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The Impact of Flat Tax Reforms on the Development of Richness in Europe

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The impact of flat tax reforms on the development of richness in Europe

Andreas Peichl*

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Abstract

European welfare states are under pressure because of population ageing and globalisation. Often, fundamental reforms into the direction of simple flat tax systems are proposed. Increasing inequality and a wider gap between rich and poor are expected as a consequence. The aim of this paper is to analyse the impact of introducing revenue neutral flat tax reforms in European countries on the development of richness. Our analysis shows that different data sources or indicators can lead to different results in terms of richness. However, in general, different homogeneous country groups can be identified: richness is high in Southern and Eastern European and English speaking countries, medium in Continental Europe and low in Scandinavian countries. The change in richness is rather small for inequality neutral flat tax scenarios and it may either be positive or negative depending on the country and the richness measure. Therefore, a flat tax reform does not necessarily lead to more richness. However, when allowing inequality to increase, richness is increasing in all countries according to all measures. This redistribution from rich to non rich might explain why a flat tax is not very popular in Western Europe.

JEL Codes: D31, D60, H20

Keywords: Richness, Flat Tax, Top Incomes, Welfare States, Income Distribution

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This paper uses EUROMOD version D5. EUROMOD is continually being improved and updated and the results presented here represent the best available at the time of writing. EUROMOD relies on micro-data from twelve different sources for fifteen countries. This paper uses data from the Luxembourg Income Study (LIS), the European Union Statistics on Income and Living Conditions (EU-SILC) and the European Community Household Panel (ECHP) User Data Base made available by Eurostat; the Austrian version of the EU-SILC made available by Statistik Austria; the Panel Survey on Belgian Households (PSBH) made available by the University of Liège and the University of Antwerp; the Income Distribution Survey made available by Statistics Finland; the public use version of the German Socio Economic Panel Study (GSOEP) made available by the German Institute for Economic Research (DIW), Berlin; the Greek Household Budget Survey by the National Statistical Service of Greece; the Socio-Economic Panel for Luxembourg (PSELL-2) made available by CEPS/INSTEAD; the Socio-Economic Panel Survey (SEP) made available by Statistics Netherlands through the mediation of the Netherlands Organisation for Scientific Research - Scientific Statistical Agency, and the Family Expenditure Survey (FES), made available by the UK Office for National Statistics (ONS) through the Data Archive. Material from the FES is Crown Copyright and is used by permission. Neither the ONS nor the Data Archive bears any responsibility for the analysis or interpretation of the data reported here. An equivalent disclaimer applies for all other data sources and their respective providers.

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1 Introduction

European welfare states are under pressure because of population ageing and globalisation. The former increases the need for public funds whereas the latter makes tax bases (sources of public funds) more elastic and tends to increase unemployment of low-skilled workers. The complex tax benefit systems of grown-up welfare states are frequently seen as inappropriate to meet the economic challenges ahead. Therefore, fundamental reforms of the tax system into the direction of simple flat tax systems are proposed. The introduction of flat rate tax systems is widely seen as a reform which may boost efficiency, employment and growth through simplification and higher incentives (see Keen et al. (2007)). However, these efficiency effects do not come for free. Inequality is likely to increase as a consequence of a flat tax reform implying redistribution from the poor to the rich. These effects have given rise to a debate whether the gap between rich and poor is widening in general and as a consequence of a flat tax reform in particular. It is widely believed that the rich are getting richer and the poor are getting poorer.

Given this debate, appropriate measures of poverty and richness are of key importance for an empirical analysis. Several income poverty indices have been developed in the long tradition of the literature on measuring poverty.[1] Measuring (income) richness is a less considered field (see, e.g., Medeiros (2006)). In a recent paper, Peichl et al. (2006) define a new class of richness indices analogously to well-known measures of poverty. This approach also takes the dimension of changes and not only the number of people beyond a given richness line into account and therefore allows for a more sophisticated analysis of richness in addition to the traditional headcount index. Empirical studies have so far mainly used the headcount ratio or top income shares to measure richness (see, e.g., Atkinson (2005), Dell (2005), Piketty (2005), Saez (2005), Saez and Veall (2005), Piketty and Saez (2006), Atkinson and Piketty (2007), Aaberge and Atkinson (2008), Roine and Waldenström (2008)). These studies have shown that richness has increased in the Anglo-Saxon countries (and Norway) since the 1970s, whereas the level remained nearly constant in Continental Europe (and Sweden) until the late 1990s. However, most of these studies have been single country analyses, sometimes comparing the results with findings from studies for other countries. However, the lack of consistency and different qualities of data, the coverage of policy elements and in definitions of income components restrict the comparability of single country analyses.

The aim of this paper is to analyse the impact of introducing revenue and inequality neutral flat tax reforms (see Paulus and Peichl (2008b)) in European countries on the development of richness. In a first step, we analyse the development of various richness indices over time in Europe (and other OECD-Countries) using micro data from different sources in a comparable

[1] See for example Zheng (1997) or Chakravarty and Muliere (2004) for recent surveys.

manner. We explain the different developments in different countries by taking country specific situations (institutions, distribution of resources) into account. Further on, we compare the findings between different richness indices to show their differences and similarities in evaluating the top of the income distribution. In a second step, we undertake a systematic approach for choosing flat tax parameters, i.e. flat rate and basic allowance, which seemed to be rather arbitrary in previous studies, for a comparative analysis of different flat tax reform scenarios. We rely on EUROMOD, a tax-benefit microsimulation model for the EU, to compare the results across countries in a common framework. We compute the values of the richness indices for different (revenue and inequality neutral) flat tax reform scenarios and compare the results of these hypothetical reforms with the actual status quo values derived in step one to analyse the impact of flat tax reforms. Again, we explain the differences across countries by taking into account country specific variation in tax benefit systems and the structure of economic resources. Furthermore, we analyse which population subgroups gain and which lose from the introduction of flat taxes. Moreover, we analyse if and why the results from the different richness indices differ in specific years, countries and/or scenarios for a better understanding of the conceptual differences in definitions of richness indices. Overall, our analysis should contribute to the literature on both the measurement of richness and the development of richness over time.

Our analysis yields the following results. Different data sources as well as different richness measures can lead to different results for cross country comparisons and rankings, the analysis of the development of richness over time or the ex ante analysis of reform scenarios. However, in general, different rather homogeneous groups of countries can be identified: richness is rather high in Southern and Eastern European countries, as well as the English speaking countries, medium in Continental Europe and low in Scandinavian countries. When constructing inequality neutral flat tax scenarios, the change in richness is rather small and it may either be positive or negative depending on the country and the richness measure. Therefore, a flat tax reform does not necessarily lead to more richness as expected. However, when allowing inequality to increase, richness is increasing in all countries according to all measures. This redistribution from the rich to the non-rich might explain why a flat tax is not very popular in Western Europe.

The setup of the paper is organised as follows: Section 2 describes the measurement of richness, section 3 the different data sources. In section 4, the development of richness over time is analysed. Section 5 presents the results of the flat tax simulation analysis. Section 6 concludes.

2 Measuring Richness

While an extensive literature on poverty indices exists, little research has been done on the measurement of richness yet. For an overview of the sparse literature see Medeiros (2006).

To analyse poverty, often the measures of Foster et al. (1984) are used. Consider a net income distribution $x = (x_1, x_2, \ldots, x_n) \in R_+^n$, where n is the number of individuals or households. Let π be the poverty line, e.g. 60% of the median income, and $p = \#\{i|x_i < \pi,\ i = 1, 2, \ldots, n\}$ the number of poor persons. The proportion of poor persons (headcount) is defined as

$$\varphi_{HC}(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n} \mathbf{1}_{x_i<\pi} = \frac{p}{n}\,, \tag{1}$$

with $\mathbf{1}_{x_i<\pi} = 1$, for $x_i < \pi$ and $\mathbf{1}_{x_i<\pi} = 0$ elsewhere. The Foster et al. (1984) indices (FGT) are defined by

$$\varphi_{FGT}(x) = \frac{1}{n}\sum_{i=1}^{n}\left(\left(\frac{\pi - x_i}{\pi}\right)_+\right)^{\alpha}\,, \tag{2}$$

with $\alpha > 0$ and $y_+ := \max\{y, 0\}$. The coefficient $\alpha > 1$ may be interpreted as a parameter of poverty aversion, since greater values of α attach increasingly greater weight to large poverty gaps.

Measuring richness is a less considered field. Let ρ be the richness line, *e.g.* 200% of median income, and $r = \#\{i|x_i > \rho,\ i = 1, 2, \ldots, n\}$ the number of rich persons. In many studies on income richness, only the proportion of rich persons is used as a measure of richness:

$$R_{HC}(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n} \mathbf{1}_{x_i>\rho} = \frac{r}{n}\,. \tag{3}$$

Its definition resembles that one of the head count ratio for poverty. Another often used concept of measuring richness is to take the income share of the top p% of the income distribution:

$$R_{IS,p}(\mathbf{x}) = \frac{\sum_{i=1}^{n} x_i \mathbf{1}_{x_i>q_{1-p}}}{\sum_{i=1}^{n} x_i} \tag{4}$$

with q_p being the $(1-p)$% quantile.

The definition of richness using the head count ratio is not satisfying, because this index will not change if nobody changes his or her status (rich or non-rich). To overcome this drawback, in a recent paper, Peichl et al. (2006) define a new class of richness measures R by

$$R(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n} v\left(f\left(\frac{x_i}{\rho}\right)\right). \tag{5}$$

This approach is more sophisticated because it also takes the dimension of changes and not only the number of people beyond a given richness line into account. As the incomes of the rich have only a lower bound ρ, these incomes are transformed relative to the richness line, $\frac{x_i}{\rho}$, to the unit interval by a strictly increasing transformation function f. Where $f : \mathbb{R}_+ \to [0,1]$ is strictly increasing, $v : [0,1] \to \mathbb{R}_+$ is increasing and $v(f(\cdot))$ is at least concave, that is, has a concave restriction on $[a, \infty[$ for some $a \in \mathbb{R}_+$.[2] Peichl et al. (2006) define $f(y) := 1 - \frac{1}{y}$ and $v(y) := y^\alpha$, with $\alpha > 0$, to obtain a richness index which resembles the FGT index of poverty[3]:

$$R_\alpha(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n}\left(1 - \frac{1}{\left(\frac{x_i}{\rho}\right)\mathbf{1}_{x_i>\rho}}\right)^\alpha = \frac{1}{n}\sum_{i=1}^{n}\left(\left(\frac{x_i-\rho}{x_i}\right)_+\right)^\alpha. \tag{6}$$

3 Data

To analyse the development of richness over time we use micro data from different sources which are described in the following subsections.

3.1 LIS

The Luxembourg Income Study (LIS) provides micro-level data for about thirty countries at different points in time.[4] The LIS database includes cross-nationally and historically harmonized and nationally representative individual-level datasets from surveys with standardized measures of key variables.

