Leiden LIS Budget Incidence Fiscal Redistribution Dataset
on
INCOME INEQUALITY

for 47 LIS countries - 1967-2014

Assembled by Jinxian Wang & Koen Caminada

Version 1, November 2017

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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

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Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017

A more detailed description of these data and method will come available in Koen Caminada, Jinxian Wang, Kees Goudswaard & Chen Wang (2017), Income inequality and fiscal redistribution in 47 LIS-countries (1967-2014), *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 update and extension of the Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017 presents the disentanglement of income inequality and the redistributive effect of social transfers and taxes in 47 LIS countries for the period 1967-2014 (Waves I - Wave IX 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 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 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 Income Inequality 2017, 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 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 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.

Content dataset 2017

This data set offers a number of measures of fiscal redistribution in the developed countries, drawing upon data from 293 Luxembourg Income Study surveys conducted in 47 countries between 1967 and 2014 (5,437,818 disposable income observations). In this dataset we have computed several 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 income taxes and social security contributions.

This dataset provides an update and extension of the Leiden LIS Budget Incidence Fiscal Redistribution Dataset (Wang & Caminada, 2011b) in three ways.

- First, the updated dataset covers a larger number of countries (47 versus 36) and a longer period (1967-2014 versus 1967-2006) using the most recent LIS data available.
- Second, 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 prior assembled dataset on fiscal redistribution are – unfortunately - not directly comparable with the figures produced for the current Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017. To obtain a consistent time-series,

all calculations of the database of Wang & Caminada (2011b) were redone using the new 2011 LIS Template, also extending the time-series with the most recent waves (2006 onwards).

♥ Third, we offer a more user-friendly version of the database allowing users to easily select income inequality variables and fiscal redistribution 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 (6):	Czech Republic, Estonia, Hungary, Poland, Slovakia and Slovenia;
Europe – other (5):	Georgia, Iceland, Norway, Serbia and Switzerland;
BRICS (5):	Brazil, China, India, Russia and South Africa;
Latin America (9):	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.

Based on the current assembled dataset, we explore how income inequality have evolved across countries and over time and what effects of fiscal redistribution are. Our dataset offers a number of measures of fiscal redistribution in the developed countries 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 (= 293 datasets; 47 countries over time; 5,437,818 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 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 ($Gini_{pri} - Gini_{dhi}$) and relative fiscal redistribution ($(Gini_{pri} - Gini_{dhi})/ Gini_{pri}$). Moreover, we have computed the shares of absolute and relative fiscal redistribution resulting from direct taxes and social transfers. All figures are presented for both the Total population and the Working-age population (18-64).
[Table A2 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

3) 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 A3 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

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

4) 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 A4 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

5) A measure of the extent of 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)
   [Table A5 in Excel Spreadsheet; a pivot table allows users to select countries and/or specific data years]

A description of the decomposition method of Gini coefficient is given in Annex C.

For 289 out of all 293 LIS datasets, we are able to decompose total redistribution into partial effects of one to seven social transfer programs and 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. Taiwan (1995) is not computed as it misses information on total social security transfers and income taxes and social security contributions.
The data set presents the results of the decomposition of income inequality and the redistributive effect of several social transfers and taxes and contributions for LIS countries. Some benefits or taxes do not have any redistributive effect. The meaning of this is twofold. First, such a benefit scheme does not exist in a specific country and/or data is not available in LIS (represented as *blanks*). Second, such a program exist, but does not have a redistributive effect, because the social expenditures of this program is rather low or the program is distributed equally among the population (noted as 0%). In all tables, when Gross/net information is marked as "net", the redistributive effect of taxes is represented as blanks.
It should be noted that LIS allocate social transfers to several categories (see above and in Tables A4 and A5 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 redistributive effect of the category *Other transfers* (= transfers not allocated to a specific category) amounts for several countries and years 20 percent and over. This high share of the category *Other transfers* is the case for 53 datasets (out of 289) concerning 18 countries (out of all 47): Canada (1994, 1997, 1998, 2000, 2004, 2007, 2010), Colombia (2013), Denmark (1987, 1992), Dominican Republic (2007), Estonia (2000), Germany (1973), Hungary (2007, 2009, 2012), Ireland (1987), Japan (2008), Mexico (1994, 1996, 1998, 2000, 2002, 2004, 2008, 2010, 2012), Norway (1979, 1986), Paraguay (2010), Slovenia (1997, 1999, 2004. 2007, 2010, 2012), South Korea (2006, 2008, 2010, 2012), Spain (1980, 1985), Sweden (2005), Taiwan (1991, 1997, 2000, 2005, 2007, 2010, 2013), 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 fiscal redistribution, especially when LIS allocates less to this category over time due to higher data quality.

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 taxes (contributions). So, state old-age pension benefits will be included in our analysis on redistribution. But countries differ to a large extent in public versus private provision of their pensions (OECD, 2008:120). Occupational and private pensions are not antipoverty programs per se, although they too have a significant effect on redistribution when pre-tax-transfer inequality and post-tax-transfer inequality are measured at one moment in time, particularly among the elderly. The standard approach treats contributions to government pensions as a tax that finances the retirement pensions paid out in the same year, while contributions to private pensions are effectively treated as a form of private consumption. This may affect international comparisons of redistribution effects of social transfers and taxes. Overcoming this bias requires a choice: should pensions be earmarked as 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. Without bottom-coding,

these households would not be included in the calculation of the Gini coefficient of primary income. On the other hand, these households would again be present in the calculation of the Gini coefficient on the basis of secondary income components as these households are entirely dependent on this. In other words, bottom-coding ensures that the calculations of the Gini coefficients are carried out over the same selection of households.

