Household Income Disparity Comparisons Among Countries with Various Levels of Redistribution

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Paper Prepared for the IARIW 33rd General Conference

Rotterdam, the Netherlands, August 24-30, 2014

Session 3

Time: Tuesday, August 26, Morning

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Introduction

When national accounts data come to the attention of the public, the primary focus is on GDP growth. While GDP may indeed provide a good indicator of what is produced in a country, it falls short of providing a suitable measure of people's material well-being. On the other hand however, there is a wealth of information available within the System of National Accounts (SNA) to help determine households' economic well-being in a more appropriate way. Data on household (adjusted) disposable income and saving, for example, may provide a better reflection of developments in material well-being of the population at large.

While there is a wealth of information available in the national accounts focusing on the household sector as a whole, there is little information on how income, consumption and wealth are distributed across socio-economic classes of households. Such information is, however, clearly of interest for economic policy to answer questions such as how to arrive at more inclusive economic growth, i.e. a growth where the largest possible proportion of society shares its benefits.

Much valuable information exists at the macro level as the national accounts provide aggregate measures of household (adjusted) disposable income, social transfers in kind (STiK), consumption expenditure and investment, assets and liabilities. On the other hand, micro-surveys provide more detailed information on the distribution of income, consumption and wealth. However, due to differences in concepts, definitions, and statistical practices, micro data can yield results that diverge from the macro aggregate and, therefore, may not be consistent with national accounts.

The difficulty linking the concepts and definitions used in micro surveys to macro-economic statistics such as national accounts may hamper direct analysis of, for example, government policy and its impact on distributional issues. These limitations call for an enhanced integration of the results from micro-surveys to the system of national accounts. However, achieving such integration requires confronting a number of challenges.

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[1] The views expressed herein are those of the authors and should not be attributed to the Organisation of Economic Co-operation and Development. The authors are accountable for any mistakes in this paper.

In particular, household disposable income comparisons across countries with various levels of redistribution, and various levels of government participation in, primarily, education and healthcare could give a misleading image in the absence of taking into account STiK, an income category absent in most household surveys. Similarly, disparity comparisons among countries can be misleading if STiK is not allocated to beneficiary households.

To help address these issues, in 2011, Eurostat and the OECD set up a joint Expert Group on Disparities in National Accounts (EG DNA). Twenty-five countries nominated experts to participate in this Expert Group[2]. The European Central Bank and the Luxembourg Income Study also joined the Group that was chaired by Wim van Nunspeet from Statistics Netherlands (CBS).

Using the experimental calculations performed under the aegis of the EG DNA this paper discusses the issue of STiK allocations and its consequences on the distribution of income among households across income quintiles. The paper reviews various allocation choices for STiK.

The paper is organized as follows: section 1 provides a general description of various income concepts; section 2 discusses the allocations of STiK by countries during the EG DNA exercise; section 3 discusses our simulations of random allocations of STiK. The last section of this paper summarises the conclusions and discusses future work on household income distribution.

Section 1. - Income concepts

National accounts data provide information on various components of income flows received and paid by households (e.g. wages and salaries, social benefits, income taxes). In the national accounts framework the description of income distribution's pattern follows two steps: the first one depicts income generated from involvement in the production process or ownership of assets; the second one illustrates how income is re-distributed between institutional sectors by means of the payments and receipts of current transfers. Two aggregates reflect these two stages: primary income and disposable income; defined by the 2008 SNA as follows:

Primary incomes are incomes that accrue to institutional units as a consequence of their involvement in processes of production or ownership of assets that may be needed for purposes of production. A major item of primary income is compensation of employees that represents the income accruing to individuals in return for their labor input into production processes. Property income is that part of primary incomes that accrues by lending or renting financial or natural resources, including land, to other units for use in production. (2008 SNA § 7.2)

Disposable income is derived from primary income by adding net current transfers (i.e., for households, social benefits in cash and other current transfers received minus social contributions and taxes paid). This measure excludes social transfers in kind. (2008 SNA § 8.20) The SNA also states

[2] Australia, Austria, Canada, Chile, Denmark, Finland, France, Germany, Israel, Italy, India, Japan, Korea, Mexico, Netherlands, New-Zealand, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

that “Disposable income as measured in the SNA can be compared with the concept of income as it is generally understood in economics. From a theoretical point of view, income is often defined as the maximum amount that a household, or other unit, can consume without reducing its real net worth.” (2008 SNA § 8.25)

However, when defining the income quintiles for the EG DNA exercise[3] a concept of income which is close to the SNA disposable income, but not exactly, was used to determine the income quintiles. The concept chosen –*cash disposable income* – is comprised of wages and salaries, income from self-employment, net property income and net current transfers as defined in the 2001 and 2011 Canberra Group Handbook on Household Income Statistics. The broadened 2011 definition reflects national advancements in income measurement over the period. With the inclusion of free or subsidised goods and services from an employer, severance and termination pay, royalties, and imputed rent from owner-occupied dwellings, the 2011 definition comes close to the disposable income concept of the SNA, but still remains slightly different, primarily by only taking into account incomes that are closely observable by households, therefore, for example, disregarding financial intermediation services indirectly measured (FISIM).

It should be noted that the SNA includes an alternative, broader income concept called *adjusted disposable income* that takes into account spending by general government and non-profit institutions serving households (NPISHs) that benefit households. When comparing disposable income across countries, it is preferable to use adjusted disposable income because it takes into account the free (or at prices that are not economically significant) provision of services provided by government (e.g., education and health) and NPISHs. Arguably, consumption possibilities of a household do not only depend on its disposable income, but also the magnitude of the free services it receives. Therefore, for a fairer comparison of income levels across countries or household groups within a country (or indeed over time, if the range of these services change significantly) disposable income should be adjusted with the value of these services. The income representing the free provision of services by government and NPISHs is referred to as *social transfers in kind* (STiK).

In this respect SNA states that STiK consists of “goods and services provided by general government and non-profit institutions serving households (NPISHs) that are delivered to individual households. Health and education services are the prime examples. Rather than provide a specified amount of money to be used to purchase medical and educational services, the services are often provided in kind to make sure that the need for the services is met. (Sometimes the recipient purchases the service and is reimbursed by the insurance or assistance scheme. Such a transaction is still treated as being in kind because the recipient is merely acting as the agent of the insurance scheme.)” (2008 SNA § 3.83)

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[3] The EG DNA mandate has been renewed since. In the discussions on the conceptual frame of the repeated exercise the possibility to move from the cash disposable income for income quintiles determination to the fully SNA consistent disposable income or adjusted disposable income has been raised, because, based on the experience of the first exercise it seems feasible, and it would greatly increase the internal consistency of the results.

