Leiden LIS Budget Incidence Fiscal Redistribution Dataset
on
RELATIVE INCOME POVERTY RATES

for 49 LIS countries - 1967-2016

Assembled by Koen Caminada & Jinxian Wang

Version 1, February 2019

Questions / contact
KOEN CAMINADA

Economics Department, Leiden University, PO Box 9520, 2300 RA Leiden, The Netherlands.
E-mail: c.l.j.caminada@law.leidenuniv.nl

and / or

JINXIAN WANG
Business School, Central South University, Lushan South Road 932, 410083, Changsha, China.
E-mail: wangjinxian@csu.edu.cn

Dataset available via websites:

- ✓ LIS Cross-National Data Center in Luxembourg:
  http://www.lisdatacenter.org/resources/other-databases/

- ✓ Leiden University, Department of Economics:
  https://www.universiteitleiden.nl/en/law/institute-for-tax-law-and-economics/economics/data-sets

Download

Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Relative Income Poverty Rates 2019

A more detailed description of these data and method will come available in Koen Caminada, Jinxian Wang, Kees Goudswaard & Chen Wang (2019), Relative income poverty rates and poverty alleviation via T/B-systems in 49 LIS-countries (1967-2016), *LIS Working Paper*. Please cite this working paper when referring to the data set, along with the web address www.economie.leidenuniv.nl.

Aim

The Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Relative Income Poverty Rates 2019 presents the disentanglement of poverty and the anti-poverty effect of social transfers and income taxes in 49 LIS countries for the period 1967-2016 (Waves I - Wave X of LIS). This dataset allows researchers and public policy analysts to compare fiscal redistribution across developed countries and middle income countries over the last five decades. Research may employ these data in addressing several important research issues. Often 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) poverty alleviation. 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 countries and middle income countries, the literature has increasingly moved towards more disaggregated measures of social policy, an enterprise in which the Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Relative Income Poverty 2019, with its detailed data on income taxes and social contributions and a large number of individual social benefits, offers a rich source of information.
Research could focus on households with very low income — those in poverty. The budget incidence approach based on LIS data allows researchers to employ all kinds 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 income taxes and transfers across countries.
The assembled databank of poverty alleviation 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.

Content dataset 2019

This data set offers a number of measures of relative poverty and poverty alleviation via T/B-systems in the developed and middle income countries, drawing upon data from 339 *Luxembourg Income Study* surveys conducted in 49 countries between 1967 and 2016 (6,588,391 disposable income observations). In this dataset we have computed several kinds of results, namely poverty rates before social transfers and income taxes, poverty rates after social transfers and income taxes, the overall poverty reduction effect, the partial effect of redistribution by several social transfers and the partial effect of redistribution by income taxes and social security contributions.

- ♥ We offer a user-friendly version of the database allowing users to easily select relative poverty variables and poverty alleviation variables for (a group of) countries and/or specific data years via pivot tables. Somewhat arbitrary we labeled countries as follows:

Anglo-Saxon (3):	Australia, Canada and United States;
EU15 (14):	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden and United Kingdom;
CEE (7):	Czech Republic, Estonia, Hungary, Lithuania, Poland, Slovakia and Slovenia;
Europe – other (5):	Georgia, Iceland, Norway, Serbia and Switzerland;
BRICS (5):	Brazil, China, India, Russia and South Africa;
Latin America (10):	Chile, Colombia, Dominican Republic, Guatemala, Mexico, Panama, Paraguay, Peru and Uruguay;
Middle East (2):	Egypt and Israel;
South-East Asia (3):	Japan, South Korea and Taiwan.

- ♥ The LIS staff implemented a major LIS Database template revision linked to the release of the Wave VII (centered on 2007) microdata. Most components of this revised template have also been applied, retroactively, to all earlier waves of the microdata. The revised template increased both comparability over-time and cross-national. As a result, most figures of our assembled dataset on poverty alleviation are – unfortunately - not directly comparable with the figures produced before. To obtain a consistent time-series, all calculations were done using the new 2011 LIS Template.
- ♥ A decomposition of relative poverty rates by income source. A description of the decomposition method of relative poverty rates is given in Annex C.

Based on the current assembled dataset, we explore how relative poverty rates have evolved across countries and over time and what effects of poverty alleviation via T/B-systems are. Our dataset offers a number of measures of relative poverty and poverty alleviation in developing and middle income countries, namely:

1) LIS descriptives: Median and mean equivalized income, gross versus net information of income and the number of observation for each wave (= 339 datasets; 49 countries over time; 6,588,391 disposable income observations).
   [Table A1 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

2) A measure of the extent of people lifted out of poverty by fiscal redistribution, as reflected in the difference between the poverty rate of pre-tax-transfer primary income and post-tax-transfer disposable income. We offer measures of both absolute poverty alleviation ($Poverty_{pri} - Poverty_{dhi}$) and relative poverty alleviation ($(Poverty_{pri} - Poverty_{dhi})/ Poverty_{pri}$). All figures are presented for several poverty thresholds (PL40, PL50 and PL60). Moreover, figures for the average normalized poverty gap (FGT(1)) are presented, applied to a threshold of 60 percent of median income.
   [Table A2 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

3) Poverty rates (pre-tax-transfer primary income and post-tax-transfer disposable income) are presented for age-groups: Total population, Working-age population, Children and the Elderly.
   [Table A3 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

4) Poverty rates of disposable income are presented for males and females as well.
   [Table A4 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

5) The average size of social transfers as a proportion of households' pre-tax income (gross 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 A5 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

In order to disentangle relative poverty even further by income source two additional statistics are provided for:

6) The budget size that is associated with several social transfers. The average size of a social transfer is defined as a proportion of households' gross income (codes refer to LIS Household Income Components List; see Annex A for details):
   a) Old-age/disability/survivor transfers (hitsil+hitsup+hitsudi+hitsap)
   b) Sickness transfers (hitsissi+hitsiswi)
   c) Family/children transfers (hitsisma+hitsufa+hitsafa)
   d) Education transfers (hitsued+hitsaed)
   e) Unemployment transfers (hitsisun+hitsuun+hitsaun)
   f) Housing transfers (hitsaho+hitsahe)
   g) General/food/medical assistance transfers (hitsagen+hitsafo+hitsame)
   h) Other transfers (all social transfers minus transfers a to g)
   i) Income taxes and social security contributions (hxit)

   [Table A6 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

7) A measure of the extent of people lifted out of poverty by fiscal redistribution that is associated with several social transfers and income taxes and social security contributions (codes refer to LIS Household Income Components List; see Annex A for details):
   a) Old-age/disability/survivor transfers (hitsil+hitsup+hitsudi+hitsap)
   b) Sickness transfers (hitsissi+hitsiswi)
   c) Family/children transfers (hitsisma+hitsufa+hitsafa)
   d) Education transfers (hitsued+hitsaed)
   e) Unemployment transfers (hitsisun+hitsuun+hitsaun)
   f) Housing transfers (hitsaho+hitsahe)
   g) General/food/medical assistance transfers (hitsagen+hitsafo+hitsame)
   h) Other transfers (all social transfers minus transfers a to g)
   i) Income taxes and social security contributions (hxit)

   All results are presented for age-groups: Total population, Working-age population, Children and the Elderly.

   [Table A7 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

A description of the decomposition method of relative poverty rates is given in Annex C.

For 334 out of all 339 LIS datasets, we are able to decompose the effect of lifted out of poverty by fiscal redistribution into partial effects of one to seven social transfer programs and income taxes and social security contributions mentioned above. Unfortunately, in Austria (1995 and 1987) and Spain (1980) data of the social programs are not available at all. China (2013) and Taiwan (1995) are not computed as they miss information on total social security transfers and income taxes and social security contributions.

