‘Middle’ Household Incomes across OECD Countries Up To and Through the Great Recession: Decomposing by Source

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Abstract
The combination of rising income inequality and stagnating living standards for ordinary households in rich countries has brought 'inclusive growth' centre-stage. While the role of different sources of household income to inequality have been studied, much less is known about their contribution to real income growth for different parts of the distribution. This paper investigates the proximate sources of income growth for households around the middle, versus towards the top or bottom, of the distribution across OECD countries in recent decades, using a decomposition approach and data assembled by the OECD from household surveys. It shows that for households around the middle, the wage of the main earner is generally still the single most important source of income, and although declining over time as a share of the total still contributed substantially to real income growth. Wages going to the spouse are of growing importance and were an even more important source of income growth up to the onset of the Great Recession, when they fell back considerably. Cash transfers were an important source of income for the middle when the recession period is included, although direct taxes/social contributions paid more than offset such transfers on average. The bottom decile, by contrast, relies for more than half of its income on public transfers and this has increased over time, with wages declining in importance and transfers driving growth. For the top decile, wages were mainly responsible for income growth, though income from capital and self-employment also played a role. The extent to which wages of secondary earners can be relied on to generate income growth for ordinary households in future is open to question.

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1. Introduction

Income inequality in rich countries has become a major focus of attention in the political domain and for research across the social sciences (Mishel *et al.*, 2012; Stiglitz, 2012; Piketty, 2014; Atkinson, 2015). This reflects not only the widespread rise in inequality across OECD countries, but also the fact that this has gone together with stagnating living standards for ordinary households around and below the middle of the distribution, since the economic crisis in many countries and well before it in some (Goos et al., 2009; Gornick and Jäntti, 2013; Nichols and Rehm, 2014; Hacker et al., 2013). It is concern about this potentially toxic combination that has led the OECD and the World Bank to make "inclusive growth" and "shared prosperity" their rallying-cry (Sde Mello and Dutz, 2012; OECD, 2015; World Bank, 2015). While considerable effort has been invested into understanding what drives inequality trends by applying decomposition methods, surprisingly much less is known about the immediate sources of income *growth* for households in different parts of the income distribution. While this has been examined for individual countries (notably in the UK study by Brewer and Wren-Lewis, 2011), it is not known whether such patterns have been similar or very different across the rich countries – which is crucial to understanding the underlying causal forces at work and drivers of income growth versus stagnation. This is the gap in knowledge this paper seeks to address, by investigating the proximate sources of income growth for households around the middle, versus towards the top or bottom of the distribution, across OECD countries in recent decades.

In studies decomposing trends in income inequality (such as Jenkins, 1995, Brewer and Wren-Lewis, 2015, for the UK and Reed and Cancian, 2001, Gottschalk and Danziger, 2005, and Larrimore, 2014 for the USA, and OECD, 2011, comparatively), it is common to distinguish *inter alia* the main sources of income accruing to households – earnings of the main earner, earnings from others in the household, investment income, pensions, and transfers from the benefit system, and the direct taxes and social insurance contributions deducted. Here we also distinguish these income sources, but focus instead on the role they played in household income growth over time rather than in its distribution. Was such growth produced by rising earnings for the main earner, (which primarily reflects increases in hourly earnings or falling unemployment), or by earnings for others in the household (where participation rates and hours worked are often the key driver), or investment income (driven by varying rates of return over time as well as changes in the distribution of wealth), or private pensions (reflecting the coverage and returns in occupational and private schemes), or state transfers (reflecting changes in the structure and generosity of the social protection system)? Did changes in the gap between gross and disposable income (reflecting changes in income tax and social insurance rates and structures) add to or subtract from income growth? We pursue these questions using data from household surveys between 1984-2012 for 27 OECD countries, brought together in a harmonised fashion by the OECD.

To set the scheme we first analyse how the composition of household income – what is sometimes termed the 'household income package' – has changed over time for the middle versus the top and bottom. We focus on those in the 5th decile as representing 'ordinary' middle-income households, and compare their income composition to that of the bottom and top decile. The make-up of income for households in or at risk of poverty has been studied in some depth (see for example Maitre, Nolan and Whelan 2005), while the role of earnings versus income from capital at the very top has recently excited much interest (Piketty and Saez, 2007, Atkinson, 2009; Wolff & Zacharias, 2009; Piketty, 2014; Atkinson and Lakner, 2015). Against that background, seeing how household incomes around the middle are made up and how that has changed over time, set against the corresponding picture for the bottom and top, provides an important new

perspective.[1] We focus on working-age households only throughout, as income sources for the elderly are distinctive and ultimately rely on income generated by the working population for growth.

We then look in depth at the contribution of the various income sources to income growth over time for middle-income households, and how that differs from the corresponding contributions towards the top and bottom, across the 27 countries we cover. For this purpose we apply a decomposition approach similar to the one used by Brewer and Wren-Lewis (2011) to study the contributors to income growth for 'middle and below' households in the UK. Using simple regression techniques we then look at which sources have been key to underpinning (periods of) real income growth across the full set of countries. Wee also look at their contributions to 'relative growth', where households around the middle saw more rapid gains than the average.

2. Description of the data

Our analysis is based on the OECD Income Distribution Database (IDD), which is a more elaborate version of the publicly available OECD Database on Household Incomes and Poverty.[2] The OECD IDD is used in the landmark OECD studies *Growing Unequal?* (2008), *Divided We Stand* (2011), and *In It Together* (2015). The data are derived from a standardised questionnaire sent to OECD member countries and filled out by them from national surveys. No information is available about statistical precision, although database reviews of IDD have been previously carried on, both in terms of specific in-depth reviews (Gasparini and Tornarolli, 2015) and comparative reviews in which the IDD is analysed among other datasets (Ferreira et al., 2015).

2.1 Income composition

The OECD DID contains information on income from seven income sources for total household disposable income per equivalent household member (TOT) and ten income deciles. The following income sources are included:

a) Wage of household head (EH): the wage and salary income of the household head, excluding employers' contributions to social security, but including sick pay paid by governments;
b) Wage of household spouse (ES): the wage and salary income of the household head spouse or partner, excluding employers' contributions to social security, but including sick pay paid by governments;
c) Wage from other household members (EO): the wage and salary income from other household members, excluding employers' contributions to social security, but including sick pay paid by governments;
d) Capital and private transfers (K): capital and property income (net dividends, interests, rents), private pensions, private occupational pensions, and all kinds of private transfers;
e) Self-employed income (SE): self-employment incomes (profit/losses from unincorporated enterprise, net values of goods and services produced for final consumption, other);
f) Public transfers (TR): social security transfers from public sources (including accident and disability benefits, old age cash benefits, unemployment benefits, maternity allowances, child and/or family allowances, all income-tested and means-tested benefits);

[1] Our results for those towards the top, being based on survey data, will not however capture the very top as seen from the income tax data used in most recent studies of the 'top 1%'.
[2] We thank Michael Förster (OECD) for allowing us to use the data.

g) Taxes (TA): taxes and social security contributions paid directly by households (income taxes, employees' social security contributions, taxes on wealth, other). These are coded negatively

We have the following total income identity, indexed for equivalised household income for decile d, country i at year t:

$$TOT_{dit} \equiv EH_{dit} + ES_{dit} + EO_{dit} + K_{dit} + SE_{dit} + TR_{dit} + TA_{dit}$$

We refer to the sum of the first three income components (EH, ES, EO) as total wage income, and to the sum of TR and TA as total public income. We have not set any negative values to zero. Negative values could potentially appear for the market income components such as capital income and self-employed income. The dataset does not allow us to further break down changes in wage income by hours worked and hourly wages. We also do not have more detailed information on specific transfers and taxes. We can calculate income shares as follows, for instance for wage of the household head, where we multiply these by 100 for readability:

$$share(EH_{dit}) \equiv \frac{EH_{dit}}{TOT_{dit}} \times 100$$

Each income component refers to individual equivalised household income using the square root equivalence scale. For each household, a household head is defined according to the national survey definition. In most cases the household head corresponds to the survey main respondent, who is generally the oldest person in the household or the one earning the highest salary. The database also allows us to categorise different population groups as identified by the age of the household head: entire population, working age (18-65) and retirement age (66+). For our study we focus on the working age population, as developments might be different for pensioners (e.g., OECD, 2011). We express income levels in 2011 prices using PPP and CPI information from the OECD National Accounts.

Income information is available for ten deciles and for the average across deciles (the total population). For the decile information, individual observations are ranked following ascending values of household disposable income per equivalent household member (TOT). Each decile then contains 10% of the total (working age) population of individuals.[3] The income levels refer to the decile means. In our analysis we pay particular attention to the 5th decile; the category just below median income. This is our reference group for "ordinary households".[4] We compare the evolution in income for this group to that of the 1st (bottom) and 10th (top) decile.

The OECD IDD has many observations across countries over time, in particular having data for more recent years, much of it annual. In that respect it has advantages compared with the alternative source of comparative household income data, the Luxembourg Income Study (LIS) database. However, this comes with a number of disadvantages. One cannot access the underlying micro data from which the data have been derived, limiting the type of analysis that can be conducted. We cannot apply

[3] Since we have pooled cross-sectional data in which the relative population size of each decile is always 10%, our estimations are not affected by income changes resulting from changes in the relative sizes of the different groups as would be the case if the population is partitioned based on certain income brackets (see Brewer & Wren-Lewis, 2011: 13).

[4] Levels and growth rates for total income or each income component for the D5 correlate very highly to those of the D6 (always above 0.98).

formal decomposition techniques, look at the impact of different ways of equivalising income, or re-rank households based on their position in the distribution of a particular income component rather than total income to see whether people in the middle of the earnings distribution are also in the middle of the capital distribution (e.g., see for applications to the top 1% in the U.S.: Alvaredo *et al.*, 2013; Atkinson & Lakner, 2015). More generally, income at the very top is likely to be underreported in survey income (Piketty, 2014). Capital income and self-employment income might be underreported (Atkinson and Bourguignon, 2000; Milanovic, 2016). However, administrative data on income composition is not available for the middle of the distribution.

Moreover, like any cross-sectional data one cannot track particular households over time and see whether they have shifted deciles. This means, for example, that we cannot distinguish between a situation where an increase in share of income from public transfers for the 5th decile is due to public transfers aimed at working households in that decile have been increased, versus a compositional change where households higher in the distribution become unemployed and have to rely on public transfers whilst ending up in the 5th decile.

2.2 Country and years sample

We drop the years of data for which information on an income component is missing. We leave out countries generally not classified as affluent countries (Chile, Mexico, Russia, and Turkey). We also drop the observations for which the sum of all income components deviates more than 5% from total income directly available in the OECD database, or if the sum of an income component across all deciles differs by more than 5% from the total amount of the respective income component.[5] We exclude the remaining years for Switzerland (2009 and 2011) and Greece (2005-2011). The share of income from the household head's wage for the first decile seems unrealistically high for Switzerland (0.74 compared to an average of 0.29 across our sample). For Greece the income shares for self-employed income are extremely high (up to 90% of total income for the first decile in 2011) and very volatile over time (see also Artavanis et al., 2016 on mismeasurement and evasion of self employment income in Greece). Last, we drop the information available before 1985 for Canada and before 1984 for the U.S., in order to have a more comparable time coverage across countries. We end up with a database with 27 countries with unbalanced information in between 1984 and 2012, with more annual data from around 2005 onwards (see Table 3 later for the full sample). In total we have 234 observations.

To account for the unbalanced nature of the panel, we express changes in composition and (total) income growth in average annual percentage points and compound annual growth rates (see Section 4 for more detail). We weight averages of growth rates across countries by the number of years covered per country.

3. Composition over the longest period available

We start by looking at the composition of household income, postponing trends in absolute and relative income growth for ordinary households to Section 4. Three interdependent questions guide our investigation here. First, what are the compositional differences across deciles? Second, how did the composition evolve over time? Third, can we see differences in composition and compositional trends across countries? To answer the first two questions, we show in Table 1 the share of total income of each income source, as well as for total wage and public income, pooled across countries. We

[5] In our analysis we use total income calculated as the sum of each income component to avoid inconsistencies in calculating income shares.

display the shares for the last year for which we have data available per country. We also show the average annual differences over time in percentage points (weighted by the number of years covered). We start by comparing trends for the 1st, 5th, and 10th decile (rows a-f), after which we conduct a number of additional tests for the 5th decile (rows g-n).

