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GDP Per Capita Versus Median Household Income: What Gives Rise to Divergence Over Time?

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Brian Nolan, Max Roser, and Stefan Thewissen

May 2016

Luxembourg Income Study (LIS), asbl

Institute for
New Economic Thinking
AT THE OXFORD MARTIN SCHOOL

UNIVERSITY OF OXFORD

GDP per Capita Versus Median Household Income: What Gives Rise to Divergence over Time?

Brian Nolan, Max Roser, and Stefan Thewissen

INET Oxford Working Paper no. 2016-03

Employment, Equity and Growth programme

GDP per capita versus median household income: What gives rise to divergence over time?*

Brian Nolan†, Max Roser‡, and Stefan Thewissen§

May 2016

Abstract

Divergence between the evolution of GDP per capita and the income of a 'typical' household as measured in household surveys is giving rise to a range of serious concerns, especially in the USA. This paper investigates the extent of that divergence and the factors that contribute to it across 27 OECD countries, using data from OECD National Accounts and the Luxembourg Income Study. While GDP per capita has risen faster than median household income in most of these countries over the period these data cover, the size of that divergence varied very substantially, with the USA a clear outlier. The paper distinguishes a number of factors contributing to such a divergence, and finds wide variation across countries in the impact of the various factors. Further, both the extent of that divergence and the role of the various contributory factors vary widely over time for most of the countries studied. These findings have serious implications for the monitoring and assessment of changes in household incomes and living standards over time.

keywords: Economic growth, inequality, household incomes

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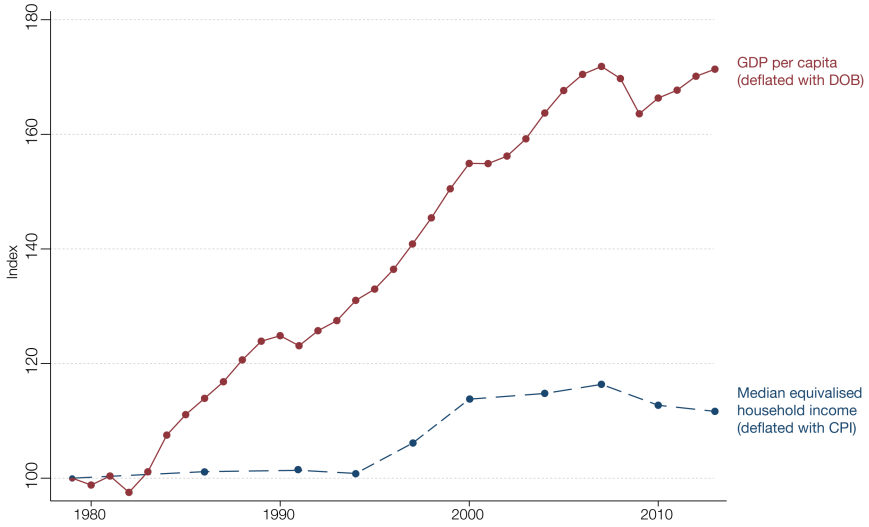
1 Introduction

The evolution of GDP per head is still widely taken to be the central indicator of a country's economic performance and success in improving living standards over time. This remains the case despite increasing recognition of its limitations in those terms (as brought out most comprehensively in Stiglitz et al., 2009) and on-going efforts to address those limitations by national statistics offices and the UN, OECD and EU. Some of the issues identified relate to the extent to which income as conventionally measured, at either national or household level, fails to capture important aspects of living standards and well-being. However, there is also increasing awareness that the evolution of average income at national level as measured in the national accounts may well diverge from that of the income of a 'typical' household as measured in household surveys, for a variety of reasons. Understanding the extent, drivers and implications of that divergence in OECD countries, fundamental to how trends in living standards are monitored and assessed, is the topic of this paper.

Growth in GDP per capita deflated using the GDP deflator is the most widely-cited aggregate measure of income growth from the national accounts (see e.g. Coyle, 2015), whereas the income of a typical household from micro data is often measured by median equivalised disposable household income, deflated using a consumer price index (Aaberge & Atkinson, 2013; Boarini et al., 2015; Thewissen et al., 2015; Nolan et al., 2016). Concern about taking GDP per capita as an indicator of trends in incomes for 'ordinary' households has been most prominent in the USA, where the contrast between growth in GDP per capita versus stagnation (for the most part) in median household income has been highlighted in a range of studies and reports (see e.g. Fixler & Jaditz, 2002; Fixler et al., 2015; Jorgenson et al., 2014). That contrast for the USA is illustrated in Figure 1 (using definitions and sources to be described below), and is indeed pronounced. This concern is now becoming more widely shared, leading Atkinson et al. (2015) to argue that median household income should be a significant focus of attention in assessing trends in living standards, and this being taken on board by the OECD and the EU in their monitoring activities.

An important aspect of the overall relationship between GDP per capita and median household income is that the former is produced in a national accounts framework whereas the latter is based on household surveys. Reconciling the information coming from these different sources is even more important in assessing living standards and poverty globally (as made clear by Deaton (2005); Pinkovskiy & Sala-i Martin (2016) among others), but remains a significant challenge for rich countries. The OECD and EU are also devoting considerable analytical effort there, notably by establishing a joint Expert Group to explore an internationally comparable methodology to produce distributional measures of household income, consumption and savings that are consistent with national accounts concepts and totals, using existing micro data sources(Fesseau & Mattonetti, 2013; Fesseau et al., 2013; OECD, 2013, 2015a; Commission, 2014b). Academic researchers are also actively engaged in developing Distributional National Accounts, and in investigating the relationship between income indicators

Figure 1: Growth in GDP per capita and median household equivalised income, USA from 1979



from the national accounts and household surveys in a comparative setting - including Törmälehto (2011), Endeweld & Alkemade (2014), and Atkinson et al. (2015). Atkinson et al. (2015), for example, draw on the European data from EU-SILC to compare the evolution of median household equivalised income with GDP per capita for EU countries from 2005 to 2011, concluding that while there are often substantial differences in levels, the trends in the two sources seem in general consistent: "To a reassuringly high degree, the two sources tell a coherent story".

In this paper we aim to deepen previous analyses of the divergence between GDP per capita and median household income in two ways. The first is that we look at a large number of OECD countries over a long period, going back decades where possible using an assembled database of median household income Thewissen et al. (2016), based on comparable micro data from LIS, which we compare with GDP per capita from the OECD National Accounts. Secondly, we employ these sources to decompose the overall divergence this reveals into a set of distinct contributory factors, distinguishing the role of the price deflators employed, the difference between GDP and Gross National Income (GNI), the definition and measurement of income in the national accounts versus household surveys, changes in household size, and changes in the distribution of income.[1] This enables us to draw some striking conclusions about the variation across countries and over time in the extent and nature of the divergence between these key indicators, with important implications that will be drawn out.

[1] While we restrict our attention to income, consumption and wealth also need to be incorporated into the picture to obtain a comprehensive integrated view, on which see for example Fesseau et al. (2013).

The data and measures to be employed are discussed in the next section. Section 3 shows how GDP per capita and median household income evolved over time for each of the countries covered and the extent to which they diverge. Section 4 discusses the various factors contributing to that divergence and a framework within which they can be distinguished. Sections 5 and 6 apply that framework and present our findings on their roles over the longest period the data cover for each of the countries. Section 7 looks at the sensitivity of the results to specific features of the method or coverage, while Section 8 examines the degree of variation over time within countries when different sub-periods are distinguished. Section 9 then probes in more depth one of the contributory factors distinguished – the gap between GNI in the national accounts and average income in household surveys – using national accounts data for the household sector for the shorter period for which that is available comparatively. Finally, Section 10 brings together the main conclusions and discusses their implications.

2 Data and measures

The data we employ on national accounts aggregates such as GDP and GNI, the GDP deflator (DOB), and the income of the household sector (in national accounts terms) and its components are taken from the OECD National Accounts. Data on the Consumer Price Index (CPI), Purchasing Power Parities (PPPs) and population are also taken from the relevant OECD databases. For the price indices the base year employed is 2010. We derive on that basis GDP and GNI per capita expressed in real terms, deflated with either the GDP deflator or the CPI, which will be central to our main analysis. We also derive average income figures relating specifically to the household sector in the national accounts for use in our more restricted analysis in Section 7, which will be described at that point.

For the other central series to be employed, on mean and median household income, we draw on our database Thewissen et al. (2016)based on Luxembourg Income Study (LIS) micro data (LIS, 2015). This brings together microdata on income from household surveys, standardised insofar as possible across countries over time.[2] The LIS database allows the microdata to be accessed, so that we can derive mean and median household income directly. The income definition employed is annual cash and near-cash money income from earnings, self-employment, capital income, and taxes and transfers, summed at the household level.[3] As well as income per capita, we derive measures of equivalised household income using the square root equivalence scale as discussed in detail below. The income measures to be used take the household as the income sharing unit but the individual as the unit of analysis – so each person is attributed

[2]For examples of its use see e.g., Atkinson et al. (1995); Gornick & Jäntti (2014); for reviews of its quality see Ravallion (2015) and Ferreira et al. (2015).

[3]In 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.

the income (per capita or equivalised) of their household. Household size and the Gini summary inequality measure are also derived from the LIS data and employed in our analysis.

Our country and year coverage is defined by the availability of the LIS micro data. We focus on 27 higher-income OECD countries, omitting middle-income OECD members Chile, Mexico, and Turkey as well as other middle-income countries such as South Africa which are in LIS. We begin our analysis around 1980 where possible (LIS has few observations before that), but for many countries data is available only from the mid-1980s, 1990, or even later.[4] For the analysis using micro data, we are restricted by the LIS "wave" structure whereby data is mostly included only at approximately five-year intervals for each country - in total, we make use of 153 observations.[5] With growth over time being the central focus, compound annual growth rates (CAGRs) in income calculated from these microdata and the national accounts-based series are at the core of our analysis.[6]

3 The divergence between GDP per capita and median household income over time across countries

We now use the data described in the previous section to look at the extent to which the growth rate of GDP per capita (deflated by the GDP deflator) diverges from the increase in median equivalised household income (deflated using the CPI). Figure 2 plots the evolution of each of these in terms of the average annual growth rate by country over the longest period for which we have data for both; it also shows the extent of the divergence between them, with countries ranked by that divergence.

