

Chapter 6. Distributional national accounts

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This chapter summarises concepts, methods, and goals of the WID.world project, the World Inequality Database, along with some first results from this source. WID.world builds on the experience of the World Top Incomes Database (WTID) to construct time-series on the concentration of income at the very top of the distribution in more than 30 countries, to include wealth distribution and developing as well as developed countries. The ultimate goal of WID.world is to provide annual estimates of the distribution of income and wealth using concepts consistent with macro-economic accounts, i.e. to construct distributional national accounts (DINA). WID.world also aims to produce synthetic micro-files providing online information on income and wealth (i.e. individual level data that do not result from direct observation but rather through estimates that reproduce the observed distribution of the underlying data). The long-run aim of the WID.world project is to release income and wealth synthetic DINA micro-files for all countries on an annual basis.

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The opinions expressed and arguments employed in the contributions below are those of the author(s) and do not necessarily reflect the official views of the OECD or of the governments of its member countries.

6.1. Introduction

Renewed interest in the long-run evolution of the distribution of income and wealth has given rise to a flourishing literature over the past 15 years. In particular, by combining historical tax and national accounts data, a series of studies has constructed time-series of the top income share for a large number of countries (see Piketty, 2001, 2003; Piketty and Saez, 2003; and the two multi-country volumes on top incomes edited by Atkinson and Piketty, 2007, 2010; see also Atkinson, Piketty and Saez, 2011; and Alvaredo et al., 2013 for surveys of this literature). These projects generated a large volume of data, intended as a research resource for further analysis as well as a source to inform the public debate on income inequality. To a large extent, this literature has followed the pioneering work and methodology of Kuznets (1953) and Atkinson and Harrison (1978) on the long-run evolution of income and wealth distribution, extending it to many more countries and years.

The *World Top Incomes Database-WTID* (Alvaredo et al., 2011-2015) was created in January 2011 to provide convenient and free access to all the existing time series generated by this stream of work. Thanks to the contributions of over a hundred researchers, the *WTID* expanded to include time-series on income concentration for more than 30 countries, spanning most of the 20th, the early 21st centuries and, in some cases, going back to the 19th century. The key innovation of this research has been to exploit tax, survey and national accounts data in a systematic manner. This has permitted the estimation of longer and more reliable time-series on the top income shares than previous inequality databases (which generally rely on self-reported survey data, with usually large under-coverage and under-reporting problems at the top, and limited time span). These new series had a large impact on the discussion on global inequality. In particular, by making it possible to compare the shares captured by top income groups (e.g. the top 1%) over long periods of time and across countries, they contributed to reveal new facts and refocus the discussion on rising inequality.

In December 2015 the *WTID* was subsumed into the *WID.world*, the *World Wealth and Income Database*, renamed in 2017 the *World Inequality Database*. In addition to the *WTID* top income shares series, the first version of *WID.world* included an updated historical database on the long-run evolution of aggregate wealth-to-income ratios and on the changing structure of national wealth and national income first developed in Piketty and Zucman (2014).¹ The name changed from *WTID* to *WID.world* in order to reflect the extension in scope and ambition of the database, and the new emphasis on both wealth and income.

In January 2017 a new website was also launched (www.wid.world), with better data visualisation tools and more extensive data coverage. The database is currently being extended into three main directions. First, the project aims to cover more developing countries and not only developed countries; in recent years, tax information has been released in a number of emerging economies, including China, Brazil, India, Mexico, and South Africa. Second, *WID.world* plans to provide more and updated series on wealth-to-income ratios and the distribution of wealth, and not only on income. Third, we aim to cover the entire distribution of income and wealth, and not only of top groups. The overall long-run objective is to produce *Distributional National Accounts (DINA)*.

The development of economic statistics is a historical lengthy process that involves economic theory, the limits of available data, the construction of a body of conventions, and the agreement of the community of scholars. Macro-economic aggregates (GDP, national income) from the System of National Accounts (SNA) are the most widely used

measures of economic activity. In the beginning, national accountants were also experts in distributional issues, as the inter-linkages between the estimation of national income and its distribution were clearly recognised. However, the focus of the SNA has so far always been on the main sectors in the economy, only distinguishing results for the household sector as a whole, and not providing insights into disparities within the household sector. Partly as a result of these developments, the discrepancies between income levels and growth rates displayed in national accounts and the ones displayed in micro statistics and underlying distributional data have been growing in all dimensions: income, consumption, wealth (see, for example, Deaton, 2005; Bourguignon, 2015 and Nolan, Roser and Thewissen, 2016). Scholars have been clearly aware of the discrepancies, and also have some ideas to explain the reasons behind them, but systematic and co-ordinated action to put them in a consistent framework has started only recently.² In 2011, the OECD and Eurostat launched a joint Expert Group to carry out a feasibility study on compiling distributional measures of household income, consumption and saving within the framework of national accounts, on the basis of micro data. This group, which was followed up by an OECD Expert Group on Disparities in National Accounts (EG DNA) in 2014, aimed to systematically combine micro- and macro-results to arrive at more granular breakdowns of the household sector available from the national accounts (see Box 6.1 for more information on the OECD project on disparities in the national accounts). One reason why this work has only started recently is quite clear: it is not a simple task.

A renovated approach to the measurement of economic inequality consistent with macro-aggregates should rebuild the bridges between distributional data available from micro sources and national accounts aggregates in a systematic way. This is the main goal of the *WID.world* project pursued through DINA. The aim is to provide annual estimates of the distribution of income and wealth using concepts that are consistent with the macro-economic national accounts. In this way, the analysis of growth and inequality can be carried over in a coherent framework. In addition, the *WID.world* project aims to also include the production of synthetic micro-files (i.e. individual level data that are not necessarily the result of direct observation but rather through estimations that reproduce the observed distribution of the underlying data, including the joint distribution of age, gender, numbers of dependent children, income and wealth between adult individuals) providing information on income and wealth, which will also be made available online. The long-run aim is to release income and wealth synthetic *DINA* micro-files for all countries on an annual basis. Such data could play a critical role in the public debate, and be used as a resource for further analysis by various actors in civil society and in the academic, business and political communities.