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 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 extent. Alternatively adjustment methods would definitely affect the ranking of countries, although the broad pattern remains the same (Atkinson et al, 1995:52).

Gross and net income datasets in LIS

The Luxembourg Income Study Database is the largest available income database of harmonized microdata collected from 47 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, taxes and contributions, demography, employment, and expenditures (LIS, 2017).

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 293 LIS datasets available at the time of writing, 194 are classified as gross, 84 as net and 15 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 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, Gini of gross income would be equal to Gini 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), and Poland (1995).

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	204,268	15	22,610	2	43,016	7	269,894	24
Wave III	218,537	16	8,603	1	73,851	9	300,991	26
Wave IV	475,730	20	62,522	3	95,616	17	633,868	40
Wave V	371,858	17	33,471	3	79,566	14	484,895	34
Wave VI	544,920	26	10,240	1	117,578	9	672,738	36
Wave VII	773,444	28	15,549	1	100,085	7	889,078	36
Wave VII	798,618	30	31,683	2	150,824	10	981,125	42
Wave IX	723,488	23	13,891	1	99,441	10	836,820	34
Total	4,444,883	194	209,037	15	783,898	84	5,437,818	293
Anglo-Saxon	1,051,330	31	-	-	-	-	1,051,330	31
EU15	1,304,823	77	108,439	9	226.025	37	1,639,276	123
Europe - other	792,132	20	-	-	21,852	5	813,984	25
BRICS	472,136	7	17,108	1	104,349	7	593,593	15
Latin America	185,353	12	45,443	3	351,087	18	581,883	33
CEE	380,875	23	38,047	2	68,736	16	487,658	41
Middle East	50,851	9	-	-	11,849	1	62,700	10
South-East Asia	207,358	15	-	-	-	-	207,358	15
Total	4,444,858	194	209,037	15	783,898	84	5,437,782	293

Source: LIS

Measuring the redistributive effects of taxes and social transfers

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

Redistribution by taxes and social transfers = primary income inequality − disposable income inequality

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

Table 2 The income inequality and redistribution accounting framework

Income components	Income inequality and redistributive effect
Labor income + capital income + private transfers = **Primary income**	**Income inequality before social transfers and taxes**
+ Social security transfers	-/- Redistributive effect of social transfers
= **Gross income**	= **Income inequality before taxes**
-/- Income taxes and social security contributions	-/- Redistributive effect of taxes
= **Disposable income**	= **Income inequality after social transfers and 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). Taiwan (1995) has 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 taxes and transfers vary across countries (Smeeding, 2008; Nolan and Marx, 2009). We apply a cross-national analysis using comparable income surveys for all countries of LIS from 1967-2014, 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, China, Colombia, Czech Republic, Denmark, Dominican Republic, 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, 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 & Jesuit (2006) 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 Gini coefficients.

Levels of inequality can be shown in several ways, e.g., by Lorenz curves, specific points on the percentile distribution (P10 or P90), decile ratios (P90—P10), and Gini coefficients or many other summary statistics of inequality. All (summary) statistics of inequality can be used to rank income inequality in LIS countries, but they do not always tell the same story.

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. 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 inequality across 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 (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 Income Inequality 2017 refines, updates and extends 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 7 main different social benefits and income taxes and social contributions across countries.
Jesuit & Mahler (2004) and Mahler & Jesuit (2006) 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 (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. The current Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017 covers a much wider range of 47 countries using the most recent LIS data available (293 datasets). Data on disposable income e.g. is available for 5,437,818 individual disposable income observations summarized over all countries and waves, i.e. on average 18,559 observations per dataset. The coverage varies per country. The highest number of observations is for Norway 2013 (# 234,519), while the lowest number of observations is for Hungary 1999 (#1,636); see Descriptives for details (Table A1 in Excel Spreadsheet].

