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Journal

Journal of Income Distribution, 26(2)

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Publication Date

2018-07-01

Peer reviewed

Rising Income Inequality and Living Standards in OECD Countries: How Does the Middle Fare?*

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July 2018

Income inequality has increased in a number of the rich democratic nations over the past generation. We examine whether this has reduced income growth for middle-income households. Using LIS, OECD and WID data, we show how median household incomes and income inequality have evolved between 1980 and 2013, and we analyse whether these trends are related. Growth in median incomes is negatively associated with changes in the Gini but not with changes in top income shares. Economic growth is strongly associated with growth in median incomes, although it does not seem to fully transmit.

Keywords: Living standards; inequality; median; inclusive growth

JEL Classifications: D31

*Earlier versions of this paper were presented at the SASE conference in London, July 2-4, 2015, the IARIW session “Developments in income inequality across the world” during the ISI World Statistics Congress in Rio de Janeiro, July 29, 2015, and the Global Economic Symposium in Kiel, October 12-14, 2015. We thank Kit Taylor who helped substantially while on secondment from Oliver Wyman consultants with the EEG team at the Institute for New Economic Thinking in Oxford.

[†]This work was conducted before Stefan Thewissen joined the OECD. The views reflect those of the author and not necessarily those of the OECD or its member states. Corresponding author. Email: stefan.thewissen@oecd.org

1 Introduction

Concern about rising income inequality in rich countries has become a common theme among commentators, politicians and international organisations, often focusing on the increased share going to the top versus the “squeezed middle”. Polarisation of the wage distribution from hollowing out of the occupational structure has received a great deal of attention. Polarisation in the broader income distribution in terms of a shrinking share of households “in the middle” has also been studied, as has the extent to which the share of total income going to households around the middle has been falling (Wolfson, 1997; Deutsch & Silber, 2010). Polarisation or declining income shares for the middle could go together with rising living standards, but rising inequality is seen by some to be a key cause of stagnating real incomes and living standards for the middle and lower parts of the distribution (Mishel et al., 2012; Stiglitz, 2012; Chakravarty & D’Ambrosio, 2010). This linkage is at the core of the recent focus on “inclusive growth” and “shared prosperity”, which has become a rallying-cry and central focus for the OECD and other multilateral organisations (Saunders, 2001; de Mello & Dutz, 2012; OECD, 2015; World Bank, 2016).

This paper investigates the extent to which increasing income inequality has in fact been associated with stagnating middle incomes from around 1980 through the Great Recession. Drawing on data across 31 rich countries from the Luxembourg Income Study (LIS), the OECD Income Distribution Database (OECD) and the World Inequality Database (WID), we examine how income inequality and median household incomes have evolved over time and the extent to which rising inequality is associated with changes in median incomes. The experience of the United States over the past 30 years – rapid rise in income inequality together with slow growth of middle incomes – has played a major role in influencing research and commentary on inequality, living standards and the “squeezed middle”. Here we put that experience in comparative context. The paper also brings out some important lessons about using the available data to analyse the relationship between inequality and living standards and how best to track and monitor “inclusive growth”.

We begin in Section 2 with a discussion of the channels through which inequality might affect middle incomes. Section 3 describes the data we use. Sections 4 and 5 look at trends in middle incomes and in income inequality, respectively. In Section 6 we investigate the extent to which rising income inequality is associated with stagnating middle incomes. Section 7 highlights our key findings and priorities for further analysis.

2 Inequality and the “squeezed middle”

The notion that the middle has been squeezed could refer to a shrinking proportion being located around the middle, which is what polarisation is usually taken to mean, or to those around the middle losing out in terms of their share in total income. Each of these has been the focus of recent research in economics and sociology, including the classic study by C. Wright Mills (Mills 1956; Ehrenreich, 1989; Alderson et al., 2005; Goos & Manning, 2007; Goos et al., 2009; Foster & Wolfson, 2010; D’Ambrosio, 2001; Bigot et al., 2011; Alderson & Doran, 2013; Atkinson & Brandolini, 2013; Autor & Dorn, 2013; Lazonick, 2014).

In popular and political debate, the dominant concern is that the middle has seen little or no improvement in living standards and overall prosperity over time. While this concern includes greater insecurity and vulnerability for the middle as well as diminished opportunities and prospects for their children (Nichols & Rehm, 2014; Hacker et al., 2014), stagnating real incomes is central to the debate, particularly in the USA.

Why would rising income inequality reduce the growth of middle incomes? One hypothesis suggests a direct effect: if those in the upper-middle or at the top receive an increasing share of total income, there must be a compensating decline in shares elsewhere (see also Nolan & Thewissen, forthcoming).

A second hypothesis proposes an indirect effect: economic growth is a key source of real income growth for households in the middle and lower parts of the income distribution, and rising income inequality reduces economic growth (see also Thewissen, 2014). For many years the prevailing wisdom held that higher inequality provides the incentives required to drive economic growth. Recently, though, Joseph Stiglitz (2012; 2015), IMF and OECD studies (Ostry et al., 2014; Cingano, 2014; OECD, 2015), and some prominent financial sector commentaries (Morgan, 2015; Standard & Poor’s, 2014), among others, have suggested that rising income inequality may instead be damaging to growth. There are several channels through which inequality might reduce economic growth. First, inequality might reinforce barriers to socio-economic mobility, so more people fail to reach their full productive potential. Second, there are channels related to investment in human, physical, and financial capital and reducing aggregate demand, such as the reduction of the capacity of middle and lower income households to invest in education and skills; the undermining of capital investment; fuelling household debt and real estate bubbles; and increasing barriers to entry and stifling innovation. A third set of channels relates to attitudinal changes, trust, and power: inequality may exacerbate pressures for protectionism and restriction of immigration, undermine political and legal institutions, reduce social trust, and entrench the power of existing elites to protect their economic interests, including rent-seeking.

Our aim is to describe and assess overall trends and patterns in income inequal-

ity and middle incomes in OECD countries and probe the extent to which they are related. While this can only be suggestive as to underlying causal mechanisms and relationships, such an analysis does allow us to consider which of the competing grand narratives that are central in current debates – that inequality contributes to rising prosperity for "ordinary" middle-income households or hinders it – is more consistent with the evidence from varying country experiences.

