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Assessing income redistribution: what are the key analytic choices?

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Abstract

We present the extent of divergence in the literature on the stylised facts about income redistribution in rich countries. Analytical choices that underpin this divergence are then identified and investigated empirically using microdata for 30 European countries. In terms of direct redistribution via cash transfers and direct taxes, whether social insurance pensions are treated as redistribution – the conventional approach – or as market income – as in some recent studies – is seen to be critical. When the analysis is extended to include indirect taxes and non-cash benefits from state spending, they work in opposite directions and generally have only a limited net redistributive impact. Being able to attribute the benefits of such spending to households in more satisfactory ways is a priority. Whether household survey data are 'corrected' to include missing incomes at the top as well as imputed rent of owner-occupiers and undistributed profits of companies is also seen to have a substantial impact on the scale of measured redistribution. Finally, extending the scope of redistributive analysis to include all of national income, as in recent studies from a Distributional National Accounts perspective, is investigated. This underlines the implications of including state spending on collective goods such as security and infrastructure, without a clear rationale for how it is meaningfully allocated across households.

KEYWORDS
inequality, redistribution, top incomes, Distributional National Accounts

JEL CLASSIFICATION
D31, D63, H23, N30

1 | INTRODUCTION

Redistribution and how it affects income inequality has been the topic of a substantial research literature going back decades using household microdata to compare incomes before redistribution with those after social transfers have been received and direct taxes paid. The influential early study by Atkinson, Rainwater and Smeeding (1995) was followed by among others Pontusson and Kenworthy (2005), Jesuit and Mahler (2010), Immervoll and Richardson (2011), OECD (2011 and 2015) and Causa and Hermansen (2020). These provide the empirical underpinning for the widely held understanding that rich countries differ substantially in the extent of redistribution by the state and that this is central to the variation across them in disposable income inequality.

The ranking of countries in those terms is generally regarded as well established, but there are in fact important differences across studies in how much direct redistribution individual countries are achieving and thus how they rank in those terms. Furthermore, while redistribution is generally seen as driven primarily by the operation of cash social transfers rather than direct taxes and social insurance contributions, this is strongly contested by among others Fuest, Niehues and Peichl (2010), Avram, Levy and Sutherland (2014) and Guillaud, Olckers and Zemmour (2020). Going beyond cash incomes, the measured redistributive impact of state spending on health and education services ('non-cash benefits') and the indirect taxes paid by households and their importance compared with direct transfers/taxes also varies across studies. Even more problematically, employing Distributional National Accounts, Piketty and colleagues at the World Inequality Lab (WIL) have recently argued that it is differences in pre-redistribution inequality rather than in redistribution that account for the higher level of inequality in the USA than in Western Europe (Bozio et al., 2020; Blanchet, Chancel and Gethin, 2022).

The extent of this divergence in the literature with respect to the central 'stylised facts' about redistribution represents an under-appreciated and major challenge. Why is it so difficult to arrive at a consensus about which components of the redistributive capacity of the state are most effective in bringing about redistribution and how much redistribution versus pre-redistribution inequality accounts for the variation in inequality levels across countries and over time? This paper tackles that challenge by first identifying the main analytical choices involved in measuring redistribution. We bring out how these choices differ in nature, with some driven primarily by data availability whereas others depend on the precise aim of the exercise or on the underlying conceptual underpinning and assumptions.

We then assess empirically with survey and other data for 30 European countries which of these choices actually make the most difference to the extent and nature of measured redistributive impact. We find that in terms of direct redistribution via cash transfers and direct taxes, it is whether social insurance pensions are treated as redistribution – the conventional approach – or as market income – as in some recent studies – that is critical. Averaging across the 30 countries, under the conventional approach the Gini coefficient for factor income is 0.49 while the Gini for disposable income is 0.30, with the impact of contributory pensions accounting for close to half of that reduction.

When the analysis is extended to include indirect taxes and non-cash benefits from state spending, these work in opposite directions and mostly have only a limited net redistributive impact, with the average Gini across the 30 countries when they are both included at 0.32. Whether household survey data are 'corrected' to include missing incomes at the top as well as imputed rent of owner-occupiers and undistributed profits of companies is then found to have a substantial impact on the scale of measured redistribution.

Finally, extending the scope of redistributive analysis to include all of national income, as in recent studies from a Distributional National Accounts (DINA) perspective, brings out the substantial impact of including government income in pre-tax income and of the choice of allocation rule employed for government spending. Moving from allocating that spending in proportion to income to allocation on a per-capita basis reduces the average Gini across the 30 countries from 0.34 to 0.26, with much of that reduction being attributable to health spending.

Overall, our findings serve to highlight the key choices faced in assessing the extent and nature of redistribution and the core conceptual, methodological and data considerations they involve. It is important to emphasise that our focus, like most of the literature on the topic, is on cross-sectional income rather than income over the life cycle. Redistribution measured over the life cycle will look very different, in particular with respect to social insurance pensions and health and education spending, while the distributional impact of indirect taxes will also be affected by consumption smoothing over time (see for example Hills (2017)). Research from that perspective represents an essential complement to the literature on cross-sectional redistribution to which we are contributing here. Income allows consumption which contributes to welfare, and inequality in welfare is the ultimate source of interest, but both current and long-term income and how they are distributed and redistributed are central building blocks.

2 | MEASURING REDISTRIBUTION: KEY ANALYTICAL CHOICES

To understand why findings vary so substantially among redistribution studies, key analytical choices can be identified as follows.

1) What cash income sources or types are to be taken as 'income from the market / factor income' and what types are to be counted as redistribution?
   In defining the point of departure in terms of 'market/factor income', a major issue is how pensions from social insurance and from employer-based occupational schemes are to be treated. A common practice, consistent with, for example, the Canberra Report guidelines on survey income concepts and measures (Canberra Group, 2011), is to treat occupational pensions as income 'from the market' but take social insurance pensions as representing redistribution. This gives rise to considerable debate, however, given that both serve a similar purpose and represent a return on entitlements built up over one's working career. Piketty and colleagues, for example, argue in a DINA context that neither should count as redistribution; indeed, they extend this argument to working-age social insurance benefits such as for unemployment and illness. Individual private pensions are generally not treated as redistribution, while the role of transfers between households has received little attention (though see Gornick and Smeeding (2018)).
2) Are employer social insurance contributions included in the analysis and, if so, with what incidence assumptions?
   While social insurance contributions by employees are conventionally counted alongside income taxes as redistribution, contributions by employers are often not included. While the incidence of the latter can be debated, Guillaud, Olckers and Zemmour (2020) for example argue that their exclusion primarily reflects difficulties in adequately capturing them in household surveys and impute them in their analysis, as does the microsimulation-based study by Avram, Levy and Sutherland (2014). The European Union Statistics on Income and Living Conditions (EU-SILC) began recording them in 2007, focusing on legal or mandatory contributions, separately documenting any voluntary contributions by employers.
3) Is imputed rent for owner-occupiers to be included in the analysis and, if so, on what basis?
   In measuring household income, a case can be made for including the benefit from owning one's house as 'imputed rent', reflected in both the UN's System of National Accounts (SNA) and the Canberra Group Handbook on household income statistics. Failure to include imputed rent until recently has reflected difficulties in agreeing how best to estimate it and obtaining the information required, but estimates are now included in for example the EU-SILC harmonised data for EU countries and have been analysed by Sauli and Törmälehto (2010) and Törmälehto and Sauli (2017).