LIS data are based on uniform definitions, making reliable comparisons across countries and over time possible. The LIS is not conducted annually, but in waves which take five years each; each country is supposed to have one observation within each wave, but for some years the

[2] One may argue that in analogy to poverty measurement the richness index should increase with larger richness gaps. This would imply a convex function $v(f(\cdot))$. However, due to diminishing marginal utility of income, we think that a concave function is more appropriate. I.e., if the income of someone just above the richness line increases by a certain amount Δx, the increase in R_α should be larger than if Bill Gates' income increases by the same amount Δx.

[3] One may also define $f(y) = 1 - \frac{1}{y^e}$, $e > 0$, for $y > 1$ and $v(y) = y$ and obtain an index similar to that one of Chakravarty: $R_e(x) = \frac{1}{n}\sum_{i=1}^{n}\left(1 - \left(\frac{\rho}{x_i}\right)^e\right)_+$, $e > 0$ (see Peichl et al. (2006)).

[4] The LIS countries include: Australia (AU), Austria (AT), Belgium (BE), Canada (CA), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Israel (IL), Italy (IT), Japan (JP), Korea (KR), Luxembourg (LU), Mexico (MX), Netherlands (NL), Norway (NO), Poland (PL), Romania (RO), Russia (RU), Slovak Republic (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Taiwan (TW), United Kingdom (UK), United States (US). See http://www.lisproject.org/techdoc.htm for further description and documentation.

LIS-Wave	historical		I	II	III	IV	V	VI
year	1970	1975	1980	1985	1990	1995	2000	2004
AU			1981	1985	1989	1995	2001	2003
CA	1971	1975	1981	1987	1991	1994	2000	
CH			1982	.	1992	.	2000	
DE	1973	1978	1981	1984	1989	1994	2000	
DK				1987	1992	1995	2000	2004
FI				1987	1991	1995	2000	2004
IL			1979	1986	1992	1997	2001	
NL				1983	1991	1994	1999	
NO			1979	1986	1991	1995	2000	
PL				1986	1992	1995	1999	
SE			1981	1987	1992	1995	2000	2005
TW			1981	1986	1991	1995	2000	2005
UK	1969	1974	1979	1986	1991	1995	1999	2004
US		1974	1979	1986	1991	1994	2000	2004

Table 1: LIS data matrix

data are incomplete. For our analysis, we have seleted those countries with observations in at least four different waves. Table 1 lists the allocation of years to the LIS waves for the selected countries.

3.2 ECHP

The European Community Household Panel (ECHP) micro data is a household survey with a common conceptual framework conducted in the member states of the EU, co-ordinated by the Statistical Office of the European Communities (Eurostat). ECHP data was first collected in 1994, when a sample of 60,500 nationally representative households (i.e. approximately 130,000 adults aged over 16) were interviewed in the then 12 member states. Austria has joined the project in the second wave in 1995, Finland in 1996. From 1997 onwards, similar data is also available for Sweden. Since then, the data is covering all (old) EU-15 member states. With the last wave in 2001, ECHP data is available for 8 waves altogether. The dataset includes information on e.g. family size and composition, living conditions and several income measures. Therefore it provides a source of mutually comparable income data of EU member countries. Unfortunately ECHP data does not report gross incomes but the survey is limited to net incomes, which is gross income (primary income) after social transfers and taxes increased by housing benefits and educational allowances.

3.3 EU-SILC

EU-SILC (European Union Statistics on Income and Living Conditions) is the successor of ECHP data.[5] The EU-SILC collects comparable cross-sectional and longitudinal multidimensional micro data on income and social exclusion in European countries. Since 2005, the dataset covers 25 EU member states, plus Norway and Iceland, and is the largest comparative survey of European income and living conditions.

3.4 EUROMOD: microsimulation model and database

For the analysis of flat tax reforms, we use EUROMOD[6], a static, non-behavioural tax-benefit model for the EU-15. The uniqueness of EUROMOD lies in it being a research tool that is relevant both on the national and the European level. EUROMOD uses the microsimulation technique to simulate taxes, benefits and disposable incomes under different scenarios for a representative micro-data sample of households covering the EU-15 countries.

The main stages of the simulations are the following. First, a micro-data sample and tax-benefit rules are read into the model (for each country under observation). Then for each tax and benefit instrument, the model constructs corresponding units of assessment, ascertains who is eligible for that instrument and determines the amount of benefit or tax liability. The result is then assigned to either an individual or allocated to the persons sharing the tax unit. Finally, after all taxes and benefits in questions are simulated, disposable income is calculated.

EUROMOD is characterised by greater extent of flexibility compared to usual national models in order to accommodate a range of different tax-benefit systems. For instance, the model can easily handle different units of assessment, income definitions for tax bases and benefit means-tests, as well as the order and structure of instruments. Overall, a common framework with standardised definitions allows making comparisons between countries in a consistent way. Further on, most analyses can be applied on a hypothetical "EU-15-land". Moreover, the integrated multi country model design allows for specific analyses like cross-country comparisons of certain instruments or policies, policy or system swapping, impact of national policies at the EU level or of EU policies at the national level.

EUROMOD covers only monetary incomes, excluding unrealised or irregular capital gains/losses and irregular incomes. It can simulate most of the direct taxes and benefits except those based on previous contributions as this information is usually not available from the cross-sectional

[5]The ECHP/EU-SILC countries include: Austria (AT), Belgium (BE), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia(LV), Lithuania (LT), Luxembourg (LU), Netherlands (NL), Norway (NO), Poland (PL), Slovak Republic (SK), Slovenia (SI), Spain (ES), Sweden (SE), United Kingdom (UK).

[6]For further information on EUROMOD, see e.g. Sutherland (2001), Lietz and Mantovani (2006) and Sutherland (2007).

data the EUROMOD input datasets are based on. The model assumes full benefit take-up and tax compliance. Although the latter is an important aspect of flat tax reforms, we do not consider changes in compliance here and limit our analysis to the first-order static effects only.

	Input dataset for EUROMOD	No of households	Date of collection	Reference time period for incomes
AT	Austrian version of EU-SILC	4,521	2004	annual 2003
BE	Panel Survey on Belgian Households	2,975	2002	annual 2001
DK	European Community Household Panel	7,044	1995	annual 1994
FI	Income distribution survey	10,736	2001	annual 2001
FR	Budget de Famille	29,158	1994/5	annual 1993/4
GE	German Socio-Economic Panel	11,303	2002	annual 2001
GR	Household Budget Survey	6,555	2004/5	annual 2003/4
IR	Living in Ireland Survey	14,585	1994	month in 1994
IT	Survey of Households Income and Wealth	23,924	1996	annual 1995
LU	PSELL-2	2,431	2001	annual 2000
NL	Sociaal-economisch panelonderzoek	4,329	2000	annual 1999
PT	European Community Household Panel	4,588	2001	annual 2000
SP	European Community Household Panel	5,048	2000	annual 1999
SW	Income Distribution Survey	33,223	2001	annual 2001
UK	Family Expenditure Survey	6,634	2000/1	month in 2000/1

Table 2: EUROMOD input datasets (version C13)

Table 2 gives an overview of the input datasets for EUROMOD. Their sample size varies from less than 2,500 to more than 33,000 households across countries. All monetary variables are updated to 2003 using country-specific uprating factors, as the reference time period for incomes varies from 1994 to 2003. Where net incomes were recorded in the original data, gross incomes have been also imputed.

3.5 Income concept

The unit of analysis is the individual. To compensate for different household structures and possible economies of scales in households, we use equivalised household incomes throughout the analysis. For each person, the equivalised (per-capita) total net income is its household total net income divided by the equivalised household size according to the modified OECD scale.[7] The richness line is computed as 200% of median equivalent income.

[7]The modified OECD scale assigns a weight of 1.0 to the head of household, 0.5 to every household member aged 14 or more and 0.3 to each child aged less than 14. Summing up the individual weights gives the household specific equivalence factor.

4 Development of Richness

The values for the various measures of richness described in section 2 can be found in the Appendix (Tables 9 - 15 (LIS), 16 - 22 (ECHP/EU-SILC) and 23 - 25 (EUROMOD). In the following subsections, some interesting findings and general trends will be highlighted.

4.1 LIS data

When comparing the absolute values of richness according to the different concepts across countries, different groups can be identified for the year 2000: richness is rather high in Anglo-Saxon welfare states (US, UK and Australia) and Israel, medium in Continental Europe (Germany, Poland, Switzerland) and Canada, and low in Scandinavian countries (Denmark, Norway, Finland, Sweden) and the Netherlands. This classification corresponds to the classical social sciences typology of welfare states by Esping-Andersen (1990).

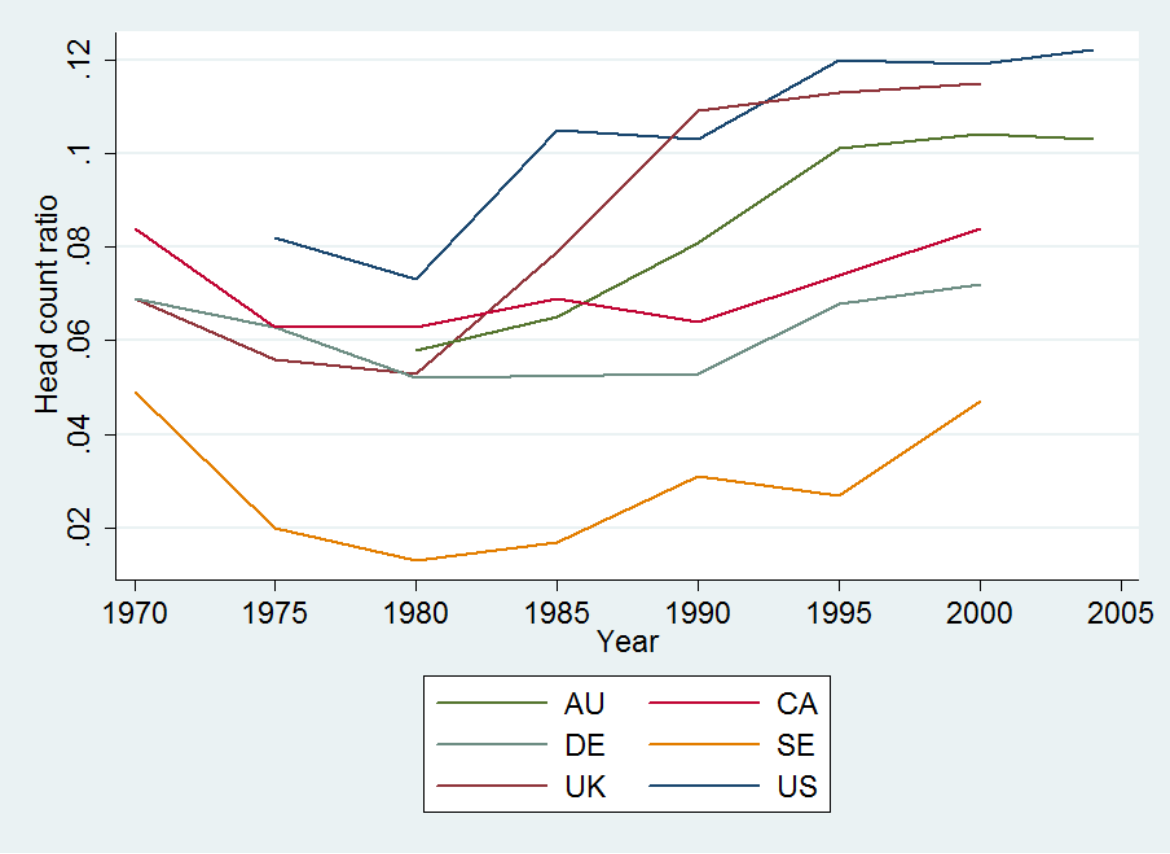

Figure 1: Richness according to headcount ratio (LIS data)

