The Use of Distributional National Accounts in Better Capturing the Top Tail of the Distribution

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Abstract
This article explains how the compilation of distributional results in line with national accounts’ totals may assist in overcoming some of the challenges faced by micro data statistics in measuring inequality, including capturing the top tail. As national accounts rely on a harmonised system of concepts and definitions in which multiple data sources are brought together in order to arrive at comprehensive, coherent and consistent results, they may capture elements that may be missing from underlying statistics and may provide more reliable estimates for items that may be more prone to quality issues in underlying statistics. This implies that aligning micro data to national accounts totals may improve the overall quality of distributional results, mainly depending on the way in which any gaps between the micro and macro data are allocated to underlying households. This article provides an overview of possible underlying reasons for the micro-macro gaps, including the issue of the missing rich, and provides guidance on how to deal with them in order to arrive at the best possible distributional results.

Keywords Distributional results · Households · Micro data · National Accounts

JEL Classification C82 · D31 · E01 · E21

Abbreviations
ECB European Central Bank
EG DFA Expert Group on Distributional Financial Accounts
EG DNA Expert Group on Disparities in a National Accounts framework
OECD Organisation for Economic Co-operation and Development
SNA System of National Accounts
WIL World Inequality Lab

The opinions expressed and arguments employed in this article are those of the author and should not be reported as representing the official views of the OECD or of its members.

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1 Introduction

Economic inequality continues to be a matter of concern for policy makers and citizens, with the COVID-19 pandemic further re- emphasising the need for more detailed information on how specific household groups are faring. Evidence-based policies targeting inequality need to rely on systematic, robust and comprehensive data and indicators. Traditionally, a lot of information is available from micro data statistics, based on surveys and (increasingly) on administrative data. However, these statistics often face specific challenges. For example, survey data may suffer from estimation and measurement errors, with a particular challenge to properly capture the top tail of the distribution, whereas administrative data sources may not capture the full population (e.g., due to the use of thresholds) and may lack information on specific items. Moreover, as the setup of micro data sources often differs across countries, this may raise concerns about international comparability.

In order to overcome some of these challenges, initiatives have been launched to develop distributional measures in line with national accounts’ totals. The OECD-Eurostat Expert Group on Disparities in a National Accounts’ framework (EG DNA), the ECB Expert Group on Distributional Financial Accounts (EG DFA), and the World Inequality Lab (WIL) are examples of recent initiatives to compile distributional national accounts. These estimates complement existing distributional information by providing more comprehensive measures of inequality, amongst others by including elements of income, consumption and wealth that may not be covered in micro statistics. By definition, the results are consistent with macroeconomic aggregates, thus also capturing elements that may be difficult to capture in micro statistics (such as the top tail) and ensuring international comparability. However, as the results heavily rely on micro data sources as input for the distributions, the overall quality of the results will largely depend on the way in which any gaps between the micro data and the national accounts’ totals are bridged. In this regard, part of the gap may relate to the missing top tail in the underlying micro data, although other factors may also be at stake.

This article explains how distributional results in line with national accounts’ totals may assist in overcoming some of the challenges faced by micro data statistics in measuring inequality, including properly capturing the top tail, but that this mainly depends on the way in which compilers deal with the gaps between the micro results and the national accounts’ totals. Section 2 describes the compilation method for distributional national accounts, focusing on the work of the EG DNA, and highlights the main benefits. Section 3 focuses on the specific issue of micro-macro gaps in the compilation method and explains how their allocation may affect the results. Subsequently, Section 4 explores possible reasons for these gaps and Section 5 discusses the best approach to close the gaps accordingly. Section 6 draws the main conclusions.

2 Compiling Distributional Results in Line with National Accounts’ Totals

The system of national accounts is an accounting framework that provides comprehensive and consistent information on all economic activities and links between economic actors in an economy. Results are compiled by confronting and balancing information from various data sources on various transactions, positions and actors, according to a harmonised system of concepts and definitions. The use of quadruple accounting ensures complete consistency.
within the accounts. Combined with the use of multiple data sources, this adds to the quality and strength of the system, providing the possibility to correct for any missing data and to improve specific estimates by complementing and confronting available data with other, possibly higher quality data sources.

