

Bartels, Charlotte; Neumann, Dirk

Working Paper

Redistribution and insurance in welfare states around the world

SOEPpapers on Multidisciplinary Panel Data Research, No. 985

Provided in Cooperation with:

German Institute for Economic Research (DIW Berlin)

Suggested Citation: Bartels, Charlotte; Neumann, Dirk (2018) : Redistribution and insurance in welfare states around the world, SOEPpapers on Multidisciplinary Panel Data Research, No. 985, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin

This Version is available at:

<https://hdl.handle.net/10419/183166>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

SOEPpapers
on Multidisciplinary Panel Data Research

SOEP – The German Socio-Economic Panel study at DIW Berlin

985-2018

Redistribution and Insurance in Welfare States around the World

Charlotte Bartels and Dirk Neumann

SOEPPapers on Multidisciplinary Panel Data Research at DIW Berlin

This series presents research findings based either directly on data from the German Socio-Economic Panel study (SOEP) or using SOEP data as part of an internationally comparable data set (e.g. CNEF, ECHP, LIS, LWS, CHER/PACO). SOEP is a truly multidisciplinary household panel study covering a wide range of social and behavioral sciences: economics, sociology, psychology, survey methodology, econometrics and applied statistics, educational science, political science, public health, behavioral genetics, demography, geography, and sport science.

The decision to publish a submission in SOEPPapers is made by a board of editors chosen by the DIW Berlin to represent the wide range of disciplines covered by SOEP. There is no external referee process and papers are either accepted or rejected without revision. Papers appear in this series as works in progress and may also appear elsewhere. They often represent preliminary studies and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be requested from the author directly.

Any opinions expressed in this series are those of the author(s) and not those of DIW Berlin. Research disseminated by DIW Berlin may include views on public policy issues, but the institute itself takes no institutional policy positions.

The SOEPPapers are available at
<http://www.diw.de/soeppapers>

Editors:

Jan **Goebel** (Spatial Economics)
Stefan **Liebig** (Sociology)
David **Richter** (Psychology)
Carsten **Schröder** (Public Economics)
Jürgen **Schupp** (Sociology)

Conchita **D'Ambrosio** (Public Economics, DIW Research Fellow)
Denis **Gerstorff** (Psychology, DIW Research Fellow)
Elke **Holst** (Gender Studies, DIW Research Director)
Martin **Kroh** (Political Science, Survey Methodology)
Jörg-Peter **Schräpler** (Survey Methodology, DIW Research Fellow)
Thomas **Siedler** (Empirical Economics, DIW Research Fellow)
C. Katharina **Spieß** (Education and Family Economics)
Gert G. **Wagner** (Social Sciences)

ISSN: 1864-6689 (online)

German Socio-Economic Panel (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: soeppapers@diw.de



Redistribution and Insurance in Welfare States around the World

Charlotte Bartels, Dirk Neumann*

October 4, 2018

Abstract:

Redistribution across individuals in a one-year-period framework is an empirically intensely studied question. However, a substantial share of annual redistribution might turn out to serve individual insurance in a longer perspective. In particular, public pensions, that smooth incomes over the life-cycle and are funded by high taxes, play an increasingly important role in welfare states with aging societies. This paper investigates to what extent long-run redistribution diverges from annual redistribution in welfare states of different types. Exploiting panel data from the Cross-National Equivalent File (CNEF) for Australia, Germany, Korea, Switzerland, the United Kingdom and the United States, we find that supposedly highly redistributive welfare states like Germany provoke comparably less redistribution between individuals in the long-run than the United Kingdom or the United States. Regression results show that a higher share of elderly is associated with higher annual redistribution, but with less long-run redistribution between individuals.

JEL Codes: D31, D63, H53, H55, I38

Keywords: Welfare states, redistribution, insurance

*Bartels (cbartels@diw.de) is affiliated to DIW Berlin, IZA and UCFS, Neumann (dirk.neumann@oecd.org) to OECD, ZEW and IZA. Neumann acknowledges support from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) / ERC grant agreement no. 269831. This paper greatly benefited from the comments of Giacomo Corneo, Benoit Decerf, Daniel Kemptner, Johannes König, François Maniquet, Pierre Pestieau, Panu Poutvaara, and Carsten Schröder as well as seminar participants of the Welfare Economics Seminar, CORE, Université Catholique Louvain, the SIMDECO workshop 2017, LISER, Luxembourg, and conference participants of the 11th Winterschool on Inequality and Social Welfare Theory 2016, SSCW 2016, ZEW Public Finance 2017, ECINEQ 2017, and IIPF 2018. Any errors as well as the views presented in this paper are the responsibility of the authors alone. In particular, the views do not represent the official positions of organizations to which the authors are affiliated.

1 Introduction

Welfare states around the world strongly redistribute income to reduce income differences between their citizens. A large literature documents the size of annual redistribution in these welfare states. However, welfare states also insure their citizens against risks such as sickness, disability, longevity and unemployment, stabilizing their income over time. This only becomes evident when extending the measurement period to more than one year. If a welfare state smoothes incomes over time, the widely used measures for annual redistribution will overstate redistribution between individuals in the long-run and a substantial share of annual redistribution will turn out to serve individual income stabilization. For instance, contributions to public pension systems reduce income differences in a society in a given year, but are paid back during retirement stabilizing a persons income stream. Progressive income taxation not only reduces income differences between individuals, but also compresses individual or household income streams over time.

This paper makes two contributions: First, using panel data from the Cross-National Equivalent File (CNEF) 1970-2013, we calculate to what extent standard measures for annual redistribution widely used in the scientific literature but also in policy debates overstate the long-run redistributive impact in six welfare states. CNEF data cover Australia, Germany, Korea, Switzerland, the United Kingdom and the United States. Secondly, we examine which determinants can explain cross-country differences in annual vs. long-run redistribution, covering, e.g., the share of elderly, migrants, openness of the economy, societal beliefs about the role of luck, etc.

We begin by comparing permanent inequality between individuals to individual income variation over time when increasing the period length. For this, we compute subgroup-decomposable inequality measures over varying period lengths, where realized individual income streams over time are interpreted as a subgroup. Our measure for redistribution between individuals over varying period lengths is the reduction of between-group inequality moving from pre- to post-government household income. We then investigate potential determinants of annual vs. long-run redistribution across the six welfare states.

We find that welfare states with more earnings-related benefits, and, thereby, more status-preserving character like Germany turn out to be less redistributive in the long-run. Extending the period length and ranking countries by their redistributive impact shows that Anglo-Saxon countries like Australia, the United Kingdom and the United States are relatively more redistributive in a longer perspective than the corporatist welfare state of Germany. Regression results show that a higher share of elderly is associated with more annual, but less long-run redistribution between individuals. This can be explained by the growing share of elderly opting in favor of annually more redistributive systems, collecting social security contributions and taxes to fund public

pensions.

The remainder of the paper is structured as follows. Section 2 gives an overview on the related literature. Section 3 introduces the conceptual framework and methodology to measure long-run redistribution, based on the Theil coefficient and the Mean Logarithmic Deviation. Section 4 describes the data. Section 5 presents our results for long-run redistribution across countries. In Section 6, we test potential explanatory variables for cross-country differences using a regression approach. Section 7 concludes.

2 Literature review

We contribute to the large literature that analyzes income redistribution over the life-cycle (Nelissen; 1998; Björklund and Palme; 2002; Pettersson and Pettersson; 2007; Ter Rele; 2007; Bovenberg et al.; 2008; Hoynes and Luttmer; 2011; Bartels; 2012; Bengtsson et al.; 2016; Levell et al.; 2017; Haan et al.; 2018; Roantree and Shaw; 2018). Some of these studies consider the stabilizing component of government redistribution, usually referred to as *insurance*. Both components are calculated as appropriate differences between pre- and post-government income.¹ Bartels (2012), Haan et al. (2018), and Björklund and Palme (2002) decompose the Theil coefficient. Both Bartels (2012) and Haan et al. (2018) use data from the Socio-Economic Panel (SOEP) and find that the German welfare state offers comparably more insurance than redistribution. Furthermore, Haan et al. (2018) find that taxes and unemployment insurance in Germany are much more effective at redistributing lifetime income than insuring lifetime earnings risk, whereas disability benefits are not redistributive. Social assistance turns out as the most important transfer program for both insurance and redistribution. Roantree and Shaw (2018) use data from the British Household Panel Survey (BHPS) and find that the share of insurance in total redistribution increases as the period length increases. Bovenberg et al. (2008) use administrative data from Denmark and find that 74% of total redistribution serves reducing income differences between individuals over a lifetime, while 26% serves income smoothing.