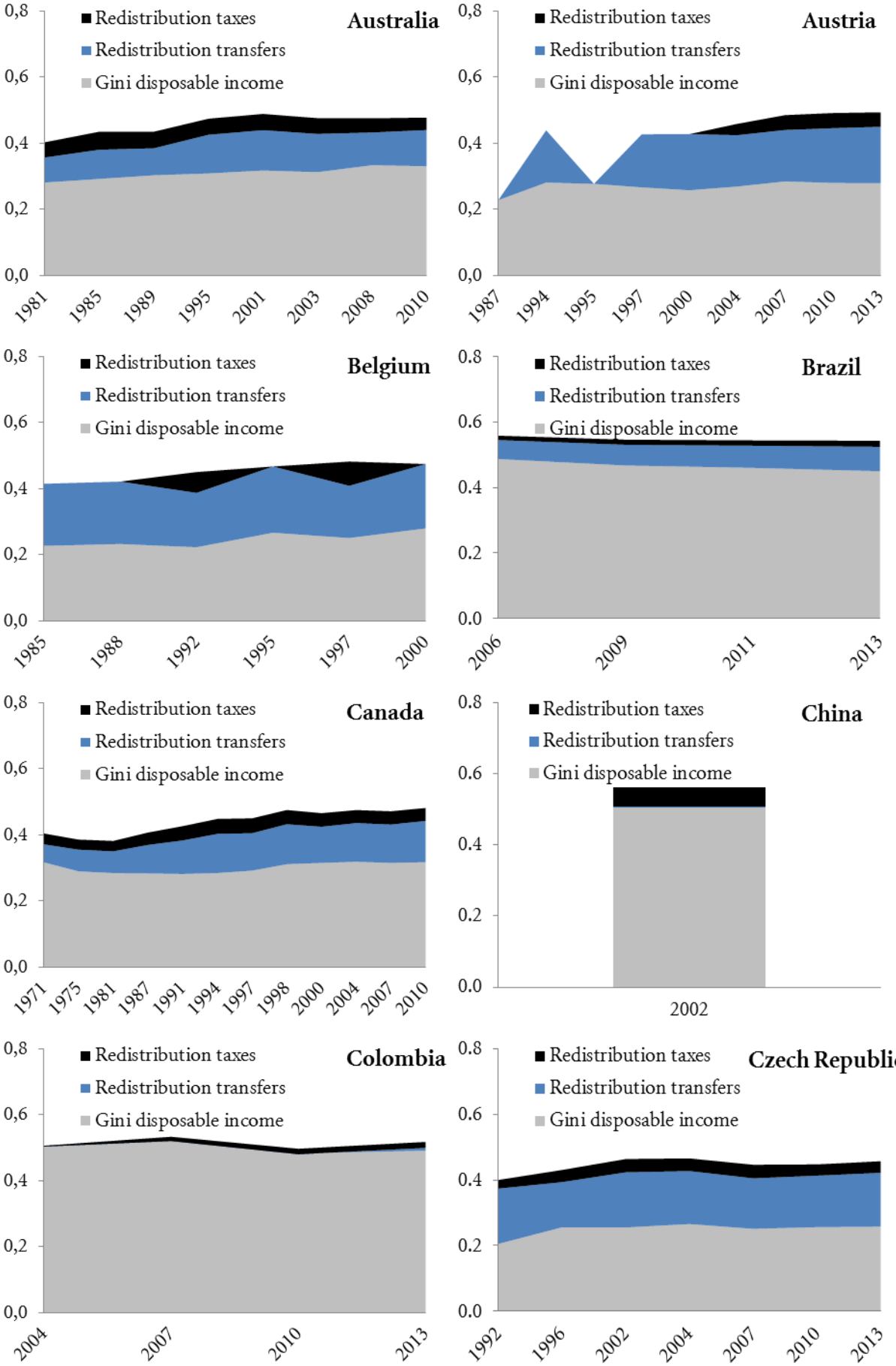
Comparability of fiscal redistribution datasets 2005/2008, 2011 and 2017

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. As a result, figures of prior assembled datasets on fiscal redistribution by both Jesuit & Mahler (2005/2008) and Wang & Caminada (2011b) are unfortunately not comparable with the figures produced for the current Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017.
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

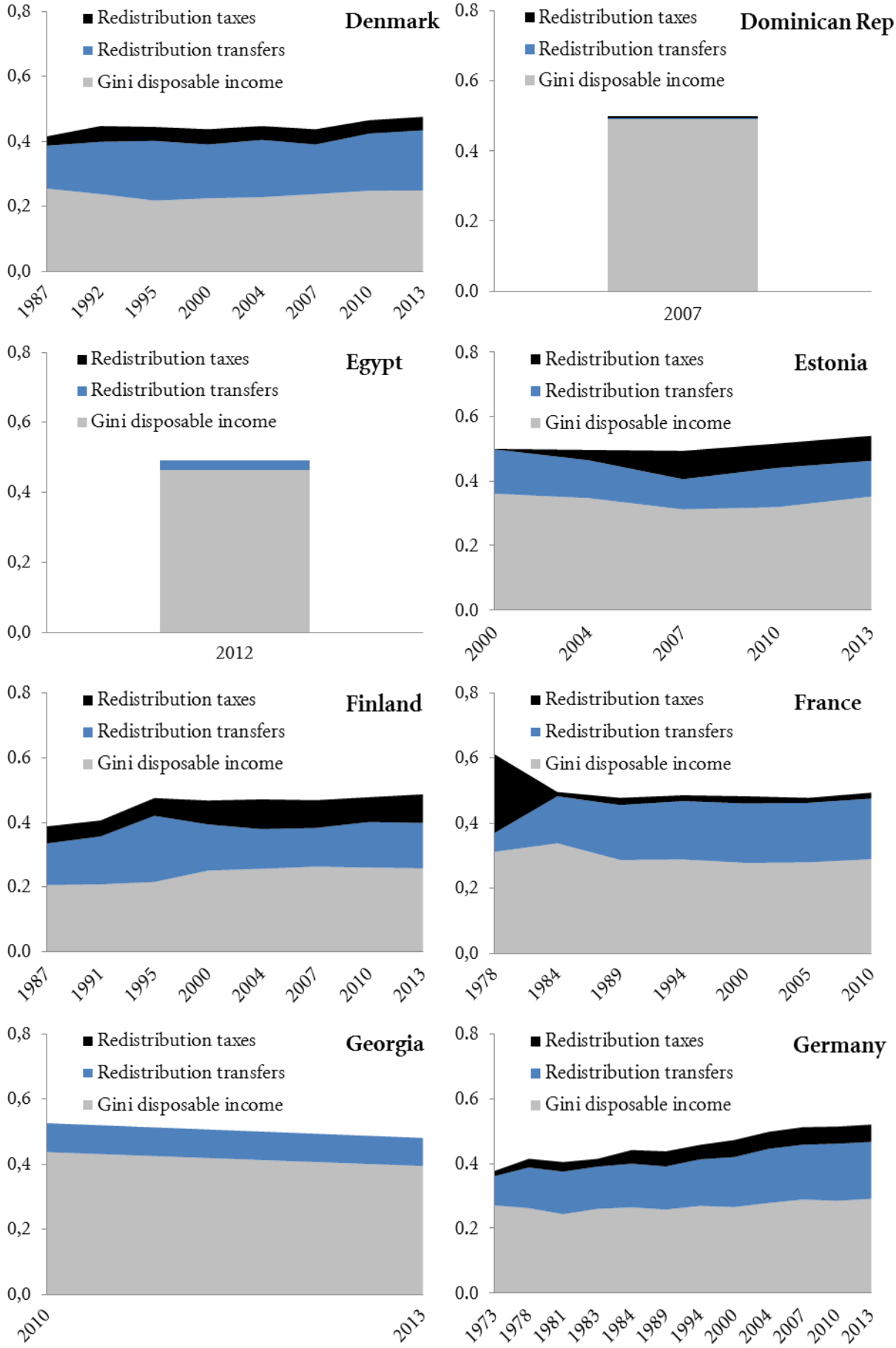
to complement the more detailed ones that are still provided. The revised 2011 LIS Template increased both comparability over-time and cross-national. Moreover, LIS' data users have to make fewer assumptions and do less recoding as they carry out their research. A drawback of the new 2011 LIS Template is that results obtained today for income, 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
Assembled	David Jesuit & Vincent Mahler	Chen Wang & Koen Caminada	Jinxian Wang & Koen Caminada
Launch / Last update	August 2005 / February 2008	August 2011	September 2017
# Countries Countries	13 Australia, Belgium, Canada, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States	36 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.	47 Australia, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Dominican Republic, 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, the UK, the USA, and Uruguay.
# LIS Waves Time-series	I, II, III, IV and V 1979-2002	I, II, III, IV, V and VI 1979-2006	I, II, III, IV, V, VI, VII, VIII and IX 1969-2014
# LIS Datasets	59	177	293
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)	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)
LIS Working Paper Availability Reference	LIS Working Paper #392 http://www.lisdatacenter.org/ Mahler, V.A. & D.K. Jesuit (2006), Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study, *Socio-Economic Review* 4 483–511.	LIS Working Paper # 567 www.economie.leidenuniv.nl Wang, C. & K. Caminada (2011a), Disentangling income inequality and the redistributive effect of social transfers and taxes in 36 LIS countries, *LIS Working Paper #567.*	LIS Working Paper # www.economie.leidenuniv.nl K. Caminada, J. Wang, K. Goudswaard & C. Wang (2017), Income inequality and fiscal redistribution in 47 LIS countries (1967-2014), *LIS Working Paper #*.