Box 6.1. The work of the OECD Expert Group on Disparities in a National Accounts Framework

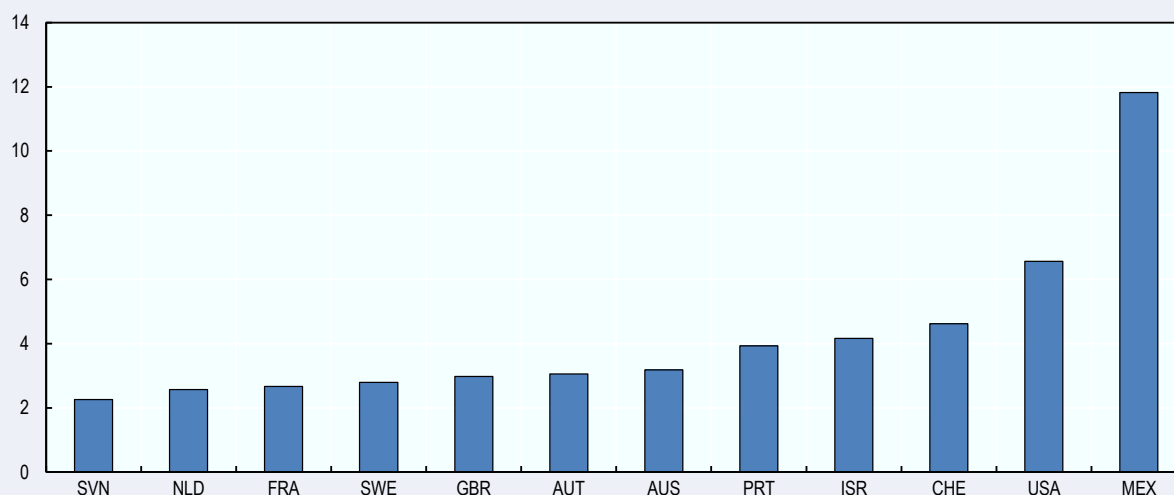
In response to the increased interest in household material well-being and its distribution, the OECD and Eurostat launched an expert group in 2011 to carry out a feasibility study of compiling distributional measures of household income, consumption and saving across household groups within the framework of the national accounts. A methodology was developed according to a step-by-step approach that assists countries in building the best conceptual link between the micro- and macro-data; closing any gaps between the micro data and the national accounts totals; imputing for any items that may be lacking in micro data sources; and linking data across sources to arrive at consistent sets of accounts for various household groups. This work was continued in 2014 by an OECD Expert Group on Disparities in a National Accounts framework (EG DNA) to improve the methodology and to look into possibilities to improve the timeliness of the distributional results. OECD Member countries have engaged in two exercises to compile experimental distributional results and some countries have already started to publish their estimates (Australia, the Netherlands and the United Kingdom).

The EG DNA project has a lot of similarities with the DINA project, as both projects aim to compile distributional results in line with national accounts totals and try to overcome any discrepancies between the micro- and the macro-totals. Where DINA is focusing on income and wealth, the OECD project initially focuses on income, consumption and saving, planning to include wealth in the second phase, probably in cooperation with the European Central Bank (ECB) and Eurostat. While there are similarities, the projects also differ in some respects. First of all, the aim of the EG DNA project is to arrive at breakdowns of the household sector from the national accounts at an aggregated level, focusing on specific household groups, e.g. classified by income quintile, main source of income or household composition, whereas DINA also aims at to produce synthetic micro-data files for income and wealth. Secondly, the two projects apply different income definitions in deriving distributional results: whereas DINA aims to align the results to national income, i.e. for the economy as a whole (distinguishing five income concepts), the EG DNA project specifically targets the income of the household sector, with primary income, disposable income and adjusted disposable income as main aggregates. A third difference relates to the unit of observation: while the DINA project focuses on individuals aged 20 years and older, the EG DNA considers the income of households (under the assumption that income is fully shared and that consumption decisions are made within the household), using equivalence scales to adjust for differences in household size and composition. These two methodological differences may lead to differences in distributional results derived from both projects.

Since the start of the OECD project, member countries have engaged in two exercises compiling first sets of experimental distributional results. Figure 6.1 presents an example of results derived from the exercise conducted in 2015: it presents estimates of the S80/S20 ratio, comparing the income of households in the highest income quintile with that of households in the lowest quintile. On the basis of these results, income inequality turns out to be very high in Mexico, followed by the United States and Switzerland, whereas it is smallest in Slovenia, followed by the Netherlands, France and Sweden. In addition to distributional results by income quintile, the experimental results also contain breakdowns into main source of income and household composition for a selection of

countries, as well as information on the socio-demographic composition of the income quintiles.

Figure 6.1. Ratio of household adjusted disposable of households in the top and bottom income quintiles



Note: Data refers to 2012 and 2011 for Australia, France, Netherlands, Portugal and Switzerland.

Source: Zwijnenburg, J., S. Bournot and F. Giovannelli (2017), “Expert group on disparities in a national accounts framework: Results from the 2015 exercise”, *OECD Statistics Working Papers*, No. 2016/10, OECD Publishing, Paris, <http://dx.doi.org/10.1787/2daa921e-en>.

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While some countries have already started to publish distributional results according to EG DNA methodology, the OECD Expert Group is pursuing its work to improve the methodology to arrive at more robust and comparable results across a broader range of countries. In that perspective, the project faces similar challenges as the DINA, particularly in obtaining a better understanding of the reasons for gaps between micro data and national accounts totals, gaps which for some items are very substantial; and in improving the methodology to impute for items for which micro data are lacking. This should lead to a more robust methodology and to the publication of distributional results for a broader range of countries within the next couple of years.

Source: Text provided by Jorrit Zwijnenburg, OECD Statistics and Data Directorate.

It is worth stressing that the *WID.world* database has both a macro- and a micro-dimension. The objective is to release homogenous time-series both on the macro-level structure of national income and national wealth, and on the micro-level distribution of income and wealth, using consistent concepts and methods. By doing so, we hope to contribute to reconciling inequality measurement and national accounting, i.e. the micro-level measurement of economic and social welfare and the macro-level measurement. In some cases, this may require revising central aspects of key national accounts concepts and estimates. By combining the macro- and micro-dimensions of economic measurement, we are following a very long tradition. In particular, it is worth recalling that Simon Kuznets

was both one of the founders of US national accounts (and author of the first national income series), and also the first scholar to combine national income series and income tax data in order to estimate the evolution of the share of total income going to top fractiles in the United States over 1913–48 (Kuznets, 1953).³ This line of research continued with Atkinson and Harrison (1978), who made use of historical inheritance tax data and capital income data to study the long-run evolution of the distribution of personal wealth in Britain over 1922–72. We are simply pushing this effort further by trying to cover more countries and years, and by studying wealth and its distribution rather than only income.