However, research on long-run redistribution from a cross-country perspective contrasting different types of welfare states is scarce as the data requirement is large: income smoothing can empirically only be separated from redistribution if comparable longitudinal data on pre- and post-government income streams can be observed

¹This approach is also related to the literature decomposing individual earnings dynamics into a permanent component, mirroring the disparity of permanent incomes, and a transitory component, covering short-term volatility. The traditional approach employed in studies on earnings dynamics decomposes the total variance structure following the seminal contribution of Gottschalk and Moffitt (1994). See, e.g., Dynarski and Gruber (1997), Haider (2001), Baker and Solon (2003), Dynan and Sichel (2008), Beach and Gray (2010), Shin and Solon (2011), Moffitt and Gottschalk (2012), Cappellari and Jenkins (2014). The reduction of earnings shocks through the tax-benefit-system is interpreted as insurance (Blundell et al.; 2015).

for long time spans. Examples using CNEF data are Chen (2009) comparing Canada, Germany, the UK and the US as well as Bartels and Bönke (2013) comparing Germany and the UK. This paper attempts to fill this gap extending the analysis to six welfare states and investigating explanatory factors for cross-country differences.

We also contribute to the literature on preferences for and the political economy of redistribution investigating the determinants of cross-country differences in redistribution.² On the one hand, the canonical model of Meltzer and Richard (1981) implies that redistribution increases with pre-tax income inequality. Milanovic (2000) and Scervini (2012) provide empirical evidence for this relationship. Buchanan (1976) showed that income uncertainty leads net taxpayers to support redistribution due to the associated insurance element. On the other hand, the prospect of upward mobility (POUM) may weaken the support of today's poor for redistributive schemes, while sufficiently risk averse individuals might again be in favor of redistribution because of social insurance (Benabou and Ok; 2001; Ravallion and Lokshin; 2000). Studies on preferences for redistribution have generally stressed the importance of societal beliefs: If people believe that the unequal distribution of incomes is due to luck, they are less willing to accept high inequality levels and support more redistribution (Alesina and Angeletos; 2005; Fong; 2001; Corneo and Grüner; 2002). Glazer et al. (2008) provide a novel theoretical model for why migration need not result in a race to the bottom in income redistribution. In contrast, migration Dahlberg et al. (2012) and racial heterogeneity Luttmer (2001) is found to empirically reduce the demand for redistribution. Razin et al. (2002) identify a redistribution trade-off in aging societies: The greater number of retirees increases the demand for benefits, but reduces the willingness of the working-age population to support redistribution as they are net losers from increased benefits for the elderly. While Tabellini (2000) and Moene and Wallerstein (2001) find a positive association between elderly share and spending for social insurance, Razin et al. (2002) show that an increasing elderly share can lead to lower taxes and less generous social transfers. Our approach enables us to disentangle redistribution and insurance and to investigate potentially different directions of the elderly share effect on annual redistribution and long-run redistribution.

The present paper also alludes to the Paradox of Redistribution (PoR) formulated by Korpi and Palme (1998). They argue that welfare states providing universal benefits are more redistributive than welfare states providing targeted, means-tested benefits. Policies aimed at maintaining living standards of the entire population will be widely supported by the population, which in turn increases the size of the budget available for redistribution and is likely to result in greater redistribution. Moene and Wallerstein (2001) analyse inequality of disposable income using LIS data and find that income distributions in universal welfare states are more equal than in welfare states with

²See Alesina and Giuliano (2001) for an overview.

basic security and targeted support schemes, especially in Australia, Switzerland, and the United States. Casamatta et al. (2000) show that it may be appropriate to adopt less redistribution than otherwise optimal, in order to ensure political support. We contribute to the discussion of the PoR by quantifying the share of individual insurance in overall redistribution across welfare states.

3 Conceptual framework

Our goal is to measure the long-run redistributive impact of welfare states. In particular, we seek to examine how long-run income differences between individuals and individual income variation over time are reduced by the tax-transfer system and how this reduction varies across countries. We split individual i 's equivalized household income y in year t over period length p into two components:

$$y_{i,t,p} = \bar{y}_{i,p} + \nu_{i,t,p}, \quad (1)$$

where $\bar{y}_{i,p}$ denotes the individual's average income in period p . $\nu_{i,t,p}$ is the transitory component reflecting the annual deviation from the individual's permanent income path. Ideally, the term $\nu_{i,t,p}$ would capture purely exogenous shocks. However, in practice, self-insuring behavioural reactions to income shocks, such as increased working hours or increased savings, potentially mitigate the effect of a shock, both in the short- and in the long-run. We do not explicitly account for these behavioural reactions, but rather take them as given, as we aim to capture the redistributive and stabilizing impact of the welfare state on realized income streams *on top* of what households might have mitigated themselves beforehand.³ Furthermore, most of the literature shows that behavioural responses to income shocks are quite small, because most workers face fixed work contracts.⁴

Total income inequality I^{total} over period length p is decomposed into permanent income inequality and individual income variation. p denotes the period length and ranges from 1, where our approach collapses to the traditional annual approach, to 13 years (see also Section 4). The between-group component, $I^{between}$, measures income differences between people (inter-individual inequality) and the within-group component, I^{within} , measures individual income variation over time (intra-individual inequality).

³For instance, Hoynes and Luttmer (2011) and Haan et al. (2018) take an *ex ante* perspective and estimate individual-level income trajectories, enabling them to identify insurance elements of government policies to unexpected shocks, which in turn requires strong assumptions on the structure of earnings trajectories as they need to decide on a functional form to model individual income paths. Haan et al. (2018) restrict their analysis to earnings as simulating family income would require further assumptions on household formation and fertility decisions.

⁴Heathcote et al. (2014) find that 15.5% of wage fluctuations are smoothed through individual labor supply. Zang (2014) finds that labor supply responses to spouse's adverse wage shocks reduce earnings instability by about 2 to 9%.

ity), while each individual income stream is interpreted as a subgroup. We compute inequality measures for different starting years in order to capture the relevant shifts in the skill-returns, e.g., through technological change favoring high-skilled workers.

$$I^{total}(y_{i,t,p}) = I^{between}(\bar{y}_{i,p}) + I^{within}(\nu_{i,t,p}) \quad (2)$$

The standard time frame for inequality measurement is $p = 1$. If $p = 1$, then $I^{within} = 0$ and $I^{total} = I^{between}$. The greater p , the lower is $I^{between}$ and the greater is I^{within} . That is, by extending the measurement period, individual income variation over time explains an increasing portion of total inequality.

We measure and decompose total inequality I^{total} employing the Theil coefficient, denoted T^{total} . Björklund and Palme (2002), Bartels (2012) and Haan et al. (2018) use the Theil coefficient in the same context. As a robustness check, we also employ the Mean Logarithmic Deviation (MLD), denoted M^{total} . The decomposition of the Theil coefficient over period length p is represented as follows:

$$T^{total} = \underbrace{\frac{1}{N} \sum_{i=1}^N \frac{\bar{y}_{i,p}}{\bar{y}_p} \ln \frac{\bar{y}_{i,p}}{\bar{y}_p}}_{\text{between}} + \underbrace{\frac{1}{N} \sum_{i=1}^N \frac{\bar{y}_{i,p}}{\bar{y}_p} T_i}_{\text{within}} \quad (3)$$

\bar{y}_p is the population average income over period length p . $T_i = \frac{1}{p} \sum_{t=1}^p \frac{y_{i,t,p}}{\bar{y}_{i,p}} \ln \frac{y_{i,t,p}}{\bar{y}_{i,p}}$ is the Theil index of individual i .

We decompose the total MLD as follows

$$M^{total} = \underbrace{\frac{1}{N} \sum_{i=1}^N \ln \frac{\bar{y}_p}{\bar{y}_{i,p}}}_{\text{between}} + \underbrace{\frac{1}{N} \sum_{i=1}^N M_{i,p}}_{\text{within}} \quad (4)$$

where $M_i = \frac{1}{p} \sum_{t=1}^p \ln \frac{\bar{y}_{i,p}}{y_{i,t,p}}$ is the MLD of individual i .

We measure traditional redistribution T as the absolute difference between pre- and post-government income inequality, $I(y)$ and $I(x)$, respectively, with equalized gross household income denoted y and equalized net household income denoted x .⁵ We compute the index for period length p and starting year t as

$$R_{t,p} = I(y_{i,t,p}) - I(x_{i,t,p}) \quad (5)$$

We compute $R_{t,p}$ for total inequality as well as for between- and within-group inequality. If $R_{t,p}^{between} > R_{t,p+1}^{between}$, then redistribution between individuals decreases with period length p , which indicates that we would overestimate the redistributive

⁵If there is no re-ranking between the gross and net income distribution, then this measure collapses to the Reynolds-Smolensky index (Reynolds and Smolensky; 1977).

impact of the welfare state if we applied a traditional annual measurement framework. Thus, the reduction of the between-group component is our measure of interest, as welfare states aiming at redistribution should direct their policies towards cancelling out permanent income differences between individuals. Long-run redistribution will mostly occur through progressive income taxation and means-tested benefits, but also to some extent through social insurance schemes that contain a redistributive element. Accordingly, the reduction of the within-component captures income smoothing by the government, e.g., through progressive income taxation, old-age pensions as well as unemployment, disability and sickness benefits.