4) Is the scope of the analysis to go beyond cash incomes, direct taxes and cash benefits to incorporate the benefits of state spending on services such as health and education and the indirect taxes paid by households and, if so, how are these to be valued and allocated among households?
   So far we have been discussing studies that relate to disposable income, but some comparative redistribution studies have sought to also incorporate the benefits from state spending on services such as health, education and housing subsidies as well as indirect taxes to assess that broader redistributive impact (see for example Aaberge et al. (2010), Garfinkel, Rainwater and Smeeding (2006), Paulus, Sutherland and Tsakloglou (2010) and Hérault and Jenkins (2022)). Their standard practice is to assume that the value of the services provided is equal to the costs of provision, while the allocation of benefits to households can reflect actual service utilisation by household members or, for healthcare, an insurance value of entitlement on the basis of utilisation patterns by (at least) age and gender.
5) Is the scope of the analysis to be extended to encompass national income in its entirety and, if so, how is the allocation across households of the various additional income components involved to be carried out?
   Researchers from the World Inequality Lab led by Thomas Piketty have recently extended the scope of redistributive analysis considerably further (Bozio et al., 2020; Blanchet, Chancel and Gethin, 2022). Reflecting the distinctive aims and structure of the WIL Distributional National Accounts methodology, they include and attribute to households everything that goes to make up national income. The related recent work of the OECD Expert Group on Disparities in National Accounts (EG-DNA), by contrast, is also focused on distributional accounts but limits its attention to household income as defined in the SNA (Fesseau and Mattonetti, 2013; Zwijnenburg et al., 2021).[1]
6) In employing survey data to measure redistribution, what correction if any is to be made for incomes they miss, including at the top?
   Redistribution studies in the mainstream tradition have mostly relied on data from household surveys. The recent availability of estimates of top income shares from tax data for many rich countries has called into question the ability of those surveys to adequately capture incomes at the top, as well as incomes from certain sources (notably from capital) throughout the distribution. Some studies have investigated the gap between survey and tax-based figures in a comparative context (e.g. Carranza, Morgan and Nolan, 2022), and the WIL-DINA studies combine household survey data with tax/administrative data and National Accounts to achieve more complete coverage.[2]
7) Is the analysis to cover the entire population or those of working age only, and how are the latter best distinguished empirically?
   While many studies cover the entire age distribution, a significant proportion restrict attention to those of working age, often as a way to avoid the issues arising with respect to the treatment of pensions noted above. It is also noteworthy that there is then significant variation across these studies in the age cut-offs used to identify 'working-age households' and in how these are applied.
8) What unit of analysis is to be employed in measuring redistribution and are incomes to be equivalised?
   In conventional inequality analysis, household income is equivalised to adjust for the size (and perhaps composition) of the household to account for economies of scale from living together and is attributed to each member of the household as the unit of analysis. WIL-DINA-based analyses,

[1] Other differences include: WIL-DINA studies income and wealth whereas EG-DNA studies income, consumption and savings; DINA mainly focuses on adults while EG-DNA looks at households and equivalises income; DINA presents results across percentiles, further unpacking the top 1 per cent, whereas EG-DNA mostly does so for income quintiles; DINA relies on tax data to adjust surveys while EG-DNA uses both survey and administrative data depending on what is available at the country level (Zwijnenburg, 2019).

[2] The UK's long-running 'Effects of taxes and benefits on UK household income' series produced by the ONS has also introduced such a correction (e.g. Office for National Statistics, 2019).

by contrast, usually measure income at the individual adult or couple level among working-age adults (to allow for alignment with tax data) and do not equivalise as that would create a wedge between its income aggregates and national income totals.[3]

Our analysis deals with the first six of these choices. It does not cover the seventh as use of the entire sample/population versus only the working-aged has already been probed in studies including Caminada et al. (2019) and Guillaud, Olckers and Zemmour (2020), so our analysis relates to full rather than working-age samples throughout. It also does not engage with the eighth question as, in our view, the role of the unit of analysis and approach to equivalisation merits a separate paper in itself, so our analysis equivalises household income using the modified OECD equivalence scale and attributes this to individual members.

We set out in the next section how we investigate the empirical salience of choices 1–6. It is worth noting that for some of these choices, data availability is a critical consideration – there would be broad agreement, for example, that employer social insurance contributions should in principle be included but the available data often make this problematic. Data availability is also often an issue for imputed rent of owner-occupiers, though in that case there would also be more debate about whether that is necessarily to be included. Data availability is also clearly a major consideration when it comes to adjusting for missing incomes at the top, though whether such adjustment is necessary or appropriate would also be debated. What constitutes pre-redistribution and what to include as redistribution in cash terms certainly remains open for vigorous debate, as do the most satisfactory ways to include the benefits from state spending on health and education if these are to be included. Finally, while the choice about whether to extend the scope of the redistributive analysis to encompass all of national income depends on the nature and goal of the exercise being undertaken, whether this is the most satisfactory way to assess redistribution is open for debate and a question to which we return in concluding.

3 | INVESTIGATING REDISTRIBUTION: MEASUREMENT CHOICES AND DATA SOURCES

This section first describes the various income concepts employed in our analysis and how they are constructed, and then discusses data sources and associated restrictions.

3.1 | Income concepts

The income concepts we employ can be thought of as comprising four groupings. First, we have cash incomes as measured in household surveys, going from pre-redistribution to disposable incomes. Second, we go beyond disposable income to include both in-kind transfers and indirect taxes in the analysis, attributing these to households in the surveys. Third, to deal with the issue of incomes generally 'missed' in surveys for various reasons, we adjust the survey data at the top using external information as well as adding in imputed rent and undistributed profits. Finally, we broaden the scope of the analysis to allocate the entirety of national income, following DINA to include other elements of corporate and government sector incomes.

Figure 1 provides a schematic presentation of the various concepts involved. Household surveys typically include three core income concepts, namely market, gross and disposable income. 'Market income' represents all income flows before the state has made any intervention, typically including wages and capital income. Gross income adds cash social transfers while disposable income deducts

[3] Some DINA measures divide a couple's income by 2 in a 'narrow' equal split or divide total income by the number of household members in a 'broad' equal split.