Such an ambitious long-term objective – annual distributional national accounts for both income and wealth and for all countries in the world – will require a broad international and institutional partnership. The first set of methodological principles and recommendations are being set by ongoing work on the first version of the *DINA Guidelines* (Alvaredo et al., 2016). There are still many methodological decisions to be taken and agreed upon. It took from the 1910s to the 1950s before scholars (Kuznets, Kendrick, Dugé, Stone, Meade, Frankel) could hand over the estimation of national income to official statistics bodies. It also took a long time (from the 1950s to the 2000s) before official national accounts were able to include standardised stock accounts. In fact, the first consistent guidelines for balance sheets – covering stocks of assets and liabilities – appear in the SNA manuals of 1995 and 2008 (in some key countries, such as Germany, the first official balance sheets were released only in 2010). Along the same lines, the development of a system of DINA is expected to take a long time before consensus among scholars and the statistical community is reached. In that regard, it is very encouraging that the OECD Expert Group on Disparities in National Accounts, which is working on compiling distributional results, has already engaged in two exercises, and that the first countries have already started to publish distributional results on the basis of the Expert Group’s methodology (Box 6.1).

We should stress at the outset that our methods and time-series are imperfect, fragile and subject to revision. The *WID.world DINA* project attempts to combine the different data sources that are available (in particular tax data, survey data and national accounts) in a systematic way. We also try to provide a very detailed and explicit description of our methodology and sources, so that other users can contribute to improving them. But our time-series and methods should be viewed in the perspective of a long, cumulative, collective process of data construction and diffusion, rather than as a finished product.

6.2. What are the concepts and methods being discussed?

The concepts and methods used in *WTID* series were initially exposed in the two collective volumes edited by Atkinson and Piketty (2007 and 2010), and in the corresponding country chapters and research articles. All country-level time-series follow the same general principles: building on the pioneering work of Kuznets (1953), they combine income tax data, national accounts and Pareto interpolation techniques in order to estimate the share of total income going to top income groups (typically the top decile and the top percentile). However, despite our best efforts, the units of observation, the income concepts and the Pareto interpolation techniques were never made fully homogenous over time and across countries. Moreover, for the most part attention was restricted to the top income decile, rather than the entire distribution of income and wealth.

In contrast, the DINA time-series and associated synthetic micro-files aim to be fully homogenous across all of these dimensions (or at least to make much more explicit the remaining heterogeneity in data construction) and, most importantly, to provide more

detailed and comprehensive measures of inequality. In the DINA series, inequality is always measured using homogenous observation units, and taxable income reported on fiscal returns is systematically corrected and upgraded in order to match national accounts totals separately for each income category (wages, dividends, etc.) using various sources, imputation methods and techniques to align the micro and macro-data. Now *WID.world* aims to provide series on wealth (and not only on income) and on the entire distribution (and not only on top shares).

The two main data sources used in the DINA series continue to be income tax data and national accounts (just like in the *WTID* series), but we use these two core data sources in a more systematic and consistent manner, with fully harmonised definitions and methods, and together with other sources such as household income and wealth surveys, inheritance, estate and wealth tax data, as well as wealth rankings provided by “rich lists” compiled by the press. In most cases, the general trends in inequality depicted in the *WTID* series will not be very different in DINA series.⁴ However the latter will allow for more precise comparisons over time and across countries, more systematic world coverage, and more consistent analysis of the underlying mechanisms.⁵

In the *DINA Guidelines* (Alvaredo et al., 2016) the following key elements used in *WID.world* are discussed at length:

- The units of observation.
- The income concepts (pre-tax national income, pre-tax factor income, post-tax disposable income, post-tax national income, and fiscal income) and the wealth concepts (personal wealth, private wealth, public wealth, corporate wealth, and national wealth, as well as the corresponding notions of capital income flows and rates of return).
- The methods (e.g. imputation) employed to reconcile income tax returns and household survey micro files with national accounts totals, as well as with wealth inequality sources.
- The methods employed to produce synthetic micro files on income and wealth.
- The methods that can be used in the case of countries and time periods with more limited data sources.

In this section, we briefly refer to the units of observation and the income and wealth concepts used in *WID.world*, but the interested reader should consult the *DINA Guidelines* for the full documentation, and a thorough investigation of details, problems, limitations and challenges.

As was the case with the development of national accounts, the methodological discussion starts from the perspective of the developed countries, given the higher (though not perfect) quality and availability of data from all sources. A number of additional and important problems arise when we consider developing countries. In many cases, e.g. in China, India or Mexico today, we only have income tax data for the top of the distribution, and the questions involve how to combine them with the household survey data that exist for the lower part of the distribution, and even the representativeness of tax data. Piketty, Yang and Zucman (2017) provide an illustration for the case of China. In this respect, it should also be noted that in developing countries the underground and informal economy may play a more significant role than in developed countries, possibly requiring different imputation techniques and different means of bridging gaps between micro data and national accounts totals. Additionally, the discrepancies of both levels and trends from the existing data

sources can be very large (Bourguignon, 2015) and deserve special and case-by-case attention.

6.2.1. *The units of observation*

One of the major limitations of the *WTID* series was the lack of homogeneity of the micro-level observation unit. Most *WTID* series were constructed by using the ‘tax unit’ (as defined by the tax law of the country at any given point in time) as the observation unit. In joint-taxation countries like France or the United States, the tax unit has always been defined as the married couple (for married individuals) or the single adult (for unmarried individuals), and the top income shares series that were produced for these two countries did not include any correction for the changing structure of tax units (i.e. the combined income of married couples is not divided by two, so couples appear artificially richer than non-married individuals). This is problematic, since variations in the share of single individuals in the population, or in the extent of assortative mating in couples (being in a couple with a person similar to you socio-economically), could potentially bias the evolution of income inequality in various and contradictory ways. In some other countries, the tax system switched to individual taxation over the course of the history of the income tax (e.g., in 1990 in the United Kingdom), which creates other comparability problems in the *WTID* series (see Atkinson, 2005, 2007).