3 Data

The Luxembourg Income Study (LIS) database and the OECD Income Distribution Database provide standardized income data across countries and time (Atkinson et al., 1995; OECD, 2008; 2011; 2012; 2015; Gornick & Jäntti, 2013; Ravallion, 2015; Gasparini & Tornarolli, 2015). LIS has assembled data for most of the countries at approximately 5-year intervals beginning around 1980. The OECD database also presents 5-year interval data for the earlier period and contains a good deal of annual data for recent years. LIS allows one to go back to around 1980 for more countries than the OECD database, but the latter has information on New Zealand and Portugal which are not in LIS, as well as Japan for which LIS has data for only one year.

Our aim is to capture trends over the medium term, covering recent decades up to and through the economic crisis. We begin in 1980, as neither database has many observations before then.¹ Most comparative studies use one or the other of these data sources, but we select from both to cover the longest possible period for each country. This means we mostly employ data from LIS, but use data from the OECD database for eight countries.² While we go back as close to 1980 as possible, for quite a few countries we have to start later.³ However, in the sample for our main regressions, we use a more consistent time frame for a more restricted set of countries because of limited data availability on top incomes.⁴ We exclude countries that are in the LIS database but are not OECD members and countries that are OECD members but generally categorised as middle-income (Chile, Mexico, and Turkey).

Our central measure for living standards is equivalised disposable household income. The concept of disposable household income employed in the LIS and OECD databases is in principle the same, as are the components in terms of earnings, self-employment, capital income, and taxes and transfers, though there may be subtle differences in operationalization across countries or over time.⁵ We divide income by the square root of household size to take differences in household size and composition into account (Buhmann et al., 1988).

To capture trends in real incomes for the middle, we focus on how the median household income has evolved over time. We use national consumer price indices (CPI) and purchasing power parities (PPP) for actual individual consump-

tion, both sourced from OECD National Accounts, to convert all income to 2011 PPP-adjusted dollars.⁶

We use two indicators of income inequality. The first is the most widely used summary measure, the Gini coefficient. The Gini is particularly sensitive to changes in the middle of the income distribution, which fits with our interest in the income of the middle. The Gini can be calculated from the micro-data in LIS and is among the measures included in the OECD Income Distribution Database.⁷

Our second inequality indicator is the income share going to the top 1%. The household surveys on which both the LIS and OECD databases rely have difficulty capturing what is happening at the very top of the income distribution, so we draw on the World Inequality Database, which uses data from the administration of income taxes together with the national accounts (see e.g. Atkinson & Piketty, 2007; 2010; Atkinson et al., 2011; Alvaredo et al., 2013; Piketty, 2014). The top 1% share data are only available for some OECD countries. They refer to the share of the top in taxable (before income tax and social insurance contributions) rather than disposable income and to the tax unit rather than the household (see also Jenkins, 2017).⁸ While these are important limitations for our purposes, it is essential to capture what has been happening at the very top of the distribution in some form.

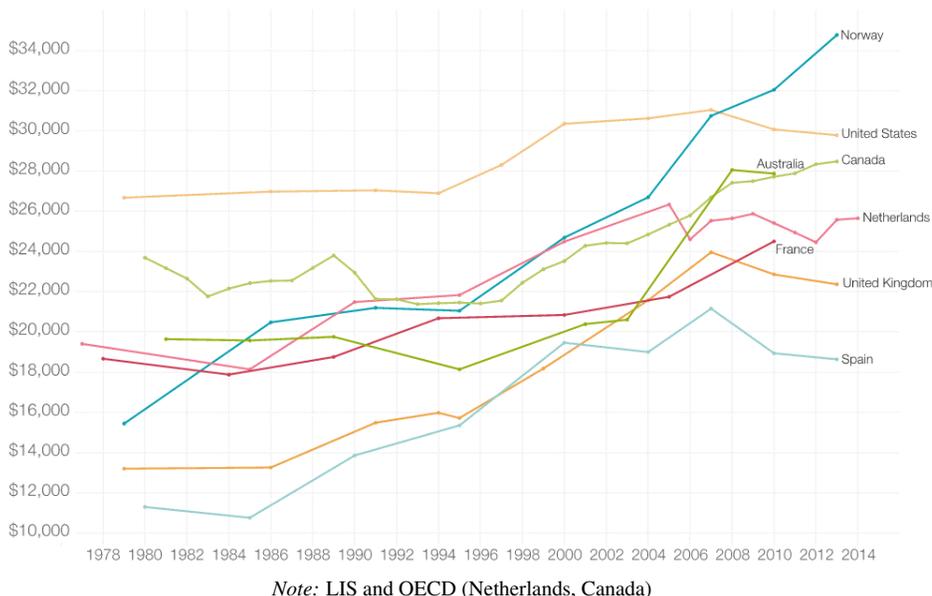
We also examine the association between median income and economic growth (for a further reflection see Nolan et al., 2018). Economic growth is measured using gross national income (GNI) per capita, taken from the OECD Systems of National Accounts database, where it is deflated using the GDP deflator and expressed in 2011 PPP-adjusted dollars. Unlike gross domestic product (GDP), GNI excludes primary incomes payable to non-resident units but includes primary incomes receivable by residents from non-residents, which is more appropriate as the household surveys measuring median income include only residents.

4 Trends in living standards at the middle

Figure 1 shows the evolution of real median household incomes for the countries where we have data going back as far as about 1980 (the evolution in those countries not included in this figure is shown in the Appendix in Figure A1). We see considerable variation. In Norway, the median income more than doubled over the entire period (+125%), while at the other extreme the USA median income almost entirely stagnated (+12%), with the result that Norway's median had risen above the US figure by 2010. Spain too had a rapidly rising median income (+65%); it soared during 1980-2007 but then fell back between 2007-2013 to below its 2004 level. The median income in Australia (+42%) was essentially stagnant between 1981-2003 and then shot up during the commodity boom, whereas in the UK (+69%) it increased substantially between 1986-2006. Canada (+20%), France (+31%), and the Netherlands (+32%; see also Salverda & Thewissen, 2018) saw much more

modest growth for the middle, with substantial periods of stagnation.