To explicitly capture the decline of the redistributive effect when extending the measurement period, we define a redistribution-ratio $RR_{t,p}$, which is the share of redistribution between individuals in the overall reduction of inequality and is written as follows:

$$RR_{t,p} = \frac{I^{between}(y_{i,t,p}) - I^{between}(x_{i,t,p})}{I(y_{i,t,p}) - I(x_{i,t,p})} \quad (6)$$

$RR_{t,p} = 1$, if inequality is traditionally measured on a cross-section, i.e. $p = 1$, while $RR_{t,p} < 1$ if p increases. Conceptually, this approach is similar to Shorrocks R (Shorrocks; 1978) measuring the ratio of permanent to total inequality.

4 Data

We use panel data from the Cross-National Equivalent File (CNEF) 1970-2013 for Australia, Germany, Korea, Switzerland, the United Kingdom and the United States. CNEF contains equivalently defined variables, most importantly pre- and post-government income, from the following household panel surveys: the Household Income and Labour Dynamics in Australia (HILDA), the German Socio-Economic Panel (SOEP), the Korea Labor and Income Panel Study (KLIPS), the Swiss Household Panel (SHP), the British Household Panel Study (BHPS), and the Panel Study of Income Dynamics (PSID).⁶ Most of the panel studies only started in the 1990s such that data are available only for a subset of the period 1970-2013 in most countries outlined Table 1.

Our income measure is annual pre- and post-government household income equivalized using the modified OECD scale.⁷ We take an ex post perspective and use income streams realized in the past as they are documented in our panel data. Our period

⁶Unfortunately, the Russian panel study RLMS-HSE does not include pre-government income.

⁷For South Korea, we recomputed pre- and post-government household income according to CNEF definitions as the definitions in the original data did not meet the CNEF standard. For instance, public transfers and social security pensions were included in pre-government household income. Also, we top-coded income taxes to a maximum of 20% of pre-government household income as some of the imputed income taxes seemed unreasonably high, sometimes even exceeding pre-government household income.

Table 1: CNEF-panel data availability by country

Country	Code	Survey	Period
Australia	AU	HILDA	2001-2013
Germany	DE	SOEP	1984-2013
Korea	KR	KLIPS	2003-2008
Switzerland	CH	SHP	1999-2013
United Kingdom	UK	BHPS	1991-2008
United States	US	PSID	1970-2009

length is between 1 and 13 years, because a period length of 13 years is available for four of our six countries, i.e., Australia, Germany, Switzerland and the US, although CNEF-data for Germany and the US would allow an even longer maximum period length starting in 1984 or 1970, respectively. While incomes are converted to 2010 PPP US-Dollars to adjust for inflation and purchasing power differences between countries, we do not discount incomes.⁸

Household post-government income is pre-government income less taxes plus benefits. Consumption taxes and in-kind benefits are not documented in the data and therefore not included. It is well-known that consumption taxes are often less redistributive or even regressive.⁹ Verbist and Matsaganis (2014) suggest that the redistributive impact of in-kind benefits is as large as that of monetary benefits, with their relative importance in social spending seeming to increase in European countries.

Since we are interested in the welfare states' empirically prevalent mix of redistribution and income smoothing for the population as a whole, we compute all inequality and redistribution measures based on the income distribution of the entire population and refrain from distinguishing specific cohorts or age groups.¹⁰ Reform effects will be smoothed out in our framework of extended period length to a certain extent. We provide results for different starting years to check the robustness of the observed patterns for a country over time. In sum, we do not specifically address country-specific

⁸For an ex ante perspective predicting future income streams, one would discount future income streams to a net present value. We refrain from discounting incomes, since we take an ex post perspective using income streams observed in the past. Next, discounting incomes compresses observed individual income streams and thereby reduces intra-individual inequality relative to inter-individual inequality. As a consequence, discounted incomes would produce less insurance and unchanged redistribution. Finally, the choice of the discount rate strongly influences time trends of intra-individual inequality. Taking market interest rates introduces additional variability to both pre- and post-government income streams which would make our results less straightforward to interpret. Results with discounted incomes using market interest rates or a constant discount factor of 3% are available from the authors upon request.

⁹CNEF data do not provide information on consumption and saving. Focussing on income streams rather than consumption streams, we neglect the stabilizing effect of private saving and dissaving. Changes in private saving behavior as a response to changes in the welfare state's provision of insurance are of central importance for the optimal design of taxes and benefits that should maximize social welfare, but minimize disincentives and crowding-out effects. However, taking this into account is beyond the scope of this paper.

¹⁰Additionally, we are restricted by the rather small sample size of individuals observed continuously over 13 years.

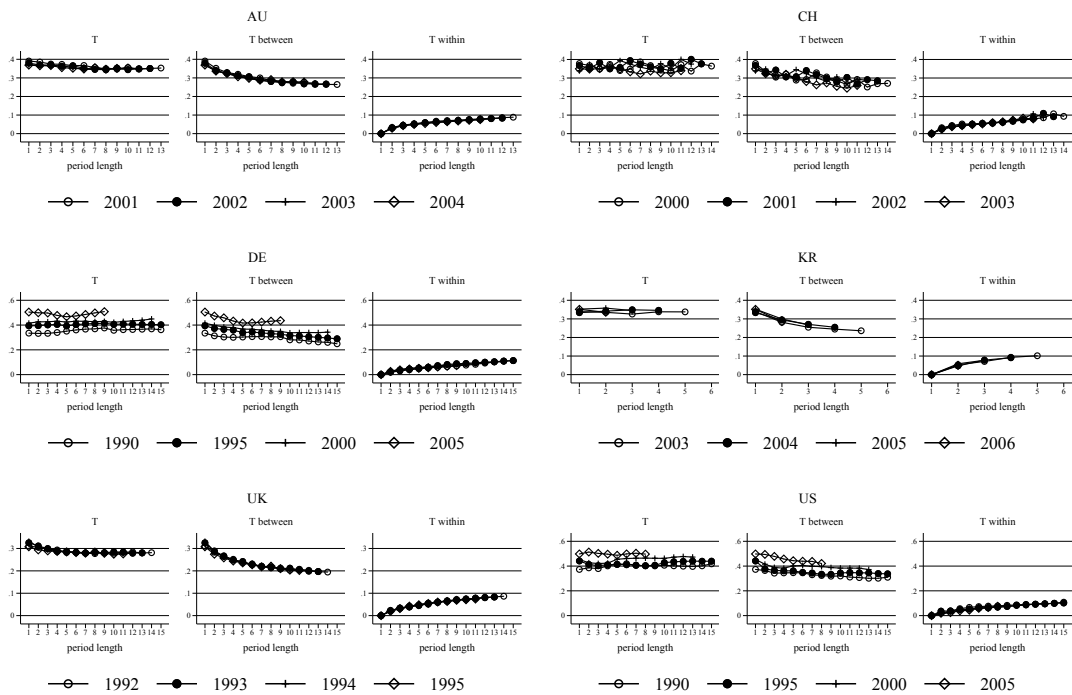
age, cohort or time effects. However, when explaining differences in the observed redistribution patterns in our regression approach in Section 6, we control for differences in the demographic composition between countries and include time dummies.

5 Redistribution in the long run

Figure 1 shows how the composition of total gross income inequality changes when extending the traditional annual measurement framework to a multiple-year framework: The size of income differences between individuals declines when extending the period length, and, conversely, the importance of individual income variation increases. For each country, total inequality of gross income is shown in the left-hand panel, inter-individual inequality in the middle and intra-individual inequality in the right-hand panel. Each marker represents a separately computed Theil for the accordant period length p and a given starting year t . The Theil for a period length of 1 (2,...,13) is thus the Theil in year 2001 (over the years 2001-02,...,2001-13). To check for robustness of the results, Theil indices are computed for different starting years t .

Total inequality is about 0.4 in Australia, Germany, Korea and the United States and about 0.3 in Switzerland and the United Kingdom. The decomposition shows that the major portion of total income inequality is explained by income differences between individuals (inter-individual inequality). However, individual income variation over time (intra-individual inequality) adds a non-negligible share to total inequality. The longer the period, the more important is individual income variation in explaining overall income differences. By construction, the intra-individual component equals zero if the period length is 1. Individual income variation reaches about 0.1 in most of the countries when considering a period length of 10 years. In sum, the decline of inter-individual inequality when extending the period length is about compensated by the increase of intra-individual inequality such that total inequality remains rather stable with respect to period length. Decomposing inequality measured by the MLD shows the same pattern (see Appendix, Figure 1).

Figure 1: Theil decomposition by period length



Source: Own calculations, Cross-National Equivalent File (CNEF).