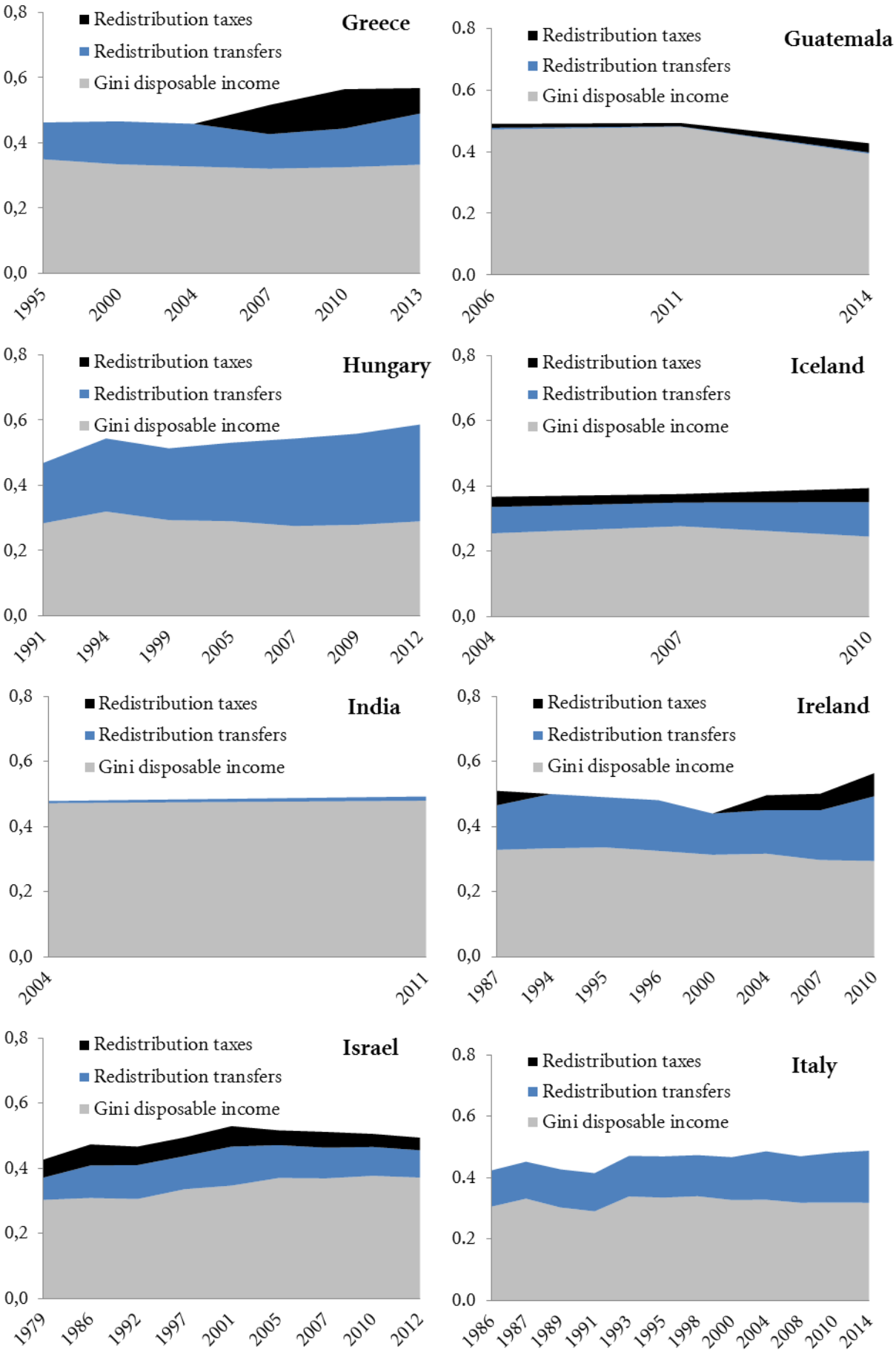
Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



