ADDING INEQUALITIES TO THE SNA FRAMEWORK

CONSTRUCTING THE HOUSEHOLD SECTOR FROM MICRO DATA

Author: Arjan Bruil

Abstract: Driven by influential reports from Stiglitz et al, and the IMF and FSB, together with impressive research on inequalities by Piketty, Atkinson and others, distributional measures in the National Accounts gained more attention. In much of the research by NSI's and many of the publications in this field, distributions are added to the national accounts data which serve as the benchmark totals. However, in construction of the household sector accounts micro data sources are often not used, resulting in unaccounted data gaps.

In this article we work the other way around, we create the national accounts totals from micro data, thus including distributions from the very first moment of constructing the national accounts. This approach improves the national accounts in two ways, first the household sector accounts are less dependent on counterpart information or the residual approach, and second, the distributions within the sector are consistent with the macro totals.

Furthermore, the framework of the national accounts differs from micro economic frameworks which are still often used in describing inequality. We feel that the present approach adds an important perspective in analysing inequality, because we include otherwise unaccounted transactions.

Keywords: Distributions, Households, Inequality, National Accounts, Sector Accounts

Content

Introduction

In recent years income and wealth inequalities in the SNA framework gained more attention. In itself these measures were not new, but the link with SNA was. The SNA framework was developed to depict developments of macro aggregates, where a micro view is more and more desired. This holds especially for the household sector within the SNA framework. The Report on the Measurement of Economic Performance and Social Progress by Stiglitz, Fitoussi and Sen (2009), and the IMF/FSB report to the G-20 Finance Ministers and Central Bank Governors (2009) made several recommendations in this area. These reports have been followed up by an expert group by the OECD and Eurostat (Expert Group on Disparities in a National Accounts framework), and in a later stage the ECB launched the Expert Group on Linking Micro and Macro statistics. Both Expert Groups focus on the breakdown of the household sequence of accounts by household type. Where the OECD focuses on income, consumption and savings, the ECB addresses the financial balance sheets. The work done internationally inspired NSI's to publish results of these breakdowns, among which the Netherlands.

In the studies concerning these breakdowns, micro data, which contain the distributional information, is linked to national accounts macro data. However the data sources used to construct the national accounts, and the data used for distributional measures often don't come from the same source. This leads to data gaps, which are addressed excessively in the EGDNA (Fesseau & Mattonetti, 2013a) (Fesseau & Mattonetti, 2013b). Moreover, current practice in the construction of national accounts is that the household sector often depends on counterpart sector or the residual approach due to a lack of data sources.

In this paper we propose a bottom up approach, constructing the household sector from multiple micro data sources, thus including distributions from the very first start of the construction process. We feel that very useful data sources are available for the construction of the sector accounts, which can directly address distributions as well. Our aim is to construct a micro database covering all individuals in the Netherlands, for which we set up the household sector accounts. This database sums up to macro totals, thus allowing for detailed analysis of the household sector that is always consistent with SNA concepts and totals.

One benefit of this approach is that the household sector is less dependent on counterpart sectors for the macro results, and that the SNA framework in total is strengthened as well by adding additional checks and balances. Furthermore distributional measures are consistent with SNA totals, though there will always occur differences through the integration process. Because every individual is represented in our database, our analytical options go beyond income inequality, for example also gender or generations can be taken into account.

In the next paragraph the household database is constructed. The compilation process of sector accounts is briefly explained, the scope of the household database is determined, and the data sources that are used to create the household accounts are explained, including adjustments needed to arrive at SNA values. In the results section we will focus on income inequality within the household sector, but also explain the differences with micro estimates of inequality. We end with a preliminary summary and plans for further research.

Methodology – construction of the household sector accounts

Process of sector accounts compilation

The compilation process of the sector accounts consists of roughly two phases. In the first phase, each (sub)sector constructs a full sequence of accounts, based upon available data sources. In the second phase, the estimates of all subsectors are integrated so the accounts of all sectors become consistent with each other. This is done in matrices that are set up for each transaction in which the estimates of sectors and counterpart sectors are combined. The resources of one sector are the uses of another. Conflicting estimates that occur in the first phase are balanced out in the second. In many countries the household sector is largely determined through counterpart data, or by a residual approach if data is unavailable. Also in the Netherlands for most transactions the counterpart sector was considered to have the better, more comprehensive and reliable data sources. The studies presented in this paper strengthens the household sector by being less dependent on these counterpart sectors.