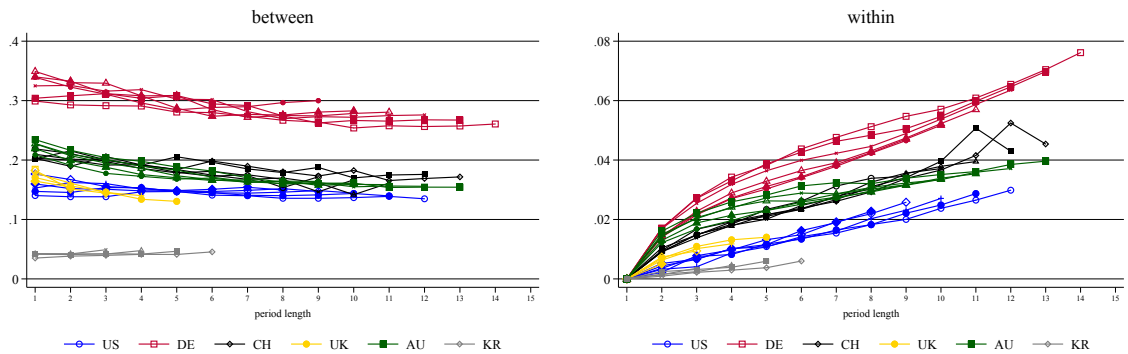
Note: Theil indices calculated based on gross equivalized household income in 2010 PPP US-Dollars. We use starting years around the millennium for all countries except the UK, where panel data including post government incomes are only available until 2007 such that the earliest starting year of a 15-year period length is 1992.

We now turn to the question to what extent welfare states reduce income inequality. The extent of redistribution as measured using the traditional annual approach might change when we extend the measurement period taking individual income variation and its stabilization through the welfare state into account. Figure 2 shows the redistribution index for inter-individual and intra-individual inequality reduction for varying period lengths and different starting years between 2001 and 2005, which are covered by all the CNEF-data countries. As a result from the different time spans available, the number of plots by country and their respective period length varies across countries. For instance, KLIPS data from South Korea only cover the years 2003 to 2008 resulting in relatively short period lengths and a few plots, whereas German SOEP data cover the years 1984 to 2016. Moreover, UK data from the BHPS stop in 2008, so that the selection of starting years 2001 to 2005 for Figure 2 only allow relatively short period lengths to be displayed for the UK.

We first comment on the redistributive effect measured by the government's reduction of the between-group inequality component, shown in the left-hand panel of Figure 2. In an annual perspective, i.e., period length equal to one, Germany clearly ranks first followed by Australia, Switzerland and the UK, the United States and Korea. However, redistribution between individuals becomes less pronounced when extending the period length, which changes the ranking of the countries as long-run redistribution is

pronounced differently across different welfare states: in a longer perspective, the UK is less redistributive than the US and Australia is less redistributive than Switzerland. All in all, long-run inequality between individuals is reduced by about 0.3 in Germany, 0.2 in Australia, by 0.1 to 0.2 in Switzerland, the United Kingdom and the United States and by only 0.04 in Korea. The reduction of within-group inequality captures income smoothing through the welfare state, shown in the right-hand panel of Figure 2. In contrast to redistribution between individuals, the reduction of individual income variation increases quite steadily with period length, while income smoothing through the welfare state is much smaller than redistribution (0.02-0.08 as opposed to 0.1 to 0.3) in absolute terms. Again, Germany ranks first and Korea last. Computing the MLD instead of the Theil coefficient ranks Switzerland as both most redistributive and most stabilizing as can be seen from Figure 2 in the Appendix, while Germany is ranked second. Apart from these two countries switching ranks, the picture remains the same.

Figure 2: Theil, government's reduction of the between- and within component by period length



Source: Own calculations, Cross-National Equivalent File (CNEF).

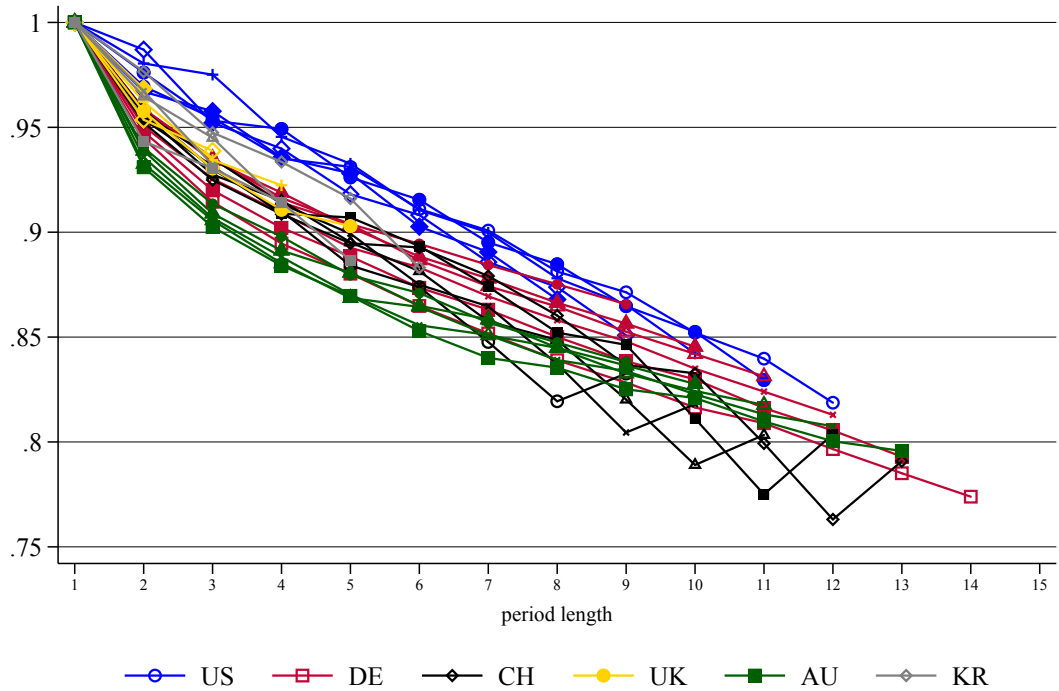
Note: Inequality is measured by the Theil coefficient. Inequality reduction is measured by the redistribution index $R = I(Y) - I(X)$, where Y is equalized gross household income and X is equalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005.

In order to further investigate the relative importance of long-run redistribution between individuals across countries, we present our redistribution ratio defined in Section 3 as the share of inter-individual inequality reduction in total inequality reduction in Figure 3. As we have seen in Figure 2, the German welfare state substantially redistributes between individuals, but at the same time greatly stabilizes incomes over time. Figure 3 shows how much of overall inequality reduction over a given period length serves reducing long-run income differences between individuals. Two noteworthy patterns emerge.

First, the redistribution ratio considerably decreases when extending the period length. For a 4-year period length, 90%, or even less, of overall inequality reduction serves redistribution across countries. For a 13-year period length, the redistribution declines to roughly 80%. This is in line with Roantree and Shaw (2018), who find that,

in the UK, after 14 years interpersonal redistribution is only 90% of total redistribution. Bovenberg et al. (2008) find that the redistribution ratio is 74% in Denmark over a lifetime. Second, the US' government intervention seems to be proportionately more redistributive between individuals than all other welfare states considered. In contrast, Germany and Australia, which appeared highly redistributive in the annual context, provide comparably less redistribution between their citizens providing support for the Paradox of Redistribution (Korpi and Palme; 1998) mentioned in Section 2. Redistributing resources in an annual context is supported by the population as these welfare states also offer comparably high insurance. Also, Korea seems to devote relatively more resources to income smoothing than to redistribution. Both findings hold when computing the MLD instead of the Theil coefficient (see Appendix, Figure 3).

Figure 3: Theil, redistribution ratio by period length



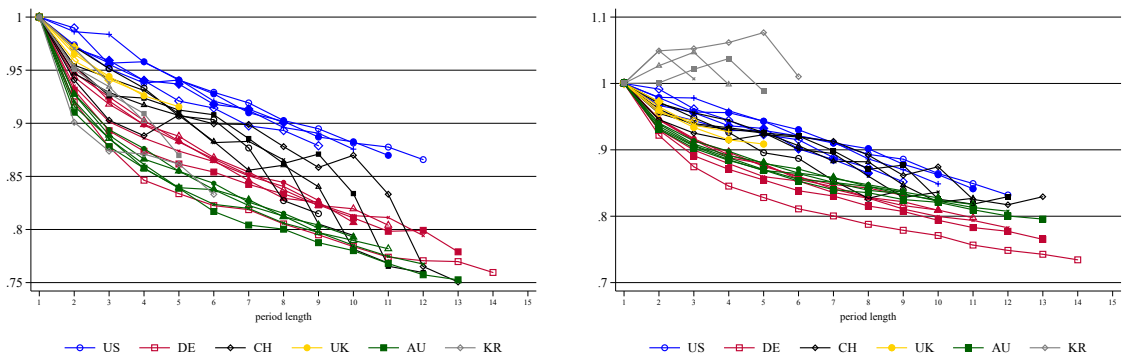
Source: Cross-National Equivalent File (CNEF).

Note: Inequality is measured by the Theil coefficient. The redistribution ratio R is $[I^{between}(Y) - I^{between}(X)]/[I(Y) - I(X)]$, where Y is equivalized gross household income and X is equivalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005.