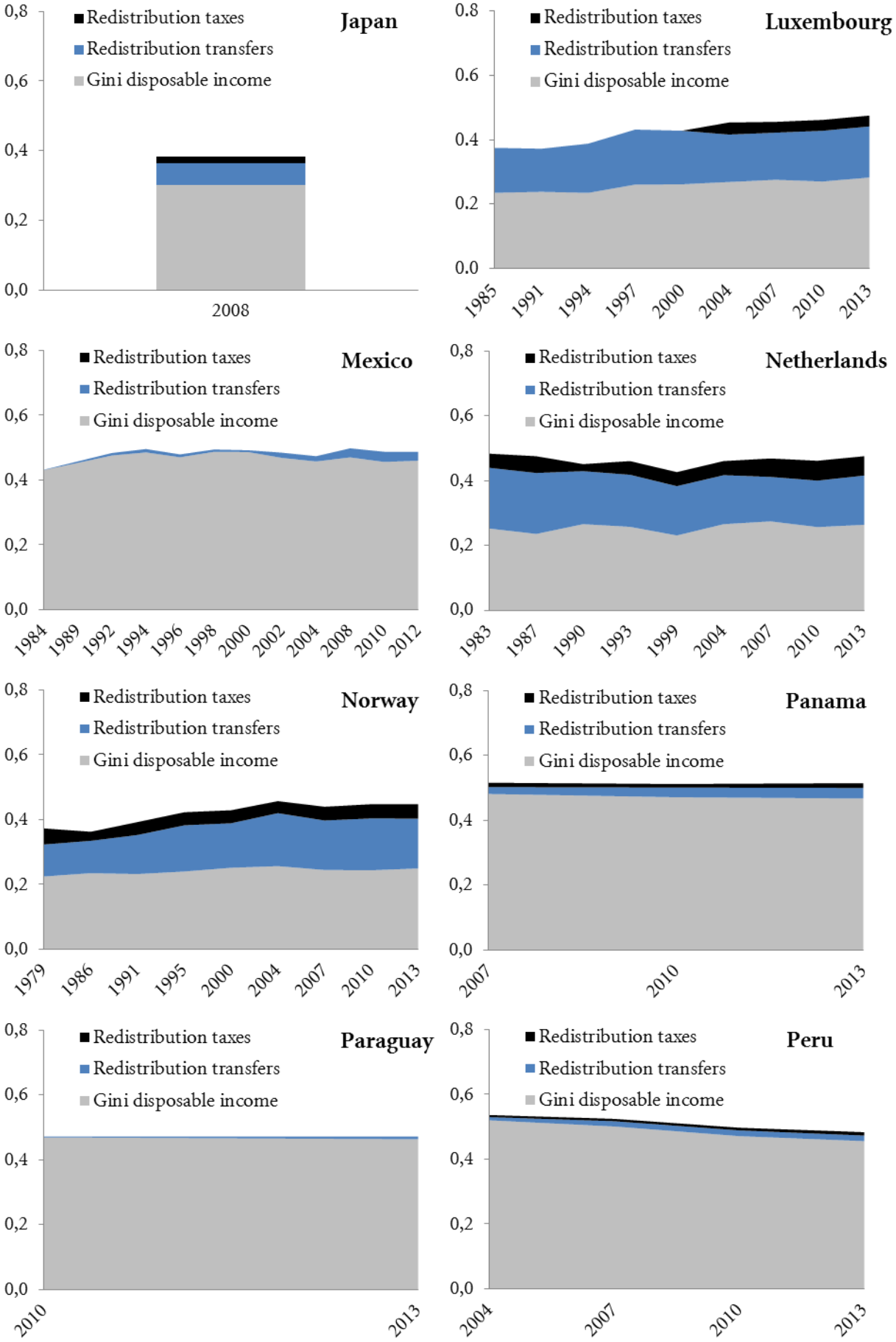
Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