Figure 1: Evolution of living standards of the middle: Real median household income from around 1980 (in 2011 PPP-adjusted dollars)



There also is considerable variation in how middle incomes evolved among countries where our earliest observation is the mid/late 1980s. Ireland achieved more than a doubling of its median household income over the course of 25 years (+106%), and the median also grew noticeably in Luxembourg (+80%), Sweden (+69%), and Belgium (+52%). Denmark (+18%) and Germany (+14%) did worse, the median income was stagnant in Japan over the full period (+0%). Middle incomes in Italy and Greece rose at first, but the Great Recession had detrimental impacts, leading to a small aggregate rise for Italy (+9%) and a decrease (-14%) for Greece.

Countries experiencing the upheaval of the post-communist transition, for which our first observation is mostly 1990 or later (often much later), also display striking differences. Hungary, for example, had a sharp initial decline in median income, and the subsequent recovery was not sufficient to bring the median back to its 1991 level (-4%). Poland also saw a sharp initial decline, but the subsequent growth, especially from the mid-2000s, was strong enough to produce a substantial increase over the whole period (+33%).

To account for the differences in time span, we express growth rates in compound annual growth rates (CAGRs). At one end of the spectrum, Estonia, Ireland,

Norway, Czech Republic, and Luxembourg had average annual median income growth of 2% or more. Belgium, Slovak Republic, Spain, Sweden and the UK are among the countries with average growth of around 1.5%. A substantial cluster of countries saw average growth that was slower but still at least 0.5%. At the low end, Germany, Italy, Japan and the USA had annual median income growth under 0.5%. Hungary, Portugal, and Greece had negative growth.

In most countries median household income growth also varied substantially from one sub-period to another, as Figure 1 illustrates. This provides another source of variation in assessing how trends in real income for the middle may be related to trends in income inequality, though the time lags one might expect to operate are far from clear.

Of course, countries also varied greatly in their median income at the beginning of the observation period. Some had already achieved high levels of income, while others started from low levels and had ample scope to catch up, as Figure 1 also illustrates. This affects to some extent one's perspective on how well or badly specific countries have done, but the USA's performance remains particularly poor.

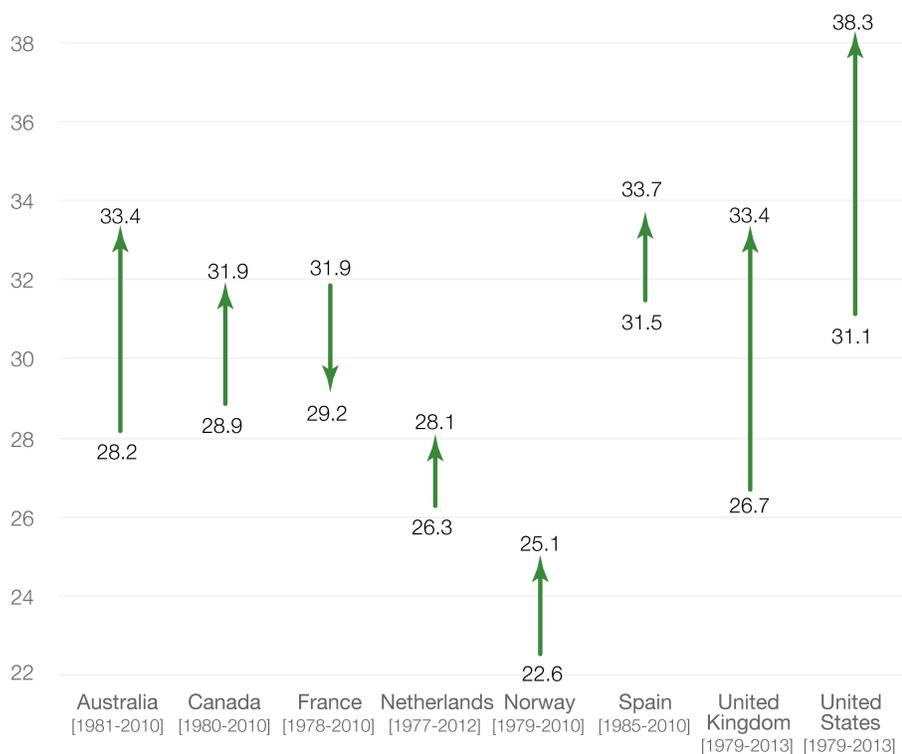
5 Trends in income inequality

Figure 2 shows what happened to the Gini coefficient over time for the countries for which we have data beginning around 1980 (the change in countries not included in this figure is shown in the Appendix in Figure A3). Inequality has risen a good deal in some nations, but in others it has not risen much, or indeed has fallen. Countries with a pronounced increase in inequality include the USA and the UK, about which there has been much research and commentary, but also Australia. Inequality also went up by more than 3 Gini points in Canada. The rise in inequality was more modest in the Netherlands, Norway, and Spain, while inequality decreased in France.

Among countries for which we have data from around 1985 onwards, the Gini coefficient rose by more than 8 Gini points in Sweden and by more than 5 Gini points in Slovak Republic, Poland, Israel, New Zealand, and Finland. In other countries, the Gini did not rise much or even, as in Ireland, decreased. So while inequality has increased in a clear majority, there is no uniform trend: country experiences vary widely.

Figure 3 shows the share of total (gross) income going to the top 1% around 1980 and the most recent year available (the evolution in those countries not included in this figure is shown in the Appendix in Figure A2). The share going to the top has generally gone up over this period, but by a great deal more in some countries than in others. Atkinson and Piketty (2007) highlighted the fact that the English-speaking countries saw much larger increases than the continental European countries for which estimates were available. Indeed, Australia (+4.2 ppt),