Table 1: Income composition in most recent year pooled across countries

		Wage head	Wage spouse	Wage other	Total wage	Self empl	Capital	Transfers	Taxes	Total public income
		Share of total income (%)								
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	1st decile									
(a)	Last year (%)	28.1	9.0	4.6	41.6	12.1	5.0	56.0	-14.6	41.3
(b)	Avg annual difference (ppt)	-0.15	-0.02	-0.02	-0.19	-0.10	-0.05	0.27	0.07	0.34
	5th decile									
(c)	Last year (%)	53.9	25.4	11.4	90.7	8.5	3.8	20.6	-23.6	-3.0
(d)	Avg annual difference (ppt)	-0.19	0.11	-0.04	-0.12	-0.02	0.01	0.10	0.03	0.13
	10th decile									
(e)	Last year (%)	56.4	32.5	11.3	100.3	19.0	10.6	8.6	-38.5	-29.9
(f)	Avg annual difference (ppt)	0.10	0.25	-0.27	0.07	-0.13	0.09	0.08	-0.10	-0.02
	5th decile									
	Before Great Recession									
(g)	Last year (%)	54.2	26.6	12.0	92.8	9.1	4.3	17.9	-24.0	-6.1
(h)	Avg annual difference (ppt)	-0.21	0.27	0.00	0.06	0.04	0.05	-0.14	0.00	-0.14
	Before Great Recession (no Eastern Europe)									
(i)	Last year (%)	57.8	24.9	11.6	94.3	9.0	5.1	16.6	-25.0	-8.4
(j)	Avg annual difference (ppt)	-0.21	0.28	0.00	0.07	-0.01	0.06	-0.05	-0.06	-0.11
	Before Great Recession for country sample with long coverage (CAN, DNK, DEU, ISR, NZL, USA)									
(k)	Last year (%)	65.3	23.3	12.1	100.7	7.7	7.0	11.9	-27.4	-15.4
(l)	Avg annual difference (ppt)	-0.37	0.29	0.01	-0.07	0.00	0.02	-0.06	0.11	0.05
	Before Great Recession for country sample with long coverage without Israel (CAN, DNK, DEU, NZL, USA)									
(m)	Last year (%)	67.5	24.6	12.5	104.6	6.9	6.9	12.1	-30.6	-18.5
(n)	Avg annual difference (ppt)	-0.36	0.31	0.01	-0.04	0.05	0.01	-0.06	0.03	-0.03

3.1 Compositional differences across deciles

First we compare the income composition in the most recent year for each country pooled, for the 1st, 5th, and 10th decile (respectively rows (a), (c), and (e) in Table 1). The 5th and 10th decile rely substantially on wage income of its household members. Wage earned by the household head represents more than half of total income for the 5th and 10th decile, with a slightly higher percentage for the 10th decile. Wage income from the spouse adds another quarter to total income for the 5th decile, and around a third for the 10th decile. Wages of other household members play comparable roles for the 5th and 10th decile (just over 10%). In total, wage income contributes 91% to total income for the 5th decile and 100% for the 10th. Total wage income only adds 42% of total income for the 1st decile. In particular the share of income from the spouse is low for this decile (9%). These shares correspond closely to the estimates for bottom and top quintiles by the OECD (2011).

Self-employed and capital income are more polarised income components, adding more to total income in percentage terms for in particular the 10th but also for the

1st than for the 5th decile. In total, these two income sources contribute 12.3% to total income for the 5th decile, compared with 17% for the bottom decile and 30% for the top. Thus, capital income seems relatively equally distributed across the total disposable income distribution (see also Atkinson, 2009), though also from survey data, which tends to understate the very top, we would conclude that capital income remains an important source at the top (Wolff and Zacharias, 2009; Piketty, 2014). Moreover, this does not mean that capital income and self-employment income by themselves are not unequally distributed (OECD, 2011). The relatively weak association between self-employment income and total earnings is more generally found (OECD, 2011).

The public income sources are inequality decreasing. The 1st decile relies for more than half of its income on public transfers, whilst paying 15% of its income on taxes. The 5th decile still receives more than a fifth of total income from transfers, whereas this accounts for less than 10% for the 10th decile. The 10th decile pays a substantially higher share of its income on taxes than the 5th (38.5% vs. 23.6%).

Potentially the Great Recession plays a disproportionate role in affecting shares. We leave out the Great Recession years on a country-specific basis, by considering as the start of the recession when average (across the distribution) total income growth became negative from 2007 onwards (row g; see Table A1 in Appendix 1 for the years still included). Leaving out the Great Recession years leads to a slightly larger share of income coming from wages for the 5th. decile (92.8 vs. 90.7%), most of which due to a larger share coming from the spouse (26.6 vs. 25.4%). Public transfers become a less important income source (17.9 vs. 20.6%). These fit with comparative findings reported elsewhere (Immervoll and Richardson, 2011). We also leave out Eastern European countries, which leads to slightly larger shares of income from wage of household head and capital, and lower shares of income from the spouse or transfers (row i). Focusing on the six countries that we can track from 1985 onwards leads to even higher shares of wage income from the head and capital income, and lower shares of public transfers (row k). Excluding Israel of these six countries does not seem to affect the picture much (row m). All in all, quite a consistent picture appears in terms of relative importance of shares for the last year available.

3.2 Trends in composition over time

We now compare trends over time for each decile over the full period available, averaged across countries, paying particular attention to trends for the 5th decile (rows (c-d) in Table 1). All numbers refer to average percentage points (ppt) difference in shares per year. The relative importance of the wage earned by the household head declined for the 1st (-0.15 ppt) and 5th decile (-0.19 ppt), whilst it went up for the 10th (+0.10 ppt). Wages of the spouse became a more important income source for the 5th (+0.11 ppt) and particular the 10th decile (+0.25 ppt). This hints at a higher overall contribution from women's employment income due to their increased participation in the labour market, both at the intensive and extensive level (OECD, 2011). For the bottom decile, we find, if any, a decrease in importance in wage of the spouse (-0.02 ppt). This could be a result of reranking combined with assortative mating (e.g., Greenwood et al., 2014). Wages for other household members went down slightly across all deciles, though particularly at the top (-0.27 ppt). All in all, the total share of income from wages went down for the bottom (-0.19 ppt) and 5th decile (-0.12 ppt), whilst it increased slightly for the top (+0.07 ppt).

Self-employment income went down in all three deciles, though more at the bottom (-0.10 ppt) and top (-0.13 ppt). Capital income became more unequally distributed, as shown by a decreased share at the bottom (-0.05 ppt) and an increased share at the top (+0.09 ppt). The observation that both capital income but particularly

wage income became more important at the top fits with findings using administrative data for the top 1% for the U.S., suggesting a stronger association between the two income sources at the very top (Alvaredo *et al.*, 2013; Atkinson and Lakner, 2015).

The public income sources had a further inequality-decreasing effect over time. Transfers grew across all deciles, but more so at the bottom (+0.27 ppt), than at the middle (+0.10 ppt) and top (+0.08 ppt). The tax burden further decreased at the bottom (+0.07 ppt) and the 5th (+0.03 ppt), whilst it increased at the top (-0.10 ppt). On average, the 5th decile contributes to the welfare state with a negative total public income, though it became less negative (+0.13 ppt).[6]

Leaving out the Great Recession years for the 5th decile has notable effects. The share of total wage income increased on average over time until the Great Recession, and collapsed afterwards (+0.06 vs. -0.12 ppt). This was particularly due to wage of the spouse (+0.27 vs. +0.11 ppt). Wage of the head seems less cyclical and curved downwards both up to and including the Great Recession (-0.19 vs. -0.21 ppt). Public transfers play a key countercyclical role, and decreased on average as a share before the crisis (-0.14 ppt) instead of increased when the Great Recession is included (+0.10 ppt). Leaving out Eastern Europe makes the decrease in share of public transfers less steep (-0.05 vs. -0.14 ppt), though taxes then show a more negative evolution for the 5th decile (-0.06 vs. 0.00). For the six countries with a long series we can see that the increase in income from the spouse (+0.29) was not enough to offset the loss in income from the head (-0.37 ppt). For these countries taxes actually became more favourable for the 5th decile (+0.11 ppt).

To gain further insight in the variation over time, we show in Table 2 trends for five-year periods for the six countries for which we have long time series (Canada, Denmark, Germany, Israel, New Zealand, and the USA). We can see that the downward trend of less reliance on income of the household head took place essentially during the entire period of 1985-2011, in particular during the late 1980s and early 1990s (as also in OECD, 2011), with only a small increase from 2000-2005. The increase of income from the spouse, however, halted around 2000, before dropping significantly during the Great Recession.

Capital income and self-employment income show relatively modest volatility over time. There is less clear of a trend for wage of other household members, apart from a bump up from 2005-2008.[7]

[6] For comparisons over time (and across countries), it is important to look at transfers and taxes in tandem. Imagine a country with equal market income components in real terms, where taxes and transfers go up by the same amount. As it does not alter total income, it would not affect market income shares, but it would lead to higher shares of both taxes and transfers.

[7] This bump up remains comparable (13.0%) when New Zealand is left out for 2008 to keep the country sample consistent. The decrease in the share of self-employment income is less noticeable when New Zealand is left out, however.

Table 2: Income composition over time for a fixed set of six countries

	Wage head	Wage spouse	Wage other	Total wage	Self employ-ment	Capital	Transfers	Taxes	Total public income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1985	73.1	17.2	11.8	102.1	8.1	6.6	13.1	-29.9	-16.8
1990	70.7	19.1	11.9	101.7	7.6	6.2	13.7	-29.3	-15.6
1995	66.3	21.6	12.3	100.2	7.7	7.0	15.4	-30.3	-14.9
2000	67.1	23.7	11.3	102.1	7.5	6.5	13.9	-30.0	-16.2
2005 (no NZL)	66.1	23.5	10.9	100.6	6.4	6.9	14.1	-28.0	-13.9
2008	64.8	23.0	13.2	101.1	8.1	6.9	11.6	-27.6	-16.1
2011	62.0	21.7	13.6	97.4	7.9	6.1	13.5	-24.8	-11.3

Legend: +0.25 average annual ppt; -0.25 average annual ppt

The results thus far seem to suggest a more diversified income composition for the 5th decile, relying less on the main earner, but more on the spouse, and when the Great Recession years are also considered, on public income sources (see also Brewer and Wren-Lewis, 2011). The 1st decile, instead, saw all its market income shares going down, and became even more reliant on the state for its income. Only the 10th decile saw an increase in share coming from wages, due to a combination of being the sole decile (of these three) for which the share from the head went up as well as being the decile with the largest increase of wage income from the spouse – enough together to offset the steep loss in wage income by other members.

We can quantify the diversification of income using the Herfindahl-Hirschmann Index (HHI). This index is generally applied to measure market concentration, but has been applied as well to measure sectoral (Imbs & Wacziarg 2003) and income diversification (Kasperski & Holland 2013). Higher values note less diversification. We calculate the HHI for each country and take the (unweighted) average.[8] The HHI cannot be calculated for negative income shares. We therefore calculate three versions: based on only market income shares, based on market income and net public income if net public income is positive, and only market income shares if the latter is negative, and based on market income and public transfer shares.

If we only consider market income shares, then the first decile has the most diversified income portfolio (HHI of 2779) for the last year available, which reflects its lower reliance on wage from the head. The HHI for the 5th and 10th decile are very comparable. (3307 and 3316 respectively) If we include net public income if positive, then only the HHI index for the 1st decile changes. The HHI index goes up but it remains the most diversified (2996). Thus, even though an extra income source becomes available, which lowers the HHI index, this extra source is so concentrated that the net effect is an increase in the HHI index. The 5th decile has the most diversified portfolio if transfers instead of net public income are taken into consideration (HHI of 2816). Given its strong reliance on transfers, diversification of the 1st decile goes down (HHI of 3110), whereas diversification at the top is hardly affected by this given its low share of income from transfers (HI of 3228).

All three HHI measures point to more diversification for the 5th decile over time, by in between 9 and 11 HHI points per year on average depending on the HHI definition. This fits with the large decrease in income share of the head, the most

[8] Calculating the HHI on the basis of average (across countries) shares ignores variation across countries and produces a less useful statistic. Assume three countries $\{c_1, \dots, c_3\}$ and three income shares $\{s_1, \dots, s_3\}$, with c_1 having $s_1 \rightarrow 100\%$, c_2 having $s_2 \rightarrow 100\%$, and c_3 having $s_3 \rightarrow 100\%$. Each country separately would score almost perfect concentration (HHI $\rightarrow 10{,}000$), whereas the HHI on the basis of the shares averaged across countries would produce perfect equality and therefore the lowest value possible for three countries.

important income source for the 5th decile. All measures point the opposite direction for the 10th decile (+3-8 HHI points), which corresponds to the increase in share of income from the head and spouse, the two largest income sources for the top of the distribution. We can see more diversification at the bottom if we only consider market income (-4 HHI points), and less so, if we also include net public income (-1 HHI point). This fits with the largest decreases in the most important market income shares at the bottom: wage of the head and self-employment income. If we would instead look at market income shares and transfers, diversification went substantially down for the bottom, as the bottom became even more reliant on transfers (+8 HHI points).