Table 1 shows the main transactions and relationships of the income concepts in the national accounts framework using the associated codes for household income.

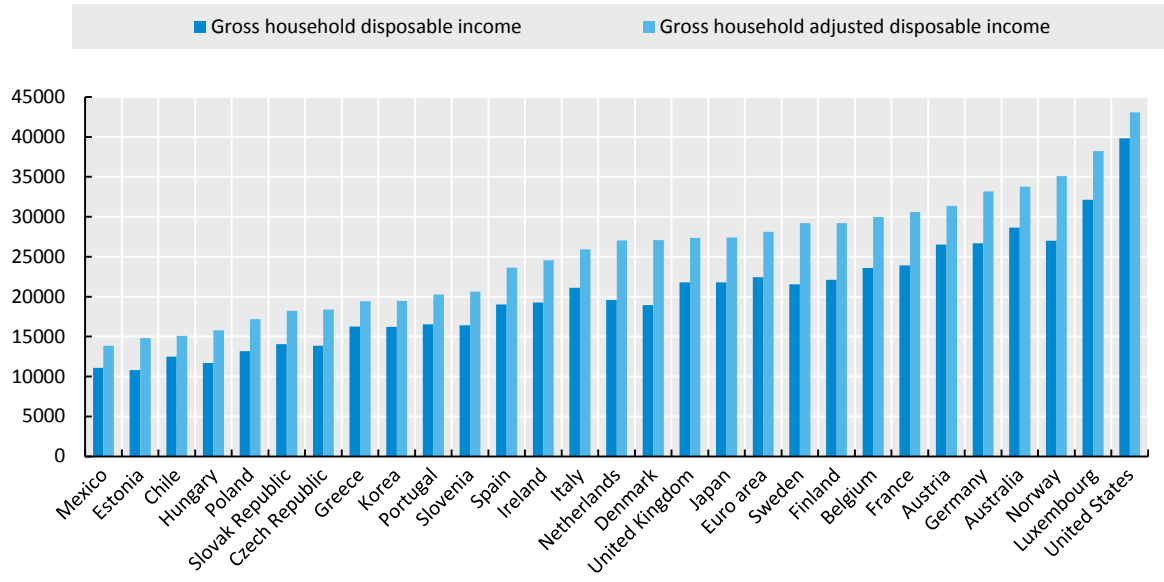
Table 1: Household Income in the SNA

Income resources – received by households		
B2	Operating surplus from actual and imputed rentals	
B3	Mixed income from owned unincorporated enterprises and from own account production	
D1	Compensation of employees, including social contributions	
D4	Property income , e.g. interest, dividends, rents on land	
Income uses - paid by households		
D4	Property income, e.g. interest, rents on land	
B5	**Primary income**	= B2+B3+D1+ D4 resources – D4 uses
Income resources – received by households		
D62	Social benefits in cash	
D7	Other current transfers	
Income uses – paid by households		
D5	Current taxes on income and wealth	
D61	Social contributions	
D7	Other current transfers	
B6	**Disposable income**	= B5+D62+D7resources-D5-D61-D7uses
D63	Social Transfers in Kind	
B7	**Adjusted disposable income**	= B6+D63

In 2012, the largest gaps (in US dollars) between adjusted disposable income and disposable income (Figure 1) were in Denmark, Norway, Sweden and the Netherlands, followed by Finland and France. The smallest gaps between the two measures were in Chile, Mexico, and Greece. Using either disposable income or adjusted disposable income can significantly affect the comparison of income levels across countries. While Denmark ranks 17th out of 28 countries when looking at disposable income per capita at USD 18 957, it moves up in rank to 13th when looking at adjusted disposable income per capita at USD 27 080. On the other hand, the United Kingdom ranks 10th when looking at disposable income per capita, but moves down in rank to 12th for adjusted disposable income per capita.

Figure 1. Gross (adjusted) disposable income of households per capita

US dollars, current PPPs, 2012



Source: OECD.STAT National Accounts at a Glance

Table 2 shows the share of STiK in household adjusted disposable income from 2008 to 2012 for the countries that completed the EG DNA exercise. The share of STiK varies across countries in 2012 from relatively high shares for Sweden (29%) and the Netherlands (28%) to relatively low shares for Mexico (8%) and the United States[4] (10%). In addition, the shares are generally stable across time. Over the 2008 to 2012 time period, most country's shares vary less than one percentage point with the exception of the Netherlands and Mexico for 2009 where the share varied by a little more than a percentage point.

Table 2: STiK as a percentage of household adjusted disposable income

	2008	2009	2010	2011	2012
Australia *,**	14%	14%	14%	14%	14%
France	21%	21%	21%	21%	22%
Italy	15%	16%	16%	15%	15%
Korea *	12%	13%	13%	13%	13%
Mexico	8%	9%	9%	9%	8%
Netherlands	26%	27%	27%	27%	28%
Slovenia	16%	17%	17%	17%	17%
Sweden	30%	30%	30%	29%	29%
USA	10%	10%	10%	10%	10%

Source: OECD.STAT annual national accounts database

* Covers Households and Non Profit Institutions Serving Households

** STiK data was proxied by individual consumption of general government

[4] For the United States, STiK as a percentage of household adjusted disposable income differs from the share shown in the EG DNA results. This is due to the country experts of the United States reallocating Medicare, Medicaid, and other state and local government medical payments from social benefits in cash to social transfers in kind for health for purposes of the EG DNA exercise.

Note: Data may not match what was included in the EG DNA exercise due to the vintage of the data or due to adjustments made by countries specifically for the purposes of the EG DNA exercise.

Section 2. - STiK allocations during the EG DNA exercise

The main focus of this paper is the allocation of STiK across income quintiles using the income quintiles as defined during the EG DNA exercise. However, before the STiK related results are discussed some background information of the EG DNA, in particular the definition of income quintiles, may be helpful.