In order to correct for these biases, our *DINA* series try to use homogenous observation units. Generally speaking, our benchmark unit of observation is the adult individual. That is, our primary objective is to provide estimates of the distribution of income and wealth between all individuals aged 20 years-old and over (such as the shares of income and wealth going to the different percentiles of the distributions of income and wealth). Whenever possible, we also aim to construct estimates of individual income and wealth distribution that can be decomposed by age, gender and number of dependent children. Ideally, we aim at producing synthetic micro-files providing the best possible estimates of the joint distribution – by age, gender and number of dependent children – of income and wealth between adult individuals. But at the very least we want to be able to describe the distribution of income and wealth between all adult individuals.

One key question is how to split income and wealth between adults who belong to a couple (married or not) and/or to the same household (i.e. adults who live in the same housing unit). To the extent possible, we want to produce for each country two sets of inequality series: “equal-split-adults series” and “individualistic-adults series”. In the equal-split series, we split income and wealth equally between adults who belong to the same couple. In the individualistic series, we attribute income and wealth to each individual income recipient and wealth owner (to the extent possible).

We should make clear that both series are equally valuable in our view. They offer two complementary perspectives on different dimensions of inequality. The equal-split perspective assumes that couples redistribute income and wealth equally between their members. This is arguably a very optimistic perspective on what couples actually do: bargaining power is typically very unequal within couples, partly because the two members come with unequal income flows or wealth stocks. But the opposite perspective (zero sharing of resources) is not realistic either, and tends to underestimate the resources available to non-working spouses (and therefore to overestimate inequality in societies with low female participation in the labour market). By offering the two sets of series, we give the possibility to compare the levels and evolutions of inequality over time and between countries under these two different perspectives. Ideally, the best solution would be to

organise synthetic micro-files in such a manner that the data users can compute their own inequality series based upon some alternative sharing rules (e.g. assuming that a given fraction of the combined income of couples is equally split) and/or some alternative equivalence scales (e.g. dividing the income of couples by a factor less than two). This is our long-run objective.

Regarding the equal-split series, an important question is whether we should split income and wealth within the couple (narrow equal-split) or within the household (broad equal-split). In countries with significant multi-generational cohabitation (e.g. grandparents living with their adult children), this can make a significant difference (typically broad equal-split series assume more private redistribution and display less inequality). In countries where nuclear families are prevalent, this makes relatively little difference. Ideally both series should be offered. We tend to favour the narrow equal-split series as the benchmark series, both for data availability reasons (fiscal data are usually available at the tax unit level, which in a number of countries means the married couple or the non-married adult) and because there is possibly more splitting of resources at the narrow level (which is also arguably the reason why fiscal legislation usually offers the possibility of joint filling and taxation at the level of the married couple rather than at the level of the broader household, whose exact composition can vary and is not regulated by a legal relationship). However in countries where fiscal sources are limited and where we mostly rely on household survey data (e.g. in China), it is sometime easier to compute the broad equal-split series. This should be kept in mind when making comparisons between countries (see the discussion in Piketty, Yang and Zucman, 2017) and the comparison between DINA series for China, France and the United States).

Finally, when we look at inequality of post-tax disposable income, we introduce dependent children into the analysis, in order to be able to compute the relevant cash and in-kind transfers to parents (family benefits and tax credits, education allowances, etc.).

In the individualistic series, observed labour income and pension income is attributed to each individual recipient. This is easy to do in individual-taxation countries like the United Kingdom today, where by definition we observe incomes at the individual level. In general, labour income and pension income are also reported separately for each spouse in the tax returns and income declarations used in joint-taxation countries like France. In some cases, however, e.g. in US public-use tax files, we only observe the total labour or pension income reported by both spouses, in which case we need to use other sources and imputation techniques in order to split income appropriately between spouses (see Piketty, Saez and Zucman, 2016).

The issues are more complicated for capital income flows. In individual-taxation countries, we usually observe capital income at the individual level. However in joint-taxation countries, capital income is usually not reported separately for both spouses, and we generally do not have enough information about the marriage contract or property arrangements within married couples to be able to split capital income and assets into common assets and own assets. So in joint-taxation countries we simply assume in our benchmark series that each spouse owns 50% of the wealth of a married couple and receives 50% of the corresponding capital income flow. If and when adequate data sources become available, we might be able to offer a more sophisticated treatment of this important issue.

6.2.2. The income and wealth concepts

One of the other major limitations of the *WTID* time-series was the lack of homogeneity of the income concept and its dependence on the tax laws of each country. In contrast, the

income concepts used in DINA series are defined in the same manner in all countries and time periods, and aim to be independent of the tax legislation of the given country/year. We use four basic pre-tax and post-tax income concepts to measure income inequality: 1) pre-tax national income; 2) pre-tax factor income; 3) post-tax disposable income; and 4) post-tax national income (see Alvaredo et al., 2016, for a detailed discussion of definitions and challenges).⁶ All of them are anchored on the notion of national income (i.e. gross domestic product, minus consumption of fixed capital, plus net foreign income, for the economy as a whole) defined by using the same concepts as those proposed in the latest international guidelines on national accounts, as set forth by the 2008 UN System of National Accounts (SNA). However, in attributing income to the household sector we apply a broader definition than is used in the 2008 SNA, as we also distribute the income of the other sectors in the economy (i.e. corporations, general government and non-profit institutions), rather than focusing on the household sector as defined in the national accounts. In the same way as for the income concepts, our wealth concepts refer to the latest international national accounts guidelines, based on which we define personal wealth, private wealth, public wealth, corporate wealth, and national wealth.⁷

We should make clear at the outset that our choice of using national accounts income and wealth concepts for distributional analysis certainly does not mean that we believe that these concepts are perfectly satisfactory or appropriate. Quite the contrary: our view is that official national accounts statistics are insufficient and need to be greatly improved. In particular, one of the central limitations of official GDP accounting is that it does not provide any information about the extent to which the different social groups benefit from GDP growth. By using national accounts concepts and producing distributional series based upon these concepts, we hope to contribute to addressing one important shortcomings of existing national accounts, to reduce the gap between inequality measurement and national accounts, and also maybe between the popular individual-level perception of economic growth and its macro-economic measurement. The other reason for using national accounts concepts is simply that these concepts represent at this stage the only existing systematic attempt to define notions such as income and wealth in a common way, which (at least in principle) can be applied to all countries independently from country-specific and time-specific legislation and data sources.