In this paper we create a household database wherein each individual in the Netherlands is represented. For each individual in our database we create the sector accounts. We do this by linking micro data sources to a population register. Ideally we do this through a record linking technique, using the (encrypted) social security number as a unique key. For data sources that don't have this unique key we synthetically impute the database, by allocating an average amount to each individual or household based upon the characteristics that are available in both the household database and the respective data sources.
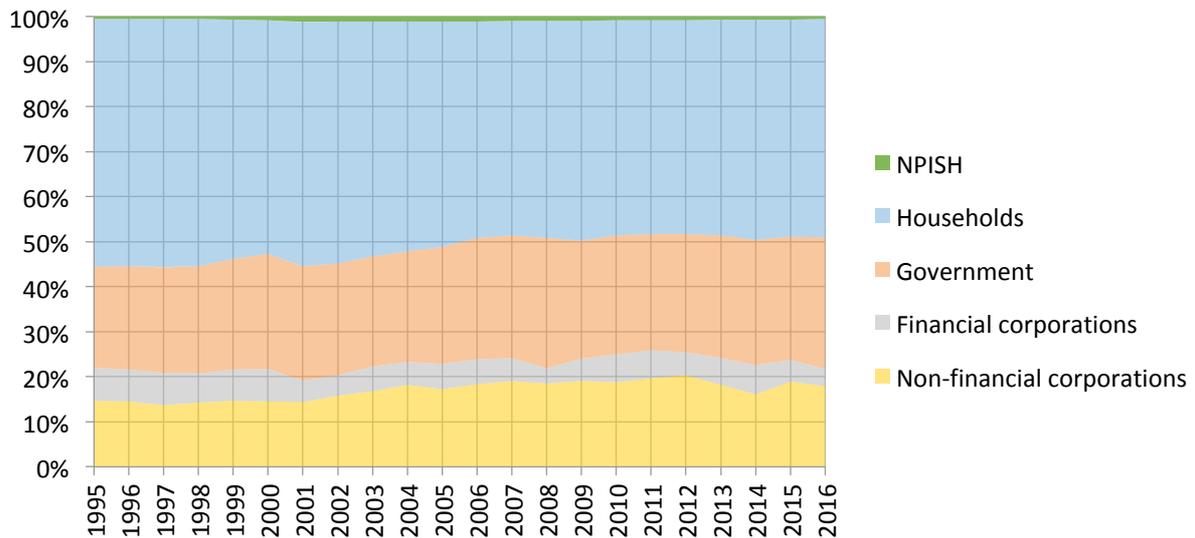
Scope of the household sector

In this article we focus on distributions within the household sector of the national accounts. This scope is consistent with research done in international expert groups (i.e. the OECD Expert Group on disparities in a national accounts framework, and the ECB expert group on linking micro and macro statistics), but differs from DINA guidelines, where the total domestic economy is considered (Alvaredo, et al., 2016).

The existence of the sector accounts already offers the possibility to analyse distributions between sectors, which is important to identify the share of income that ends up within the household sector. Figure 1 gives this distribution for the Netherlands for the years 1995-2016. It shows that 48.5% of national gross disposable income was earned by households and the other 51.5% by the government, (non-) financial corporations or non-profit institutions serving households. DINA guidelines consider this indirectly as household income as well, because companies are owned by households and so is the government. We underwrite the importance of a joint analysis of income and wealth, but we think that SNA sector delineation should be respected, in line with the recommendations of Stiglitz *et al*. (2009). Ownership of companies by households should be reflected by their balance sheets (stocks), and income flows related to these assets (dividend flows). Companies that receive more income would see their improved income statement reflected in their stock prices, which makes the households that own them more wealthy. The income and wealth of government is not of interest in cross-sectional analyses of the household sector, because, if they are distributed, this is likely to be done equally over all individuals. In intergenerational analyses of sustainability and fairness the government accounts are necessary to include because future generations might profit more or less from government resources than current generations, but this requires adaptation of the SNA to generational accounting concepts and this is not done here.

In case income and wealth distribution of a country is the point of focus we feel that a two-step approach is more in place. First income distribution between sectors can be analysed (see for one example Figure 1), after that the income and wealth inequality within the household sector can be addressed.

Figure 1: Gross disposable income by sector (1995-2016)

Data: Statistics Netherlands

For the household sector we build a database with one record for each individual. The population register is the backbone of this household database we're creating. We build this using census data for the 1st of January and the 31st of December. Individuals present on both reference dates are assumed to have lived in the Netherlands the entire year. Individuals present on the first, but not the last day, either passed away or emigrated. All deaths are known in census data as well, so by derivation emigrants are as well. Individuals present on the last day of the year, but not the first are either born (if the year of birth equals the research year), or immigrants.