We see that GDP per capita rose faster than median income in 23 out of the 27 countries – the exceptions being Czech Republic, Estonia, Norway, and Switzerland. This is in line with the concern outlined earlier that GDP per capita will often overstate the increase in real income enjoyed by "ordinary" or "typical" households. We also see from Figure 2, though, that the size of the divergence varies very substantially indeed across countries. The USA, where this has been most discussed, is among the countries where the divergence is greatest - though it is even wider for three transition countries, namely the Slovak Republic, Hungary and Poland, where the gap is over 2 percentage points

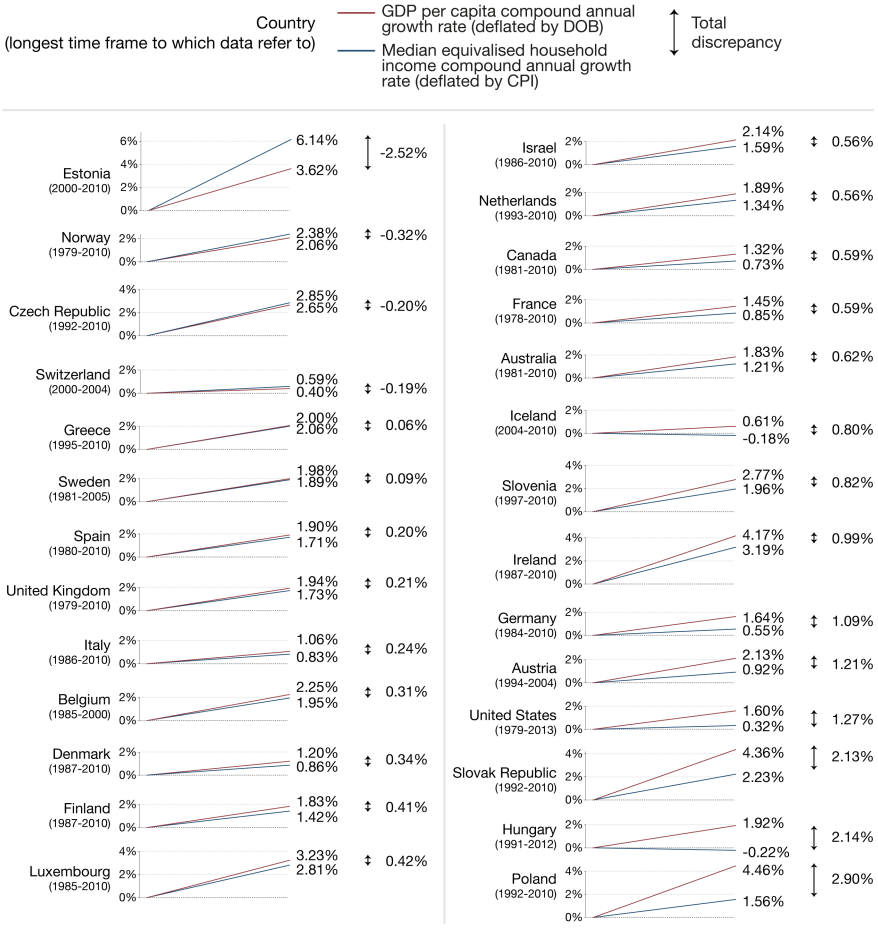
[4] We have dropped a small number of observations in LIS where breaks in series have given rise to substantial changes in definitions or coverage, based on information provided about the underling data sources and patterns in the data, namely Austria 1987 and 1995, Germany 1981, 1983, Netherlands 1983,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

[5] When we pool this time-series dataset we weight waves by their length in years, to account for the wave structure with missing observations.

[6] When we pool this time-series dataset we weight waves by their length in years, to account for the wave structure with missing observations.

per year on average. For many of the other countries where the growth in GDP per capita exceeded that in median household income, the gap is 0.6 percentage points or less. This is still substantial when cumulated over a significant period, but less striking than the USA, which is a clear outlier in this respect.

Figure 2: Country by country comparison of GDP per capita and equivalised household income growth over the longest time period available



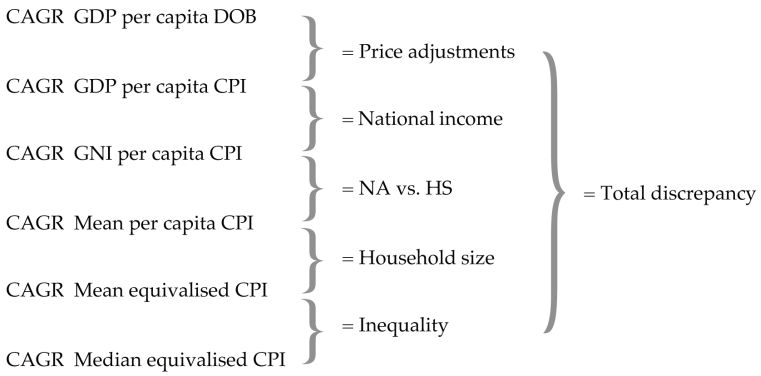
The other point to note about the US experience is that the annual average increase in the median over the long period from 1979 is so modest, at only 0.32%. This marks it out as among the lowest in our set of countries, with only Hungary and Iceland seeing lower (in fact negative) growth in the median. In the case of Iceland this relates to the much shorter period available in LIS from 2004-2010, dominated by the Great Recession and Iceland's dramatic financial crash). The other countries seeing the median lag behind GDP per capita

nonetheless saw some growth in the former, indeed countries such as Ireland, Poland and the Slovak Republic with a particularly large divergence between the two still saw relatively strong median income growth. So the USA is quite distinctive in its combination of a striking GDP-median divergence and very little growth in the median – with Germany coming closest to that experience among the major economies.

4 Decomposing the divergence between growth in GDP per capita and in median household income

How are we to explain or account for this divergence between growth in GDP per capita and in median household income, and its variation across countries? To provide a framework for investigating the different factors that may contribute, Figure 3 sets out in its first column a number of "intermediate" variables that will serve to make the linkage between GDP per capita on the one hand and median equivalised household income on the other; the second column of Figure 3 identifies the underlying factors these represent or capture.

Figure 3: Accounting for the GDP per capita/median household income divergence



The first of these factors is the difference in price deflators employed to arrive at 'real' changes, with GDP per capita corrected using the GDP deflator (DOB) whereas median household income is deflated using the CPI. We look at the impact of this difference by comparing GDP per capita deflated by the implicit GDP deflator with GDP per capita deflated using the CPI.

The second factor to incorporate into the analysis is the fact that GDP measures the economic output of the country in question, whereas household surveys capture income flows to resident households including income from other

countries and excluding income accruing externally. In national accounts terms, Gross National Income (GNI), which adjusts GDP for net factor income flows from abroad, is more closely aligned to the geographical coverage of household surveys. Comparing GDP and GNI per capita (with a common deflator, continuing here with the CPI) allows the impact of this factor to be assessed.

The third factor we look in our main analysis is the difference between GNI per capita as measured in the National Accounts and mean income per head as captured in household surveys. This difference will reflect a combination of:

1. The divergence between GNI and household sector income from a national accounts perspective;

2. The fact that there are conceptual differences between household sector income in the national accounts and income as measured in household surveys; and

3. The extent to which household surveys actually succeed in capture the income from different sources that they aim to cover.

We look in our main analysis at the overall contribution of the difference between GNI and average household survey income per head over the longest period we can cover for each country. Data distinguishing the household sector in the national accounts is only available on a comparative basis for more recent years (often the mid-1990s) for many of the countries we are studying; we employ those data in Section 9 below to investigate the different elements underpinning this GNI-survey income difference.

The fourth factor to be taken into account in our main analysis is the fact that income expressed in per capita terms may diverge from equivalised income – which is calculated by dividing income by the number of 'equivalent adults' rather than simply by the number of persons. This procedure aims to take into account that there are economies of scale in living together. The extensive literature on the topic over many years has not been able to arrive at a consensus on the extent of such economies of scale and the appropriate equivalence scale to employ, but the impact this can have on measures of poverty and inequality across countries and over time has been the subject of considerable attention (see for example Atkinson et al., 1995, 2015; Peichl et al., 2012; Ferreira et al., 2015). Here we use the square root scale widely employed in comparative analysis of poverty and inequality, where the number of 'equivalent adults' is derived as the square root of the number of persons living in the household.[7] Equivalised income will then diverge from income per capita over time if household size is changing: where it is declining, that serves to reduce the economies of scale from living together and equivalised income will lag behind income per head. We will compare the growth in mean income per capita in the household surveys with equivalised income in those surveys, to distinguish the impact this is having across different countries over time.

[7] Other commonly-used equivalence scales such as the 'modified OECD' scale distinguish children from adults, but this is not always possible in the LIS data.

The fifth and final factor to be incorporated into our analysis is that the change in mean income may well diverge from that in median income over time. This will occur where the rate of income growth in the upper or lower parts of the income distribution differs substantially from that around the middle. In that context the evolution of the gap between the mean and the median has itself been seen as a useful way of capturing growing income inequality. While it will not always be straightforward to relate this to other widely-used summary inequality measures such as the Gini coefficient, comparing the growth in mean versus median equivalised income in the surveys allows us to assess the contribution this much-remarked on phenomenon makes to the overall divergence between GDP per capita and median equivalised household income.

The order of the decomposition set out in this framework is to some degree arbitrary. In particular, while we look first at the differences in price deflators and from that point on employ the CPI, one could end rather than begin with that step. Similarly, we look at the mean/median gap and then at per capita versus equivalised income, whereas one could reverse that order. It is therefore important to empirically assess whether this affects the main findings, which we will do below.

5 What drives divergence between GDP and median income?

We now implement the analytical framework outlined in the previous section. The key figures are presented in Table 1, which in effect proceeds through the steps of the analysis presented in Figure 3 for each of the countries we are covering over the longest time span for which we have data per country. Column (1) shows the average annual growth rate in GDP per capita and column (6) shows the corresponding average for median equivalised household income, deflated by the GDP deflator and CPI respectively; Column (7) shows the difference between them, the divergence we wish to account for and already seen in Figure 2. Columns (2)-(5) present the annual average change in the "intermediate variables" that will allow us to decompose the overall divergence, and we now discuss these in turn.

Table 1: Decomposing the divergence over the longest available period for each country

		Intermediate variables (CAGR %)						Discre-pancy (ppt)	Underlying factors (CAGR %)				
		GDP pc DOB	GDP pc CPI	GNI pc	Mean pc	Mean equiv	Median equiv		DOB	CPI	Average hh size	St dev hh size	Gini
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Australia	1981-2010	1.83	1.70	1.62	1.61	1.45	1.21	0.62	4.10	4.24	-0.41	-0.45	0.58
Austria	1994-2004	2.13	1.62	1.61	1.07	0.84	0.92	1.21	1.21	1.71	-0.51	-0.55	-0.48
Belgium	1985-2000	2.25	2.41	2.58	3.18	2.58	1.95	0.31	2.23	2.07	-1.42	-0.33	2.24
Canada	1981-2010	1.32	1.17	1.22	1.01	0.90	0.73	0.59	2.85	2.99	-0.28	-0.46	0.37
Czech Rep	1992-2010	2.65	2.44	2.03	3.28	3.04	2.85	-0.20	5.19	5.41	-0.34	-0.26	1.23
Denmark	1987-2010	1.20	1.18	1.33	0.97	1.01	0.86	0.34	2.31	2.34	0.10	0.15	-0.05
Estonia	2000-2010	3.62	5.04	4.88	5.69	5.41	6.14	-2.52	5.60	4.17	-0.70	-0.05	-1.11
Finland	1987-2010	1.83	1.86	1.94	1.95	1.68	1.42	0.41	2.26	2.23	-0.53	-0.25	1.05
France	1978-2010	1.45	1.26	1.32	1.13	0.79	0.85	0.59	3.56	3.75	-0.69	-0.65	-0.28
Germany	1984-2010	1.64	1.42	1.44	0.89	0.63	0.55	1.09	1.66	1.87	-0.52	-0.55	0.32
Greece	1995-2010	2.06	1.87	1.57	2.07	1.89	2.00	0.06	3.63	3.82	-0.29	-1.02	-0.34
Hungary	1991-2012	1.92	1.30	1.14	0.19	-0.26	-0.22	2.14	10.25	10.93	-0.81	-0.38	0.07
Iceland	2004-2010	0.61	-0.03	-2.21	-0.43	-0.58	-0.18	0.80	6.90	7.58	-0.50	-0.32	-0.74
Ireland	1987-2010	4.17	4.03	3.56	3.61	2.97	3.19	0.99	2.44	2.59	-1.22	-1.58	-0.46
Israel	1986-2010	2.14	2.03	2.23	1.93	1.81	1.59	0.56	7.66	7.78	-0.23	-0.24	0.93
Italy	1986-2010	1.06	1.32	1.33	1.27	0.82	0.83	0.24	3.66	3.40	-0.86	-0.29	0.28
Luxembourg	1985-2010	3.23	3.60	2.84	3.08	2.91	2.81	0.42	2.45	2.09	-0.31	-0.21	0.49
Netherlands	1993-2010	1.89	1.96	2.00	1.62	1.56	1.34	0.56	2.15	2.09	-0.36	-0.04	-0.10
Norway	1979-2010	2.06	2.66	2.81	2.60	2.44	2.38	-0.32	4.79	4.18	-0.48	-0.43	0.34
Poland	1992-2010	4.46	3.95	4.08	2.07	1.78	1.56	2.90	9.44	9.98	-0.58	-0.08	1.00
Slovak Rep	1992-2010	4.36	2.62	2.46	2.61	2.47	2.23	2.13	5.39	7.18	-0.31	0.13	1.88
Slovenia	1997-2010	2.77	2.36	2.25	2.53	1.97	1.96	0.82	4.54	4.96	-1.37	-0.67	0.75
Spain	1980-2010	1.90	2.07	2.06	2.21	1.66	1.71	0.20	5.47	5.29	-1.12	-1.26	0.19
Sweden	1981-2005	1.98	2.12	2.20	1.89	2.06	1.89	0.09	4.03	3.89	0.27	0.31	0.77
Switzerland	2000-2004	0.40	0.14	0.07	-0.14	-0.38	0.59	-0.19	0.51	0.77	-0.63	-0.50	-1.59
UK	1979-2010	1.94	2.33	2.37	2.37	2.07	1.73	0.21	4.39	4.00	-0.53	-0.54	0.79
US	1979-2013	1.60	1.00	1.09	0.77	0.63	0.32	1.27	2.88	3.49	-0.30	-0.26	0.61
Average		2.17	2.05	1.92	1.89	1.63	1.60	0.57	4.13	4.25	-0.55	-0.40	0.32
Standard dev		1.04	1.13	1.28	1.28	1.24	1.26	0.97	2.36	2.52	0.39	0.41	0.84