One important limitation of existing official national accounts is the fact that consumption of fixed capital does not usually include the consumption of natural resources. In other words, official statistics tend to overestimate both the levels and the growth rates of national income, which in some cases could be much lower than those obtained for Gross Domestic Product. In the future, we plan to gradually introduce such adjustments to the aggregate national income series provided in the *WID.world* database. This is likely to introduce significant changes both at the aggregate and distributional level. We should also make clear that official national accounts are fairly rudimentary in a number of developing countries (and also sometimes in developed countries). Often they do not include the level of detail that we need to use the income and wealth definitions proposed below. In particular, proper series on consumption of fixed capital and net foreign income are missing in a number of countries, so that official series do not always allow national income to be computed.⁸

6.2.3. Countries/years with limited income and wealth data

The construction of *DINA* series is very demanding in terms of data needs. Countries do not usually have all the data sources required, the limitations being very pronounced in many countries/years. This problem was also at the centre of the development of national

accounts: designing the SNA meant accepting that the standards could not be set at the level of the best, i.e. their implementation had to be feasible in less well-advanced countries. Methods need to be developed in the case of countries and periods with more limited data sources, typically on the basis of income tax tabulations rather than income tax micro-files, and/or with income tax data covering only a subset of the population rather than the entire population, and/or inadequacy of income tax data (e.g. due to large or complete exemptions for capital incomes). The *DINA Guidelines* refer to each of these problems and illustrate the methods that can be applied with the case of China (a country with limited access to income tax data; see Piketty, Yang and Zucman, 2017) and France (a country with detailed tax data but where only income tax tabulations – rather than micro-files – are available prior to 1970; see Garbinti, Goupille-Lebret and Piketty, 2017).⁹

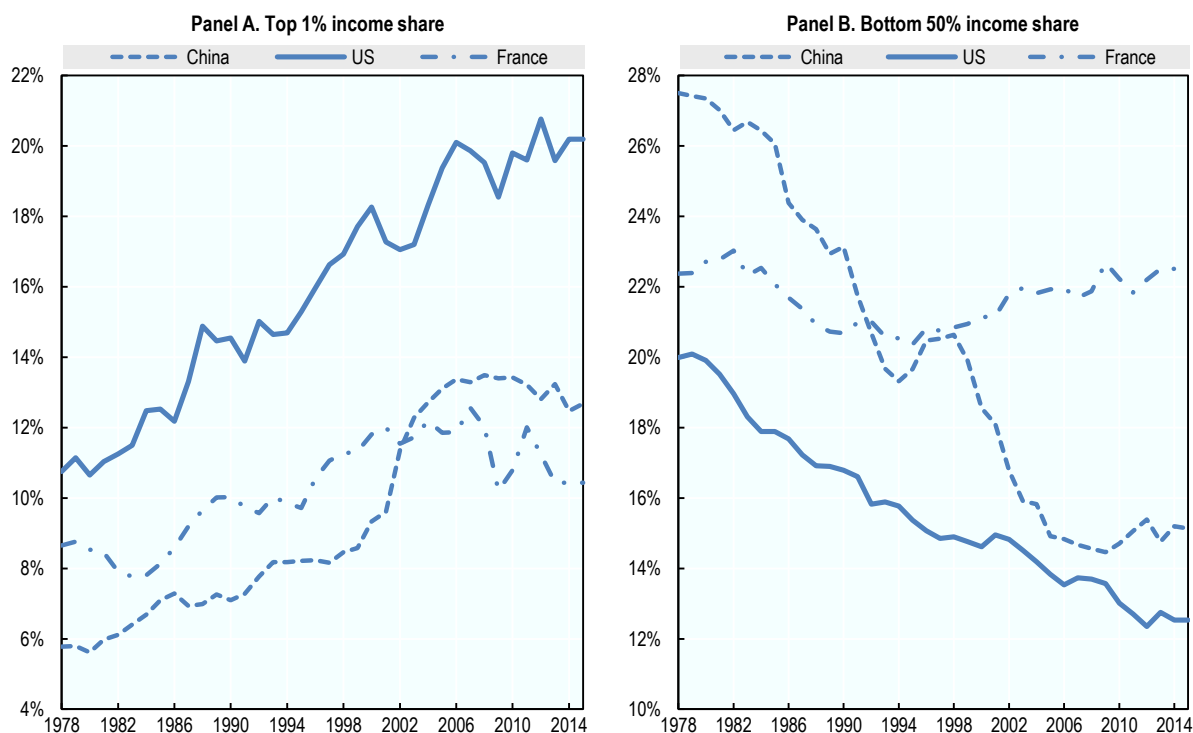
6.3. What can we say based on available evidence? First results from *WID.world* and *DINA*

6.3.1. *Income inequality dynamics: The United States, China, France*

We first present some selected results on income inequality for the United States, China, and France (a country that is broadly representative of the West European pattern) in Figure 6.2. All series shown follow the same general *DINA Guidelines* (Alvaredo et al., 2016). National accounts, surveys, and fiscal data are combined in a systematic manner in order to estimate the full distribution of pre-tax national income (including tax exempt capital income and undistributed profits). For more detailed results and discussions, we refer to the country-specific papers (Piketty, Saez and Zucman (2016) for the United States; Piketty, Yang and Zucman (2017) for China; Garbinti, Goupille-Lebret and Piketty (2017) for France).¹⁰

The combination of tax and survey data leads to a markedly upward revision of the official inequality estimates of China. The corrected top 1% income share is around 13% of total income in 2015, as compared to 6.5% in survey data. We stress that these estimates should be viewed as lower bounds, due to tax evasion and other limitations of tax and national accounts data, but we regard them as more realistic and plausible than survey-based estimates. The estimates illustrate the need for more systematic use of administrative records, even for countries where the tax administration is far from perfect. China had very low income inequality levels in the late 1970s, but it is now approaching the United States, where income concentration is the highest among the countries shown. In particular, we observe a complete collapse of the bottom 50% income share in the United States between 1978 and 2015, from 20% to 12% of total income, while the income share of the top 1% rose from 11% to 20%. In contrast, and in spite of a similar qualitative trend, the share of the bottom 50% remains higher than the top 1% share in 2015 in China and, even more so, in France.¹¹

Figure 6.2. Distribution of income in China, the United States and France, 1978-2015



Note: Distribution of pre-tax national income (before taxes and transfers, except for pensions and unemployment insurance benefits) among adults. Corrected estimates combine survey, fiscal, wealth and national accounts data. Equal-split adult series (the income of married couples is divided by two).