Table 1: Stocks and flows of household population (2015)

1/1	Flows			31/12
	Emigrants	-	143.696	
16.900.726	Deaths	-	146.348	**16.979.120**
	Immigrants	+	198.097	
	New-borns	+	170.341	

The household database consists of all people who have lived in the Netherlands in the research year (we focus on 2015 in this paper), including the flows within the year, consistent with SNA. Total household population comes to 16.900.726 + 198.097 +170.341 = 17.269.164. The importance of this exhaustive population register comes forward when data sources are matched. Often these data sources focus on the population on a reference data, hence not representing the entire national

accounts population. For almost all data sources we need to correct for part of the missing population. Without estimates for these groups, the sum of the distributions can never equal the SNA macro totals. The benefit of this approach is also that every euro in the sector accounts can be distributed over the population, and analyses are not a priori limited to the scope of the population. For instance research questions on human capital or analyses on generational flows can only be meaningfully addressed when the young are included. This is not possible in the DINA framework which is limited to the population aged 20 and over. This scope is likely to be sufficient for their analytical purposes, i.e. measuring income inequality, but our account of the complete population does not let us make these a priori choices in analyses.

Data sources

There is not one data source that can cover the wide span of transactions on the SNA sequence of accounts. We follow a multi sources approach where we combine census data on the population with integral administrative data, but also sample surveys, where needed. We use census data to determine the population of the household sector, and for the construction of the sequence of accounts we use the Integral Income and Wealth Statistics (IIWS), Labour Accounts (LA) estimates on the micro and macro level, the Household Budget Survey (HBS), and the Pension Claims Statistics (PCS), the Longitudinal Internet Studies for the Social sciences (LISS), data on personal transfers through Money Transfer Operators (MTO), and the Giving in the Netherlands Panel Survey (GiN). These data sources are elaborated upon below.

Even though we use a multi-source approach, not all transactions have a micro counterpart. This is mostly the case for specific SNA constructs, such as fisim or the income attributed to insurance policy holders. For the transactions for which no micro data is available we take the SNA total from a previous national accounts status[1], and find a proxy variable to distributed it over the population. Including these transactions in the construction allows us to analyse disposable income in this phase. For the non-observed economy (which is part of mixed income) we use macro estimates by the Supply and Use Tables and allocate them to individuals using a partial regression analysis by Kazemier (2014), who did research on the grey economy, based upon sample surveys.

For wages and salaries there are two data sources available. The IIWS, and the Labour Accounts statistics. In this studies we use the latter. The Labour Accounts (LA) are part of the SNA core, just as the Supply and Use Tables, and the Sector Accounts. The data sources underlying the LA are the labour market data from the Employee Insurance Agency (UWV), which is available on the level of individual jobs. For our purpose this is already aggregated to the level of individuals. The labour accounts provide individual register data, for the entire population working in the Netherland in a given year. These distributional results are, by construction, consistent with the macro totals. The LA cover the compensation of employees earned in the Netherlands, but part of this compensation flows abroad, and also some flows come from abroad. Both flows need to be identified in order to construct the household sector accounts correctly. The flow to abroad is estimated by matching with our population database. In case there is no matching possible the wage flows abroad. Wages flowing from abroad to the Netherlands are covered by the IIWS. The LA also estimate mixed income from self-employment on the macro and micro level. In the current version of this studies we use the macro estimate, because the micro data is only available with a lag. The most recent data is only available on the macro level. We do add distributional information to these macro results however,

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[1] National accounts are made twice. The first estimate has preliminary status, the second a definitive one. Currently were working on a revision of the national accounts, which adds a third status, revised. In this phase the definitive status is considered the previous one.

but ideally we use the micro database because just as for wages and salaries these are brought to SNA concepts and by construction equal to SNA totals.

The IIWS has been designed to have a picture of the composition and distribution of the income of individuals and households in the Netherlands. It is an integral register of all individuals present in the Netherlands on the first day of the year, which is consistent with census data. For the largest part it is based upon tax records. The IIWS records detailed income and wealth information by individual and household characteristics. In constructing the household sector accounts it is used for the distribution of self-employment, and the construction of property income, and current (social) transfers, both paid and received. This data source is used for property income, taxes on income, social contributions and benefits, and alimony payments. Also the distribution of mixed income from self-employment is used, and the operating surplus through owner-occupied dwellings. We correct taxes and social contributions for the missing population, i.e. immigrants. For these individuals we know their labour income through wages and salaries (part of the LA data), and by using the ratio of wages to taxes and social contributions for the known population we can estimate these transactions for the immigrants as well. We make corrections for implausible results, for example when taxes are paid by young children, or if dividends are received by them. For new-borns we impute child benefits[2] by modelling the social system for these schemes. For property income we corrected for the interest paid and received by self-employed as a results of their business, because this is part of self-employment income in the IIWS.