When looking at the development of richness over time (see Figures 1 and 2)[8] a U-shaped

[8] We selected the six countries with the longest available data series in LIS for these two figures. The results

pattern can be identified for many countries. Richness declined in the 1970s and has been increasing since 1980. The Netherlands and Switzerland are the only countries were richness is not increasing during this period of time. As a consequence, all richness measures show values below those of Finland and Sweden in the year 2000 and only Denmark has lower richness. The results differ slightly when looking at different measures of richness. For instance, for the US a small decline in the head count ratio between 1995 and 2000 can be observed. However, the income share of the rich people remains constant. Therefore, the income of the (fewer) rich people increased. One should note, though, that the income share of the people defined "rich" by the head count ratio is not a very good measure when comparing countries with different fractions of rich people. Therefore, the income shares of the top $x\%$ of the income distribution are used in addition. When taking a closer look a the distribution within rich people (the head count index is 12%, i.e. the top 10% are all belonging to the group of the "rich"), the income shares of the top 10% and 5% increase, respectively. The income share of the top 1%, however, decreases. These different changes in income shares and number of rich people are reflected in changes in the R_α measures: $R_{\alpha=1}$ is increasing, i.e. the income structure is changing, but $R_{\alpha=2}$ does not change, i.e. the change is not happening at the very top of the distribution. Although the ranking of countries according to the absolute values of indices might differ, in general, all measures show the same trends and relationship of changes.

The different indicators lead to a similar ranking of countries, however some small changes in the order occur. In 1980, richness is highest in Switzerland according to all measures but the head count ratio (R_{HC}) which is highest in Israel that is ranked second according to all other measures. Taiwan is always ranked third, whereas the US is fourth for most measures. However, $R_{\alpha=2}$ and $R_{IS,1}$ indicate lower values for the US than, for instance, for Germany, which is usually ranked as a country with little richness (only the Scandinavian countries have less). In 1990, the UK and the US move up in the richness table. Switzerland moves down according to R_{HC} and R_α but remains the country with the highest top income shares $R_{IS,p}$. For the US, $R_{IS,1}$ still indicates a rather low level. In 2000, the US has the highest richness according to all measures except the head count ratio (highest in Israel, US is second) and $R_{IS,1}$ (third). Switzerland continues to move downwards and drops out of the top four according to all measures, whereas the UK battles for the second place with Israel. $R_{IS,1}$ indicates rather high richness for Sweden, which has the lowest values for all other measures, and Norway which has the second highest top 1% income share but is ranked second according to all other measures (except $R_{IS,5}$). Richness is also increasing in Canada and Australia (except for $R_{IS,1}$).

These findings are, generally speaking, in line with the studies in Atkinson and Piketty (2007) which find increasing richness in English speaking countries but not in Continental

for the other countries are available in the Appendix.

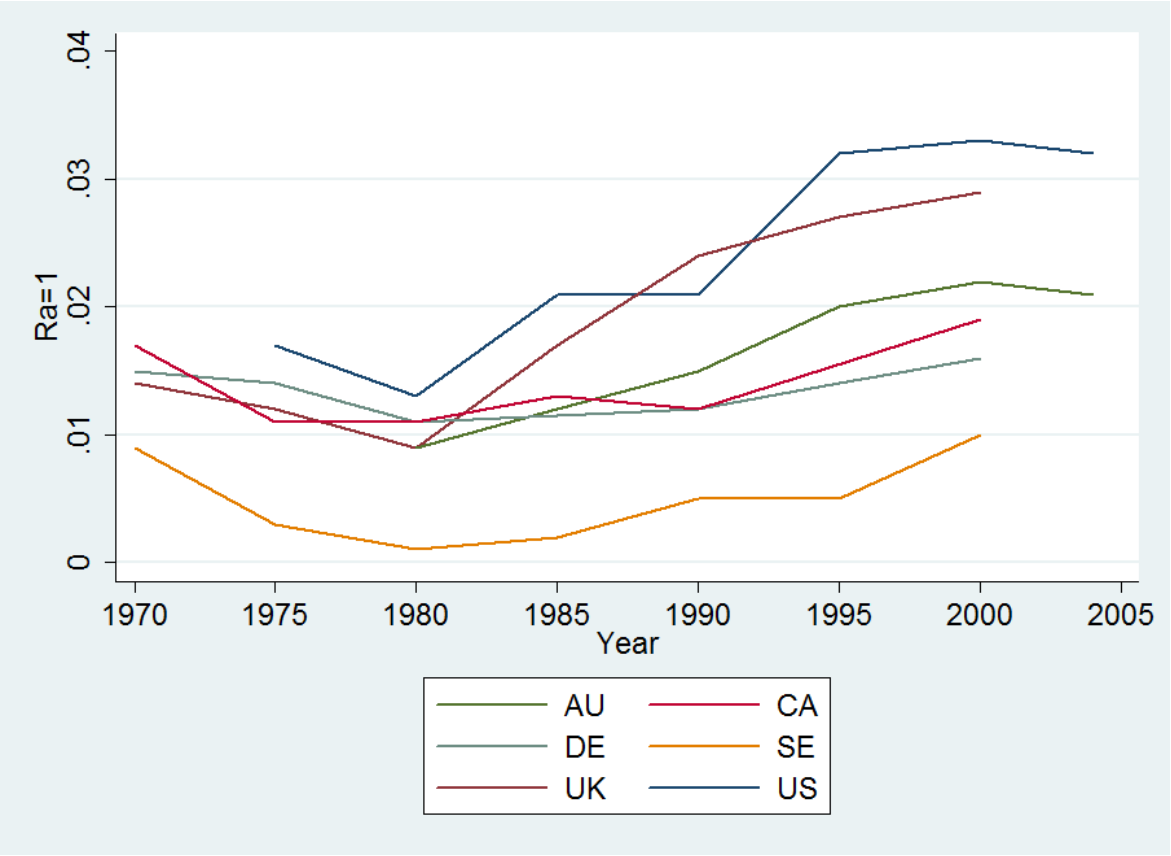

Figure 2: Richness according to $R_{\alpha=1}$ (LIS data)

European countries. The differences in the ranking order can be attributed to differences in the underlying income distribution. For instance, the results for the US show that between 1980 and 2000 the share of the top decile ($R_{IS,10}$) increased but not as strong as the share of the top percentile ($R_{IS,1}$) which is confirmed by the findings of Piketty and Saez (2006). This development is also captured in the development of the $R_{\alpha=2}$ measure. Therefore, not only changes in the overall income distribution (between rich and non-rich) but also within the rich subpopulation play an important role for the development of richness over time.

4.2 ECHP / EU-SILC data

When looking at the richness measures for the European countries in 2004/2005, again different groups of countries can be identified: richness is rather high in Southern and Eastern European countries, as well as the Anglo-Saxon countries, medium in Continental Europe and low in Scandinavian countries. Two exceptions are the Czech and Slovak Republics which have rather low values similar to those of Continental countries.

The development of richness according to the ECHP/EU-SILC[9] data depicts a slightly different and (due to more observations for a shorter period of time) more complex picture than according to the LIS data. When looking at the ECHP data only (1993-2000), a general decline over the whole period of analysis can be observed. However, in general, a cycling pattern can be found for most countries. The cycles, however, are not the same for all countries and continue when taking the EU-SILC data into account.

	R_{HC}	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	5	4	4	4	4	4	4
BE	7	5	5	5	6	5	7
CY	13	13	11	13	13	12	16
CZ	6	7	6	6	5	6	11
DE	9	8	8	8	8	10	17
DK	2	2	3	2	3	3	9
EE	20	21	19	20	18	15	8
ES	19	15	15	16	14	11	5
EU	22	20	20	23	23	21	20
FI	4	6	7	7	9	14	21
FR	12	12	10	11	11	8	10
GR	21	22	23	21	22	23	19
HU	15	19	22	19	24	24	26
IE	16	18	18	18	19	22	24
IS	8	10	12	9	10	13	15
IT	17	16	16	15	15	16	14
LT	23	24	24	24	21	19	6
LU	14	14	13	14	12	7	3
LV	25	25	25	25	25	25	23
NL	11	9	9	10	7	9	13
PL	24	23	21	22	20	18	12
PT	26	26	26	26	26	26	22
SE	1	1	1	1	1	1	2
SI	3	3	2	3	2	2	1
SK	10	11	14	12	17	20	25
UK	18	17	17	17	16	17	18

Table 3: Ranking of countries according to different richness measures, 2005
Sources: own calculation using EU-SILC data.

Table 3 shows the ranking of countries according to the different measures of richness. For our analysis, the country with the lowest value of the corresponding richness index is assigned the rank #1, the second lowest #2, and so. This ranking order does not imply any normative

[9]One should be aware that there are some conceptual differences regarding the coverage of policy elements and definitions of income components between ECHP and EU-SILC that affect the consistency and the quality of data and restrict the comparability of the analysis (see Eurostat (2005)).

assumptions or judgements about less richness (inequality) being better than more or vice versa. Equivalent statements (with different "signs") could be derived with an opposite ordering.

The ranking of countries differs when looking at different measures of richness. For instance, considering only the top income shares (especially $R_{IS,1}$) indicate a higher ranking (i.e. higher richness in comparison to other countries) for the Czech Republic, Germany, Denmark, Finland, Hungary, Ireland, Iceland and the Slovak Republic in 2005. When comparing these rankings with those of 2004, the same observation can be made for all countries but the Czech Republic. In 2004, all measures rank the Czech Republic between 9 and 13. In 2005, all measures but $R_{IS,1}$ (#11) rank the Czech Republic between 5 and 7.

Especially the high ranks of Denmark (#9 instead of $\#2-3$ according to all other measures), Germany (#17 instead of #9 (R_{HC}) or #8 (R_α)), Finland (#21 ($R_{IS,1}$) or #14 ($R_{IS,5}$) instead of #4 (R_{HC}) or $\#6-7$ (R_α)) when using the income share of the top 1% ($R_{IS,1}$) can be quite misleading if they are used as the only measure to compare countries. In contrast, of course, for some other countries the ranking changes in the opposite direction. According to $R_{IS,1}$, Spain (#8 instead of #19 (R_{HC}) or #15 (R_α)), Estonia (#5 instead of #20 (R_{HC}) or $\#19-21$ (R_α)), Lithuania (#5 instead of #19 (R_{HC}) or #15 (R_α)) and Luxembourg (#3 instead of $\#13-14$ (R_{HC} and R_α)) are among the countries with the lowest richness in 2005 (together with Austria, Sweden and Slovenia that are among the top group according to all measures). In 2004, Spain and Luxembourg are also ranked among the countries with the lowest richness according to $R_{IS,1}$, Estonia and Lithuania are not, but still for them $R_{IS,1}$ indicates a higher rank than the other measures. The low values for Luxembourg might be surprising. When taking a look at the 2004 data, Luxembourg is ranked #4 according to $R_{IS,10}$, $R_{IS,5}$ and $R_{IS,1}$, but #12 (R_{HC}) and #10 ($R_{\alpha=1}$) whereas $R_{\alpha=2}$ ranks it #5. These results imply a rather high inequality among the top 10% of the income distribution. However, the overall inequality according to the Gini coefficient, for example, is on an average level compared to other Continental countries (see, e.g., Peichl (2008)). Further on, Greece is ranked #10 according to $R_{IS,1}$ in 2004, whereas all other measures rank it around #20. In 2005, $R_{IS,1}$ ranks it 19^{th} and all other measures are just above #20.