The decrease in HHI points for the 5th decile, indicating an increase in income diversification, becomes stronger when the crisis years are left out (-12 to -16 HHI points). It is not affected by leaving out Eastern Europe and becomes stronger when we focus on the six countries for which we have long time series (-21 to -27 HHI points), also when leaving out Israel (-22 to -29 HHI points). For the six countries with longer series, we can look at variation at different time points. Large increases of diversification took place between 1985-1990 (-26 to -28 HHI points) and 1990-1995 (-63 to -64 HHI points). Diversification went down slightly until the onset of the Great Recession (+8 to +10 HHI points). Diversification increased again significantly between 2005 and 2008 if we only consider market income (-46 HHI points) and less so if we also consider transfers (-18 HHI points). Between 2008-2011 diversification in market income was stable (-2 HHI points) but it increased further if we also consider transfers (-18 HHI points).

3.3 Trends across countries

In Table 3 we look at how the 5th decile has fared over the longest period in all countries in our country sample. We show the income composition in the last year available for each country, and we note in green if the share of an income source went up by more than 0.5 ppt on average per annum, and in red if it went down by more than 0.5 ppt. All in all we can depict a number of general trends, but we should not neglect country differences as also emphasised in studies looking at income composition at the very top across countries (Atkinson and Piketty, 2007) or across the distribution (OECD, 2011). The reported levels in shares across countries follow closely the estimates from the OECD (2011) for the average (across the distribution), based on a slightly different total income definition.

Table 3 confirms that wage of the household head is the most important income for the 5th decile in 25 out of 27 countries.[9] The share went down in 14 out of 27 OECD countries (16 when crisis years are left out). In 8 countries wage of the household head as a share of total income decreased by more than 0.5 ppt. This trend took place in some liberal countries (US, UK), continental countries (Belgium, Germany), as well as Nordic countries (Iceland, Finland[10]). The share went up in a few of varied countries as well, including Spain and Portugal, Ireland, and Austria.

The share of income from the spouse varies substantially across countries, from 10% (South Korea) to 44% (Iceland), reflecting differences in female labour market

[9] The only two countries for which this does not hold are Ireland and Poland. For Ireland, this is a consequence of its severe hit by the Great Recession, as transfers played a larger role than wage for the household head only in 2011 (the latter went up from 33 to 42% from 2010 to 2011). For Poland the share of total income from the household head is (perhaps surprisingly) generally lower than that of the spouse or of public transfers.

[10] In Finland there was a severe banking crisis between 1990-1993, when real GDP per capita contracted on average per year by 3.9% (data from OECD National Accounts). From 1990 to 1993 the share of income from public transfers went up from 22 to 41%.

participation. In 17 out of 27 countries the share of income from the spouse went up over time (increasing to 21 when the crisis years are left out). In Spain, Portugal, Poland and the Netherlands the rise was more than 0.5 ppt, and in Slovak Republic, Ireland, Finland, and Austria, there was a decrease of more than 0.5 ppt. The share of wages from other household members varies less across countries (2-21%). Also movements seem to have been less large. The share of total wages went down in 19 out of 27 countries (in 15 if crisis years are left out). The largest decreases took place in the UK, Ireland, Finland, Belgium, and Slovak Republic. The share of total wages went up notably in the Netherlands, Poland, and Portugal, South Korea, and Spain. Thus, any increase in wage of in particular the spouse did not fully offset the loss in wage income from the household head on average, but there is country variation. For the other market income sources there seems to be less heterogeneity in levels across countries, and fewer substantial increases or decreases as the overall shares are lower.

Table 3: Composition for the most recent year available for the 5th decile

Country	Years	Wage head	Wage spouse	Wage other	Total wage	Self employ-ment	Capital	Trans-fers	Taxes	Public income
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Australia	1995-2012	61.5	14.2	14.5	90.2	6.6	9.9	8.2	-14.9	-6.7
Austria	2004-2011	55.4	27.0	11.3	93.7	11.1	1.8	25.2	-31.8	-6.6
Belgium	2004-2010	58.1	28.4	9.0	95.6	9.7	2.6	22.4	-30.2	-7.8
Canada	1984-2011	67.6	14.3	9.4	91.3	6.2	11.5	12.4	-21.4	-9.0
Czech Rep	2004-2011	39.8	29.8	10.9	80.6	12.7	0.6	21.8	-15.7	6.1
Denmark	1985-2011	72.9	35.1	6.7	114.8	4.4	4.5	20.2	-43.8	-23.6
Estonia	2004-2011	49.3	35.5	11.4	96.2	2.4	0.5	20.3	-19.4	0.9
Finland	1986-1993	59.1	15.4	2.3	76.9	7.1	2.8	40.8	-27.6	13.2
France	1996-2011	51.7	22.9	4.8	79.4	3.4	4.5	24.5	-11.8	12.7
Germany	1985-2011	68.9	20.5	21.2	110.5	10.3	2.3	15.0	-38.2	-23.2
Iceland	2004-2011	58.5	44.0	10.5	113.0	5.0	2.8	17.3	-38.1	-20.8
Ireland	2004-2011	38.2	25.2	6.7	70.1	6.7	0.0	41.9	-18.7	23.2
Israel	1985-2011	50.3	16.9	10.5	77.7	12.8	7.1	12.3	-9.9	2.4
Italy	2004-2011	43.0	24.3	12.3	79.6	19.1	3.0	26.8	-28.4	-1.6
Japan	1995-2009	67.2	12.3	14.8	94.3	5.1	4.5	16.0	-19.9	-3.9
Luxembourg	2004-2011	49.8	31.7	8.3	89.8	4.0	1.5	30.1	-25.4	4.7
Netherlands	2000-2012	84.2	24.0	8.6	116.7	5.9	10.4	16.3	-49.3	-33.0
New Zealand	1985-2011	60.9	19.1	16.2	96.2	8.8	5.3	10.0	-20.3	-10.3
Poland	2004-2011	28.9	36.1	15.9	80.9	13.8	0.9	32.5	-28.1	4.4
Portugal	2004-2011	41.9	36.8	14.2	92.9	7.9	2.0	19.1	-21.9	-2.8
Slovak Rep	2004-2011	33.7	26.8	14.8	75.3	13.8	0.6	21.2	-10.9	10.3
Slovenia	2004-2011	42.3	37.8	12.6	92.7	5.4	0.6	27.4	-26.0	1.4
South Korea	2006-2012	53.1	10.1	11.0	74.1	24.3	5.5	4.3	-8.3	-3.9
Spain	2004-2011	33.7	32.9	11.8	78.4	7.0	0.8	27.5	-13.6	13.9
Sweden	1995-2011	75.0	27.3	3.6	105.8	3.0	3.5	15.2	-27.6	-12.3
United Kingdom	1999-2010	58.1	13.0	15.4	86.4	8.1	8.4	18.0	-21.0	-2.9
United States	1984-2012	51.6	24.2	18.9	94.8	4.9	5.6	10.5	-15.8	-5.3
Average		53.9	25.4	11.4	90.7	8.5	3.8	20.6	-23.6	-3.0

Legend: +0.5 average annual ppt; -0.5 average annual ppt

The share of transfers increased in 16 out of 27 countries (10 when the crisis is left out). Five countries saw the share of transfers going up by more than 0.5 ppt. This increase was particularly large in Ireland, Finland, and Spain, but also in the UK (see Brewer & Wren-Lewis, 2011) and Japan. The opposite held for two Eastern European countries and Sweden. We can see quite some country differences regarding tax shares. In 4 countries taxes went down by more than 0.5 ppt (shown in green below), including Finland and Sweden. In 5 countries the share went up by more than 0.5 ppt, including

Spain, Portugal, and Ireland. Tax load for the 5th decile decreased in 15 OECD countries (16 when the crisis is left out). The share of total public income went up in 17 out of 27 countries (13 when the crisis is left out).

In Appendix 1 we show the equivalent of Table 3 leaving out the years of the Great Recession. Then 10 rather than 4 countries show an increase of 0.5 percentage point per year on average in the share of income from the spouse. Moreover, 7 instead of 4 countries display a significant decrease in share of income from transfers, whereas only 3 instead of 5 show an increase for this income source.

We also look at differences across countries in income diversification. The 5th decile has a less diversified income portfolio than the 1st and 10th decile in 14 countries if we only look at market income sources, and in 15 countries if we also consider net public income if positive. If public transfers are included, then the 1st decile has the least diversified portfolio in the majority of the countries (21 out of 27). In the previous sub section we noted that diversification went up on average for the 5th decile. The increase in diversification took place in 14 to 15 countries, depending on the HHI definition. Largest increases in diversification took place in Belgium, Slovak Republic, Germany, and most liberal countries (US, UK, Canada, Israel, Japan, New Zealand), whereas we see more concentration in Ireland, Finland, Spain, Portugal, and South Korea, for all three HHI definitions.

4. Absolute and relative income growth

Thus far we have only looked at variation in the income composition across deciles, time, and countries, ignoring by and large trends in income growth. Income growth for ordinary households can be operationalized in two ways: as a percentage growth of total income (absolute growth), or growth compared to other parts of the distribution (relative growth). To account for the varying amount of years between waves across the sample, we define t as the year at wave w and t' as the year of the previous wave $w-1$. We then calculate growth rates as compound annual growth rates ($CAGR\ x$) for each income component x for decile d, country i at year t:

$$CAGR\ x_{dit} = \left(\left(\frac{x_{dit}}{x_{dit'}} \right)^{\frac{1}{(t_{di} - t'_{di})}} - 1 \right) \times 100$$

CAGRs cannot be defined when the sign of the income level flips. This can happen for capital and self-employment income (though not very frequently), but happens more frequently for total public income. If this happens, we will note it.

We also calculate the average annual differences ($AAD\ x$):

$$AAD\ x_{dit} = \left(\frac{x_{dit} - x_{dit'}}{t_{dit} - t_{dit'}} \right)$$

We can then express the contribution of each income component x to growth of total income tot as follows in percentages ($\%\ contrib\ x$) and percentage points ($ppt\ contrib\ x$):

$$\%\ contrib\ x_{dit} = \left(\frac{AAD\ x_{dit}}{AAD\ tot_{dit}} \right) \times 100$$

$$ppt\ contrib\ x_{dit} = \left(\frac{AAD\ x_{dit}}{AAD\ tot_{dit}}\right) \times CAGR\ x_{dit}$$

For the pooled analysis we will use the percentage contributions. For individual countries this is less convenient as total income growth can be very low, resulting in extremely high percentages; so there we will show the percentage point contributions. As stated earlier, when evaluating trends in growth pooled across countries we account for differences in years covered by weighting.

4.1 Differences across deciles in contribution to total income growth

Table 4 plots income growth pooled across countries for the first and last year for which we have data available for the 1st, 5th, and 10th decile (rows (a-c)), with again additional tests for the 5th decile (rows (d-g)).[11]

As noted in the first paragraph of this paper, average total income growth per year for the pooled sample was higher for the 10th decile (1.37%) than for the 5th (1.19%) and 1st (0.72%). We can see widely varying patterns across deciles in terms of contributing income sources. For the 5th decile, 37.8% of total income growth came from wages of the head. We can see that this income source has a strong disequalising effect; contributing very significantly to total income at the top (+77.8%) whilst contributing negatively to growth for the bottom (-30.0%). Wage of the spouse adds another 33.3% to total income growth for the 5th decile. Again the contribution of this income source monotonically increases with the income deciles, contributing negatively to growth at the bottom (-3.1%) and substantially at the top (+52.8%). Wages of the other household members contributed negatively to growth for the bottom and top deciles. All in all, wage income contributed negatively to incomes at the bottom (-36.9%), strongly positively for incomes at the top (+123.3%), and somewhere in between, but quite substantially (+77.5%), for the 5th decile. The contributions of self-employment and capital income to total income growth are lower. Taken together, they increase inequality by contributing negatively to the bottom and the most to the top. Our findings here correspond to the general conclusions that market income inequality is (much) higher than disposable income inequality, and that earnings inequality was the main driver for rising disposable income inequality (OECD, 2011).

Interestingly, a large relative contribution to growth for the 5th decile came from public transfers (+32.0%). Yet, taxes added negatively, leaving about 10.5% of total public income coming from public sources. We can see that transfers and taxes have strong equalising effects. Public transfers account for 156.6% of total income growth for the bottom decile. Indeed, all income growth came from public transfers for the 1st decile. For the top decile, transfers accounted for +9.4% of total income growth, which did not offset the negative effect of public taxes on total income growth.

As before, for the 5th decile we try to account for the impact of the Great Recession by leaving out those years for the pooled sample (row (d) in Table 4). This has notable effects on our estimates. Total income growth almost doubles to 2.02%. The contribution of transfers changes markedly, decreasing from +32.0% to +9.8%. Taking into account taxes, we can see that in "normal" times, net public income has a negative effect on total income growth (-21.6%). Until the Great Recession spouses add more to total income growth (+43.4% rather than +33.3%). The same, though less so, holds for wages of the head and of other household members. In fact, we can see that the spouse

[11] Undefined CAGRs for rows a-c: Row a: self employed: NZL, capital: EST SVN, total public income: POL. Row b: capital: IRL, total public income: FIN, ISR, PRT
Row c: capital: EST, total public income: PRT ESP

contributed slightly more to total income growth before the recession than the household head. Leaving out the Eastern European countries (row e) does not alter these general patterns, even though it lowers annual total income growth from 2.02 to 1.36%. If we only focus on the set of countries for which we have a longer series (row f), we see an even stronger contribution of the spouse to total income growth (51.2% vs. 46.3%), and a much less important role of the head (30.9% to 45.4%). For this set of countries taxes played a less negative role (-20.8 to -30.8%). The latter, however, is for a large extent due to Israel (row g). Leaving out Israel boosts the income-generating role of the spouse for the 5th decile even further, to more than double the contribution of the head (59.6% vs. 28.3%).

