



Micro Macro Alignment of Household Income and Consumption in the EU. A Case Study Comparing the Eurostat Centralized Exercise with National Distributional Results

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Paper prepared for the 37th IARIW General Conference

August 22-26, 2022

Session 6C-1, Reducing Gaps between Micro and Macro Statistics on Household Income, Consumption, and Wealth in Compiling Distributional National Accounts I

Time: Friday, August 26, 2022 [9:00-10:30 CEST]

Micro-macro alignment of household income and consumption in the EU. A case study comparing the Eurostat centralized exercise with national distributional results

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Abstract

Distributional national accounts (DNA) are obtained by breaking down national accounts (NA) variables with indicators derived from microdata. The accuracy of these distributional estimates depends on how representative the chosen indicator is for the corresponding NA variable. Three factors influence the selection of the indicators: The availability and the quality of microdata sources and the conceptual correspondence of derived indicators with the respective NA variables. The best indicators are those that fully match conceptually and for which the micro-macro gap is smallest. The gaps between macro and micro totals can be read as a measure of coherence between the two sources and represent a first indication of the quality of the distributional accounts.

This paper analyses the methodology and distributional results derived from two different approaches: the Eurostat centralised exercise and national exercises. The centralised exercise used the European Statistics on Income and Living Conditions (EU-SILC) and consumption expenditure microdata from the Household Budget Survey (HBS) available at EU level to derive micro indicators, whereas the national exercises used all microdata sources available at national level that were deemed to meet the purpose. The strength of the centralised approach is that all microdata come from official data sources, harmonised across countries. Moreover, the methodology is well explained in the metadata. The weak point is the lack of additional information only available at national level that could help to refine the gap allocation. The national approaches have the advantage of having a variety of microdata sources and auxiliary information. On the other hand, their methodologies are not necessarily fully the same, despite of following common guidelines, and metadata more difficult to collect and compare.

The paper aims at shedding light on the differences between the Eurostat centralised approach and national exercises. We compare the micro-macro alignment process for three selected EU

countries for which recent results are available. In particular, we compare the sizes of initial gaps and the distributions obtained after allocating the gaps to household groups. Statistical analysis of the centralised exercise data has shown the high sensitivity of the distributional estimates to the different gap allocation methods, highlighting the need for sound assumptions on which to base the methodology and a coordinated approach across countries.

Disclaimer

The analysis presented in this paper has been made by Eurostat based on experimental data and metadata transmitted by countries and the experimental exercise conducted by Eurostat based on data available in-house for EU countries. This paper presents work in progress to stimulate discussions, but results should be considered as preliminary. The views expressed in this paper are those of the authors and do not represent an official position of Eurostat or any European member state.

1. Introduction

In its ‘GDP and beyond’ communication, the European Commission recognised that it is not only the economy that matters, but also the society’s ability to address environmental and social challenges, and promised to step up efforts to measure progress in delivering social and environmental goals (EC 2009). As a response, the European Statistical System Committee (ESSC) launched the ‘Sponsorship Group on Measuring Progress, Well-being, and Sustainable Development’, which identified priority areas for European statistics in which the viewpoint of the household should be emphasised. One of these priorities was to incorporate disparities among households in the NA framework by distributing NA totals for the household sector to different household groups based on micro data sources.

In the following years, Eurostat, the OECD and several countries worked together within the Expert Group on Disparities in a National Accounts Framework (EG DNA), developing methodological guidance for the distribution of household income, consumption and saving. In parallel, an ECB lead expert group worked on the distribution of financial accounts. As a result, the EG DNA guidelines and the System of National Accounts (SNA) review guidance note on distribution of household income, consumption and wealth provide proposals for the compilation of household distributional accounts.

Several countries developed their own household distributional accounts, whereas Eurostat produced household distributional accounts for all EU and EFTA countries in a centralised exercise, based on sector accounts data and microdata from the EU-SILC and the HBS.

However, the methodology applied by different countries varies according to the national availability and quality of microdata sources and knowledge about data gaps or quality issues. Likewise, Eurostat made methodological choices for the centralised exercise that were limited by the data and knowledge available in-house, even though countries were consulted on the results.

Not surprisingly, estimates produced nationally differ from Eurostat's centralised results. A comparison can only be made for some income items, with other items reported by countries not being available in the centralised exercise. Nevertheless, it is worth investigating the differences for the available items, trying to find explanations beyond the general assumption of national results being more reliable due to additional data sources available at the national level and better knowledge of the country's economy. The common income items for both exercises are: 'gross operating surplus', 'gross mixed income', 'property income (paid and received)' and 'social benefits other than social transfers in kind (STiK)'. For consumption, all twelve main COICOP categories are available from both national and central sides.

In this paper, we analyse the differences between the national estimates and Eurostat's centralised results for three countries – Czechia, Italy and the Netherlands, for which most recent results have been published. The comparability of national results across different countries is also worth investigating, but we will only look at it broadly here with more work to be done in the future.

2. Methodology

To be able to understand differences between the national and centralised results, we need to compare the underlying methodologies. In this chapter, we look through the main methodological aspects of the two data compilation exercises, following the EG DNA guidelines on how to compile distributional estimates of household income, consumption and savings in line with NA.

Step 1 - Adjustment to NA totals

Both national and centralised exercises focus only on a specific part of the household sector in the NA, i.e., private households. Therefore, the first step according to the EG DNA guidelines is the adjustment of national account totals removing any amounts that do not relate to private households, such as non-profit institutions serving households (NPISHs), if reported together

with the institutional sector households, and non-private households such as retirement homes, prisons, etc.

In addition, the distribution of private household account totals based on micro data is only possible for resident households. The passage from a domestic to a national concept requires to subtract expenditures of non-resident households from the NA domestic consumption expenditure and add expenditures that resident households make abroad, before applying the distributional information.

Table 1 summarises the overall adjustments made by each country and in the centralised exercise.

Table 1 – Adjustment to NA totals (difference between adjusted and original NA totals in %)

	Czechia (2019)	Italy (2018)	Netherlands (2019)
	Income ¹		
National exercise	-0.119	-0.232	0.00
Centralised exercise	-1.976	0.418	-1.132
	Consumption ²		
National exercise	-1.74	<i>n.a.</i>	0.00
Centralised exercise	<i>n.a.</i>	0.3509	-0.968
	NPISH reported with households		
National exercise	<i>No</i>	<i>No</i>	<i>No</i>
Centralised exercise	<i>No</i>	<i>No</i>	<i>No</i>
	Adjustment of non-resident households' expenditures on the territory		
National exercise	<i>Yes</i>	-	<i>Yes</i>
Centralised exercise	<i>No</i>	<i>No</i>	<i>No</i>

Table 1 shows that in the national exercise the adjusted NA totals are exactly equal to the original NA totals for the main aggregates in the Netherlands, while Czechia and Italy make minor adjustments for income and Czechia makes a substantial adjustment for consumption. In general, we see that the adjustments in the centralised exercise are higher than the ones in the country exercises and that adjustments are not aligned neither in size nor sign.