These results show that taking into account at several measures should lead to a more reliable picture than focussing on a single measure.

4.3 Comparison of results from different data sources

In comparison of ECHP and EU-SILC data, no systematic differences can be found. For some countries the EU-SILC values seem to be in line with ECHP data (e.g. Germany, Denmark, France, Greece, Netherlands, Portugal), for some countries the EU-SILC values are higher (e.g. Ireland, Italy, UK), for others lower (e.g. Sweden). These changes, however, could not be traced

back to systematic differences in the data, they might as well stem from different developments in the underlying income distributions.

When comparing the values between the LIS and the ECHP data, it can be found that, in general, the LIS data yield higher values for all richness indices. Especially the absolute values of indices and the ranking of countries according to these values differ. The income shares of the top x% of the population seem to be the most robust measures across data sets.[10] However, in general, all measures show the same trends and relationship of changes.

5 Effects of Flat Tax Reforms

5.1 Flat Tax

Flat tax implies that some sort of proportionality is embedded in the income tax system, i.e. income is taxed at the same (flat) rate along the whole range of income. Its design, however, can be very different. There are two dimensions to be distinguished: tax schedule and tax base.

In general, a tax schedule can apply the same rate on all sources of income (i.e. comprehensive tax) or different rates on different types of incomes (i.e. schedular tax). Most countries with a flat tax system apply different rates to personal and corporate income, although a common rate has become more popular among the countries recently implementing these systems. Usually, the tax rate does not vary for components of personal income, i.e. capital and labour income is taxed at the same marginal rate independent of the level of income. There is also a number of countries which only tax capital income at a flat rate and levy a progressive rate schedule on labour income. However, these are usually not considered as flat tax systems but dual or semi-dual income tax systems.[11]

For the tax base one can differentiate between concepts that allow or do not allow for tax reliefs. Certainly, only the flat tax without any tax reliefs is a "pure" flat tax as in this case tax payments are indeed proportional to incomes. A flat income tax as such has only been applied in Georgia and recently in Bulgaria. In all other cases, the tax incidence on incomes is progressive, i.e. a single marginal flat tax rate (FTR) is combined with a general personal flat tax allowance (FTA). This is also what we consider in this paper:

$$T = FTR * \max(taxbase - FTA, 0) \tag{7}$$

An important aspect is the setting of tax system parameters for the ex ante analysis of

[10] However, all data sources are survey samples that use weights to extrapolate the results to the whole population. These weights are usually designed such that the overall income is well represented.

[11] See OECD (2006) for more about dual income tax systems. These countries include, e.g., the Scandinavian countries.

hypothetical tax reforms. In terms of flat tax reforms this translates into the question of how to set the flat tax rate and the basic allowance. In our case we are interested in the relationship between flat tax parameters and distributional effects.[12] Davies and Hoy (2002) show theoretically that the inequality of after-tax distribution of income is monotonically declining in the flat tax rate and the associated level of basic allowance generating the same tax yield.[13] Furthermore, for revenue neutral tax reforms replacing a graduated rate tax with a flat rate tax, they prove the existence of critical flat tax rates such that after-tax income inequality is - compared to the (existing) graduated rate tax:

A) the same for a given inequality index I at a certain flat tax rate, $t = t_F^*(I) \in (t_F^l, t_F^u)$,

B) always higher (according to any inequality index) for any flat tax rate equal to or below a lower bound, $t \leq t_F^l$,

C) always lower (according to any inequality index) for any flat tax rate equal to or above an upper bound, $t \geq t_F^u$.

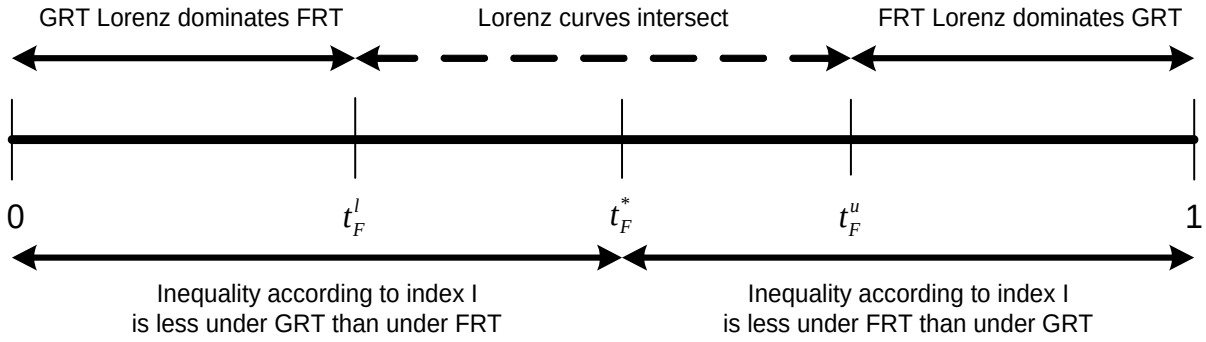

Figure 3: Comparison of critical tax rates
Source: Davies and Hoy (2002), p. 40.

Figure 3 illustrates these regularities. In other words: When moving from a graduated income tax to a flat tax system that yields the same revenue, three critical flat tax rate values with respect to after-tax income exist. The first depends on the chosen inequality index, the other two do not, i.e. they stem from the concept of Lorenz dominance. First, for a given

[12] The setting of the key flat tax design features (marginal rate, basic allowance, tax base) crucially depends on the objective of the reform (like simplifying the system, improving compliance, broadening the tax base, increasing or decreasing the tax burden for selected groups, higher, lower or constant revenue) and if other reforms (like shifting tax burden between direct and indirect taxes, social insurance, social security) are planned to accompany the flat tax introduction.

[13] As a flat tax schedule has only two parameters - marginal rate and basic allowance - it is only possible to choose one freely when accounting for revenue neutrality.

inequality index I, a flat rate value $t_F^*(I)$ can be found such that inequality remains unchanged. Further on, inequality in terms of this index is always higher (lower) below (above) this critical value after the flat tax introduction. Second, there exist a lower bound t_F^l such that for all marginal rates below this critical value inequality in terms of any inequality measure is always higher than compared to the existing system (i.e. the existing graduated rate tax Lorenz dominates the flat tax). Third, inequality is always lower above an upper bound t_F^u according to any inequality index (i.e. the flat tax Lorenz dominates the existing graduated rate tax). These results apply to any inequality measure satisfying the Pigou-Dalton principle of transfers and under the assumption that behaviour is not affected by tax system changes.

Paulus and Peichl (2008a) and Paulus and Peichl (2008b) rely on these theoretical insights to systematically construct hypothetical flat tax reform scenarios. All scenarios are revenue neutral with the total income tax revenue within $\pm 0.1\%$ limits of its baseline value. Although, the premise of ex-ante revenue neutrality (i.e. without behavioural responses) is a rather strong assumption but it is necessary to apply the Davies and Hoy (2002) approach.[14] The Paulus and Peichl (2008a)-scenarios are focussing on the lower and upper bound (t_F^l and t_F^u), whereas the Paulus and Peichl (2008b)-scenarios do not change the post-government income inequality according to several indices, i.e. they correspond to the critical values $t_F^*(I)$. In terms of Davies and Hoy (2002) approach, the scenarios correspond to the critical flat tax rate value t_F^*. Table 4 presents the flat tax parameter values for the scenarios lower boundary t_F^l and the critical value $t_F^*(Gini)$ in terms of the Gini coefficient.

	t_F^l		$t_F^*(Gini)$	
	FTR	FTA	FTR	FTA
AT	21.7%	3,640	44.4%	14,567
FI	33.9%	5,800	34.2%	7,115
GE	27.0%	7,235	44.8%	19,788
GR	21.4%	8,400	37.5%	14,077
LU	16.6%	9,750	52.2%	37,553
NL	19.0%[15]	10,258	38.5%	21,884
PT	11.6%	1,770	28.6%	10,092
SP	17.7%	3,400	38.7%	13,845
UK	22.5%	4,615	29.9%	8,811

Table 4: Critical parameter values for revenue and inequality neutral flat tax scenarios, 2003
Sources: Paulus and Peichl (2008a) and Paulus and Peichl (2008b) using EUROMOD version D5.

[14] If the scenarios were chosen to be revenue neutral ex-post, i.e. after labour supply reactions, the marginal tax rates could be lower (higher) in case of increasing (decreasing) labour supply but the underlying research question would be different. Our aim is to analyse scenarios that are equal ex-ante and to reveal the ex-post differences by analysing the economic effects of the scenarios in terms of equity and efficiency.

[15] The Netherlands have an integrated schedule of income tax and social insurance contributions. The latter

In this paper, we use the microsimulation technique to simulate taxes, benefits and disposable incomes for the two flat tax scenarios for a representative micro-data sample of households. Simulations are done with EUROMOD, a static tax-benefit model covering the EU15 countries. Our analysis is based on the 2003 tax-benefit systems, which is the most recent wave currently available in EUROMOD but limited to 9 countries, excluding Denmark, Belgium, France, Ireland, Italy and Sweden.

The existing income tax systems in the 9 countries under consideration are quite varied. As of 2003, all have graduated rate schedules with a number of brackets ranging from 3 (UK) to 16 (Luxembourg) and the highest marginal tax rate from 38% (Luxembourg) to about 55% (Finland, state and local rate combined). All schedules are piecewise linear except that of Germany which has a unique continuous function for tax rates at some income levels. Seven countries have a general basic allowance, often integrated into the tax schedule; the Netherlands and Portugal apply general (wastable) tax credits and Austria uses both elements. About half of the countries tax capital income (and property income) together with other income and the rest tax it separately applying a flat rate (of 15-30%), in Belgium this is optional.

The countries also differ in the unit of assessment. Again, half of them allow only individual taxation, four countries apply either optional or compulsory joint taxation and Belgium provides limited income sharing for married couples. Nevertheless, even systems based on individual taxation often have elements assessed at family level or couple level (e.g. family or child allowances) or allow the sharing of non-labour income or household expenditures (e.g. property income, mortgage payments).

Overall, although there are few countries with relatively simple income tax systems (e.g. UK), most of them can be characterised as complex systems with the combination of many different elements and varying tax units. Additional examples of complexities include progression adjustments in Austria and Germany, income taxation both at the state and the local level in Finland, and an integrated schedule of social insurance contributions and income tax in the Netherlands.