About the EG DNA exercise

The objective of the EG DNA was to arrive at distributional information on household income, consumption and saving, consistent with the system of national accounts, for three different breakdowns of households: (i) income quintiles; (ii) main sources of income; and (iii) household types. Detailed results of the EG DNA have been published in two working papers[5], one showing the comparison between micro and macro sources on household income, consumption and wealth, the other one presenting the experimental results of the allocation of national account totals for household adjusted disposable income, actual final consumption and saving to household groups.

This paper uses as a foundation the work related to STiK allocation to income quintiles, presented in the second OECD-Eurostat working paper "*Distributional Measures across Household Groups in a National Accounts Framework*"(Fesseau, M., Wolff F. and Mattonetti M-L. (2013)).

As mentioned before, the income concept used for the definition of income quintiles was the Canberra Group Handbook's cash disposable income. Although this settled the range of income categories to be taken into account two questions remained before determining which households are allocated to which quintiles: 1)What income level should be used?; 2)How should the households be ranked?

What income level should be used?

The first question is whether the partitioning of households into income quintiles should be done using the income levels from the micro survey with imputations made only for components not covered in the micro sources (such as imputed rentals for owner occupied dwellings) or should the partitioning be made after the imputations for the missing components ***and*** after all the income categories have been scaled up so that the micro survey totals for households match the totals in the national accounts aggregates. Certainly, as the goal of the exercise was to produce distributional estimates in line with the national accounts aggregates, the second option was more desirable – but perhaps more prone to allocation errors if the information in the micro source was noisy and scarce for certain income components. In the EG DNA exercise both variants were requested, with the

[5] The two working papers can be downloaded using the following link: http://www.oecd-ilibrary.org/economics/oecd-statistics-working-papers_18152031 (papers 2013/03 and 2013/04).

majority of the countries providing the desired option—that is the income components were benchmarked to their corresponding national accounts totals. The only exception was Sweden, where the data provided followed the first approach.

Thus when missing information is imputed in micro households data, or when the data are scaled up to match the totals estimated in national accounts a correction (generally small in size) has to be made to the national accounts totals, reflecting the fact that part of the population is outside the scope of the household surveys and cannot be trivially allocated to household quintiles. People falling outside the scope of micro data sources, but included in the household institutional sector within the national accounts aggregates, are people without a permanent address, those living in non-private dwellings (such as prisons, boarding schools, retirement homes, hospitals and nursing homes, religious institutions, hotels, etc.), and those living in territories overseas or in sparsely populated areas. An argument in favor of adjusting national accounts totals is that the population groups outside the scope of micro sources may have a significant impact on some specific income and consumption components (e.g. social protection spending and Social Transfers in Kind related to health for people living in retirement homes).

Australia, France, Italy, Korea, Slovenia, Sweden, Switzerland and the United States adjusted their national accounts totals by subtracting the income and expenditures attributed to these people not covered by micro sources[6]. Adjustments were applied, to the extent possible, by population group and for specific income and consumption components, since these population groups targeted are expected to have income and consumption patterns that differ significantly from those of the population covered by micro sources.

Overall, the impact of these adjustments was small (Table 3), and mainly related to a limited number of quite specific components. The components most frequently impacted were other current transfers received net of transfers paid and social transfers in kind received. STiK for health was reduced by 28% in the United States, while other STiK (not health and not education related) was reduced by 27% in France. Nonetheless, in the case of France and Korea, the adjustment for the population not covered by micro sources impacted a high number of income items, occasionally resulting in more significant adjustments.

[6] The adjustment is not relevant in the Netherlands for income components because the micro sources used cover all residents. In Mexico, New Zealand and in the Netherlands experts decided not to adjust national accounts totals because the small size of the population and the lack of data.

Table 3. Adjustments made to correct for population scope differences

as a percentage of the corresponding National Accounts component

	Disposable Income	STiK			
		All	Health	Education	Other
Australia	0.8%	2.1%	2.6%	0.9%	2.2%
France	3.8%	13.8%	9.9%	5.6%	26.8%
Italy	0.9%	3.6%	5.3%	0.9%	2.3%
Mexico	0.0%	0.0%	0.0%	0.0%	0.0%
Netherlands	0.0%	0.0%	0.0%	0.0%	0.0%
Sweden	0.3%	3.9%	0.6%	0.3%	9.5%
Slovenia	0.5%	0.0%	0.0%	0.0%	0.0%
United States	1.4%	13.9%	28.3%	0.0%	0.0%
New Zealand	0.0%	0.0%	0.0%	0.0%	0.0%
Korea	5.5%	0.0%	0.0%	0.0%	0.0%

Another issue related to the population scope adjustment was the case of persons who died during the year of the survey. This issue very much depends on the way micro surveys pick-up information on the income of deceased people. For example people living in single person households who were alive during the reference year but have subsequently died by the time the survey is carried out cannot be surveyed. For other household types, it is country and survey specific whether their income and demographic information is reported. The related corrections may be significant for some income components, such as social transfers in kind. In the United States, around 25% of healthcare expenditures (Medicare and Medicaid) went to those in their last year of life (Clinton P. Mc Cully (2013).[7] Nonetheless, the question remains whether this issue is best solved with a population scope adjustment of the national accounts aggregates, or whether imputations of related incomes can be performed by quintiles (if for example mortality rates can be determined by quintiles). In the EG DNA exercise the United States and Italy made scope adjustments in relation to this phenomenon.

How should the households be ranked?

The second question is how to compare or rank incomes for households where the number of household members is different. Three options are available: (i) the total income per household (that is, disregarding the variation in the number of household members); (ii) the income per capita; or (iii) income per consumption unit (also referred to as equivalized income), which yields an income for each household in-between the 'per household' and the 'per capita' figure. In the EG DNA exercise the determination of income quintiles was based on households ranked by income per consumption unit, because by using consumption units a balance can be struck between taking into account the increased needs of a larger family, but also the economies of scale that larger households enjoy compared to single-person households. The number of consumption units was calculated following the Oxford modified equivalence scale: allocating 1 to the first household member, 0.5 to every other adult member and 0.3 for every child. It is important to note here that, although the quintiles were defined on a 'per-consumption unit' basis, the results presented by quintiles in this paper are on a 'per household' basis, mainly because of the convenience of the

[7] http://www.bea.gov/papers/pdf/integration_of_micro_and_macro_data_on_consumer_expenditures.pdf

calculations/simulations and because of the likely invariance of our conclusions to which basis we chose.