Table 4: Contribution to growth in most recent year pooled across countries

		Total income CAGR	Wage head	Wage spouse	Wage other	Total wage	Self employ-ment	Capital	Transfers	Taxes	Total public income
		(%)	Contribution to total income (%)								
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(a)	*1st decile*	0.72	-30.0	-3.1	-3.8	-36.9	-8.7	-2.6	156.6	-8.5	148.1
(b)	*5th decile*	1.19	37.8	33.3	6.4	77.5	5.9	6.0	32.0	-21.5	10.5
(c)	*10th decile*	1.37	77.8	52.8	-7.3	123.3	4.3	18.4	9.4	-55.4	-46.1
	5th decile										
	Before Great Recession										
(d)		2.02	42.8	43.4	11.8	98.0	10.1	8.0	9.8	-25.9	-16.1
	Before Great Recession (no Eastern Europe)										
(e)		1.36	45.4	46.3	11.0	102.7	8.5	10.4	9.2	-30.8	-21.6
	Before Great Recession for country sample with long coverage (CAN, DNK, DEU, ISR, NZL, USA)										
(f)		1.11	30.9	51.2	13.1	95.2	9.8	8.4	7.4	-20.8	-13.4
	Before Great Recession for country sample with long coverage leaving out Israel (CAN, DNK, DEU, NZL, USA)										
(g)		0.85	28.3	59.6	14.0	101.8	11.9	8.0	6.7	-28.5	-21.8

Another way to look into absolute and relative growth is by using decomposed growth incidence curves. In Figure 1 we show the growth incidence curve for total income over the full period, pooled across countries. Again, results are weighted by the number of years covered. It shows the CAGR of total income at each decile, where the deciles are plotted on the horizontal axis. The decomposition of the CAGR of total income by each income source is shown in the same figure in percentage points. Thus, vertically, for each decile, the sum of the percentage points of all income sources add up to the CAGR of total income. In Table 4 we noted the impact of the Great Recession on the contribution of a number of income sources. This is why we show the patterns for the full sample and the sample leaving out the country-specific Great Recession years. In the figures on the LHS we show total wage and the contributions of the three wage income sources. On the RHS we plot the two remaining market income sources and the two public income sources.

In Figure 1a we can see the rise of inequality across the entire distribution, shown by a monotonic increase in total income growth when we go up in the distribution. Furthermore, the figure visualises and generalises across the entire distribution our previous finding of the disequalising effect of wages of the head and the spouse (see Brewer *et al.*, 2015 for comparable findings for the UK). Wages of the head still contributed to growth from the 2nd decile onwards, and wages of the spouse from the 3rd decile onwards. We can nicely see as well the mirrored pattern for the contribution of

transfers and taxes to total income growth: both have a strong equalising effect. The other factors play relatively minor roles on average, given their lower shares.

Leaving out the years before the Great Recession matters for our findings, however. We still see a rise in inequality, but it is less pronounced and no more monotonic as the 1st and 3rd decile saw a comparable increase in income. Wages of the head and spouse still contributed more to total income growth higher up the distribution, but the slope is less positive and the contribution is positive across the entire distribution. The percentage point contribution due to the spouse does not differ much anymore in the upper half of the distribution. This suggests that the Great Recession was particularly detrimental for the bottom deciles, or that households with less wage income from the head or spouse ended up lower in the distribution. Public income sources are still negatively sloped, but the slope is less steep at the upper half of the distribution. The impact of taxes is more negative across the distribution.

Figure 1: Decomposed growth incidence curves for the pooled sample
Figure 1a: All years

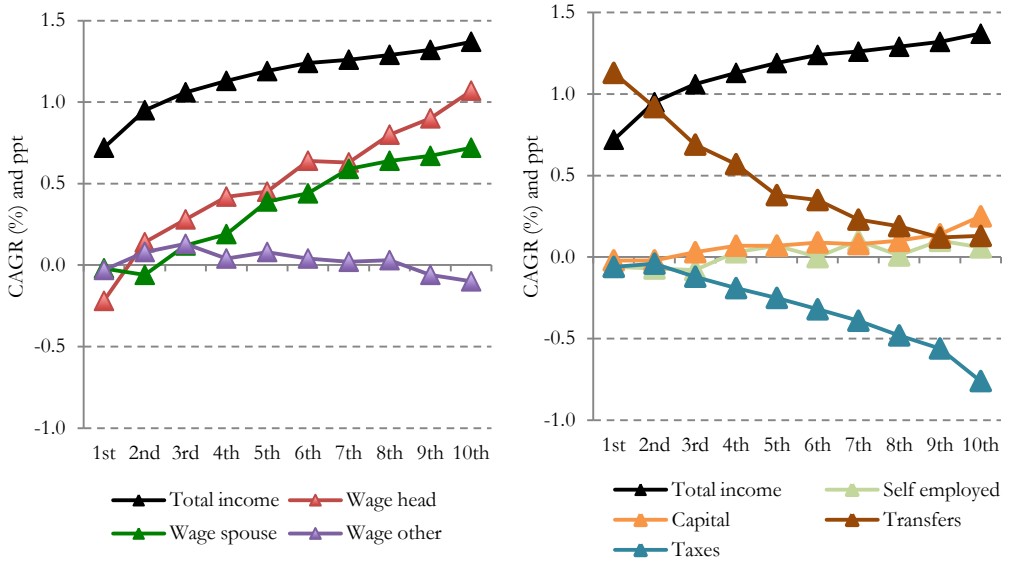
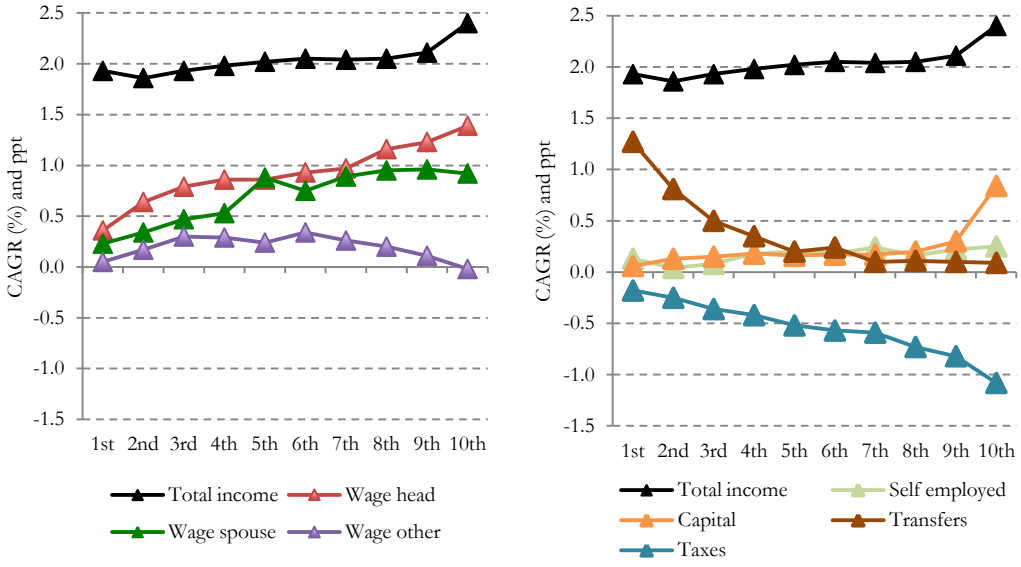


Figure 1b: Before the Great Recession



We can again look at the pooled trends at different time points for the six countries for

which we have long time series. As with Figure 1, we show the percentage point contribution, which are easier to interpret compare with fluctuating growth patterns. Results are shown in Table 5 for the 5th decile. Peaks and troughs of the economic cycle interchange each other. Contribution of total wage always has the same sign as total income growth, and is stronger in absolute terms. Contribution of wage of the head has the same sign too, and has a particularly strong effect in recession times. The contribution of wage of the spouse was large up to around 2000. Since then its contribution was lower than that of wage of other household members, and the contribution was negative during 2008-2011. Capital and self-employment income had small and generally positive contributions to total income growth.

Both public transfers and taxes contributed to income growth positively during the Great Recession. Both sources had a negative effect on total income growth during the peaks of 1995-2000 and 2005-2008, and taxes also had a lowering effect on growth during the peak of 1985-1990.

Table 5: Contribution to growth over time for a fixed set of six countries

		Total income CAGR	Wage head	Wage spouse	Wage other	Total wage	Self empl-oy-ment	Capit-al	Trans-fers	Taxes	Total public income
		(%)	Contribution to total income (ppt)								
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
5th decile for six countries with long coverage (5th decile, CAN, DNK, DEU, ISR, NZL, USA)											
(a)	*1985-90*	1.61	0.74	0.75	0.23	1.72	0.07	0.00	0.33	-0.51	-0.19
(b)	*1990-95*	-0.08	-0.33	0.15	0.00	-0.18	0.01	0.03	0.11	-0.04	0.07
(c)	*1995-00*	1.73	1.31	0.81	0.06	2.19	0.11	0.02	-0.16	-0.44	-0.59
(d)	*2000-05*	0.82	0.08	0.08	0.15	0.31	0.06	0.23	0.02	0.20	0.22
(e)	*2005-08*	1.23	0.75	0.14	0.86	1.75	0.41	-0.08	-0.53	-0.32	-0.85
(f)	*2008-11*	-0.07	-0.50	-0.26	0.08	-0.68	-0.04	-0.14	0.31	0.48	0.79

4.2 Absolute and relative growth

The results in the previous section suggest that the contribution of income sources might differ during periods of absolute and relative total income growth. In this sub section we try to generalise our descriptive findings using simple means tests.

In Table 6 we show the number of years (weighted) and waves (unweighted) where we can see positive absolute growth, defined as growth above 0% of total income for the 5th decile, compared to negative absolute growth; and positive relative growth, defined as more positive (less negative) growth for the 5th than for the average, versus negative relative growth.[12] We show both the total number of years within our sample and the waves, since for the regressions we have to rely on waves, whereas the years are more informative for substantive conclusions. We only discuss here the findings for the years. In 65% of the years absolute income growth for the 5th decile was positive. Relative income growth was less frequent, taking place in 41% of the total years. Most common were years with above 0% income growth, but where average income grew faster (35%), whereas the least common was below 0% income growth with decreasing inequality (11%). The findings suggest that crises tend to be more disequalising (24 vs. 11%), whereas positive growth is more equal or even equalises (35 vs. 30%).

[12] We focus on total income growth rather than GDP per capita, to avoid having to discuss the (substantial) divergence between GDP per capita and total equivalised household income (we do this in Nolan et al., 2016b).

Table 6: Numbers of positive absolute and relative growth for the 5th decile

			Absolute income growth 5th decile		
			Positive	Negative	Total
Relative income growth 5th decile	Positive	Years	103 (30%)	38 (11%)	141 (41%)
		Waves	69 (33%)	30 (14%)	99 (48%)
	Negative	Years	123 (35%)	83 (24%)	206 (59%)
		Waves	61 (29%)	47 (23%)	108 (52%)
	Total	Years	226 (65%)	121 (35%)	347
		Waves	130 (63%)	77 (37%)	207

Next, we test whether the composition of income evolves differently during periods of absolute and relative income gains for the 5th decile. We look at the average annual changes in the share of total income of each income component. Thus, if an income component went down from 70.1% to 69.1% of total income in one year, this will be a -1 ppt change.[13] We show the means of the average annual percentage change of each income component in times of growth versus no growth (to be defined later). On the basis of these results we conduct chi-squared tests for equality of multivariate group means, where we allow for heterogeneity in variances across groups. If there is a significant difference, this is noted using asterisks. Unfortunately, with this specification we cannot apply probability weights to account for the unevenly spaced data. Thus, every wave counts as the same regardless of whether this observation covers 1 year or more.