Figure 2: Long-term trends in the Gini coefficient

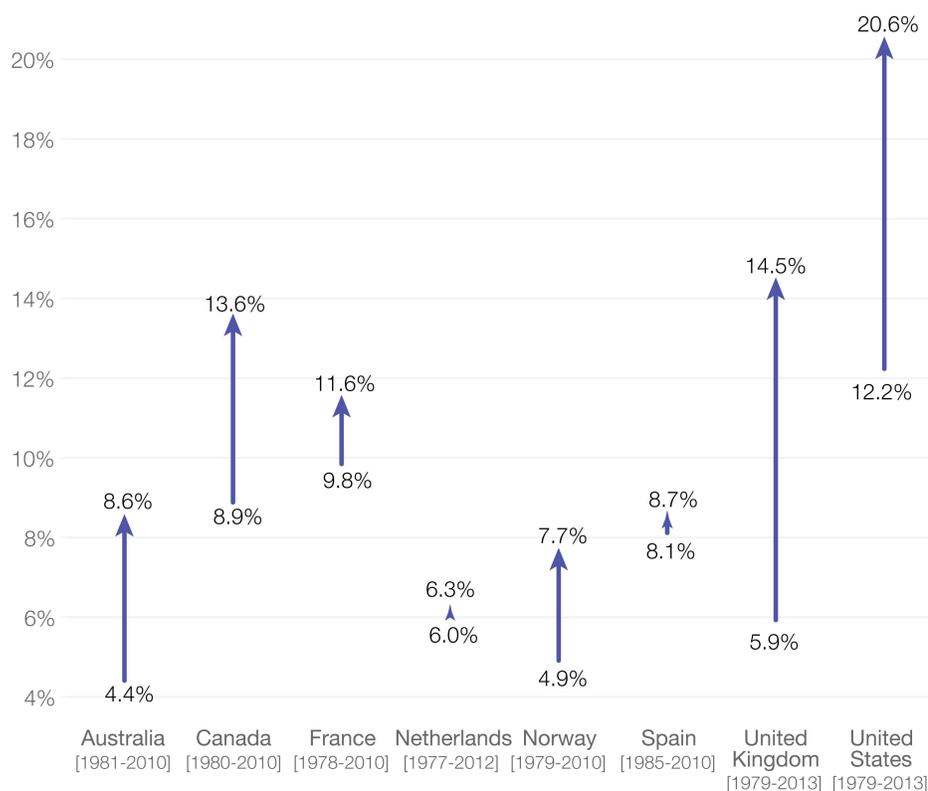


Note: LIS and OECD (Netherlands, Canada)

Canada (+4.7 ppt), Ireland (+5.5 ppt), the UK (+8.6 ppt), and the USA (+8.3 ppt) all saw this share rise by 4 percentage points or more. Sweden (+4.3 ppt), Finland (+3.2 ppt), and Germany (+3.0 ppt) saw a lower but still substantial increase of 3 percentage points or more. The top 1%'s share did not increase by much in Switzerland (+0.2 ppt), the Netherlands (+0.3 ppt), or Spain (+0.6 ppt), though no country experienced a decrease in the top share over time.

Most of the English-speaking countries where top income shares rose particularly rapidly (namely Australia, Canada, the UK and the USA) also saw overall inequality rise markedly. Ireland is an exception: the share of the top 1% increased sharply but overall inequality declined. Also in Finland and Sweden, top income shares as well as the Gini coefficient went up noticeably. So there is some consistency in terms of trends between the two indicators of inequality, but also some substantial divergence: the two measures are positively but only weakly associated (for the full sample a correlation of 0.57 in levels, but 0.15 in average annual growth rates). This may arise for a variety of reasons: changes at the top may be missed

Figure 3: Long-term trends in top income shares



Note: WID

in household surveys to a varying extent across countries and the Gini measure is in any case more sensitive to changes occurring around the middle than at either extreme of the distribution, so the Gini may mostly reflect inequality within the “bottom 99%”. The differences in income concept and recipient unit already noted may also be important and merit investigation. For our current purposes, though, each indicator contains valuable information about what has been happening to inequality.

6 Are changes in income inequality associated with changes in living standards?

Have countries with rapidly rising inequality tended to have stagnant real incomes around the middle? Table 1 ranks nations by their compound annual median household income growth, splitting the sample into those for which we have top 1% income share information and those for which we have not, and brings that together

with the annual average change in the Gini and in the top 1% share, each calculated over the longest period available in LIS for the same years for each country individually. The rankings by inequality change do not align closely with that by median income growth (see also Kenworthy, 2013).

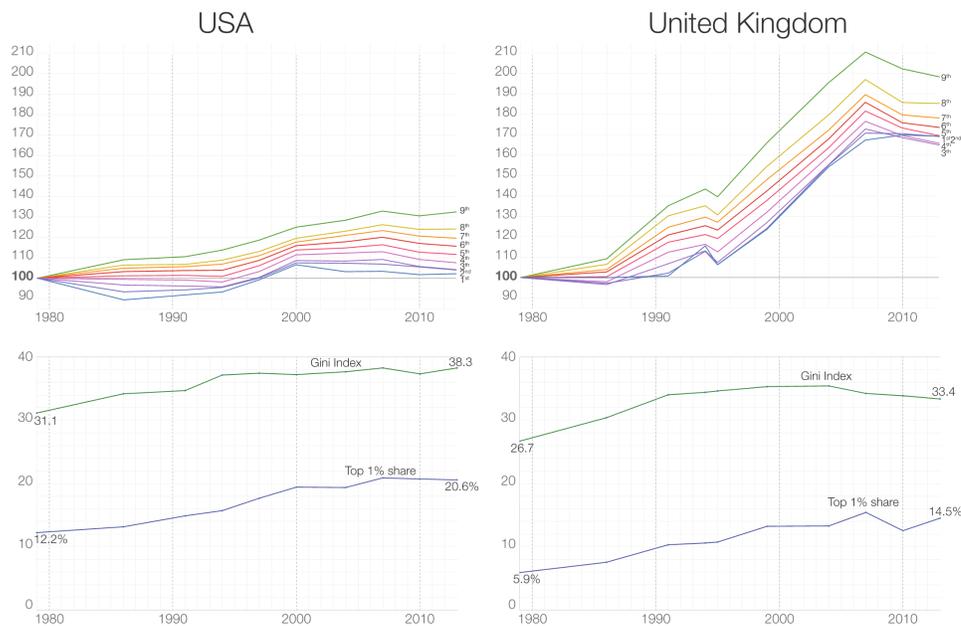
Table 1: Evolution of ordinary living standards and inequality