The Household Budget Survey is, since 2015, held once every five years. It is a difficult and expensive survey to conduct. It is a cross-sectional survey of only the private households, thus excluding the household living in institutions; i.e. old age homes, prisons, medical facilities, etc.. The HBS measures the consumption expenditures on the household level, therefore individual estimates are unavailable. In our studies we use this for selected SNA transactions which, as opposed to the HBS, are not in the consumption sphere, but the income sphere. We use this data source to impute data to the register, using the household composition as the linking characteristic. We choose this characteristic because it is both distinctive for many classes and undisputable. Other characteristics, such as the income quintile are less well able to coordinate over different studies. We assume that the missing population (in institutions) behaves similar as the private households, but we assume they don't pay taxes regarding the use of a vehicle as these individuals are mostly very old, or living in a prison or hospital for a long time. For immigrants we assumes that they only lived in the Netherlands for half a year thus we allocate half of the amount according to the HBS to them.

In this paper we make use of data of the LISS (Longitudinal Internet Studies for the Social sciences) panel administered by CentERdata (Tilburg University, The Netherlands). The LISS panel is a representative sample of Dutch individuals who participate in monthly Internet surveys. The panel is based on a true probability sample of households drawn from the population register. Households that could not otherwise participate are provided with a computer and Internet connection. A longitudinal survey is fielded in the panel every year, covering a large variety of domains including work, education, income, housing, time use, political views, values and personality. This data covers the year 2014, but in our construction it is used for 2015 as well. We do not record link this to individuals, but use it to impute average values to households by background characteristics. The assumption here is that these average values do not change between 2014 and 2015. These data are also imputed in the register. For payment from parents to (studying) children who live on their own, we use the income group as the matching characteristic. We mimic the income concept as closely as

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[2] In Dutch: Kinderbijslag and kindgebonden budget.

possible, because other characteristics are less plausible or distinctive to use. For the payments received by children from their parents we use age, income did not work here because these students were all poor. Also student grants received was matched using age.

This research also uses data from the Giving in the Netherlands Panel Survey (GINPS) collected by the Center for Philanthropic Studies at VU University Amsterdam. GINPS is largely supported by a grant from the Netherlands Ministry of Justice (Bekkers & Boonstoppel, 2010) (Bekkers, Schuyt, & Gouwenberg, 2002-2008). It focuses on giving behaviour to NPISH mainly. These flows are substantial in the SNA, but hardly covered by other data sources. These data are imputed using the combination of income quintile and wealth group. Both characteristics are mimicked as closely as possible. These characteristics were preferred over other household characteristics because the studies explicitly claimed that the 20% wealthiest households made 80% of total gifts to NPISH such as charities, and religious institutes.

Data from Money Transfer Operators (MTO) are used to estimate personal transfers flowing to and from abroad. These are linked to individuals aged 18 and over from the countries the transfers flow to and from. Corrections are made because not all personal transfers will go through MTO's, and because a maximum is set for each household to receive or send.

An overview of data sources used per transaction is given in Table 2.[3]

Table 2: Data sources used per SNA transaction

SNA transaction		Data sources used for:	
		Means	Uses
B2G	Operating surplus	IIWS	IIWS
B3G	Mixed income	LA, IIWS, SUT	LA, IIWS, SUT
D.1	Compensation of employees	LA, IIWS	See B3G
D.4	Property income	IIWS	IIWS
D.51	Taxes on income	-	IIWS
D.59	Other current taxes	-	HBS
D.61	Social contributions	-	IIWS
D.62	Social benefits	IIWS	-
D.71	Net non-life insurance premiums	-	HBS
D.72	Non-life insurance claims	IIWS, HBS	-
D.75	Miscellaneous current transfers	IIWS, MTO	HBS, LISS, GiN, IIWS, MTO

Results

After construction we have a full picture of distributions of disposable household income in the national account. This includes , but not limits us, to income inequality. The data presented here are the results before we enter the integration phase. Even though we improved our initial estimate, data will still change during integration. The challenge is to keep the integrated data close to the constructed data, and find an appropriate distribution to allocate differences. The final result is an

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[3] In a later stage also mixed income of self-employed as constructed by the Labour Accounts will be available on the individual level, allowing for record linking as well. Due to timeliness of the data on this level we use only with the macro totals derived by LA, and distribute it using information in the IIWS.

integrated framework, where results from the household sector are balanced with other sectors, in the current data this balancing has not yet occurred.

SNA income distribution

Following this approach household gross disposable income would add up to 317.4 bn euros, primary income equals 429.6 bn euros. These are the revised estimates upon construction. Every integration decision can change this estimate substantially. Compared to published results, gross disposable income is around 5 bn euros lower in the new estimate. Large differences are to be found in property income, and miscellaneous current transfers, but these are an improvement compared to the previous estimates and are likely to remain after integration. However paid taxes on income and social contributions are difficult to combine, because of recording differences between the micro data and the SNA macro sources (used by the government sector). On the macro level taxes and social contributions are recorded the moment they are received by the government. In the micro data the data reflect the amounts households owe, based upon the income in the research year. The fact that households owe this amount does not mean they pay this amount, substantial payments can be made after the research year, going back even more than one year. In the integration phase the government sources will be used, and these household estimates need to be adjusted to these levels.