Legend: > 0.50 ppt < -0.50 ppt

5.1 Price adjustments

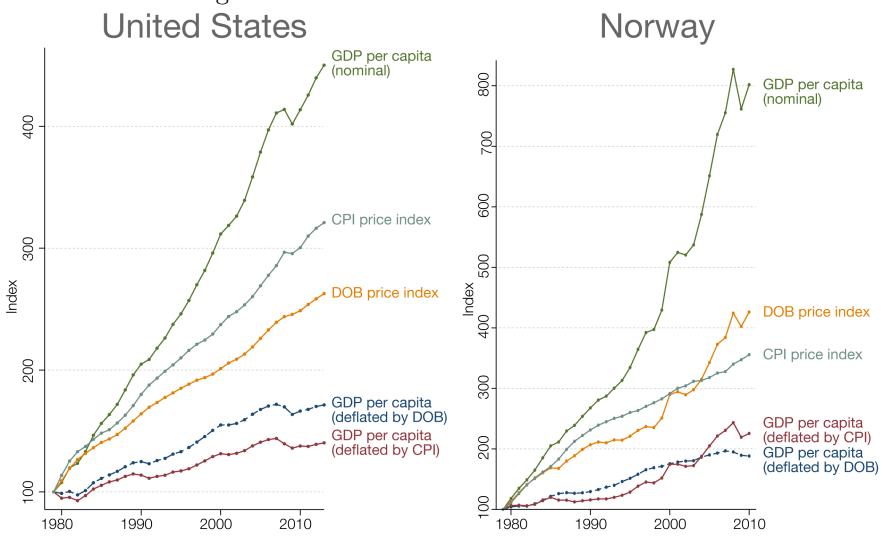
Table 1 column (2) shows the annual average change in GDP per capita deflated by the CPI rather than the GDP deflator, and comparison with column (1) allows us to see the difference this makes to the rate of real growth.[8] We see that while the two series are very similar for most countries, there are some notable exceptions: in Austria, Hungary, Iceland, the Slovak Republic and the USA the growth rate when one deflates using the CPI is a good deal lower than with the GDP deflator, whereas for Estonia and Norway the opposite is the case. This reflects the differences in the evolution of these price deflators, for which the annual average changes are shown in columns (8) and (9) of Table 1. Pooled across the full sample, there is almost no difference in that average: the CPI increased on average per annum by 4.3%, whereas the DOB increased by 4.2%. Atkinson et al. (2015), by contrast found some difference in these averages for the set of EU countries they examine from 2004 on). However, there are substantial differences for specific countries, which Figure 4 illustrates for Norway – where the CPI lagged the GDP deflator from the mid-2000s - and the USA, where the CPI rose more rapidly than the GDP deflator throughout. This meant that in the USA GDP per capita deflated with the GDP deflator grew by 1.6% per year on average compared to only 1.0% when deflated with the CPI.

The GDP deflator and the CPI serve different purposes, with the CPI designed to measure the changes in prices of the goods and services consumed by the typical household whereas the GDP deflator relates to the prices of all domestically produced final goods and services in the economy - to production rather than consumption (Lequiller & Blades, 2006). The GDP deflator thus does not adjust for changes in prices of goods imported from other countries, but does cover those of capital goods, unlike the CPI. The difference between the two – the "terms of trade wedge" (Mishel, 2012) – thus reflects a difference in price growth of products households purchase relative to what they produce. There are also more specific differences between the two deflators, such as in the formulae accounting for substitution due to relative price changes, the weighting of housing, coverage of medical expenses paid by individuals versus by public and private insurers, and in methodologies for computing price changes (Pessoa & Van Reenen, 2013). Here we do not attempt to distinguish the role of these differences (though see e.g., Fixler & Jaditz (2002) for the USA). Rather, our results bring out how much the price deflator employed can matter in assessing real growth over time, but also that the salience of this factor varies widely across countries over the periods covered here. For the USA, prices for national output grew more slowly than prices for consumer purchases - households faced worsening terms of trade, as discussed in for example Mishel (2012); this is not

[8] We concentrate here on comparing the GDP deflator (DOB) to CPI and leave purchasing power parity (PPP) corrections aside, since this only matters for the level and not the evolution within countries over time – also, generally the same PPP indicator is applied to GNI and household income. For discussions on PPP for income measurement see for instance Ferreira et al. (2015).

unique to the USA, but applied to any considerable extent in only a relatively small minority of the OECD countries. At the other end of the spectrum, there are a few countries where the effect worked in the opposite direction.

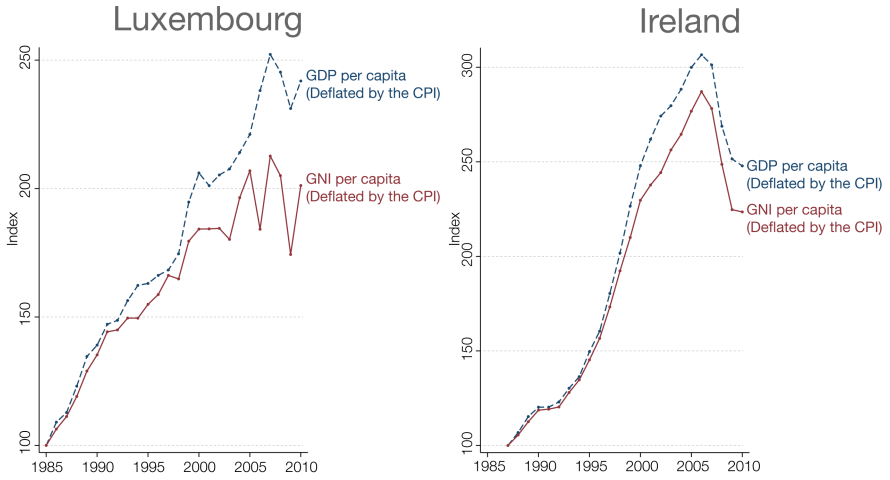
Figure 4: Evolution of GDP in DOB and CPI



5.2 GDP versus GNI

We now focus on the difference in growth rates between GDP and GNI per head, shown in columns (2) and (3) of Table 1 respectively (and deflate using the CPI from this point onwards). We see that there is little difference in the annual average growth rates for most countries, and across the full set of observations the average is virtually identical. However, there are three countries – Iceland, Ireland and Luxembourg – where GNI lagged substantially behind GDP, in the case of Iceland falling much more substantially and in the other two rising less rapidly. This reflects the scale of net factor outflows in these three cases, with a significant part of output flowing to no-resident entities. Figure 5 illustrates the trends for Luxembourg and Ireland, for which we have a relatively long time series. This shows that Luxembourg has a large discrepancy between GNI and GDP, as is well known (see also Zucman, 2015), but also a relatively low correlation between GNI and GDP over time, with GNI being is particularly volatile (on which see also OECD, 2015b). Ireland also has a relatively pronounced gap between GNI and GDP, but in this case the correlation in growth rates is higher, the difference between GNI and GDP is less volatile.

Figure 5: Evolution of GDP and GNI



5.3 National income versus mean income in household surveys

We now turn to the difference between the change over time in GNI per capita versus household income per capita, the former being measured in the national accounts and the latter in household surveys. These are shown in Table 1 columns (3) and (4) respectively, and we see that, on average, there is almost no difference between their annual average growth rates across the full set of country observations. This may come as something of a surprise given how much attention has been paid in recent research to the need to forge much stronger links between the national accounts and household surveys. However, there are substantial differences between the two for some countries, in particular a number of Eastern Europe countries where average income in the surveys has grown less rapidly than GNI, and there is also some gap in the same direction for the USA.

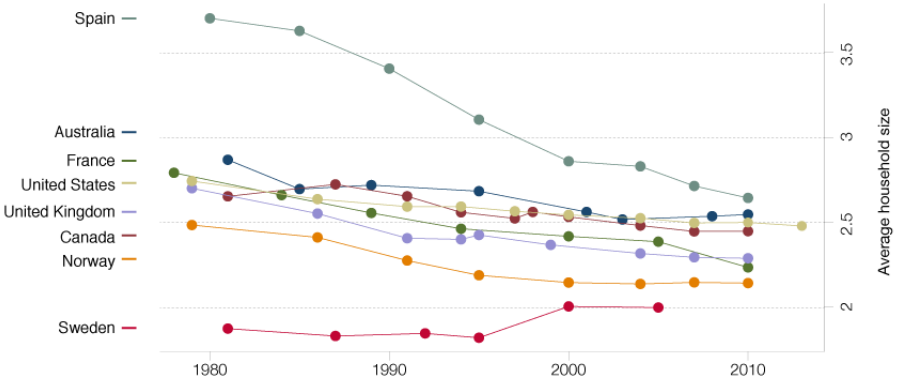
As already noted, there are many reasons why these two income measures might diverge, relating to both concepts and measurement, as has been teased out to some extent in recent studies for the USA (see for example Smeeding & Weinberg, 2001; Fixler et al., 2015) and comparatively for EU and OECD countries (including Atkinson et al., 2015; Commission, 2014a,b; OECD, 2013, 2015a; Endeweld & Alkemade, 2014; Causa et al., 2015). The data required to investigate these factors in any depth are not available across the countries and periods we are covering, so at this stage we simply capture the extent of the difference between the two measures for the purpose of our overall accounting, returning in Section 9 to some further analysis for a sub-set of countries over a shorter time-span.

5.4 Household size

The next factor to be analysed is the difference between the growth rate of income per capita as captured in household surveys and of equivalised income in the same surveys, shown in columns (4) and (5) of Table 1 respectively. We see that the growth in equivalised income was lower than that in income per head in 25 out of the 27 countries, the exceptions being Denmark and Sweden. Column (10) of Table 1 shows what underlies this: average household size declined in all but those two countries, where it rose marginally. The extent of the decline in household size varied across the other countries: across the entire set of observations the average number of household members went down by 0.5% per year on average, but the decline was as much as twice that large in some countries.

To illustrate, Figure 6 plots average household size over time for 8 countries for which we have data from around 1980 onwards. We see a particularly rapid decrease in Spain (from 3.7 to 2.7 between 1980-2010) and the slight increase in Sweden (from 1.9 to 2.0 between 1981-2005).

Figure 6: Evolution of average household size in 8 countries



As outlined earlier, individuals living with others in households benefit from economies of scale in consumption, enhancing their living standards, which equivalence scales aim to capture. As household size declines the extent of these economies is reduced, so equivalised income will lag behind income per capita.[9] So our findings bring out that the fact that the gap between income per head and equivalised income has been narrowing over time contributes to explain the overall divergence we are seeking to explain.

[9] One could in some cases see having the option to live separately as representing an increase in welfare, but that is beyond the scope of our analysis.