The data set presents the results of the decomposition of relative poverty and the poverty reduction via several social transfers and income taxes and social contributions for LIS countries. Some benefits or income taxes do not have any anti-poverty 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 *blanks*). Second, such a program exist, but does not have any anti-poverty effect, because the social expenditures of this program is rather low or the program is distributed equally among the population (noted as 0%). In all tables, when Gross/net information is marked as "net", the redistributive effect of income taxes and social contributions is represented as blanks.

It should be noted that LIS allocate social transfers to several categories (see above and in Tables A5 and A6 of our Excel Spreadsheet). Unfortunately, the category *Old-age/disability/survivor*

transfers cannot be further divided into old-age, disability and survivor transfers distinctively as part of the variable *hitsil* does not contain more specific income sources; see Annex A.
Results should be interpreted with caution because the anti-poverty effect of the category *Other transfers* (= transfers not allocated to a specific category) amounts 25 percent and over of total transfer redistribution for several countries and years. This high share of the category *Other transfers* is the case for 58 datasets (out of 334) concerning 21 countries (out of all 49): Canada (1971, 1981, 1994, 1997, 1998, 2000, 2004, 2007, 2010 , 2013), China (2002), Colombia (2007, 2013), Denmark (1987, 1992), Dominican Republic (2007), Estonia (2000), Germany (1973), Guatemala (2014), Ireland (1987), Israel (1979), Japan (2008), Mexico (1994, 1996, 2002, 2004, 2008, 2010, 2012), Netherlands (1987), Norway (1979, 1986), Slovenia (1997, 1999, 2004. 2007, 2010, 2012), South Korea (2006, 2008, 2010, 2012), Spain (1985), Sweden (1975, 2005), Taiwan (1981, 1986, 1991, 1997, 2000, 2005, 2007, 2010, 2013, 2016), the United Kingdom (1986, 1991) and Uruguay (2004). Of course, high figures for transfers not allocated to a specific category (the category *Other transfers*) are somewhat troublesome in our decomposition analysis of poverty alleviation, especially when LIS allocates less to this category over time due to higher data quality.
For the breakdown of poverty among males and females, we had to combine (merge) household files of LIS with files on persons. In most cases we did not have any troubles. 174 cases out of all 1,356 possibilities (= 339 data points of countries/ years for each Total population, Working-age population, Children and the Elderly) should be threated with caution, because the merged files did not (exactly) produce the same poverty rate as the household files, which is troublesome. We present the deviations in separate columns. Moreover, in some LIS files the breakdown of the population by gender is not fully possible – this is presented as 'unknown' share of population being male or female.
The treatment of pensions needs special attention. Public pension plans are generally seen as part of the safety net, generating large antipoverty effects through transfers and income taxes (social contributions). So, state old-age pension benefits will be included in our analysis on relative poverty. 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 poverty alleviation when pre-tax-transfer poverty and post-tax-transfer poverty 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 income taxes. Overcoming this bias requires a choice: should pensions be earmarked as primary income or as a transfer? We deal with this bias rather pragmatically by following LIS Household Income Variables List (LIS, 2017): occupational and mandatory private pensions are earmarked and treated as social security transfers; see Annex A for details.

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. In the last decades,

equivalence scales have been widely used in the literature on income distribution (see Figini, 1998). In measuring income, we employ 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. That is, income in the top of the distribution is cut off by ten times the median of the non-equivalized household income. Income at the bottom of the distribution is replaced by one percent of the average equivalized household income. The bottom coding is particularly relevant for households without primary income.

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: $W = D/S^E$, 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 poverty.

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 extent. Alternatively adjustment methods would definitely affect the ranking of countries, although the broad pattern remains the same (Atkinson et al, 1995:52). Similarly, the choice of equivalence scales will affect international comparisons of poverty.

Gross and net income datasets in LIS

The Luxembourg Income Study Database is the largest available income database of harmonized microdata collected from 49 countries in Europe, North America, Latin America, Africa, Asia, and Australasia spanning five decades. Harmonized into a common framework (click here for Harmonization Guidelines), LIS datasets contain household- and person-level data labor income, capital income, social security and private transfers, income taxes and contributions, demography, employment, and expenditures (LIS, 2017).

Country-comparative and trend analyses of relative poverty based on LIS gross/net datasets should be done with caution. LIS provides gross income data in most countries and years while providing income data that are net of (income) taxes in others. Of the 339 LIS datasets available at the time of writing, 214 are classified as gross, 103 as net and 22 as 'mixed'; see Annex B for a specification.

Datasets on Egypt, Georgia, Hungary, Italy, Mexico, Paraguay, Russia, Serbia, Slovenia and Uruguay have always been net (Italy provides information for income taxes separately but all incomes are expressed in net values therefore we treat Italy as net.) Belgium, Greece, Ireland, Luxembourg, Slovakia and Spain are covered by both gross and net datasets, at different points in time. In the net dataset, poverty rate of gross income would be equal to poverty rate of disposable income. Mixed datasets are a special case in which total income can be gross of income taxes but

net of contributions, or vice versa. Mixed datasets apply to Austria (1995, 1987), China (2002), Colombia (2013. 2010, 2007), Estonia (2000), France (2010, 2005, 2000, 1994, 1989, 1984, 1978), Paraguay (2004) and Poland (1995, 1999, 2004, 2007, 2010, 2013, 2016).

Table 1 Datasets with gross and net income data in LIS

	Gross incomes		Mixed		Net incomes		Total	
	# obs	# datasets	# obs	# datasets	# obs	# datasets	# obs	# datasets
Historical wave	185,254	9	-	-	-	-	185,254	9
Wave I	148,766	10	10,468	1	23,921	1	183,155	12
Wave II	209,080	16	22,610	2	43,016	7	274,706	25
Wave III	225,200	17	8,603	1	135,030	11	368,833	29
Wave IV	482,424	21	62,522	3	173,926	19	718,872	43
Wave V	371,893	19	64,879	4	200,341	17	637,113	40
Wave VI	548,077	28	50,165	3	185,246	10	783,488	41
Wave VII	757,944	29	52,865	2	176,904	9	987,713	40
Wave VIII	801,188	32	69,048	3	278,971	12	1,149,207	47
Wave IX	788,889	29	50,977	2	164,773	11	1,004,639	42
Wave X	109,212	4	36,803	1	149,396	6	295,411	11
Total	4,627,927	214	428,940	22	1,531,524	103	6,588,391	339
Anglo-Saxon	1,169,111	35	-	-	-	-	1,169,111	35
EU15	1,483,386	92	108,439	9	226,025	37	1,817,850	138
Europe - other	792,132	20	-	-	30,946	7	823,078	27
BRICS	490,020	8	17,112	1	104,349	7	611,481	16
Latin America	185,378	12	53,205	4	1,086,663	34	1,325,246	50
CEE	215,795	20	250,184	8	71,692	17	537,671	45
Middle East	68,219	11	-	-	11,849	1	80,068	12
South-East Asia	223,886	16	-	-	-	-	223,886	16
Total	4,627,927	214	428,940	22	1,531,524	103	6,588,391	339

Source: LIS

Measuring the anti-poverty effects of social transfers and income taxes

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

Poverty alleviation by social transfers and income taxes = primary income poverty − disposable income poverty

This formula is used to estimate the reduction in relative poverty produced by social transfers and income taxes, where primary income poverty is given by a summary statistic of pre-tax, pre-transfer incomes and disposable income poverty is given by the same summary statistic of disposable equivalent incomes. Table 2 presents the framework of accounting income poverty and redistribution through various income sources; see Annex A for details.