In the centralised exercise, Eurostat adjusted the official NA figures by a country-specific factor to exclude the part of the population that does not concern private households (mainly

¹ National exercise: simple average of the adjustments to primary income (B5), disposable income (B.6) and adjusted disposable income (B7). Eurostat's centralised exercise: same adjustment for all income items is applied.

² National exercise: actual final consumption. Eurostat's centralised exercise: same adjustment for all consumption items is applied.

institutional households). It is an implicit coefficient derived as the ratio between the total population in the social surveys (calculated as the sum of weights in EU-SILC/HBS multiplied by the number of persons in the households) and the population corresponding to the NA concept for the purpose of per capita GDP figures. Due to the lack of detailed information, aggregate adjustment coefficients were calculated separately for income and consumption and then applied at the level of individual income and consumption items

In both the country exercises and in the centralised exercise NPISH were excluded. However, Czechia and the Netherlands were also able to make an adjustment for non-resident households' expenditures on the territory. Adjusting consumption expenditure from domestic to national at category level requires information not available at Eurostat. For this reason, the centralized exercise distributes domestic consumption expenditure.

Step 2 – Identifying the relevant variables from micro data sources in relation to the national account variables.

Data sources

Micro variables that conceptually match the NA items are essential for obtaining accurate distributional results. While the input macro data in both exercises come from the household sector in the annual institutional sector accounts, the source of input microdata may differ.

In addition to the social surveys regularly carried out in all EU countries, many national statistical institutes have access to other microdata sources. Table 2 compares the microdata sources used in the three national exercises and in the centralised exercise:

Table 2 – Microdata sources

Czechia	Italy	Netherlands	Eurostat's centralised exercise
Income: <ul style="list-style-type: none"> - EU-SILC - Tax income declarations - Census data Consumption: <ul style="list-style-type: none"> - HBS 	Income: <ul style="list-style-type: none"> - EU-SILC combined with administrative data. 	Income: <ul style="list-style-type: none"> - Census data - Registers for addresses and buildings - Integral Income and Wealth Statistics - Labour Accounts - Pension Claims Statistics - Money Transfer Operators - Satellite Self-employed entrepreneurs - Giving in the Netherlands Panel Survey - Longitudinal Internet Studies for the Social sciences - Wage register - Healthcare Insurance Act - Education registration - Legal counsel register Consumption: <ul style="list-style-type: none"> - HBS 	Income: <ul style="list-style-type: none"> - EU-SILC Consumption: <ul style="list-style-type: none"> - HBS

For consumption, the three countries and the centralised exercise rely on the HBS. For income, the EU-SILC are the main data sources for Eurostat, Czechia and Italy, but Czechia and Italy complement the survey with administrative data. The Netherlands has a large variety of statistical and administrative information available, various register data.

Income and consumption item breakdown

The national estimates have been reported using the EG DNA template. Tables 3.1 and table 3.2 present the breakdown of income and consumption items in the template that have been covered by the three countries and Eurostat's centralised exercise.

Table 3.1 – Breakdown of income items

	National exercise	Eurostat's centralised exercise (ECE)	Comments
B2R+B3R	Operating surplus and mixed income	X	
B2R	Operating surplus	X	
B3R	Mixed income	X	
D1R	Compensation of employees	-	Only wages and salaries (D11R), received are included in ECE due to lack of micro data on employers' social contributions
D4N	Net property income received / Net property income	-	
D4R	Property income received	X	
D41R	Interest received	-	
D42R	Distributed income of corporations	-	
D43R	Reinvested earnings on foreign direct investment	-	
D44R	Investment income disbursements	-	
D45R	Rent received	-	
D4P	Property income paid	X	
D41P	Interest paid	-	
D45P	Rent paid	-	
B5	Balance of primary incomes	-	
D5P	Current taxes on income and wealth	-	Taxes on wealth, paid, are included in ECE
D61P	Net social contributions paid	-	In the ECE the households' social contribution, paid, includes also taxes on income
D61R	Net social contributions received	-	
D62P	Social benefits other than STiK paid	-	
D62R	Social benefits other than STiK received	X	
D7N	Other current transfers (net)	X	
B6	Disposable income	-	ECE calculates disposable income, gross, as an aggregate of available disposable income item
D63R	STiK	-	STiK data are not available from surveys
B7	Adjusted disposable income	-	

Table 3.1 shows that there are only five common income items in both exercises: 1) gross operating surplus, 2) gross mixed income, 3) property income, paid, 4) property income, received and 5) social benefits, other than social transfers in kind (STiK). According to the table in Annex 1, which provides an indication of the conceptual comparability for income items, it is only social benefits other than STiK that has a high conceptual link (Comparison of household income, Eurostat 2018). The other four common income items either have a low or a medium conceptual link, which ceteris paribus implies that these income items may have

higher micro and macro gaps and therefore may be more impacted by the choice of gap allocation methods.

Table 3.2 – Breakdown of consumption items

National exercise		Eurostat's centralised exercise
CP010	Food and non-alcoholic beverages	X
CP020	Alcoholic beverages, tobacco and narcotics	X
CP030	Clothing and footwear	X
CP040	Housing, water, electricity, gas and other fuels	X
CP050	Furnishings, household equipment and routine maintenance of the house	X
CP060	Health	X
CP070	Transport	X
CP080	Communications	X
CP090	Recreation and culture	X
CP100	Education	X
CP110	Restaurants and hotels	X
CP120	Miscellaneous goods and services	X
P31DC	Final domestic consumption expenditure	X
P33-P34	Adjustment for expenditures by resident households abroad minus expenditures by non-resident households on the territory	-
P31NC	Final national consumption expenditure	-
D63R	STiK	-
P4	Actual final consumption	-
B7	Adjusted disposable income	-

For *consumption*, all twelve main COICOP categories are available from Czechia, the Netherlands, and for Italy and the Netherlands from the centralised exercise according to the domestic concept.³

Step 3a – Imputations in case no direct microdata are available

It is a well-known fact that not all macro variables will have a corresponding item in the micro data sources, especially for those items specific to the system of national accounts, such

³ Italy did not report own estimates for consumption. No centralised estimates could be compiled for Czechia, as due to the Czech HBS sampling scheme the available HBS data could not be used for calculating country totals.

as FISIM (Financial Intermediation Services Indirectly Measured) and STiK. Missing items need to be imputed to include them in the distributional estimates.