Figure 4 shows that the pattern of the redistribution ratio across countries also holds for two alternative specifications addressing the concern that observed trends predominantly stem from the elderly share in each country. Public pensions are the most important item in social expenditure of most welfare states, which makes them appear more redistributive. We evaluate the impact of retirees and social security pensions on the cross-country patterns observed above. The left-hand panel shows the ratio based on a sample restricted to the working age population between 25 and 55 years.

The right-hand panel counts social security pensions as gross income, i.e. interpreting pensions as deferred income. The US with a relatively young population turns out as relatively more redistributive, while Germany and Australia with relatively old populations turn out as comparably less redistributive. However, the slope of the ratio when extending the period length is somewhat less steep in both alternative specifications. This means that, as can be expected, welfare states are more long-run redistributive if we exclude retirees and their social security pensions are considered as market income. South Korea's redistribution ratio exceeds one when counting social security pensions as market income. This results from the fact that social security pensions in South Korea are much more income smoothing than income taxes and public transfers. As a consequence, within-group inequality is higher for post-government income than for pre-government income including social security pensions. If within-group inequality is higher for post-government income than for pre-government income including social security pensions, the denominator of Eq. 6 is smaller than the numerator and the redistribution ratio exceeds one.

Figure 4: Theil, redistribution ratio by period length, alternative specifications



Source: Cross-National Equivalent File (CNEF).

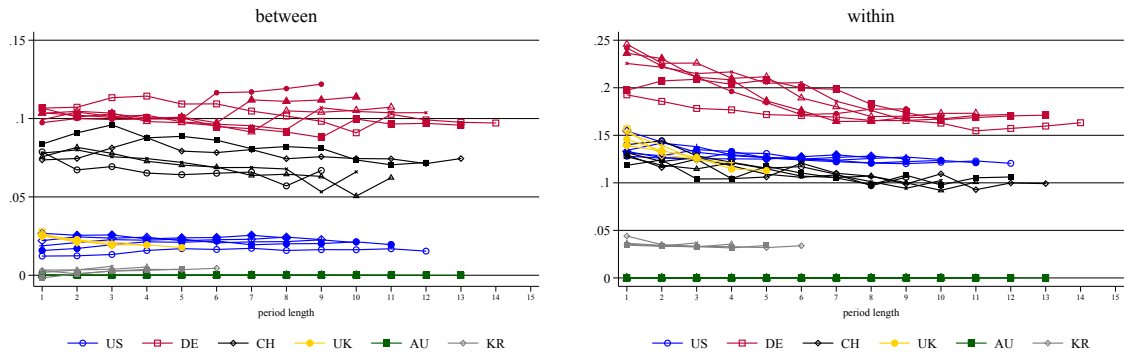
Note: Inequality is measured by the Theil coefficient. The redistribution ratio R is $[I^{between}(Y) - I^{between}(X)]/[I(Y) - I(X)]$, where Y is equivalized gross household income and X is equivalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005.

We further decompose the between-group inequality component, i.e., permanent income inequality between individuals, in order to understand how welfare states differentially reduce permanent income differences between generations by means of their public pension system. More precisely, we investigate to what extent long-run income differences between pensioners and those who don't receive pensions (and likely contribute to the pension system) are mitigated by the government (between-group component) as opposed to the extent to what extent long-run income differences within both groups are mitigated (within-group component). We count those as receiving social security pensions whose household received a payment for at least one year of the entire period length. Retirement schemes can be classified into *Bismarckian* systems, where earnings-related pensions are mainly financed by earnings-related contributions,

and *Beveridgean* systems, characterized by tax-financed, flat-rate benefits providing an old-age income adequate enough to ensure a basic living standard (Jensen et al.; 2004). Germany, South Korea, Switzerland, and the US follow the Bismarckian tradition, while the UK, and Australia follow the Beveridgean tradition. Unfortunately, Australia does not provide information on flat-rate pensions in the CNEF-data so that we have to exclude Australia from this exercise.

On the one hand, we expect that Beveridgean systems are intergenerationally more redistributive between pensioners and non-pensioners as suggested by Jensen et al. (2004), given that pensions schemes are less earnings-dependent and thus more equalizing. On the other hand, Bismarckian systems with a generous means-tested minimum pension and top-capped pensions for high income earners might eventually turn out to be more redistributive than Beveridgean systems. Figure 5 shows the reduction of between- and within-group inequality by period length. Germany and Switzerland strongly intergenerationally redistribute between pensioners and non-pensioners (between-group) and among the members of each group. While pensions in both countries depend on previous earnings, they also provide means-tested pensions which amount to about 20% of average earnings OECD (2017). The US and the UK show quite similarly sized intergenerational inequality reductions despite the different character of their pension systems. Means-tested pensions in the US only amount to about 17% of average earnings.¹¹

Figure 5: Theil, government's reduction of intergenerational inequality by period length



Source: Own calculations, Cross-National Equivalent File (CNEF).

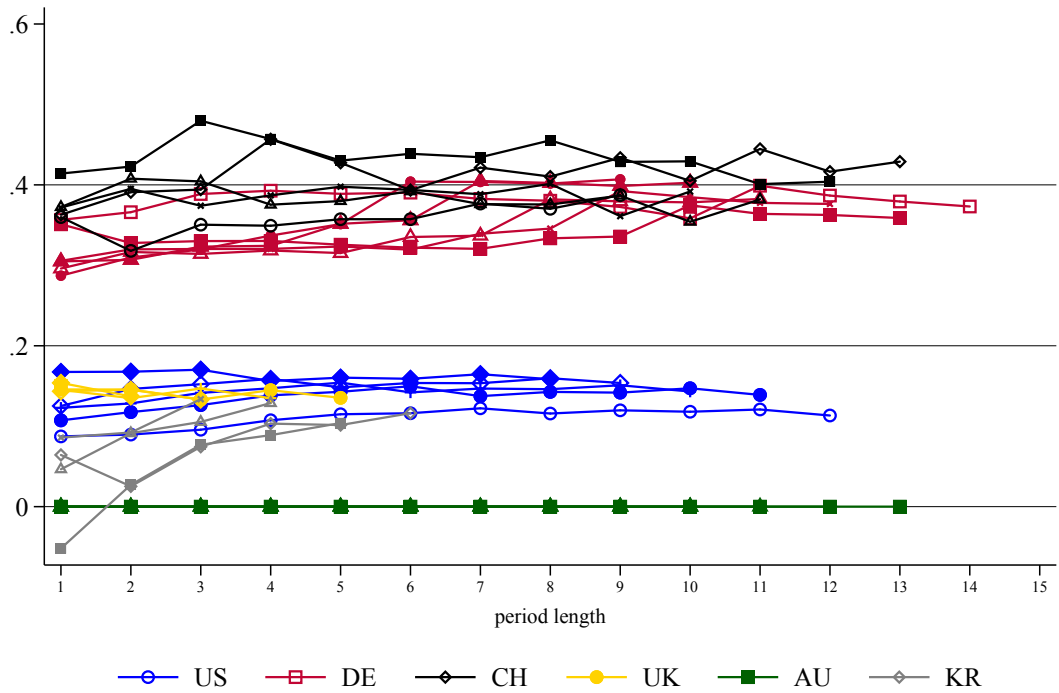
Note: Inequality is measured by the Theil coefficient. Inequality reduction is measured by the redistribution index $R = I(Y) - I(X)$, where Y is equalized gross household income and X is equalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005. For Australia, there is no information available on public pensions.

We now build a redistribution ratio measuring the share of between-group inequality reduction in overall inequality reduction shown in the left-hand panel of Figure 5. This ratio is displayed in Figure 6 and shows that Germany and Switzerland most strongly

¹¹This finding may change if we could assess individual net present values of pensions payments, which could be credited against their contributions, in order to assess how much they gain or lose over a lifetime perspective. However, this would require a microsimulation model which is not available for the universe of the CNEF countries.

redistribute intergenerationally.

Figure 6: Theil, intergenerational redistribution ratio by period length



Source: Cross-National Equivalent File (CNEF).

Note: Inequality is measured by the Theil coefficient. The redistribution ratio R is $[I^{between}(Y) - I^{between}(X)]/[I(Y) - I(X)]$, where Y is equivalized gross household income and X is equivalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005. For Australia, there is no information available on public pensions.

6 Explaining cross-country differences

What are potential explanatory factors for cross-country variation in long-run redistribution? We address this question in this section estimating the following regression equation:

$$R_{ctp} = X'_{ct}\beta + \alpha_c + \mu_t + \epsilon_{ctp}, \quad (7)$$

where R_{ctp} is our redistribution measure in country c with starting year t over period length p . R_{ct1} is the traditional measure of annual redistribution in year t . X_{ct} is a vector of explanatory variables that are most often used in the literature explaining cross-country differences in inequality and redistribution. These are inequality of market income, elderly share, openness of the economy, migration, and role of luck. Market income inequality and elderly share (population above age 60) are own calculations from CNEF-data. Openness of the economy is measured as export share in GDP, which is taken from Penn World Tables 9.0. Migration per capita is available at OECD.Stat. Role of luck is the average result from the World Value Survey question asking to choose a value between 1 and 10 according to one's own belief of either *Hard work usually brings a better life* (1) or *It is more a matter of luck and connections* (10), which is also used in Alesina and Angeletos (2005). α_c is a country fixed effect, μ_t captures year effects (or rather period effects) and ϵ_{ctp} is the error term. In order to address serial correlation in the error term ϵ_{ctp} when increasing the period length to more than one year, we estimate Eq. 7 using GLS and directly allow for an AR-process of an order equal to the period length p .