Results for the household sector usually not only rely on direct data sources on households, but also on counterpart information available from other sectors (such as banks, insurance companies, pension funds and government). Furthermore, the results may be affected by the impact of balancing all the information in the framework of the national accounts, arriving at consistent information across income, consumption and wealth. Consequently, the national accounts’ totals for the household sector may capture elements that may be missing in household micro data sources, such as the top tail, and may arrive at more accurate results for items that may be prone to misreporting in household statistics. Furthermore, it may include items that are not included in micro data sources, such as property income on pension entitlements attributed to policy holders and social transfers in kind. In view of distributional statistics, this also means that alignment to national accounts’ totals may lead to better and more comprehensive distributional results, dependent on the specific methodology to align the micro data to the national accounts’ totals.

The OECD and Eurostat launched a joint Expert Group in 2011 to develop methodology to compile distributional measures of income, consumption and savings across household groups within the framework of the national accounts. The methodology contains five steps, starting with the adjustment of national accounts’ totals to exclude any amounts that do not relate to resident private households, i.e., the target population for the distributional results. The second step involves lining up the relevant components from micro data sources to the income and consumption variables from the national accounts. These micro data provide the

1 The quadruple accounting provides the possibility to check consistency of results in two ways. First of all, it can be checked whether the numbers for a unit (or sector) are internally consistent, i.e., whether they respect the traditional double entry rules. In the national accounts, this can be checked by comparing the balancing item from the capital account with the balancing item of the financial account. Secondly, it can be checked whether there is consistency between total uses and resources for each of the transactions (and positions), as each use/resource should have an equivalent counterparty entry. In the compilation of national accounts, the latter consistency is usually accomplished by changing the original source data which are considered to be lowest-quality (see paragraphs 2.50–2.53 of the 2008 System of National Accounts (SNA) (European Commission 2009)).

2 The system of national accounts treats investment income on invested pension contributions by pension funds as benefiting policy holders, as it will further increase their pension entitlements. The amounts are recorded as earned by households in the form of property income and then reinvested in the pension fund in the form of imputed social contributions (see paragraphs 7.147–7.150 of the 2008 SNA (European Commission 2009)). Similar treatments apply to investment income on insurance technical reserves (related to insurance premiums paid by households for life and non-life insurance policies) and on investment fund shares.

3 These concern goods and services that are provided to households by government and non-profit institutions, either free of charge or at prices that are not economically significant. As the provision of these goods and services is a direct alternative to providing households with a cash benefit to purchase these goods and services themselves, their inclusion in distributional measures leads to a more comparable and more comprehensive overview of income inequality.

4 See OECD (2020) for a more detailed description of the methodology. More information and experimental results can also be found in Fesseau and Mattonetti (2013), Zwijnenburg et al. (2016) and Zwijnenburg et al. (2021).

5 This adjustment concerns, for example, amounts related to institutional households (such as people living in prisons, boarding schools and retirement homes) included in the national accounts’ aggregates for the household sector.
main underlying information to distribute income and consumption across households. In the third step, imputations are made for elements that fall outside the scope of micro data, and the results are aligned to the ‘adjusted’ national accounts totals. In the fourth step, households are clustered into household groups, for instance on the basis of their disposable income or on the basis of socio-demographic characteristics. In the final step, relevant indicators for the distribution of income, consumption and saving are derived, such as disparity ratios that show the degree of income and consumption inequality in a country. Figure 1 presents an overview of this step-by-step approach.

### 3 The Issue of Micro-Macro Gaps

The step-by-step approach clearly shows the importance of micro data in the compilation of distributional results in line with national accounts’ totals. They constitute the basis for determining the distributional patterns in the data, whereas the national accounts data provide the totals to which these micro data need to be aligned. Ideally, corresponding items can be found in micro data sources for all national accounts components, and the relevant micro data aggregates perfectly align with the national accounts totals. However, as some items are specific to the system of national accounts, imputations will normally be needed. Furthermore, as micro and macro data usually show different totals, alignments are often needed to close any gaps between the two. These two steps may have a substantial impact on the distributional results, depending on the number of items for which imputations are needed and the size of the gaps between the micro and the macro aggregates.