5.2 Reform simulations

There are already distinct differences between the analysed countries in the baseline (see Tables 23 - 25 in the Appendix). Two groups of countries are afferent when looking at the head count ratio (R_{HC}): richness (like inequality and polarisation, see Paulus and Peichl (2008a)) is rather high in Anglo-Saxon and Southern European countries, and it is rather low in Continental and Nordic Europe. When using more sophisticated measures of richness, that take both the

are kept unchanged, therefore the income tax flat rate is lower than the integrated flat tax rate would have been as the social insurance contributions have a flat rate of 31.2%.

dimension of changes and the number of people beyond a given richness line into account, this picture changes slightly, at least for the Anglo-Saxon countries. However, richness is still the highest in the Mediterranean countries. These results indicate that in those countries many people have incomes considerably above the richness line. This is confirmed by measures of polarisation as Southern countries are those with the highest polarisation of the income distribution (see Paulus and Peichl (2008a)). In contrast, in the Anglo-Saxon countries, many people are just above the richness line but not as far away as in the Southern countries.

absolute changes

	R_{HC}	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	-0.005	-0.001	0.000	0.000	-0.005	-0.003	0.000
FI	0.003	0.002	0.001	0.003	0.002	0.001	-0.002
GE	-0.003	-0.001	-0.001	-0.004	-0.003	0.000	0.000
GR	-0.001	0.000	0.001	0.003	0.001	0.001	0.001
LU	0.003	-0.001	-0.001	-0.002	-0.005	-0.007	-0.001
NL	-0.006	0.000	0.000	0.004	0.001	0.003	0.003
PT	0.001	-0.001	0.000	0.000	-0.002	0.003	-0.003
SP	-0.002	0.000	0.000	0.000	-0.001	-0.003	0.002
UK	-0.005	0.000	0.000	0.003	0.003	0.005	0.004

relative changes in %

	R_{HC}	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	-9.3	-9.2	-6.9	-0.1	-2.2	-2.1	0.2
FI	7.5	13.8	11.7	1.8	0.9	0.8	-3.1
GE	-3.5	-5.3	-4.3	-2.3	-1.0	-0.7	1.1
GR	-0.9	1.7	2.8	1.2	0.3	0.8	2.0
LU	3.8	-4.8	-19.4	-1.8	-2.5	-5.9	-3.8
NL	-10.1	2.9	11.9	3.0	0.7	2.1	7.9
PT	0.4	-1.0	0.3	0.0	-0.8	1.9	-6.8
SP	-2.2	-1.7	-1.3	0.1	-0.4	-2.6	4.1
UK	-4.1	-1.3	3.2	1.2	1.2	3.0	8.0

Table 5: Changes in richness measures for inequality neutral flat tax scenarios
Sources: own calculation using EUROMOD version D5.
Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%.

The changes in the various richness measures for revenue and inequality (in terms of the Gini coefficient) neutral flat tax reforms are presented in Table 5. There is no clear pattern of changes emerging when comparing the different richness measures across countries. There is not a single country for which all indices indicate the same directions of change. For instance, for Austria and Germany, $R_{IS,1}$ is the only measure indicating an increase (the same for Spain plus $R_{IS,rich}$ as well) implying larger gains at the very top of the income distribution. For Finland, all measures but $R_{IS,1}$ are increasing. When looking at the data, the decline in the top 1%

income share can be explained by the existing dual income tax system in Finland, i.e. capital income is taxed at a lower marginal flat rate of 29%, whereas labour income is taxed at (higher) progressive rates. Capital income is concentrated at the top of the distribution. Therefore, these households face higher taxes and lower disposable incomes with the introduction of a uniform marginal flat tax rate of 34.2% resulting in less richness at the very top. For Greece and the Netherlands, R_{HC} is the only decreasing measure, whereas it is the only increasing measure for Luxembourg. Fot the UK, R_{HC} and $R_{\alpha=1}$ are decreasing, all other measures are increasing. These effects can be explained with the higher tax burden of the (upper) middle class and the lower tax burden of the very top of the income distribution.

	Gainer			Unchanged			Loser		
	all	rich	non-rich	all	rich	non-rich	all	rich	non-rich
AT	31.3	23.1	31.7	13.8	1.4	14.5	54.9	75.6	53.8
FI	38.0	70.1	36.1	21.3	1.8	22.5	40.7	28.1	41.4
GE	34.7	55.9	33.0	33.9	9.3	35.9	31.4	34.8	31.1
GR	18.8	47.9	15.5	66.9	24.3	71.6	14.3	27.8	12.8
LU	43.0	52.4	42.2	13.6	2.5	14.5	43.4	45.0	43.2
NL	39.8	56.0	38.9	22.3	4.9	23.3	37.9	39.0	37.9
PT	28.9	53.2	25.1	51.8	14.6	57.6	19.3	32.2	17.3
SP	35.6	32.2	36.0	32.4	23.0	33.4	32.0	44.8	30.6
UK	29.6	42.7	28.2	35.2	3.5	38.7	35.2	53.8	33.1

Table 6: Gainer and loser for inequality neutral flat tax scenarios in %
Sources: Paulus and Peichl (2008b) and own calculation using EUROMOD version D5.

Table 6 summarises gainers and losers[16] for the inequality neutral flat tax scenario by presenting the overall population shares for each group, as well as the shares for the mutually exclusive subgroups "rich" and "non-rich". Overall, there are (slightly) more gainers than losers in Germany, Greece, Netherlands, Portugal and Spain, whereas the opposite is true for Austria, Finland, Luxembourg and the UK. However, in none of the countries does a flat tax lead to a majority of people gaining. The rather larger number of people with unchanged disposable income in Greece (and Portugal) can be explained by the large share of people not paying income tax at all in these countries (77.4% in GR and 62.6% in PT), even among the rich subpopulation. These fractions increase under the flat tax scenario to 84.2% and 80.7%, respectively. In all countries but Austria and Spain, the share of rich people gaining is larger than those of non-rich. However, in all countries but Finland, the share of losers is also larger among the rich than among the non-rich. In Finland, those among the rich who are loosing, are mainly people for whom the main source of income is capital income which also helps to

[16]Households whose disposable income does not change more than 10 Euro per month in either direction are regarded as „unchanged".

explain the afore mentioned decline in the top 1% income share.

When using different inequality indices to obtain inequality neutral scenarios, the critical values do not vary that much (see Paulus and Peichl (2008b)). Therefore, the change in richness measures do not differ very much as well (see Table 26). However, for some countries the change in richness has a different sign for different critical values (e.g. when using the head count index for Greece richness is increasing according to the GE critical values but decreasing according to the Gini critical value).

Furthermore, it should be noted that the changes are rather small. This is due to the fact that the flat tax scenarios are designed to be revenue and inequality neutral. The effects of the flat tax reforms depend heavily on the chosen scenarios, i.e. the flat tax parameters. When allowing the inequality to change, in general, the following observation can be made (see Paulus and Peichl (2008a)): the sign and the magnitude of the change in richness is correlated with the sign and the magnitude of the change in inequality, i.e. increasing inequality leads to increasing richness and vice versa. Further on, one should bear in mind, though, that the flat tax reforms in Eastern Europe were not intended to be inequality neutral. Therefore, we are using the Paulus and Peichl (2008a)-scenarios which correspond to the lower bound t_F^l in terms of Davies and Hoy (2002) approach and which are closer to the marginal flat tax rates applied in reality (see Keen et al. (2007)). The results are presented in Table 7.

There are already distinct differences between the countries in terms of inequality in the baseline scenario. The same two groups of countries can be distinguished: like poverty and richness, inequality is rather high in Southern European countries (Greece, Portugal and Spain) and the UK, and is rather low in Continental Europe (Austria, Germany and the Benelux countries) and Finland. Introducing a revenue neutral flat tax corresponding to the lower bound t_F^l unambiguously increases inequality in all countries, as predicted by Davies and Hoy (2002). The same is true for all richness measures which are increasing for all countries with the increases being always higher than for the inequality neutral scenario.

The pattern of changes in richness measures matches closely the change in inequality measures, i.e. increasing richness in the t_F^l-scenario for all countries and measures. The relative changes of richness measures are larger than the increases of the Gini coefficient. For all countries, the top of the distribution gains the most (see Paulus and Peichl (2008a)). Therefore, $R_{\alpha=2}$ indicates a larger increase than R_{HC} and $R_{\alpha=1}$ and the change in $R_{IS,1}$ is larger than that of $R_{IS,10}$ and $R_{IS,5}$ for all countries but Finland. This is due to the dual income taxation in the existing system, as explained above.

Table 6 presents gainers and losers for the lower bound scenario. In comparison to the inequality neutral scenario (see Table 6), the overall shares of gainers are lower and those of losers are higher for all countries. The shares of rich people gaining are also always higher -

absolute changes

	Gini	R_{HC}	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	0.038	0.025	0.008	0.004	0.041	0.024	0.020	0.010
FI	0.009	0.008	0.003	0.001	0.013	0.008	0.007	0.002
GE	0.021	0.020	0.007	0.003	0.037	0.016	0.013	0.006
GR	0.014	0.010	0.005	0.003	0.036	0.017	0.015	0.008
LU	0.040	0.043	0.012	0.005	0.060	0.025	0.019	0.007
NL	0.027	0.017	0.007	0.003	0.032	0.020	0.016	0.008
PT	0.032	0.019	0.012	0.008	0.072	0.032	0.026	0.008
SP	0.037	0.024	0.011	0.005	0.056	0.028	0.023	0.011
UK	0.014	0.007	0.005	0.003	0.030	0.015	0.013	0.008

relative changes in %

	Gini	R_{HC}	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	15.8	48.0	79.1	101.9	32.2	11.6	15.8	26.2
FI	3.3	16.2	23.5	23.2	8.5	3.6	4.6	3.5
GE	7.7	25.7	45.4	66.6	20.8	7.4	10.4	18.1
GR	4.4	10.4	23.7	37.8	15.2	6.9	10.4	17.6
LU	16.3	67.2	95.2	125.7	41.0	12.0	15.9	22.9
NL	10.8	31.9	70.1	100.8	24.9	9.7	13.9	25.1
PT	8.9	13.7	27.7	41.0	20.8	11.2	14.5	15.2
SP	11.8	23.5	53.8	78.6	23.5	11.8	16.0	26.6
UK	4.4	6.5	19.1	30.0	12.0	6.2	9.1	16.5

Table 7: Changes in richness measures for not inequality neutral flat tax scenarios (lower bound)
Sources: own calculation using EUROMOD version D5.
Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%.

in Austria and Luxembourg they almost reach 100% - and the shares of losers among the rich are lower for all countries except Greece. The shares of the non-rich gaining (losing) are lower (higher) under the t_F^l-scenario. These results imply redistribution from the rich to the non-rich which is reflected in the increasing inequality measures. Further on, there are more losers than gainers in every country under this not inequality neutral scenario. If disposable income was chosen as the only criterion for an election decision, this flat tax scenario would not have a majority in the population (in the sense of more gainers than losers) for all countries. Thus, these effects might explain why a flat tax is not very popular in Western Europe.

When interpreting these results, one has to be aware of the fact that we limit our analysis to static models. However, flat rate taxes are also supposed to have positive dynamic efficiency and growth effects.[17] As a result of these efficiency effects richness might further increase or decrease depending on which population subgroups gain the most in consequence of these reforms. Note further that we limit our analysis to revenue-neutral scenarios. If we allowed

[17] Cf. Stokey and Rebelo (1995) or Cassou and Lansing (2004).