Country	First year	Last year	Average annual change in median in %	Average annual Gini change in Gini points	Average top 1% share change in ppt
Ireland	1987	2007	4.52	-0.13	0.28
Norway	1979	2010	2.38	0.08	0.09
Spain	1985	2010	2.29	0.09	0.02
Sweden	1983	2013	1.76	0.28	0.14
South Korea	2006	2012	1.62	0.02	0.24
United Kingdom	1979	2013	1.56	0.2	0.25
Finland	1987	2007	1.51	0.3	0.16
Australia	1981	2010	1.21	0.18	0.14
Switzerland	2000	2010	1.15	0.13	0.02
Italy	1986	2008	1.05	0.1	0.11
Denmark	1987	2010	0.86	-0.01	0.05
France	1978	2010	0.85	-0.08	0.05
New Zealand	1985	2012	0.79	0.23	0.13
Netherlands	1977	2012	0.66	0.05	0.01
Canada	1980	2010	0.53	0.1	0.16
Germany	1984	2010	0.52	0.08	0.12
United States	1979	2013	0.32	0.21	0.25
Japan	1985	2009	0.06	0.13	0.08
Portugal	2004	2005	-0.41	-0.54	0.15
Estonia	2000	2013	5.72	-0.08	
Czech Republic	1992	2013	2.3	0.25	
Luxembourg	1985	2013	2.13	0.17	
Slovak Republic	1992	2013	1.8	0.38	
Israel	1986	2012	1.71	0.24	
Slovenia	1997	2012	1.63	0.28	
Belgium	1985	2013	1.51	0.12	
Poland	1992	2013	1.36	0.28	
Austria	1994	2013	0.77	-0.01	
Iceland	2004	2010	-0.18	-0.19	
Hungary	1991	2012	-0.22	0.02	
Greece	1986	2013	-0.55	-0.03	

Note: LIS, OECD and WID.

The UK and the USA provide a striking illustration of how countries that look similar in one of these dimensions performed very differently in the other. As the bottom part of Figure 4 shows, from around 1980 to 2013 the Gini increased by a comparable amount in the two countries, and both saw a rapid increase in the top 1% income share. Yet the top part of the figure shows that growth in the median (and in incomes below the median) was much more substantial in the UK.

Figure 4: Trends in income inequality and growth of real disposable household income by decile in the US and the UK



Note: LIS and WID

In addition to overall changes over the entire period covered for each country, we can look at the relationship between median income growth and inequality employing all the available observations for intervening years. We then find that median income growth is negatively correlated with change in the Gini (-0.21) but positively correlated with growth in top income shares (+0.15).

To assess more fully whether the evolution in median household income is associated with changes in income inequality, we estimate a simple OLS regression with growth in median household income as the dependent variable and change in the Gini and the top 1% share entered separately and then together as independent variables.⁹ Country fixed effects are removed as the variables are expressed in growth rates (compound annual growth rate (CAGRs) for median income and GNI per capita, and average annual percentage point changes for the inequality scalars which are already expressed as percentages or in Gini points). As we have the top 1% variable only for a subset, we present the results for the Gini estimated with the full sample and with that subset. As stated before, the time coverage for the subset for which top 1% information is available is also more consistent across countries.¹⁰

The results, presented in Table 2, consistently suggest a statistically significant

negative association between median income growth and change in the Gini in the same period. We see in column (1) that this holds across the entire sample and in column (2) that it also holds for the subset of countries for which the top 1% share is available. By contrast, the contemporaneous change in the top 1%'s income share is not statistically significant when it is the inequality measure included in the model instead of the Gini coefficient (column 3). The adjusted R^2 for these equations is low, consistent with the low correlation we already noted between median income growth and change in inequality. The estimated size for the Gini coefficient in column (6) implies that an average annual increase of 1 Gini point is associated with a decrease in the compound annual growth rate of 0.6% in median household income.

Table 2: Estimates of regression model for change in median household income

	(1)	(2)	(3)	(4)	(5)	(6)
	Gini, full sample	Gini, top 1% sample	Top 1%	Gini and GNI, full sample	Top 1% and GNI	Gini, top 1% and GNI
Gini	-1.087* (0.054)	-0.796* (0.059)		-1.052** (0.034)		-0.575* (0.058)
Top 1%			0.872 (0.134)		-0.453 (0.382)	-0.269 (0.556)
GNI				0.721*** (0.000)	0.601*** (0.000)	0.556*** (0.000)
P50 (level) (x 10 ⁴)				-0.002 (0.996)	-0.885*** (0.002)	-0.965*** (0.002)
Constant	1.340*** (0.000)	1.354*** (0.000)	1.153*** (0.000)	0.05 (0.943)	2.095*** (0.000)	2.389*** (0.000)
N	261	151	151	261	151	151
Adjusted R^2	0.039	0.026	0.017	0.406	0.293	0.304

Note: Dependent variable: average annual change in equivalised disposable household income (%). Independent variables: average annual changes in Gini (Gini points), top 1% (ppt), and GNI per capita (%), and the level of median equivalised disposable household income (in 2011 PPP-adjusted dollars). OLS with standard errors clustered at the country level. Significance levels are noted as * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Source: LIS, OECD and WID.

We elaborate the model in several directions. First, we add the level of median household income at the beginning of the period as a right-hand-side variable (from column 4 onwards), as convergence in median incomes, whereby countries with initially lower incomes tend to grow comparatively quickly and catch up, might complicate the relationship between change in median incomes and in inequality (Barro, 2000). Secondly, one would expect growth in national output to be a key determinant of median income growth, alongside what happens to the distribution. Moreover, some of the causal stories embedded in the competing narratives whereby inequality may help or hinder median income growth operate via their postulated effects on national income. We do not seek to add to the literature on

the inequality-growth relationship (Barro, 2000; Voitchovsky, 2005), but simply to investigate what happens to our estimated models when change in gross national income (GNI) per capita in the same period is added as an explanatory variable. When the lagged value of the median and the contemporaneous change in GNI per capita are added to the model, in column (4) of Table 2, the coefficient on change in overall inequality remains significant and negative, and this is also the case for the sub-set of countries. Change in GNI per capita is positively associated with median income growth, and its inclusion improves the explanatory power of the model substantially. With an estimated coefficient (elasticity) of about 0.6-0.7, increases in GNI per capita tend to be substantially though not fully transmitted to middle-income households. Substituting change in the top 1%'s income share for the change in Gini for the sub-set of countries for which it is available, column (5) shows that this is not statistically significant (though the coefficient is now negative).