Analysis on the basis of EG DNA data collected in 2015 showed that distributional results for income and consumption are to the largest extent based on available micro data, but that the share of imputations and alignments in overall distributional results is quite large and may significantly affect the outcomes (see Zwijnenburg 2016). On average, the share of alignments in overall distributional results was 26.5% for adjusted disposable income and 30.2% for actual consumption expenditure. This implies that the way in which the micro-macro gaps are allocated to the underlying households may have a large impact on the distributional results. Allocating these amounts proportional to the reported data would lead to significantly different results than when allocating them to either the highest or the lowest income groups. It is therefore important that the gaps are allocated in the best possible way.

Before discussing possible ways to allocate micro-macro gaps, it is relevant to acknowledge that micro-macro gaps are not uniform across all items. Table 1 shows the coverage ratios for the main income and consumption items on the basis of results obtained in the 2020 collection round (see Zwijnenburg et al. 2021). The coverage ratio presents the micro aggregate as a percentage of the national accounts totals. The table shows the number of countries for which an adjustment coefficient could be calculated (i.e., for which micro data was available to compile the distributional results), the average value of the coefficient, the median value, and the minimum and maximum values in the exercise.

A coverage ratio that is close to 100% implies good alignment. However, the average values are much lower for most of the components. Alcohol and tobacco records the lowest

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6 On average, micro data sources cover more than 70% of the underlying flows of adjusted disposable income, whereas this is more than 60% for actual consumption expenditure.
average ratio (37.6%), followed by health care (50.2%) and net social contributions (55.1%). Operating surplus (60.8%), mixed income (64.6%), interest received (61.7%), recreation and

Table 1 Coverage ratios (in %) for main income and consumption components in 2020 EG DNA collection round

|                         | Number of countries | Average | Median | Minimum | Maximum |
|-------------------------|---------------------|---------|--------|---------|---------|
| **Primary income**      |                     |         |        |         |         |
| Operating surplus       | 7                   | 60.8    | 66.6   | 7.4     | 107.5   |
| Mixed income            | 10                  | 64.6    | 70.8   | 12.6    | 127.8   |
| Compensation of employees | 9                  | 87.8    | 87.6   | 78.3    | 99.6    |
| Interest received       | 9                   | 61.7    | 58.8   | 6.1     | 113.1   |
| Distributed income of corporations | 8              | 77.3    | 80.6   | 10.3    | 150.0   |
| Interest paid           | 6                   | 76.3    | 94.6   | 25.7    | 98.5    |
| **Disposable income**   |                     |         |        |         |         |
| Current taxes on income and wealth | 8              | 98.6    | 95.8   | 53.9    | 156.1   |
| Net social contributions | 9                  | 55.1    | 49.9   | 34.8    | 84.6    |
| Social benefits in cash | 10                  | 87.5    | 85.2   | 56.4    | 151.7   |
| **Consumption**         |                     |         |        |         |         |
| Food                    | 12                  | 77.1    | 77.9   | 32.9    | 107.5   |
| Alcohol and tobacco     | 12                  | 37.6    | 34.6   | 4.6     | 81.0    |
| Clothing and footwear   | 12                  | 76.6    | 79.9   | 43.5    | 122.9   |
| Housing, water, etc….   | 11                  | 71.1    | 79.8   | 25.4    | 128.4   |
| Furnishings and maintenance | 12             | 71.2    | 71.5   | 28.1    | 102.4   |
| Health                  | 11                  | 50.2    | 44.8   | 8.0     | 98.3    |
| Transport               | 11                  | 73.5    | 78.6   | 23.6    | 96.5    |
| Communications          | 12                  | 90.5    | 93.2   | 54.7    | 121.2   |
| Recreation and culture  | 11                  | 68.2    | 71.1   | 22.1    | 110.8   |
| Education               | 11                  | 90.9    | 93.6   | 32.3    | 169.6   |
| Restaurants and hotels  | 12                  | 77.1    | 77.9   | 32.9    | 107.5   |
| Misc. goods and services | 10                | 60.0    | 52.3   | 29.1    | 116.3   |
culture (68.2%) and miscellaneous goods and services (60%) also show relatively low coverage ratios on average. The table also highlights that countries show quite divergent coverage ratios for specific items. For example, for alcohol and tobacco, one country only records a coverage ratio of 4.6%, whereas another country reaches a coverage ratio of 81.0%. Particularly low minimum coverage ratios can be observed for operating surplus, mixed income, distributed income of corporations and health care, with coverage ratios below 20%. On the other hand, the maximum ratios shows that some countries have to deal with large over-coverage for some of the items. For example, one country records a coverage ratio of 169.6% for consumption of education services. Relatively high maximum ratios can also be observed for current taxes on income and wealth, social benefits in cash, and distributed income of corporations. These findings imply that some countries have to bridge large gaps in aligning their micro data to the national accounts’ totals. As explained, the way in which this is done may significantly affect the distributional results.