Table 2 The income poverty and poverty alleviation accounting framework

Income components	Income poverty and redistributive effect
Labor income + capital income + private transfers = **Primary income** (= Market income)	**Income poverty before social transfers and income taxes**
+ Social security transfers	-/- Redistributive effect of social transfers
= **Gross income**	= **Income poverty before income taxes**
-/- Income taxes and social security contributions	-/- Redistributive effect of income taxes
= **Disposable income**	= **Income poverty after social transfers and income taxes**

For some countries and years, private transfers (e.g. alimony and other family transfers and private education transfers) are not available, including Canada (1997, 1994, 1991, 1987, 1981, 1975, 1971), Czech Republic (1996, 1992), Italy (1986), Norway (2013, 2010, 2007), Poland (1986), Romania (1997, 1995), Slovakia (1992), Spain (1985, 1980), Sweden (1981, 1967). China (2013) and Taiwan (1995) have no information on private transfers or social security transfers. Austria (1995, 1987) only has information on disposable income. For cases without information on private transfers, we calculate all incomes without adding private transfers.

Countries and other measurement issues

In empirical literature, the selection of countries and data-years differ due to the consideration of data quality. LIS micro data seems to be the best available data for describing how income inequality and the redistributive effects of income taxes and transfers vary across countries (Smeeding, 2004; Nolan and Marx, 2009; Smeeding & Latner, 2015). We apply a cross-national analysis using comparable income surveys for all countries of LIS from 1967-2016, allowing researchers to make comparisons in a straightforward manner, and the information is still updating and expanding. This dataset contains all countries in LIS: Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Dominican Republic, Egypt, Estonia, Finland, France, Germany, Georgia, Greece, Guatemala, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Lithuania, Luxembourg, Mexico, the Netherlands, Norway, Panama, Paraguay, Peru, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, the United Kingdom, the United States, and Uruguay.
From more than 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 poverty and the anti-poverty effect of T/B-systems across countries. In line with LIS convention and the work of Jesuit & Mahler (2004) and Wang & Caminada (2011a and 2011b), we have eliminated both observations with zero or a missing value of disposable income from LIS data. Household weights are applied for calculation of relative poverty rates.
It should be noted that there have been controversial arguments regarding the issues in the measurement of (relative) income poverty. 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 poverty. The choice of indicator used will mainly depend on the purpose of the research. 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 poverty across countries. We simply refer to a vast literature on the sensitivity of measured results to the choice of income definitions, poverty and income inequality indices, appropriate equivalence scales, and other elements that may affect results in comparative research (see Wang & Caminada, 2011a).

Origin of the idea

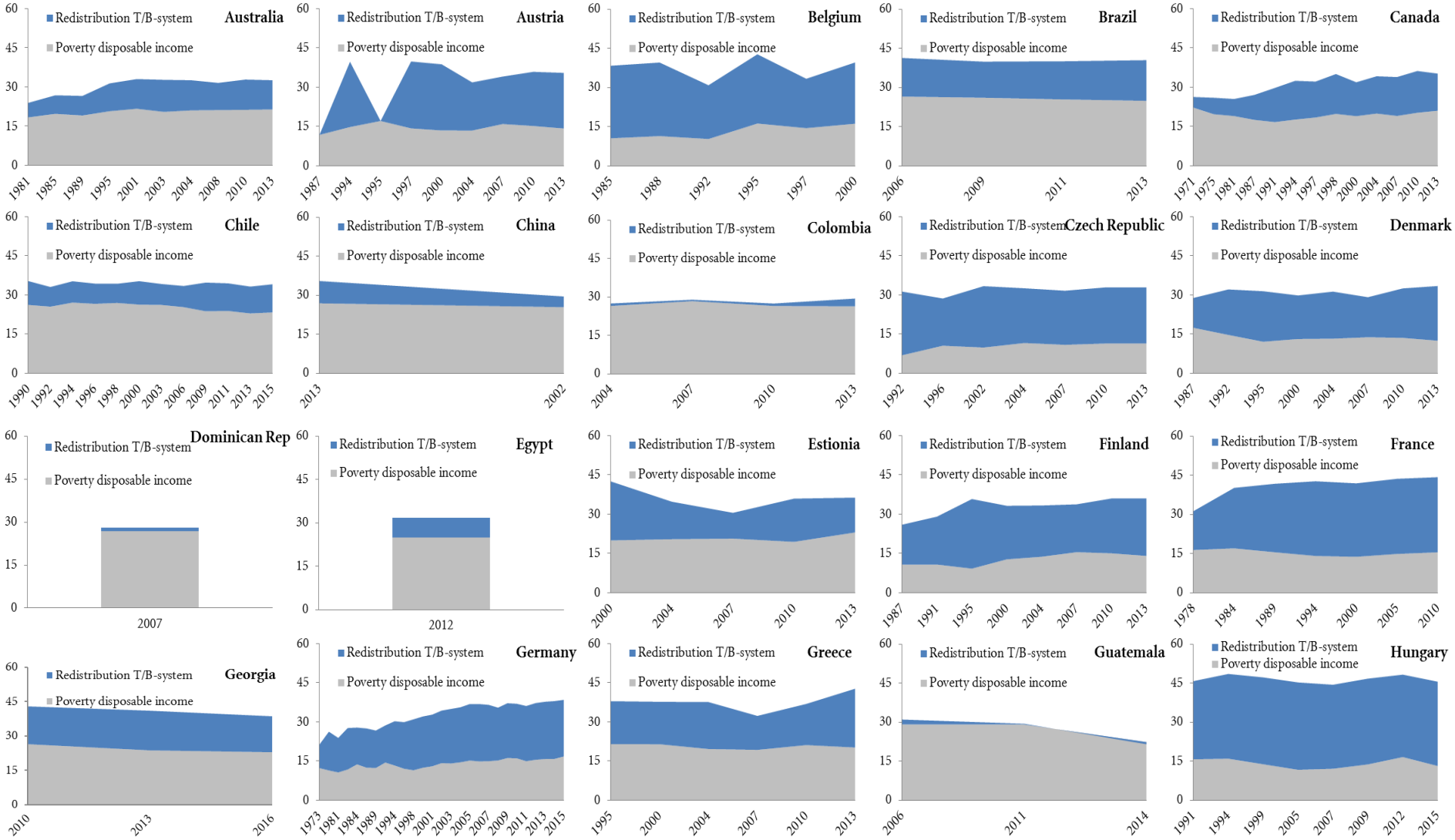
The original database on Fiscal Redistribution based on LIS data was initiated by Jesuit & Mahler in 2004 (LIS Working Paper #392). This Leiden Budget Incidence Fiscal Redistribution Dataset on Relative Income Poverty Rates 2019 extends their Fiscal Redistribution approach. LIS data allows us to decompose the trajectory of poverty before social transfers and income taxes (primary income) to poverty after social transfers and income taxes (disposable income) in several parts: the dataset distinguish 7 main different social benefits and several income taxes and social contributions across countries.
Jesuit & Mahler (2004 and 2017) and Mahler & Jesuit (2006) divided overall government redistribution only into 3 components: the redistributive effects from unemployment benefits, from pensions, and from income taxes. They applied their empirical exercise for 13 countries with LIS-data around the years 1999/2000 (59 datasets). Wang & Caminada (2011b) assembled a comparable dataset for 36 LIS-countries for the period 1979-2006 (177 datasets). Overall government redistribution was divided into 13 components. Recently Wang & Caminada (2017) assembled the Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017, which covers a much wider range of 49 countries using the most recent LIS data available (293 datasets). Data on disposable income e.g. is available for 5,653,573 individual disposable income observations summarized over all countries and waves. The current databank elaborates on this and focuses on the disentanglement of *relative income poverty rates*, while the datasets mentioned above concentrated on several aspects of primary and disposable income inequality.