The Gini-coefficient for primary income (before redistribution through taxes, social schemes, or private household decisions) comes to 0.568 (Figure 2). The effect of these redistributive efforts is that inequality drops to 0.401 (Figure 3). It must be noted that in these results household incomes are not equivalized, which is often done in analysis of income inequality.

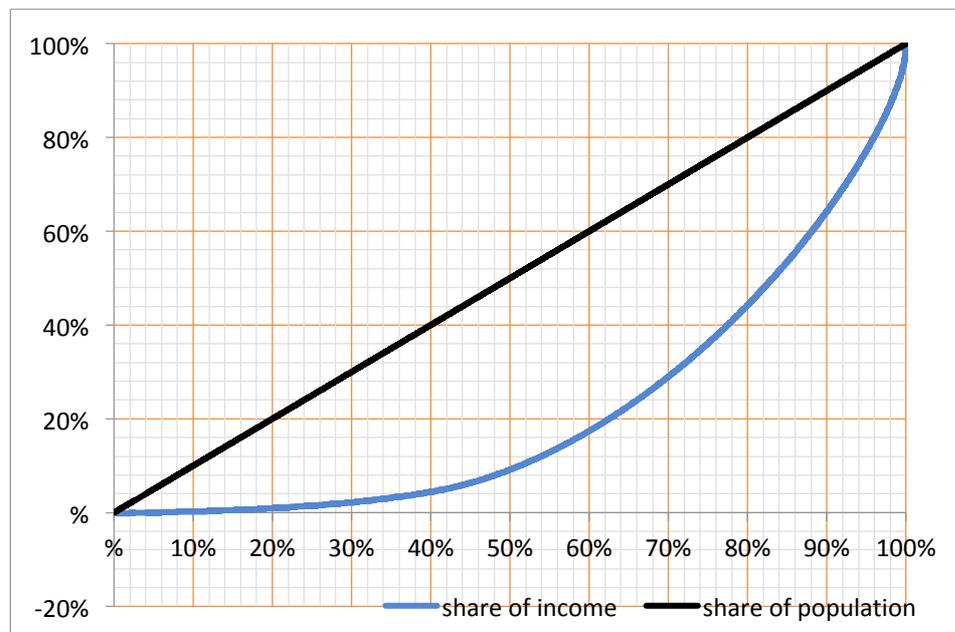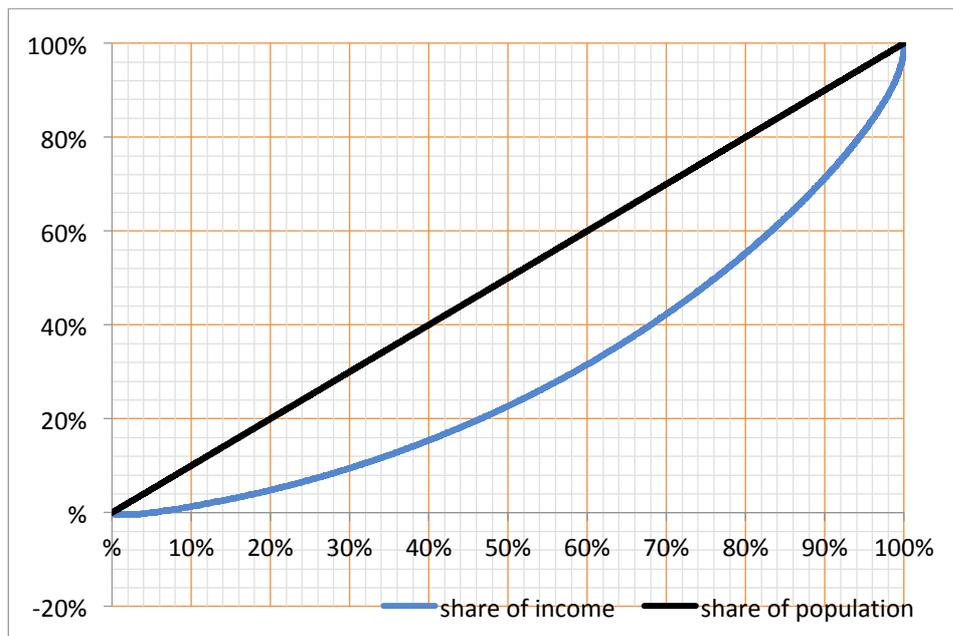**Figure 2: Lorenz curve of primary income (2015)**

Lorenz curves have changing axis because of the ranking of households. If we cluster households in groups of gross disposable income and depict both the income distribution of primary and disposable income for those groups, we see the effect of redistribution for each group better. Figure 4 shows the income distribution of households grouped by 1% groups of gross disposable income. More than half of the household population has a higher gross primary income than disposable income (integration of taxes night change this).Relatively few households seem to benefit from redistribution. This is partly because the social transfers in kind, paid through taxes and social contributions as well, are not yet taken into account. Including these will allow us to analyse adjusted disposable income, which will give a complete picture of redistribution.