Sources: US: Piketty, T., E. Saez and G. Zucman (2016), “Distributional national accounts: Methods and estimates for the United States”, *NBER Working Paper*, No. 22945; France: Garbinti, B., J. Goupille-Lebret and T. Piketty (2017), “Income inequality in France, 1900-2014: Evidence from Distributional National Accounts (DINA)”, *WID.world Working Paper*, No. 2017/4; China: Piketty, T., L. Yang and G. Zucman (2017), “Capital accumulation, private property and rising inequality in China 1978-2015”, *WID.world Working Paper*, No. 2017/6.

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In light of the massive fall of the pre-tax incomes of the bottom 50% in the United States, our findings also suggest that policy discussions about rising global inequality should focus on how to equalise the distribution of primary assets – including human capital, financial capital, and bargaining power – rather than merely discussing ex-post redistribution through taxes and transfers. Policies that could raise the pre-tax incomes of the bottom 50% include improved education and access to skills, which may require major changes in the system of education finance and admission; reforms of labour market institutions, including minimum wage, corporate governance, and workers’ bargaining power through unions and representation in the board of directors; and steeply progressive taxation, which can affect pay determination and pre-tax distribution, particularly at the top end (Piketty, Saez and Stantcheva, 2014; Piketty, 2014).

The comparison between the United States, China and France illustrates how *DINA* can be used to analyse the distribution of economic growth across income groups. As shown in Table 6.1, national income per adult increased in the three countries between 1978 and

2015: by 811% in China, by 59% in the United States, and by 39% in France. Nevertheless, performance has been very different across the distribution. There has been a clear pattern of rising inequality: top income groups enjoyed higher growth. In China, people at the top experienced very high growth rates of their income, but average growth was so large that the average income of the bottom 50% also grew markedly, by 401%. This is likely to make rising inequality more acceptable. In contrast, there was no growth at all for the bottom 50% in the United States (-1%). France illustrates another type of situation: people at the very top of the distribution experienced above-average income growth, but this pattern of rising inequality happened only for very high and numerically relatively negligible groups, so that it had limited consequences for the majority of the population. In effect, the bottom 50% income group enjoyed the same income growth as average growth (39%).

Table 6.1. Real income growth across the distribution, 1978-2015

Percentages			
Income group (distribution of per-adult pre-tax national income)	China	US	France
Full Population	811	59	39
Bottom 50%	401	-1	39
Middle 40%	779	42	35
Top 10%	1 294	115	44
Top 1%	1 898	198	67
Top 0.1%	2 261	321	84
Top 0.01%	2 685	453	93
Top 0.001%	3 111	685	158

Note: Distribution of pre-tax national income (before taxes and transfers, except pensions and unemployment insurance benefits) among adults. Corrected estimates combining survey, tax, wealth and national accounts data. Equal-split-adult series (income of married couples divided by two).

Sources: US: Piketty, T., E. Saez and G. Zucman (2016), “Distributional national accounts: Methods and estimates for the United States”, *NBER Working Paper*, No. 22945; France: Garbinti, B., J. Goupille-Lebreton and T. Piketty (2017), “Income inequality in France, 1900-2014: Evidence from Distributional National Accounts (DINA)”, *WID.world Working Paper*, No. 2017/4; China: Piketty, T., L. Yang and G. Zucman (2017), “Capital accumulation, private property and rising inequality in China 1978-2015”, *WID.world Working Paper*, No. 2017/6.

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6.3.2. Private and public wealth-to-income ratios: The United States, China, France, the United Kingdom, Japan, Norway and Germany

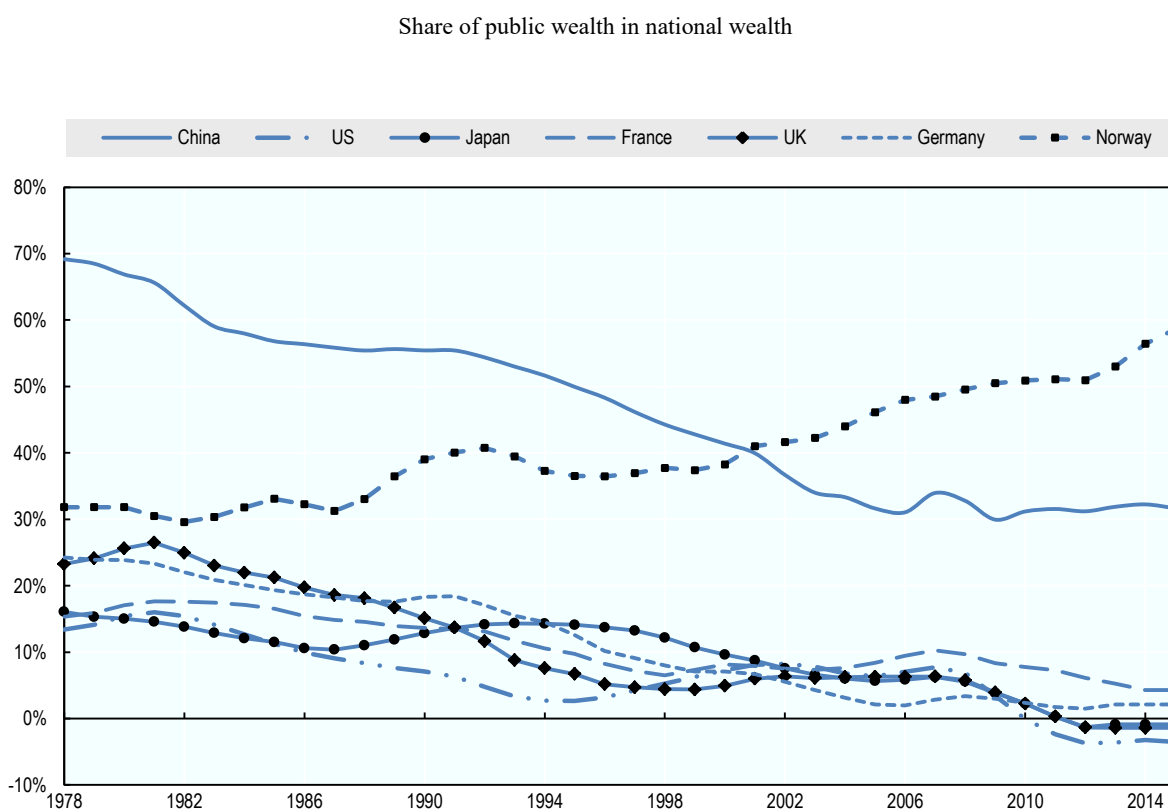
Next, we present findings on the evolution of aggregate wealth. We observe a general rise of the ratio between net private wealth and national income in nearly all countries in recent decades. It is striking to see that this phenomenon was largely unaffected by the 2008 financial crisis. The unusually large rise of the ratio for China is notable: net private wealth was a little above 100% of national income in 1978, while it was above 450% in 2015. The private wealth-to-income ratio in China is now approaching the levels observed in the United States (500%), the United Kingdom and France (550-600%).