Comparability of fiscal redistribution datasets 2005/2008, 2011 and 2017-2019

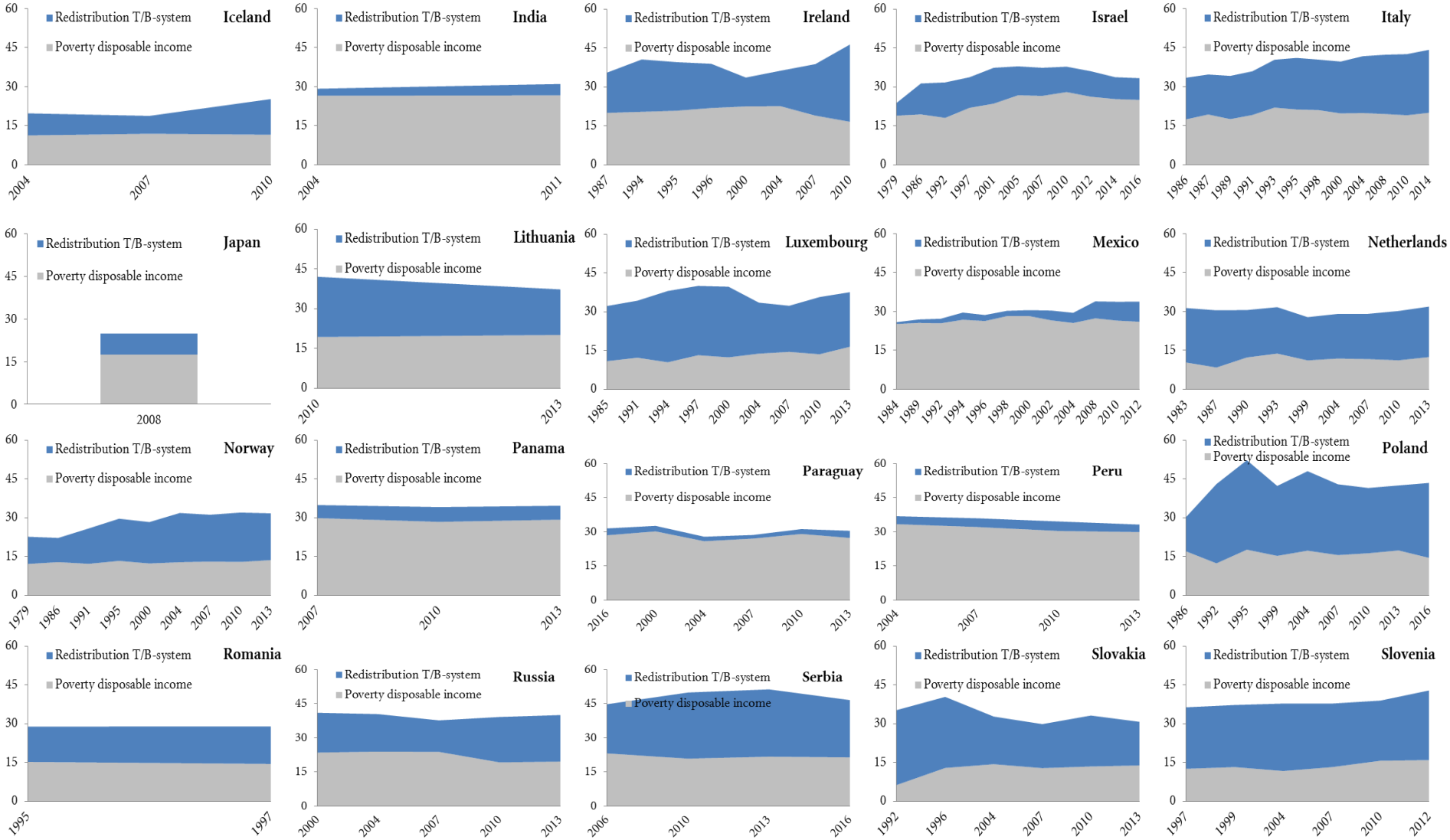
LIS has, for 35 years, grown and evolved in order to adapt to the needs of researchers throughout the world. The LIS staff implemented a major LIS Database template revision – referred to as the 2011 Template – linked to the release of the Wave VII (centered on 2007) microdata. Most components of this revised template have also been applied, retroactively, to all earlier waves of the microdata.
Especially the inclusion of an increasing number of datasets from middle-income countries by the LIS staff necessitated conceptual adjustments and changes to the list of harmonized variables into the 2011 Template. The revision by LIS was guided by several principles and goals (Gornick et al, 2013): (1) to restructure the variables, especially the income variables, to achieve a more logical, comparable, and comprehensive list; (2) to standardize most of the variables, which led to the use of fewer country-specific codes; and (3) to introduce easy-to-use dummy or categorical variables to complement the more detailed ones that are still provided. The revised 2011 LIS Template increased both comparability over-time and cross-national. Moreover, LIS' data users have to make fewer assumptions and do less recoding as they carry out their research. A drawback of the new 2011 LIS Template is that results obtained today for income, poverty, income inequality and fiscal redistribution are not comparable with results obtained before 2011.

	Fiscal Redistribution Dataset	Budget Incidence Fiscal Redistribution Dataset	Budget Incidence Fiscal Redistribution Dataset on Income Inequality	Idem, on Relative Income Poverty Rates
Assembled	David Jesuit & Vincent Mahler	Chen Wang & Koen Caminada	Jinxian Wang & Koen Caminada	Koen Caminada & Jinxian Wang
Launch / Last Update	August 2005 / February 2008	August 2011	November 2017	January 2019
# Countries	13	36	47	49
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.	Australia, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Dominican Rep, Egypt, Estonia, Finland, France, Germany, Georgia, Greece, Guatemala, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Panama, Paraguay, Peru, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, UK, USA, and Uruguay.	Idem + Chili and Lihouania
# LIS Waves	I, II, III, IV and V	I, II, III, IV, V and VI	I, II, III, IV, V, VI, VII, VIII and IX	I, II, III, IV, V, VI, VII, VIII, IX and X
Time-series	1979-2002	1979-2006	1967-2014	1967-2016
# LIS Datasets	59	177	293	339
Redistribution from	Unemployment benefits Pensions Direct income 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 income taxes (v7+v13) Income taxes (v11)	Old-age/disability/survivor transfers (hitsil+hitsup+hitsudi+hitsap) Sickness transfers (hitsissi+hitsiswi) Family/children transfers (hitsisma+hitsufa+hitsafa) Education transfers (hitsued+hitsaed) Unemployment transfers (hitsisun+hitsuun+hitsaun) Housing transfers (hitsaho+hitsahe) General/food/medical assistance transfers (hitsagen+hitsafo+hitsame) Other transfers Income taxes and social security contributions (hxit)	Idem
LIS Working Paper Availability	LIS Working Paper #392 http://www.lisdatacenter.org/	LIS Working Paper # 567 www.economie.leidenuniv.nl	LIS Working Paper # 724 www.economie.leidenuniv.nl	LIS Working Paper # ??? www.economie.leidenuniv.nl
Reference	Mahler VA & Jesuit DK (2006), Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study, *Socio-Economic Review* 4 483–511.	Wang C & Caminada K (2011a), Disentangling income inequality and the redistributive effect of social transfers and income taxes in 36 LIS countries, *LIS Working Paper #567.*	Caminada K, Wang J, Goudswaard K & Wang C (2017), Income inequality and fiscal redistribution in 47 LIS countries (1967-2014), *LIS Working Paper* #724.	Caminada K, Wang J, Goudswaard K & Wang C (2019), Relative income poverty rates and poverty alleviation via T/B-systems in 49 LIS countries (1967-2016), *LIS Working Paper.*