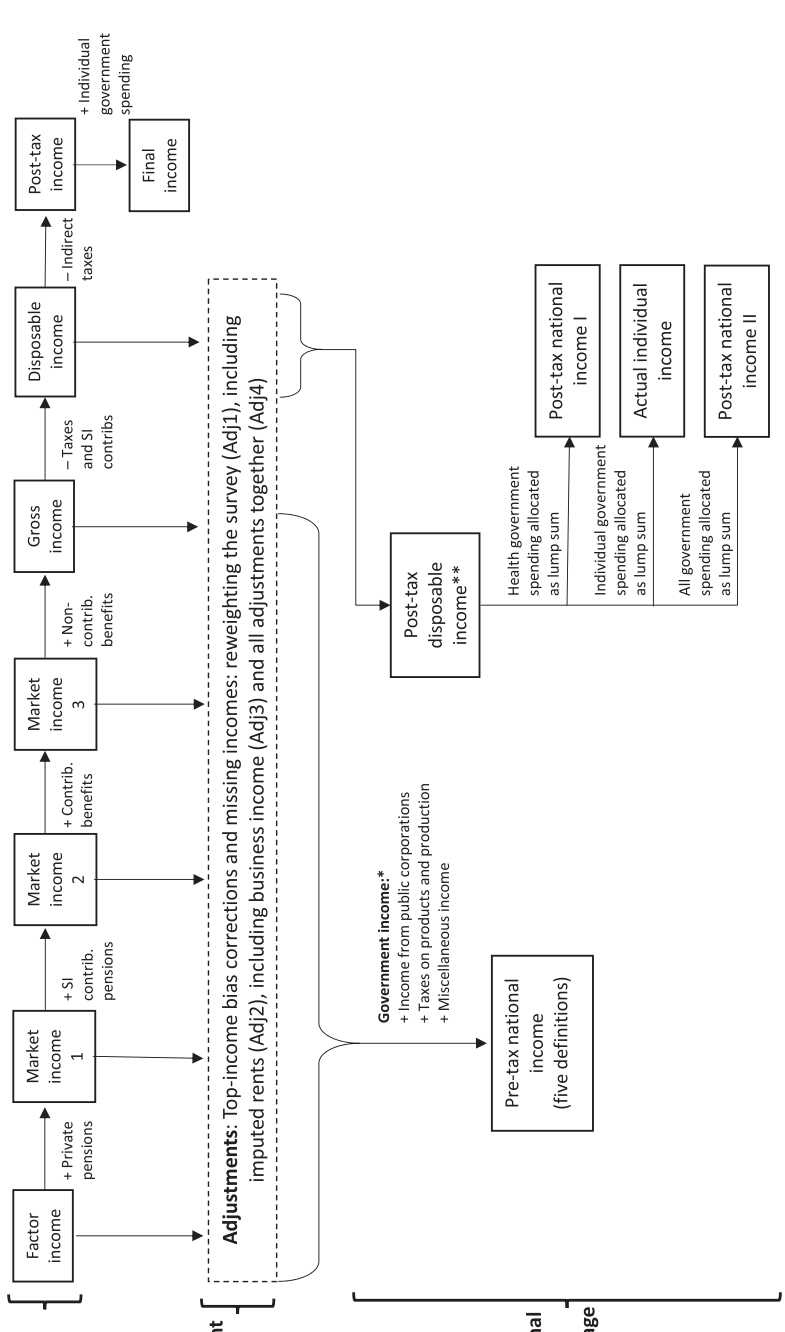

FIGURE 1 Detailed construction of all income concepts (survey, adjusted and DINA). * All taxes are allocated in proportion to gross income. Alternatively, taxes on products can also be allocated in proportion to household consumption. ** This measure is equivalent to assuming that all government income is allocated proportionally, thus leaving any relative inequality index unchanged. *Note*: SI = social insurance. The figure reports all income concepts and adjustments used in our analysis. Income concepts are described going from left (factor income) to right (post-tax income), while adjustments go from top (survey-based measures) to bottom (DINA-based measures).

direct taxes and social insurance contributions. Comparing income inequality under these concepts is the standard approach to assessing the impact of cash transfers and direct taxes.

What is counted as 'market income' is then key. Factor income covering flows stemming from the ownership of labour or capital plus private pensions seen as deferred earnings represents our first definition. A second market income concept adds public social-insurance-based contributory pensions, while a third adds other contributory benefits (on the basis that these reflect entitlements also 'earned' by activity in the labour market). Both factor and market income concepts include employer social insurance contributions which are to be deducted alongside employee contributions when going from gross to disposable income. In a first stage, we assess the extent of redistribution by comparing income inequality under each of these concepts with inequality in disposable income.

We then go beyond cash income to incorporate the indirect taxes paid by households, such as value-added taxes and excise duties on alcohol, tobacco and energy, and the in-kind benefits they receive from government spending on health and education as shown in the last column of the 'survey stage' in Figure 1. Using the terminology employed by the UK ONS's redistributive analyses (Office for National Statistics, 2022), we refer to disposable income minus indirect taxes as 'post-tax income', while allocating government spending on health and education then produces 'final income'. For convenience, we draw on the distributions of indirect taxes and 'individual government spending' (used as a measure of in-kind benefits) by country produced by Blanchet, Chancel and Gethin (2022) (with full details on the data and methods employed provided in their online appendix) to capture these components empirically. These allocate indirect taxes in proportion to consumption as measured in household budget surveys, merged to EU-SILC by ranking households according to disposable income and attributing average consumption at each percentile of the income distribution.[4] They allocate government spending on education, housing and health as an average lump sum to each household, a simplifying assumption which may not accurately capture their actual redistributive impact. Investigating alternative allocation methods discussed in the broader literature would clarify the redistributive impact of these benefits more comprehensively but this is very difficult to do in a satisfactory and consistent manner across 30 countries, so here our more limited aim is to be able to include them in a broader comparative evaluation of overall redistribution.

Focusing on incomes missed in surveys, three aspects are covered here as potentially affecting measures of redistribution, as shown in the 'adjustment stage' of Figure 1. The first, receiving considerable attention in recent literature, is that most surveys fail to adequately capture incomes at the very top of the distribution due to lower response rates combined with non-reporting and under-reporting of certain income types.[5] Here we rely on reweighting the survey data to address this issue, modifying survey weights so that top income shares match those estimated by the World Inequality Lab from (primarily) income tax data. This follows the 'correction' approach described in detail in Blanchet, Chancel and Gethin (2022) and Carranza, Morgan and Nolan (2022).[6] This employs standard survey calibration methods aiming to minimise the distance between the original and new survey weights subject to reweighted survey top income shares matching external top income shares, which are mostly taken from the World Inequality Database figures based on 'fiscal' (i.e. pre-tax-and-transfers) income complemented in a few cases by new or updated estimates (for details, see the online appendix to Blanchet, Chancel and Gethin (2022)).

[4] Note that this approach differs from what is suggested in the DINA guidelines, which recommend allocating indirect taxes in proportion to disposable income minus savings, with saving rates obtained from external sources (World Inequality Lab, 2021), but this is on the assumption that consumption data are not available.

[5] The literature has also highlighted mismeasurement issues elsewhere in the income distribution rather than at the top, such as under-reporting of cash benefits towards the bottom and labour income across the broad middle – see, for example, Jenkins (2021); these are not covered here as we follow the dominant concentration of the literature on the 'missing top'.

[6] See also the in-depth discussion of top income correction in Blanchet, Flores and Morgan (2022). Note also that Blanchet, Chancel and Gethin (2022) further adjust the surveys including replacing the top 10 per cent with random draws of a generalised Pareto distribution to increase sample size and provide more robust estimates of the top 0.1 per cent or 0.01 per cent, but that is not relevant here as we do not include those groupings in our analysis.

The second aspect of 'missed' income is imputed rents for owner-occupiers which have generally not been included in comparative studies of redistribution. Owning one's own house can free up resources for other uses, and in principle – as recommended by the Canberra Group – imputed rent should be included in survey-based estimates of income, but difficulties in the estimation process mean that this has only been done in EU-SILC relatively recently. This database now includes estimates of imputed rent for owner-occupier households produced by each country following guidelines set out by Eurostat to maximise comparability (though some differences in implementation remain), and we can make use of those estimates here.