Table 4 – Imputation of missing items

	Czechia	Italy	Netherlands
	STiK		
National exercise	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Centralised exercise	<i>No</i>	<i>No</i>	<i>No</i>
	FISIM		
National exercise	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Centralised exercise	<i>No</i>	<i>No</i>	<i>No</i>
	Underground or illegal activities		
National exercise	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Centralised exercise	<i>No</i>	<i>No</i>	<i>No</i>

The missing information in the microdata may explain a large part of the gap between microdata and the NA totals. Therefore, the EG DNA guidelines recommend to impute missing information. However, Eurostat is not applying any imputation for missing data because no alternative or supplementary information is available. This on its own makes it difficult to compare the national exercises with the centralised exercise. Because the centralised exercise is not covering social transfers in kind, adjusted disposable income cannot be compared with national estimates despite the importance of this item.

Step 3b - Methods for micro-macro gap allocation

The EG DNA guidelines define the following main methods for allocating the micro-macro gap across individual households.

- A. The transaction values in micro sources are scaled up or down so that their totals match the corresponding totals in NA (proportional allocation or pareto modelling, for example);
- B. Indirect method based on proxies. Missing or unreliable micro information is estimated by using the distribution of a different component as a proxy, therefore assuming that the two are distributed in the same way. Adjustment is made at the micro level before benchmarking aggregates to the NA totals;
- C. Indirect method based on external data. Missing or unreliable micro information is estimated using exogenous information (e.g., socio-demographic information)

available at the individual and at the household levels and making assumptions (in cases no micro information at all is available) before applying the distribution to NA totals;

- D. The NA total is distributed among all households at the end of the calculation process in a manner that the inclusion or exclusion of the component does not have an impact on the commonly used distributional indicators.

Tables 5.1 and 5.2 summarise the main methods used in both the country exercises and Eurostat's centralised exercise. For income, countries are using more than one method to scale the micro data to the adjusted NA totals, while Eurostat is applying only one method for all items. However, Eurostat uses a combination of different allocation approaches (Annex 2) to allocate the national account totals to individual households in the micro data by income item.

Table 5.1 – Methods applied by Czechia, Italy, the Netherlands and Eurostat for distributing selected income items

		Czechia	Italy	Netherlands	Centralised Exercise
B2R	Operating surplus	A	A, B	C	A (Proportional scaling)
B3R	Mixed income	A	A, B, C	A, C	A (Ascending gap share)
D4R	Property income, received	B, C	B, C, D	A, B	A (Pareto tail modelling)
D4P	Property income, paid	A, B, C	A, B	A, B	A (Proportional scaling)
D62R	Social benefits other than STiK, received	A	A	A	A (Proportional scaling)

For consumption, the countries and Eurostat apply a simple proportional scaling for all COICOP items (Table 5.2).

Table 5.2 - Applied methods for consumption items

		Czechia	Italy	Netherlands	Centralised Exercise
CP010	Food and non-alcoholic beverages	A	-	A	A
CP020	Alcoholic beverages, tobacco and narcotics	A	-	A	A
CP030	Clothing and footwear	A	-	A	A
CP040	Housing, water, electricity, gas and other fuels	A	-	A	A
CP050	Furnishings, household equipment and routine maintenance of the house	A	-	A	A
CP060	Health	A	-	A	A
CP070	Transport	A	-	A	A
CP080	Communications	A	-	A	A
CP090	Recreation and culture	A	-	A	A
CP100	Education	A	-	A	A
CP110	Restaurants and hotels	A	-	A	A
CP120	Miscellaneous goods and services	A, C	-	A	A

Step 4 – Clustering households

In line with the [EG DNA guidelines](#) and the [SNA Update: Guidance note on Distribution of household income, consumption and wealth](#), in both national and centralised exercises households are clustered into household groups (quintiles) based on *equivalised disposable income* according to 2008 SNA definitions using the OECD modified equivalence scale. This equivalisation is applied to take into account differences in the size and composition of households.

3. Comparison of results

This section compares results from the centralised and national exercises for a selection of countries. We compare results on income for Czechia, Italy and the Netherlands, while we consider only results from the Netherlands for consumption expenditure⁴. The analysis focuses on households classified by quintile of equivalent disposable income.

⁴ National distributional results were not available for Italy, and it was not possible to produce centralised estimates for Czechia, because of missing information about sample weights for the HBS data available at Eurostat.