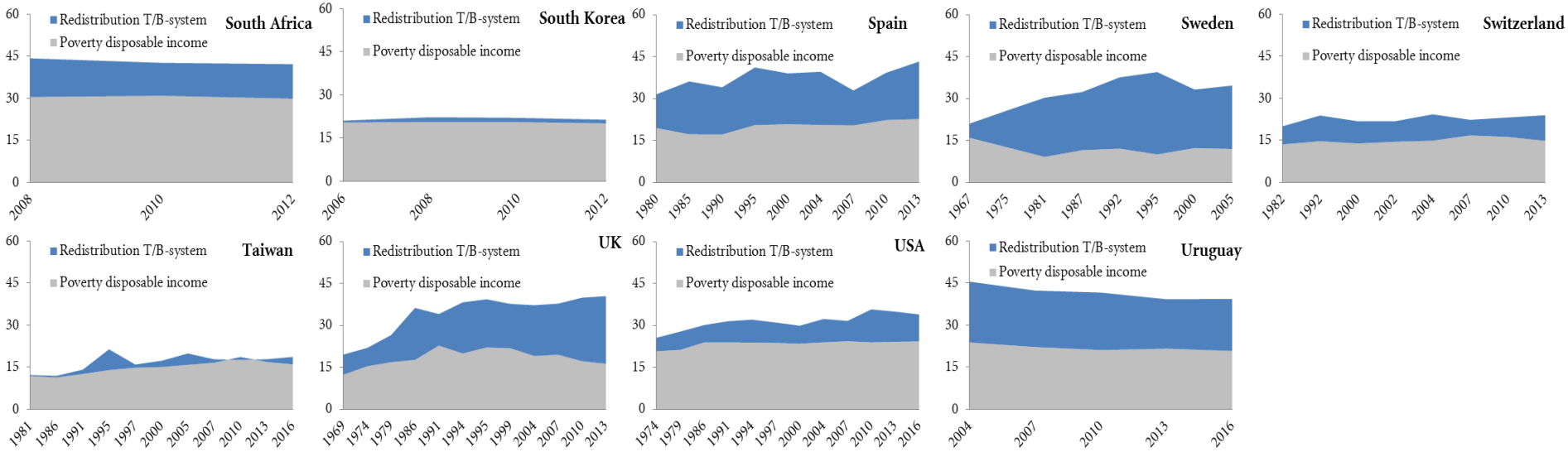
Relative poverty and poverty alleviation via social transfers and income taxes in 49 LIS countries 1967-2016



Relative poverty and poverty alleviation via social transfers and income taxes in 49 LIS countries 1967-2016



Relative poverty and poverty alleviation via social transfers and income taxes in 49 LIS countries 1967-2016



Annex A: Household Income Components List

Table A1 presents the framework for accounting relative income poverty and redistribution through various income sources. 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 A2 household (pre-tax) income is divided into 3 parts: factor income (labor income + capital income), social security transfers and private transfers. In each part, there are more specific income sources, which can be helpful for studies focusing on different elements of income. Table A3 provides household aggregated income sources provided by LIS. Using those aggregated variables, it is more convenient to process and present income distribution and decomposition results.

In this Leiden Budget Incidence Fiscal Redistribution Database on Relative Income Poverty 2019 we compute five kinds of results, namely income poverty before social transfers and income taxes, income poverty after social transfers and income taxes, the overall anti-povety effect, the partial effect by several transfers and income taxes. In calculating pre-tax-transfer income poverty, we use primary income, which consists of factor income (sum of labor income and capital income), and private transfers; gross income is equal to primary income plus social security transfers; in calculating post-tax-transfer income, we use net disposable income (dhi). Difference between $Poverty_{pri}$ and $Poverty_{gross}$ is the poverty alleviation via social transfers while difference between $Poverty_{gross}$ and $Poverty_{dhi}$ is the poverty alleviation from income taxes and social security contribution. For some countries and waves which only report net incomes, gross income is equal to net disposable income (dhi). In addition, we use the number of persons in a household (nhhmem) and household weight (hwgt) in LIS dataset so as to obtain equivalized income and weighted results.

Table A1 Income distribution indicator list

Income Poverty Indicator	Poverty alleviation Measurement	Specific Income Source
Poverty (pri)		Primary Income (factor+hitp)
Transfers Redistribution	Poverty (pri)-Poverty (pri+trans)	
Poverty (pri+trans)		Primary Income + social security transfers (factor+hitp+hits)
Income taxes Redistribution	Poverty (pri+trans)-Poverty (dhi)	
Poverty (dhi)		Net disposable Income (dhi)
Overall Redistribution	Poverty (pri)-Poverty (dhi)	

Source: LIS

Table A2 Household income variables in LIS dataset

Factor income	HILERB	basic wages and salaries	**HILER** regular paid employment income	**HILE** paid employment income	**HIL** labor income
	HILERS	wage supplements			
	HILERD	director wages			
	HILEC	casual paid employment income			
	HILSF	farm self-employment income		**HILS** self-employment income	
	HILSNB	profit from businesses	**HILSN** non-farm self-employment income		
	HILSNH	household production activities			
	HICIDI	Interest		**HICID** interest and dividends	**HIC** capital income
	HICIDD	Dividends			
	HICVIP	voluntary individual pensions			
	HICRENR	rental income from real estate		**HICREN** rental income	
	HICRENL	rental income from land			
	HICRENM	rental income from machinery			
	HICROY	Royalties			
HITP Private transfers	HITPED	merit-based education transfers			**HITP** private transfers
	HITPNP	transfers from non-profit institutions			
	HITPIHA	alimony/child support		**HITPIH** interhousehold transfers	
	HITPIHR	Remittances			
	HITPIHFT	other family transfers			
HITS Social security transfers	HITSILMIP	mandatory individual pensions		**HITSIL** long-term insurance transfers	**HITSI** work-related insurance transfers
	HITSILO	occupational pensions			
	HITSILEPO	old-age insurance public pensions	**HITSILEP** employment-related public pensions		
	HITSILEPD	disability insurance public pensions			
	HITSILEPS	survivors insurance public pensions			
	HITSILWI	work-injury pensions			
	HITSISSI	sickness wage replacement		**HITSIS** short-term insurance	
	HITSISMA	maternity/parental wage replacement			
	HITSISWI	work-injury wage replacement			
	HITSISUN	unemployment wage replacement			
	HITSUPO	old-age universal pensions		**HITSUP** old-age/disability/survivors universal pensions	**HITSU** universal benefits
	HITSUPD	disability universal pensions			
	HITSUPS	survivors universal pensions			
	HITSUUN	unemployment universal benefits			
	HITSUDI	disability universal benefits			
	HITSUFACA	child allowances		**HITSUFA** family/child universal benefits	
	HITSUFAAM	advance maintenance			
	HITSUFACC	non-work related child care benefits			
	HITSUED	education-related universal benefits			
	HITSAGEN	general social assistance			**HITSA** assistance benefits
	HITSAPO	old-age assistance pensions		**HITSAP** old-age/disability/ survivors assistance pensions	
	HITSAPD	disability assistance pensions			
	HITSAPS	survivors assistance pensions			
	HITSAUN	unemployment assistance			
	HITSAFA	family/maternity/child assistance			
	HITSAED	education assistance			
	HITSAHO	housing assistance			
	ITSAHE	heating assistance			
	HITSAFO	food assistance			
	HITSAME	medical assistance			