Further focusing on this top tail (Figure 5), it shows that the top 0.1% of the distribution receives both a relatively high amount of compensation of employees, and a high amount of net property income. The latter consists for a great part of dividends received. In SNA these are either received individually (D.421) or as a part of collective funds (D.443). The micro data we used identifies the dividends owned by major shareholders, and other dividends. Dividends received are an important subject of integration decisions. Most of these dividends are paid out by director-shareholders to themselves and do not always link to the income earned in a year. This shows clearly in years when the tax rates for these dividends are relatively low. Director-shareholders pay out more dividends in those years than in the years before and after. In SNA we consider part of these dividends a subtraction of capital from the firm, thus a financial transaction, rather than an income flow. The correction we make is substantial for 2015, and equals 5.5 bn euros. This correction mainly concerns the wealthiest households. Where figure 4 shows that gross disposable income for the top 1% was around 24 bn euros, figure 5 (after the correction) adds up to a little over 19 bn euros.

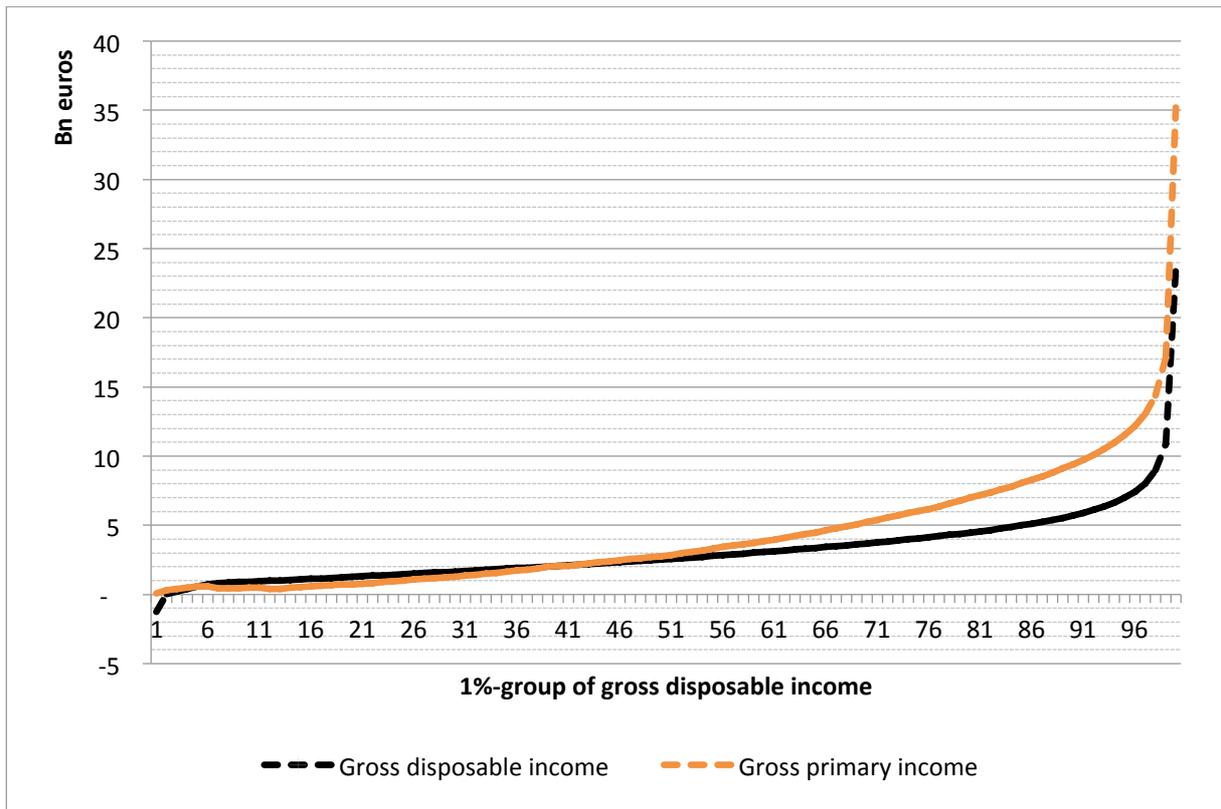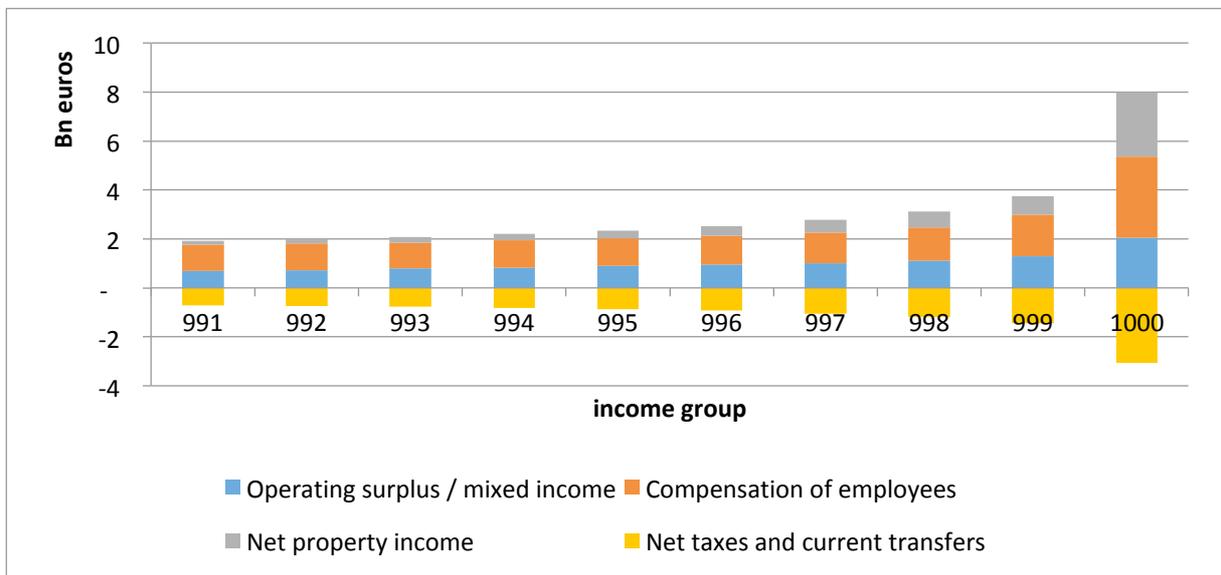**Figure 4: Gross primary and gross disposable income by income percentile of gross disposable income (2015)**