In summary, the following step by step procedure was recommended to produce the ranking and breakdown of households for the numbers reported in this paper:

- Step 1: Identify in the micro source the variables corresponding to each component of the Canberra Group Handbook's cash disposable income at the level of each household.
- Step 2: Whenever possible, benchmark the micro variables identified in step 1 to the national accounts totals (e.g. wages and salaries, interests received, etc.) adjusted to match the population scope of the micro-survey. The benchmarking procedure might imply a simple calibration (applying an adjustment coefficient to all households) and/or a more elaborated imputation at a household or individual level.
- Step 3: Estimate the number of consumption units for each household following the Oxford modified equivalence scale.
- Step 4: Estimate the disposable income per consumption unit for each household by dividing household disposable income (step 2) by the number of consumption units (step 3);
- Step 5: Rank households according to the value of the disposable income per consumption unit (step 4) and allocate households to income quintiles (Q1, Q2, Q3, Q4 or Q5), so that each quintile represents 20% of households (with sampling weights applied).

STiK imputations in the EG DNA

Because the micro sources do not account for the goods and services provided by general government to individuals, imputations were made during the EG DNA exercise to account for STiK at the micro level. The national accounts' total STiK adjusted to align to the population covered by micro data sources was further subdivided into three separate categories of STiK: *Health care*, *Education*, and *Other* before the allocation to household groups was performed. Table 4 shows that for the majority of the countries performing this imputation, the largest category of STiK to be allocated was health, ranging from 33% to 55% of total STiK. However for Mexico and Korea, education was the largest share of total STiK and for Sweden 'other STiK' was the largest category. For Sweden, Australia, and the Netherlands, the category of 'other STiK' was above 30%.

Table 4: Category of STiK as a share of Total STiK

	Australia	France	Italy	Mexico 2010	Nether-lands	Sweden	Slovenia	United States	New Zealand	Korea
Health	41%	41%	55%	33%	40%	33%	45%	41%	53%	37%
Education	24%	32%	31%	54%	27%	31%	42%	38%	30%	38%
Other	35%	26%	13%	13%	33%	36%	13%	22%	17%	25%

For STiK related to health and education socio-demographic information was used to allocate the national accounts total and a brief discussion of the methods follow. For 'other STiK', no set standard was used to distribute the national accounts total.

Social Transfers in Kind (STiK) - Healthcare

Imputations were made to account for goods and services provided by general government to individuals to cover health care needs. These goods and services are provided for free or at subsidized prices; they can be supplied directly by general government or can be purchased by

households themselves and later reimbursed by government. In most OECD countries, national accounts compilers estimate this income component using administrative sources (see Fesseau M., Wolff F. and Mattonetti M-L. (2013)). However, very few countries have information on this type of government spending at the micro level, e.g. showing the cost of hospital services or medicines reimbursed to each individual household.

Several studies discuss the issue of how to allocate health government spending, and other types of Social Transfers in Kind, among individuals and households (for instance, see Verbist G., Forster M. and Vaalavuo M. (2012)). The two main approaches for allocating the value of STiK covering health care needs are:

- The *actual consumption approach* which is based on data on the effective use of health care services by individuals. Based on this approach, every individual who actually use health care services receive a public benefit;
- The *insurance approach* which allocates to each individual the average health care cost of a person with the same socio-demographic profile (age, sex, etc…). In this approach, every individual is assumed to receive a public benefit determined by the average public spending of his/her group, irrespective of whether or not they have used these services.

National experts relied on the insurance approach, for both practical and conceptual reasons. The significant impact of this component on the results required harmonizing the imputation method across countries; furthermore, most countries have no information to implement the actual use approach. All countries imputed STiK using an insurance approach based on different sources to estimate the average health care cost for each socio-demographic group. The criteria used to define the socio-demographic groups may differ across countries. Age is a common criterion used in all countries but other individual characteristics were taken into account by some experts such as gender, region, deprivation and health status (disabled or in long-term care). Estimates for Sweden were based on both the insurance and the actual use approach. The latter was performed by combining micro data per individual and costs for certain activities. For example, information on type of treatment and time in treatment by individuals was combined with information on the cost of one day of treatment for a certain activity and on total costs at an aggregated level (annual accounts for municipalities and county councils).

The distribution of STiK for health resulting from these imputations differs across countries. In most of the countries, STiK appear to be targeted on the poorest households (Table 5); this is especially the case in the United States, where 30% of the total STiK for health is received by the 20% of the poorest households. To a certain extent the profile of STiK is increasing with income in France. In New Zealand and the Netherlands, STIK for health are relatively large for households belonging to the middle of the distribution. Differences in the distribution of STiK across quintiles might be explained by cross country differences in the household composition of the different quintiles, in the types of population targeted by STiK, and/or by differences in the content of what is classified as STiK by national accountants.

In all countries, the relative income gain due to STiK for health decreases with income quintiles (Table 6). In the Netherlands, however, the rise in household income is lower for households belonging to the first quintile than for those in the second quintile.

Table 5: Distribution of STiK on health across income quintiles

	Q1	Q2	Q3	Q4	Q5	Total
Australia 2011-12	21%	22%	20%	19%	18%	100%
France 2003	19%	19%	20%	20%	22%	100%
Italy 2008	20%	22%	21%	19%	19%	100%
Korea 2009	24%	21%	19%	19%	17%	100%
Mexico 2010	22%	21%	21%	19%	18%	100%
Netherlands 2008	11%	24%	24%	24%	17%	100%
New Zealand 2006-07	19%	23%	22%	18%	18%	100%
Slovenia 2008	22%	20%	19%	19%	19%	100%
Sweden 2008	16%	23%	21%	19%	21%	100%
Sweden 2008, Actual method	18%	24%	21%	19%	18%	100%
United States 2010	30%	25%	18%	14%	14%	100%

Table 6: STiK on health as a percentage of household disposable income by quintiles

	Q1	Q2	Q3	Q4	Q5	Total
Australia 2009-10	21%	17%	12%	8%	5%	10%
France 2003	24%	15%	11%	9%	5%	10%
Italy 2008	27%	18%	13%	9%	4%	10%
Korea 2009	21%	9%	6%	4%	3%	6%
Mexico 2010	20%	10%	7%	4%	1%	3%
Netherlands 2008	18%	24%	18%	14%	6%	14%
New Zealand 2006-07	31%	23%	14%	9%	5%	11%
Slovenia 2008	22%	12%	9%	7%	4%	8%
Sweden 2008	35%	27%	15%	10%	7%	13%
Sweden 2008, Actual method	39%	29%	16%	10%	6%	13%
United States 2010	50%	20%	9%	5%	2%	8%

Social Transfers in Kind - Education

The method applied by national experts to allocate government spending on education consisted of allocating to each student a public benefit determined by the average per-capita public spending of his/her level of education. Following this approach, only those individuals who are identified as studying in the micro source receive STiK on education. In most countries, due to data availability, the method applied by national experts does not take into account whether households use public education services or private education services. This may be a significant issue for countries where higher-income households mainly opt for private education.