Detailed information via http://www.lisdatacenter.org/wp-content/uploads/our-lis-documentation-variables-list.pdf

Source: LIS

Table A3 Household aggregated income variables in LIS dataset

Name	Label	Definition
DHI	disposable household income	Total monetary and non-monetary current income net of income taxes and social security contributions.
FACTOR	factor income	Total current monetary and non-monetary income from labor and capital (HIL+HIC).
HITS	social security transfers	Total current monetary and non-monetary social security transfers
HITP	private transfers	Total current monetary and non-monetary private transfers.
HXIT	income taxes and social security redistribution	Total monetary and non-monetary expenditures on income taxes and social security contributions.
HITSIL+HITSUP +HITSUDI+HITS AP	old-age/disability/survivor transfers	1) Monetary long-term work-related insurance transfers from the public social security system and/or from private insurers through monetary long-term work-related insurance transfers from the public social security system and/or from private insurers through mandatory schemes, and from the employers or occupational organizations (occupational schemes), which cover mainly the active population. 2) Pensions and monetary transfers for old-age, disability and survivors from the public programs, which are universal in structure. 3) Monetary disability-related transfers from public programs, which are universal in structure. Such transfers cover people in connection with disability, sickness or injury. 4) Pensions and similar monetary transfers for old-age, disability and survivors, received from the state through social programs targeted towards individuals or households in need.
HITSISSI+HITSIS WI	sickness transfers	1) Short-term work-related insurance monetary transfers from sickness insurance schemes that cover mainly the active population. Such transfers replace or supplement employment income during periods of temporary interruptions (or reductions) of employment caused by temporary inability to work due to (non-work related) sickness or injury, or cover the additional costs incurred in such circumstances (e.g. rehabilitations benefits). 2) Short-term insurance monetary transfers for temporary total or partial work inability caused by a work-injury or occupational disease, stemming from schemes specifically set up with the purpose of covering work-injury and occupational diseases.
HITSISMA+HITS UFA+HITSAFA	family/children transfers	1) Short-term work-related monetary insurance transfers from maternity, paternity, or parental leave insurance schemes. 2) Monetary family-related transfers from public programs, which are universal in structure. 3) Monetary and non-monetary family-related transfers received from the state through social programs that are targeted on individuals or households in need.
HITSUED+HITS AED	education transfers	1) Monetary education-related transfers from public programs, which are universal in structure. 2) Monetary and non-monetary education-related transfers received from the state through social programs that are targeted on individuals or households in need.
HITSISUN+HITS UUN+HITSAUN	unemployment transfers	1) Short-term monetary transfers from the unemployment insurance aimed to compensate for the partial or total loss of labor income and to help the job seeker integrate the labor market. 2) Monetary transfers from unemployment public programs, which are universal in structure. 3) Monetary transfers received from unemployment social programs that are targeted on individuals or households in need.
HITSAHO+HITS AHE	housing transfers	1) Monetary and non-monetary housing-related transfers received from the state through social programs that are targeted on individuals or households in need. 2) Monetary and non-monetary heating-related transfers received from the state through social programs that are targeted on individuals or households in need.
HITSAGEN+HIT SAFO+HITSAME	General/food/medical assistance transfers	1) Monetary transfers from minimum income guarantee systems/last resort systems, received from the state through social programs that are targeted on individuals or households in need. 2) Monetary and non-monetary food-related transfers received from the state through food assistance programs that are targeted on individuals or households in need. 3) Monetary and non-monetary health-related transfers received from the state through medical care programs that are targeted on individuals or households in need.

Notes:

- Old-age/disability/survivor transfers: in some cases the variable HITSIL is missing but its sub-components are available, we then use it sub-components (sum of HITSILMIP, HITSILO, HITSILEP and HITSILWI) instead, including CA13, CA10, CA07, CA04, CA00, CA98, CA97, CA94, CA91, CA87, CA81, CA75, CA71, DK92, DK87, JP08. In other cases, HITSIL and its subcomponents, together with variables HITSUP, HITSUDI AND HITSAP are missing or provides poor information while the variables in the additional set 1 in the LIS variable list are available. In such cases old-age/disability/survivor transfers are computed based on sum of HIATOLD, HIATDIS and HIATSUR, including EE13, EE10, EE07, EE04, GR04, GR00, GR95, IS10, IS07, IS04, LU04, NL04, NO13, NO10, NO07, NO04, NO00, NO95, RU00, ES04, SE00.

- Sickness transfers are computed based on the variable HIATSIC in the additional set1 in LIS variable list in IS10, IS07, IS04, LU04, UK13, UK10, UK07.
- Family/children transfers are computed based the variable HIATFAM in the additional set1 in LIS variable list in AT04, CA07, EE04, GR04, IS10, IS07, IS04, LU04, RU13, RU10, RU07, RU04, RU00, ES04.
- Education transfers are computed based the variable HIATEDU in the additional set1 in LIS variable list inIT14, IT10, IT08, LU04, US13, US10, US07, US04, US00, US97, US94, US91.
- Unemployment transfers are computed based the variable HIATFAM in the additional set1 in LIS variable list in AT04, LU04, ES04, ES90, ES85.
- Housing transfers are computed based the variable HIATHOU in the additional set1 in LIS variable list in GR10, GR07, LU04, RU00.

Variable construction via http://www.lisdatacenter.org/our-data/lis-database/documentation/.

Source: LIS

Annex B: Gross and net income datasets in LIS

Country-comparative and trend analyses of income distribution based on LIS gross/net datasets should be done with caution. LIS provides gross income data in most countries and years while providing income data that are net of (income) taxes in others. Of the 339 LIS datasets available at the time of writing, 214 are classified as gross, 103 as net and 22 as 'mixed'; see Table B1 for a specification.

To compare LIS gross and net datasets, researchers can apply at least four different approaches. The first approach includes both gross and net datasets in the same comparative analysis, acknowledging that the incomparabilities may lead to biased results (e.g. Wang et al, 2012; Wang et al, 2014). The second approach is to restrict analyses to either gross or net datasets (e.g. Gornick & Jäntti, 2012). This will result in accurate findings but limits the scope of the analyses. Third, one can present separate analyses based on LIS gross and net datasets (e.g. Wang et al, 2014). However, the limitation of this approach is that the different results using gross and net datasets could originate from the different income concepts, or from real differences across countries or both. The fourth strategy is to gross up net income data or net down gross income data. With LIS, grossing up is not possible as most net datasets do not contain information on income taxes. To estimate gross income, country-specific details on the tax systems are required. Instead, Nieuwenhuis et al (2016) come up with a net down procedure to modify income data to approximate net income data. One shortcoming of this strategy is that in net datasets the comparison between pre-tax-transfer income and post-tax-transfer income only captures the effects of transfers, whereas in gross datasets this comparison would capture both effects of income taxes and transfers. We offer a user-friendly version of the database allowing users to easily select income poverty variables (gross and/or net) and fiscal redistribution variables for (a group of) countries and/or specific data years via pivot tables.

