) A measure of the extent of fiscal redistribution that is associated with several taxes and transfers (codes refer to LIS Household Income Components List; see Annex A below):
  - Sickness benefits (v16)
  - Occupational injury and disease benefits (v17)
  - Disability benefits (v18)
  - State old-age and survivors benefits (v19)
  - Child/family benefits (v20)
  - Unemployment compensation benefits (v21)
  - Maternity and other family leave benefits (v22)
  - Military/veterans/war benefits (v23)
  - Other social insurance benefits (v24)
  - Social assistance cash benefits (v25)
  - Near-cash benefits (v26)
  - Mandatory payroll taxes (v7+v13)
  - Income taxes (v11)
 [Table A4 in Excel Spreadsheet]

In measuring income, we have employed an equivalency scale that divides household size by the square root of the number of household members, weighting households by the number of members they include. As to missing data, we have included households which report zero primary income (i.e., all of their income is derived from the state) but have excluded households that report zero disposable income. We have employed standard LIS top- and bottom-coding conventions, top-coding income at 10 times the median of non-equivalized income and bottom-coding income at 1 percent of equivalized mean income.

A description of the decomposition method of Gini coefficient is given in sections 3.2 and 3.3.

### **Availability / Questions / Contact**

Leiden LIS Budget Incidence Fiscal Redistribution Dataset – LIS Waves I – VI, 1970-2006 is posted at the website of Department of Economics homepage at [www.hsz.leidenuniv.nl](http://www.hsz.leidenuniv.nl) or [www.economie.leidenuniv.nl](http://www.economie.leidenuniv.nl).

Any questions about Leiden Budget Incidence Fiscal Redistribution Dataset may be addressed to:

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