4 Exploring the Reasons for Micro-Macro Gaps

To properly deal with micro-macro gaps, there is a need to gain more insight in the reasons for these gaps. When looking at the methodology to compile distributional national accounts, there are three main possible reasons for the gaps (see Zwijnenburg 2016).

A first possible reason for micro-macro gaps is quality issues regarding the national accounts totals. As these are the product of a balancing framework in which data from various data sources are combined and confronted, it may be the case that gaps between micro and macro data point to specific issues in some of the underlying data sources used in the compilation of the national accounts or in the balancing process. This will largely depend on the way in which the result for a specific item have been derived, i.e., to what extent they derive from actual underlying data and to what extent from balancing decisions and specific assumptions. This needs to be carefully assessed when confronting the micro aggregates and the macro data. Where necessary, this may require adjustments to the national accounts’ totals.

Secondly, gaps may be due to conceptual differences and classification issues between micro and macro data. The definition of the national accounts item will often differ from the one used in survey or administrative data, (part of the) transaction may be classified differently, and the time of recording may differ. Specific elements might also be missing from the micro data, for example related to the underground economy or illegal activities, or to items that are specific to the system of national accounts. In these cases, corrections will be needed to better align the data.

Finally, gaps may be due to quality issues regarding the micro estimates. These can be broken down into estimation errors and measurement errors. Estimation errors relate to the extrapolation of sample results to the target population and may be linked to sample size, representativeness of the

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7 The underground economy relates to activities that in principle are legal, but are deliberately concealed from public authorities. Illegal activities are forbidden by law or become illegal when carried out by unauthorised persons.

8 For example, net social contributions cover actual social contributions as paid by employers and households into social insurance schemes, which will usually be covered in micro data sources. However, it also includes imputed social contributions, amongst others related to benefits provided by employers to their employees directly (to treat this similar to when these benefits would have been provided via an insurance scheme) and to supplements resulting from investment income made on insurance and pension technical reserves, that are attributed to the policy holders (see footnote 2). These imputed elements are normally not covered in micro data sources.
sample and magnitude of the non-response. All these aspects may lead to higher variability of the weighted estimates and therefore to possible gaps with the macro results. Especially survey data may suffer from estimation errors, with a particular challenge to capture the top tail of the distribution, even in the case of oversampling (Vermeulen 2018). Administrative data sources tend to have broad coverage and are therefore less prone to these kinds of errors. However, they may suffer from non-random under-coverage (especially in the case of reporting thresholds), which may warrant specific adjustments. Measurement errors relate to mistakes in the reported data. They may concern item non-response or the reporting of incorrect data, and may both affect survey and administrative data. Meyer et al. (2009) explain that these kinds of errors have increased over time, at least for specific items. In this regard, especially questions on income are relatively sensitive and prone to higher non-response rates or larger measurement errors. Where possible, these types of errors should be corrected for, although it may be difficult to obtain the necessary information. The combination and confrontation of survey results with administrative data, as well as the confrontation of income and consumption data on a micro-economic level may provide more insight in possible measurement errors.