We also estimated an additional set of models to assess the sensitivity of these results. These are shown in Table 3. Column (1) repeats the final model from Table (2) for ease of comparison. Column (2) uses measures of median income and income inequality for the working-age population only, rather than the values for the entire population, since patterns for "ordinary working families" are of particular salience in current debates. In testing alternative lag structures, we are severely limited by the number of time periods covered in the data on overall inequality, but the availability of annual data for the top 1% share means that including the value for the previous rather than current year can be tested in column (3), and that for two years previously in column (4). Finally, since the period of the Great Recession from 2008 onwards might be distinctive, in column (5) we re-estimate the main model for pre-2008 observations only. In all of these variants, the estimated coefficient on the change in the Gini coefficient is little changed, while that on the change in the top 1% share remains insignificant.

The models presented so far focus on associations between median income, measures of income inequality, and economic growth, without controlling for other potentially relevant features of the economy and time-period in question. Table 4 looks whether these associations change when a variety of control variables are included. In column (2), we include demographic controls, namely education (the change in average years of schooling for the population aged 25 and above, linearly interpolated from the series produced by Barro & Lee, 2017) and the dependency ratio (average annual difference in the ratio of the population aged under 15 and over 64 to those aged 15-64 from OECD data). In column (3) we include imports (average annual percentage point change in international import in goods and services as a % GDP from OECD data). Column 4 has a variable for technological change as also used in OECD (2011), namely the CAGR in patents per million capita, with total patent applications to both the European Patent Office and the

Table 3: Estimates of regression model for change in median household income, alternative formulations

	(1)	(2)	(3)	(4)	(5)
	Main results	Working age	Top 1% lag 1	Top 1% lag 2	Before 2008 only
Gini	-0.575* (0.058)	-0.639*** (0.008)	-0.596** (0.044)	-0.529* (0.074)	-0.654** (0.019)
Top 1%	-0.269 (0.556)	-0.091 (0.838)	0.215 (0.576)	0.479 (0.217)	-0.148 (0.797)
GNI	0.556*** (0.000)	0.540*** (0.000)	0.538*** (0.000)	0.540*** (0.000)	0.724*** (0.000)
P50 (level) (x 10 ⁴)	-0.965*** (0.002)	-0.639*** (0.001)	-0.921*** (0.002)	-0.806** (0.015)	-1.009*** (0.005)
Constant	2.389*** (0.000)	2.892*** (0.000)	2.264*** (0.000)	1.991*** (0.003)	1.949*** (0.010)
<i>N</i>	151	151	160	167	114
Adjusted <i>R</i> ²	0.304	0.323	0.33	0.325	0.395

Note: Dependent variable: average annual change in equivalised disposable household income (%). Independent variables: average annual changes in Gini (Gini points), top 1% (ppt), and GNI per capita (%), and the level of median equivalised disposable household income (in 2011 PPP-adjusted dollars). OLS with standard errors clustered at the country level. Significance levels are noted as * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; Source: LIS, OECD and WID.

United States Patent and Trademark Office.

The results in Table 4 show that when education and the dependency ratio (column 2), imports as a percentage of GDP (column 3) and patents as an indicator of innovation and technical change (column 4) are included in the model separately, or when they are all included in combination (column 5), the key features of the coefficients in the main model are not affected. The same applies when, as a final sensitivity check, country fixed effects are added to the main model in place of these additional controls in column (6). Again, the estimated coefficient of income inequality does not change much.

Even when income inequality, economic growth and this range of additional variables are included in the estimated model, a significant part of the variation in median household income growth over time and across countries is left unexplained (see Nolan et al., 2018 for a detailed study on the divergence between economic growth and median income). This is partly due to the fact that not all the increase in national income goes to households in the first place (Piketty & Zuc-

Table 4: Regression model for change in median household income with additional control variables or country fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	Main model	With education dependency ratio	With imports	With patents	With all controls	Country fixed effects
Gini	-0.575* (0.058)	-0.627** (0.041)	-0.580* (0.072)	-0.578* (0.058)	-0.633** (0.050)	-0.588* (0.067)
Top 1%	-0.269 (0.556)	-0.151 (0.718)	-0.258 (0.580)	-0.224 (0.628)	-0.088 (0.842)	-0.16 (0.735)
GNI	0.556*** (0.000)	0.480*** (0.000)	0.608*** (0.000)	0.592*** (0.000)	0.561*** (0.000)	0.484*** (0.000)
P50 (level) (x 10 ⁴)	-0.965*** (0.002)	-0.804*** (0.006)	-0.915*** (0.003)	-0.993*** (0.001)	-0.784*** (0.006)	-0.769 (0.178)
% Schooling		-0.088 (0.626)			-0.072 (0.679)	
Dependency	-168.059** (0.045)			-171.267** (0.025)		
Imports			-0.152 (0.228)		-0.13 (0.292)	
% Patents				-0.016 (0.125)	-0.017 (0.106)	
Constant	2.389*** (0.000)	2.230*** (0.002)	2.241*** (0.001)	2.529*** (0.000)	2.225*** (0.001)	2.092* (0.083)
N	151	151	151	151	151	151
Adjusted R ²	0.304	0.318	0.31	0.307	0.326	0.285

Note: Dependent variable: average annual change in equivalised disposable household income (%). Independent variables: average annual changes in Gini (Gini points), top 1% (ppt), and GNI per capita (%), average years of schooling (%), dependency ratio (ppt), imports as % GDP (ppt), patents per million (%), and the level of median equivalised disposable household income (in 2011 PPP-adjusted dollars). OLS with standard errors clustered at the country level. Column (6) includes country fixed effects. Significance levels are noted as * p < 0.1, ** p < 0.05, *** p < 0.01; Source: LIS, OECD, WID, Barro & Lee.

man, 2014). Some of the economic growth measured through the national accounts accrues to other sectors, and even the proportion going to the household sector in national accounts terms will not be fully reflected in the incomes of households as captured in household surveys. The differences arise for both conceptual and measurement reasons: who and what is included differs, and some components of income are underreported in household income surveys (Tormalehto, 2011). Making the analytical links in the chain going from overall economic growth to growth benefitting households is thus an important complement to understanding how the income that does reach households is distributed among them. It is encouraging that the OECD is coordinating a project to produce data on incomes reaching the household sector compatible with the framework of the national accounts (Fesseau et al., 2013). Another difference is that economic growth is measured on a per capita basis, whereas our real income levels are calculated at the household level and equivalised to account for economies of scale within households.