The third aspect is the treatment of the undistributed profits of businesses. This is not a component of household income as conventionally measured in household surveys, but business profits, whether distributed or not, can be seen as returns to capital so, in the spirit of accounting for all income sources accruing to both labour and capital, we investigate how much difference it makes if undistributed as well as distributed profits are included in the assessment of redistributive impact. To do so, we use estimates produced by Blanchet, Chancel and Gethin (2022) by constructing measures of the ownership of stocks and other financial assets by position in the income distribution for each country and allocating National Accounts business profits to households in proportion to their financial assets.[7]

The final stage is to apply the DINA framework to allocate the entirety of national income across households, including not only undistributed business profits and individual government spending but also collective government spending as shown in the 'Distributional National Accounts stage' of Figure 1. (Note that since our results are based on equivalised household income among persons and cover the full age range, they are not directly comparable with the DINA output produced by WIL researchers, and there are also some relatively minor differences with respect to the pre-tax income concept where DINA includes some tax-exempt capital income components not available in EU-SILC.) Undistributed profits are allocated as described above, but the treatment of government spending is more complex, including for individual government spending, than our 'survey stage' analysis above (where we exploited the availability of relevant WIL-DINA output but were not engaged in the full-scale DINA exercise). For pre-redistribution income the DINA exercise allocates government income to households in proportion to their gross income, whereas for post-redistribution income it is government spending that is allocated, and this is done either proportionally to disposable income or equally across households. These allocation rules do not have a clear intuition but rather represent two 'extreme' allocations – one where relative inequality will remain unchanged and another where absolute income differences will remain unchanged. (The latter may not be the upper bound on redistributive impact as actual government expenditure could well be more progressive; see for example Fisher-Post, Hérault and Wilkins (2022).) This has important implications for redistributive analysis, as it drastically changes the allocation of the government sector when going from pre- to post-tax income. Indeed, the WIL documentation makes clear that capturing fiscal incidence is not the purpose of DINA (World Inequality Lab, 2021) which closely follows the National Accounts accounting framework.

As noted earlier, our analysis is based throughout on household income equivalised using the modified OECD equivalence scale and covering the full rather than only working-age samples. We measure inequality using both the Gini concentration index and the top 1 per cent share and assess redistribution by a sequential analysis going from, for example, market to gross income, gross to disposable income etc.[8] Due to the sequential nature of this approach, these changes are to be interpreted as marginal differences having accounted for previous income components. For presentational purposes, the Gini is reported in terms of values between 0 and 100, commonly referred to as 'Gini points'.

[7] Note that this being a National Accounting definition, undistributed business profits do not include capital gains.

[8] The presence of negative values can potentially bias estimation of the Gini. While this is not a major issue in this sample, we use the adjusted Gini suggested by Raffinetti, Siletti and Vernizzi (2015) which separates those reporting negative, zero and positive income. There is no such procedure for the Atkinson or the General Entropy inequality measures.

3.2 | Data sources

Our analysis is centred on the 2018 version of the European Union Statistics on Income and Living Conditions (EU-SILC) which is used by the EU to monitor trends in poverty and inequality and provides detailed information on household incomes, including contributory versus non-contributory benefits. These are merged with microfiles produced by WIL-DINA (based on a reduced version of EU-SILC) which have additional income components such as undistributed profits and indirect taxes and other business and government sector income, all allocated to EU-SILC households as described in the previous subsection. Microdata from the Household Finance and Consumption Surveys (HFCS) for most countries and the Wealth and Assets Survey (WAS) for the UK provide patterns of financial asset holdings across the household income distribution used in the allocation of undistributed profits. Data on consumption from the Household Budget Surveys (HBS) brought together by Eurostat are used in the allocation of indirect taxes. The National Accounts as presented by Eurostat provide core aggregates for the components of corporate and government sector income distinguished in the exercise. Finally, top income share estimates from the WIL database are employed in reweighting the survey data to correct top incomes as described above.

The 2018 version of EU-SILC covers 32 countries; we exclude Malta, for which there is no DINA microfile for 2018, and Slovakia, for which contributory and non-contributory benefits cannot be separately identified, so our analysis covers 30 countries (including the UK which was still in EU-SILC at that point).

4 | ESTIMATING REDISTRIBUTION: EMPIRICAL FINDINGS

We now present our findings working our way through the four different stages of the income adjustment process as presented in Figure 1:

- using cash income reported in household surveys going from factor to disposable income to assess the redistributive role of benefits, cash transfers and direct taxes;
- including indirect taxes and in-kind benefits;
- adding 'missing incomes' at the top of the income distribution as well as imputed rents and undistributed business income (with the impact of each of these assessed separately and then in combination);
- allocating all of government income/spending to capture national income.

We present results for the Gini in some depth, and then those for the top 1 per cent share in summary form.

4.1 | From factor to disposable income inequality

Table 1 presents the levels for the Gini coefficient and Figure 2 shows the change in the Gini when going from factor to disposable income for various definitions of market income. Moving from factor income to our first definition of market income, which adds private pensions, makes little difference to the Gini (the change in terms of Gini points is shown as circles). By contrast, including social-insurance-based contributory pensions in market income makes a substantial difference (triangles): the Gini falls by about 9 points on average, with a fall of 15 points in Greece and 12 points in France, Romania and Luxembourg. Norway, Denmark and the Netherlands see the smallest declines, of between 3 and 6 points.

TABLE 1 Gini index estimates for survey-based income concepts.

	Factor	Mkt1	Mkt2	Mkt3	Gross	Disposable	Post-tax	Final
Austria	0.493	0.491	0.383	0.360	0.326	0.268	0.315	0.264
Belgium	0.489	0.488	0.383	0.351	0.334	0.257	0.319	0.253
Bulgaria	0.548	0.548	0.457	0.444	0.415	0.396	0.589	0.498
Switzerland	0.448	0.446	0.359	0.339	0.309	0.297	0.302	0.287
Cyprus	0.467	0.465	0.408	0.392	0.334	0.291	0.355	0.315
Czechia	0.443	0.443	0.337	0.321	0.302	0.240	0.366	0.269
Germany	0.515	0.512	0.410	0.392	0.343	0.308	0.355	0.292
Denmark	0.499	0.499	0.451	0.432	0.314	0.276	0.345	0.270
Estonia	0.451	0.451	0.381	0.378	0.350	0.305	0.440	0.343
Spain	0.515	0.511	0.431	0.394	0.377	0.332	0.373	0.319
Finland	0.513	0.509	0.403	0.378	0.324	0.258	0.322	0.257
France	0.501	0.500	0.379	0.368	0.333	0.282	0.324	0.268
UK	0.539	0.534	0.448	0.444	0.384	0.335	0.381	0.334
Greece	0.548	0.548	0.401	0.374	0.353	0.322	0.430	0.359
Croatia	0.494	0.494	0.408	0.378	0.364	0.297	0.484	0.399
Hungary	0.484	0.484	0.375	0.361	0.334	0.287	0.527	0.412
Ireland	0.539	0.537	0.478	0.468	0.383	0.289	0.333	0.287
Iceland	0.362	0.362	0.305	0.283	0.266	0.232	0.267	0.225
Italy	0.515	0.515	0.421	0.393	0.376	0.334	0.378	0.329
Lithuania	0.514	0.514	0.442	0.428	0.405	0.369	0.529	0.415
Luxembourg	0.502	0.501	0.384	0.371	0.340	0.316	0.462	0.332
Latvia	0.500	0.500	0.433	0.424	0.398	0.356	0.487	0.405
Netherlands	0.480	0.480	0.424	0.409	0.331	0.273	0.322	0.248
Norway	0.452	0.450	0.419	0.398	0.292	0.242	0.286	0.228
Poland	0.465	0.465	0.353	0.332	0.301	0.278	0.428	0.338
Portugal	0.531	0.531	0.427	0.405	0.391	0.321	0.424	0.354
Romania	0.526	0.526	0.407	0.395	0.378	0.351	0.564	0.435
Serbia	0.540	0.540	0.453	0.419	0.410	0.352	0.614	0.444
Sweden	0.481	0.473	0.372	0.357	0.317	0.269	0.330	0.249
Slovenia	0.456	0.455	0.357	0.333	0.306	0.239	0.346	0.277
EU average	0.494	0.492	0.403	0.384	0.346	0.299	0.400	0.323