5.5 Mean versus median income

The final factor to be incorporated into our analysis is the fact that mean and median income may not evolve over time in the same way. Comparing columns (6) and (7) in Table 1, one sees that growth in the median lagged behind that in the mean in about half the countries covered. For a number of others there was little difference between the two, while for four countries the median grew more rapidly.

Over time, the median growing less rapidly than the mean generally reflects an increase in inequality as reflected in conventional summary inequality measures: the change in the Gini coefficient for equivalised income is shown in Table 1 column (11), and we see that it has usually risen where the median has lagged behind the mean and vice versa (though there are exceptions).[10] The evolution of median equivalised income can in fact be explained to a very large extent by taking together the change in mean per capita income, in average household size, and in income inequality. Table 2 shows the estimation results for a simple regression model using our pooled dataset. In this OLS regression, the change in median equivalised income is first related to that in mean per capita income only (column 1); the change in average household size or the Gini coefficient are added in columns 2 and 3 respectively, while in column (4) all three explanatory variables are included. We see that while the mean alone is very strongly correlated with the median, both household size and inequality are also significant in predicting the latter and increase the R2 from 0.92 to 0.97; when they are also included, the coefficient of mean per capita income is no longer statistically significant from 1 (p value of 0.60). This implies that trends in average household size and inequality account for the differences over time in the path of mean per capita and median equivalised income: one can essentially explain the entire divergence between them within the household survey data by what happened to the Gini and average household size. It is also of interest that the Gini index is sufficient to capture the difference between median and mean, and the general decrease in household size, rather than what is happening to household size and composition in particular parts of the income distribution, suffices to bridge the gap between unadjusted and equivalised mean/median income.

[10] In principle the mean could grow also grow more rapidly than the median because incomes below the median increased more rapidly in proportionate terms than those above it (though not enough for re-ranking to drive up the median), in which case inequality would decline; that is not however a common pattern in practice.

Table 2: Explaining median equivalised income by mean per capita income, household size, and income inequality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Mean pc	0.997***	1.018***	0.999***	0.991***	1.019***	1.009***	0.993***	1.009***
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Δ Avg hh size		0.577***			0.605***	0.488***		0.456***
		0.000			0.000	0.000		0.000
Δ St dev hh size			0.221**		-0.052		0.267***	0.056
			-0.021		-0.554		0.000	-0.374
Δ Gini				-0.290***		-0.269***	-0.296***	-0.272***
				0.000		0.000	0.000	0.000
Constant	-0.342***	-0.080	-0.253***	-0.201***	-0.088	0.010	-0.091*	0.020
	0.000	-0.326	-0.002	0.000	-0.286	-0.849	-0.062	-0.717
N	153	153	153	153	153	153	153	153
Adjusted R^2	0.915	0.936	0.918	0.957	0.936	0.973	0.963	0.973

6 Accounting for the GDP-median income divergence

We now employ the results presented so far to decompose the divergence between GDP per capita (deflated by the DOB, GDP deflator) and median household equivalised income (deflated with the CPI), using the framework outlined earlier and covering the longest time span for which we have data for each country. Table 3 presents this decomposition: it first shows once again the average annual growth in our two central variables of interest and the divergence between them – in columns (1-3) respectively – and then shows for each of the factors we have distinguished how much it contributes to the total divergence in percentage point terms (columns 4-8) and then the percentage of the total divergence attributable to each factor (columns 9-13). In interpreting these figures it is important to highlight that the percentage contributions in columns (9-13) can be misleading if taken on their own, since the underlying divergence being accounted for is so different and sometimes very small; the percentage contributions thus have to be taken together with the actual gaps in growth rates they represent.

An overarching conclusion can first be drawn from Table 3: not only does the extent of the divergence varies widely across countries, as emphasized earlier, but so does the mix of factors contributing to produce it. This underpins the second point that can be highlighted: the USA experience, where the divergence itself is very wide and where differences between the price deflators, between national accounts and household survey per capita means, between per capita and equivalised income, and between the mean and the median all make substantial contributions to accounting for that divergence, is far from typical. We now look at each of the factors distinguished in turn to bring out the extent and nature of the variation in their contributions to the divergence we are aiming to explain.

6.1 Prices

The contribution of differences in price deflators is shown in Table 3 columns (4) and (9). On average across the set of countries, the GDP deflator rose less rapidly than the CPI, as discussed earlier, and this represented a reduction of 0.11 percentage points in real income growth, which in turn would account for about 20% of the total divergence we are aiming to explain. However, the discussion in Section 5 highlighted the extent of the variation across countries in this factor, with ten countries seeing the CPI increase by less than the GDP deflator. We thus see that its contribution in absolute percentage points varies very considerable. In the two countries at either extreme, Estonia and the Slovak Republic, the difference in deflators would serve to reduce or increase annual average growth in real income by as much as 1.5 percentage points. For a number of other countries (Austria, Hungary, Iceland, Norway, Poland, and the USA), that contribution is 0.5 or larger, more often reducing than increasing the growth rate as one moves from deflating with the GDP deflator to doing so with the CPI. The finding that price deflators matter for how we perceive real income growth corresponds to Atkinson et al. (2015), who show that choices in correcting for price changes can be important in assessing real income developments across the EU-27 between 2005-2011. What our findings bring out, though, is how much the direction and scale of this effect can vary.

6.2 GDP versus GNI

Moving from GDP to GNI per capita also contributes to accounting for the divergence between GDP and median household income, reducing the gap by 0.13 percentage points on average, making up one-quarter of the overall gap. However, here there is even more cross-country variation around these averages – in 14 out of 27 GNI rose faster rather than more slowly than GDP, and a few countries (the Czech Republic, Iceland, Ireland and Luxembourg) contribute most of the overall average percentage point difference. When one excludes these countries there is little remaining difference on average, and no other countries for which the difference between GDP and GNI average growth is larger than 0.5 ppt.

6.3 GNI vs. mean income in household surveys

The gap between GNI per capita from the national accounts and mean income from household surveys (columns 6 and 11), while receiving considerable attention of late, is not always pronounced and can go in either direction, as we saw in the previous section. The percentage point contribution of this factor was a very modest 0.03 on average, but the variation across countries is extremely wide, varying from -1.77 in Iceland to 2.02 in Poland. In total there are nine countries for which this absolute difference is larger than 0.5 ppt, and these are fairly evenly divided between cases where the household mean grew more slowly than GNI and ones where it grew more rapidly. In terms of accounting for the

overall divergence, then, the proportion accounted for by this factor on average is only 5%, but ranges across countries from very modest to very substantial, and sometimes offsets rather than reinforces the other factors being examined.

6.4 Household size

As can be seen from columns (7) and (12) in Table 3, the difference between household income per capita versus equivalised income is an important contributor to the overall divergence we are accounting for. As we saw in the previous section, income per capita grew faster (or decreased less) than mean equivalised income in all the countries covered except for Denmark and Sweden; the percentage point reduction in income growth this produced was a substantial 0.26 on average, much greater than for any of the other factors identified. This factor is also distinctive, though, in its limited variation across countries, most having their percentage point contribution in the 0.2-0.6 range. On average across countries, falling household size accounted for 45% of the overall divergence we aim to explain, and for most countries it makes some significant contribution. As noted earlier, the decline in average household size rather than its evolution in particular parts of the income distribution suffices in accounting for that substantial proportion of the divergence.

6.5 Inequality

Finally, the contribution of the difference in growth rates between mean versus median equivalised income can be seen from columns (8) and (13) of Table 3. On average across countries, mean equivalised income rose 0.03 percentage points faster than median equivalised income, a marginal difference and only accounting for 6% of the divergence between GDP per capita and median household income on average. In Belgium, the UK and the USA it does contribute +0.3 or more in percentage point terms to the overall divergence, and a substantial contribution in the other direction is seen for Estonia, Iceland and Switzerland. The fact that falling household size/equivalisation often contributes more than rising inequality to the GDP-median income gap may be a surprise given the attention paid to increasing inequality in discussions of that gap, but average household size went down more substantially and consistently across the countries being studied than inequality rose in percentage terms (at least as captured by the change in the Gini coefficient). In the USA rising inequality contributed rather more than falling household size, but in the UK, for example, their contributions were similar in scale.

7 Sensitivity of the decomposition results

We now examine the robustness of these decomposition results to a number of alternatives that could have been adopted in implementing our decomposition framework. Table 4 repeats in column (1) the average impact of the various

Table 3: Decomposing the GDP per capita-median household income divergence

		(A) CAGR %		Discre-	(B) ppt contribution					(C) % contribution				
		GDP pc DOB	Median equiv	pancy (ppt)	Prices	National income	NA vs HS	House- hold size	Inequality	Prices	National income	NA vs HS	House- hold size	Inequality
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Australia	1981-2010	1.83	1.21	0.62	0.13	0.08	0.01	0.16	0.24	21	14	1	26	38
Austria	1994-2004	2.13	0.92	1.21	0.50	0.02	0.54	0.23	-0.08	42	2	45	19	-7
Belgium	1985-2000	2.25	1.95	0.31	-0.16	-0.17	-0.60	0.60	0.63	-52	-54	-196	197	205
Canada	1981-2010	1.32	0.73	0.59	0.14	-0.05	0.22	0.11	0.17	24	-9	37	18	29
Czech Rep	1992-2010	2.65	2.85	-0.20	0.22	0.41	-1.25	0.23	0.19	-110	-210	637	-118	-99
Denmark	1987-2010	1.20	0.86	0.34	0.02	-0.15	0.36	-0.03	0.14	6	-45	105	-9	43
Estonia	2000-2010	3.62	6.14	-2.52	-1.42	0.16	-0.81	0.28	-0.73	56	-6	32	-11	29
Finland	1987-2010	1.83	1.42	0.41	-0.03	-0.08	-0.01	0.27	0.26	-7	-19	-3	66	64
France	1978-2010	1.45	0.85	0.59	0.19	-0.05	0.18	0.34	-0.06	31	-9	31	58	-11
Germany	1984-2010	1.64	0.55	1.09	0.21	-0.02	0.55	0.25	0.09	20	-2	51	23	8
Greece	1995-2010	2.06	2.00	0.06	0.19	0.30	-0.51	0.19	-0.12	334	534	-896	332	-204
Hungary	1991-2012	1.92	-0.22	2.14	0.62	0.17	0.95	0.45	-0.05	29	8	44	21	-2
Iceland	2004-2010	0.61	-0.18	0.80	0.64	2.18	-1.77	0.15	-0.40	81	273	-223	18	-50
Ireland	1987-2010	4.17	3.19	0.99	0.15	0.47	-0.05	0.63	-0.21	15	47	-5	64	-22
Israel	1986-2010	2.14	1.59	0.56	0.11	-0.20	0.30	0.12	0.22	20	-35	53	22	40
Italy	1986-2010	1.06	0.83	0.24	-0.26	-0.01	0.07	0.45	0.00	-109	-5	27	187	-1
Luxembourg	1985-2010	3.23	2.81	0.42	-0.36	0.76	-0.25	0.18	0.10	-86	179	-59	42	23
Netherlands	1993-2010	1.89	1.34	0.56	-0.06	-0.04	0.38	0.06	0.22	-11	-8	68	11	40
Norway	1979-2010	2.06	2.38	-0.32	-0.60	-0.15	0.21	0.17	0.05	184	47	-63	-51	-16
Poland	1992-2010	4.46	1.56	2.90	0.51	-0.13	2.01	0.29	0.22	18	-4	69	10	8
Slovak Rep	1992-2010	4.36	2.23	2.13	1.74	0.16	-0.15	0.15	0.23	82	8	-7	7	11
Slovenia	1997-2010	2.77	1.96	0.82	0.41	0.11	-0.28	0.56	0.01	50	14	-34	69	2
Spain	1980-2010	1.90	1.71	0.20	-0.17	0.02	-0.16	0.55	-0.05	-86	8	-80	281	-24
Sweden	1981-2005	1.98	1.89	0.09	-0.14	-0.08	0.30	-0.16	0.16	-147	-82	327	-174	177
Switzerland	2000-2004	0.40	0.59	-0.19	0.26	0.07	0.21	0.24	-0.97	-137	-38	-110	-126	511
UK	1979-2010	1.94	1.73	0.21	-0.38	-0.05	0.01	0.30	0.34	-183	-23	3	142	160
US	1979-2013	1.60	0.32	1.27	0.60	-0.09	0.32	0.14	0.31	47	-7	25	11	24
Average		2.17	1.60	0.57	0.11	0.13	0.03	0.26	0.03	20	24	5	45	6
Standard dev		1.04	1.26	0.97	0.54	0.46	0.69	0.19	0.32	105	131	237	111	123

Legend: > 0.50 ppt < -0.50 ppt

factors across countries, in percentage point and percentage contribution terms, reported Table 3, so these can be directly compared with these alternatives shown in the remainder of the table. As mentioned earlier, the ordering in which the various factors are taken in the decomposition is to some extent arbitrary – in terms for example of whether price deflators are examined first or last, or whether one looks at equivalisation and then inequality or vice versa. The detailed results found when we employ the full range of different possible orderings are given in in Appendix 2, but the summary shown in Table 4 column (2) demonstrates that the patterns found in the decomposition are not much affected. The effect of price deflators, GNI versus GDP, and GNI versus mean household income remain very similar, the only difference is that looking at inequality first and then per capita versus equivalised income increases the contribution of falling household size, with inequality now having effectively no influence on average.