7 Conclusions

The evolution of ordinary households' living standards has become a central concern as rich countries strive for inclusive growth and shared prosperity. By analysing the best available comparative data, this paper has brought out the widely varying experiences of OECD countries with respect to real income growth around the middle over the last two or three decades. Median household income growth has been much faster in some countries than others – 2% or more per year at the high end, compared to less than 0.5% in the United States. Over a twenty- to thirty-year period this yields very striking differences in how middle-income households have fared. The data also show that for most countries median income growth also varied a good deal from one sub-period to another. An increase in overall inequality – as reflected in the Gini coefficient – has been the most common experience among the OECD countries over the same decades, but there has been wide variation in the extent and timing of that increase, and some countries have seen little or none. Among the subset of OECD countries for which estimates of top income shares are available, all have seen increasing concentration of (pretax) income at the top, but the scale of that increase varies widely and is not always consistent with measured trends in overall inequality. So here too it is important not to lose sight of differences in the search for a common, consistent pattern and overarching story. Furthermore, available estimates of changes in inequality are subject to error, and different sources and indicators do not always tell the same story, so caution is required in using these data, not least in studying their relationship with household income growth.

The comparative time-series data employed here do not allow for an investigation of the complex channels and processes through which inequality levels and changes might influence middle income growth, but they do show that there have been widely varying experiences in how median incomes and inequality have evolved together. There are countries and sub-periods where inequality rose rapidly and the median income stagnated, but also ones where rapid median income growth accompanied increasing inequality and others where inequality was stable while the median rose only modestly. The US case, with rapidly rising inequality accompanied by stagnating middle incomes, is not representative of the experience of the rich countries over recent decades.

A negative and statistically significant association between the change in the Gini coefficient and median income growth was found when we pooled the data across countries and sub-periods, but this accounted for only a small portion of the variation in median income growth. Including economic (GNI per capita) growth and a set of related variables in the statistical model increases its explanatory power, and the negative relationship between changes in inequality and median income growth remains. Yet once again a substantial part of the variation in income change

for the middle remains unaccounted for.

Our findings can only be suggestive, but they do imply that neither of the polar grand narratives featuring so strongly in current debates – that high or rising inequality consistently boosts or reduces real income growth for the middle – reflects the variety of experiences actually observed across the rich countries in recent decades.

Finally, these findings have implications for how one measures and monitors progress toward improving living standards for ordinary households. Promoting and tracking economic growth clearly will not suffice, as is now widely recognised. The evidence presented here shows that monitoring the evolution of income inequality alongside economic growth will also fall short. If incomes around the middle (or toward the bottom) of the distribution are of central interest, these must be measured directly and integrated into headline indicators and policy impact tracking processes.

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Notes

¹Note though that national data for a sub-set of countries going back further has been valuably brought together in the *Chartbook of Economic Inequality*, see Atkinson et al. (2017).

²These are New Zealand and Portugal, which are not included in LIS; Japan, for which LIS only has data for only 1 year; Sweden, for which LIS has data only up to 2005; the Netherlands, for which the early waves in LIS are drawn from a different source to later ones, giving rise to what looks like a major break in the time-series; Greece, where LIS only starts in 1995 whereas OECD data goes back to 1986; Canada, for which LIS only goes up to 2010 whereas the OECD database allows 2013 to be included; and South Korea, for which both data sources start only in 2006 but OECD goes up to 2014 whereas LIS has data only to 2012. For Belgium, LIS runs only up to 2000 and OECD from 2004-2013, so we link those two series to provides estimates that are necessarily tentative but allow us to include it in our analysis. In our preferred empirical specification, Belgium drops out as no data on top incomes are available.

³We have dropped a small number of observations where breaks in series have given rise to substantial changes in definitions or coverage, based on information provided about the underlying data sources and patterns in the data, namely Austria 1987 and 1995, Germany 1981, 1983, Netherlands 1983, 1987, 1990 and Switzerland 1982, 1992. We also do not use Israel 1979 or Poland 1986 because comparable PPP information is not available.

⁴This is the sample shown in Table 1 for which we have top 1% income data (above the horizontal line). We exclude Portugal, as we only have data on top incomes for 2004-2005. All our results are replicated when we also exclude South Korea and Switzerland for which the data cover a somewhat shorter time span.

⁵In using data from LIS we set negative disposable household incomes to zero but retain all households with zero disposable income, rather than dropping negatives or zero incomes as is sometimes the practice, and we do not apply top and bottom coding. For the OECD database it is not always clear whether top and bottom coding has been applied or how negative incomes have been treated, as noted in the OECD's quality review on the database.

⁶Households at different income levels may not be affected by price changes in the same way, as shown for example by Flower and Wales (2014) for the UK, but the absence of comparable data means we cannot take this into account.

⁷Among alternative summary inequality measures, the P90/P10 ratio is also available in the OECD database, so we derived it from LIS micro data as well, and it shows similar patterns to those we describe.

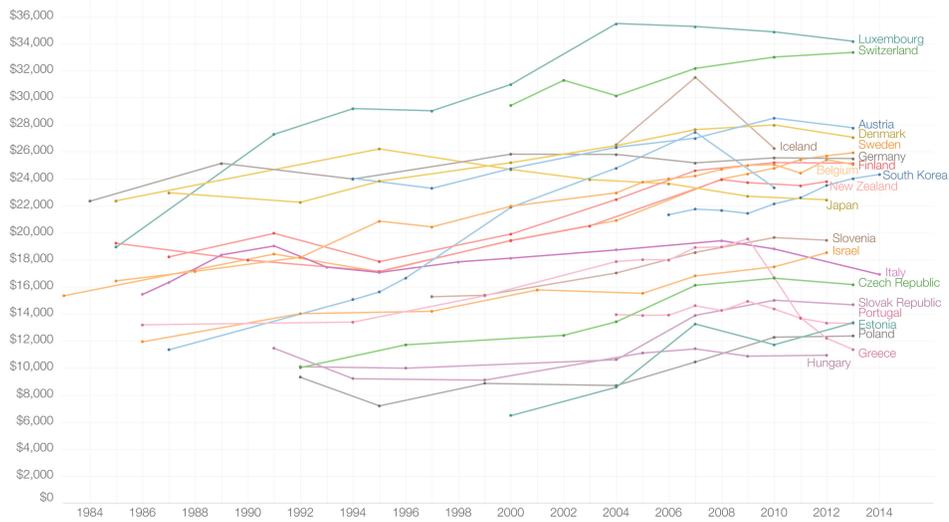
⁸Estimates on a post-tax basis have been produced in separate studies for a few countries.