Table 7: Average annual growth per income source as a % of total income during waves of absolute income growth and no growth for the 5th decile

	5th decile threshold		Average income threshold	
Growth?	Yes	No	Yes	No
	(1)	(2)	(3)	(4)
Wage head	-0.20	-0.05	-0.17	-0.10
Wage spouse	0.30*	-0.41*	0.34**	-0.51**
Wage other	0.06	-0.31	0.02	-0.24
Total wage	0.16**	-0.77**	0.19**	-0.85**
Self empl	0.10	-0.16	0.13*	-0.23*
Capital	0.03	-0.03	0.02	-0.03
Transfers	-0.32***	1.18***	-0.32***	1.24***
Taxes	0.03	-0.21	-0.02	-0.13
Public income	-0.29***	0.97***	-0.34***	1.11***
N	130	77	133	74

We start by looking at absolute income growth in Table 7. In columns (1-2) we define absolute income growth as in Table 6 on the basis of positive total income growth for the 5th decile. We can see that transfers have an anticyclical effect for the 5th decile. There is some evidence as we saw before that wage of the spouse is procyclical. We can see that this income source tends to grow in relative terms when total income goes up for the 5th decile, whereas the opposite holds when total income decreases for this 5th decile. In columns (3-4) we use positive total income growth for the average (across the distribution). Columns (1-2) show the results of our preferred specification for absolute

[13] Our reason for tracking shifts in the composition rather than actual growth rates or CAGRs is that otherwise we would find the obvious result that income growth for particular income components differs in times of recession. An additional advantage of looking at changes is that country fixed effects are removed. The change is defined in average annual differences to account for the unevenly spaced data.

income growth, since the specification in columns (3-4) combines an element of relative gains for the 5th decile. It might be that average income growth is positive, but that the 5th does not benefit from it and still has negative total income growth. This happens apparently during three waves. Nevertheless, our findings regarding transfers and wages for the spouse still hold for this specification, and there are some signs now that self-employed income is procyclical too.

In Table 8 we continue by looking at relative income growth for the 5th, and combinations of absolute and relative income growth. We follow the definition we used previously: whether or not the 5th decile saw higher income gains than the average (across the distribution). Columns (1-2) show this for the full sample (combining waves of positive and negative absolute growth). Now different income sources pop up. Income from wages of other household members and from self-employed work become more important income components in waves that incomes for the 5th go up more than on average across the distribution. In particular for self-employed income, however, the change in share is very small (e.g., its share of total income goes up by 0.02 percentage points per year on average during positive relative growth), due to the fact that this income source is relatively small.

In columns (3-6) we combine our definitions of relative and absolute income growth, by first looking at changes in relative income growth during times of rising (absolute) incomes for the 5th (columns 3-4) and during times of decreasing (absolute) incomes for the 5th (columns 5-6). The results are not particularly stark, which might partly be due to the lower sample size. We find at the 10% significance level that during times that positive incomes grow faster for the median than on average across the distribution the share of income coming from wages of the spouse and capital income go up. The latter seems counter intuitive, but is in line with the previous findings that capital income is relatively equally distributed across deciles. When income decreases for the 5th, then wages of other household members contribute to relatively less negative growth for the 5th decile.

Table 8: Average annual growth per income source as a % of total income during waves of relative income growth and no growth for the 5th decile

	Full sample		And positive absolute income growth		And negative absolute income growth	
Growth?	Yes	No	Yes	No	Yes	No
	(1)	(2)	(3)	(4)	(5)	(6)
Wage head	-0.31	0.01	-0.53	0.16	0.18	-0.20
Wage spouse	0.21	-0.12	0.59*	-0.03*	-0.66	-0.24
Wage other	0.19**	-0.31**	0.19	-0.08	0.18**	-0.62**
Total wage	0.08	-0.43	0.25	0.06	-0.31	-1.06
Self empl	0.02	-0.01	0.10	0.11	-0.16	-0.17
Capital	0.07	-0.06	0.12*	-0.07*	-0.04	-0.03
Transfers	0.01	0.44	-0.50	-0.12	1.19	1.17
Taxes	-0.18	0.06	0.03	0.03	-0.68	0.09
Public income	-0.17	0.50	-0.47	-0.09	0.51	1.26
N	99	108	69	61	30	47

4.3 Trends across countries

In Table 9 we analyse the contributions of each income source to total income growth for the 5th decile over the longest period in all countries in our country sample. We show total income growth in percentages for the 5th decile and for the average (across the distribution) income (columns (1-2)), and the contributions of each income source in

percentage points rather than, as before, in percentages to prevent having extreme numbers in case of low total growth rates (columns (3-9)). Thus, for each country, the income sources do not add up to 100% but add up instead to the country-specific total income CAGR rate. We mark the higher one of the CAGR of the 5th decile or the average in dark green, and we mark the income contribution with the largest positive contribution for each country in light green, and the largest negative contribution in red (none for Czech Republic with only positive contributions).

Not surprisingly, we see the highest total income growth rates in Eastern European countries as a result of convergence. Sweden and Australia show the highest total income growth rates of the Western countries. In 11 out of 27 countries income growth was higher for the 5th than for the average (across the distribution). These are all five Eastern European countries, three countries severely affected by the Great Recession (Portugal, Iceland, and Italy), the Netherlands, Belgium, and South Korea.

In 13 countries wages of the household head contributed most to total income growth. These include all Eastern European countries except Poland, most continental European countries except Germany and the Netherlands, and none of the liberal countries apart from Australia. In five countries the opposite holds true – the head's wages were the main negative contributor to total income growth. Two of these five countries have a short time series around the Great Recession (Belgium and Iceland, though for Belgium total income growth was still positive with 1.35%). For two others we have longer series (Japan 1995-2009 and the U.S. 1984-2012). We will further reflect on the U.S. later. Also Finland, for which we do not have recent information (1986-1993), shows a negative contribution of the head's wages to total income growth.

In five countries wages of the spouse were the most significant positive contributor to total income growth. In 22 countries this income source had a positive impact on growth – the negative numbers are all for countries with data around the Great Recession and Finland. The contributions of wages of other household members, self-employment income, and capital income to total income growth seem to be more modest, albeit with substantial country variation.

For six countries transfers were the main contributor to growth, which includes countries hit by the recent crisis (Ireland, Italy, Spain), a previous severe crisis (Finland), and the UK and Japan, the latter showing negative total income growth between 1995-2009. Transfers had the most negative impact in Sweden, which could explain the recent surge in inequality in this country (OECD, 2015). Last, taxes had the most negative impact on total income growth for the 5th decile in 13 countries, including continental and most of Eastern Europe.

Table 9: Contributions to growth over the entire period for all countries

Country	Years	Total income 5th	Total income average	Wage head	Wage spouse	Wage other	Total wage	Self empl	Capi-tal	Transfers	Taxes	Public income
		CAGR (%)		Contribution to total income (ppt)								
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Australia	1995-2012	2.69	2.86	1.91	0.25	0.19	2.35	-0.05	0.45	0.07	-0.13	-0.06
Austria	2004-2011	0.80	0.85	1.28	-1.20	0.29	0.37	0.51	0.21	-0.12	-0.16	-0.29
Belgium	2004-2010	1.35	0.53	-1.22	0.11	0.61	-0.49	0.62	0.00	0.24	0.98	1.22
Canada	1984-2011	0.74	0.93	0.24	0.20	-0.04	0.41	0.11	0.24	0.15	-0.18	-0.03
Czech Rep	2004-2011	2.33	1.93	0.91	0.67	0.25	1.83	0.26	0.00	0.20	0.04	0.24
Denmark	1985-2011	0.86	0.98	0.46	0.45	0.02	0.94	-0.14	0.05	0.19	-0.17	0.02
Estonia	2004-2011	4.99	4.56	2.54	1.77	0.37	4.69	0.16	0.07	1.17	-1.10	0.07
Finland	1986-1993	0.51	0.96	-1.25	-1.10	-0.38	-2.72	-0.45	0.10	2.99	0.59	3.58
France	1996-2011	1.02	1.28	0.66	0.48	0.06	1.20	-0.01	-0.03	0.28	-0.43	-0.15
Germany	1985-2011	0.65	0.89	-0.07	0.23	0.45	0.61	0.34	0.01	0.06	-0.37	-0.31
Iceland	2004-2011	-1.01	-1.25	-1.65	-0.25	0.29	-1.61	-0.21	0.04	0.14	0.64	0.77
Ireland	2004-2011	-2.75	-2.50	-0.34	-1.33	-1.88	-3.54	-1.31	-0.20	2.50	-0.19	2.30
Israel	1985-2011	2.17	2.19	0.68	0.51	0.25	1.43	0.13	0.19	0.27	0.16	0.42
Italy	2004-2011	-0.35	-0.65	-0.02	0.01	-0.44	-0.46	-0.25	0.13	0.20	0.03	0.23
Japan	1995-2009	-0.85	-0.85	-0.97	0.23	-0.28	-1.01	-0.37	0.14	0.44	-0.06	0.38
Luxembourg	2004-2011	-0.46	-0.30	0.34	-0.31	-0.28	-0.24	0.29	0.05	0.26	-0.82	-0.55
Netherlands	2000-2012	-0.24	-0.49	0.13	0.57	-0.23	0.47	0.09	0.00	0.09	-0.89	-0.80
New Zealand	1985-2011	0.70	1.00	0.06	0.39	0.09	0.54	0.14	-0.16	-0.04	0.22	0.18
Poland	2004-2011	7.21	6.08	1.93	3.43	1.62	6.98	1.15	-0.01	1.05	-1.96	-0.91
Portugal	2004-2011	-0.57	-1.68	1.24	1.68	-0.03	2.90	-0.30	-0.10	-0.08	-3.00	-3.08
Slovak Rep	2004-2011	10.62	10.27	3.08	1.98	1.78	6.83	2.50	0.09	1.55	-0.35	1.20
Slovenia	2004-2011	1.36	1.23	0.90	0.62	-0.63	0.90	0.32	0.03	0.26	-0.14	0.12
South Korea	2006-2012	1.96	1.82	1.86	0.58	-0.06	2.38	-0.27	-0.05	0.36	-0.45	-0.09
Spain	2004-2011	-1.28	-0.92	0.30	0.46	-0.93	-0.17	-0.21	0.05	0.88	-1.83	-0.95
Sweden	1995-2011	2.46	2.60	1.91	0.72	0.15	2.77	0.08	0.04	-0.41	-0.02	-0.43
United Kingdom	1999-2010	1.21	1.35	0.15	0.01	0.20	0.36	0.16	0.02	0.70	-0.02	0.68
United States	1984-2012	0.32	0.67	-0.41	0.32	0.28	0.18	-0.03	-0.08	0.15	0.10	0.25
Average		1.19	1.23	0.45	0.39	0.08	0.92	0.07	0.07	0.38	-0.25	0.12

5. Trends for the U.S., Germany, and Denmark

Having found substantial variation across countries and time for trends in absolute and relative income growth, we further zoom in on trends for three countries. We look at the U.S., Germany, and Denmark, for which we have relatively long time series (for Denmark and Germany we have data between 1985-2011, and for the U.S., for 1984-2012).[1] The countries are generally seen as archetypal cases of welfare states (e.g., Esping-Andersen, 1990; Hall & Soskice, 2001; Oesch, 2015; Nolan *et al.*, 2016). The results for the three country cases support our more general findings above.

We start by looking at the first and last year for which we have data using the growth incidence curves with decomposed contributions of each income source in Figure 2. In Appendix 2 we show the information over time in a slightly different way; by plotting the share of each income component that the 5th decile has in each country.

Inequality went up in all three countries, as noted by higher growth higher up the distribution. Moreover, growth was quite modest for the 5th decile in all three countries over the entire period: 0.86% (Denmark), 0.65% (Germany), and 0.32% (U.S.) on average per year. Growth for the 10th decile reached between 1.34% (U.S.) and 1.56% (Germany) on average per year. Growth was negative for the 1st decile in both the U.S. (-0.38%) and Germany (-0.03%), and essentially non-existent in Denmark (0.17%). The particularly dismal case of the U.S. in terms of generating prosperity for households is discussed in greater detail in Thewissen et al. (2015) and Nolan et al. (2016a; 2016b).

The results from Figure 2 are in line with the trends set out in the analysis of the change in income composition shares carried out in the previous section. We can see in all three countries that the growth incidence curve for wage of the household head (in red) lies underneath the total income curve (in black), except for at the very top in Denmark. We can now also see that wage for the household head is a key contributor to rising wage inequality (see also OECD, 2011), since the growth incidence curve is more closely aligned with the total income growth incidence curve at the top of the total income distribution.

As we saw before, the wage of the spouse rose faster than total income, in particular at the top for Denmark and the U.S., and interestingly, more so at the bottom for Germany. Also wages from other household members grew the most around the middle in Germany and the U.S., the most for the 5th decile. In Denmark this latter income component was an equalising factor too, though it did not rise as much as total income for the 5th decile. The strongly disequalising role of male and female earnings for the U.S. is more generally reported in the literature (Reed and Cancian, 2001; Gottschalk and Danziger, 2005; Larrimore, 2014).