Table 4: Sensitivity tests on the decomposition results

Years	Original results	Changing the order	Weighting by wave length	Leaving out Eastern Europe	Before 2008
Discrepancy (ppt)	0.57	0.57	0.61	0.48	0.78
(B) ppt contribution					
Prices	0.11	0.11	0.09	0.05	0.00
National income	0.13	0.14	0.06	0.13	0.08
NA vs HS	0.03	0.03	0.11	0.01	0.36
Household size	0.26	0.30	0.25	0.24	0.26
Inequality	0.03	-0.01	0.10	0.05	0.08
(C) % contribution					
Prices	20	20	14	10	0
National income	24	24	11	28	11
NA vs HS	5	5	17	3	46
Household size	45	53	41	49	33
Inequality	6	-2	16	10	10

Legend: > 0.50 ppt < -0.50 ppt

The next test relates to the consideration that, so far, the average growth rates and contributions across countries that we have presented ignore the fact that the number of years they cover differs a good deal across countries – because LIS has data for much longer periods for some countries than others. If one instead weights each country by the number of years available for it in computing these averages, column (3) of Table 4 shows that this increases the contribution of inequality and the difference between GNI and mean household income, with these factors more important in the countries (such as the UK and the USA) for which data covers the longest period back to about 1980.

As noted earlier, the overall divergence between GDP per capita and median equivalised household income is particularly large in some Eastern European countries – notably in Poland, Hungary, and the Slovak Republic, where median household income lagged behind GDP per capita very substantially, and Estonia and the Czech Republic where the opposite was the case. Column (4) shows that if one excludes the countries of Eastern Europe, the average divergence to

be explained decreases and price deflators become less important in accounting for it, while declining house size becomes even more important.

Finally, analyses of the Great Recession from 2008 and of previous economic crises suggests that in severe recession household income tends to drop less than GDP per capita, at least initially (Immervoll & Richardson, 2011; Jenkins et al., 2012). We can examine how much our results are affected by the fact that our analysis include the period of the Great Recession (for most countries) by dropping observations from 2008 onwards. We see from column (5) of Table 4 that this produces a 0.21 higher average overall divergence between GDP per capita and median household income, leading to a lower overall discrepancy if crisis years are included. This is consistent with our hypothesis that in crisis years median income goes down less than GDP per capita. Leaving out the crisis years also affects the average contributions of the various factors to explaining this divergence. In particular, the contribution of the gap between GNI in the National Accounts and household income increases substantially and this becomes the most important factor in explaining the overall divergence, with the role of inequality also increasing and that of the difference between price deflators falling. This sensitivity of the decomposition results to the time-period covered is clearly an important feature, which we investigate in greater depth in the next section.

8 Variation in the decomposition results over time

Not only contrasting periods of recession versus growth but more generally, the extent of the divergence between GDP per capita and median equivalised household income and the factors producing that divergence might well vary for a particular country over different time-periods. To probe this variation we first pool the available data across countries relating to different sub-periods – 1980-1987, 1987-1992, 1992-1997, 1997-2001, 2001-2004, 2004-2007, and 2007-2010. Using this pooled data we look at the average divergence and the decomposition by contributory factor for those sub-periods in Table 5, which also shows the evolution of the "intermediate variables" underpinning those factors in each period. The country coverage differs across the sub-periods, since some countries are only present in LIS for later ones; the corresponding results for the sub-set of countries for which data is available throughout are shown in Appendix Table 1, and support similar conclusions.

Table 5: Decomposing the GDP-median household income divergence for different time-periods

Years (approximately)	1980-2010	1980-1987	1987-1992	1992-1997	1997-2001	2001-2004	2004-2007	2007-2010
No countries included	7	11	18	21	24	27	24	24
(A) Basic trends (CAGR %)								
GDP pc DOB	1.75	1.94	2.37	2.33	3.29	2.36	3.24	-1.17
GDP pc CPI	1.76	1.56	2.40	1.92	3.45	2.33	3.72	-1.76
GNI pc CPI	1.80	1.54	2.26	2.08	3.30	2.36	3.50	-1.91
Mean pc	1.64	1.32	2.70	0.57	2.48	2.17	3.67	-0.29
Mean equiv	1.40	1.04	2.35	0.24	2.30	1.93	3.49	-0.45
Median equiv	1.23	0.81	2.27	-0.21	2.19	1.80	3.81	-0.44
Discrepancy (ppt)	0.52	1.13	0.10	2.54	1.10	0.56	-0.57	-0.73
(B) ppt contribution								
Prices	-0.01	0.38	-0.03	0.40	-0.16	0.03	-0.48	0.59
National income	-0.04	0.02	0.14	-0.15	0.16	-0.03	0.23	0.15
NA vs HS	0.17	0.22	-0.43	1.51	0.82	0.18	-0.17	-1.62
Household size	0.24	0.28	0.35	0.33	0.18	0.24	0.18	0.16
Inequality	0.16	0.23	0.08	0.45	0.10	0.13	-0.32	-0.01
(C) % contribution								
Prices	-2	34	-26	16	-15	5	85	-81
National income	-7	1	131	-6	14	-5	-40	-21
NA vs HS	32	20	-421	60	75	33	29	222
Household size	46	25	338	13	17	43	-31	-22
Inequality	31	20	77	18	10	24	56	2

Legend: > 0.50 ppt < -0.50 ppt

We see first from Table 5 (section A) that GDP per capita on average rose faster than median household income in each of the sub-periods up to 2004, while in the recession years from 2007-2010 but also in the preceding 2004-2007 period the opposite was the case.[11] However, from 1980-2004 the average divergence was much greater in some sub-periods than others, being particularly wide in 1992-97 and only marginal from 1987-1992.

In terms of contributory factors, we also see (section B) wide variation across the sub-periods. Household size is the most consistent in its effects across sub-periods, contributing around 0.2-0.3 in percentage point terms to the overall divergence being decomposed in most of the periods we distinguish. For the other factors, not only the size but sometimes the direction of their average effect varies from one sub-period to another. The gap between average growth in GNI and mean survey income per capita was particularly pronounced in 1992-97, and the gap between mean and median household income was also much wider then than in other periods; each of these contributory factors worked in the other direction from 2004-07 and 2007-10, going a considerable way to accounting for the fact that GDP per capita rose much more rapidly than median income over the former period but more slowly from 2004 on. It is also noteworthy, though, that the impact of these two factors was also quite different from 1992-97 in the preceding 5-year period 1987-92, when GNI grew more slowly than mean

[11] For the 21 observations we have at country level with negative GDP growth, median incomes grew 0.28 percentage points faster than GDP per capita, whereas for the 132 observations with positive GDP growth the gap was 0.70 percentage points in the other direction.

household income and median household grew almost as fast as the mean.

Given the substantial variation across countries and over time in both the scale of the overall divergence to be explained and the contributory factors, it is also helpful to examine these patterns for individual countries. For this purpose we focus on five of the countries for which LIS has data going back to the early/mid-1980s, which serve to illustrate the extent of the variation in the patterns observed. We start with the USA, which as highlighted earlier is often taken as the exemplar or basis for discussion in this domain. Table 6 shows the GDP-median divergence and decomposition results overall and by sub-period for the USA. We see that the divergence between growth in GDP per capita and the household median, which we saw earlier was very pronounced over the whole period, was also substantial in most of the sub-periods distinguished – the exception being the 2007-10 period when the Great Recession struck. There is much less consistency in the contribution of the various factors, though – with household size and inequality contributing most in the 1980s, the gap between GNI in the National Accounts and mean income in surveys being a substantial contributor from 1997-2004, and with the difference between the GDP deflator and CPI being very important up to 2000 but not subsequently.

Table 6: Decomposing the GDP-median household income divergence for different time-periods: USA

Years	1979-2013	1979-1986	1986-1991	1991-1994	1994-1997	1997-2000	2000-2004	2004-2007	2007-2010	2010-2013
(A) Basic trends (CAGR %)										
GDP pc DOB	1.60	1.88	1.56	2.10	2.44	3.22	1.39	1.63	-1.08	1.00
GDP pc CPI	1.00	1.13	0.54	1.50	1.63	2.48	1.19	1.46	-1.45	0.62
GNI pc CPI	1.09	1.02	0.62	1.29	2.20	2.88	1.06	1.44	-1.35	1.12
Mean pc	0.77	0.96	0.49	1.28	2.02	2.11	0.27	0.93	-1.29	0.33
Mean equiv	0.63	0.56	0.28	1.43	1.78	2.14	0.28	0.70	-1.28	0.29
Median equiv	0.32	0.16	0.05	-0.18	1.72	2.36	0.22	0.46	-1.06	-0.32
Discrepancy (ppt)	1.27	1.72	1.52	2.28	0.73	0.87	1.17	1.17	-0.03	1.31
(B) ppt contribution										
Prices	0.60	0.75	1.02	0.60	0.82	0.75	0.20	0.17	0.37	0.38
National income	-0.09	0.12	-0.08	0.21	-0.58	-0.40	0.13	0.02	-0.10	-0.50
NA vs HS	0.32	0.06	0.13	0.01	0.18	0.77	0.79	0.51	-0.06	0.80
Household size	0.14	0.39	0.21	-0.15	0.24	-0.03	-0.01	0.23	-0.01	0.04
Inequality	0.31	0.40	0.23	1.60	0.07	-0.21	0.06	0.25	-0.23	0.60
(C) % contribution										
Prices	47	43	67	26	112	86	17	15	-1390	29
National income	-7	7	-5	9	-79	-47	11	1	368	-38
NA vs HS	25	3	9	0	25	89	67	44	228	61
Household size	11	23	14	-7	33	-4	-1	19	47	3
Inequality	24	23	15	70	9	-25	5	21	847	46

Legend: > 0.50 ppt < -0.50 ppt

We compare these patterns for the USA first with three other large 'Anglo-Saxon/liberal' countries, Australia, Canada and the UK. Table 7 we see that in the case of Australia, there was also a substantial divergence between GDP per capita and median household income in most of the sub-periods up to 2003,

though median income grew much faster than GDP from 2003-2008.[12] Differences between the price deflators make an important contribution up to the mid-1990s, with the GDP deflator rising more rapidly than the CPI, but work strongly in the opposite direction from 2003 onwards. Household size and inequality do so only in certain sub-periods, and the GNI-mean household income gap is important from 1985-95.