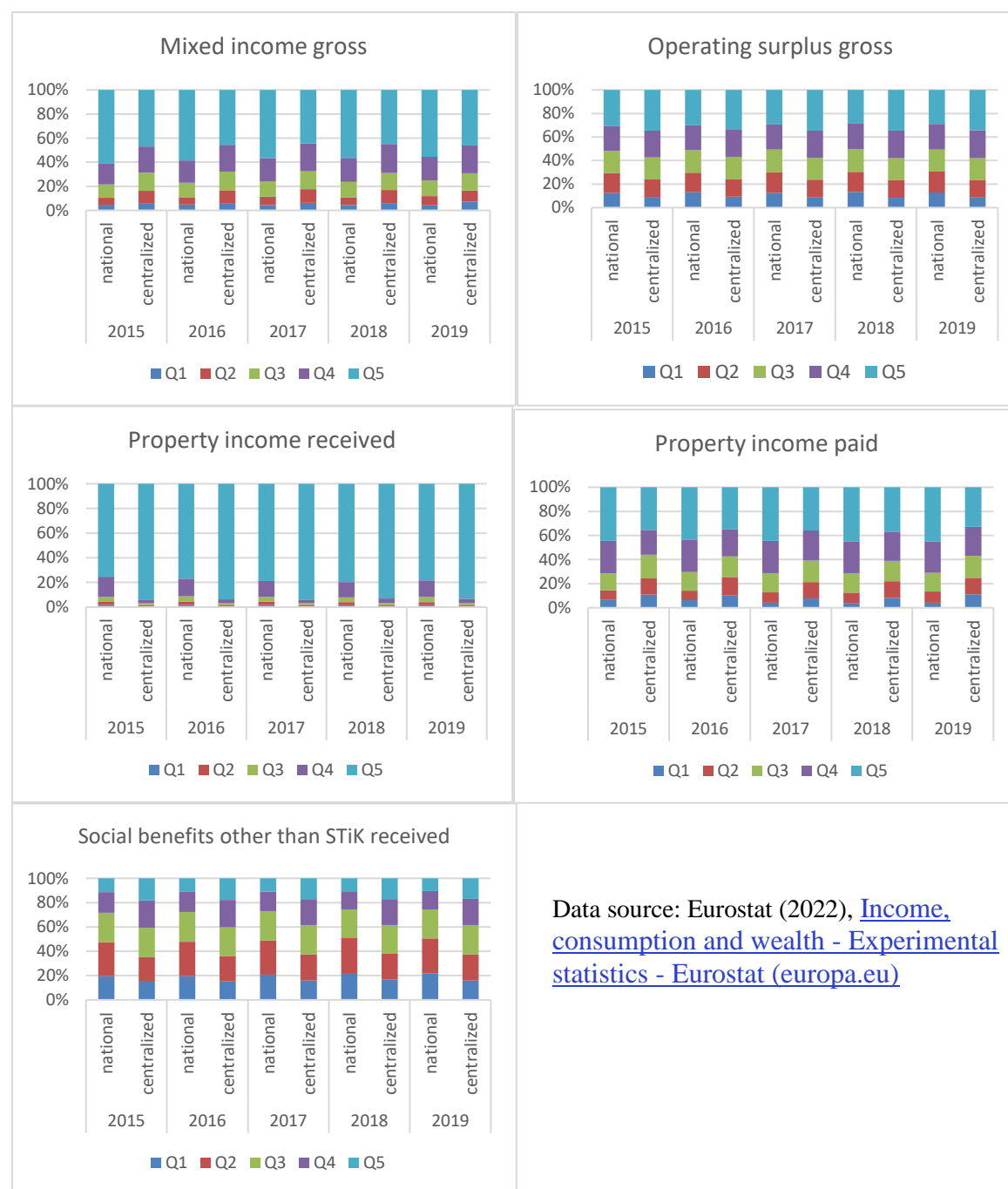
3.1 Income

The analysis considers only income items which are common to both the exercises, namely: ‘Gross operating surplus’, ‘gross mixed income’, ‘property income (paid and received)’ and received ‘social benefits other than social transfers in kind (STiK)’.

The figures in Boxes 1, 2 and 3 show the distributions of each income item across household groups for the national and centralised exercises, in each country. The differences between the national and the centralised estimates are significant for all income items, except ‘operating surplus’ in Czechia, ‘property income paid’ in the Netherlands, and ‘social benefits other than STiK’ in Italy. The centralised exercise consistently allocates smaller shares to the fifth quintile for ‘mixed income gross’ and ‘property income paid’, whereas it estimates the shares of the fifth quintile higher for ‘property income received’, ‘gross operating surplus, and ‘social benefits other than STiK’. Particularly significant differences are observed for ‘property income received’, with the centralised exercise showing a considerably higher share of income assigned to the fifth quintile, in each country and for all the observed years. Furthermore, the differences are quite stable over time for all three countries.

Box 1 – CZECHIA

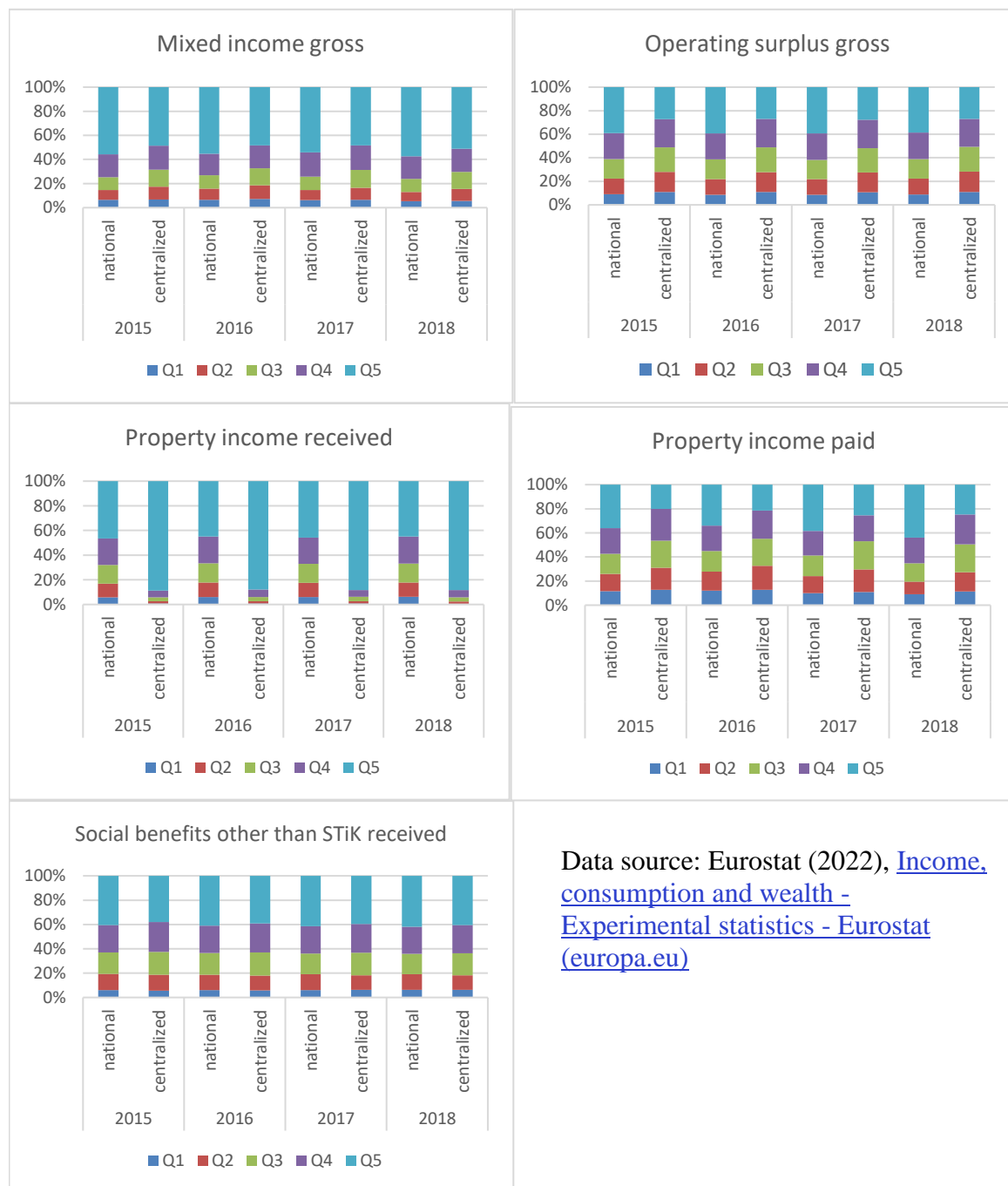
Figure 1 – Comparison of distributional results of national and centralised exercises by shares of the analysed income items