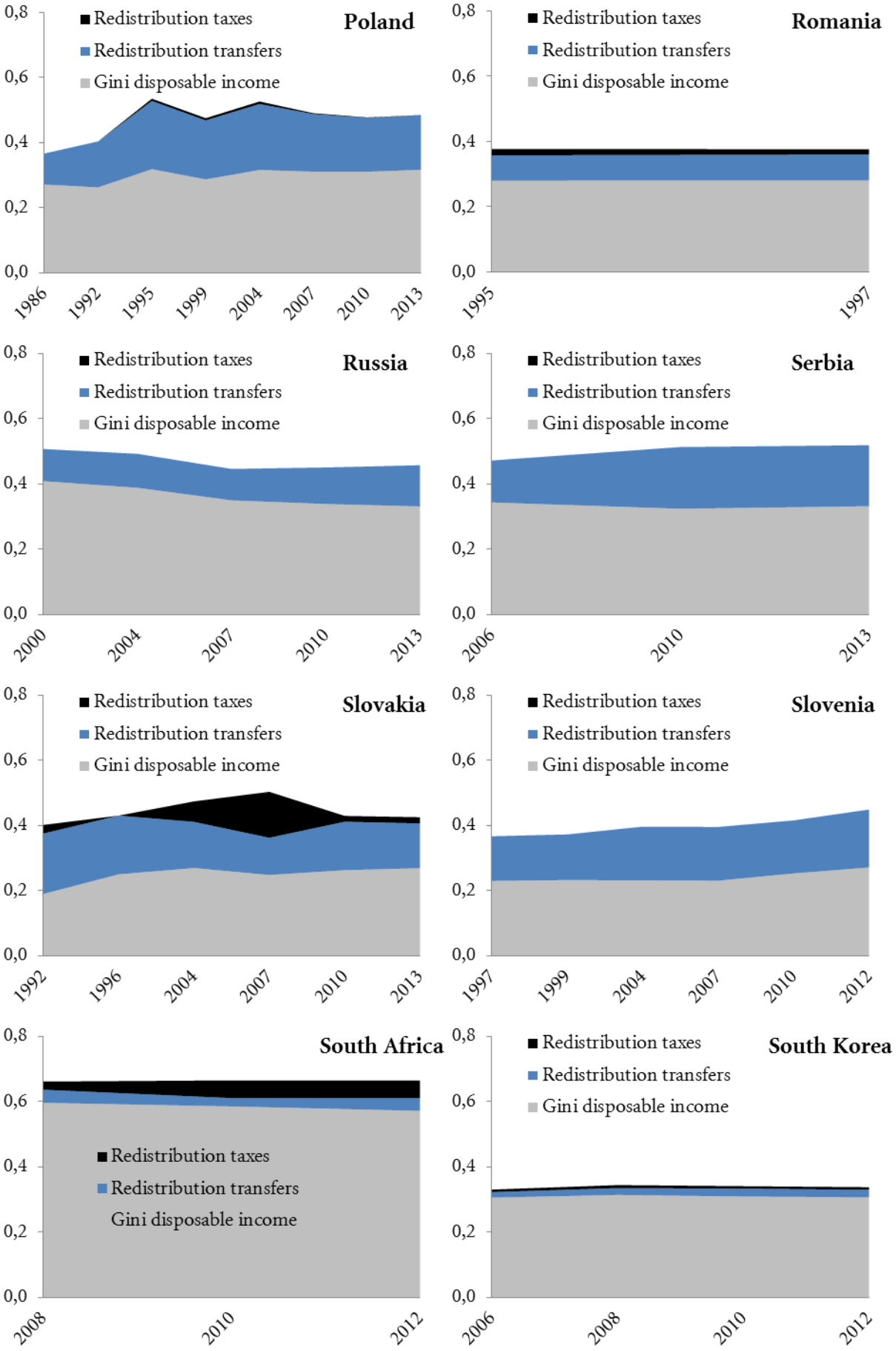
Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



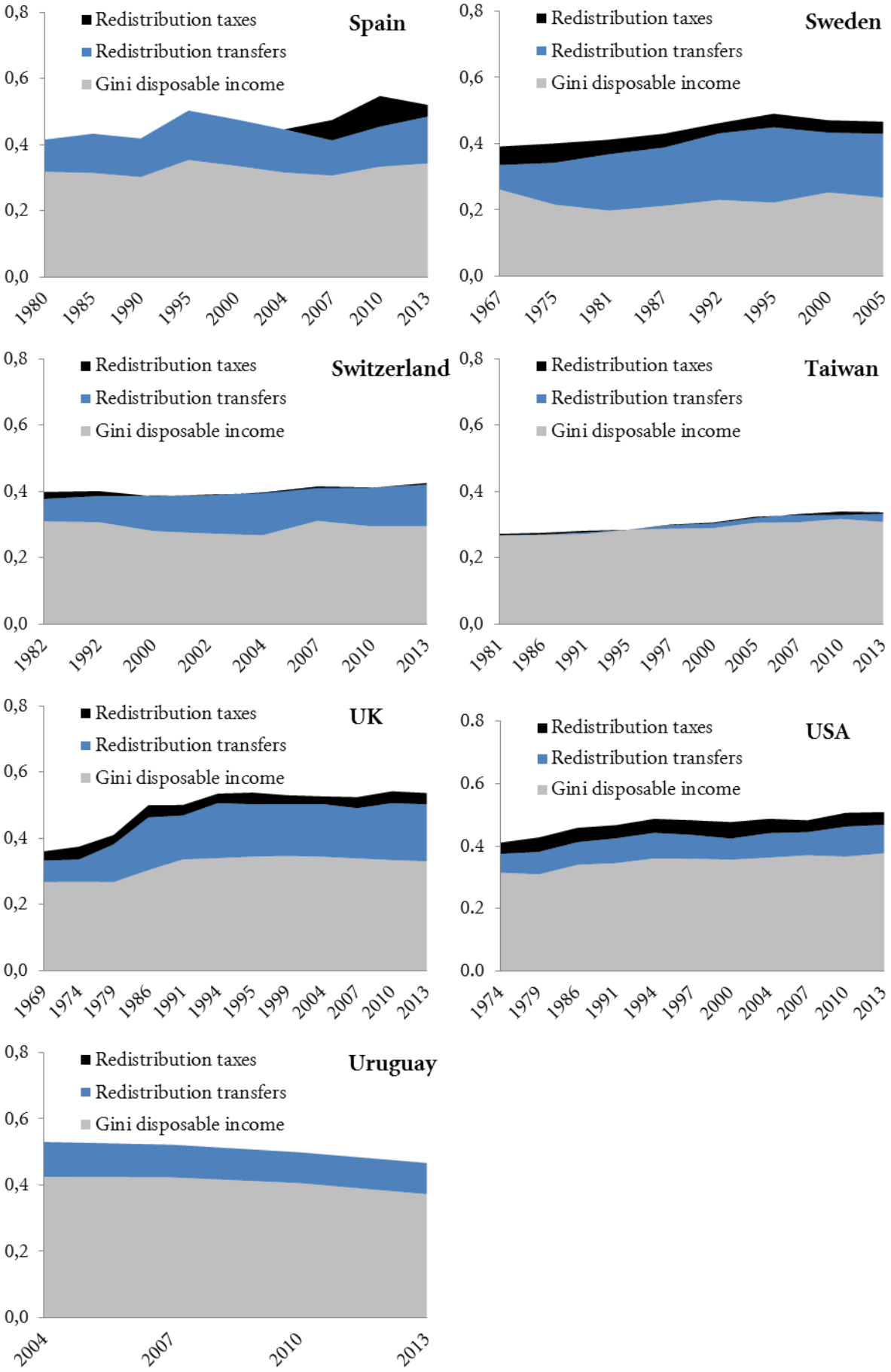
Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