**Figure 5: Components of gross disposable income for the top 0.1% (2015)**

Macro vs micro disposable income

In SNA the key income concept for households is disposable income. The micro statistics, based upon the IIWS, also know a disposable income concept, but only equal in name. From previous elaborations it is already clear that SNA covers more than the IIWS alone. Because there are more

transactions in the SNA, and corrections are made for the population, or because different data sources are used for comparable transactions, not only levels of disposable income can change, but also measures of inequality.

Population is one difference. The micro disposable income does not include immigrants and new-borns (Table 1), which are together almost 370 thousand individuals. The children are economically inactive, but immigrants are not. The labour accounts show that the compensation of employees is on average 8.5 thousand euros, which adds up to 1.7 bn euros in total. Also other transactions, such as taxes and social contributions, are influenced by this. A second difference is that the micro disposable income as published includes only the private households, leaving the institutionalized households out of the scope. This equals 244 thousand households, mainly elderly people. This group is represented in the IIWS, receiving around 2.2 bn euros on old age pensions (first and second pillar).

Figure 6: From micro to macro disposable income (2015)
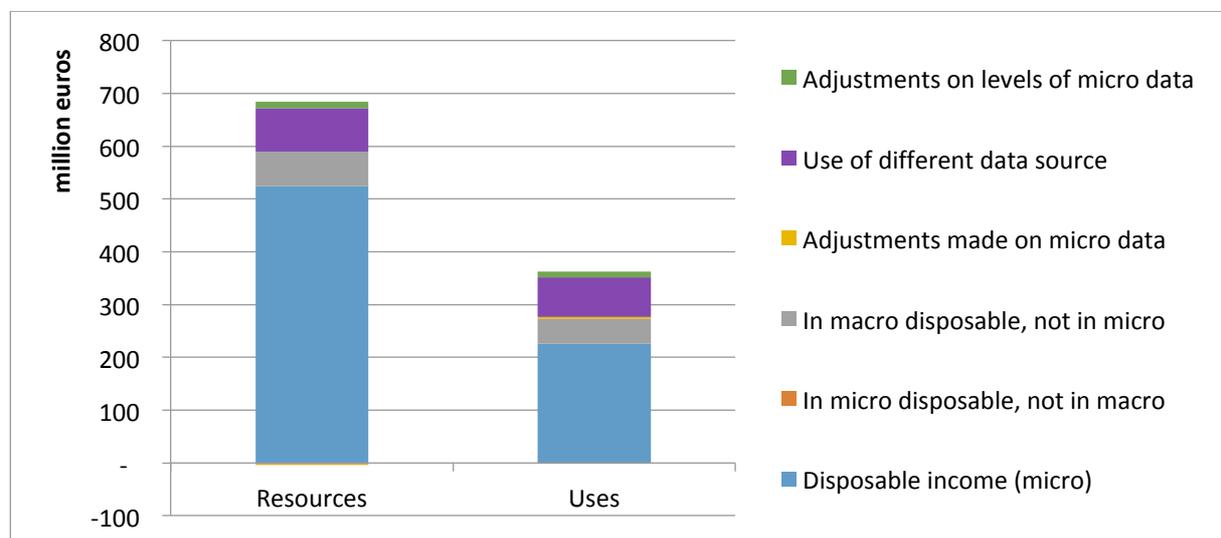
The balancing items of micro disposable income and SNA disposable income are 18.7 bn euros apart, but the resources and uses far more. Figure 6 shows that the resources of the SNA household sector are for roughly 75-80% a results of the IIWS. For the uses this percentage is lower, around 65%. Only a few variables in the IIWS are completely out of scope for the construction of the household sector (in micro disposable, not in macro). This is mainly the rent subsidies which are treated as a social transfer in kind in SNA. On the other hand, the variables that are part of SNA, but not of the micro statistics (in macro disposable, not in micro) are far more influential. These include the estimates for the non-observed economy (9.5 bn euros added to resources, 2.4 bn euros to uses), the largest part of the miscellaneous current transfers (5.1 bn euro added to the resources and 8.8 bn euros to the uses), fisim (-2.6 bn euro for the resources, -2.9 for uses), and other current taxes (8.2 bn euros added to uses). These all influence inequality as well as the levels of disposable income. The largest transaction added is the income attributed to insurance policy holders, which covers the income pension funds and insurers receive on the pension wealth of households. This is in SNA considered as property income for households (30.8 bn euros), but because households do not actually receive this, it is also recorded, for the same amount, as supplementary pension contributions. Both the resources and means are there for adjusted for the same amount, but disposable income is not influenced. Inequality (measured by the disposable income) is not adjusted either. It does influence primary