Data source: Eurostat (2022), [Income, consumption and wealth - Experimental statistics - Eurostat \(europa.eu\)](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&plugin=1)

Box 2 – ITALY

Figure 2 – Comparison of distributional results of national and centralised exercises by shares of the analysed income items



Data source: Eurostat (2022), [Income, consumption and wealth - Experimental statistics - Eurostat \(europa.eu\)](#)

Box 3 – NETHERLANDS

Figure 3 – Comparison of distributional results of national and centralised exercises by shares of the analysed income items



Data source: Eurostat (2022), [Income, consumption and wealth - Experimental statistics - Eurostat \(europa.eu\)](#)

Differences between the distributional results of the national and centralised exercises depend on several factors. First, countries may rely on more accurate microdata sources than Eurostat to distribute the NA totals (see Table 1). Second, even if the same microdata were used, the allocation of micro-macro gaps may be based on different assumptions, leading to different allocation methods and consequently different distributions of income items across household groups. Furthermore, the allocation of gaps to individual households in the sample may cause a shift of some households from one quantile to another and induce further changes in the distribution.

The significant difference between the centralised exercise and national exercises observed for ‘property income received’ is in part due to a low coverage rate of this income item in the EU-SILC microdata. Table 6 shows for each income item the coverage rates, i.e., the ratios of the total of the micro source to the total of the NA, the latter adjusted for population (see Section 2). Coverage rates can be interpreted as a measure of the quality of the micro source, indeed higher coverage ratios should provide more accurate distributional results. According to our analysis:

- Coverage rates have generally values lower than 1, meaning that micro source totals are lower than the corresponding NA totals. ‘Property income paid’ is an exception in all three countries, with ratios ranging from 1.1 (Italy, centralised exercise) to 3.16 (Netherlands, national exercise). The Netherlands shows over-coverage values also for ‘operating surplus’, in both the national and the centralized exercises.
- Coverage rates are generally higher for national exercises, meaning that countries can rely on additional information on income at the micro level (with respect to EU-SILC data) to fill the gap with the macro totals. The only exception is ‘mixed income’ for Italy, whose coverage ratio is higher for the centralised exercise.
- ‘Property income received’ is the item showing generally the largest micro-macro gaps for both the exercises. However, in Czechia, ‘operating surplus’ is the item less covered by the micro source, with a coverage rate of about 12% in the national exercise and 8% in the centralised exercise.

Table 6 – Micro-macro gaps: microsource totals over NA totals* (adjusted estimates). Year 2018.

		Czechia		Italy		Netherlands	
		national	centralised	national	centralised	national	centralised
B2R	Operating surplus	0.12	0.08	0.88	0.74	2.10	1.83
B3R	Mixed income	0.71	0.65	0.80	0.85	0.75	0.58
D4R	Property income received	0.17	0.17	-	0.21	0.20	0.20
D4P	Property income paid	1.21	1.22	-	1.09	3.16	3.04
D62R	Social benefits other than STiK received	0.76	0.74	0.91	0.90	0.93	0.89

* In the case of Netherlands national exercise, no adjustment is made on national accounts totals

Source of data: Eurostat centralised exercise and estimates transmitted by countries (Eurostat, 2022)

Comparing the distributions before and after the alignment to the NA totals can give us an indication of the importance that the gap allocation process may have had on the distributional results of the national and centralised exercises.

Tables 7.1 – 7.5 compare the Q5/Q1 ratio of the following four datasets:

1. *National micro dataset*, used in the national exercise. Only Czechia provided the information needed to calculate the ratio.
2. *National DNA dataset*, providing the distributional results of the national exercise.
3. *Centralised (EU-SILC) dataset*, corresponding to the EU-SILC micro data available to Eurostat.
4. *Centralised DNA dataset*, containing the distributional results of the centralised exercise.

The Q5/Q1 ratio of the original micro data for Czechia hardly differs between the national dataset and the EU-SILC data used by Eurostat for ‘operating surplus’ and ‘social benefits other than STiK’. It does differ, however, for ‘mixed income gross’ and ‘property income received’ and even more so for ‘property income paid’. The gap allocation process increases the differences in the Q5/Q1 ratio between the national and Eurostat estimates significantly leading to very different distributions in some cases:

- In the national exercise the allocation of the micro-macro gap seems to have no significant impact onto the Q5/Q1 ratio. An exception is ‘property income received’, for which inequality decreases significantly through the alignment of micro data to the NA totals in 2015 and 2016 whereas it increases in 2018 and 2019. For all the other

income items, the Q5/Q1 ratio remains fairly equal in the original micro dataset and the DNA.

- In contrast, the Q5/Q1 ratio of the centralised exercise changes significantly from the original EU-SILC data to the centralised DNA for all income items. As such, the centralised exercise overestimates Czech inequality, as compared to the national estimates, for ‘operating surplus’ and ‘social benefits other than STiK’ and in particular for ‘property income received’. It underestimates inequality for ‘mixed income gross’ and ‘property income paid’.

Table 7.1 – Operating surplus gross. Time series of Q5/Q1 ratios according to the national and centralised exercises. Years 2015-2019.

		2015	2016	2017	2018	2019
Czechia	national (micro source)	2.4	2.2	2.3	2.2	2.2
	national (DNA)	2.4	2.3	2.3	2.1	2.2
	centralised (EU-SILC)	2.6	2.4	2.4	2.4	2.3
	centralised (DNA)	3.8	3.7	4.0	4.2	4.0
Italy	national (micro source)	-	-	-	-	-
	national (DNA)	4.3	4.6	4.6	4.4	-
	centralised (EU-SILC)	2.3	2.2	2.4	2.2	
	centralised	2.5	2.5	2.6	2.5	-
Netherlands	national (micro source)	-	-	-	-	-
	national (DNA)	-197.4	75.6	15.1	14.2	13.7
	centralised (EU-SILC)	6.1	5.9	5.6	5.9	6.2
	centralised	5.2	5.0	4.8	5.1	5.0

Table 7.2 – Mixed income gross. Time series of Q5/Q1 ratios according to the national and centralised exercises. Years 2015-2019.