	Gainer			Unchanged			Loser		
	all	rich	non-rich	all	rich	non-rich	all	rich	non-rich
AT	20.52	97.26	15.35	4.67	1.20	4.90	74.81	1.54	79.75
FI	26.78	70.75	24.28	18.77	2.79	19.69	54.44	26.46	56.04
GE	15.58	75.65	9.61	30.84	5.51	33.36	53.58	18.84	57.04
GR	10.44	60.35	4.30	41.87	7.88	46.05	47.69	31.77	49.65
LU	20.46	98.30	13.19	2.62	0.20	2.85	76.92	1.50	83.96
NL	24.26	81.40	20.48	7.85	2.88	8.18	67.89	15.73	71.34
PT	15.08	71.40	4.36	13.97	7.32	15.24	70.95	21.28	80.41
SP	19.40	88.07	10.25	7.79	6.30	7.99	72.81	5.62	81.76
UK	9.79	57.35	3.68	27.37	4.83	30.26	62.85	37.82	66.06

Table 8: Gainer and loser for not inequality neutral flat tax scenarios (lower bound) in %
Sources: Paulus and Peichl (2008a) and own calculation using EUROMOD version D5.

for a loss of tax revenue (which could be financed through cuts in government spending), the efficiency gains would be larger but inequality (and richness) would increase as well (see also Fuest et al. (2008)). Furthermore, our analysis abstracts from effects of the flat tax reform on compliance. Flat rate tax systems are widely expected to improve taxpayer compliance. The 2001 tax reform in Russia is widely thought to be an example for this effect. Indeed, tax compliance and revenue apparently improved by about one third after the 2001 tax reform (Ivanova et al. (2005)). However, it is not clear whether this can be attributed solely to the flat tax or to improved law enforcement and tax administration which was also part of the 2001 reform (see also Gaddy and Gale (2005) and Gorodnichenko et al. (2007)). Moreover, the case of Russia differs from Western Europe insofar as the latter has a long tradition of income taxation in a market economy and a well established tax administration to ensure tax compliance. In addition, since we do not change social insurance contributions, the marginal tax rate on labour still remains high. This suggests that positive effects of a flat tax reform on compliance are probably less important in Western Europe than in the transition countries of Eastern Europe.

6 Conclusion

The financing problems of the European welfare states and the increasing pressure of global economic competition have given rise to a debate whether the gap between rich and poor is widening. Given this debate, appropriate measures of poverty and richness are of key importance for an empirical analysis. The aim of this paper was to analyse the development of richness over time and the likely impact of flat tax reforms on richness. For a comprehensive analysis of richness, several data sources and richness indicators have been used.

In principle, all richness measures and data sources lead to similar results in many cases. However, for some countries quite striking differences between measures and / or data sources have been shown. For instance, in general, LIS data yield higher values for the head count and R_α measures, whereas the income shares yield similar results. When comparing the results across countries, different rather homogeneous groups of countries can be identified: richness is rather high in Southern and Eastern European countries, as well as the English speaking countries, medium in Continental Europe and low in Scandinavian countries.

It is widely believed that the rich are getting richer and the poor are getting poorer when introducing a flat tax system. Countries worldwide differ with respect to various dimensions including the design of the welfare state, i.e. the tax benefit system. Reasons for the fact that one system does not fit all countries include, among others, the specific socio-economic structure and the preferences of the society. Therefore, different outcomes of (similar) policy reforms should be expected for different countries.

The impact of a flat tax system on richness (and poverty[18]) depends on the chosen flat tax parameters and is correlated with the change in inequality measures. When constructing inequality neutral flat tax scenarios, the change in richness is rather small and it may either be positive or negative depending on the country. Therefore, a flat tax reform does not necessarily lead to more richness as expected. However, the inequality neutral flat tax rates are rather high in comparison to existing flat tax rates. Thus, when allowing inequality to increase which leads to more realistic (i.e. lower) flat tax rates, richness is increasing in all countries according to all measures. This redistribution from the rich to the non-rich might explain why a flat tax is not very popular in Western Europe.

One should note, though, that our analysis is based on survey data where the top and the bottom of the income distribution are usually underrepresented. One solution could be to construct series of top income data based on tax return data. However, tax return data is generally not comparable across countries as income tax systems differ considerably across countries. Constructing a homogeneous cross-country top income dataset is subject to further research and could lead to important insights for future cross-country comparisons (see e.g. Atkinson and Piketty (2007)). However, to be able to apply the R_α measures, information about the whole income distribution or at least the median income (for the richness line) is needed. Therefore, it would be useful to merge such a top income dataset with information of the bottom of the income distribution. As a result, a reliable picture of the entire income distribution can be obtained (see e.g. Bach et al. (2007)).

To sum up, our analysis showed that the measurement of richness is a complex field. The

[18]In general, the effect of income tax reforms on poverty is rather small as most people in the bottom half of the income distribution seldom pay income taxes at all (see Paulus and Peichl (2008a)).

results of cross country comparisons, development over time or the analysis of reform scenarios depend on the chosen measure of richness. Therefore, several measures should be used for a distinct analysis of structural changes at the top of the income distribution.

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A LIS

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.058	0.065	0.081	0.101	0.104	0.103
CA	0.084	0.063	0.063	0.069	0.064	0.068	0.084	
CH			0.082		0.076		0.070	
DE	0.069	0.063	0.052	0.066	0.053	0.068	0.072	
DK				0.038	0.024	0.022	0.025	0.026
FI				0.019	0.022	0.031	0.044	0.048
IL			0.104	0.118	0.117	0.123	0.128	
NL				0.076	0.057	0.049	0.039	
NO			0.032	0.032	0.028	0.027	0.037	
PL				0.052	0.081	0.084	0.085	
SE	0.049	0.020	0.013	0.017	0.031	0.027	0.047	
TW			0.078	0.078	0.083	0.087	0.095	
UK	0.069	0.056	0.053	0.079	0.109	0.113	0.115	
US		0.082	0.073	0.105	0.103	0.120	0.119	0.122

Table 9: Richness according to headcount ratio (LIS data)
Sources: own calculation using LIS data.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.009	0.012	0.015	0.020	0.022	0.021
CA	0.017	0.011	0.011	0.013	0.012	0.013	0.019	
CH			0.024		0.018		0.015	
DE	0.015	0.014	0.011	0.014	0.012	0.014	0.016	
DK				0.008	0.005	0.004	0.005	0.005
FI				0.003	0.003	0.006	0.010	0.010
IL			0.021	0.024	0.024	0.029	0.031	
NL				0.016	0.012	0.008	0.007	
NO			0.005	0.006	0.007	0.006	0.010	
PL				0.010	0.017	0.021	0.019	
SE	0.009	0.003	0.001	0.002	0.005	0.005	0.010	
TW			0.017	0.017	0.017	0.019	0.021	
UK	0.014	0.012	0.009	0.017	0.024	0.027	0.029	
US		0.017	0.013	0.021	0.021	0.032	0.033	0.032

Table 10: Richness according to $R_{\alpha=1}$ (LIS data)
Sources: own calculation using LIS data.
Note: R_α: Peichl et al. (2006) richness measure.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.002	0.004	0.005	0.006	0.007	0.007
CA	0.005	0.003	0.003	0.004	0.004	0.004	0.008	
CH			0.011		0.007		0.006	
DE	0.006	0.005	0.003	0.005	0.004	0.005	0.006	
DK				0.003	0.002	0.001	0.002	0.002
FI				0.001	0.001	0.002	0.004	0.004
IL			0.007	0.008	0.008	0.010	0.012	
NL				0.005	0.005	0.002	0.002	
NO			0.002	0.002	0.003	0.003	0.005	
PL				0.003	0.006	0.009	0.007	
SE	0.003	0.001	0.000	0.001	0.001	0.002	0.004	
TW			0.006	0.006	0.006	0.006	0.007	
UK	0.005	0.004	0.003	0.006	0.009	0.011	0.012	
US		0.006	0.003	0.007	0.007	0.014	0.014	0.014

Table 11: Richness according to $R_{\alpha=2}$ (LIS data)
Sources: own calculation using LIS data.
Note: R_α: Peichl et al. (2006) richness measure.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.131	0.153	0.188	0.233	0.245	0.239
CA	0.203	0.150	0.146	0.162	0.152	0.161	0.214	
CH			0.246		0.206		0.183	
DE	0.171	0.159	0.124	0.158	0.135	0.165	0.178	
DK				0.100	0.067	0.060	0.067	0.069
FI				0.047	0.052	0.079	0.121	0.133
IL			0.242	0.269	0.265	0.294	0.310	
NL				0.177	0.146	0.113	0.093	
NO			0.078	0.078	0.078	0.082	0.124	
PL				0.125	0.191	0.228	0.217	
SE	0.124	0.046	0.030	0.044	0.074	0.069	0.124	
TW			0.184	0.189	0.195	0.205	0.226	
UK	0.167	0.140	0.124	0.188	0.266	0.280	0.293	
US		0.199	0.168	0.245	0.243	0.312	0.312	0.319

Table 12: Income share of rich people (LIS data)
Sources: own calculation using LIS data.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.204	0.213	0.222	0.233	0.238	0.235
CA	0.231	0.214	0.211	0.215	0.214	0.215	0.242	
CH			0.274		0.251		0.232	
DE	0.222	0.221	0.203	0.215	0.214	0.219	0.226	
DK				0.204	0.191	0.186	0.188	0.190
FI				0.177	0.178	0.190	0.212	0.218
IL			0.235	0.237	0.235	0.254	0.263	
NL				0.218	0.219	0.202	0.194	
NO			0.191	0.189	0.193	0.199	0.223	
PL				0.206	0.223	0.258	0.244	
SE	0.213	0.176	0.169	0.179	0.188	0.187	0.212	
TW			0.221	0.226	0.224	0.227	0.234	
UK	0.219	0.214	0.204	0.226	0.252	0.258	0.269	
US		0.232	0.217	0.235	0.238	0.278	0.280	0.281

Table 13: Income share of top 10% (LIS data)
Sources: own calculation using LIS data.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.115	0.124	0.131	0.136	0.143	0.140
CA	0.136	0.125	0.122	0.126	0.126	0.126	0.151	
CH			0.186		0.160		0.146	
DE	0.134	0.136	0.121	0.129	0.130	0.132	0.138	
DK				0.122	0.113	0.110	0.111	0.112
FI				0.101	0.101	0.112	0.132	0.137
IL			0.140	0.140	0.140	0.155	0.164	
NL				0.130	0.134	0.116	0.112	
NO			0.110	0.109	0.116	0.123	0.146	
PL				0.121	0.133	0.165	0.151	
SE	0.125	0.098	0.093	0.102	0.108	0.109	0.131	
TW			0.132	0.137	0.134	0.137	0.141	
UK	0.132	0.129	0.119	0.135	0.157	0.161	0.172	
US		0.139	0.124	0.138	0.140	0.180	0.182	0.183

Table 14: Income share of top 5% (LIS data)
Sources: own calculation using LIS data.