Note: Countries are listed in alphabetical order in terms of their EU country codes/acronyms. Factor income includes all income concepts stemming from ownership of capital and labour. Market income 1 (Mkt1) adds private pensions. Market income 2 (Mkt2) adds contributory pensions. Market income 3 (Mkt3) adds all other contributory benefits. Gross income adds non-contributory benefits (including pensions). Disposable income subtracts income taxes and social insurance contributions. Post-tax income subtracts indirect taxes, allocated in proportion to consumption. Final income adds individual government spending, allocated as a lump sum across all households. Both indirect taxes and in-kind transfers are scaled up to match their share of total national income. See Figure A1 in the online appendix for a diagram representing each step of the process. Gini coefficient considers non-positive values and is estimated following the normalisation proposed in Raffinetti, Siletti and Vernizzi (2015).

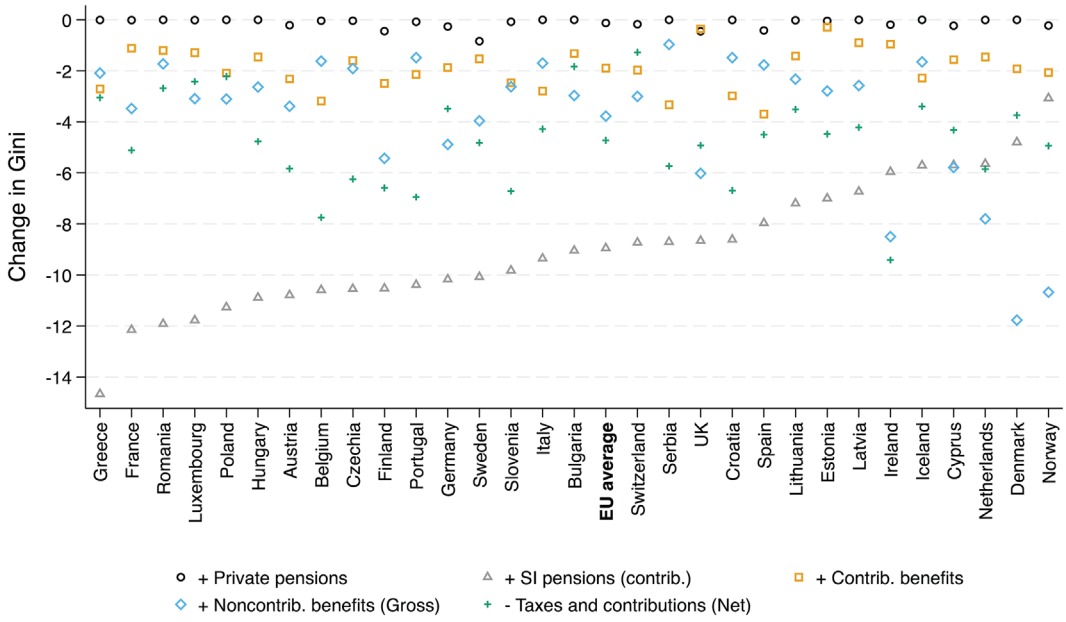

FIGURE 2 Sequential contribution of income components to the Gini index (survey income). *Note*: The figure shows the changes in inequality under standard survey-based definitions of income, as reported in the first six columns of the 'survey stage' in Figure 1. The sequential contribution of each component is defined as the difference in the Gini index between a given income concept and a second concept that includes such component. We begin with factor income (see Figure A1 in the online appendix), to which we add (1) private pensions, (2) SI-based contributory pensions, (3) other contributory benefits, (4) non-contributory benefits, achieving the standard 'gross income' concept, from which we deduct (5) taxes and contributions to get to disposable income. All estimates use equivalised income, rely on the standard survey weights and have not been adjusted. Gini coefficient considers non-positive values and it is estimated following the normalisation proposed in Raffinetti, Siletti and Vernizzi (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

Including other income components as market income has a much more limited impact on average, albeit with some heterogeneity. Adding all other contributory benefits (squares in Figure 2) reduces the Gini by about 2 points on average, with Spain, Serbia, Belgium and Croatia seeing declines of 3–4 points. The inclusion of non-contributory benefits (rhombuses) reduces the Gini by 4 points on average, but with much greater heterogeneity across countries. Serbia, Croatia and Portugal see almost no change, most other countries see a change of 2 or 3 points, whereas Ireland and the Netherlands see declines of 8 points and Norway and Denmark over 10 points (the last four countries doing most of their redistribution via non-contributory social benefits).[9]

Figure 2 finally shows that deducting direct taxes and social insurance contributions in going from gross to disposable income (plus signs) reduces the Gini by almost 5 points on average. These taxes and contributions make the least impact in Switzerland, Bulgaria and Poland but have a particularly substantial impact in Ireland, Belgium and Portugal, where the Gini is reduced by 7–9 points.

The total 'direct' redistributive effect of cash transfers and direct taxes is measured as the difference between the Gini for a given pre-redistribution income definition versus that for disposable income. Taking factor income as our measure of pre-redistribution income, the average total redistributive effect across countries is a very substantial 19 Gini points. Averaging across the 30 countries, the Gini coefficient for factor income is 0.49 while the Gini for disposable income is 0.30, with the impact of

[9] We find that the overall impact of each of the components is related to their relative size. Table A3 in the online appendix reports the average share of each component in disposable income. Across Europe, contributory pensions account for 19 per cent of disposable income, while the remaining contributory benefits account for 6 per cent and non-contributory benefits represent 12 per cent. As with any social transfer, its relative size is as important as its progressivity.

contributory pensions accounting for close to half of that reduction. To bring out how substantial this is, in terms of the variation in initial factor income inequality across countries it is equivalent to going from the highest factor income inequality countries (Bulgaria and Greece, at 0.55) all the way to the lowest (Iceland, at 0.36).

Including social-insurance-based contributory pensions as pre-redistribution income reduces the average redistributive effect to 10 Gini points (which is still equivalent to going from the level of factor income inequality in Bulgaria (0.55) to Norway (0.45)). Also counting other contributory benefits as pre-redistribution income brings the average redistributive effect down to 8.5, falling further to 5 when this is also the case for non-contributory benefits. While that is still equivalent to going from the highest factor income inequality country to the EU average, it is clear that the treatment of cash transfers makes a very substantial difference to the extent of measured direct redistribution.