income however, because the property income is included in this balancing item, and the supplementary pension contribution is not. The distribution of this item is part of further research, for now every participant in a pension scheme receives and pays an equal share.

Apart from these conceptual differences, also using different data sources for comparable transactions influence levels and the balancing item. In case of the compensation of employees, the variables of the IIWS are not used, but instead the labour accounts are preferred. Confrontation of these data sources does lead to large deviations for individual records. For mixed income of self-employed, the variables of the IIWS are used for distributional purposes only. Where mixed income on the micro side is the sum of a few variables (according to SNA concepts), the sector accounts need production, intermediate use, paid wages etc. instead of the sum of those components only. This leads to higher levels mainly, but also the balancing item differs quite substantially, and so is inequality.

Finally the adjustments made on IIWS variables are less influential, these include the corrections made for the missing population.

Inequality of the micro data is 0.385, as measured by the Gini-coefficient, where it was 0.401 for macro disposable income. There are still some redistributive effects than we can't capture. These are for example the insurance premiums and claims, for which we estimated a macro total, but lack distributional information of the claims, that are set equal to the premiums. Also, far smaller, lottery winnings are part of the macro amount, but resources and uses are equal for every household.

Preliminary summary and further research

In this paper we showed how we construct the household sector from micro data. This is the first stage of the construction of the annual sector accounts. This improves the position in the integration phase, up until now the household sector was almost fully dependent on counterpart information.

This research focused on disposable income so far. However a major influence in redistribution are the social transfers in kind. Including these will allow us to analyse adjusted disposable income, an income concept that is better comparable between countries. Ideally we get a better grasp on the private redistribution through non-life insurances as well. Furthermore wealth components can be included, so the household balance sheets will tell us the story of wealth inequality.

In this studies we looked at distributions on the household level. However, in the end, we want to have the same picture for individuals as well as households. This requires some modifications to the micro data that has not yet been done. In some cases micro variables are imputed as well, in case of income from owner occupied dwellings for instance. This is imputed to a household, or an individual within the household, but might be relevant for other people within that household as well. Also due to joint tax filings, the tax levels might not reflect economic reality on the individual level. Corrections for these issues won't affect the household level, but will affect the individual results.

Moreover some distributions will be reconsidered. For instance the income attributed to insurance policy holders will be confronted with the pension claims statistics (PCS). The PCS estimates the current claims and the claims individuals will get when they reach the retirement age in the Netherlands. Only the working age (15-64) is considered, and the claims of children living at home fall outside the scope, as are the institutional households. A claim is the right one has on a future benefit, so the household balance sheets represent the amount pension funds need in order to pay for all the future benefits, instead of the amount that is actually available. Even though financial accounts are currently out of scope in this studies, related transactions (income attributed to

insurance policy holders) can be found on the current accounts as well. We will consider using the distributions found in the PCS as well as allocating an equal amount to each participant.

Finally, perhaps the biggest challenge is the integration phase of the sector accounts. The views in this paper might change, but we feel that in many respects we improved our estimates greatly, with the benefit that we have a full picture of inequality from the start of the production process.

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