Table B1 Gross and net income data in LIS

	Gross	*Net*	Mixed	# sets
Australia	AU14, AU10, AU08, AU04, AU03, AU01, AU95, AU89, AU85, AU81			10
Austria	AT13, AT10, AT07, AT04	*AT00, AT97, AT94*	AT95, AT87	9
Belgium	BE97, BE92	*BE00, BE95, BE88, BE85*		6
Brazil	BR13, BR11, BR09, BR06			4
Canada	CA13, CA10, CA07, CA04, CA00, CA98, CA97, CA94, CA91, CA87, CA81, CA75, CA71			13
Chile		*CL15, CL13, CL11, CL09, CL06, CL03, CL00, CL98, CL96, CL94, CL92, CL90*		12
China	CN13		CN02	2
Colombia	CO04		CO13, CO10, CO07	4
Czech Republic	CZ13, CZ10, CZ07, CZ04, CZ02, CZ96, CZ92			7
Denmark	DK13, DK10, DK07, DK04, DK00, DK95, DK92, DK87			8
Dominican Rep.	DO07			1
Egypt		*EG12*		1
Estonia	EE13, EE10, EE07, EE04		EE00	5
Finland	FI13, FI10, FI07, FI04, FI00, FI95, FI91, FI87			8
France			FR10, FR05, FR00, FR94, FR89, FR84, FR78	7
Georgia		*GE16, GE13, GE10*		3
Germany	DE15, DE14, DE13, DE12, DE11, DE10, DE09, DE08, DE07, DE06, DE05, DE04, DE03, DE02, DE01, DE00, DE98, DE95, DE94, DE91, DE89, DE87, DE84, DE83, DE81, DE78, DE7			27
Greece	GR13, GR10, GR07	*GR04, GR00, GR95*		6
Guatemala	GT14, GT11, GT06			3
Hungary		*HU15, HU12, HU09, HU07, HU05, HU99, HU94, HU91*		8
Iceland	IS10, IS07, IS04			3
India		*IN11, IN04*		2
Ireland	IE10, IR07, IE04, IE87	*IE00, IE96, IE95, IE94*		8
Israel	IL16, IL14, IL12, IL10, IL07, IL05, IL01, IL97, IL92, IL86, IL79			11
Italy		*IT14, IT10, IT08, IT04, IT00, IT98, IT95, IT93, IT91, IT89, IT87, IT86*		12
Japan	JP08			1
Lithuania	LT13, LT10			2
Luxembourg	LU13, LU10, LU08, LU04	*LU00, LU97, LU94, LU91, LU85*		9
Mexico		*MX12, MX10, MX08, MX04, MX02, MX00, MX98, MX96, MX94, MX92, MX89, MX84*		12
Netherlands	NL13, NL10, NL07, NL04, NL99, NL93, NL90, NL87, NL83			9
Norway	NO13, NO10, NO07, NO04, NO00, NO95, NO91, NO86, NO79			9
Panama	PA13, PA10, PA07			3
Paraguay		*PY16, PY13, PY10, PY07, PY00*	PY04	6
Peru	PE13, PE10, PE07, PE04			4
Poland		*PL92, PL86*	PL16, PL13, PL10, PL07, PL04, PL99, PL95	9
Romania	RO97, RO95			2
Russia		*RU13, RU10, RU07, RU04, RU00*		5
Serbia		*RS16, RS13, RS10, RS06*		4
Slovak Republic	SK13, SK10, SK07, SK04, SK92	*SK96*		6
Slovenia		*SI12, SI10, SI07, SI04, SI99, SI97*		6
South Africa	ZA12, ZA10, ZA08			3
South Korea	KR12, KR10, KR08, KR06			4
Spain	ES13, ES10, ES07	*ES04, ES00, ES95, ES90, ES85, ES80*		9
Sweden	SE05, SE00, SE95, SE92, SE87, SE81, SE75, SE67			8
Switzerland	CH13, CH10, CH07, CH04, CH02, CH00, CH92, CH82			8
Taiwan	TW16, TW13, TW10, TW07, TW05, TW00, TW97, TW95, TW91, TW86, TW81			11
United Kingdom	UK13, UK10, UK07, UK04, UK99, UK95, UK94, UK91, UK86, UK79, UK74, UK69			12
United States	US16, US13, US10, US07, US04, US00, US97, US94, US91, US86, US79, US74			12
Uruguay		*UY16, UY13, UY10, UY07, UY04*		5
# LIS Datasets	214	*103*	22	339

See for a continuously updated overview: http://www.lisdatacenter.org/our-data/lis-database/datasets-information/

Annex C: Decomposition of relative poverty rates

In order to get any measure of income poverty, it is essential to make assumptions concerning the criteria based on which to define poverty. LIS uses the approach (which is most commonly adopted in the literature) to create a relative poverty line based on the level and distribution of equivalised household disposable income in the total population. Households are classified as poor or non-poor on the basis of whether their equivalised household disposable income is lower or higher than the relative line. In our dataset, we use three poverty lines, which are equal to 60, 50 and 40 percent of the median equivalised household disposable income. For each of the poverty lines, we calculate two kinds of poverty indices which are expressed as follows (Foster et al., 1984):

$$FGT(\lambda) = \sum_{i=1}^{n} f_i * I_i * \left[\frac{z_i - y_i}{z_i}\right]^{\lambda}, for\ \lambda = 0, 1, 2 \quad (1)$$

where $I_i = 1$ if $y_i < z_i$ and $I_i = 0$ otherwise. n denotes number of individuals and f_i is the average weight of individual. y_i presents income of individual and z_i is the poverty line. FGT(0) is the headcount ratio (the proportion poor); *FGT(1)* is the average normalized poverty gap; *FGT(2)* is the average squared normalized poverty gap (however, we do not incorporate FGT (2) in our calculations). The larger λ is, the greater the degree of 'poverty aversion' (sensitivity to larger poverty gaps). For each case of the poverty indices, we set the poverty threshold at 60, 50 and 40 percent of median equivalised household disposable income. In addition to total population, we will present the results of the poverty indices and decompositions for several age-groups: the working-age population, the children and the elderly.

Income can be measured with or without transfers and/or income taxes.

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

y_i^{pri}, B_i and T_i denote primary income of individual i, total transfers of individual i and total income taxes of individual i, respectively. Depending on α and β, individual income is determined by the sum of all cash incomes, such as wages and salaries, social security transfers, private transfers and so on, where we focus on social transfers and direct income taxes. When $\alpha = 0$ and $\beta = 0$, the resulting income measure presents income before transfers and income taxes (primary income); if $\alpha = 1$ and $\beta = 1$, the measure corresponds to income after transfers and income taxes (disposable income). For $\alpha = 1$ and $\beta = 0$, income represents income after transfers, but before income taxes (gross income)). If $\alpha = 0$ and $\beta = 1$ the measure shows the income after income taxes but before transfers.

In a more general expression, individual income can be shown as formula (3), consisting of primary income, m kinds of transfers and p types of income 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.

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

This allows us to calculate poverty rates without a certain kind of transfer or tax, and consequently the partial redistributive effect of that transfer or tax. Likewise the redistributive

effects of all income components on poverty within the trajectory between primary income and disposable income (like old-age/disability/survivor transfers, sickness transfers, family/children transfers, education transfers, unemployment compensation, housing transfers, general/food/medical assistance transfers and other transfers) can be calculated using 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 (1977) measure of the redistributive impact of transfers and income taxes to present the reduction in poverty from primary income (pri) to disposable income (dhi). The anti-poverty effect *LP* can be expressed as (c.f. Creedy & Ven, 2001):

$$LP = FGT_{pri} - FGT_{dhi} \tag{4}$$

$$LP_B = FGT_{pri} - FGT_{pri+B} \tag{5}$$

$$LP_T = FGT_{pri+B} - FGT_{dhi} \tag{6}$$

$$LP_{Bk} = ((FGT_{pri} - FGT_{pri+Bk}) + (FGT_{gross-Bk} - FGT_{gross}))/2 \tag{7}$$

LP, LP_B, LP_T, LP_{Bk} represent the overall poverty reduction, the poverty reduction effect of transfers, the poverty reduction effect of income taxes and the partial effect of a specific kind of transfer B_k. Consequently, the decomposition in formula (5) and (6) will offer us a quantitative measure for overall poverty reduction by social transfers and income taxes while the decomposition in formula (7) will offer us a quantitative measure for poverty reduction by specific benefit programs in a country.