Average values of the explanatory variables by country are given in Table 2. On average, market income inequality is lower in the United Kingdom and Switzerland and higher in Germany and Australia. Germany and the United Kingdom show the highest elderly share, where 40% of the population are older than 60 years. In contrast, this share is only 22% in South Korea and 28% in Australia and the United States. The economies of Switzerland, Germany, and South Korea are most open as measured by the share of exports in GDP. Switzerland received the largest inflow of migrants per capita during our investigation period. The belief that luck determines income is more prevalent in Switzerland and Germany, whereas the belief that hard work brings success is more prevalent in the United States.

Regression results estimated via OLS using the traditional annual redistribution measure R_1 , the redistribution index, as dependent variable are presented in Table 3.

Higher market income inequality is associated with significantly higher redistribution. This finding corroborates Milanovic (2000), who also finds higher redistribution in countries with greater market income inequality. In countries with high market income inequality, the relatively poor median voter is in favor of redistribution as suggested

Table 2: Descriptive statistics

Country	pre-gov. gini	elderly share	openness	migration p.c.	luck
AU	0.511	0.278	0.227	0.008	4.207
CH	0.475	0.325	0.576	0.014	5.254
DE	0.534	0.392	0.365	0.009	5.362
KR	0.473	0.220	0.343	0.009	4.061
UK	0.462	0.392	0.237	0.003	4.550
US	0.489	0.279	0.076	0.003	3.636

Note: Pre-government Gini and elderly share (population above age 60) are own calculations from CNEF-data. Exports in % of GDP are from Penn World Tables 9.0. Migration per capita is from OECD.Stat. Role of luck is from the World Value Survey.

by Meltzer and Richard (1981).

The belief that luck determines income (rather than hard work) is associated with significantly more annual redistribution, which is in line with Alesina and Angeletos (2005), who argue that the social desirability of redistribution increases with the share of income that is due to luck (as opposed to effort). However, the effect of luck is insignificant and negative when using the MLD instead of the Theil (see Appendix, Table 1).

A higher share of elderly is associated with significantly more annual redistribution. The theoretical and empirical literature on the effect of the elderly share on redistribution is ambiguous. Razin et al. (2002) identify a trade-off due to aging: The greater number of retirees increases the demand for benefits, but reduces the willingness of the working-age population to support redistribution as they are net losers from increased benefits for the elderly. Our results are in line with the positive effects found by Tabellini (2000) and Moene and Wallerstein (2001). However, both of these studies aim to capture the insurance rather than the redistributive effect using annual expenditures for social security or insurance programmes, respectively, across welfare states as dependent variable. We will come back to this controversy when discussing the regression results for long-run redistribution. Redistribution in a country with a high share of elderly might very well turn out to be income smoothing in a longer period which we address in the next regression.

Migration shows a negative association and openness of the economy a positive association, but both are insignificant in most specifications.

The inclusion of country fixed effects absorbs most of the cross-country variation, as can be seen from the large increase in the adjusted R-squared between column (1) and (2). This means that most of the differences in annual redistribution across countries is due to country-specific features that remain constant over time. Qualitatively, regressions based on MLD show the same results except for the effect of luck which turns negative and insignificant (see Appendix, Table 1). The coefficients are larger

because the MLD is larger, on average, than the Theil coefficient.

Table 3: Explaining annual redistribution

Dependent variable: annual redistribution R_1 based on Theil					
	(1)	(2)	(3)	(4)	(5)
Pre-gov.gini	1.215*** (0.128)	0.802*** (0.176)	0.390*** (0.141)	0.386** (0.189)	0.379 (0.248)
Elderly share			0.670*** (0.090)	0.581*** (0.097)	0.971*** (0.123)
Exports % of GDP				0.080** (0.034)	0.122 (0.110)
Migrants p.c.				-0.789 (1.266)	-1.858 (1.170)
Luck					0.032* (0.017)
Country/year effects	No	Yes	Yes	Yes	Yes
Adj. R^2	0.469	0.915	0.961	0.963	0.986
N	119	119	119	114	45

Note: Regressions are based on CNEF-countries. Standard errors are heteroscedasticity robust and indicated in brackets. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 10 percent level. Pre-government Gini and elderly share (population above age 60) are own calculations from CNEF-data. Exports in % of GDP are from Penn World Tables 9.0. Migration per capita is from OECD.Stat. Role of luck is from the World Value Survey.

We now turn to regression results explaining long-run redistribution, where the redistribution ratio RR_p across varying period lengths p is our dependent variable. GLS regression results for varying period lengths using both Theil and MLD are shown in Table 4.¹²

The association between market income inequality and long-run redistribution is less clear than for annual redistribution. While the effect is negative and significant for most period lengths, it is significantly positive for $p = 3$ using the Theil. The former effects suggest that higher market income inequality tends to be related with more income smoothing and with less interpersonal redistribution.

As expected, the sign of the coefficient for the elderly share changes when considering long-run redistribution rather than annual redistribution. The coefficient is negative and highly significant using our long-run redistribution ratio for various period lengths. The negative association between long-run redistribution and elderly share which implies a positive association between income smoothing and elderly share corroborates Tabellini (2000) and Moene and Wallerstein (2001), who find a positive association between government spending for insurance and share of elderly. Reformulating the trade-off identified by Razin et al. (2002), we might thus conclude that a

¹²We refrain from displaying a stepwise introduction of explanatory variables, because this does not alter neither sign nor significance of the estimated coefficients. The estimation for period lengths higher than 6 is not feasible due to limited data availability across countries.

greater number of retirees increases the demand for insurance. The only exception of a small positive effect arises for $p = 4$ using the Theil.

Migration is associated with significantly less long-run redistribution. This provides evidence for Soroka et al. (2006) who argue that migration reduces solidarity within a community and, thereby, reduces support for interpersonal redistribution. This result also in line with Sandmo (2002), who argues that the threat of emigration of top taxpayers in high-tax countries may induce these welfare states to provide relatively more insurance. As for elderly share, the only exception of a small positive effect of migration arises for $p = 4$ using the Theil.

Trade openness mostly shows a negative association with long-run redistribution. This finding, however, provides further evidence for Rodrik (1998) who finds a positive correlation between government spending and trade openness and hypothesizes that societies demand (and receive) an expanded government role and more social insurance at the price for accepting larger doses of external risk.

Table 4: Explaining long-run redistribution

	Dependent variable: redistribution ratio RR_p based on									
	Theil					MLD				
	RR_2	RR_3	RR_4	RR_5	RR_2	RR_3	RR_4	RR_5	RR_4	RR_5
Pre-gov gini	-0.199*** (0.069)	0.186** (0.094)	-0.090 (0.070)	0.043 (0.050)	-0.713** (0.323)	-0.609*** (0.192)	-0.719*** (0.210)	0.042 (0.122)		
Elderly share	-0.099*** (0.025)	-0.322*** (0.035)	0.070* (0.041)	-0.074* (0.041)	-0.621*** (0.124)	-0.684*** (0.148)	-0.134 (0.233)	-0.585*** (0.114)		
Exports % of GDP	-0.031 (0.021)	0.026 (0.018)	-0.062** (0.025)	-0.049** (0.020)	0.048 (0.046)	0.050 (0.042)	-0.036 (0.073)	0.063* (0.034)		
Migrants p.c.	-0.879 (0.633)	-0.542** (0.232)	0.878** (0.344)	-1.166*** (0.408)	-3.120 (2.614)	-3.168** (1.458)	-0.677 (1.104)	-0.013 (0.809)		
Country/year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	108	99	94	89	108	99	94	89	94	89

Note: Regressions are based on CNEF-countries. Standard errors are heteroscedasticity robust and indicated in brackets. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 10 percent level. Pre-government Gini and elderly share (population above age 60) are own calculations from CNEF-data. Exports in % of GDP are from Penn World Tables 9.0. Migration per capita is from OECD.Stat.

7 Conclusion

An important feature of modern welfare states is that they do not only redistribute income between individuals but also smooth individual income over time. This paper investigated to what extent the measurement of redistribution in an annual framework, as widely focussed in the scientific literature and policy debates, overstates actual redistribution in the long-run in six different welfare states. Using panel data for Australia, Germany, Switzerland, the United Kingdom, and the United States from the Cross-National Equivalent File (CNEF), we first decomposed total income inequality into income differences between individuals and individuals' income variation over time, and computed a redistribution ratio capturing the long-run redistributive character of welfare states.