5 Closing the Gaps

As micro-macro gaps may be caused by different reasons, it is important that compilers carefully assess to what extent each of the reasons may be at stake for the various items, and then adjust the results accordingly. This should be done in a systematic way to arrive at the best possible results and should be done in close collaboration between the relevant micro data and national accounts’ experts, as they have the best understanding of the underlying results, what may be the most likely causes for any gaps, and how to make the necessary adjustments. It is also important that the assessment is done at item level, as the causes and magnitudes of the gaps are likely to vary across items. Furthermore, all possible reasons should be assessed irrespective of the size and sign of the micro-macro gap, since the existence of an issue may be independent of the size and sign. In this regard, some of the issues may have opposing effects, which may lead to a negligible overall micro-macro gap, but which may conceal significant issues in the data that may have a large impact on the distributional results.

Looking at the way in which the distributional results are compiled, it may seem to be most sensible to first correct any errors in the micro and macro data, to then correct for any conceptual and classification differences, and to then correct for any missing elements in the micro data. However, in practice, it may be difficult to correct for any errors in the data upfront, as they may not be obvious from the start. For that reason, it may be better to first solve known differences between the micro and macro results before exploring possible quality issues in the data. This means that one should start with correcting for any conceptual differences and classification issues, and to then adjust for elements that are missing in the micro data. After solving these issues, it will turn out whether there are still remaining gaps, which may point to errors in the underlying data or in the adjustments made in the process.

Assessing whether any conceptual or classification issues may be at stake will require a detailed discussion between micro and macro experts, carefully comparing definitions, classifications and underlying methods to compile the data. Where possible, adjustments will need to be made to the underlying micro data to bring them more in line with the national accounts’

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9 The availability of metadata and reconciliation tables would be very instrumental for these discussions.
concepts. In some cases, this may be done by reclassifying amounts from one item to another, whereas in other occasions it may require assumptions to overcome specific differences.

Subsequently, corrections should be made for elements that may be missing from the micro data. First of all, this may concern specific parts of the national accounts items that may not be covered in the micro data, for example related to conceptual differences as explained above. For example, informal or illegal activities may not be captured in the micro data, so should be added to better align to the national accounts’ totals. Furthermore, some elements may be specific to the system of national accounts, such as imputed social contributions or property income on pension entitlements attributed to policy holders. In those cases, the micro data can be adjusted to include these missing elements, or, alternatively, it can be decided to separate out the imputed item from the national accounts’ total and to distribute this element separately from the part for which there is close conceptual alignment.

The other element that may need to be corrected for concerns missing part(s) of the population. This may be due to differences in the target population, the use of thresholds, and possible estimation errors in the data. With regard to the latter, as mentioned before, survey data sources may face difficulties in capturing the toptail of the distribution, even after applying oversampling techniques. In case of missing parts of the population, adjustments will be needed to better align the micro data to the national accounts’ totals. Sometimes, data may be available from other data sources (e.g., administrative data may be used to complement survey data) or estimates can be derived on the basis of information available for other groups in the population. If the missing parts of the population are very different from other groups, specific techniques may be needed.

With regard to better capturing the top tail of the distribution, parametric tail adjustments (i.e., Pareto tail adjustments) are often applied. These may, for example, rely on external benchmark data, such as rich lists (see Vermeulen (2018)). If such information is missing, Pareto tail adjustments may also be based on the available micro data, which can be used to derive the cut-off point and the shape parameter of the top tail (see Grilli et al. 2022, forthcoming). Alternatively, Lakner and Milanovic (2013) proxy the missing top incomes on the basis of the discrepancy between survey and national accounts data and allocate this to the top using Pareto fitting. However, this may be too simplistic, as gaps may also be due to other reasons and the lack of a gap (or over-coverage) does not automatically imply that the data properly captures the top tail. For that reason, compilers have to carefully assess whether there is a need for a Pareto-tail adjustment for specific items and how this can be incorporated into the micro data. As there are different types of Pareto-tail adjustments, compilers will also need to assess which type of adjustment will best fit the data.

