LEIDEN LIS BUDGET INCIDENCE FISCAL REDISTRIBUTION DATASET

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Introduction

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 Annex B.

A more detailed description of these data and method is available in Chen Wang and Koen Caminada, 'Disentangling income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries', *Leiden Department of Economics Research Memorandum* #2011.02, 2011). Please cite this working paper when referring to the data set, along with the web address www.hsz.leidenuniv.nl. You may also refer to Leiden Department of Economics Research Memorandum #2011.02 for additional details.

Aim

Leiden LIS 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 LIS 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 LIS 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 LIS Budget Incidence Fiscal Redistribution Dataset
Assembled	Jesuit & Mahler	Wang & Caminada
Launch / Year	August 2005 -- updated July 2006	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	LIS Working Paper #392 http://www.lisdatacenter.org/resources/other-databases/	LIS Working Paper # 567 www.hsz.leidenuniv.nl
Reference	V.A. Mahler and D.K. Jesuit, 'Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study', *Socio-Economic Review* 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', *Leiden Department of Economics Research Memorandum* #2011.02.

Questions / contact

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Annex A: Household Income Components List

Below we provide the household income components list of LIS, 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 A4 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 Leiden Budget Incidence Fiscal Redistribution Database 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 transfer redistribution and the partial effect of redistribution by several transfers and 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 equivalised income and weighted results.

Special attention needs the treatment of pensions (v19, v32 and v33). 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 (v19). But countries differ to a large extent in public versus private provision of their pensions (OECD, 2008:120). Occupational and private pensions (v32+v33) 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 as and threaded as market income; see Table A1 and Table A2).

Table A1 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

Table A2 Household income variables in LIS dataset

Wages and salaries	V1/V1NET	*Gross wages and salaries / Net wages and salaries*	**V1 / V1NET**
Self-employment income	V4	*Farm self-employment income*	**V4**
	V5	*Non-farm self-employment income*	**V5**
Income tax and employee social security contributions	V7	*Mandatory contributions for self-employment*	**V7 + V13** *Mandatory payroll taxes*
	V13	*Mandatory employee contributions*	
	V11	*Income taxes*	**V11**
Property income	V8S1	*Interest and dividends*	**V8** *Cash property income*
	V8S2	*Rental income*	
	V8S3	*Private savings plans*	
	V8S4	*Royalties*	
	V8SR	*Cash property income n.e.c.*	
Social security cash benefits	V16	*Sickness benefits*	**V16**
	V17S1	*Short-term occupational injury and disease benefits*	**V17** *Occupational injury and disease benefits*
	V17S2	*Long-term occupational injury and disease benefits*	
	V17SR	*Occupational injury and disease benefits n.e.c.*	
	V18S1	*Disability pensions*	**V18** *Disability benefits*
	V18S2	*Disability allowances*	
	V18SR	*Disability benefits n.e.c.*	
	V19S1a	*Universal old-age pensions*	**V19S1** *Old-age pensions*
	V19S1b	*Employment-related old-age pensions*	
	V19S1c	*Old-age pensions for public sector employees*	
	V19S1r	*Old-age pensions n.e.c.*	
	V19S3	*Early retirement benefits*	**V19** *State old-age and survivors benefits*
	V19S4	*Survivors pensions*	
	V19SR	*State old-age and survivors benefits n.e.c.*	

	V20S1	*Child allowances*		**V20** *Child/family benefits*
	V20S2	*Advance maintenance*		
	V20S3	*Orphans allowances*		
	V20SR	*Child/family benefits n.e.c.*		
	V21S1	*Unemployment insurance benefits*		**V21** *Unemployment compensation benefits*
	V21S2	*(Re)training allowances*		
	V21S3	*Placement/resettlement benefits*		
	V21SR	*Unemployment compensation benefits n.e.c.*		
	V22S1	*Wage replacement*		**V22** *Maternity and other family leave benefits*
	V22S2	*Birth grants*		
	V22S3	*Child care leave benefits*		
	V22SR	*Maternity and other family leave benefits n.e.c.*		
	V23	*Military/veterans/war benefits*		**V23**
	V24S1	*Invalid carer benefits*		**V24** *Other social insurance benefits*
	V24S2	*Education benefits*		
	V24S3	*Child care cash benefits*		
	V24SR	*Other social insurance benefits n.e.c.*		
	V25S1	*General social assistance benefits*		**V25** *Social assistance cash benefits*
	V25S2	*Old-age and disability assistance benefits*		
	V25S3	*Unemployment assistance benefits*		
	V25S4	*Parents assistance benefits*		
	V25SR	*Social assistance cash benefits n.e.c.*		
	V26S1	*Near-cash food benefits*		**V26** 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*	**V32S1** *Occupational pensions*	**V32** *Private occupational and other pensions*
	V32S1b	*Voluntary occupational pensions*		
	V32S1r	*Occupational pensions n.e.c.*		
	V32S2	*Mandatory individual retirement pensions*		
	V32SR	*Private occupational and other pensions n.e.c.*		
	V33	*Public sector occupational pensions*		**V33**
Private transfers	V34	*Alimony/child support*		**V34**
	V35S1	*Regular transfers from relatives*		**V35** *Regular private transfers*
	V35S2	*Regular transfers from private charity*		
	V35SR	*Regular private transfers n.e.c.*		
Other cash income	V36	*Other cash income*		**V36**

Source: LIS

Table A3 Household aggregated income variables in LIS dataset

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

Annex B: Decomposition of the Gini coefficient

Sequential decomposition of the Gini coefficient: *partial effects of taxes and transfers*
The Gini coefficient is expressed as follows (cf. Jenkins, 1999; updated 2010):

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

In formula (1), n denotes number of individuals, μ 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.

$$y_i = y_i^{pri} + \alpha B_i - \beta T_i \quad , \; i = 1,2,\cdots,n \quad , \; \alpha,\beta \in \{0,1\} \tag{2}$$

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 α and β, 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 α = 0 and β = 0, the resulting inequality measure presents the Gini coefficient before taxes and transfers; if α = 1 and β = 1, the measure corresponds to the Gini coefficient after taxes and transfers; if α = 0 and β = 1 the measure shows the Gini coefficient after taxes but before transfers, which displays a world without social transfers. For α = 1 and β = 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≠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≠l)), individual income contains primary income plus all the transfers and the l^{th} tax, we explain why we choose this order later.

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

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):

$$\mathrm{L} = G_{pri} - G_{dpi} \tag{4}$$

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).

$$R = G_{dpi} - C_{dpi} \tag{5}$$

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:

$$\mathrm{L_B} = G_{pri} - G_{pri+B} \tag{6}$$

$$\mathrm{L_T} = G_{pri+B} - G_{dpi} \tag{7}$$

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 an 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 redistributional 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 (2000), 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.[1] 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 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

[1] See for 'descogini' in STATA (Lopez-Feldman, 2006).

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.

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 af several benefit transfers and taxes can be represented by formula (8) and (9):

$$\mathrm{L} = G_{pri} - G_{dpi} \tag{4}$$

$$\mathrm{L}_{Bk} = G_{pri} - G_{pri+B_k} \tag{8}$$

$$\mathrm{L}_{Tl} = G_{pri+B} - G_{pri+B-T_l} \tag{9}$$

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 income after (all) transfers. 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.

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).

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 the LIS project 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.

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 database 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.[2]

2 See Wang and Caminada (2011).

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