Income inequality and fiscal redistribution by social transfers and taxes in 47 LIS countries 1967-2014



Annex A: Household Income Components List

Table A1 presents the framework for accounting income inequality 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 Income Inequality 2017 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. In calculating pre-tax-transfer income inequality, 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 $Gini_{pri}$ and $Gini_{gross}$ is the redistribution from total transfers while difference between $Gini_{gross}$ and $Gini_{dhi}$ is the redistribution 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 Distribution Indicator	Redistribution Measurement	Specific Income Source
Gini (pri)		Primary Income (factor+hitp)
Transfers Redistribution	Gini (pri)-Gini (pri+trans)	
Gini (pri+trans)		Primary Income + social security transfers (factor+hitp+hits)
Taxes Redistribution	Gini (pri+trans)-Gini (dhi)	
Gini (dhi)		Net disposable Income (dhi)
Overall Redistribution	Gini (pri)-Gini (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 AU10, AU08, 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 293 LIS datasets available at the time of writing, 194 are classified as gross, 84 as net and 15 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 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 taxes and transfers. We offer a user-friendly version of the database allowing users to easily select income inequality 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 income	*Net income*	*Mixed*
Australia	AU10, AU08, AU03, AU01, AU95, AU89, AU85, AU81		
Austria	AT13, AT10, AT07, AT04	AT00, AT97, AT94	AT95, AT87
Belgium	BE97, BE92	BE00, BE95, BE88, BE85	
Brazil	BR13, BR11, BR09, BR06		
Canada	CA10, CA07, CA04, CA00, CA98, CA97, CA94, CA91, CA87, CA81, CA75, CA71		
China			CN02
Colombia	CO04		CO13, CO10, CO07
Czech Republic	CZ13, CZ10, CZ07, CZ04, CZ02, CZ96, CZ92		
Denmark	DK13, DK10, DK07, DK04, DK00, DK95, DK92, DK87		
Dominican Rep	DO07		
Egypt		EG12	
Estonia	EE13, EE10, EE07, EE04		EE00
Finland	FI13, FI10, FI07, FI04, FI00, FI95, FI91, FI87		
France			FR10, FR05, FR00, FR94, FR89, FR84, FR78
Georgia		GE13, GE10	
Germany	DE13, DE10, DE07, DE04, DE00, DE94, DE89, DE84, DE83, DE81, DE78, DE73		
Greece	GR13, GR10, GR07	GR04, GR00, GR95	
Guatemala	GT14, GT11, GT06		
Hungary		HU12, HU09, HU07, HU05, HU99, HU94, HU91	
Iceland	IS10, IS07, IS04		
India		IN11, IN04	
Ireland	IE10, IR07, IE04, IE87	IE00, IE96, IE95, IE94	
Israel	IL12, IL10, IL07, IL05, IL01, IL97, IL92, IL86, IL79		
Italy		IT14, IT10, IT08, IT04, IT00, IT98, IT95, IT93, IT91, IT89, IT87, IT86	
Japan	JP08		
Luxembourg	LU13, LU10, LU08, LU04	LU00, LU97, LU94, LU91, LU85	
Mexico		MX12, MX10, MX08, MX04, MX02, MX00, MX98, MX96, MX94, MX92, MX89, MX84	
Netherlands	NL13, NL10, NL07, NL04, NL99, NL93, NL90, NL87, NL83		
Norway	NO13, NO10, NO07, NO04, NO00, NO95, NO91, NO86, NO79		
Panama	PA13, PA10, PA07		
Paraguay		PY10, PY13	
Peru	PE13, PE10, PE07, PE04		
Poland	PL13, PL10, PL07, PL04, PL99	PL92, PL86	PL95
Romania	RO97, RO95		
Russia		RU13, RU10, RU07, RU04, RU00	
Serbia		RS13, RS10, RS06	
Slovak Republic	SK13, SK10, SK07, SK04, SK92	SK96	
Slovenia		SI12, SI10, SI07, SI04, SI99, SI97	
South Africa	ZA12, ZA10, ZA08		
South Korea	KR12, KR10, KR08, KR06		
Spain	ES13, ES10, ES07	ES04, ES00, ES95, ES90, ES85, ES80	
Sweden	SE05, SE00, SE95, SE92, SE87, SE81, SE75, SE67		
Switzerland	CH13, CH10, CH07, CH04, CH02, CH00, CH92, CH82		
Taiwan	TW13, TW10, TW07, TW05, TW00, TW97, TW95, TW91, TW86, TW81		
United Kingdom	UK13, UK10, UK07, UK04, UK99, UK95, UK94, UK91, UK86, UK79, UK74, UK69		
United States	US13, US10, US07, US04, US00, US97, US94, US91, US86, US79, US74		
Uruguay		UY13, UY10, UY07, UY04	

