



“Towards Full Income; How Non-market Production Affects Distributions Within the Household Sector”

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Towards full income

How non-market production affects distributions within the household sector.

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Abstract: A classic GDP issue is that only market production adds to income. Household non-market production such as cooking or taking care of children is not included in GDP. Among the recommendations of Stiglitz *et al* is the adoption of the concept of full income, which is considered a better measure of welfare. Shifts from market to the non-market economy cannot be reflected accurately in conventional measures of living standards such as disposable income, but can be recorded in full income.

We use the household sector accounts as constructed by Statistics Netherlands for the final 2016 year. These household sector accounts consist of a database in which the entire household population is represented integrally. This database is enriched with time use data, allowing us to not only look at the macro effects of the non-market economy, but also look within households.

In this paper we will focus on the effect that these unpaid household activities have on income distributions and inequalities within the household sector. From the household point of view it becomes clear that including these activities decrease inequality measures. Also gender differences in income generation can only be considered meaningfully if household non-market production is included, because there are still clearly different patterns between men and women. Finally, we also consider the intergenerational aspects of the extended income concept, and see that non-market income is largely earned by the elderly.

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Introduction

Despite the fact that household production of domestic and personal services is productive in an economic sense – these activities are carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods or services – it is not included in the System of National Accounts’ (SNA) production boundary. Housing services produced by owner-occupiers are an exception to this rule. It is stated that the production boundary is deliberately chosen such to take into accounts the needs of most users. Including other unpaid household service work in the national accounts boundary will for example obscure unemployment statistics as people engaged in household services would become self-employed. Others warn that including non-market production in calculating GDP may result in developments in markets going unnoticed.

Although critiques on (the production boundary of) GDP are not new, the (inter)national debate was boosted by the Stiglitz-Sen-Fitoussi Report (Stiglitz *et al.*, 2009). Also in the Netherlands, this report received considerable attention and in response to a report by the Netherlands Scientific Council for Government Policy, the Dutch government appointed a temporary commission to provide even more insight into what GDP can and cannot measure and what role GDP has in policy making and political decision-making (WRR, 2013). Amongst many other findings, they acknowledged that excluding unpaid household service work may distort GDP-figures across time and space – the classic when-a-man-marries-his-housewife story, and increasing labour participation rates of women. However, the SNA-argument to include owner-occupied dwelling services was actually similar, namely to avoid distorting estimates of production and consumption of housing services because of significant differences in the ratio of owner-occupied to rented dwellings between countries.

In this paper, we will adhere to the recommendation of the Stiglitz-Sen-Fitoussi report to broaden income measures to non-market activities. This recommendation renewed international attempts to provide agreed guidelines on how to cope with measurement challenges regarding non-SNA household production of services, resulting in the UNECE Guide on Valuing Unpaid Household Service Work (2017). We will follow the methodological suggestions provided in this guide in determining full income – which is the sum of national accounts income and income resulting from the own-account production of household services – for the Netherlands in 2016. The recommendations of Stiglitz,

Sen and Fitoussi stressed that a better understanding of the production of household services is necessary to apprehend and explain shifts from the market economy to the household sphere, or the other way around. The framework we discuss in this paper should be able to capture these on the detailed levels that we will publish here.

In valuing unpaid household production of services, we use the input approach as recommended by the Guide, in which we value time-use data against a wage rate of a generalist worker, but we also present results according to a specialist wage approach. Furthermore, we make corrections to existing national accounts transactions by reallocating certain products from household final consumption expenditure to intermediate consumption and gross fixed capital formation. For the latter transaction, corresponding consumption of fixed capital will be estimated using a straight-line perpetual inventory model.

Then, we will match these results to our household database, as this is used for the construction and integration of the final 2016 publication of Statistics Netherlands (Bruil, 2018) in order to explore the effects on the (income) distribution and inequality, both across households and individuals. We find that extending the production boundary to include non-SNA household production of services decreases inequality, reduces gender differences in income and changes the distribution of labour income and consumption over the life cycle.