Table 7: Decomposing the GDP-median household income divergence for different time-periods: Australia

Years	1981-2010	1981-1985	1985-1989	1989-1995	1995-2001	2001-2003	2003-2008	2008-2010
(A) Basic trends (CAGR %)								
GDP pc DOB	1.83	1.45	2.32	1.47	2.66	2.44	1.55	0.31
GDP pc CPI	1.70	0.76	1.67	0.11	2.49	2.78	3.12	1.51
GNI pc CPI	1.62	0.78	1.21	0.08	2.63	2.71	2.99	1.23
Mean pc	1.61	0.82	0.69	-1.46	2.41	1.59	6.65	-0.25
Mean equiv	1.45	0.02	0.78	-1.34	2.02	0.93	6.77	0.05
Median equiv	1.21	-0.08	0.23	-1.41	1.97	0.54	6.36	-0.32
Discrepancy (ppt)	0.62	1.53	2.09	2.88	0.70	1.90	-4.81	0.63
(B) ppt contribution								
Prices	0.13	0.69	0.65	1.35	0.18	-0.34	-1.57	-1.20
National income	0.08	-0.03	0.46	0.03	-0.14	0.07	0.14	0.28
NA vs HS	0.01	-0.04	0.52	1.55	0.22	1.12	-3.66	1.48
Household size	0.16	0.80	-0.09	-0.12	0.39	0.66	-0.13	-0.30
Inequality	0.24	0.10	0.55	0.07	0.05	0.39	0.41	0.38
(C) % contribution								
Prices	21	45	31	47	25	-18	33	-189
National income	14	-2	22	1	-21	4	-3	44
NA vs HS	1	-2	25	54	32	59	76	234
Household size	26	52	-5	-4	56	35	3	-47
Inequality	38	7	26	2	7	20	-8	59

Legend: > 0.50 ppt < -0.50 ppt

From Table 8 we see that Canada also saw a substantial divergence between GDP per capita and median household income in most of the sub-periods distinguished up to 2000, being particularly marked in the late 1990s, but the median grew more rapidly from then onwards especially from 2004-2007. The factors responsible again varied considerably over time, with differences between the price deflators important in the 1980s and late 1990s, household size and inequality intermittently contributing, and the GNI-mean household income gap the main contributor to the pronounced overall divergence in the late 1990s.

[12] Note that the specific sub-periods distinguished vary across the countries reflecting the availability of data in LIS.

Table 8: Decomposing the GDP-median household income divergence for different time-periods: Canada

Years	1981-2010	1981-1987	1987-1991	1991-1994	1994-1997	1997-1998	1998-2000	2000-2004	2004-2007	2007-2010
(A) Basic trends (CAGR %)										
GDP pc DOB	1.32	1.55	-0.22	1.51	1.84	3.28	4.15	1.37	1.56	-0.61
GDP pc CPI	1.17	0.87	-1.12	1.76	1.77	2.05	5.00	1.38	2.49	-0.66
GNI pc CPI	1.22	0.91	-1.18	1.67	1.94	1.78	5.40	1.50	2.73	-0.81
Mean pc	1.01	0.48	0.15	0.63	0.10	2.93	0.71	1.92	3.16	0.72
Mean equiv	0.90	0.58	-0.01	0.03	-0.06	4.05	0.61	1.63	2.92	0.76
Median equiv	0.73	0.44	-0.18	0.02	-0.05	1.98	-0.47	1.65	2.80	1.09
Discrepancy (ppt)	0.59	1.11	-0.04	1.49	1.89	1.30	4.61	-0.28	-1.24	-1.70
(B) ppt contribution										
Prices	0.14	0.68	0.90	-0.25	0.07	1.23	-0.85	-0.01	-0.93	0.05
National income	-0.05	-0.04	0.06	0.09	-0.17	0.27	-0.40	-0.12	-0.24	0.16
NA vs HS	0.22	0.43	-1.33	1.04	1.84	-1.15	4.69	-0.42	-0.43	-1.53
Household size	0.11	-0.10	0.16	0.60	0.16	-1.12	0.10	0.29	0.24	-0.04
Inequality	0.17	0.14	0.18	0.00	-0.01	2.07	1.07	-0.01	0.12	-0.33
(C) % contribution										
Prices	24	62	-2359	-17	4	95	-18	4	75	-3
National income	-9	-4	-151	6	-9	21	-9	44	20	-9
NA vs HS	37	39	3479	70	97	-89	102	149	34	90
Household size	18	-9	-409	40	8	-86	2	-102	-19	3
Inequality	29	13	-461	0	0	159	23	5	-9	19

Legend: > 0.50 ppt < -0.50 ppt

Table 9 shows the corresponding results for the UK, where the divergence between GDP per capita and median household income was much less marked overall, as we saw earlier, but which we now see to be confined to and concentrated in the first half of the 1980s and, even more so, from 1991-95. In those specific sub-periods the only consistent contributor was the substantial difference between GNI in the national accounts and mean household survey income; household size and inequality contributed in the 1980s but not 1991-95, while the opposite was the case for differences in the price deflators.

Table 9: Decomposing the GDP-median household income divergence for different time-periods: UK

Years	1979-2010	1979-1986	1986-1991	1991-1994	1994-1995	1995-1999	1999-2004	2004-2007	2007-2010
(A) Basic trends (CAGR %)									
GDP pc DOB	1.94	1.61	2.35	2.11	4.62	2.77	2.85	2.11	-1.72
GDP pc CPI	2.33	1.86	3.52	1.56	2.23	3.24	3.97	2.80	-2.05
GNI pc CPI	2.37	1.57	2.97	2.48	2.44	3.71	4.37	2.54	-1.99
Mean pc	2.37	1.16	4.52	2.13	-4.03	4.49	4.02	1.53	-0.56
Mean equiv	2.07	0.58	3.93	2.20	-4.07	4.31	3.81	1.39	-0.65
Median equiv	1.73	0.06	3.16	1.05	-1.64	3.71	3.48	2.26	-0.86
Discrepancy (ppt)	0.21	1.55	-0.81	1.06	6.27	-0.94	-0.63	-0.15	-0.86
(B) ppt contribution									
Prices	-0.38	-0.25	-1.17	0.55	2.40	-0.47	-1.12	-0.69	0.33
National income	-0.05	0.29	0.55	-0.93	-0.21	-0.47	-0.40	0.26	-0.06
NA vs HS	0.01	0.41	-1.55	0.36	6.47	-0.78	0.35	1.01	-1.43
Household size	0.30	0.58	0.59	-0.08	0.04	0.18	0.21	0.14	0.08
Inequality	0.34	0.52	0.77	1.15	-2.43	0.60	0.33	-0.87	0.21
(C) % contribution									
Prices	-183	-16	145	52	38	50	177	465	-38
National income	-23	19	-68	-87	-3	50	63	-174	7
NA vs HS	3	26	193	34	103	84	-55	-685	166
Household size	142	38	-73	-7	1	-19	-33	-96	-10
Inequality	160	34	-96	109	-39	-64	-52	591	-25

Legend: > 0.50 ppt < -0.50 ppt

Finally, we look at two other major OECD economies, France and Germany. From Table 10 we see that France saw a substantial divergence between GDP per capita and median household income in specific sub-periods up to 2005, notably through the 1980s and in the second half of the 1990s. The GNI-mean household income gap was an important contributor to that divergence, while household size and the difference between price deflators also contributed and with inequality being important only from 1989-1994.

Table 10: Decomposing the GDP-median household income divergence for different time-periods: France

Years	1978-2010	1978-1984	1984-1989	1989-1994	1994-2000	2000-2005	2005-2010
(A) Basic trends (CAGR %)							
GDP pc DOB	1.45	1.40	2.60	1.01	2.36	0.94	0.21
GDP pc CPI	1.26	0.78	2.94	0.46	2.07	0.94	0.34
GNI pc CPI	1.32	0.65	3.13	0.47	2.30	0.92	0.40
Mean pc	1.13	-0.10	0.29	3.18	0.04	0.77	3.15
Mean equiv	0.79	-0.49	-0.06	2.73	-0.11	0.61	2.56
Median equiv	0.85	-0.72	0.97	1.97	0.13	0.85	2.42
Discrepancy (ppt)	0.59	2.12	1.64	-0.96	2.23	0.09	-2.21
(B) ppt contribution							
Prices	0.19	0.62	-0.33	0.55	0.29	0.00	-0.13
National income	-0.05	0.13	-0.19	-0.01	-0.23	0.02	-0.06
NA vs HS	0.18	0.74	2.84	-2.70	2.26	0.15	-2.76
Household size	0.34	0.39	0.35	0.45	0.15	0.16	0.60
Inequality	-0.06	0.23	-1.03	0.76	-0.24	-0.25	0.14
(C) % contribution							
Prices	31	29	-20	-57	13	-1	6
National income	-9	6	-12	1	-10	27	3
NA vs HS	31	35	173	282	101	172	125
Household size	58	19	21	-47	7	180	-27
Inequality	-11	11	-63	-79	-11	-278	-6

Legend: > 0.50 ppt < -0.50 ppt

For Germany, Table 11 shows that there was a particularly pronounced divergence between GDP per capita and median household income in the late 1980s-early 1990s, when unification took place, but that there was a further gap up to 2007. The gap between GNI per capita and household income was particularly important in contributing to that overall divergence from 1989-1994 and 2004-2007 but worked in the opposite direction from 1994-2004, when household size and inequality were the most substantial contributors.

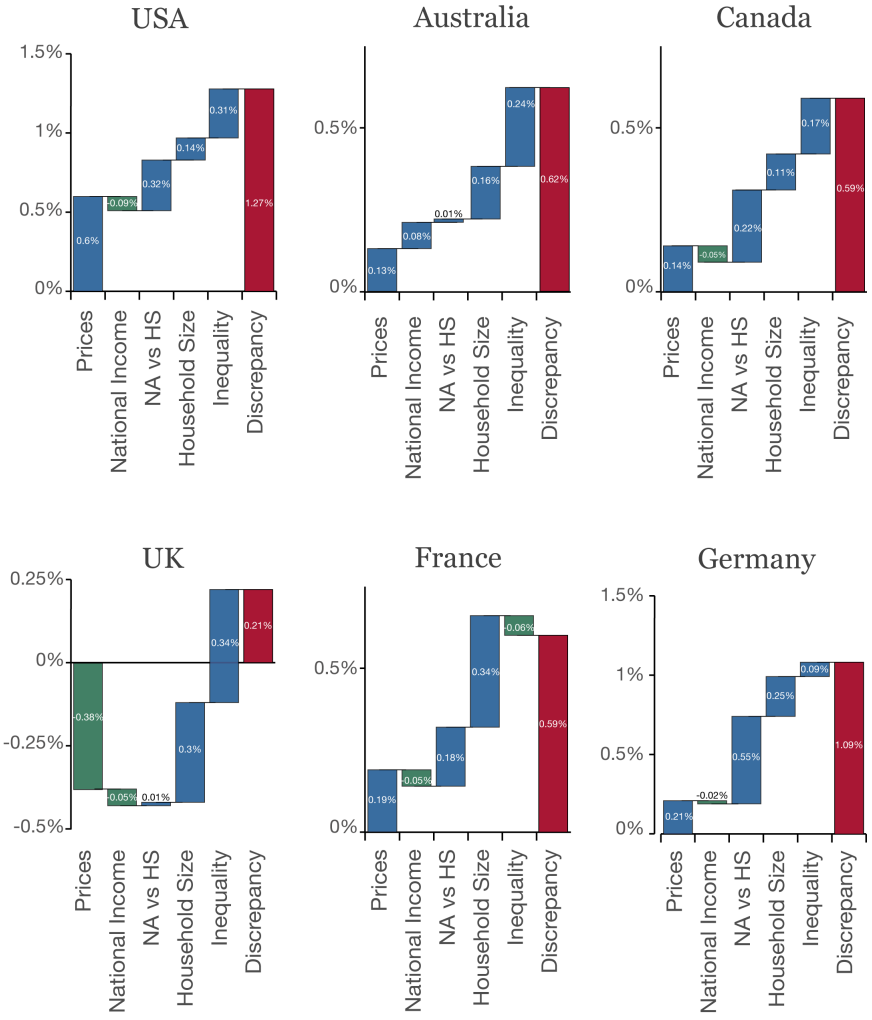
Table 11: Decomposing the GDP-median household income divergence for different time-periods: Germany