Our benchmark estimations include employer social insurance contributions as part of pre-tax income, whereas as mentioned in Section 2 these have not always been included in previous redistributive exercises. It is thus noteworthy that excluding them decreases the redistributive contribution of taxes and contributions, from 4.7 to 3.6 points in terms of the average across countries, and increases the contribution of transfers by the same amount.[10]

4.2 | Incorporating indirect taxes and government spending on households

We now go beyond disposable income to incorporate indirect taxes and government spending that affects households, allocated across the distribution in the manner described in Section 3. Figure 3 reports their contribution to changing the Gini relative to disposable income, with the underlying Gini levels once again in Table 1. Deducting indirect taxes increases that Gini by 10 points on average, with this impact being largest for Serbia and Hungary (around 25 points) and Romania, Bulgaria and Croatia (about 20 points). Including individual government spending then reduces inequality by 8 points on average relative to post-tax income, with Serbia (17 points) followed by Luxembourg and Romania (13 points) seeing the largest reductions. The net effect of indirect taxes and in-kind transfers taken together, on average across the 30 countries, is a 2-point increase in the Gini; half the countries see an increase, six have zero net effect and the remaining nine see a slight decrease. The average Gini across the 30 countries increases to 0.40 when indirect taxes are added but comes down to 0.32 when in-kind transfers are then added.

On average, the net effect of incorporating both indirect taxes and in-kind benefits on inequality/redistributive impact is thus quite limited, but there is substantial variation across countries in the impact of each component and individual effects are sometimes particularly large (compared with those of direct taxes for example). Indirect taxes greatly increase inequality in Eastern European countries, by as much as 20–25 Gini points. This is partly because these taxes account for a major share of all taxation revenues there – approaching 50 per cent in Hungary. Even combining indirect taxes with in-kind transfers, the net impact in these countries is an increase in inequality of around 10 Gini points.

As noted earlier, the allocation procedure for in-kind benefits may underestimate their impact on inequality. More complex procedures explored in country-level analyses (e.g. Lustig, 2018) employ age-adjusted profiles for an insurance-based allocation of health spending, or allocate educational spending per pupil rather than per person and distinguish between early childhood, primary, secondary and tertiary education. Our results based on a simple common allocation rule across countries that does not consider the specifics of the institutional context in each provide a baseline for what the inclusion of in-kind benefits in an overall redistributive assessment can mean, which future comparative studies can elaborate.

[10] Contributory pensions account for 50 per cent of the increase, followed by non-contributory benefits (30 per cent) and other contributory transfers (20 per cent).

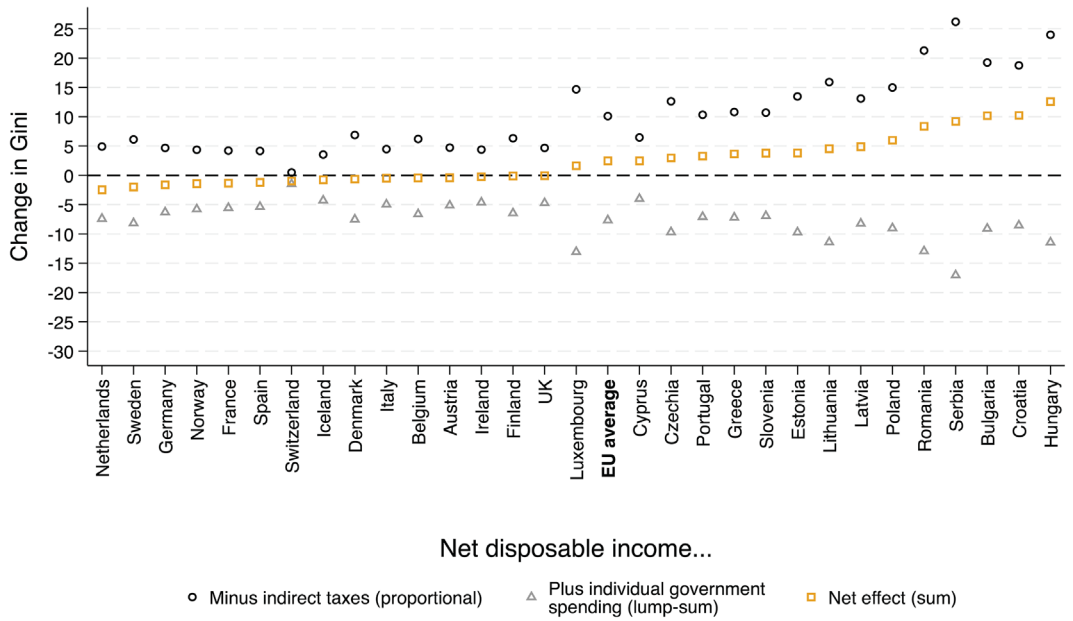

FIGURE 3 Contribution of indirect taxes and in-kind transfers to the Gini index. *Note*: The figure shows the change in inequality when accounting for taxes on consumption and non-cash benefits, as reported in the last column of the 'survey stage' in Figure 1. The circle is the difference between the Gini for disposable income and the Gini for disposable income minus indirect taxes. The triangle is the difference between the Gini for disposable income and the Gini for disposable income plus individual government income. The square is the sum of both, representing the net effect. All estimates use equivalised income and rely on the standard survey weights. Gini coefficient considers non-positive values and it is estimated following the normalisation proposed in Raffinetti, Siletti and Vernizzi (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

4.3 | Adjusting for top incomes, imputed rent and undistributed profits

We now focus on the impact of incorporating incomes missed in the surveys, returning for that purpose to the comparison between factor and disposable income. We start with missing incomes at the top and rely on reweighting of the survey to address this as described in Section 3.1. This has only a marginal impact on the average level of the Gini for disposable income across the 30 countries, increasing it from 0.30 to 0.31. Figure 4 shows that this 'correction' modestly reduces the measured redistributive effect, by 2 Gini points on average (and at most by 3 Gini points for Bulgaria, Czechia and Denmark). Comparison of the Gini levels reported in Table 1 with those in Table A1 in the online appendix shows that this average decrease is due to both factor income inequality falling and disposable income inequality rising, in each case by about 1 Gini point. (The decline in factor income inequality reflects the fact that the adjusted weights are computed to match gross income top shares as explained in Section 3.1, so those whose weights are increased are not all at the top of the factor income distribution.)

Our second adjustment at this stage is the inclusion of imputed rents from owner-occupation, which has hardly any effect on the average Gini for disposable income. Figure 4 shows this produces a similar decrease in the average redistributive effect of around 2 Gini points, with inequality in factor income falling by 2.6 points but disposable income inequality falling by only 0.9 points. The impact varies considerably across countries, with Bulgaria, Cyprus and Romania seeing a reduction in redistributive effect of about 5 points, while Germany, Croatia and the Netherlands (among others) see little change.