The remainder of this paper is structured as follows, in the next section we will discuss the Time Use Survey (TUS) and Household Budget Survey (HBS), the two main data sources for this research. We will explain in detail how we estimated the extended income following the input method, and how we linked this to the household sector accounts results of Statistics Netherlands. In the following section, we will show the results, first focusing on the macro outcomes and put them in a perspective. Second, we will go beyond these macro overview and analyse the effects on distributions within the household sector. The last section summarises and concludes.

Data & Methodology

Data sources

Our starting point is the household database of Statistics Netherlands (SN), used for the construction and publication of the final 2016 year. This database consists of all residents in the Netherlands, 17.4 mln persons in 8.1 mln households¹. For each individual or household the complete SNA sequence of accounts is constructed, using a multi-source approach. Ideally, and for a large part, data sources are record-linked to individuals, using an encrypted unique key that is available on the individual level. When record linking is not possible, a background character that is both available in the data source and in the SN household database, is used to impute an average value to an individual, a household, or group of persons. In the integration process of the national accounts, macro corrections are made for the household sector. In every case these macro corrections are translated into micro corrections as well, resulting in a database where the sum of micro meets the macro total for every SNA transaction. The final distribution of SNA transactions over households is consistent with the

¹ These figures are derived by the number of persons registered in the Netherlands on the first of January 2016 plus the new-borns and the immigrants.

distribution over individuals. In case measurement focuses on the household we further break it down to individuals within the household. Bruil (2018) gives a full description of the construction and use of this database.

We need to modify these integrated results for the consumption. For this we reevaluate the use of the Household Budget Survey, according to the UNECE guide. Next we add the results of the time use survey, in order to arrive at an extended income concept.

Time Use Survey

The purpose of the Time Use Survey (TUS) is to gather information on how individuals spend their time. They are asked which activities they do, with whom they are when they are doing it, and how much time they spend. Each respondent completes a journal for a period of seven days. Before and after this participation period a questionnaire is completed. The research period is one year and the HETUS guidelines are followed. In 2016 the final sample consisted of 2,106 respondents.

Every respondent completes their journal per episode, which is a dimension consisting of the main activity, the secondary activity, the location, and the company with whom the activity is undertaken. An episode ends when one of these dimension changes. The UNECE Guide (2017) acknowledges that measuring time spent in simultaneous activities is challenging. A first approach is to count only the time spent in the main activity. Although this might mean omitting meaningful activities that are recorded as secondary, we chose to follow this suggestion. Accounting for secondary activities as well might be something to elaborate on in the future.

In the 2016 TUS 10 activities are included: (i) personal care, (ii) employment, (iii) study, (iv) household and family care, (v) voluntary work and meetings, (vi) social life and entertainment, (vii) sports and outdoor activities, (viii) hobbies and computing, (ix) mass media, and (x) travel and unspecified time use. For our purpose only those activities where production takes place are included. According to the UNECE Guide on Valuing Unpaid Household Service Work (UN 2017), the distinction between productive and non-productive unpaid household work is made based on the so-called third party criterion. Activities are considered productive only if they can be delegated to a third person. The set of recommended activities by the Guide includes the following 5 main activities and corresponding sub activities: Housing (provision of housing, cleaning, gardening, repair), Nutrition (plan meals and shopping, prepare, serve and wash up meals), Clothing (buy clothing or material to make clothing, laundry- washing and ironing), Care (child care, adult care, pet care) and Transport. We consider household and family care as productive activities which could also be bought on the market. The former is production that is also consumed within the household (cooking, cleaning, taking care of family members), the latter is not. For the income from owner occupied dwellings the output valuation method as included in the current practice of the national accounts is preferred. To avoid double counting of the provision of housing, the hours worked on major repair are thus removed.

In case of the TUS the households in institutions are not considered. We neglect these households (255 thousand at the first of January 2016), because these consist mainly of elderly living in retirement homes, patients in other care homes, or imprisoned people. We think that the productive activities of these households are negligible, because the nature of these institutions is that these individuals cannot take care of their household anymore. Individuals living in religious convents are likely to be productive, but excluded due to this choice.