		2015	2016	2017	2018	2019
Czechia	national (micro source)	13.1	11.6	12.3	16.3	13.4
	national (DNA)	13.1	11.7	12.4	13.1	12.9
	centralised (EU-SILC)	11.5	9.8	10.8	15.5	12.8
	centralised (DNA)	8.2	7.3	7.1	8.0	6.3
Italy	national (micro source)	-	-	-	-	-
	national (DNA)	8.6	8.4	8.7	10.8	-
	centralised (EU-SILC)	2.3	6.8	7.6	9.7	
	centralised (DNA)	7.2	6.7	7.5	9.1	-
Netherlands	national (micro source)	-	-	-	-	-
	national (DNA)	15.8	14.2	13.6	14.9	17.2
	centralised (EU-SILC)	19.4	26.5	25	27.1	19.6
	centralised (DNA)	22.5	32.7	27.2	34.3	21.8

Table 7.3– Property income received. Time series of Q5/Q1 ratios according to the national and centralised exercises. Years 2015-2019.

		2015	2016	2017	2018	2019
Czechia	national (micro source)	52.7	59.2	44.8	41.7	44.4
	national (DNA)	42.7	42.8	43.3	53.0	51.3
	centralised (EU-SILC)	54.7	51.4	43.8	38	43.8
	centralised (DNA)	161.7	202.2	176.7	175.2	156.3
Italy	national (micro source)	-	-	-	-	-
	national (DNA)	8.0	7.3	7.5	7.2	-
	centralised (EU-SILC)	15.8	15.6	16.1	17.6	
	centralised (DNA)	122.6	104.9	96.1	129.1	-
Netherlands	national (micro source)	-	-	-	-	-
	national (DNA)	10.0	9.0	5.8	10.0	10.0
	centralised (EU-SILC)	22.7	15.3	21.1	22.7	60.4
	centralised (DNA)	327.2	165.8	-242.3	-242.7	152.1

Table 7.4 – Property income paid. Time series of Q5/Q1 ratios according to the national and centralised exercises. Years 2015-2019.

		2015	2016	2017	2018	2019
Czechia	national (micro source)	6.9	7.1	12.5	11.3	9.1
	national (DNA)	6.9	7.1	10.5	11.3	10.8
	centralised (EU-SILC)	3.9	3.9	5.9	6.7	5.4
	centralised (DNA)	3.3	3.3	4.7	4.6	3.0
Italy	national (micro source)	-	-	-	-	-
	national (DNA)	3.1	2.8	3.9	4.8	-
	centralised (EU-SILC)	2	2.5	2.6	2.4	
	centralised (DNA)	1.6	1.7	2.3	2.2	-
Netherlands	national (micro source)	-	-	-	-	-
	national (DNA)	7.4	7.9	7.3	8.4	9.3
	centralised (EU-SILC)	6.8	7.9	7.2	8.1	8
	centralised (DNA)	7.2	7.8	8.3	7.6	7.7

Table 7.5 – Social benefits other than STiK received. Time series of Q5/Q1 ratios according to the national and centralised exercises. Years 2015-2019.

		2015	2016	2017	2018	2019
Czechia	national (micro source)	0.6	0.6	0.5	0.5	0.5
	national (DNA)	0.6	0.6	0.5	0.5	0.5
	centralised (EU-SILC)	0.6	0.6	0.5	0.5	0.5
	centralised (DNA)	1.2	1.2	1.1	1.0	1.1
Italy	national (micro source)	-	-	-	-	-
	national (DNA)	6.8	6.8	6.7	6.8	-
	centralised (EU-SILC)	5.3	5.5	5.7	5.8	
	centralised	6.6	6.7	6.4	6.4	-
Netherlands	national (micro source)	-	-	-	-	-
	national (DNA)	1.5	1.4	1.4	1.3	1.3
	centralised (EU-SILC)	1.6	1.6	1.7	1.4	1.4
	centralised (DNA)	2.4	2.3	2.3	2.3	2.5

Source of data: Eurostat centralised exercise and estimates transmitted by countries (Eurostat, 2022)

For Italy, the centralised exercise underestimates inequality, as compared to the national estimates, for ‘operating surplus’, ‘mixed income gross’ and ‘property income paid’, whereas comparable results are obtained for ‘social benefits other than STiK’. The Netherlands, estimate inequality in ‘operating surplus’ significantly higher and ‘mixed income gross’ and ‘social benefits other than STiK’ lower than the centralised exercise. The extreme

overestimation of inequality in the centralised exercise for ‘property income received’ is blatant for all three countries. The large micro-macro gap alone cannot explain these differences. It shows us that we will need to dig even deeper into a methodological comparison in the future and that much work will be needed to align methodologies within the EU.

Table 8 provides some descriptive statistics of the relative changes in the Q5/Q1 ratio of original micro data and DNA in the centralised exercise. ‘Property income received’ records the highest relative changes of the ratio, while ‘property income paid’ records the lowest.

Table 8 – Relative changes of Q5/Q1 ratios after the alignment to NA totals. Descriptive statistics computed over the 2015-2019 period*. Percentage values.

	Czechia (centralised exercise)			Italy (centralised exercise)			Netherlands (centralised exercise)		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Operating surplus gross	62.6	46.6	73.5	9.8	7.5	12.0	-15.5	-19.0	-13.7
Mixed income gross	-37.4	-50.9	-25.1	51.3	-6.5	215.2	17.3	9.0	26.6
Property income received	282.1	195.6	361.1	594.6	496.6	675.8	11.9	-1248.4	1341.5
Property income paid	-25.8	-45.1	-15.3	-18.7	-32.4	-10.3	2.2	-6.0	15.3
Social benefits other than STiK received	105.9	94.8	113.9	17.7	11.2	25.4	53.4	35.5	78.5

Note relative changes are computed as follows: (Q5/Q1 ratio computed on the centralised DNA dataset)/ (Q5/Q1 ratio computed on the centralised EU-SILC dataset) -1.

* From 2015 to 2018 for Italy

3.2 Consumption

In this section we compare the distributional results for consumption expenditure for the Netherlands, year 2015. According to the metadata, both the national and the centralised exercises rely on the same micro data source, i.e., the HBS (see table 1). Furthermore, both the exercises use the proportional allocation method for allocating the micro-macro gaps across individual households (see table 5b). Consequently, we expect to find similar distributional results for the two exercises.