It should be noted that the results to be obtained will be affected by the ordering effect. For example, the partial redistributive effect of a specific social transfer will not be the same when computed as the first (last) social program; see equation (7). The partial effects of these transfers in total poverty alleviation could be computed in several orders. We consider every specific social transfer as the first program to be added to primary income distribution and then the last program following all other transfers. Consequently, the anti-poverty effect from every specific social transfer is the average of the two effects.

In order to assess the effects of transfer benefits and income taxes on the overall poverty alleviation we apply a sequential decomposition technique. It should be noted, however, that this procedure is somewhat arbitrary since the choice of benchmark income affects the outcome. Applying the redistribution from, say, income taxes on gross income rather than primary income alters the outcome to some extent. Since income taxes are levied on gross income (primary income plus benefits), the redistributive effects may be underestimated. Nevertheless the logic of this decomposition of relative poverty is that income taxes are applied to gross income and benefits to primary income. This approach has been, among others, advocated by Kakwani (1986). Our sequential decomposition approach of income poverty follows studies by Jesuit & Mahler (2004 and 2017), Mahler & Jesuit (2006), Kristjánsson (2011) and Kammer et al (2012) with poverty indices accounted sequentially in order to determine the effective distributional impact of different income sources. This choice for an sequential accounting decomposition 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.

References

Atkinson AB, Rainwater L & Smeeding TM (1995), Income Distribution in OECD Countries: Evidence from the Luxembourg Income Study, *OECD Social Policy Studies* 18, Paris.

Caminada K, Goudswaard K & Wang C (2012), Disentangling income inequality and the redistributive effect of income taxes and transfers in 20 LIS countries mid 1980s – mid 2000s, *LIS Working Paper Series* #581.

Caminada K, Wang J, Goudswaard K & Wang C (2017), Income inequality and fiscal redistribution in 47 LIS-countries, 1967-2014, *LIS Working Paper Series #724.*

Caminada K, Goudswaard K, Wang C & Wang J (2019), Has the distributive power of social transfers changed over time?, *International Social Security Review* (accepted; forthcoming).

Caminada K, Goudswaard K, Wang C & Wang J (2018), Income inequality and fiscal redistribution in 31 countries after the crisis, *Journal of Comparative Economic Studies* (published online: 16 November 2018).

Caminada K & Wang J (2019), *Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Relative Income Poverty Rates*, posted at the website of Leiden University (Leiden University / Department of Economics / Data).

Creedy J & Ven J (2001), Decomposing Redistributive Effects of Income taxes and Transfers in Australia: Annual and Lifetime Measures, *Australian Economic Papers* 40(2): 185–198.

Figini P (1998), Inequality Measures, Equivalence Scales and Adjustment for Household Size and Composition, *LIS Working Paper Series* #185.

Gornick JC & Jäntti M (2012), Child poverty in cross-national perspective: Lessons from the Luxembourg Income Study, *Children and Youth Services Review* 34(3): 558-568.

Gornick JC, Ragnarsdóttir BH & Kostecki S (2013), LIS, Cross-National Data Center in Luxembourg – An Overview, *LIS Technical Working Paper Series* #5.

Jäntti M (1997), Inequality in five countries in the 1980s: The role of demographic shifts, markets and government policies, *Economica* 64: 415-40.

Jesuit DK & Mahler VA (2004), State Redistribution in Comparative Perspective: A Cross-National Analysis of the Developed Countries, *LIS Working Paper Series* #392.

Jesuit D, & Mahler V (2017), Fiscal Redistribution in Comparative Perspective: Recent Evidence from the Luxembourg Income Study (LIS) Data Centre, in: M Buggeln, M Daunton, & A Nützenadel (eds.), *The Political Economy of Public Finance: Taxation, State Spending and Debt since the 1970s*, Cambridge: Cambridge University Press: 177-198.

Kakwani N (1986), *Analyzing Redistribution Policies: A Study Using Australian Data*, Cambridge: Cambridge University Press.

Kammer A, Niehues J & Peichl A (2012), Welfare regimes and welfare state outcomes in Europe, *Journal of European Social Policy*, 22(5): 455–471.

Kristjánsson AS (2011), Income Redistribution in Iceland: Development and European Comparisons, *European Journal of Social Security* 13(4): 392–423.

LIS Cross-National Data Center in Luxembourg (2017), Luxembourg Income, *LIS Key Figures and LIS micro datasets,* Luxembourg (www.lisproject.org).

Mahler VA & Jesuit DK (2006), Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study, *Socio-Economic Review* 4: 483–511.

Musgrave RA, Case KE & Leonard HB (1974), The Distribution of Fiscal Burdens and Benefits, *Public Finance Quarterly* 2(July): 259 311.

Nieuwenhuis R, Munzi T & Gornick JC (2016), Comparative research with net and gross income data: An evaluation of two netting down procedures for the LIS Database, *Review of Income and Wealth,* DOI: 10.1111/roiw.12233.

Nolan B & Marx I (2009), Economic Inequality, Poverty, and Social Exclusion in: W. Salverda, B. Nolan & T.M. Smeeding (eds.), *The Oxford Handbook of Economic Inequality*, New York: Oxford University Press: 315-341.

OECD (2008), *Growing unequal? Income distribution and Poverty in OECD Countries*, Paris: OECD.

OECD (2011), *Divided We Stand: Why Inequality Keeps Rising*, Paris: OECD.

OECD (2015), *In It Together: Why Less Inequality Benefits All*, Paris: OECD.

Reynolds M & Smolensky E (1977), Post Fisc Distributions of Income 1950, 1961, and 1970, *Public Finance Quarterly* 5:419-438.

Ringen S (1991), Households, standard of living and inequality, *Review of Income and Wealth* 37: 1-13.

Smeeding TM (2004), Twenty Years of Research in Income Inequality, Poverty and Redistribution in the Developed World: Introduction and Overview, *Socio-Economic Review* 2: 149-163.

Smeeding T & Latner (2015), PovcalNet, WDI and 'All the Ginis': a critical review, *The Journal of Economic Inequality*, 13 (4): 603–628.

Wang C & Caminada K (2011a), Disentangling income inequality and the redistributive effect of social transfers and income taxes in 36 LIS countries, *LIS Working Paper Series #567.*

Wang C & Caminada K (2011b), *Leiden LIS Budget Incidence Fiscal Redistribution Dataset*, posted at the website of Leiden University (Leiden University / Department of Economics / Data).

Wang C, Caminada K & Goudswaard K (2012), The redistributive effect of social transfer programmes and income taxes: A decomposition across countries, *International Social Security Review* 65(3): 27-48.

Wang C, Caminada K & Goudswaard K (2014), Income distribution in 20 countries over time, *International Journal of Social Welfare* 23(3): 262-275.

Wang J & Caminada K (2017), *Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality*, posted at the website of Leiden University (Leiden University / Department of Economics / Data).