Table 1: Recommended list of activities concerning own-use production work of services

Activity	Sub activity	Market counterpart *	Class *
Housing	Provision of housing	No market comparison	-
	Cleaning	Cleaning services	8531, 8532, 8533, 8534
	Gardening	Other support services	8597
	Repair	Repair services of other	8721, 8722, 8723, 8724, 8729
Nutrition	Plan meals and shopping	Domestic services	9800
	Prepare, serve and wash up meals	Domestic services, food serving services	9800, 6331, 6332, 6339
Clothing	Buy clothing or material to make clothing	Domestic services	9800
	Laundry, washing and ironing	Washing, cleaning and dyeing services	9711, 9712, 9713, 9714, 9715
Care	Child care	Other social services without accommodation, pre-primary education services, primary education services, secondary education services, residential care services for the elderly and disables, other social services with accommodation, social services without accommodation for the elderly and disabled	9351, 9210, 9220, 9231, 9232, 9233, 9234, 9322, 9330, 9349
	Adult care	Residential care services for the elderly and disables, other social services with accommodation, social services without accommodation for the elderly and disabled	9321, 9322, 9330, 9341
	Pet care	Support and operation services to agriculture, hunting, forestry and fishing	8612
Transport	Performing transportation services on own account	Local transport and sightseeing transportation services of passengers, long-distance transport services of passengers,	6411, 6412, 6413, 6421, 6422, 6423, 6424

*** Central Product Classification Version 2.1**

Source: UNECE Guide on Valuing Unpaid Household Service Work (2017).

The recommended list corresponds with the activities household and family care, and transportation from the TUS 2016. Transportation is only included if not by public transport, because that would be purchasing a service instead of producing your own.

The TUS includes time spent on leisure as well. We acknowledge that this is an important field of study, and crucial for a complete insight in the effects of unpaid household activities. First, because one person can consider a chore as leisure, while another person considers it work. Second, because leisure time has a value as well, and any changes in the time spent on unpaid household activities impacts leisure time as well. Still, we decide to leave this field of study out of scope for now.

Voluntary work is also left out of consideration, which is in line with the UNECE Guide. Volunteering

not only involves additional measurement challenges, it would also complicate even further our distributional breakdowns, because voluntary work is by definition consumed by other households. We would not be able to identify those households based on the available data sources.

Household Budget Survey

The data source used for the construction and distribution of the consumption components of Dutch households is the Household Budget Survey. The HBS is held once every 5 years. The last time was 2015, the results of this survey are used in this paper. For the 2016 national accounts publication this data source is brought to 2016 price levels, and integrated and balanced with the supply and use tables. Statistics Netherlands (SN) asks households to fill out a survey with general questions on the household, fill out a survey on recurring periodic expenses, keep track of all non-periodic purchases in a diary during 4 weeks, and fill out a survey on very large expenses and holiday activities. The total sample size is 90 thousand households, in which low and high income groups are oversampled. The response rate is approximately 17%, which leads to a survey population of 15 thousand households. This covers only private households, persons living in institutions are excluded.

Methodology

For the valuation of non-market household production, two approaches can be distinguished: an input method which uses hourly market wages on labour inputs plus other costs of productions and an output method which uses market prices of goods and services. Although the output approach is conceptually consistent with the valuation of market production in the SNA, the UNECE Guide on Valuing Unpaid Household Service Work (2017) acknowledges that the input approach is more realistic to implement and therefore recommends the input approach as the preferred method to measure household production of services. Under the input-based method, the value of output is calculated as the sum of costs and equals an imputed compensation for labour input (time multiplied by wage rate) plus taxes minus subsidies plus consumption of fixed capital plus a return to capital plus intermediate consumption.

Imputed compensation for labour input

For the imputed compensation of labour input, we will follow the recommendations of the UNECE Guide by proceeding a number of steps. First, we compute average weekly minutes spent on the different activities for demographic subgroups from the TUS. In order to make demographic subgroups, we compiled a list of characteristics that are available in both the TUS and the micro database of the household sector accounts. Then, for each of the TUS activities a multiple variable linear regression has been run to see which variables are in fact associated with the time spent on various activities. It turned out that the most distinguishing variables are gender, age, household income and the number of children in the household. These variables are then recoded into groups such that they provide enough detailed information without losing substantial coverage. From the TUS 2016, we have distinguished 60 groups by gender (male, female), child (yes, no), micro standardized household disposable income (<20.000, 20-30.000, 30-40.000 and >40.000) and age (<18, 18-30, 30-50, 50-65 and 65+). For the group under the age of 18² and above the age of 65, we only included gender and standardized household income in order to prevent the groups from becoming too small. For a similar reason, we grouped together the income categories 30-40.000 and

² Individuals under 12 years old are excluded from the time use survey and thus have no output of unpaid household activities.