The distribution of STiK for education resulting from these imputations differs across countries (Table 7). As in the case of STiK for health, differences in the distribution of STiK for education across quintiles might reflect cross-country differences in the household composition of the quintiles, in the types of population targeted by STiK, and/or in the content of what is classified as STIK by national accountants.

Table 7: Distribution of STiK on education across income quintiles

	Q1	Q2	Q3	Q4	Q5	Total
Australia 2009-10	25%	23%	22%	17%	14%	100%
France 2003	28%	20%	18%	18%	15%	100%
Italy 2008	23%	21%	19%	19%	18%	100%
Korea 2009	11%	22%	26%	23%	18%	100%

Mexico 2010	24%	22%	20%	19%	15%	100%
Netherlands 2008	18%	35%	26%	9%	13%	100%
New Zealand 2006-07	25%	19%	24%	19%	13%	100%
Slovenia 2008	21%	23%	21%	18%	17%	100%
Sweden 2008	20%	16%	25%	23%	17%	100%
United States 2010	19%	26%	23%	19%	14%	100%

Social Transfers in Kind - Other

"Other" STiK includes all spending by NPISHs and the government spending benefiting households to cover various needs other than health and education. In particular, the other spending by government includes e.g. social protection services, such as elderly or child care services, and recreational and cultural services provided in kind to individuals.

As mentioned earlier no set standard was used to allocate "other" STiK to household groups, but some countries used information, such as information on subsidized housing, to distribute "other" STiK to household groups. The distribution of "other" STiK resulting from these imputations differs across countries (Table 8). As in the case of STiK for health and education, differences in the distribution of "other" STiK across quintiles might reflect cross-country differences in the household composition of the quintiles, in the types of population targeted by STiK, and/or in the content of what is classified as STIK by national accountants.

Table 8: Distribution of "other" STiK across income quintiles

	Q1	Q2	Q3	Q4	Q5	Total
Australia 2011-12	28%	26%	21%	15%	10%	100%
France 2003	29%	18%	16%	17%	19%	100%
Italy 2008	19%	20%	20%	21%	20%	100%
Korea 2009	25%	34%	22%	13%	6%	100%
Mexico 2010	20%	21%	21%	20%	17%	100%
Netherlands 2008	11%	28%	23%	21%	16%	100%
New Zealand 2006-07	23%	16%	19%	21%	22%	100%
Slovenia 2008	20%	19%	20%	20%	21%	100%
Sweden 2008	24%	37%	16%	11%	13%	100%
United States 2010	18%	22%	21%	20%	19%	100%

EG DNA results for the distribution of income

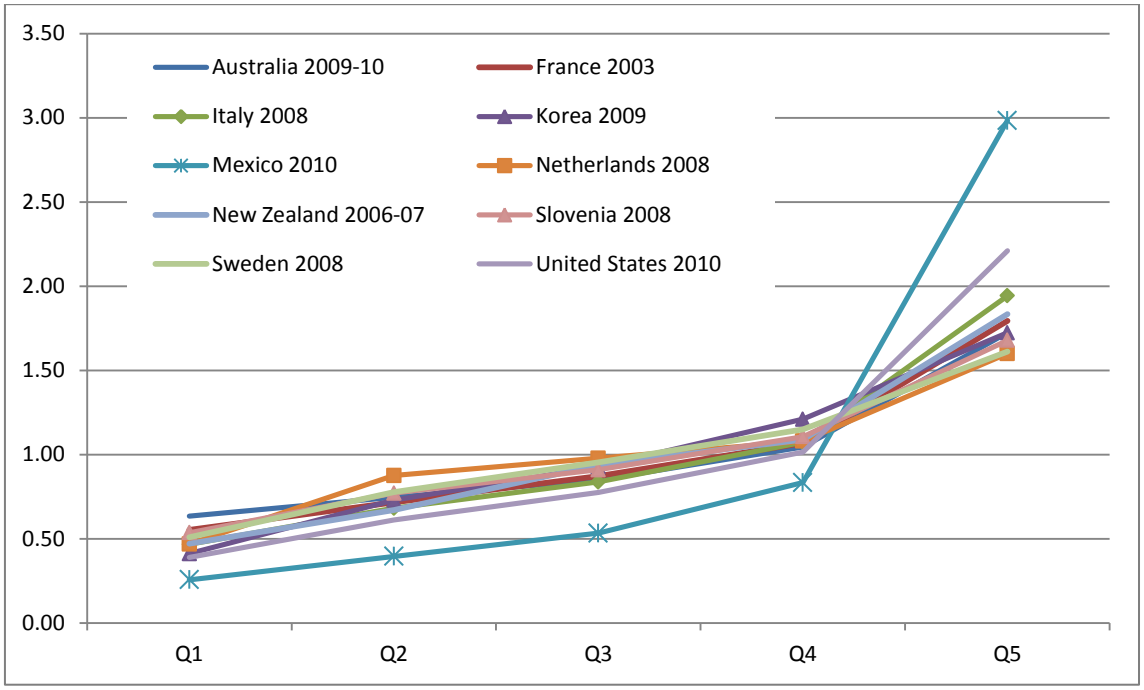
This next section focuses on the results for main categories of income and summary inequality measures in the EG DNA exercise by income quintiles.[8]

Figure 2 shows that households in the top quintile have significantly higher incomes than the average household especially in Mexico and, to a lesser extent, in the United States. The average income of the richest household group is 1.6 times the overall average in the Netherlands, and 3.0 times the overall average in Mexico. The first quintile has an average income equal to 26% of the

[8] For distributional information consistent with national accounts for the three different types of household groupings see Distributional Measures Across Household Groups in a National Accounts Framework. The working paper can be downloaded using the following link: http://www.oecd-ilibrary.org/economics/oecd-statistics-working-papers_18152031 (paper 2013/04).

overall average in Mexico, in contrast to 63 % in Australia. In all countries the median income, approximated by the average income of the median quintile Q3 is lower than the average income. The median income accounts for 53% of the average in Mexico, as compared to 98% of the average in the Netherlands. In the Netherlands, the middle of the distribution is particularly flat and appears to be in large part due to how STiK was allocated.