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

Annex C: Decomposition of the Gini coefficient

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

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

$$Gini = 1 + \left(\frac{1}{n}\right) - \left[\frac{2}{n^2}\ \mu\right]\sum_{i=1}^{n}(n - i + 1)y_i\ , i = 1, 2, \dots, n \qquad (1)$$

In formula (1), n denotes number of individuals, μ denotes average income of individuals, and y_i presents income of individual i. 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.

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

y_i^{pri}, B_i and T_i denote primary income of individual i, total transfers 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 and salaries, social security transfers, private transfers and so on, where we focus on social transfers and direct taxes. When $\alpha = 0$ and $\beta = 0$, the resulting inequality measure presents the Gini coefficient before transfers and taxes ($\mathrm{Gini}_{\mathrm{pri}}$); if $\alpha = 1$ and $\beta = 1$, the measure corresponds to the Gini coefficient after transfers and taxes ($\mathrm{Gini}_{\mathrm{dhi}}$). For $\alpha = 1$ and $\beta = 0$, Gini coefficient after transfers, but before taxes is measured ($\mathrm{Gini}_{\mathrm{gross}}$). If $\alpha = 0$ and $\beta = 1$ the measure shows the Gini coefficient after 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 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.

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

This allows us to calculate inequality (Gini) 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 within the trajectory between primary income inequality and disposable income inequality (like old-age/disability/survivor transfers, sickness transfers, family/children transfers, education transfers, unemployment transfers, housing transfers, general/food/medical assistance transfers and other social security 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 (1977a and 1977b) measure of the redistributive impact of transfers and taxes to present the reduction in Gini coefficient from primary income (pri) to disposable income (dhi). The redistributive effect *LG* can be expressed as (c.f. Creedy & Ven, 2001):

$$LG = Gini_{pri} - Gini_{dhi} \tag{4}$$

LG and *Gini* are the redistributive effect and the Gini coefficient of primary or disposable income. The total redistributive effect can be disentangled in several partial effects:

$$LG_B = Gini_{pri} - Gini_{pri+B} \tag{5}$$

$$LG_T = Gini_{pri+B} - Gini_{dhi} \tag{6}$$

LG_B and LG_T represent the partial redistributive effect of all benefit transfers *B*, and the partial redistributive effect of all taxes and social contributions *T*. $Gini_{pri+B}$ is equal to $\text{Gini}_{\text{gross}}$. Consequently, the decomposition in formula (5) and (6) will offer us a quantitative measure for the overall reduction in the Gini by transfers and taxes in a country.

In order to assess the effects of social benefits and taxes on the overall redistribution 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, taxes on gross income rather than primary income alters the outcome to some extent. Since taxes are levied on gross income (primary income plus benefits), the redistributive effects may be underestimated. Nevertheless the logic of this decomposition of Gini is that taxes are applied to gross income and benefits to primary income. This approach has been, among others, advocated by Kakwani (1986).

Our sequential decomposition approach of income inequality follows studies by Jesuit & Mahler (2004) and Mahler & 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 & Yitzhaki (1985), Stark et al (1986), Kim (2000), Creedy & Ven (2001). For example the well-known Lerman & Yitzhaki's (1985) 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 & 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, whereas taxes and social contributions are by far the most important contributors to income inequality reduction (e.g., Jenkins 1995; Jäntti 1997; Burniaux et al, 1998). 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

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

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 & Jesuit (2006), and recent studies by Kristjánsson (2011) and Kammer et al (2012). 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.

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

Disentangling the inequality by income source could be affected by the ordering effect. 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 correct for this as follows: we first consider every specific social transfer as the first program to be added to primary income and then the last program following all other transfer programs. Consequently, we can get two Ginis: $Gini_{pri+Bk}$ and $Gini_{gross-Bk}$. The redistributive effect of specific transfer programs can be presented by (7):

$$LG_{BK} = ((Gini_{pri} - Gini_{pri+Bk}) + (Gini_{gross-Bk} - Gini_{gross}))/2 \quad (7)$$

The redistributive effect of income taxes and social security contributions will be calculated by formula (6). Consequently, the decomposition in formula (7) and (6) will offer us a quantitative measure for the reduction in the Gini by specific social programs in a country. When we take the mean of the decomposition results across countries, the sum of all partial redistributive effects amount (a little) over 100 percent due to missing observations. 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.

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