>40.000 for the age category 18-30. After these corrections, we have 60 groups with an average size of 35 observations and the smallest groups consisting of 9 respondents.

It should be kept in mind that the TUS-dataset only contains a small number of observations and that the coverage for some activities is very limited, in particular adult care (n = 90) and buy clothing (n = 145), whereas for other activities such as transport (n = 2.026) and preparing meals (n = 1.901) coverage is substantial. In case of limited coverage, it sometimes happens that the value that is allocated to a group is coming from just one respondent.

Secondly, we compute average weekly hours spent for each of the subgroups and apply an imputed wage rate to arrive at a weekly value of unpaid household service work. Regarding the valuation of these services, the UNECE Guide recommends the replacement cost method instead of the opportunity cost method. The rationale behind this is that under the opportunity cost method the value will differ depending on who is performing the task – the same activity is valued higher when performed by for example a dentist than by a lavatory attendant. In contrast, the replacement cost method values the time spent on unpaid activities at the hourly wage rate of persons performing similar tasks in the market sector.

This replacement cost method can be further divided into 3 alternatives: 1) the generalist wage approach; 2) the specialist wage approach and 3) a hybrid approach. The UNECE Guide recommends using the generalist wage method, as this approach best accounts for the fact that the productivity of household members does not match that of their market equivalent workers. Furthermore, the Guide states that the generalist wage approach has some advantages over the specialist approach in overcoming issues raised by simultaneous activities, as only one wage rate is required to value for example an hour of childcare combined with cleaning. An argument against the generalist wage approach and in favor of the specialist wage method is given by Poissonier and Roy (2017) who argue that the generalist method levels out any composition effects of domestic production across time: if women spend less time doing laundry and more time helping children with their homework, the hourly wage of domestic production does not account for such a shift in the composition of household work. For us, the insensitivity to the composition of domestic work is even more problematic if we want to capture the productivity differentials across households, as is possible with the link to our household database. In this paper, we will therefore show results based on both the generalist and specialist wage approaches, whereas the hybrid approach might be something to elaborate in the future. Also, the UNECE Guide acknowledges that the choice of wage rate will have a substantial effect on the final valuation of unpaid household service work and that sensitivity tests are needed to assess the differences between the methods.

Alternative 1, the generalist wage approach imputes replacements costs by the wage rate of a general housekeeper. We use the compensation of employees in the industry “households as employers” from the labor accounts tables of the Dutch national accounts³. This wage concept is consistent with the instructions of the UNECE Guide, which states that replacements costs should be based on gross wages including fringe benefits and (estimated) employers’ social security contributions. The industry “households as employers” includes private households with domestic

³ <http://statline.cbs.nl/Statweb/publication/?DM=SLLEN&PA=84165ENG&D1=10-12&D2=1,5,7,34,36,39,44,48,54-55,61,65,68,76,82,84,86,90,93,97-98&D3=21&LA=EN&VW=T>

workers, such as maids, cooks, house servants, butlers, gardeners, janitors, stable boys, drivers, caretakers and babysitters.

For alternative 2, the specialist wage approach we use data from Statistics Netherlands' custom-made tables about hourly wages of employees in the Netherlands by professional groups commissioned by the Dutch Ministry of Economic Affairs⁴. These tables contain information about gross hourly earnings by occupational classification ISCO 2008. For each TUS-activity, a related 4-digit ISCO-occupation has been selected. Hourly wages at this level of detail are available for 2012, for 2016 we only have hourly wages at the 1-digit level⁵. We use the 2012-wages as the starting point, then extrapolate these to 2016-levels by using the growth rates at the 1-digit levels. Hourly wages from the custom-made tables only include an estimation for holiday allowances, but employers' social security contributions and overtime pay, incidental extra rewards, special rewards, bonuses, company cars etc. are not included. To include employers' social security contributions and other benefits, we increase gross hourly wages by the rate of compensation of employees (D.1 = D.11 wages and salaries + D.12 employers' social security contributions) in National Accounts⁶ by sector of industry to gross hourly wages excluding bonuses/allowances and overtime pay by sector of industry⁷, corrected for double-counting of holiday allowances. An overview of the applied specialist wages is presented in **Table 2**.