The third adjustment is to include the income flow stemming from the ownership (directly or indirectly) of businesses by allocating undistributed profits to households as described in Section 3.1. This serves to raise the average Gini for disposable income across the 30 countries to 0.36. Figure 4

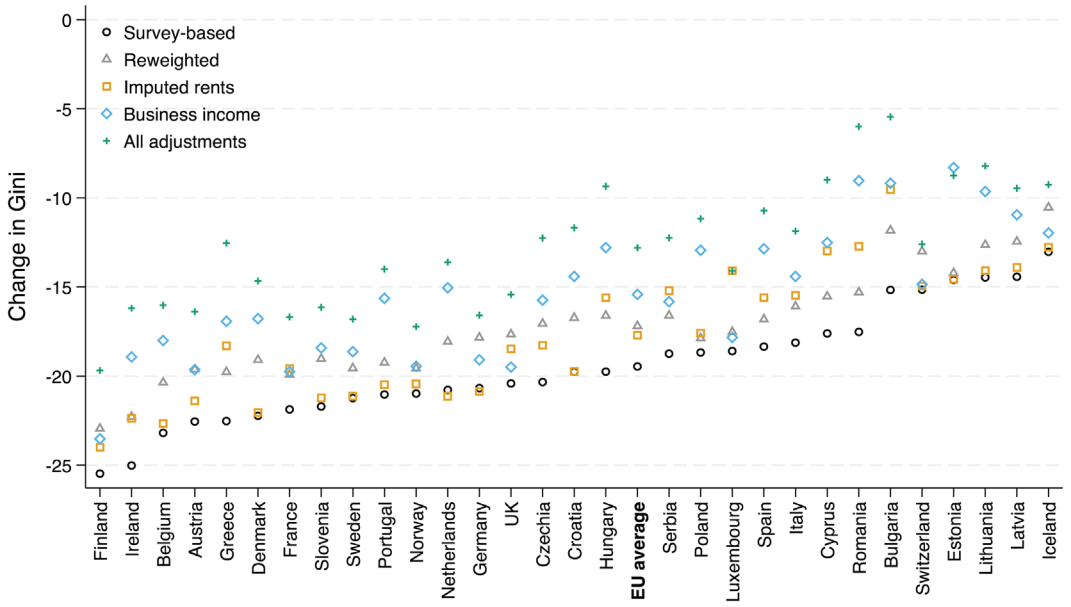

FIGURE 4 Total redistribution by post-redistribution income concept (pre-DINA). *Note*: The figure shows the change in the Gini due to the inclusion of missing incomes, as reported in the 'adjustment stage' of Figure 1. Total redistributive effect is measured as the difference between the Gini for factor income and different adjusted measures of disposable income. All estimates use equivalised income. The benchmark definition of survey-based disposable income uses the survey weights, as is the case for disposable income plus imputed rents and business income. Reweighted disposable income uses the adjusted weights, as does the final disposable income concept that includes all adjustments. Gini coefficient considers non-positive values and is estimated following the normalisation proposed in Raffinetti, Siletti and Vernizzi (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

shows that it also leads to the average redistributive effect falling by about 4 Gini points: the factor income Gini goes up on average by 2.3 points whereas the Gini for disposable income increases by 6.3 points. Estonia, Hungary and Romania see particularly large reductions in redistribution, while Luxembourg, Switzerland and the UK see relatively little change.

While the inclusion of either imputed rents or undistributed profits reduces overall redistribution, they do so through different mechanisms. Imputed rents reduce inequality levels while business profits increase them, but the former have a larger impact on factor income inequality, while the latter have a larger impact on disposable income inequality. To further explore this difference, Table A4 in the online appendix reports the concentration index for these two components over factor, gross and disposable income, reflecting where in the income distribution they are located.[11] The indexes for imputed rents are negative or close to zero, which means they are located either at the bottom of the distribution or uniformly distributed. By contrast, the concentration indexes for undistributed profits are large and positive, reflecting their concentration towards the top.

Finally, Figure 4 also shows the effect of incorporating all three of these adjustments together. We see that this has a substantial impact on measured redistribution, reducing average redistribution across the EU countries by almost 7 Gini points and up to 10–12 points for Greece, Hungary and Romania. This is because their combined effect (on average) is to increase disposable income inequality while leaving factor income inequality largely unchanged.

[11] Note, however, that the impact of adding these components on overall inequality is not only due to their degree of concentration. Including them will also result in reranking of individuals, which will attenuate changes in inequality. For an example of such a decomposition in the case of taxes and transfers in the UK, see Hérault and Jenkins (2022).

4.4 | Redistribution using national income

The estimates of inequality and redistributive effect produced by WIL-DINA extend the core income concept to include all of national income, and we now probe how this affects measured redistribution. (It is important to re-emphasise here, as set out in Section 3, that unlike the DINA output produced by WIL researchers, our results are based on equivalised household income among persons and cover the full age range so they are not directly comparable, and there may also be some relatively minor differences in coverage of the pre-tax income concept.) We therefore start with the adjusted income measure discussed in Section 4.3 which employs adjusted weights to match WID top income shares and includes imputed rents and business income. To this we now add the government sector. In the DINA methodology, this allocation differs for pre- and post-redistribution income: the former splits the government sector by income source while the latter splits it by spending component. Government income is split into income from public corporations, income from taxes and other miscellaneous income. Income from public corporations, taxes from production and products as well as miscellaneous income are allocated proportionally to gross income, while other taxes and contributions are allocated proportionally to their survey counterparts.

Government spending comprises two major components, individual and collective spending, with a third one being government surplus. Individual spending includes expenditures that go towards household consumption, such as health, housing or education already discussed in Section 4.2. Collective spending includes components such as defence and infrastructure. We further split individual spending into health spending and the rest to highlight the importance of the allocation of health spending in itself. We therefore present four alternative measures of post-redistribution DINA income in which: (1) all government spending is allocated proportionally to disposable income; (2) only health spending is allocated equally among households as a lump sum; (3) all individual government spending is allocated as a lump sum; and (4) all government spending is allocated as a lump sum. Figure 5 shows the total redistributive effect when going from DINA factor income inequality to each of the four post-redistribution DINA concepts (Gini levels on which this is based are in Table A2 in the online appendix).

Figure 5 shows a clear and unsurprising ordering in terms of redistributive effect: the more components of government spending that are allocated on a lump-sum basis, the higher the redistributive effect. On average, the Gini decreases by 12 points when government spending is allocated proportionally. If we allocate health spending as a lump sum, that increases to 15 points, while including all individual government spending on that basis pushes this to over 17 points. Finally, allocating the entirety of government spending on a lump-sum basis results in an average redistributive effect of 20 Gini points. Moving from a fully proportional allocation of this government spending (i.e. with no redistributive impact) to allocating everything on a per-capita basis reduces the average Gini across the 30 countries from 0.34 to 0.26, with 40 per cent of that 8-point reduction being attributable to health spending. The inclusion of collective government spending in the analysis, and distributing this on a lump-sum basis, serve to increase the overall redistributive impact substantially in some countries, but on average it is the treatment of health spending that represents the most significant analytical choice. (Recall that, as noted in Section 3, at least some components of government spending may well in fact be more progressive than a lump-sum transfer.)