The structural rise of private wealth-to-income ratios in recent decades is due to a combination of factors, which can be decomposed into: 1) *volume factors* (high saving rates, which can themselves be due to ageing and/or rising inequality, with differing relative importance across countries, combined with growth slowdown); 2) *relative asset prices*; and 3) *institutional factors*, including the increase of real estate prices (which can be due to housing portfolio bias, the gradual lift of rent controls, and lower technical progress in

construction and transportation technologies as compared to other sectors) and of stock prices (which can reflect higher power of shareholders leading to the observed increase in Tobin's Q ratios – i.e. the ratio between market and book value of corporations).

Another key institutional factor driving the rise of private wealth-to-income ratios is the gradual transfer from public wealth to private wealth. This is particularly spectacular in the case of China, where the share of public wealth in national wealth dropped from about 70% in 1978 to 35% by 2015, as shown in Figure 6.3. The corresponding rise of private property has important consequences for the levels and dynamics of inequality. Net public wealth has become negative in the United States, Japan and the United Kingdom, and is only slightly positive in Germany and France. This arguably limits government ability to redistribute income. The only exceptions to the general decline in public property are oil-rich countries with large public sovereign funds, such as Norway.

Figure 6.3. The decline of public property and the rise of sovereign funds



Note: Share of net public wealth (public assets minus public debt) in net national wealth (private + public).

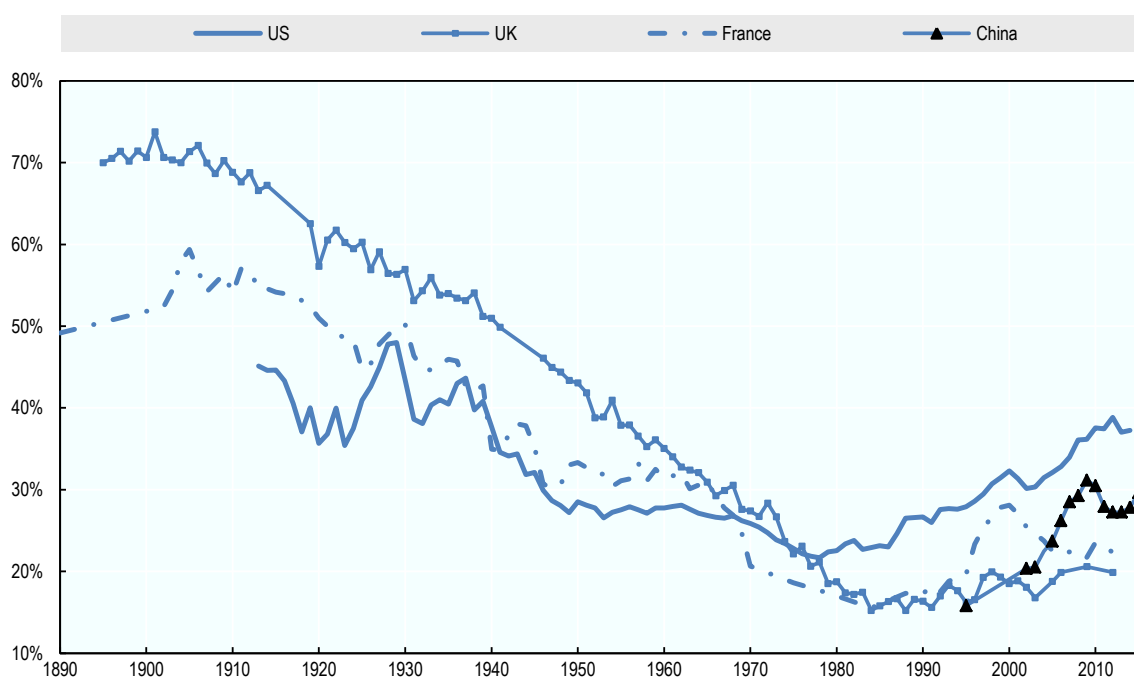
Sources: China: Piketty, T., L. Yang and G. Zucman (2017), "Capital accumulation, private property and rising inequality in China 1978-2015", *WID.world Working Paper*, No. 2017/6; other countries: Piketty, T. and G. Zucman (2014), "Capital is back: Wealth-income ratios in rich countries, 1700-2010", *The Quarterly Journal of Economics*, Vol. 129(3), pp. 1255-1310, and WID.world updates.

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6.3.3. Wealth inequality dynamics: The United States, China, France and the United Kingdom

Finally, we present findings on wealth inequality in Figure 6.4. We stress that currently available statistics on the distribution of wealth are highly imperfect. More transparency and better access to administrative and banking data sources are sorely needed if we want to gain knowledge of the underlying evolutions. In *WID.world*, we combine different sources and methods to reach robust conclusions: the income capitalisation method (using income tax returns), the estate multiplier method (using inheritance and estate tax returns), wealth surveys, national accounts and “rich lists”. Nevertheless, our series should still be viewed as imperfect, provisional, and subject to revision. We provide full access to our data files and computer codes so that everybody can use them and contribute to improving the data collection.¹²

Figure 6.4. Top 1% wealth share in China, the United States, France and the United Kingdom, 1890-2015



Note: Distribution of net personal wealth among adults. Corrected estimates (combining survey, fiscal, wealth and national accounts data). For China, US and France, equal-split-adult series (wealth of married couples divided by two); for UK, adult series.