We found that the major portion of income inequality is indeed explained by income differences between individuals. However, intra-individual inequality, i.e., individual income variation over time, adds a non-negligible share to total inequality in all countries and increases when extending the measurement period. The share of reduction in interpersonal inequality decreases to nearly 80% for the maximum period length considered in Germany, Switzerland, the United Kingdom, and the United States.

Ranking countries by their relative redistributive impact in the long-run (as opposed to income smoothing) shows that Anglo-Saxon countries like the United Kingdom and the United States are more redistributive between individuals in a longer perspective than the corporatist welfare state of Germany. This suggests support for the Paradox of Redistribution (Korpi and Palme; 1998): The elevated annual redistribution in Germany is supported by the wider population as the insurance offered by the welfare state is accordingly high.

Second, we examined possible explanatory factors for cross-country differences in observed annual vs. long-run redistribution. Regression results show that higher market income inequality is associated with more annual redistribution while the impact is less clear and mostly negative for long-run redistribution. The latter finding suggests that higher market income inequality tends to be related with more income smoothing, rather than interpersonal redistribution. Migration and trade openness is related to less long-run redistribution. A higher share of elderly is associated with more annual, but less long-run redistribution between individuals. This can be explained by the growing share of elderly opting in favor of annually more redistributive systems, collecting social security contributions and taxes to fund public pensions. Reformulating the trade-off identified by Razin et al. (2002), we conclude that a greater number of retirees increases the demand for insurance, but decreases the demand for long-run redistribution.

References

- Alesina, A. and Angeletos, G.-M. (2005). Fairness and redistribution, *American Economic Review* **95**(4): 960–980.
- Alesina, A. and Giuliano, P. (2001). Preferences for redistribution, *Handbook of Social Economics Volume 1A*, Elsevier.
- Baker, M. and Solon, G. (2003). Earnings dynamics and inequality among Canadian men, 1976-1992: Evidence from longitudinal income tax records, *Journal of Labor Economics* **21**: 289–321.
- Bartels, C. (2012). Redistribution and insurance in the German welfare state, *Schmollers Jahrbuch - Journal of Applied Social Science Studies* **132**: 265–295.
- Bartels, C. and Bönke, T. (2013). Can households and welfare states mitigate rising earnings instability?, *Review of Income and Wealth* **59**(2): 250–282.
- Beach, C. M., R. F. and Gray, D. (2010). Long-run inequality and short-run instability of mens and womens earnings in canada, *Review of Income and Wealth* **56**: 572–596.
- Benabou, R. and Ok, E. (2001). Social mobility and the demand for redistribution: the POUM hypothesis, *Quarterly Journal of Economics* **116**(2): 447–487.
- Bengtsson, N., Holmlund, B. and Waldenström, D. (2016). Lifetime versus annual tax-and-transfer progressivity: Sweden, 1968-2009, *Scandinavian Journal of Economics* **188**(4): 619–645.
- Björklund, A. and Palme, M. (2002). Income redistribution within the life cycle versus between individuals: Empirical evidence using Swedish panel data, in T. P. D. Cohen and G. Saint-Paul (eds), *The economics of rising inequality*, Oxford University Press.
- Blundell, R., Graber, M. and Mogstad, M. (2015). Labor income dynamics and the insurance from taxes, transfers, and the family, *Journal of Public Economics* **127**: 58–73.
- Bovenberg, A., Hansen, M. and Sorensen, P. (2008). Individual savings accounts for social insurance: Rationale and alternative designs, *International Tax and Public Finance* **15**(1): 67–86.
- Buchanan, J. (1976). Taxation in fiscal exchange, *Journal of Public Economics* **6**(1-2): 17–29.
- Cappellari, L. and Jenkins, S. (2014). Earnings and labour market volatility in britain, with a transatlantic comparison, *Labour Economics* **30**: 201–211.

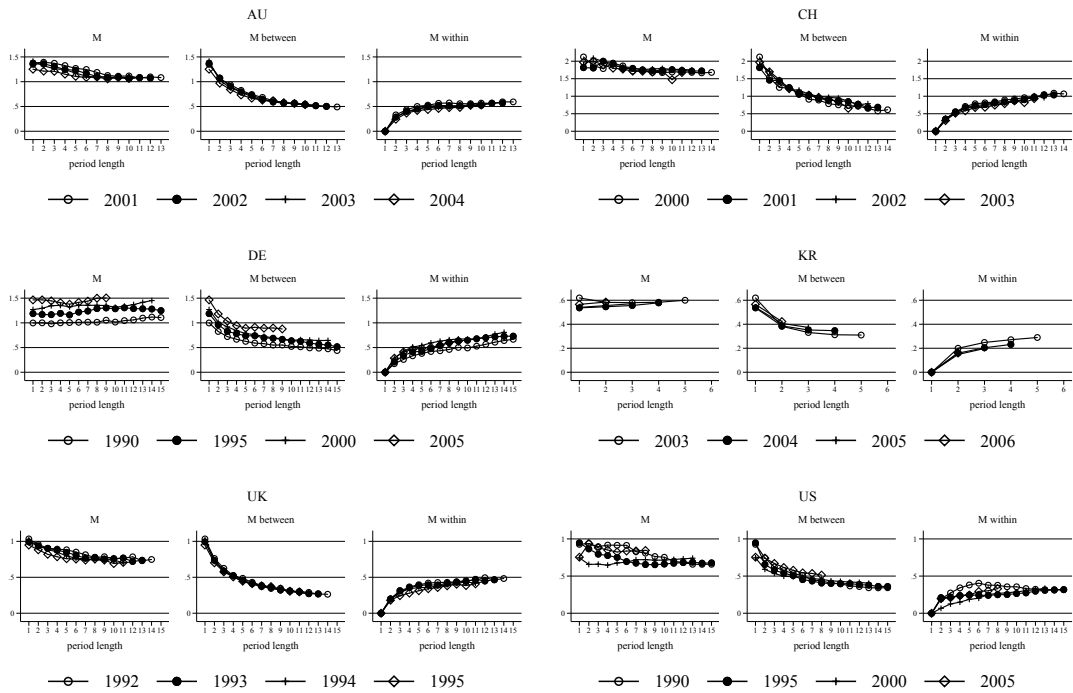
- Casamatta, G., Cremer, H. and Pestieau, P. (2000). Political sustainability and the design of social insurance, *Journal of Public Economics* **75**: 341–364.
- Chen, W.-H. (2009). Cross-national difference in income mobility: Evidence from Canada, the United States, Great Britain and Germany, *Review of Income and Wealth* **55**(1): 75–100.
- Corneo, G. and Grüner, P. (2002). Individual preferences for political redistribution, *Journal of Public Economics* **83**: 83–107.
- Dahlberg, M., Edmark, K. and Lundqvist, H. (2012). Ethnic diversity and preferences for redistribution, *Journal of Political Economy* **120**(1): 41–76.
- Dynan, K., D. E. and Sichel, D. (2008). The evolution of household income volatility, *Brookings Papers on Economic Activity* .
- Dynarski, S. and Gruber, J. (1997). Can families smooth variable earnings?, *Brookings Papers on Economic Activity* pp. 229–303.
- Fong, C. (2001). Social preferences, self-interest, and the demand for redistribution, *Journal of Public Economics* **82**: 225–246.
- Glazer, A., Kannianen, V. and Poutvaara, P. (2008). Income taxes, property values, and migration, *Journal of Public Economics* **92**: 915–923.
- Haan, P., Kemptner, D. and Prowse, V. (2018). Insurance, redistribution, and the inequality of lifetime income, *IZA Discussion Paper No. 11275* .
- Haider, S. (2001). Earnings instability and earnings inequality of males in the united states: 1967-1991, *Journal of Labor Economics* **19**: 799–836.
- Heathcote, J., Storesletten, K. and Violante, G. (2014). Consumption and labor supply with partial insurance: An analytical framework, *American Economic Review* **107**(4): 2075–2126.
- Hoynes, H. and Luttmer, E. (2011). The insurance value of state tax-transfer programs, *Journal of Public Economics* **95**: 1466–1484.
- Jensen, S., Lau, M. and Poutvaara, P. (2004). Efficiency and equity aspects of alternative social security rules, *FinanzArchiv* **60**(3): 325–358.
- Korpi, W. and Palme, J. (1998). The paradox of redistribution and strategies of equality: Welfare state institutions, inequality, and poverty in the western countries, *American Sociological Review* **63**(5): 661–687.