It is worth noting that the inclusion of government income/spending also attenuates the impact of the analytical choices with respect to market income examined in Section 4.1 (as can be seen from Table A2 in the online appendix). For example, the inclusion of social-insurance-based contributory pensions in pre-redistribution income now reduces the Gini by 3 points on average, far below the 9-point decrease observed in the survey-based exercise. This is because the government sector is large relative to household income and is being treated identically here across pre-redistribution concepts,

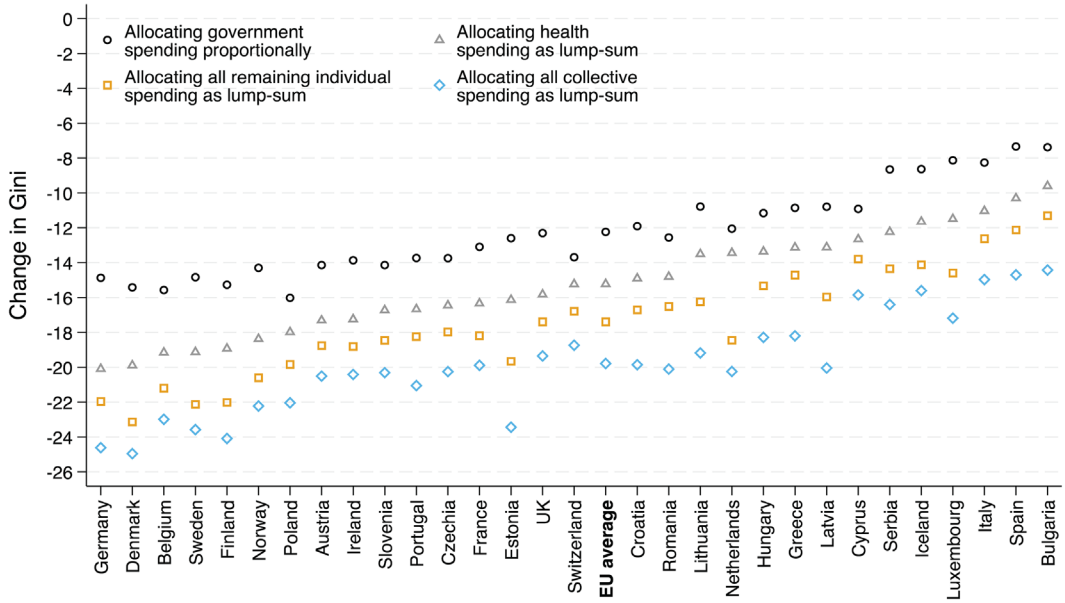

FIGURE 5 Redistribution from DINA factor income by DINA post-redistribution income concept. *Note*: The figure shows the change in the Gini under different DINA post-tax allocation rules, as reported in the right-hand side of the 'Distributional National Accounts stage' in Figure 1. Total redistributive effect is measured as the difference between the Gini for DINA factor income and one of four post-redistribution DINA income concepts, described in Figure A1 in the online appendix. All estimates use equivalised income. Gini coefficient considers non-positive values and is estimated following the normalisation proposed in Raffinetti, Siletti and Vernizzi (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

so its inclusion reduces the relative importance of other items such as pensions in gross and disposable income.

4.5 | Impacts on the top 1 per cent share

To complement our main analysis focused on overall inequality as captured by the Gini, it is informative to also assess redistributive impacts in terms of the top 1 per cent share (details in Appendix B online). Our findings in the 'survey stage' of Figure 1 do not change substantially. Contributory pensions remain the most important component in terms of redistribution, with most countries seeing a reduction of 0.5–1 percentage point in the top 1 per cent share, and country rankings do not vary substantially. Non-contributory benefits remain relevant in Norway and Denmark, while Ireland has a relatively sizeable reduction in inequality via taxes and contributions. We also once again find the net effect of indirect taxes and in-kind transfers to be limited, with Bulgaria and Hungary having a positive net effect (i.e. a reduction in redistribution) due to the highly regressive impact of indirect taxes.

The adjustment stage also shows somewhat similar results. However, the main difference is that the inclusion of undistributed profits greatly impacts post-tax inequality, to the point that redistribution almost disappears for most countries, and it is even reversed for some. Eastern European countries see a positive change after including undistributed profits, meaning that post-tax inequality – measured by the top 1 per cent share – is higher than pre-tax inequality. This is also true in the case of reweighting for Serbia and Belgium.

Finally, the DINA stage shows very consistent results with our previous estimates. Redistribution increases as more components of government spending are allocated on a lump-sum basis. Perhaps

the most notable difference is for Serbia, where redistribution is small under any of the allocation assumptions due to very low top 1 per cent shares under DINA, even for factor income.

5 | CONCLUSIONS AND IMPLICATIONS

This paper has highlighted the under-appreciated degree of divergence in the research literature on the stylised facts of redistribution and sought to identify the key sources of this divergence in terms of analytical choices. We identified eight such choices and empirically assessed the role of six of these using data for 30 European countries. These choices were seen to differ in nature, with some driven primarily by data availability whereas others depend on the precise aim of the exercise or on the underlying conceptual underpinning and assumptions.

Our findings have shown first that for measures of direct redistribution (i.e. via cash transfers and direct taxes), the way social-insurance-based cash transfers are treated is central to the divergence in findings across studies. This applies most clearly to pensions but is also relevant for working-age payments. A coherent rationale can be advanced for treating these transfers as market income because they represent a return to working over one's career. However, treating them that way means that the principal institutional tool developed by the modern welfare state to provide income protection across the range of potential contingencies is entirely discounted in assessing and comparing the redistributive impact of the state – which may be widely regarded as problematic. The fact that pensions represent redistribution across the life cycle is of course of central importance, but that is more satisfactorily taken into account via a complementary lifetime perspective on assessing redistribution.

Conventional redistributive analyses are sometimes extended to include both indirect taxes and non-cash benefits from state spending. When we did this, we found each had a considerable impact but working in opposite directions so their inclusion generally had only a limited net redistributive impact. However, for non-cash benefits, this was on the basis of a simple lump-sum allocation of the average spend to households. More complex allocation procedures and the impact they have on measures of redistribution need to be investigated as a priority. These would ideally take the national context fully into account – for example, in the case of health spending, they would reflect patterns of entitlement to and use of public care across individuals and households – but that is particularly challenging in a comparative context.

Our findings also brought out the importance of whether redistributive analysis is based purely on household survey data or on these 'corrected' for missing incomes. We found that adjusting survey data for missing top incomes by reweighting samples to align with external top income shares modestly reduced the measured redistributive effect, and this was also the case for the inclusion of imputed rent of owner-occupiers. Attributing undistributed profits to households had a more substantial impact in the same direction, and incorporating all three adjustments together reduced the average redistributive impact across the 30 countries substantially.

Finally, we explored the implications of extending the scope of the redistributive analysis to include all of national income, as in recent output from the WIL-DINA programme. Our empirical findings serve to underline the impact in this context of how in-kind benefits are allocated, but also the implications of now including state spending on collective goods such as security and infrastructure. Allocating this spending on a lump-sum basis substantially affected the measured extent of redistribution, whereas the alternative approach of attributing it in proportion to household income entails a smaller impact. A basis for choosing between these approaches is anything but obvious, and at a more fundamental level one can question the rationale for including such expenditures in a redistributive analysis. They are included in producing Distributional National Accounts to provide a comprehensive picture of the relationship between the evolution of national income and its distribution, but that is not the aim of analyses of redistributive impact; including them in that context raises more questions than it answers.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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