Sources: US: Saez, E. and G. Zucman (2016), “Wealth inequality in the United States since 1913: Evidence from capitalized income tax data”, *The Quarterly Journal of Economics*, Vol. 131(2), pp. 519-578; UK: Alvaredo, F., A.B. Atkinson and S. Morelli (2018), “Top wealth shares in the UK over more than a century”, forthcoming, *The Journal of Public Economics* and Alvaredo, F., A.B. Atkinson and S. Morelli (2017), “Top wealth shares in the UK over more than a century”, *CEPR Discussion Paper*, No. 11759; France: Garbinti, B., J. Goupille-Lebret and T. Piketty (2016), “Accounting for wealth inequality dynamics: Methods, estimates and simulations for France (1800-2014)”, *WID.world Working Paper*, No. 2016/5; China: Piketty, T., L. Yang and G. Zucman (2017), “Capital accumulation, private property and rising inequality in China 1978-2015”, *WID.world Working Paper*, No. 2017/6.

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We observe a large rise of top wealth shares in the United States and China in recent decades, and a more moderate rise in France and the United Kingdom. A combination of factors explains these trends. First, higher income inequality and severe bottom-income stagnation explain higher wealth inequality in the United States. Next, the very unequal process of privatisation and access by Chinese households to quoted and unquoted equity probably played an important role in the very fast rise of wealth concentration in China. The potentially large mitigating impact of high real estate prices should also be taken into account; this effect, which benefitted the middle class, is likely to have been particularly strong in France and the United Kingdom, where housing prices have increased significantly relative to stock prices.

Given all these factors, it is not easy to predict whether the observed trend of rising concentration of wealth will continue. In the long run, steady-state wealth inequality depends on the inequality of saving rates across income and wealth groups, inequality of labour incomes and of rates of returns to wealth, and the progressivity of income and wealth taxes. Numerical simulations show that the response of steady-state wealth inequality to relatively small changes in these structural parameters can be large (Saez and Zucman, 2016; Garbinti, Goupille-Lebret and Piketty, 2016). This instability reinforces the need for increased democratic transparency about the dynamics of income and wealth.

6.4. Conclusions

We have very briefly described the basic concepts, sources and methods that we apply in the World Inequality Database (*WID.world*) and in the development of the DINA project. We should stress again that these methods are fragile, exploratory and subject to revision. As more countries join the database, new lessons will be learned, and the methods will be refined and updated. Accordingly, new updated versions of the *DINA Guidelines* will be regularly released on *WID.world*.

We have also presented selected results on income and wealth inequality dynamics based on the DINA project. Global inequality dynamics involve strong and contradictory forces. We observe rising top income and wealth shares in nearly all countries in recent decades. But the magnitude of rising inequality varies substantially across countries, suggesting that different country-specific policies and institutions matter considerably. High-GDP growth rates in emerging countries reduce between-country inequality, but this in itself does not guarantee acceptable within-country inequality levels and ensure the social sustainability of globalisation. Access to more and better data (administrative records, surveys, more detailed national accounts, etc.) is critical to monitor global inequality dynamics, as this is a key building block both to properly understand the present as well as the forces which will dominate in the future, and to design appropriate policy responses.

Notes

1. See also Piketty (2014) for an interpretative historical synthesis on the basis of this new material and of the top income shares time-series.
2. Social Accounts Matrices are a related precedent.
3. Kuznets (1953) was preceded by ten years in this by Frankel and Herzfeld (1943), who made estimates of the European income distribution in South Africa based on the income tax returns, making use of control totals from the census of population and from the national accounts.

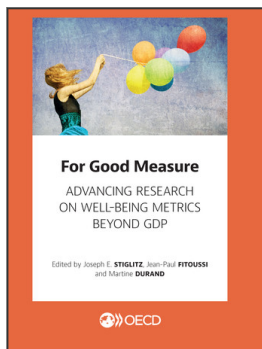
4. Results of these comparisons are already available for France (Garbinti, Goupille-Lebret and Piketty, 2017) and the United States (Piketty, Saez and Zucman, 2016).
5. As new DINA series become available, we will systematically compare the inequality trends obtained in the old and the new series, and analyse the sources of biases.
6. We also keep the *fiscal income* definition associated with the first top income share series (Atkinson and Piketty, 2007, 2010; Alvaredo et al., 2011-15).
7. Readers are referred to the *DINA Guidelines Appendix*, where we provide an Excel file with the formulas linking the income and wealth definitions to the SNA 2008 classification codes.
8. *WID.world* provides estimates of the consumption of fixed capital in countries where these series are not available in SNA series. *WID.world* also estimates missing income from tax havens to correct net foreign income flows (see Blanchet and Chancel (2016) for a discussion of methods). While these imputations are far from fully satisfactory, they increase the level of comparability of national income aggregates across countries.
9. The *DINA Guidelines* also discuss how the initial *WTID* time series, based on a fiscal income concept, can be corrected so as to be more directly comparable to new *DINA* series. In order to construct *DINA/WID.world* series for countries and time periods with limited data, we strongly recommend using the “Generalized Pareto interpolation” (gpinter) web interface available on-line (<http://WID.world/gpinter>). See Blanchet, Fournier and Piketty (2017) for full technical details on Pareto curves and the corresponding interpolation techniques.
10. The series for China make use of the data recently released by the tax administration on high-income taxpayers and include a conservative adjustment for the undistributed profit of privately owned corporations.
11. These series refer to pre-tax, pre-transfer inequality. Post-tax, post-transfer series (in progress) are likely to reinforce these conclusions, at least regarding the US-France comparison.
12. We refer to the country-specific papers for detailed discussions: Saez and Zucman, 2016; Alvaredo, Atkinson and Morelli, 2017, 2018; Garbinti, Goupille-Lebret and Piketty, 2016; Piketty, Yang and Zucman, 2017.

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