Capital and self-employment contributed less to total income. This is a result of their lower shares of total income. The strong increase in importance of self-employed income for the middle and top part of the income distribution witnessed by Germany between 1985 and 2011 is mirrored here by strong positive growth (5.92% and 4.43% for the 5th and 10th deciles respectively). On the other side, self-employment income decreased for the bottom part of the distribution in all countries especially in the case of Denmark. There are less large changes for the U.S. for this income source. Capital income grew more unequal in Denmark and to a lesser extent in Germany, whereas it decreased across the distribution, though in particular in deciles 2-5, in the U.S. Thus,

[1] We use 1984 for the U.S. as we do not have information for 1985. We have information both on 2011 and 2012. Using 2011 instead of 2012 would not alter our results. The income composition is quite similar among the two years. Household wage is 51% in 2011 and 52% in 2012, wage of other household members is 18% vs. 19%, and all other income sources have the same relative contribution to total income at the 2-digit level.

capital income still adds in general to rising income inequality for these three countries. These findings are in line with trends for the top 1% using pre-tax pre-transfer administrative data, where top executives have replaced capital owners at the top in the U.S., whereas top capital income are still predominant at the top of the distribution in continental Europe (Atkinson and Piketty, 2009). With our coarse top income measure from survey data, we do not see the stronger association between wage and capital income at the very top in the U.S. (Alvaredo *et al.*, 2013; Atkinson and Lakner, 2015).

The three countries also share two equalising factors, which we saw previously for the wider sample. The first is taxes, which have become more tailored to the top of the distribution (increases for the 10th decile range between 1.27% in the U.S. to 2.03% in Denmark) whilst showing decreases at the bottom (in particular for Germany). Still, average taxes grew less than average income in Denmark and the U.S., reducing the total amount of redistribution. Moreover, taxes rose faster than total income for the 5th decile in Germany.

Public transfers became more means tested in Denmark, though the 5th decile did not benefit from this. In Germany all in all transfers did not change much. In the U.S., under the liberal welfare state regime, transfers stagnated for the bottom end of the distribution, but went up significantly across the rest of the distribution (1.74% for the 5th and 1.91% for the 10th decile respectively). Thus, transfers seem to have become less means tested there, though they became a more prominent income source for ordinary households.

Figure 2: Decomposed growth incidence curves
Figure 2a: The U.S. (1984-2012)

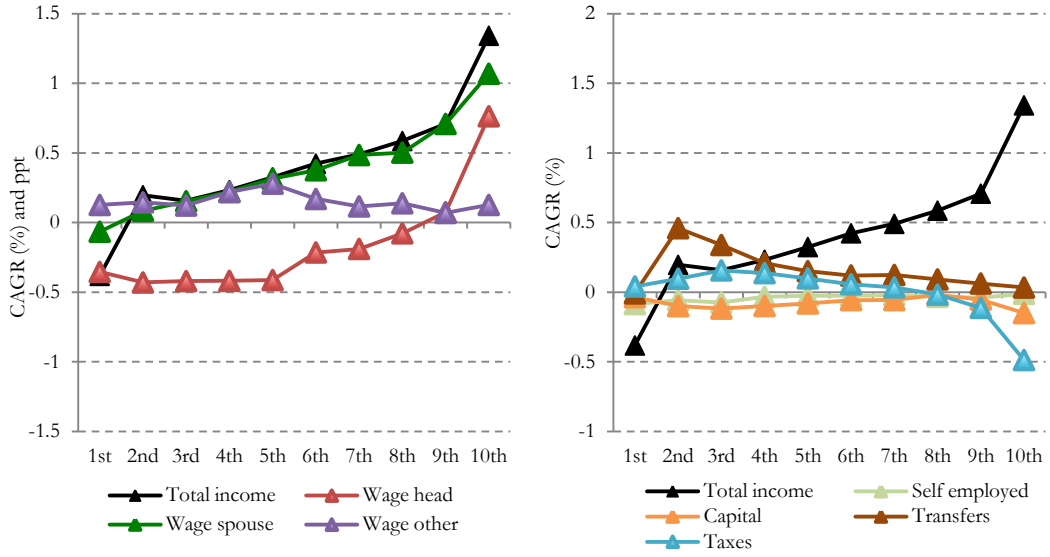


Figure 2b: Germany (1985-2011)

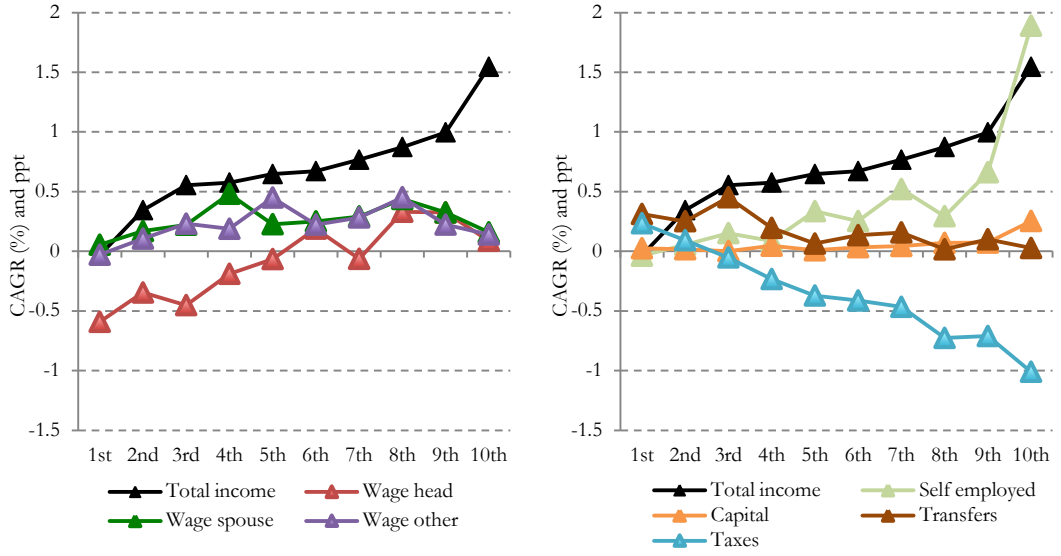
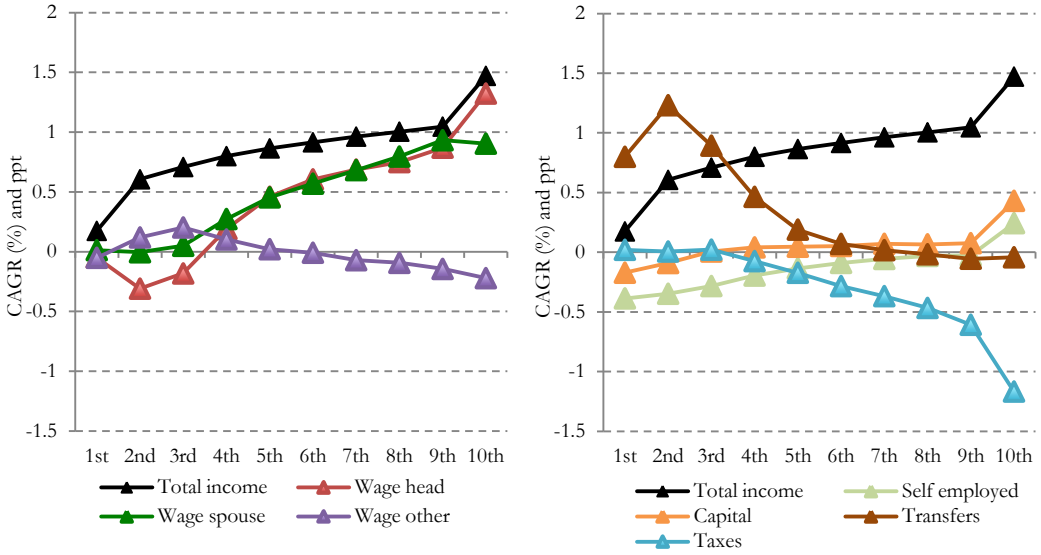


Figure 2c: Denmark (1985-2011)



We move on by looking at how the composition changed over time for the three countries for the 5th decile, linking this to absolute and relative growth rates of this income group. We show in Figure 4 for each year for which we have data for the three country cases the income composition, as well as the CAGR for total income for the 5th and for average income. It is important to keep in mind that due to availability of data, information is not available annually for the first part of the series for each country. Thus, the x-axis is not linear in time, but corresponds to each year for which we have data.

The trends in Figure 3 reflect the more general conclusions drawn thus far. A few country-specific trends are notable. Both the U.S. and Germany are quite extreme in their plummeting share of income coming from the head for the 5th decile over the full period. We noted in the growth incidence curves already that for the U.S. this is a phenomenon for the 5th decile (-17 ppt), whereas in Germany this trend is seen more widely across deciles. Wage of the household head as a share of total income decreased in most periods, except 1984-1989 (strong average growth), 1995-2000 (strong 5th decile growth), and 2011-2012 (growth for 5th while average income went down). Given the large number of periods of decrease in total and 5th decile income well before the Great

Recession – a clear sign of the poor performance of the U.S. in generating prosperity for ordinary households (Thewissen et al., 2015; Nolan et al., 2016a; 2016b) – it comes as no surprise that over the entire period the share of the head's wage went down the most in the U.S. in absolute terms.

For Germany, we can see a decrease of 8 ppt in the relative share of this income component from 1990-1995 and another decrease of 6 ppt between 2000-2008. The share went up by 6 ppt between 2008-2009 before dropping 11 ppt from 2009-2010. The decreases in the share correspond to periods of negative total income growth for the average and the 5th decile, except for the last year when negative income growth was from 2010-2011, rather than 2009-2010.

For Denmark, wages of the head as a share of total income went up slightly from by 2 ppt between 1985-2008 – with a dip of between 1990-1995 when total income growth was relatively low – and went down afterwards between 2008-2011 to 73% (2011). The relatively strong performance of the share of the head in Denmark fits with the steadily rise of total income in real terms in the 26 years under analysis, with the exception of 2011, when the country witnessed a decrease of 1.90 points. The decrease between 2008-2010 was a consequence of low income growth for the 5th rather than on average across the distribution.

The share related to the wage earned by the spouse increased over the full period in all countries. However, it became a more important income component over time, but this growth took place before the Great Recession. This follows with our initial observation that wage of the spouse seems to be procyclical. In the U.S. the share of income coming from wages of the spouse went up significantly between 1984-2000 (from 17 to 28%), but went down or stagnated since, reaching 24% in 2012. In Germany it went up from 19 to 25% between 1990-1995, and stayed stable until 2004, before decreasing gradually to around 20% in 2011. For Denmark, most of the growth of the spouse's wage income took place between 1985-2000 (from 31 to 36%; hitting 37% in 2008), with a slight decrease afterwards (to 35% in 2011).

Wage income of others household members were a relatively stable income source on average for the three countries. For Denmark there was little change for the 5th decile for this income source, whereas it increased by 9 and 6 ppt in respectively Germany and the U.S. Total wage income went down in all three countries by 2-4 ppt for the 5th decile.

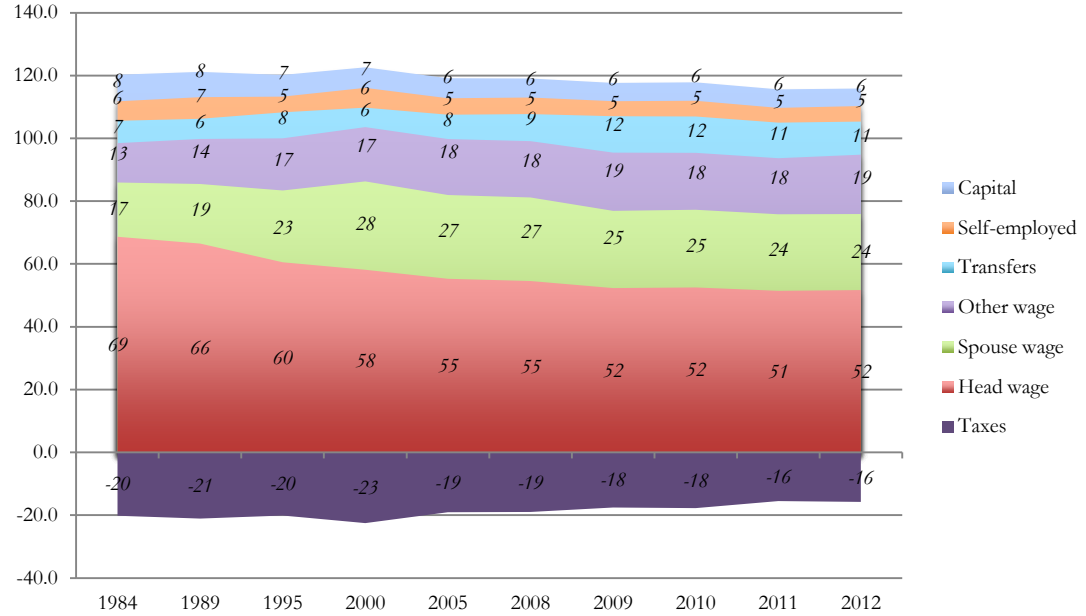
As we saw already across all countries, self-employment income and capital income show more heterogeneous trends across countries. Germany shows a marked shift from the household head's wages to self-employment income over the full period for the 5th decile (+8 ppt) – though this rise was not as spectacular as at the top of the distribution (+31 ppt) – for the latter more than compensating for the drop in total wage income.[2] In Denmark and the U.S., the share of self-employed income went down over time, in particular from 1984/1985-1990, whereas in Germany this increased from 5 to 7% during 2004-2008 (after the Hartz reforms) and further to 10% in 2011. Wages of other household members gradually declined in Denmark between 1985-2006, whereas the share increased in the U.S. in particular between 1984-1995 (13 to 17%, reaching 19% in 2012). For Germany the share went up from 13 to 20% between 2004-2008. There are no clear patterns in capital income for the three countries – it shows higher volatility in percentage terms but its share is always low.