Years	1984-2010	1984-1989	1989-1994	1994-2000	2000-2004	2004-2007	2007-2010
(A) Basic trends (CAGR %)							
GDP pc DOB	1.64	2.49	2.04	1.73	0.44	2.65	-0.04
GDP pc CPI	1.42	3.45	1.87	0.94	0.15	1.71	-0.26
GNI pc CPI	1.44	3.50	1.56	0.81	0.49	1.97	-0.10
Mean pc	0.89	2.96	-0.55	1.47	0.73	0.04	-0.21
Mean equiv	0.63	2.64	-0.87	1.27	0.42	-0.28	-0.19
Median equiv	0.55	2.39	-0.95	1.24	-0.02	-0.63	0.55
Discrepancy (ppt)	1.09	0.10	2.99	0.49	0.46	3.28	-0.59
(B) ppt contribution							
Prices	0.21	-0.96	0.18	0.79	0.29	0.94	0.22
National income	-0.02	-0.05	0.31	0.13	-0.34	-0.26	-0.16
NA vs HS	0.55	0.54	2.10	-0.66	-0.24	1.92	0.11
Household size	0.25	0.32	0.32	0.20	0.32	0.32	-0.01
Inequality	0.09	0.25	0.07	0.02	0.43	0.35	-0.74
(C) % contribution							
Prices	20	-1004	6	162	63	29	-38
National income	-2	-52	10	26	-75	-8	28
NA vs HS	51	559	70	-135	-52	59	-19
Household size	23	337	11	42	69	10	2
Inequality	8	259	2	5	95	11	127

Legend: > 0.50 ppt < -0.50 ppt

In Figure 7, we visualise using waterfall charts the divergence and the contributing factors over the longest available period for the six countries we discussed previously in more detail. The overall conclusion to be highlighted, as illustrated by these countries but also applying to the others we have included, is that not only does the scale of the divergence between GDP per capita and median household income vary a great deal over different time-periods within countries, but even across sub-periods where the divergence is similar the drivers may well differ substantially.

Figure 7: Waterfall charts for the divergence over the longest available period for six countries



9 From GNI in national accounts to household income in surveys

We have seen that the difference between GNI per capita as measured in the National Accounts and mean income per head as captured in household surveys is often a significant contributor to the overall divergence we are examining between GDP and median income. As noted earlier, this GNI-mean survey income gap will itself reflect some combination of the fact that:

1. GNI and household sector income differ in national accounts terms;

2. There are conceptual differences between household sector income in the national accounts and income as measured in household surveys; and

3. Household surveys may not succeed in capturing the income from different sources that they aim to cover.

Teasing out the impact of these different aspects is a very complex matter, to which the OECD-Eurostat Joint Expert Group mentioned earlier has devoted considerable effort (see especially Fesseau et al., 2013; Fesseau & Mattonetti, 2013). It is clear from these and other studies such as Endeweld & Alkemade (2014) and Atkinson et al. (2015) that both conceptual differences and survey under-representation of particular income sources are important and need further investigation; Deaton (2005) also provides a helpful discussion of the major elements involved, focused primarily on developing countries but also included the USA and UK.

Here we carry out a limited comparative exercise, again framed in accounting terms, aimed at seeing how the overall GNI-household income gap is produced by such factors. This requires national accounts data relating to the household sector, or at least for households together with 'non-profit institutions serving households' (NPISH), which is only available for many countries on a consistent basis in the OECD National Accounts from the early/mid-1990s. For the subset of countries for which this is available, we derive two "intermediate" income measures that help to link GNI per capita on the one hand and mean household income in surveys on the other. The first is Gross Household Disposable Income (GHDI). Note that income estimated as arising from state provision of services, which in national accounts terms is now included in an adjusted measure of household income, is not included here because it will not feature in household income from a survey perspective.

The second intermediate income measure we derive from the national accounts household sector adjusts GHDI for a number of items which it takes into account but would not be seen by households as "spendable income", to use Atkinson's (2013) term, and would not generally be included in household income as measured in surveys. These include most importantly the value of imputed rent[13] and the national accounts adjustment for 'Financial Intermediation Services Indirectly Measured' (FISIM).[14] Following Atkinson's suggestion we exclude these from GHDI to arrive at an approximate figure for "spendable income". Comparing the growth rates in GNI per capita, these two intermedi-

[13] While imputed rent is sometimes estimated and included in household survey data, and that is the approach recommended by the Canberra Report this is not the common practice to date.

[14] FISIM is measured as the interest paid to banks and other intermediaries less interest paid by them. This is taken to be a measure of the value of financial intermediation and, since the 1993 revision of the SNA, has been added to national accounts estimates of household income. A similar item is included for risk-bearing services, measured from the profits of insurance companies.

ate variables, and mean household income then helps in assessing the relative importance of different elements where divergence is to be seen.

In measuring mean household income from surveys we continue to rely on LIS, though now for the shorter period being covered and a restricted set of countries (with 220 observations in all). We deflate by the CPI and use per capita income measures throughout, and look at annual average real growth rates.

These growth rates for each of these income variables are shown by country in Table 12. We see that, when both are averaged across countries, the difference in growth rates between the GNI and GDHI national accounts aggregates is modest. However, when we look at individual countries there are some marked differences: these go in both directions, with GHDI growth lagging GNI in some countries and exceeding it in others, thus offsetting each other when the overall average is derived. A gap of 0.5 or 1 ppt. is not uncommon, with GNI growing considerably faster than household sector income in Austria, Belgium, Italy, the Netherlands, and Sweden while household sector income grew more rapidly than GNI in France and Ireland. So the transmission of overall economic growth to the household sector cannot be taken for granted, and plays a part in explaining how a gap can emerge between GDP/GNI and household income.

Table 12: From GNI in national accounts to mean income in household surveys

		GNI per capita CPI	GDIH per capita CPI	Spendable income per capita CPI	Mean income per capita CPI
		(1)	(2)	(3)	(4)
Austria	1997-2004	1.58	1.07	1.04	2.18
Belgium	1995-2000	2.21	0.90	0.59	3.36
Czech Republic	1996-2010	1.46	1.85	1.48	2.73
Denmark	2000-2007	2.03	1.81	1.42	1.50
Estonia	2000-2010	4.88	4.74	5.08	5.69
Finland	1995-2010	2.78	2.70	2.45	2.70
France	2000-2010	0.66	1.07	0.99	1.95
Germany	2000-2010	0.75	0.44	0.49	0.24
Greece	2007-2010	-3.93	-3.57	-3.85	-2.87
Hungary	1999-2012	1.64	1.22	1.12	1.37
Ireland	2000-2010	-0.28	1.23	1.19	1.31
Italy	1995-2010	0.68	0.07	-0.32	1.06
Netherlands	1999-2010	1.29	0.35	0.15	0.98
Slovak Republic	1996-2010	2.34	2.87	2.76	3.20
Slovenia	1997-2010	2.25	2.05	2.02	2.53
Spain	2000-2010	0.91	0.59	0.14	-0.09
Sweden	1995-2005	3.52	2.40	2.51	2.72
United Kingdom	1999-2010	2.10	2.22	2.02	2.07
United States	2000-2013	0.65	0.92	0.81	0.07
Average		1.45	1.31	1.16	1.72

The comparison between GDHI and 'spendable income' reveals more modest differences between these growth rates, but still considerable – of the order of 0.3-0.5% - for certain countries (such as Czech Republic, Italy, Spain) over the period available. Comparing spendable income with mean income in the house-

hold surveys, though, reveals some much larger differences, and in a direction that may be unexpected given the initial source of concern being household incomes lagging behind national accounts aggregates. Mean disposable household income as measured in the surveys is seen to have grown considerably faster than spendable income in Austria, Belgium, Czech Republic, France, Greece, Italy, and the Netherlands, whereas it lagged behind spendable income in the national accounts to a substantial degree only in the USA. This may well be specific to the period covered, but is nonetheless striking.

Recent studies such as Endeweld and Alkemade (2014) comparing national accounts and LIS survey data by income source, like other such studies on a national or comparative basis including those organized by the OECD and Eurostat referenced earlier, suggest that while differences in definition matter, surveys are particularly prone to 'missing' specific income sources such as income from capital and self-employment, as well as the tails of the income distribution. This is clearly of major concern where surveys are the basis for assessing income levels as the central indicator of living standards and their distribution, but might not necessarily have such serious implications in capturing changes in incomes and living standards over time for most of the distribution. However, our findings suggest that there can indeed be substantial differences in the income growth over time if one relies on household income in the national accounts versus household surveys, reinforcing the conclusion that efforts to bring together and integrate these sources more effectively need to be supported and intensified.

10 Conclusions

The evolution of GDP per capita may well diverge from the path of income of a 'typical' household as measured in household surveys. The stark contrast between growth in real GDP per capita of over 1.5% per annum versus stagnation (for the most part) in median household income in the USA has received considerable attention, in a context where GDP growth is widely employed as the core indicator of economic performance and living standards. This paper has investigated the extent of that divergence and the factors that contribute to it in a comparative context across 27 OECD countries, bringing together data from OECD National Accounts and the Luxembourg Income Study over recent decades.

Our results reveal first that while GDP per capita rose faster than median household income in most of these countries over the period covered (which differs across countries), the size of that divergence varied very substantially. In most cases it was much less than for the USA, which was also distinctive in combining such a large divergence with very little growth in the median in real terms – with Germany coming closest to that experience among the major economies.

The paper then distinguished and examined a number of factors which can contribute to producing a divergence between growth in GDP per capita and

median household income: differences between price deflators, between GDP and GNI, between national accounts and household survey per capita mean incomes, between per capita and equivalised mean income, and between the mean and the median of the household income distribution. Each of these factors other than the difference between GDP and GNI was found to make a substantial contribution in accounting for the overall divergence in the case of the USA, but once again this was seen to be far from typical, with wide variation across countries in the impact of the various factors. Falling household size was the most consistent in its impact, often a more substantial contributor than rising inequality to the GDP per capita-median household income gap.

To further complicate the picture, both the extent of that divergence and the role of the various contributory factors were seen to vary widely over time for most of the countries studied. Household size was again the most consistent factor in both the scale and direction of its effects across time. For the other factors, however, not only the size but sometimes the direction of the effect varied from one sub-period to another. Within the elements coming from household surveys, the divergence between mean per capita and median equivalised income can be explained by reference to the evolution of the Gini coefficient and average household size. Within the elements coming from the national accounts, the impact of differing price deflators varies widely, but the GDP-GNI distinction is important for only a small number of countries.

The gap between GNI per capita from the national accounts and mean household income as seen in the household surveys is then a key focus, which we explored over the shorter period for which the components of household sector income are distinguished in the national accounts. This showed that the differences between GNI and household sector income, between the latter and a 'spendable income' concept also derivable from the national accounts but excluding items that will not (generally) be measured in household surveys, and between that figure and income as actually measured in household surveys each contributes to the GNI-mean household income gap that itself is often responsible for a substantial proportion of the overall GDP per capita-median household income divergence.

Taken together, these findings have serious implications for the monitoring and assessment of changes in incomes and living standards for 'middle' or typical households over time. Atkinson et al. (2015) conclude on the basis of their comparison between median household equivalised income and GDP per capita for EU countries from 2005 to 2011 that the trends in the two sources seem in general consistent. Our findings over a longer period across OECD countries are less reassuring, with the 'story' often depending on the indicator chosen; furthermore, the divergence between them is the product of different factors at different times, sometimes related to factors such as changes in producer versus consumer prices, falling household size or increasing inequality that may be teased out but on other occasions due to differences between national accounts and survey-based figures that are much less easy to interpret. This reinforces the conclusion that efforts to bring together and integrate these sources more effectively need to be supported and intensified. In the meantime, in assessing

how a country is performing there is no substitute for careful examination on a case-by-case basis of the various indicators available, how these have related to one another in the past in the country in question, and how the different drivers of potential divergence such as household size and income inequality appear to be evolving. No single indicator or source will reliably support judgements about success or failure in promoting real income growth.