Figure 2: Adjusted disposable income of each household group compared to the average household



The relative position of each household group compared to the overall average is different when measured on primary income, i.e. before deducting any income taxes and social contributions paid and before adding transfers in cash and in kind. Comparing the distributional indicators measured on adjusted disposable income and primary income illustrates how net current transfers, mainly related to the intervention of general government and pension schemes, brings some household groups closer to the average. Table 9 shows that, when measured for primary income, the income gap between the 20% highest income households and the 20% lowest income households is significantly higher in the United States and New Zealand— that is the income of the highest income households is 15.1 times the income of the lowest income households in the United States and 12.6 times in New Zealand. Once net current transfers are taken into account the income disparity between the highest and the lowest income households is reduced; the income of the highest income households is only 5.7 times the income of the lowest income households in the United States and 3.9 times in New Zealand.

Table 9: Impact of net transfers on the relative position of the richest to the poorest households

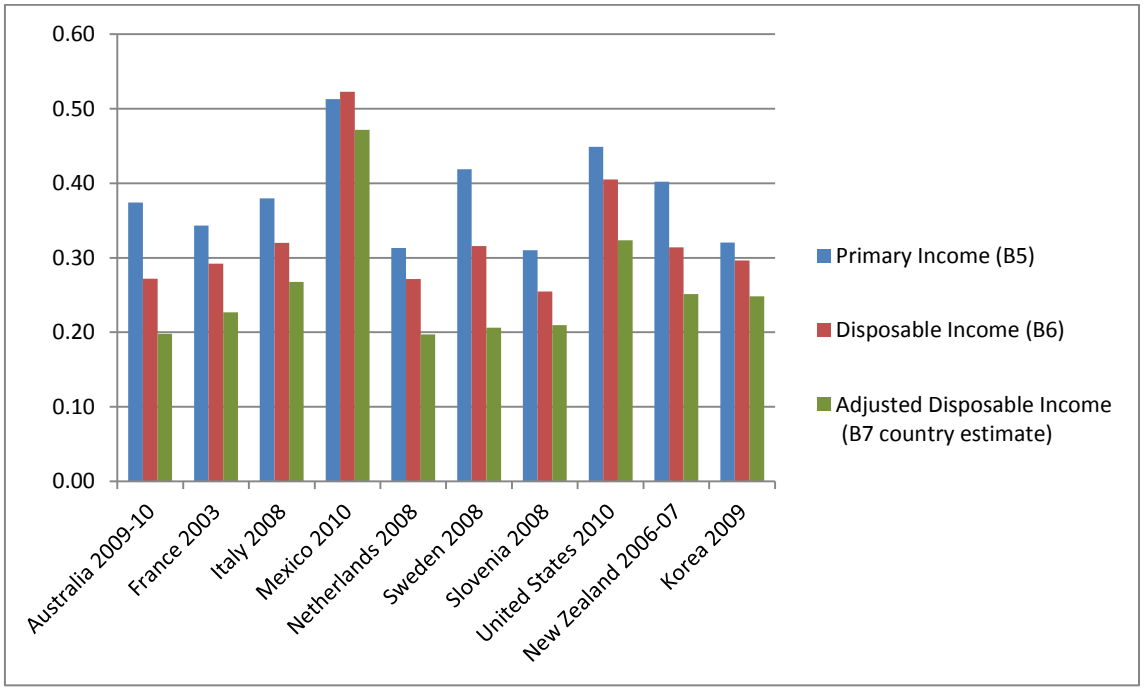
ratio of the income of the fifth quintile to the first quintile

	Australia 2009-10	France 2003	Italy 2008	Korea 2009	Mexico 2010	Nether-lands 2008	New Zealand 2006-07	Slovenia 2008	Sweden 2008	United States 2010
Primary income	7.4	8.3	8.2	7.2	17.8	6.0	12.6	6.1	10.4	15.1
Adjusted disposable income	2.7	3.2	4.2	4.2	11.7	3.4	3.9	3.1	3.2	5.7

Figure 3 shows that in all countries, with the exception of Mexico, the disparity decreases with each successive step going from primary income (income earned from involvement in the production process or ownership of assets) to disposable income (after adjustment for social benefits in cash and other current transfers received minus social contributions and taxes paid) and to adjusted disposable income (after accounting for income received from STiK). Mexico presents a slight increase in the Gini-coefficient moving from primary income to disposable income.

Figure 3: Income inequality across equivalized disposable income quintiles

Gini-coefficients



As shown in figure 3, each definition of income brings relevant information on income inequalities. In discussions among experts of the EG DNA not all experts were confident enough to allocate the various types of STiK. They felt that, given the uncertainties and the often complex modelling requirements to be able to produce reliable estimates, it is safer to limit the exercise of decomposing income components to transactions affecting disposable income, and not to deal with the analysis of income inequalities at the level of adjusted disposable income. However, based on Figure 3 and the results of our simulations, the next section of this paper argues that the inclusion of STiK is beneficial for inequality analysis.

Section3. – Random simulation of STiK allocations

In this simulation exercise random STiK allocations were evaluated, and their impact was quantified on inequality as measured by the Gini-coefficient. The Gini coefficient is a measure of inequality of a distribution. It is defined as a ratio with values between 0 and 1, where 0 corresponds to perfect income equality (i.e. every household quintile has the same income) and 1 corresponds to perfect income inequality (i.e. one quintile has all the income). The goal of the simulations was to provide context for the figures produced in the EG DNA exercise.