- Levell, P., Roantree, B. and Shaw, J. (2017). Mobility and the lifetime distributional impact of tax and transfer reforms, *IFS Working Paper 17.7*.
- Luttmer, E. (2001). Group loyalty and the taste for redistribution, *Journal of Political Economy* **109**(3): 6–34.
- Meltzer, A. and Richard, S. (1981). A rational theory of the size of government, *Journal of Political Economy* **89**(5): 914–927.
- Milanovic, B. (2000). The median-voter hypothesis, income inequality, and income redistribution: an empirical test with the required data, *European Journal of Political Economy* **16**: 367–410.
- Moene, K. and Wallerstein, M. (2001). Inequality, social insurance, and redistribution, *American Political Science Review* **95**(4): 859–874.
- Moffitt, R. and Gottschalk, P. (2012). Trends in the transitory variance of male earnings - methods and evidence, *Journal of Human Resources* **47**(1): 204–236.
- Nelissen, J. (1998). Annual versus lifetime income redistribution by social security, *Journal of Public Economics* **68**(2): 223–249.
- OECD (2017). *Pensions at a Glance 2017: OECD and G20 Indicators*, OECD Publishing.
- Petterson, T. and Petterson, T. (2007). Lifetime redistribution through taxes, transfers and non-cash benefits, in A. H. Tomas and A. Gupta (eds), *Modelling our Future*, Elsevier, pp. 205–232.
- Ravallion, M. and Lokshin, M. (2000). Who wants to redistribute? the tunnel effect in 1990s Russia, *Journal of Public Economics* **76**: 87–104.
- Razin, E., Sadka, E. and Swagel, P. (2002). The aging population and the size of the welfare state, *Journal of Political Economy* **110**(4): 900–918.
- Reynolds, M. and Smolensky, E. (1977). *Public Expenditures, Taxes, and the Distribution of Income: The United States, 1950, 1961, 1970*, Academic Press.
- Roantree, B. and Shaw, J. (2018). What a difference a day makes: inequality and the tax and benefit system from a long-run perspective, *Journal of Economic Inequality* **16**: 23–40.
- Rodrik, D. (1998). Why do more open economies have bigger governments?, *Journal of Political Economy* **105**(5): 997–1032.

- Sandmo, A. (2002). Globalisation and the welfare state: More inequalityless redistribution?, *Norwegian School of Economics and Business Administration Discussion Paper 4* .
- Scervini, F. (2012). Empirics of the median voter: democracy, redistribution and the role of the middle class, *Journal of Economic Inequality* **10**: 529–550.
- Shin, D. and Solon, G. (2011). Trends in mens earnings volatility: What does the panel study of income dynamics show?, *Journal of Public Economics* **95**: 973–982.
- Shorrocks, A. (1978). Income inequality and income mobility, *Journal of Economic Theory* **19**: 376–393.
- Soroka, S., Banting, K. and Johnston, R. (2006). Immigration and redistribution in a global era, in P. Bardhan, S. Bowles and M. Wallerstein (eds), *Globalization and Egalitarian Redistribution*, Princeton University Press, pp. 261–288.
- Tabellini, G. (2000). A positive theory of social security, *Scandinavian Journal of Economics* **102**(3): 523–545.
- Ter Rele, H. (2007). Measuring the lifetime redistribution achieved by Dutch taxation, cash transfer and non-cash benefits programs, *Review of Income and Wealth* **53**(2): 335–362.
- Verbist, G. and Matsaganis, M. (2014). The redistributive capacity of services in the EU, in B. Cantillon and F. Vandenbroucke (eds), *Reconciling Work and Poverty Reduction: How Successful Are European Welfare States?*, Oxford University Press.
- Zang, S. (2014). Wage shocks, household labor supply, and income instability, *Journal of Population Economics* **27**(3): 767–796.

Appendix

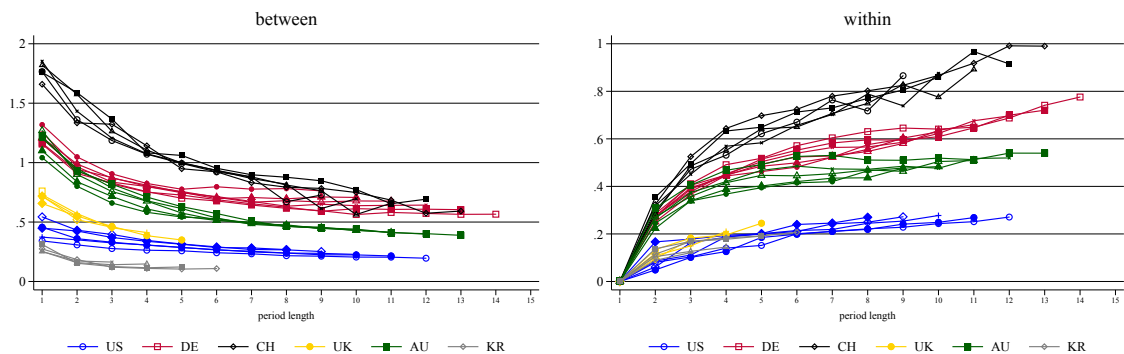
Figure 1: MLD decomposition by period length



Source: Own calculations, Cross-National Equivalent File (CNEF).

Note: MLD calculated based on gross equivalized household income in 2010 PPP US-Dollars. We use starting years around the millennium for all countries except the UK, where panel data including post government incomes are only available until 2007 such that the latest starting year of a 15-year period length is 1992.

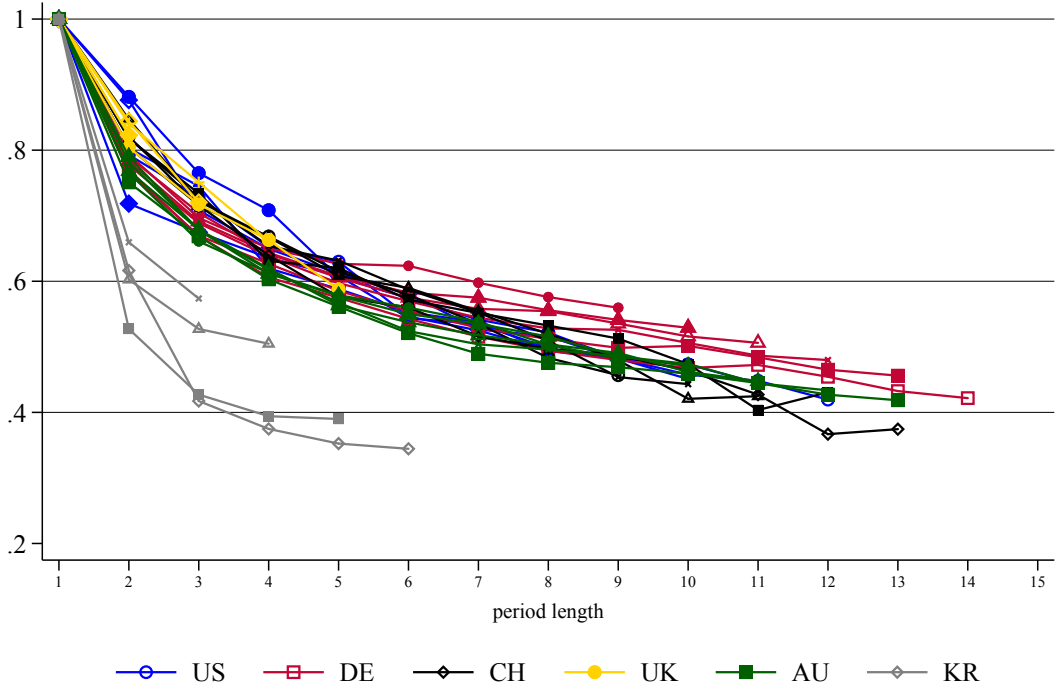
Figure 2: MLD, government's reduction of the between- and within component by period length



Source: Own calculations, Cross-National Equivalent File (CNEF).

Note: Inequality is measured by the MLD coefficient. Inequality reduction is measured by the redistribution index $R = I(Y) - I(X)$, where Y is equivalized gross household income and X is equivalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005.

Figure 3: MLD, redistribution ratio by period length



Source: Cross-National Equivalent File (CNEF).

Note: Inequality is measured by the MLD coefficient. The redistribution ratio R is $[I^{between}(Y) - I^{between}(X)]/[I(Y) - I(X)]$, where Y is equivalized gross household income and X is equivalized net household income in 2010 PPP US-Dollars. The number of plots varies across countries according to data availability for the selected starting years 2001 to 2005.

Table 1: Explaining annual redistribution

Dependent variable: annual redistribution R_1 based on MLD					
	(1)	(2)	(3)	(4)	(5)
Pre-gov.gini	2.263** (0.905)	4.748*** (1.288)	2.609** (1.114)	2.705* (1.532)	-2.427 (2.263)
Elderly share			3.483*** (0.609)	2.757*** (0.720)	6.225*** (1.092)
Exports % of GDP				0.631* (0.338)	-0.970 (0.784)
Migrants p.c.				-4.679 (10.296)	-4.261 (10.399)
Luck					-0.140 (0.135)
Country/year effects	No	Yes	Yes	Yes	Yes
Adj. R^2	0.032	0.906	0.936	0.939	0.967
N	119	119	119	114	45

Note: Regressions are based on CNEF-countries. Standard errors are heteroscedasticity robust and indicated in brackets. *** = significant at the 1 percent level, ** = significant at the 5 percent level, * = significant at the 10 percent level. Pre-government Gini and elderly share (population above age 60) are own calculations from CNEF-data. Exports in % of GDP are from Penn World Tables 9.0. Migration per capita is from OECD.Stat. Role of luck is from the World Value Survey.