References

Aaberge, R. & Atkinson, T. (2013). The median as watershed,. *Statistics Norway Discussion papers no. 749*.

Atkinson, T. (2013). Putting people first and macro-economic policy. *European Commission Economic Papers 481 (part II)*, (pp. 39–64).

Atkinson, T., Marlier, E., & Guio, A. (2015). Monitoring the evolution of income poverty and real incomes over time. *Centre for Analysis of Social Exclusion CASE Paper 188*.

Atkinson, T., Rainwater, L., & Smeeding, T. (1995). Income distribution in oecd countries: The evidence from the luxembourg income study, organization for economic cooperation and development. *OECD*.

Boarini, R., Murtin, F., & Schreyer, P. (2015). Inclusive growth: The oecd measurement framework. *OECD Statistics Working Papers, 2015/06*.

Causa, O., de Serres, A., & Ruiz, N. (2015). *Can Pro-Growth Policies Lift all Boats?* OECD Economics Department Working Papers, Organisation for Economic Co-operation and Development, Paris.

Commission, E. (2014a). Employment and social developments in europe 2013. *Publications Office of the European Union Luxembourg*.

Commission, E. (2014b). Eu employment and social situation quality review: Towards a better measurement of welfare and inequalities. *Publications Office of the European Union*.

Coyle, D. (2015). *GDP: A Brief but Affectionate History*. Princeton University Press.

Deaton, A. (2005). Measuring Poverty in a Growing World (or Measuring Growth in a Poor World). *Review of Economics and Statistics*, 87(1), 1–19.

Endeweld, M. & Alkemade, P. (2014). Lis micro-data and national accounts macro-data comparison: Findings from wave i-wave viii. *LIS Technical Working Paper Series no. 7*.

Ferreira, F. H. G., Lustig, N., & Teles, D. (2015). Appraising cross-national income inequality databases: An introduction. *The Journal of Economic Inequality*, 13(4), 497–526.

Fesseau, M. & Mattonetti, M. (2013). Distributional measures across household groups in a national accounts framework: Results from an experimental cross-country exercise on household income, consumption and saving. *OECD Statistics Working Papers, No. 2013/04*.

Fesseau, M., Wolff, F., & Mattonetti, M. (2013). A cross-country comparison of household income, consumption and wealth between micro sources and national accounts aggregates. *OECD Statistics Working Papers, No. 2013/03*.

Fixler, D. & Jaditz, T. (2002). An examination of the difference between the cpi and the pce deflator. *Bureau of Labor Statistics Working Paper no. 361*.

Fixler, D., Johnson, D., & Craig, A. Furlong, K. (2015). *A consistent data series to evaluate growth and inequality in the national accounts*. Technical report, Bureau of Economic Analysis.

Gornick, J. & Jäntti, M. (2014). *Income Inequality: Economic Disparities and the Middle Class in Affluent Countries*. Stanford: Stanford University Press.

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 Papers no. 122*.

Jenkins, S., Brandolini, A., Micklewright, J., & Nolan, B. (2012). *The Great Recession and the Distribution of Household Income*. Oxford: Oxford University Press.

Jorgenson, D. W., Landefeld, J. S., & Schreyer, P. (2014). *Measuring Economic Sustainability and Progress*. University of Chicago Press.

Lequiller, F. & Blades, D. (2006). *Understanding National Accounts*. OECD, 2 edition.

LIS (2015). Micro data runs for multiple countries completed in september 2015.

Mishel, L. (2012). The wedges between productivity and median compensation growth. *EPI issue brief no. 330*.

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

OECD (2013). *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth*. Paris: OECD.

OECD (2015a). *The drivers of differences between GDP and household adjusted disposable income*. Paris: OECD.

OECD (2015b). *Economic Surveys: Luxembourg*. Paris: OECD.

Peichl, A., Pestel, N., & Schneider, H. (2012). Does Size Matter? The Impact of Changes in Household Structure on Income Distribution in Germany. *Review of Income and Wealth*, 58(1), 118–141.

Pessoa, J. P. & Van Reenen, J. (2013). Decoupling of wage growth and productivity growth? myth and reality. *CEP Discussion Paper No 1246*.

Pinkovskiy, M. & Sala-i Martin, X. (2016). Lights, Camera ... Income! Illuminating the National Accounts-Household Surveys Debate. *The Quarterly Journal of Economics*, (pp. qjw003).

Ravallion, M. (2015). The Luxembourg Income Study. *The Journal of Economic Inequality*, 13(4), 527–547.

Smeeding, T. M. & Weinberg, D. H. (2001). Toward a Uniform Definition of Household Income. *Review of Income and Wealth*, 47(1), 1–24.

Stiglitz, J., Sen, A., & Fitoussi, J.-P. (2009). *Report of the Commission on the Measurement of Economic Performance and Social Progress*. Technical report.

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*.

Thewissen, S., Nolan, B., & Roser, M. (2016). Incomes across the distribution database. *https://ourworldindata.org/incomes-across-the-distribution*.

Törmälehto, V.-M. (2011). Lis and national accounts comparison. *LIS Technical Working Paper Series no. 2*.

Zucman, G. (2015). *The Hidden Wealth of Nations: The Scourge of Tax Havens*. Chicago: University of Chicago Press.

Appendices

Table A.1: Decomposing the GDP-median household income divergence in different orders

		(A) CAGR %		Discre-	(B) ppt contribution					(C) % contribution				
		GDP pc DOB	Median equiv	pancy (ppt)	National income	NA vs HS	Inequa- lity	House- hold size	Prices	National income	NA vs HS	Inequa- lity	House- hold size	Prices
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Australia	1981-2010	1.83	1.21	0.62	0.08	0.01	0.16	0.24	0.13	14	1	25	39	21
Austria	1994-2004	2.13	0.92	1.21	0.02	0.54	-0.13	0.28	0.50	2	45	-11	23	41
Belgium	1985-2000	2.25	1.95	0.31	-0.16	-0.60	0.77	0.46	-0.16	-54	-196	250	151	-52
Canada	1981-2010	1.32	0.73	0.59	-0.05	0.22	0.04	0.24	0.14	-9	37	7	40	24
Czech Rep	1992-2010	2.65	2.85	-0.20	0.41	-1.25	0.17	0.25	0.22	-210	639	-88	-130	-110
Denmark	1987-2010	1.20	0.86	0.34	-0.15	0.36	0.03	0.08	0.02	-45	105	10	23	6
Estonia	2000-2010	3.62	6.14	-2.52	0.16	-0.80	-0.68	0.24	-1.44	-6	32	27	-10	57
Finland	1987-2010	1.83	1.42	0.41	-0.08	-0.01	0.25	0.28	-0.03	-19	-3	62	68	-7
France	1978-2010	1.45	0.85	0.59	-0.05	0.18	-0.14	0.42	0.18	-9	31	-24	72	31
Germany	1984-2010	1.64	0.55	1.09	-0.02	0.56	0.06	0.28	0.21	-2	51	6	26	19
Greece	1995-2010	2.06	2.00	0.06	0.30	-0.51	-0.25	0.32	0.19	535	-898	-445	573	334
Hungary	1991-2012	1.92	-0.22	2.14	0.17	0.96	-0.06	0.47	0.61	8	45	-3	22	29
Iceland	2004-2010	0.61	-0.18	0.80	2.19	-1.78	-0.61	0.36	0.64	275	-224	-76	45	80
Ireland	1987-2010	4.17	3.19	0.99	0.47	-0.05	-0.12	0.54	0.15	47	-5	-12	55	15
Israel	1986-2010	2.14	1.59	0.56	-0.20	0.30	0.14	0.20	0.11	-35	53	26	37	20
Italy	1986-2010	1.06	0.83	0.24	-0.01	0.07	0.01	0.44	-0.26	-5	27	3	182	-108
Luxembourg	1985-2010	3.23	2.81	0.42	0.76	-0.25	0.11	0.17	-0.36	179	-59	25	40	-85
Netherlands	1993-2010	1.89	1.34	0.56	-0.04	0.38	-0.16	0.44	-0.06	-8	68	-28	79	-11
Norway	1979-2010	2.06	2.38	-0.32	-0.15	0.20	-0.11	0.33	-0.60	46	-63	35	-102	183
Poland	1992-2010	4.46	1.56	2.90	-0.13	2.02	0.24	0.27	0.50	-4	70	8	9	17
Slovak Rep	1992-2010	4.36	2.23	2.13	0.16	-0.16	0.20	0.18	1.74	8	-7	9	9	81
Slovenia	1997-2010	2.77	1.96	0.82	0.11	-0.28	-0.05	0.63	0.41	14	-35	-6	76	50
Spain	1980-2010	1.90	1.71	0.20	0.02	-0.16	-0.15	0.66	-0.17	8	-79	-77	334	-86
Sweden	1981-2005	1.98	1.89	0.09	-0.08	0.30	0.21	-0.21	-0.13	-82	326	230	-228	-147
Switzerland	2000-2004	0.40	0.59	-0.19	0.07	0.21	-0.72	-0.02	0.26	-38	-111	375	10	-137
UK	1979-2010	1.94	1.73	0.21	-0.05	0.01	0.22	0.41	-0.38	-23	3	105	197	-182
US	1979-2013	1.60	0.32	1.27	-0.09	0.32	0.28	0.17	0.59	-7	25	22	13	47
Average		2.17	1.60	0.57	0.14	0.03	-0.01	0.30	0.11	24	5	-2	53	20
Standard dev		1.04	1.26	0.97	0.47	0.69	0.31	0.19	0.54	131	238	137	145	105

Legend: > 0.50 ppt < -0.50 ppt

Table A.2: Decomposing the GDP-median divergence over time for a fixed set of countries

Years (approximately)	1980-2010	1980-1987	1987-1992	1992-1997	1997-2001	2001-3004	2004-2007	2007-2010
No countries included	5	5	5	5	5	5	5	5
(A) Basic trends (CAGR %)								
GDP pc DOB	1.72	1.51	2.15	1.81	3.17	1.99	1.75	-0.71
GDP pc CPI	1.65	1.03	2.10	1.26	3.18	2.45	2.57	-0.93
GNI pc CPI	1.67	0.94	1.92	1.42	3.40	2.51	2.43	-0.82
Mean pc	1.59	0.66	2.39	0.98	3.12	1.47	3.60	-0.62
Mean equiv	1.34	0.28	2.11	0.76	2.88	1.18	3.40	-0.68
Median equiv	1.14	-0.03	1.83	0.29	2.81	1.24	3.48	-0.92
Discrepancy (ppt)	0.58	1.54	0.31	1.52	0.36	0.75	-1.73	0.21
(B) ppt contribution								
Prices	0.06	0.48	0.04	0.55	-0.01	-0.46	-0.82	0.23
National income	-0.02	0.09	0.18	-0.16	-0.22	-0.07	0.14	-0.12
NA vs HS	0.08	0.28	-0.46	0.45	0.27	1.04	-1.17	-0.20
Household size	0.25	0.39	0.27	0.21	0.25	0.29	0.20	0.07
Inequality	0.20	0.31	0.28	0.47	0.07	-0.06	-0.08	0.24
(C) % contribution								
Prices	11	31	14	36	-3	-62	48	107
National income	-3	6	58	-11	-60	-9	-8	-54
NA vs HS	14	18	-148	30	77	140	68	-94
Household size	44	25	86	14	69	39	-12	31
Inequality	35	20	89	31	19	-8	4	110

Legend: > 0.50 ppt < -0.50 ppt