⁹Standard errors are clustered at the country level. Alternative estimation approaches such as system-GMM are problematic given the limited number of time periods per country

¹⁰See Table 1. Portugal is excluded from these regressions because only two years of data are available.

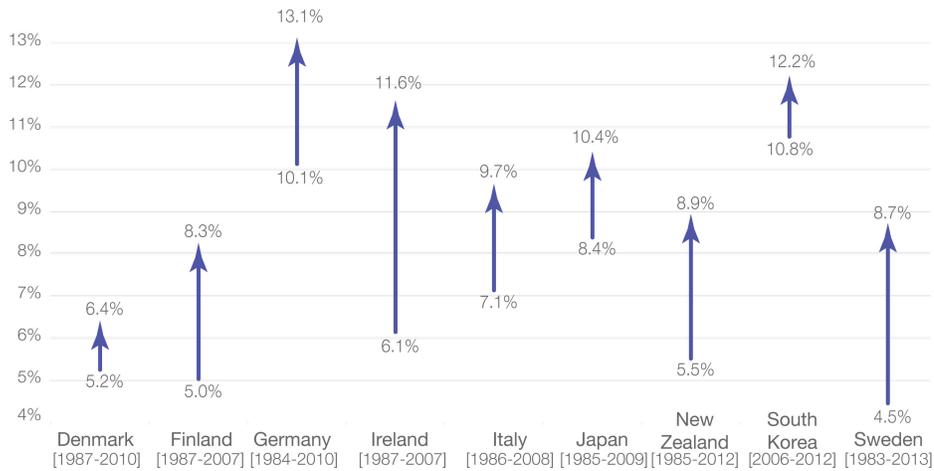
Appendix

Figure A1: Evolution of living standards of the middle: Real median household income from around 1985 or later (in 2011 PPP-adjusted dollars)



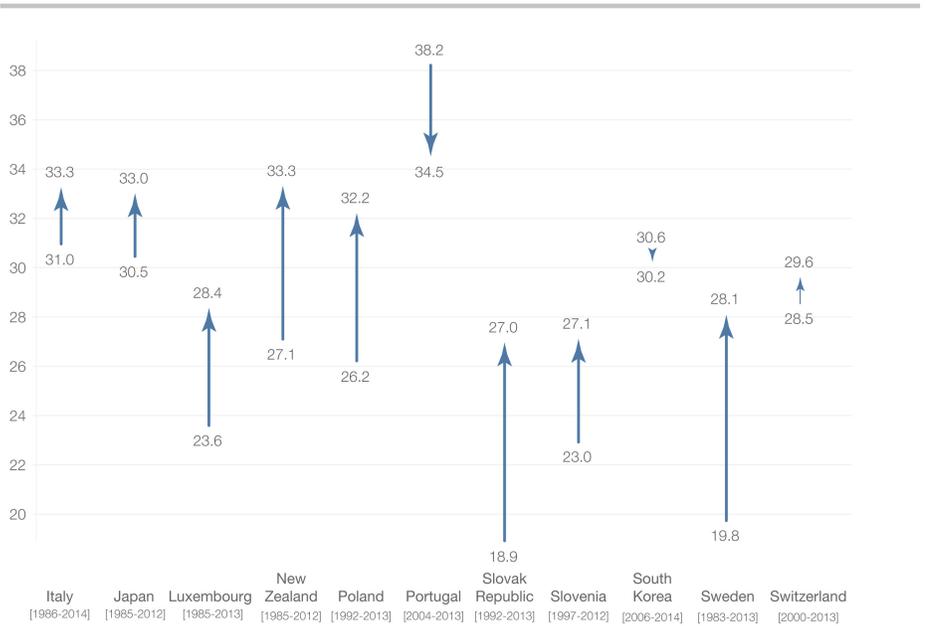
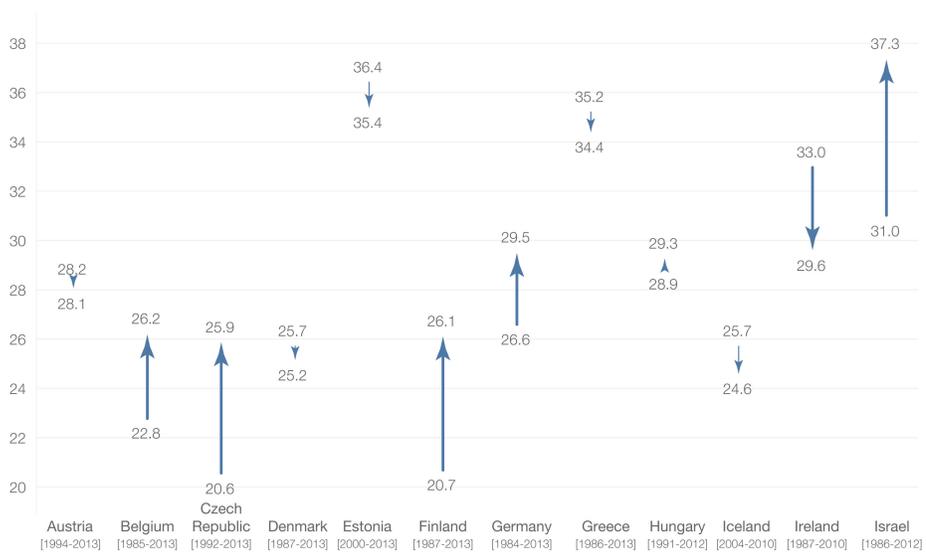
Note: LIS & OECD

Figure A2: Long-term trends in top income shares from around 1985 or later



Note: WID

Figure A3: Long-term trends in the Gini coefficient from around 1985 or later



Note: LIS & OECD