	1970	1975	1980	1985	1990	1995	2000	2004
AU			0.030	0.036	0.040	0.042	0.045	0.045
CA	0.039	0.035	0.034	0.035	0.038	0.037	0.054	
CH			0.078		0.064		0.055	
DE	0.042	0.046	0.034	0.040	0.042	0.039	0.045	
DK				0.036	0.038	0.036	0.036	0.036
FI				0.028	0.028	0.035	0.048	0.053
IL			0.045	0.041	0.043	0.051	0.057	
NL				0.037	0.047	0.031	0.032	
NO			0.033	0.031	0.039	0.046	0.065	
PL				0.035	0.041	0.062	0.050	
SE	0.036	0.025	0.023	0.029	0.030	0.032	0.047	
TW			0.038	0.043	0.042	0.041	0.043	
UK	0.043	0.041	0.034	0.041	0.056	0.054	0.066	
US		0.042	0.032	0.037	0.040	0.065	0.062	0.068

Table 15: Income share of top 1% (LIS data)
Sources: own calculation using LIS data.

B ECHP EU-SILC

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.063	0.046	0.041	0.038	0.045	0.041	0.039	0.050	0.056	0.048
BE	0.064	0.057	0.047	0.052	0.062	0.053	0.062	0.060	0.048	0.056	0.049
CY										0.072	0.070
CZ										0.055	0.049
DE	0.073	0.061	0.054	0.047	0.050	0.052	0.048	0.053		0.051	0.053
DK	0.030	0.028	0.024	0.025	0.019	0.021	0.019	0.025	0.032	0.028	0.027
EE									0.138	0.111	0.104
ES	0.126	0.133	0.122	0.148	0.133	0.110	0.123	0.112	0.124	0.101	0.095
FI			0.031	0.037	0.030	0.039	0.039	0.038	0.045	0.045	0.046
FR	0.088	0.078	0.081	0.074	0.069	0.068	0.065	0.065	0.067	0.074	0.066
GR	0.110	0.117	0.111	0.118	0.115	0.111	0.108	0.101	0.096	0.109	0.108
HU										0.064	0.084
IE	0.114	0.102	0.094	0.085	0.076	0.083	0.071	0.061	0.073	0.075	0.088
IS									0.037	0.043	0.052
IT	0.095	0.098	0.085	0.080	0.082	0.079	0.064	0.062	0.094	0.088	0.090
LT										0.132	0.113
LU		0.063	0.049	0.057	0.055	0.069	0.074	0.087	0.072	0.062	0.079
LV										0.115	0.136
NL	0.065	0.065	0.073	0.054	0.054	0.053	0.057	0.055		0.054	0.057
PL										0.124	0.114
PT	0.135	0.128	0.126	0.130	0.128	0.130	0.124	0.135	0.137	0.138	0.141
SE				0.028	0.035	0.029	0.038	0.044	0.030	0.037	0.026
SI										0.043	0.044
SK										0.045	0.053
UK	0.093	0.095	0.085	0.083	0.085	0.085	0.080	0.076		0.108	0.093
EU	0.140	0.135	0.126	0.101	0.097	0.095	0.093	0.094	0.094	0.107	0.108

Table 16: Richness according to headcount ratio (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.013	0.010	0.007	0.006	0.009	0.008	0.009	0.010	0.013	0.010
BE	0.015	0.013	0.011	0.014	0.013	0.016	0.016	0.013	0.009	0.013	0.011
CY										0.014	0.015
CZ										0.013	0.012
DE	0.015	0.013	0.010	0.010	0.009	0.010	0.009	0.012		0.011	0.012
DK	0.007	0.006	0.007	0.004	0.004	0.005	0.004	0.004	0.007	0.006	0.007
EE									0.036	0.027	0.025
ES	0.031	0.033	0.033	0.037	0.033	0.028	0.027	0.028	0.029	0.022	0.019
FI			0.006	0.006	0.006	0.009	0.008	0.008	0.010	0.010	0.011
FR	0.024	0.017	0.017	0.016	0.014	0.014	0.013	0.012	0.015	0.017	0.014
GR	0.027	0.027	0.026	0.028	0.029	0.026	0.023	0.021	0.020	0.026	0.027
HU										0.015	0.023
IE	0.026	0.025	0.023	0.019	0.018	0.017	0.014	0.009	0.018	0.018	0.021
IS									0.009	0.010	0.014
IT	0.021	0.023	0.019	0.016	0.016	0.016	0.013	0.012	0.024	0.021	0.020
LT										0.035	0.030
LU		0.011	0.009	0.011	0.011	0.014	0.014	0.015	0.014	0.013	0.017
LV										0.029	0.037
NL	0.012	0.015	0.016	0.011	0.010	0.010	0.010	0.011		0.011	0.013
PL										0.031	0.028
PT	0.038	0.036	0.034	0.038	0.039	0.039	0.035	0.041	0.039	0.044	0.044
SE				0.005	0.007	0.005	0.007	0.009	0.005	0.007	0.005
SI										0.007	0.008
SK										0.010	0.014
UK	0.019	0.022	0.020	0.016	0.018	0.018	0.018	0.016		0.028	0.020
EU	0.033	0.031	0.029	0.021	0.020	0.021	0.020	0.020	0.021	0.026	0.025

Table 17: Richness according to $R_{\alpha=1}$ (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.
Note: R_α: Peichl et al. (2006) richness measure.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.005	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.004	0.004
BE	0.006	0.005	0.005	0.006	0.004	0.007	0.007	0.005	0.003	0.005	0.004
CY										0.005	0.006
CZ										0.005	0.005
DE	0.005	0.005	0.003	0.003	0.003	0.003	0.003	0.004		0.004	0.005
DK	0.003	0.002	0.003	0.001	0.001	0.002	0.002	0.001	0.003	0.002	0.003
EE									0.014	0.010	0.009
ES	0.011	0.012	0.013	0.013	0.012	0.011	0.009	0.010	0.011	0.007	0.006
FI			0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.004	0.005
FR	0.011	0.007	0.006	0.006	0.005	0.006	0.005	0.004	0.006	0.006	0.005
GR	0.011	0.010	0.010	0.011	0.012	0.010	0.008	0.007	0.007	0.009	0.011
HU										0.006	0.011
IE	0.010	0.010	0.009	0.007	0.008	0.007	0.004	0.003	0.008	0.007	0.009
IS									0.003	0.004	0.006
IT	0.008	0.009	0.007	0.005	0.005	0.005	0.005	0.004	0.009	0.009	0.007
LT										0.014	0.011
LU		0.003	0.003	0.004	0.004	0.005	0.004	0.004	0.005	0.004	0.006
LV										0.012	0.016
NL	0.004	0.006	0.007	0.004	0.004	0.004	0.003	0.004		0.004	0.005
PL										0.012	0.011
PT	0.016	0.015	0.014	0.015	0.016	0.017	0.015	0.018	0.016	0.020	0.019
SE				0.001	0.003	0.001	0.003	0.004	0.001	0.002	0.002
SI										0.002	0.002
SK										0.004	0.006
UK	0.006	0.009	0.007	0.006	0.006	0.007	0.007	0.006		0.011	0.007
EU	0.012	0.012	0.011	0.007	0.007	0.007	0.007	0.007	0.008	0.010	0.009

Table 18: Richness according to $R_{\alpha=2}$ (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.
Note: R_α: Peichl et al. (2006) richness measure.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.151	0.115	0.097	0.089	0.115	0.100	0.095	0.122	0.141	0.118
BE	0.169	0.156	0.135	0.143	0.152	0.162	0.179	0.161	0.115	0.153	0.130
CY										0.173	0.176
CZ										0.145	0.130
DE	0.171	0.152	0.128	0.115	0.119	0.123	0.115	0.129		0.136	0.141
DK	0.080	0.076	0.073	0.060	0.049	0.056	0.052	0.060	0.090	0.075	0.080
EE									0.336	0.269	0.253
ES	0.300	0.311	0.306	0.345	0.310	0.268	0.286	0.272	0.295	0.239	0.224
FI			0.082	0.087	0.076	0.099	0.099	0.100	0.126	0.122	0.134
FR	0.261	0.194	0.195	0.183	0.168	0.187	0.162	0.153	0.169	0.182	0.165
GR	0.283	0.279	0.272	0.290	0.285	0.273	0.253	0.239	0.228	0.262	0.273
HU										0.174	0.245
IE	0.272	0.261	0.255	0.233	0.234	0.216	0.171	0.144	0.200	0.205	0.231
IS									0.100	0.121	0.143
IT	0.232	0.242	0.209	0.189	0.193	0.189	0.159	0.152	0.245	0.233	0.223
LT										0.322	0.281
LU		0.145	0.115	0.134	0.132	0.164	0.170	0.192	0.168	0.149	0.188
LV										0.290	0.347
NL	0.149	0.175	0.193	0.133	0.130	0.137	0.133	0.137		0.136	0.147
PL										0.308	0.276
PT	0.343	0.324	0.313	0.327	0.330	0.335	0.315	0.346	0.346	0.364	0.364
SE				0.068	0.089	0.072	0.099	0.116	0.070	0.090	0.067
SI										0.101	0.102
SK										0.121	0.166
UK	0.219	0.249	0.208	0.199	0.207	0.210	0.204	0.186		0.280	0.229
EU	0.337	0.324	0.306	0.245	0.237	0.237	0.228	0.230	0.234	0.282	0.276

Table 19: Income share of rich people (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.214	0.205	0.195	0.192	0.206	0.193	0.195	0.204	0.213	0.204
BE	0.230	0.227	0.223	0.221	0.216	0.236	0.239	0.226	0.204	0.224	0.215
CY										0.220	0.225
CZ										0.217	0.214
DE	0.218	0.216	0.206	0.203	0.201	0.201	0.202	0.208		0.216	0.219
DK	0.191	0.189	0.192	0.177	0.178	0.181	0.181	0.178	0.198	0.193	0.196
EE									0.271	0.251	0.244
ES	0.254	0.253	0.268	0.261	0.252	0.249	0.243	0.250	0.254	0.237	0.234
FI			0.193	0.190	0.189	0.198	0.197	0.200	0.215	0.212	0.221
FR	0.280	0.231	0.227	0.227	0.221	0.240	0.221	0.212	0.225	0.225	0.222
GR	0.265	0.249	0.250	0.259	0.259	0.253	0.237	0.236	0.236	0.247	0.260
HU										0.233	0.271
IE	0.249	0.257	0.264	0.255	0.271	0.244	0.217	0.210	0.245	0.247	0.251
IS									0.201	0.212	0.221
IT	0.244	0.247	0.236	0.224	0.225	0.226	0.221	0.220	0.255	0.254	0.240
LT										0.266	0.257
LU		0.205	0.201	0.206	0.206	0.216	0.214	0.212	0.214	0.211	0.225
LV										0.264	0.285
NL	0.204	0.233	0.237	0.209	0.207	0.214	0.203	0.210		0.213	0.219
PL										0.267	0.252
PT	0.282	0.272	0.267	0.274	0.280	0.282	0.273	0.287	0.281	0.299	0.294
SE				0.184	0.195	0.186	0.199	0.206	0.184	0.192	0.189
SI										0.194	0.194
SK										0.213	0.242
UK	0.231	0.257	0.234	0.228	0.233	0.236	0.239	0.226		0.267	0.242
EU	0.267	0.263	0.259	0.244	0.243	0.246	0.240	0.241	0.245	0.269	0.261