After these steps, the remaining gaps should be assessed to see if there may be specific quality issues at stake. As discussed above, these may relate to the national accounts totals, the micro data, and/or the specific adjustments made in the process. In finding the most likely reasons, it is important to closely look at the underlying data. Sometimes the micro data may reveal implausible results, for instance in confronting results on income, consumption and wealth for specific households (or household groups) or in comparing results over time, which may be corrected for in order to further

10 In this regard, it may be more common for items such as property income, mixed income and, to a certain extent, for wages and salaries, than for items such as social benefits, other current transfers, property income paid, and various consumption items.

11 The OECD is currently looking into methodology to assist in this assessment, as part of the development of a centralized approach to compile distributional national accounts’ estimates for non-European OECD countries that are not actively involved in the EG DNA work. This will be discussed in Grilli et al. (2022, forthcoming).
close the gaps between the micro and macro data. In addition to reflecting on the quality of the micro data, it also needs to be assessed whether the remaining gap may point to quality issues in the macro totals. This will largely depend on the way in which the national accounts’ totals have been derived and to what extent these rely on actual data, on specific assumptions and/or on balancing decisions. If the underlying micro data are deemed more reliable than the national accounts total, this may require a change to the macro total. Finally, it is important to also reflect upon the specific adjustments made in the process of compiling the distributional results, as these may also suffer from quality issues.

In case corrections are made to the underlying micro data, some of the adjustments made for conceptual and classification issues, and to correct for missing elements may need to be updated, as they may rely on the underlying micro data. For example, if the Pareto tail adjustment relies on the shape of the distribution as captured in the available micro data, any corrections to the micro data might have a direct impact on the toptail adjustment. Furthermore, some conceptual and classification adjustments may be based on the underlying micro data, which would also warrant an update in case of any changes to the micro results.

Ideally, compilers manage to assign the full gap to the most likely underlying reasons and are able to allocate it to the relevant households accordingly. Compilers are strongly encouraged to do so, as this will lead to the best overall distributional results. Furthermore, it may help in improving the quality of the micro and macro statistics. Only if compilers are left with small remaining gaps, they may decide to allocate these in proportion to the underlying data, not affecting the overall distributional results for the specific item.

6 Conclusions

This article discussed how distributional accounts in line with national accounts’ totals may assist in overcoming some of the challenges faced by micro statistics. As national accounts rely on a harmonised system of concepts and definitions in which multiple data sources are brought together in order to arrive at comprehensive, coherent and consistent results, they may capture elements that may be missing from underlying statistics and may provide more reliable estimates for items that may be more prone to quality issues in underlying statistics. Whereas this may lead to better and more comprehensive distributional results, the article showed that the overall quality of the results will depend on the way in which any gaps between the micro and macro data are allocated to underlying households.

To arrive at the best possible results, compilers should carefully assess the underlying reasons for the micro-macro gaps, starting with adjusting the micro data for any conceptual and classification differences, correct for any elements that may be missing in the micro data, and then assess the quality of the underlying micro and macro results and of the various steps taken in the process. In this regard, part of the gap may relate to the fact that the micro data sources may not properly capture the top tail of the distribution, but other factors may also be at stake. It should be avoided to simply assign the full micro-macro gap to the toptail of the distribution. Instead, it needs to be carefully assessed whether part of the gap may indeed relate to a missing top tail, and, if so, how this can best be corrected for. Furthermore, it needs to be assessed to what extent the gaps can be explained by some of the other reasons and what corrections may be needed for this purpose. This assessment should be done in close collaboration between the
relevant micro data and national accounts’ experts and for each of the relevant items, irrespective of the size and sign of the gap.

Data Availability  Data from the EG DNA project are available in the public database from the OECD: https://stats.oecd.org/Index.aspx?DataSetCode=EGDNA_PUBLIC. The data underlying Table 1 are available from the corresponding author upon request.

Declarations

Competing Interests  The authors have no relevant financial or non-financial interests to disclose.

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