The disposable income by quintile (D_i) provided by the national statistical offices (NSOs) in the EG DNA exercise was the starting point to which we added randomly generated STiK by quintile, separately for each of the three STiK categories ($S_{i,k}$) (k = health, education and other)[9].

$$A_i = D_i + S_i\,, \qquad i = 1, \ldots, 5$$
$$S_i = \sum_k S_{i,k}\,, \qquad k = \text{health, education, other}$$

As described in section 2, the STiK values provided by national accounts were adjusted for the population scope of the micro survey whenever national offices provided such adjustment factors in the EG DNA exercise: S_k^a, and were partitioned into quintiles, by independently generated random weights $w_{i,k}$ for each of the three STiK categories, resulting in:

$$S_{i,k} = w_{i,k} S_k^a$$

The weights $w_{i,k}$ were generated through a two stage process. First four uniform random variables $u_{i,k} \sim U(0,1)$ were independently generated and ordered, and then, in a second step, transformed as follows:

$$u_{1,k} \leq u_{2,k} \leq u_{3,k} \leq u_{4,k} \leq 1 = u_{5,k}$$
$$w_{1,k} = u_{1,k},$$
$$w_{i,k} = u_{i,k} - u_{i-1,k} \text{ for } i \geq 2$$

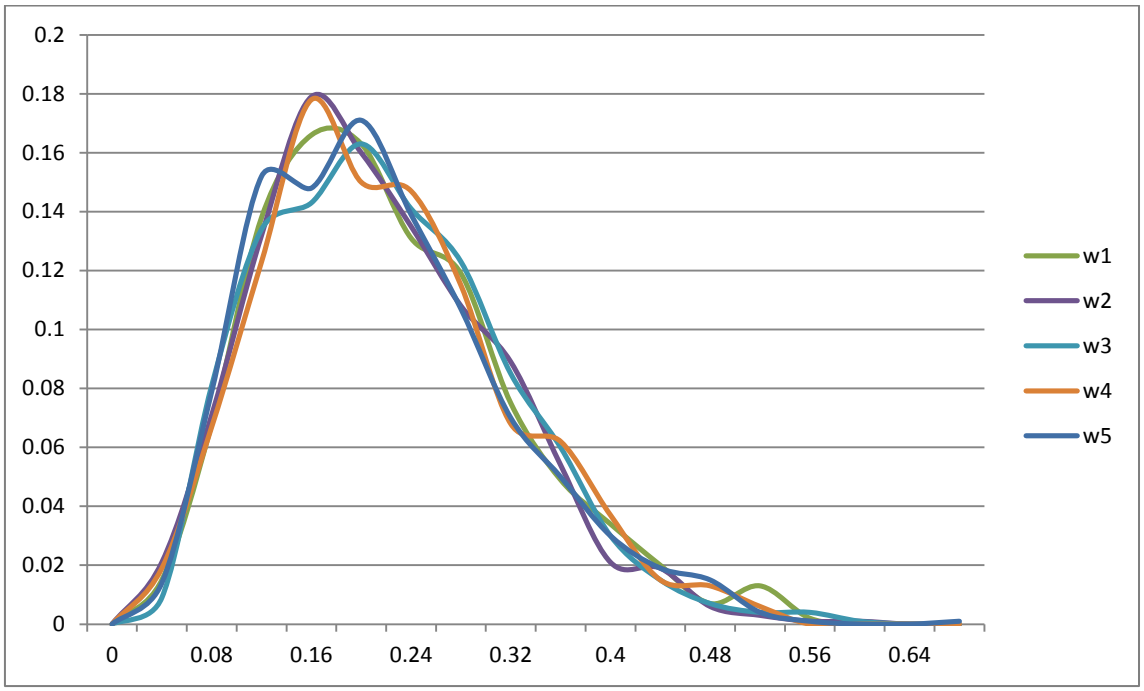
The resulting weights scattered around a uniform mesh, i.e. on average 20% of S^a was allocated to each income quintile. Figure 4 shows the histogram of the compound weights $\mathrm{w_i}$.

$$w_i = \frac{\sum_k w_{i,k}\, S_k^a}{\sum_k S_k^a}$$

These weights (representing shares of STiK allocated to quintiles) have an expected value of 0.2 for each quintile with a 0.1 standard deviation and a slight positive skew.

[9] The ranking of households and their association with household quintiles was taken from the EG DNA exercise. There was no re-ranking after the allocation of STiK.

Figure 4: The distribution of STiK shares allocated to quintiles.



It should be noted that the simulation exercise has been carried out on household totals; therefore the average allocated STiK is uniform for each household; that is, it does not take into account variations in the number of consumption units across quintiles.

Figure 5 shows how the random STiK allocations impact inequality, as measured by the Gini coefficient calculated for the 'per household' adjusted disposable income, and how it compares to the estimates provided by countries in the EG DNA exercise. As can be seen in Figure 5, in all countries, the Gini-coefficient estimated in the EG DNA exercise falls to the left of the mode of the distribution obtained in the simulation. This means that in all countries the true STiK allocation tends to be targeted to the lower income quintiles beyond an egalitarian allocation captured by the mean/mode of the simulated distribution.

Another key point also shown in figure 5 is that the width of the histogram for each country is related to the size of total STiK. This means that the larger the share of total STiK in adjusted disposable income the greater impact STiK may have on the Gini coefficient. For example in Mexico the share of total STiK in adjusted disposable income is small and the range of possible Gini-coefficients is narrower, even though the distribution of randomly generated shares of the STiK was the same for all countries.

Figure 5. The distribution of Gini-coefficients of 'per household' adjusted disposable income