Table 20: Income share of top 10% (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.128	0.121	0.112	0.111	0.121	0.116	0.115	0.121	0.128	0.123
BE	0.142	0.143	0.140	0.139	0.128	0.156	0.156	0.142	0.119	0.141	0.131
CY										0.132	0.139
CZ										0.135	0.132
DE	0.129	0.131	0.121	0.120	0.120	0.118	0.117	0.124		0.134	0.136
DK	0.114	0.114	0.117	0.103	0.102	0.106	0.106	0.103	0.121	0.115	0.120
EE									0.166	0.154	0.146
ES	0.152	0.150	0.169	0.154	0.148	0.152	0.129	0.116	0.154	0.141	0.138
FI			0.116	0.111	0.111	0.118	0.117	0.121	0.135	0.131	0.140
FR	0.193	0.142	0.137	0.139	0.132	0.154	0.132	0.125	0.139	0.137	0.135
GR	0.169	0.151	0.156	0.162	0.163	0.157	0.141	0.141	0.142	0.150	0.162
HU										0.149	0.182
IE	0.154	0.166	0.176	0.170	0.188	0.156	0.129	0.123	0.157	0.158	0.162
IS									0.123	0.133	0.140
IT	0.148	0.152	0.143	0.133	0.133	0.134	0.131	0.130	0.162	0.162	0.147
LT										0.164	0.155
LU		0.121	0.116	0.121	0.119	0.128	0.125	0.122	0.128	0.124	0.134
LV										0.166	0.186
NL	0.122	0.148	0.152	0.126	0.122	0.131	0.120	0.128		0.129	0.135
PL										0.167	0.153
PT	0.174	0.170	0.163	0.167	0.175	0.175	0.167	0.183	0.175	0.191	0.187
SE				0.105	0.115	0.109	0.121	0.127	0.105	0.113	0.110
SI										0.113	0.112
SK										0.129	0.159
UK	0.136	0.165	0.141	0.137	0.141	0.144	0.147	0.138		0.170	0.149
EU	0.166	0.161	0.159	0.147	0.147	0.150	0.145	0.145	0.151	0.169	0.161

Table 21: Income share of top 5% (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.

	1993	1994	1995	1996	1997	1998	1999	2000	2003	2004	2005
AT		0.037	0.039	0.032	0.029	0.040	0.034	0.033	0.037	0.038	0.037
BE	0.049	0.050	0.052	0.043	0.039	0.059	0.062	0.056	0.033	0.037	0.043
CY										0.043	0.049
CZ										0.045	0.045
DE	0.037	0.039	0.035	0.035	0.035	0.034	0.036	0.037		0.048	0.050
DK	0.037	0.039	0.043	0.029	0.030	0.031	0.034	0.030	0.043	0.037	0.043
EE									0.054	0.047	0.043
ES	0.044	0.041	0.054	0.045	0.041	0.038	0.041	0.045	0.047	0.041	0.041
FI			0.039	0.033	0.033	0.037	0.037	0.041	0.053	0.048	0.055
FR	0.092	0.049	0.043	0.045	0.043	0.067	0.047	0.037	0.046	0.043	0.043
GR	0.062	0.048	0.053	0.056	0.056	0.053	0.043	0.041	0.043	0.043	0.052
HU										0.058	0.076
IE	0.057	0.065	0.079	0.079	0.096	0.068	0.037	0.036	0.061	0.065	0.064
IS									0.042	0.049	0.048
IT	0.046	0.046	0.044	0.039	0.040	0.041	0.042	0.039	0.057	0.060	0.047
LT										0.046	0.042
LU		0.035	0.032	0.035	0.032	0.036	0.033	0.033	0.035	0.037	0.035
LV										0.057	0.060
NL	0.035	0.061	0.063	0.041	0.039	0.049	0.034	0.043		0.042	0.046
PL										0.056	0.045
PT	0.055	0.051	0.047	0.043	0.051	0.053	0.044	0.050	0.057	0.063	0.060
SE				0.031	0.036	0.032	0.041	0.045	0.028	0.034	0.033
SI										0.032	0.031
SK										0.045	0.071
UK	0.037	0.066	0.042	0.043	0.045	0.049	0.049	0.046		0.064	0.051
EU	0.057	0.053	0.052	0.047	0.047	0.050	0.047	0.046	0.051	0.059	0.053

Table 22: Income share of top 1% (ECHP and EU-SILC data)
Sources: own calculation using ECHP (1993-2000) and EU-SILC (2003-2005) data.

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	HCR	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	0.052	0.009	0.002	0.120	0.200	0.115	0.030
BE	0.042	0.011	0.005	0.124	0.218	0.138	0.052
DK	0.032	0.008	0.004	0.100	0.209	0.131	0.053
FI	0.047	0.010	0.004	0.131	0.218	0.137	0.053
FR	0.091	0.022	0.008	0.227	0.242	0.149	0.048
GE	0.063	0.012	0.003	0.146	0.209	0.121	0.033
GR	0.123	0.028	0.010	0.295	0.255	0.153	0.046
IR	0.096	0.023	0.009	0.247	0.254	0.161	0.061
IT	0.118	0.032	0.013	0.306	0.276	0.178	0.063
LU	0.078	0.015	0.005	0.186	0.222	0.133	0.041
NL	0.057	0.011	0.003	0.138	0.210	0.124	0.037
PT	0.131	0.037	0.015	0.328	0.274	0.166	0.049
SP	0.132	0.031	0.011	0.313	0.256	0.154	0.043
SW	0.053	0.013	0.006	0.167	0.242	0.162	0.077
UK	0.101	0.021	0.007	0.241	0.240	0.145	0.045

Table 23: Richness measures 1998

Sources: own calculation using EUROMOD version D5.

Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%.

	HCR	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	0.051	0.009	0.002	0.117	0.199	0.114	0.030
BE	0.036	0.007	0.003	0.099	0.206	0.124	0.044
DK	0.031	0.008	0.004	0.094	0.206	0.127	0.049
FI	0.048	0.012	0.005	0.152	0.235	0.154	0.068
FR	0.080	0.017	0.006	0.191	0.225	0.135	0.039
GE	0.065	0.012	0.003	0.150	0.208	0.122	0.034
GR	0.122	0.028	0.010	0.293	0.255	0.153	0.047
IR	0.100	0.022	0.008	0.247	0.247	0.154	0.055
IT	0.113	0.030	0.013	0.295	0.273	0.175	0.061
LU	0.075	0.013	0.004	0.169	0.211	0.122	0.035
NL	0.051	0.009	0.003	0.122	0.206	0.120	0.035
PT	0.140	0.040	0.017	0.354	0.285	0.176	0.051
SP	0.107	0.024	0.008	0.259	0.246	0.146	0.044
SW	0.037	0.007	0.003	0.096	0.202	0.121	0.040
UK	0.099	0.022	0.008	0.240	0.242	0.147	0.047

Table 24: Richness measures 2001

Sources: own calculation using EUROMOD version D5.

Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%.

	HCR	$R_{\alpha=1}$	$R_{\alpha=2}$	$R_{IS,rich}$	$R_{IS,10}$	$R_{IS,5}$	$R_{IS,1}$
AT	0.049	0.008	0.002	0.113	0.198	0.114	0.030
BE	0.036	0.008	0.003	0.101	0.209	0.127	0.046
DK	.	.	.	.	.	.	.
FI	0.049	0.012	0.005	0.151	0.234	0.152	0.067
FR	.	.	.	.	.	.	.
GE	0.078	0.015	0.004	0.180	0.216	0.126	0.035
GR	0.101	0.025	0.009	0.254	0.251	0.155	0.046
IR	.	.	.	.	.	.	.
IT	.	.	.	.	.	.	.
LU	0.076	0.014	0.004	0.174	0.214	0.124	0.036
NL	0.053	0.009	0.003	0.124	0.206	0.120	0.035
PT	0.139	0.040	0.017	0.352	0.284	0.171	0.051
SP	0.081	0.016	0.005	0.193	0.228	0.135	0.038
SW	.	.	.	.	.	.	.
UK	0.097	0.021	0.008	0.234	0.241	0.146	0.046

Table 25: Richness measures 2003

Sources: own calculation using EUROMOD version D5.

Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%.

	Gini	GE(-1)	GE(0)	GE(1)	GE(2)
			HCR		
AT	-0.005	-0.008	-0.007	-0.004	-0.005
FI	0.003	0.006	0.006	0.006	0.015
GE	-0.003	-0.005	-0.005	-0.005	-0.005
GR	-0.001	0.000	0.003	0.001	0.001
LU	0.003	0.010	0.011	0.011	0.010
NL	-0.006	0.003	-0.003	-0.007	-0.007
PT	0.001	0.001	0.001	0.001	0.000
SP	-0.002	-0.002	-0.002	-0.002	-0.002
UK	-0.005	-0.004	-0.004	-0.007	-0.010
			$R_{\alpha=1}$		
AT	-0.001	-0.002	-0.001	-0.001	-0.001
FI	0.002	0.002	0.002	0.003	0.005
GE	-0.001	-0.001	-0.001	-0.001	-0.001
GR	0.000	0.001	0.000	0.000	0.000
LU	-0.001	-0.001	0.000	0.000	0.001
NL	0.000	0.001	-0.001	-0.001	-0.001
PT	-0.001	-0.001	-0.001	-0.001	-0.001
SP	0.000	0.000	0.000	-0.001	-0.001
UK	0.000	0.000	-0.001	-0.002	-0.003
			$R_{IS,rich}$		
AT	0.000	-0.007	-0.002	-0.001	-0.002
FI	0.003	0.005	0.005	0.008	0.020
GE	-0.004	-0.005	-0.005	-0.005	-0.006
GR	0.003	0.010	0.003	0.002	0.001
LU	-0.002	-0.002	-0.001	0.003	0.005
NL	0.004	0.011	0.001	0.001	-0.003
PT	0.000	0.000	0.000	0.000	0.001
SP	0.000	0.003	0.000	-0.001	-0.003
UK	0.003	0.005	0.001	-0.002	-0.010
			$R_{IS,5}$		
AT	-0.003	-0.006	-0.003	-0.003	-0.003
FI	0.001	0.003	0.002	0.004	0.011
GE	0.000	-0.001	-0.001	-0.001	-0.001
GR	0.001	0.005	0.001	0.001	0.000
LU	-0.007	-0.007	-0.006	-0.005	-0.003
NL	0.003	0.007	0.000	0.000	-0.001
PT	0.003	0.003	0.003	0.003	0.004
SP	-0.003	0.001	-0.004	-0.004	-0.002
UK	0.005	0.005	0.003	0.002	-0.002

Table 26: Changes in richness measures for neutral flat tax scenarios according to different inequality indices

Sources: own calculation using EUROMOD version D5.

Note: R_α: Peichl et al. (2006) richness measure, $R_{IS,p}$: income share of the top p%, GE(α): Generalized Entropy Index.