Table 9 shows the coverage rates of HBS compared to the NA values. The first two columns show the amount of consumption expenditure (in millions euro) by consumption category according to the HBS dataset. The first column reports data from the HBS data available at Eurostat, while the latter shows data from HBS as transmitted by the Netherlands along with

distributional results. We notice that coverage rates differ significantly for CP04 (Housing, water, electricity, gas and other fuels), CP10 (Education) and CP12 (miscellaneous good and services). For CP04 the difference can be explained by the use of administrative data, which the Dutch experts consider more reliable than the HBS for housing. For CP12, the national data exclude certain taxes, private insurances and lottery tickets from the HBS that are recorded under income items in NA. For CP10, we were not able to explain the differences yet, but will further investigate the issue in the continuation of our work.

Table 9 – Domestic consumption expenditure by consumption category according to micro (HBS, centralised and national exercises) and macro (NA) data and related coverage rates. Netherlands, year 2015

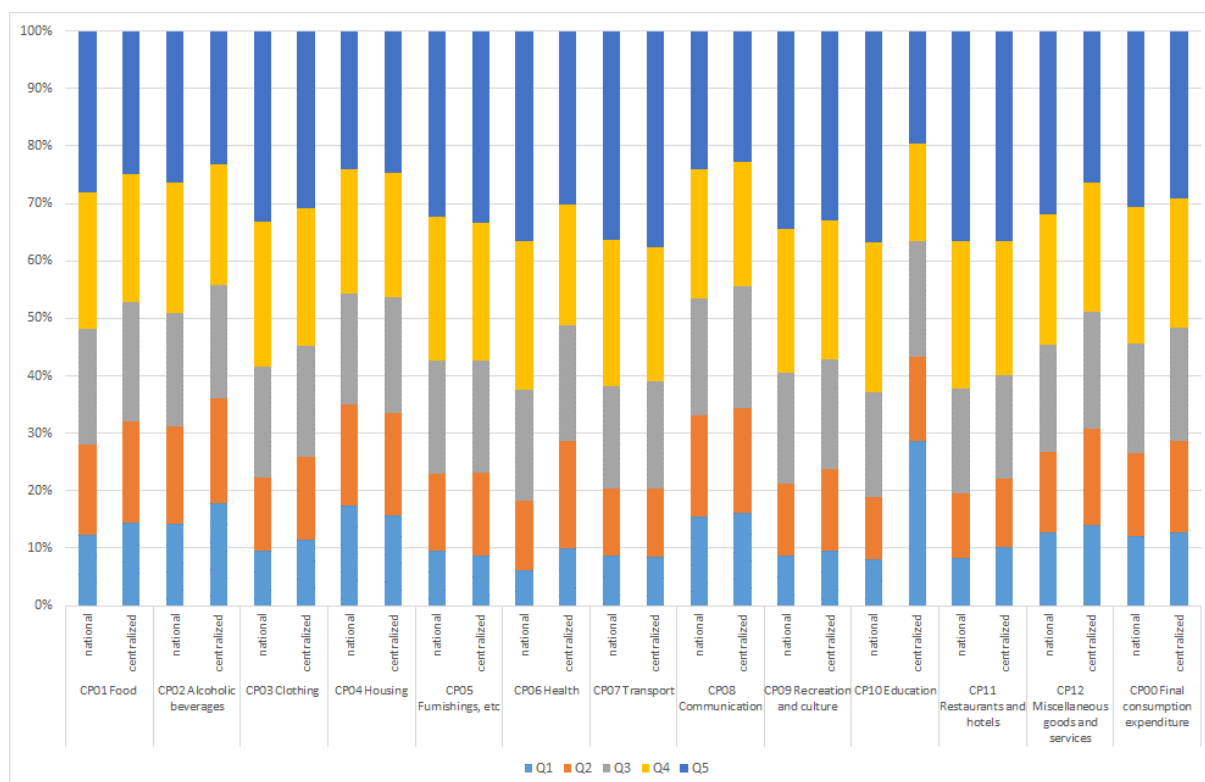
	HBS (centralised) (A)	HBS (national) (B)	NA domestic consumption expenditure (C)	Coverage rate (centralised) : A/C	Coverage rate (national) : B/C
CP00 Final domestic consumption expenditure (domestic)	270787	194466	303545	0.89	0.64
CP01 Food and non-alcoholic beverages	28697	29969	34881	0.82	0.86
CP02 Alcoholic beverages, tobacco and narcotics	7816	8137	10040	0.78	0.81
CP03 Clothing and footwear	12252	12794	16512	0.74	0.77
CP04 Housing, water, electricity, gas and other fuels	82382	18828	74215	1.11	0.25
CP05 Furnishings, household equipment and routine household maintenance	13886	15365	16338	0.85	0.94
CP06 Health	3521	3724	10544	0.33	0.35
CP07 Transport	33921	35403	36435	0.93	0.97
CP08 Communications	8695	9080	9290	0.94	0.98
CP09 Recreation and culture	22703	23686	30438	0.75	0.78
CP10 Education	3547	1103	2127	1.67	0.52
CP11 Restaurants and hotels	15509	16142	23536	0.66	0.69
CP12 Miscellaneous goods and services	37858	20236	39189	0.97	0.52

Note: Consumption expenditure (columns 1, 2 and 3) is in millions euro.

Source: Eurostat centralised exercise and estimates transmitted by countries (Eurostat, 2022) for HBS data; Eurostat database for NA consumption expenditure data

Figure 4 compares the distributions by household groups of each consumption category in the national and centralised exercises. Total consumption shows an almost identical distribution, whereas relevant differences are visible for some consumption categories, especially for ‘Education’.

Figure 4 – Consumption expenditure distributed by consumption category and household groups, Netherlands 2015, national and centralised exercises.



Note: the national exercise distributes national final consumption expenditure while the centralised exercise distributes domestic final consumption expenditure.

As already mentioned, the two exercises use the same data source (HBS), except for a few items (under CP04 and CP12) which have been complemented with administrative data at national level (see above). Furthermore, both the exercises use the proportional allocation method to fill in the gaps. Therefore, neither the different accuracy of the source micro-data nor the process of alignment to the NA total can explain the differences in the final results of the two exercises, in particular for education.

Minor differences between distributional results may be due to the different amount of final consumption expenditure distributed, national in the case of the national exercise and domestic in the case of the centralised exercise. Such differences concern particularly ‘transport’, ‘recreation and culture’ and ‘restaurant and hotels’, i.e., the categories where the difference between domestic and national expenditure is likely to be greatest. Also, the difference in the underlying populations may explain the differences to a certain extent: The centralised exercise applies a coefficient to total consumption expenditure (adjustment) to align survey and NA populations, while the Netherlands national exercise distributes the NA total without any adjustment.