[2] The shares for self-employment income for the 10th decile in Germany for the year 2011 are in line with those of previous years (68% in 2009, 65% in 2010 and 59% in 2011). On the other side, when looking at data for the 9th decile, quite a large gap can be identified with self-employment income representing respectively 22%, 29% and 25% of the 10th decile total income in 2009, 2010 and 2011.

Figure 3 immediately reveals the low shares of taxes and transfers in the U.S., and the universal welfare state in Denmark with high shares of taxes and transfers in particular in the 1st and 5th decile. Over the full period, the share of public transfers stayed constant for the 5th decile, except for the U.S. were it increased (+3 ppt). The relative tax burden in Denmark shifted away from the 5th decile towards the top, whereas there was less movement in Germany, and more a movement towards means testing indicated by lower shares for the bottom and higher shares for the 5th and 10th decile. In the U.S. we see a slight decrease in the already lower shares of taxes across the distribution, and particularly so for the 5th decile (+4 ppt).

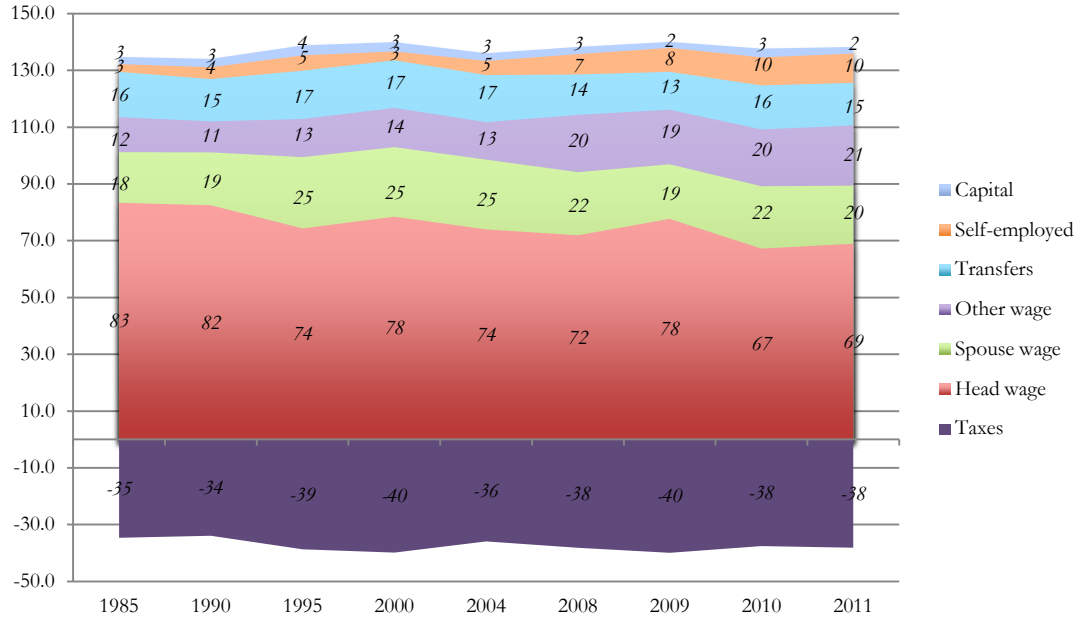
Moreover, the 5th decile is positively affected by cushioning transfers and taxes. Both transfers and taxes play a mitigating role in the U.S., though their levels are not particularly high. The share of income from transfers went up from 6.2 to 12% between 2000 and 2009 and has stabilised since. The share of taxes decreased from 23 to 16% between 2000 and 2011. In Germany transfers were quite stable. The share went down between 2004-2009 (17 to 13%), before going back up (16%) the year after. Taxes were also quite stable, with some notable shifts between 1990-1995 (-34 to -39%) and 2000-2004 (-40 to -36%). The chart for Denmark underlines how transfers weigh more over the total household income in periods for low growth and recession, such as between 1990-1995 (from 21 to 26%, and a decrease to 20% between 1995-2000) and during the Great Recession (from 16 to 20% between 2008-2011). Taxes seem to have remained relatively stable across the period examined, with a gradual decrease in their relative importance between 2008-2010 (from -48 to -43%).

Figure 3: Income growth and compositional changes over time
Figure 3a: U.S.



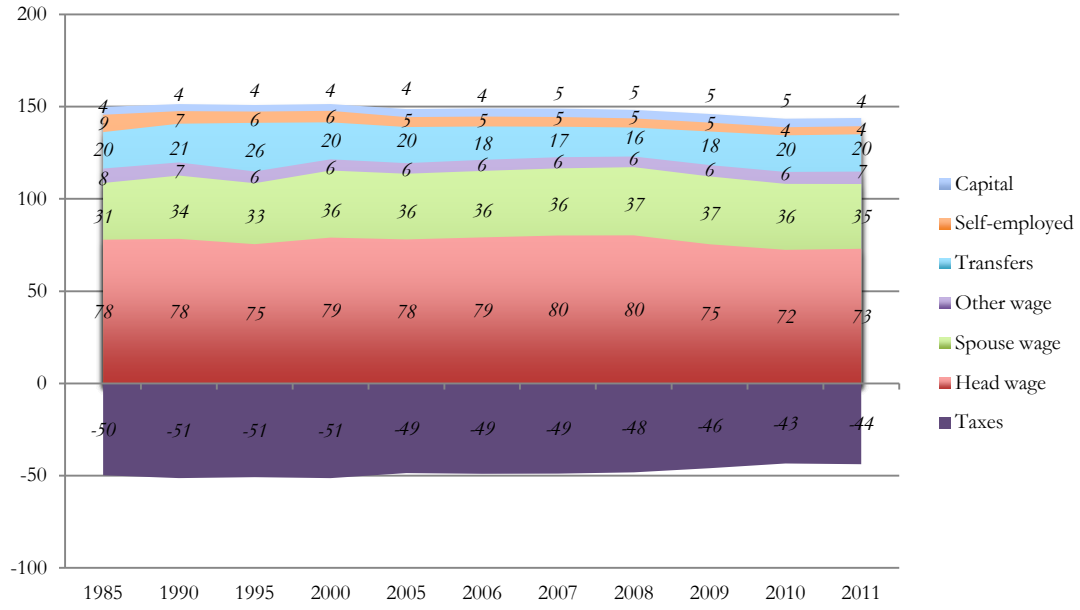
Total income growth (CAGR %)									
Average	2.07	-0.07	1.63	0.63	-0.84	-0.36	-1.61	2.36	-0.12
5th decile	1.79	-0.57	1.91	-0.29	-0.74	-1.41	-1.22	-0.32	0.77

Figure 3b: Germany



Total income growth (CAGR %)								
Average	3.86	-0.40	0.96	0.22	-0.14	2.12	1.08	-2.29
5th decile	3.33	-0.54	1.06	-0.31	-0.07	2.77	1.18	-4.45

Figure 3c: Denmark



Total income growth (CAGR %)										
Average	1.22	0.63	1.02	1.01	2.33	3.02	-0.15	-0.55	3.50	-1.96
5th decile	1.19	0.68	0.82	0.97	1.68	2.52	0.93	0.04	0.98	-1.90

6. Conclusions

This paper has distinguished the main sources of income accruing to households at different points in the income distribution and assessed the role they have played in household income growth over time across 27 OECD countries. It focused on those in the 5th decile of the working-age distribution as representing 'ordinary' middle-income households, and analysed the income composition and sources of income growth for this

decile compared to the bottom and top deciles of the distribution. The data employed were assembled by the OECD from national authorities drawing on household surveys.

We first examined the income composition of each decile, averaged across all the countries, for the most recent year available – usually 2011 or 2012. For the 5th decile, the wage of the main earner made up more than half of total income on average, the wage income of the spouse contributed another quarter, and around one-fifth of total income came from transfers. Households in the 5th decile pay slightly more in direct taxes/social contributions than they receive in such transfers on average. The bottom decile, by contrast, relies for more than half of its income on public transfers, which substantially exceed taxes and social contributions paid. For the top decile, on the other hand, wages of the main earner comprise more than half of income, other earners are also important, income from capital and self-employment makes up 30% of total income, transfers account for only 10%, and direct taxes and social security contributions deducted represent 40% of total disposable income.

This represents the situation after the effects of the economic crisis has been felt. If we look instead at the composition of household income for the 5th decile in 2007, before the onset of the Great Recession, the share of income coming from wages is about 2 percentage points higher and that of transfers correspondingly smaller. Interestingly, taxes as a proportion of total income were little different.

We then examined how these income composition patterns evolved over time, going as far back for each country as the OECD data permit. For the 5th decile, wages earned by the household head declined in importance over the entire period, whereas wages for the spouse increased. Up to the Great Recession the increase in share for the spouse was greater than the decline the head, but this is not the case when the Great Recession is included, since the share of spouse's earnings then went down substantially. Moreover, for some countries the share of the spouse's earnings had plateaued well before the crisis. The extent to which this income source, which played a major role in many countries, can be relied on to generate income growth for ordinary households in future must be open to question. The share of transfers in total income for the 5th decile rose over the whole period, but this was due to the effect of the Great Recession: up to 2007, by contrast, it registered a decline. Overall, the composition of income around the middle of the distribution became more diversified over time, with less reliance on the earnings of the head.

The relative importance of the wage earned by the household head also declined for the first decile, but so did the earnings of the spouse; transfers contributed a substantially larger proportion of total income. For the 10th decile, by contrast, both wages of the main earner and spouse became more important income sources, reflecting the higher overall contribution from women's employment income but also perhaps influenced by assortative mating and more dual earners towards the top of the distribution. For both the bottom and top deciles income became less rather than more diversified by source – the bottom became more reliant on transfers, and the top even more on wage of the head and spouse, their respective main income sources.

We then looked directly at the contribution various income sources made to income growth over time for middle-income households, and how that differed from the corresponding contributions towards the top and bottom. A decomposition approach similar to the one used by Brewer and Wren-Lewis (2011) to study the UK was employed for this purpose. We found that the earnings of the main earner were the most important contributor to income growth for the 5th decile over the entire period, contributing 38% of total growth on average. Wages earned by the spouse contributed 33% to total income growth for this decile, while public transfers contributed about the same proportion. This picture is once again significantly influenced by the impact of the Crisis; when the

analysis was carried out up to 2007 only, the contributions of head and spouse's earnings each increase, with the latter then the single most important engine of income growth, and the contribution of transfers is much lower at only 10%.

Compared with this pattern for the 5th decile, the proximate contributors to income growth were very different for the bottom and top deciles. At the bottom, wages made a negative contribution and transfers were what drove growth; at the top the opposite was true, with wages driving growth and transfers making little contribution. Earnings of the head and spouse thus had a strong disequalising effect, accentuated during the Great Recession. Total wage income, and income from the spouse's wage in particular, were seen to be procyclical, becoming a significantly more important share in total income during periods of strong growth, whereas transfers were unsurprisingly countercyclical.

These findings bring out that in the future, real income growth for ordinary working households in the rich countries is unlikely to come from a single source towards which policies could be directed, such as increasing employment rates or public transfers. Instead, in most cases it is likely to require broad-based strategies that underpin real hourly wage growth, substantial employment for both spouses, and greater direct support via the (net impact of the) transfer and direct tax systems. While income from capital has played only a modest role to date, ways of enhancing access to income-earning assets across the distribution may also have a role. For future research, the role of housing, which is a major influence on living standards not incorporated into the present analysis, is also key both in terms of housing costs and the role of imputed rent and as the main source of wealth holding for middle- and lower-income households.