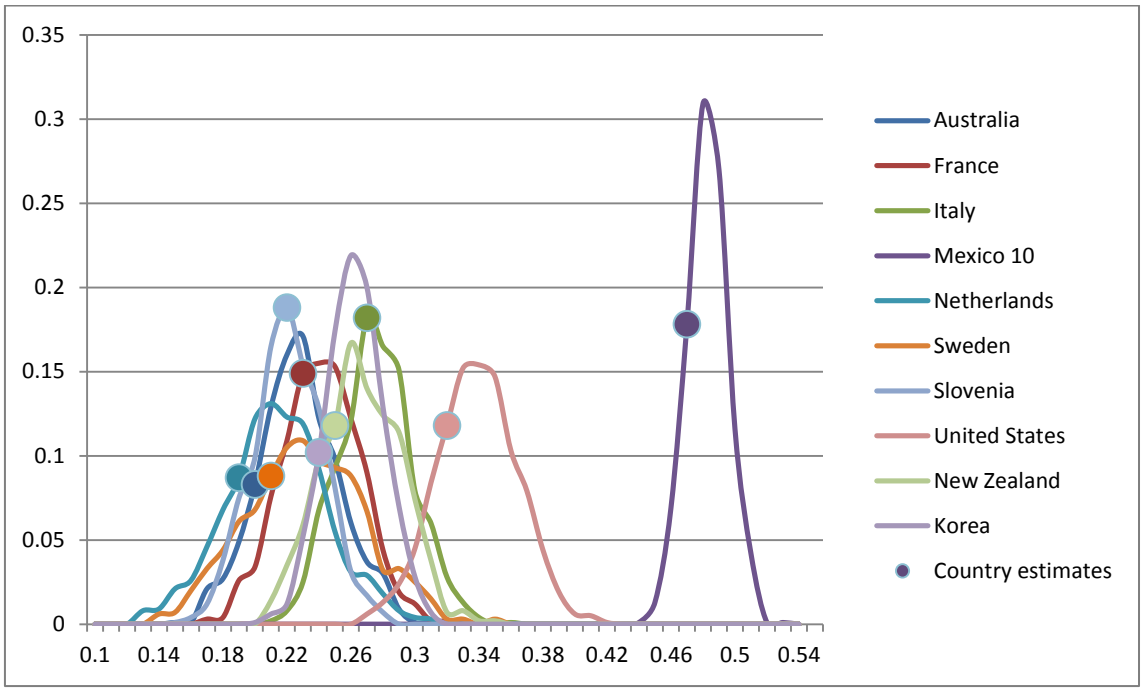


Table 10 illustrates how inequality changes looking at the three definitions of income (primary, disposable, and adjusted disposable) and the various STiK allocation scenarios. The values of the column "Gini before STiK allocation" show the percentile rank of the Gini of disposable income among Gini's of the adjusted disposable income following the random allocations of STiK. When compared to the second column, the Gini of the disposable income, we notice that the larger the starting levels of inequality the more likely any random allocation of STiK will improve the Gini coefficient.

Nontheless the variation is not large. From the simulation exercise it turns out that the starting levels of inequality are so large that almost any random allocation of STiK would improve the Gini-coeffiecient (the Gini coeffiecient of disposable income is at the 0.96-1.00 (column 5 of Table 10) percentile rank of the distribution of Gini-coefficients of adjusted disposable income after random allocation of STiK). The non- inclusion of STiK therefore leaves a significant bias in inequality measures. Of the countries in the simulation, the non-inclusion of STiK, in general, will not change (much) a country's relative income inequality ranking (based on the Gini coefficients) when moving from disposable income to adjusted disposable income, in other words Mexico still ranks first in income inequality looking at either disposable income or adjusted disposable income. However, the impact on the level of the Gini coefficients between the two income definitions is significant. Therefore, within a country, the perceived inequality between the two categories is important.

Similarly, the concerns related to an imperfect allocation of STiK should not be a deterrent from carrying out the exercise. The size of the overall STiK already conveys important information on the likely impact of STiK on inequality and therefore even if there is no additional information and STiK is allocated evenly to every household (or consumption unit) a large part of the impact of STiK is captured. In the simulation exercise this impact was 67%-95% depending on the country when Gini-coefficients were calculated on the basis of 'per household' income (as shown in column 8 of Table

10), and 71%-96% when Gini-coefficients were calculated on the basis of 'per consumption unit' income.

Table 10. Impact of STiK allocations on the Gini-coefficients

	Gini coefficient				Gini before STiK allocation	Size of STiK	Gini after STiK allocation	
	Primary Income (B5)	Disposable Income (B6)	Adjusted Disposable Income (B7) country estimate	Adjusted Disposable Income (B7) simulation average	percentile rank of B6 on the simulated distribution	STiK as a % of Adjusted Disposable Income	percentile rank of B7 on the simulated distribution	Percent of Gini-improvement from B6 to B7 captured by the simulation average
Australia	0.37	0.27	0.20	0.22	0.97	19.6%	0.17	67%
France	0.34	0.29	0.23	0.24	0.99	21.1%	0.33	85%
Italy	0.38	0.32	0.27	0.27	0.98	15.7%	0.46	95%
Mexico	0.51	0.52	0.47	0.48	1.00	8.7%	0.31	88%
Netherlands	0.31	0.27	0.20	0.21	0.97	25.5%	0.36	85%
Sweden	0.42	0.32	0.21	0.23	0.99	29.9%	0.29	81%
Slovenia	0.31	0.25	0.21	0.22	0.96	15.7%	0.39	86%
United States	0.45	0.41	0.32	0.33	1.00	18.1%	0.34	87%
New Zealand	0.40	0.31	0.25	0.26	0.99	17.8%	0.35	84%
Korea	0.32	0.30	0.25	0.26	0.99	12.8%	0.32	82%

Section 4. - Conclusions and way forward

Through our analysis and the work of the EG DNA the alignment of micro sources to the national accounts aggregates shows that the exercise can have a significant impact on the distributional information, especially when STiK is taken into account. The micro sources should be benchmarked to the various national accounts income definitions (primary income, disposable income, and adjusted disposable income) because the exercise provides useful insights into how income is distributed across households.

From analysing the results of the simulation we argue that the impact of STiK on inequality is determined by three main factors: starting levels of inequality, the size of STiK relative to disposable income (for all households), and the distribution of STiK across income quintiles. We have illustrated that:

- The larger the starting levels of inequality the more likely any random allocation of STiK will improve the Gini-coefficient.
- The larger the share of total STiK in adjusted disposable income the greater impact STiK may have on the Gini coefficient.
- The allocations of STiK done by countries in the EG DNA exercise tend to be targeted to the lower income quintiles, beyond an egalitarian allocation captured by the mean/mode of the simulated distribution.

While the true distribution of STiK provides more relevant information an imperfect allocation of STiK is better than not accounting for STiK at all. A uniform allocation – corresponding to a situation where no information is available to the NSO to model STiK allocation at a micro level – already captures at least 2/3 of the true impact of STiK on the value of the Gini-coefficient. Nonetheless with little information on socio-demographic determinants of STiK spending, solid estimates can be

obtained. By looking at the experience of the first exercise carried out by NSOs, we can say that the results are plausible and robust, with some scope to further align and harmonise methods (to the extent possible) to facilitate cross-country comparisons.

At the international level, it has been agreed to continue the work of the Expert Group with the goals (i) to refine and streamline the methodology with a focus on improving the consistency of the results on income and consumption; (ii) to provide national-accounts compatible distributional estimates for a more recent benchmark year; and (iii) to consider the possible development of a methodology for compiling more timely distributional estimates of levels and changes in income, consumption and savings consistent with the SNA framework.

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