The most significant cause of the differences between the two exercises probably lies in the method used to create the household groups. In the centralised exercise a household is assigned to one quintile rather than another based on the equivalised disposable income calculated with the HBS income data. In the national exercise, on the other hand, the allocation is presumably made using information from the register that the Netherlands constructs by integrating several sources (Bruil 2018).

Conclusions

The compilation of household distributional accounts is still a challenge for many countries, although some countries, such as the three European countries included in this analysis, have come a long way and are able to produce distributional estimates for most if not all income and consumption items. Even though countries and Eurostat are following the same guidelines a direct comparison between the two exercises is not easy. Methodologies used are not fully comparable and common (income) variables are limited to only five. Eurostat is limited by the lack of additional information, only available at national level that could help to refine the gap allocation and to impute missing data.

Based on the data and metadata that were available to Eurostat for this analysis, the national and Eurostat's centralised exercises show more similarities than expected in terms of both microdata sources and methods used to fill the gaps (especially for consumption expenditure). Nevertheless, the resulting distributional household account estimates are significantly different.

The integration of EU-SILC and HBS microdata with administrative data available at national level certainly play a role, increasing the quality of input data and enhancing the number of variables that can be used for distributing the national account totals, although we miss detailed information on how countries improved their micro input datasets. We could also see differences in the population adjustments done at national level and at Eurostat, with the centralised exercise inducing larger changes for income and using a domestic final consumption expenditure instead of a national one. However, the information available on the methods used for gap allocation was insufficient to explain the significant differences in results. In particular, it would be important to verify if countries allocate gaps at the micro level (as suggested in the guidelines) or only at the macro level. In the first case the allocation of the gap may cause the shift of some households (and related transactions) from one quintile

to another. It would be useful and important to explore this issue in depth in both the centralised and the national exercises.

A major issue is the large size of micro-macro gaps found for some income and consumption items. With coverage rates below 70%, any assumptions about how to accurately fill the gap will remain weak and methodological differences will have a significant impact onto the results. This has become particularly evident for ‘property income received’, for which coverage rates were only about 20%.

In conclusion, our analysis shows that the work on household distributional accounts is still in its infant shoes. Significant differences in distributional estimates are found not only between the national approaches and the centralised approach, but also between the national approaches themselves. This is a result of the different approaches applied, in particular for the population adjustment and the treatment of micro-macro gaps. Despite a decade of work on DNA at international level, and in particular coordination of this work within the OECD-Eurostat expert group and the useful guidelines, methodologies are not fully comparable yet and further harmonisation work together with detailed methodological descriptions will be important if we want to obtain EU statistics on household distributional accounts.

Links and literature

Bruil A. (2018) Adding Inequalities to the SNA Framework: How Macro Disposable Income Benefits and Differs from Micro Disposable Income Paper prepared for the 35th IARIW General Conference, Copenhagen, Denmark, August 20-25, 2018.

EC (2009): [GDP and Beyond – Measuring progress in a changing world](#) (COM (2009) 433), August 2009.

Eurostat (2022): [Income, consumption and wealth - Experimental statistics - Eurostat \(europa.eu\)](#)

Eurostat (2022): [Eurostat Centralised Exercise - methodological note \(europa.eu\)](#)

Eurostat (2018): [Comparison of household income \(europa.eu\)](#)

Annex 1

Eurostat assessment of conceptual correspondence between EU-SILC and NA income items

Item	EU-SILC		NA		Indicative assessment of conceptual link
	Code	Description	Code	Description	
Operating surplus, gross	HY030G	Imputed rent	B2G	Operating surplus, gross	Low
Mixed income, gross	PY050G HY170G	Cash benefits or losses from self-employment Value of goods produced for own consumption	B3G	Mixed income, gross	Medium
Property income (received)	HY090G HY040G	Interest, dividends, profit from capital investments in unincorporated business Income from rental of a property or land	D4/ resource	Property income, received	Medium/ Low
Property income (paid)	HY100G	Interest repayments on mortgage	D4/use	Property income, paid	Low
Wages and salaries (received)	PY010G PY020G PY021G	Employee cash or near cash income Non-cash employee income Company car	D11/resource	Wages and salaries	High
Social benefits, other than STiK (received)	HY050G HY060G PY090G PY100G PY110G PY120G PY130G PY140G HY070G	Family/children related allowances Social exclusion not elsewhere classified Unemployment benefits Old-age benefits Survivor' benefits Sickness benefits Disability benefits Education-related allowances Housing allowances	D62/ resource	Social benefits, other than social transfers in kind	High
Other current transfers (received)	HY080G	Regular inter-household cash transfer (received)	D7/ resource	Other current transfers, received	Low
Taxes on wealth (paid)	HY120G	Regular taxes on wealth	D59	Other current taxes	Low
Households' social contributions (paid) and taxes on income	HY140G	Taxes on income and social contributions	D51/use D613/use D614/use	Taxes on income Households' actual social contributions Households' social contributions supplements	High
Other current transfers (paid)	HY130G	Regular inter-household cash transfer (paid)	D7/use	Other current transfers, paid	Low/No

Annex 2

Eurostat centralised exercise methods for micro-macro gap allocation

Method	Description	Assumption	Income item	Consumption item
(i) Simple proportional scaling	The entire gap is distributed proportionally to each household, the micro data are uprated using the coefficient to reach the macro total.	The distribution found in the sample survey is close to the real distribution of the household population.	Operating surplus, gross; Property income (paid); Wages and salaries (received); Social benefits, other than STiK (received); Households' social contributions (paid) and taxes on income	All COICOP items
(ii) Pareto tail modelling (complemented by proportional scaling)	The top 10% of households by income component are adjusted to follow a Pareto distribution. The remaining gap by item is subsequently allocated to all households by simple proportional scaling to match the corresponding NA totals.	The sample survey strongly underestimates the very top of the distribution.	Property income (received)	-
(iii) Allocation of ascending gap shares by decile	This includes 'to-the-top' allocation: gap shares 0,0,4,6,8,12,14,16,18,22% to D1-D10 accordingly. The meso-level gaps are subsequently distributed across the underlying households.	Underestimation towards the top of the household distribution in the sample survey.	Mixed income, gross; Taxes on wealth	-
(iiia) Modified ascending gap shares by decile	This includes 'to-the-top' allocation: gap shares 4,6,7,8,9,11,12,13,14,16% to D1-D10 accordingly. The meso-level gaps are subsequently distributed across the underlying households.	Ascending gap shares based on corresponding HBS data	Other current transfers, paid/received	-