References

Alvaredo, F., Atkinson, A.B., Piketty, T., Saez, E. (2013) The top 1 percent in international and historical perspective, *Journal of Economic Perspectives* 27(3): 3-20

Artavanis, N., Morse, A., Tsoutsoura, M. (2016) Measuring income tax evasion using bank credit: Evidence from Greece, *The Quarterly Journal of Economics* 131(2): 739-798

Atkinson, A. (2009) Factor shares: The principal problem of political economy?, *Oxford Review of Economic Policy* 25(1): 3-16

Atkinson, A., Bourguignon, F. (eds) (2000) *Handbook of Income Distribution*, Amsterdam: Elsevier, pp. 1-58

Atkinson, A., Lakner, C. (2015) Wages, capital and top incomes: The factor income composition of top incomes in the USA, 1960-2005, *unpublished document*

Atkinson, A., Piketty, T. (eds) (2007) *Top Incomes over the 20th Century*, Oxford: Oxford University Press

Brewer, M. and Wren-Lewis, L. (2011) 'Why did Britain's households get richer? Decomposing UK household income growth between 1968 and 2009-2009', *IFS Briefing Note 125*

Brewer, M. and Wren-Lewis, L. (2015) 'Accounting for changes in income inequality: Decomposition analyses for the UK', 1978-2008, *Oxford Bulletin of Economics and Statistics* 78(3): 289-322

Chakravarty, S.R., D'Ambrosio, C. (2010) 'Polarization Orderings of Income Distributions', *Review of Income and Wealth* 56(1): 47-64

De Mello, L., Dutz, M. (eds) (2012) *Promoting Inclusive Growth: Challenges and Policies*, Paris: OECD

Esping-Andersen, G. (1990) *The Three Worlds of Welfare Capitalism*, Cambridge: Polity Press

Gasparini, L. and Tornarolli, L. (2015) 'A review of the OECD Income Distribution Database', *The Journal of Economic Inequality* 13(4): 579-602

Goos, M., A. Manning, Salomons, A. (2009) 'Job Polarization in Europe', *American Economic Review: Papers and Proceedings* 99(2): 58-63

Gornick, J.C., Jäntti, M. (eds) (2013) *Income Inequality: Economic Disparities and the Middle Class in Affluent Countries*, Stanford: Stanford University Press

Gottschalk, P. and Danziger, S. (2005). 'Inequality of wage rates, earnings and family income in the United States, 1975–2002', *Review of Income and Wealth*, Vol. **51**, pp. 231–254.

Greenwood, J., Guner, N., Kocharkov, G. and Santos, C. (2014) 'Marry your like: Assortative mating and income inequality', *American Economic Review* 104(5): 348-353

Hacker, J.S., Huber, G.A., Nichols, A., Rehm, R., Schlesinger, M., Valletta, R., Craig, S. (2014) 'The Economic Security Index: A New Measure for Research and Policy Analysis', *Review of Income and Wealth* 60(S1): S5-S32

Hall, P. and Soskice, D. (2001) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, Oxford: Oxford University Press

Imbs, J., Wacziarg, R. (2003) 'Stages of diversification', *American Economic Review* 93(1): 63-86

Immervoll, H., Richardson, L. (2011) 'Redistribution policy and inequality reduction in OECD countries: What has changed in two decades?', *OECD Social, Employment and Migration Working Paper*

Jenkins, S. P. (1995). 'Accounting for inequality trends: decomposition analyses for the UK, 1971–86', *Economica*, Vol. **62**, pp. 29–63

Kasperski, S., Holland, D.S. (2013) 'Income diversification and risk for fishermen', *PNAS* 110(6): 2075-2081

Larrimore, J. (2014). 'Accounting for United States household income inequality trends: The changing importance of household structure and male and female labor earnings inequality', *Review of Income and Wealth*, Vol. **60**, pp. 683–701

Maitre, B., Nolan, B. and Whelan, C.t. (2005) 'Welfare Regimes and Household Income Packaging in the European Union', *Journal of European Social Policy*, 15 (2), 157-171.

Milanovic, B. (2016) Increasing capital income share and its effect on personal income inequality, *LIS Working Paper no. 663*

Mishel, L., J. Bivens, E. Gould, and H. Shierholz (2012) *The State of Working America*, Ithaca: Cornell University Press

Nichols, A., Rehm, P. 'Income Risk in 30 Countries', *Review of Income and Wealth* 60(S1): S98-S116

Nolan, B., Roser, M., Thewissen, S. (2016) 'Models, regimes, and the evolution of middle incomes in OECD countries', *LIS Working Paper Series no. 660*

Nolan, B., Roser, M., Thewissen, S. (2016) 'GDP per capita versus median household income: What gives rise to divergence over time?', *LIS Working Paper Series no. 672*

OECD (2008) *Growing Unequal?*, Paris: OECD

OECD (2011) *Divided We Stand*, Paris: OECD

OECD (2015) *In It Together*, Paris: OECD

Oesch, D. (2015) 'Welfare regimes and change in the employment structure: Britain, Denmark and Germany since 1990', *Journal of European Social Policy* 25(1): 94-110

Piketty, T. and Saez, E. (2007) 'Income and wage inequality in the United States 1913-2002', In: Atkinson, A., Piketty, T. (eds) *Top Incomes over the Twentieth Century: A Contrast between Continental European and English-Speaking Countries*, Oxford: Oxford University Press

Piketty, T. (2014) *Capital in the Twenty First Century*, Harvard: Harvard University Press

Reed, D. and Cancian, M. (2001). 'Sources of inequality: measuring the contributions of income sources to rising family income inequality', *Review of Income and Wealth*, Vol. **47**, pp. 321–333.

Saunders, P. (2001) 'Growth, Prosperity and the Generation of Inequality', *Review of Income and Wealth* 47(2): 273-280

Shorrocks, A. F. (1982) 'Inequality decomposition by factor components', *Econometrica* 50(1): 193-211

Stiglitz. J.E. (2012) *The Price of Inequality: How Today's Divided Society Endangers Our Future*, New York: W.W. Norton

Thewissen, S., Kenworthy, L., Nolan, B., Roser, M., Smeeding, T. (2015) 'Rising income inequality and living standards in OECD countries: How does the middle fare?', *LIS Working Paper Series no. 656*

Wolff, E., and Zacharias, A. (2009) 'Household wealth and the measurement of economic wellbeing in the United States', *The Journal of Economic Inequality* 7(2): 83-115

World Bank (2015) *A Measured Approach to Ending Poverty and Boosting Shared Prosperity*, Washington DC: World Bank

Appendix 1

Table A1: Composition for the most recent year available for the 5th decile, leaving out the Great Recession

Country	Years	Wage head (1)	Wage spouse (2)	Wage other (3)	Total wage (4)	Self empl (5)	Capital (6)	Transfers (7)	Taxes (8)	Public income (9)
Australia	1995-2008	59.4	14.7	17.4	91.5	8.5	8.6	7.3	-16.0	-8.7
Austria	2004-2011	55.4	27.0	11.3	93.7	11.1	1.8	25.2	-31.8	-6.6
Belgium	2004-2009	65.0	27.2	7.1	99.2	6.4	2.6	24.4	-32.6	-8.2
Canada	1984-2008	67.3	14.4	11.2	92.8	7.3	11.0	10.9	-22.1	-11.2
Czech Rep	2004-2009	38.0	34.1	10.2	82.3	11.1	0.9	21.5	-15.8	5.7
Denmark	1985-2007	80.1	36.4	6.1	122.5	5.3	4.6	16.6	-48.9	-32.4
Estonia	2004-2008	50.9	35.4	10.3	96.6	1.3	0.6	18.6	-17.2	1.5
Finland	1986-1993	59.1	15.4	2.3	76.9	7.1	2.8	40.8	-27.6	13.2
France	1996-2008	51.3	25.1	4.8	81.2	3.2	4.5	21.7	-10.7	11.1
Germany	1985-2004	73.9	24.6	13.2	111.7	5.0	2.7	16.6	-36.0	-19.4
Iceland	2004-2008	60.2	46.4	10.1	116.7	5.9	4.9	10.9	-38.4	-27.5
Ireland	2004-2006	29.0	31.5	18.4	78.9	13.0	2.3	19.0	-13.2	5.8
Israel	1985-2008	54.4	16.7	10.0	81.1	11.8	7.3	11.2	-11.4	-0.2
Italy	2004-2007	40.6	24.3	13.1	78.0	20.9	3.7	26.0	-28.6	-2.6
Japan	1995-2006	69.4	10.5	14.8	94.7	8.7	3.6	14.2	-21.2	-7.0
Luxembourg	2004-2007	48.0	43.1	6.6	97.7	4.0	1.1	21.7	-24.5	-2.8
Netherlands	2000-2008	83.3	23.9	9.0	116.2	5.0	11.7	14.0	-46.8	-32.9
New Zealand	1985-2008	60.8	21.2	14.4	96.3	11.8	9.9	8.6	-26.7	-18.1
Poland	2004-2011	28.9	36.1	15.9	80.9	13.8	0.9	32.5	-28.1	4.4
Portugal	2004-2007	41.0	34.2	14.6	89.7	10.1	1.6	18.7	-20.1	-1.4
Slovak Rep	2004-2011	33.7	26.8	14.8	75.3	13.8	0.6	21.2	-10.9	10.3
Slovenia	2004-2008	39.8	37.6	17.8	95.1	6.7	0.8	23.0	-25.7	-2.7
South Korea	2006-2007	48.8	8.5	12.8	70.1	27.1	6.2	3.6	-7.0	-3.4
Spain	2004-2007	31.4	33.8	21.5	86.7	10.4	1.3	17.7	-16.2	1.5
Sweden	1995-2011	75.0	27.3	3.6	105.8	3.0	3.5	15.2	-27.6	-12.3
United Kingdom	1999-2007	63.5	14.9	15.0	93.4	7.6	9.1	14.0	-24.1	-10.1
United States	1984-2005	55.2	26.7	17.8	99.7	5.2	6.4	7.7	-19.1	-11.4
Average		54.2	26.6	12.0	92.8	9.1	4.3	17.9	-24.0	-6.1

Legend: +0.5 average annual ppt; -0.5 average annual ppt

Appendix 2

Figure A2.1a: Income for the 5th decile as a share of total income for Denmark

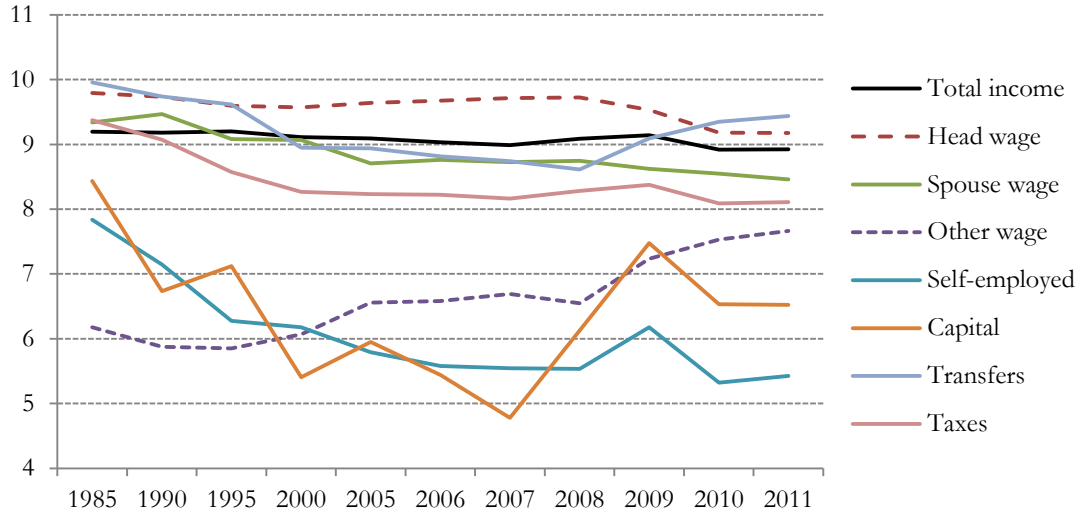


Figure A2.1b: Germany

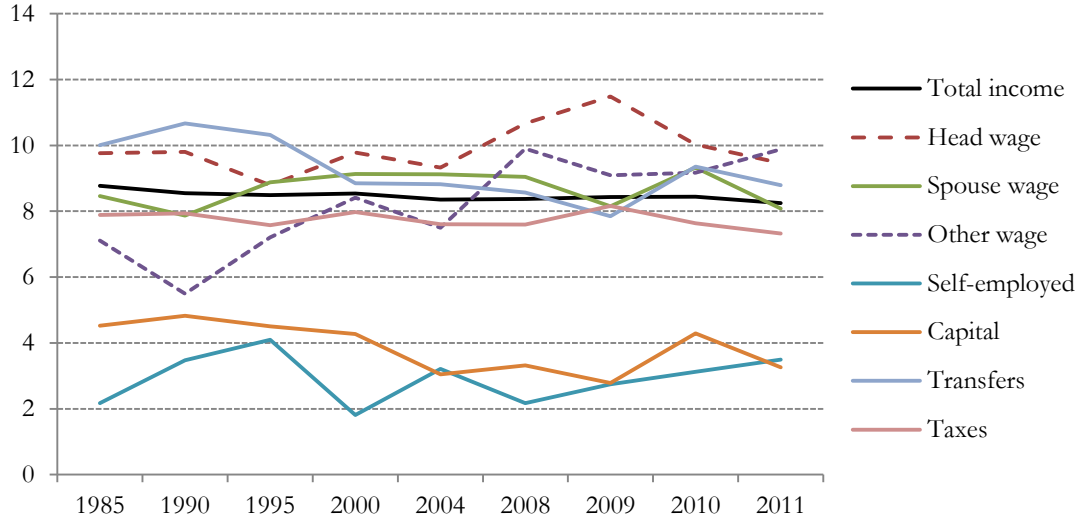


Figure A2.1c: U.S.