Table 2: Wages by activity

Method	Activity	Average weekly hours	Related ISCO2008* (if method 2)	Average gross hourly wage rate, 2016
1. Generalist wage approach	All		-	€ 23,20
2. Specialist wage approach	Adult care	0,08	5322 Home-based Personal Care Workers	€ 24,67
	Buy clothing or material to make clothing	0,16	7533 Sewing, Embroidery and Related Workers	€ 24,74
	Child care	1,68	5311 Child Care Workers	€ 25,46
	Cleaning	1,81	9111 Domestic Cleaners and Helpers	€ 17,95
	Gardening	0,90	9214 Garden and Horticultural Labourers	€ 19,76
	Laundry, washing and ironing	0,94	9121 Hand Launderers and Pressers	€ 19,02
	Mgt and shopping	2,23	4110 General Office Clerks	€ 28,49
	Pet care	1,22	5164 Pet Groomers and Animal Care Workers	€ 23,92
	Plan meals and shopping	1,82	9412 Kitchen Helpers	€ 17,83
	Prepare, serve and wash up meals	4,73	5120 Cooks	€ 21,68
	Repair	0,54	7222 Toolmakers and Related Workers	€ 25,52
	Transportation	7,42	8322 Car, Taxi and Van Drivers	€ 22,44
* ISCO - International Standard Classification of Occupations				

After applying an imputed wage rate to the average weekly hours, either a generalist or specialist wage rate, we then multiply by number of weeks a year and link the estimates to the household database based on the background characteristics of the demographic subgroups. Summing over the total population then gives a macro-estimate of the imputed compensation for labour input.

The input method is frequently criticized for not taking into account differences in the productivity of the labour input and the quality of the product compared to market equivalents. Van de Ven and

⁴ <https://www.cbs.nl/nl-nl/maatwerk/2014/15/uurlonen-van-werknemers-naar-beroepsgroep-2012>

⁵ <https://www.cbs.nl/nl-nl/maatwerk/2017/48/uurlonen-van-werknemers-naar-beroepsgroep-2016>

⁶ <http://statline.cbs.nl/Statweb/publication/?DM=SLEN&PA=84165ENG&D1=0-3&D2=1,5,7,34,36,39,44,48,54-55,61,65,68,76,82,84,86,90,93,97-98&D3=21&LA=EN&VW=T>

⁷ <http://statline.cbs.nl/Statweb/publication/?DM=SLEN&PA=81434ENG&D1=5-6&D2=0&D3=0&D4=0&D5=2,5-9,12-17,19-20,23-25,27-28&D6=I&LA=EN&HDR=T&STB=G1,G2,G3,G4,G5&VW=T>

Zwijnenburg (2016) argue that these divergences are often assumed to be non-existent, but that the cost approach is therefore likely to overestimate the value of non-market services produced in households: a professional cook is likely to be more efficient and probably also provides a higher quality product than someone preparing a meal at home for the family. Despite this risk of overvaluation, we chose to ignore the possibility of productivity differentials. We feel strengthened in this choice by the research of Gál et al. (2015) who found that age-specific productivity differentials or economies of scale hardly influence the results they found for the total unpaid household activities.

Adjusting for taxes and subsidies

Next to an imputed value for compensation of labour input, the UNECE guide recommends to make some additional adjustments to the existing SNA-framework. One of these adjustments is the reconciliation of taxes and subsidies, which come in the form of two categories. Taxes and subsidies on products are considered not to be relevant, because unpaid household service work is by its nature not sold on the market. Regarding taxes and subsidies on production, the UNECE Guide proposes to allocate (part of) the tax burden to unpaid household service work if a household pays a tax or receives a subsidy for the use or ownership of a product or asset that is used in the own-use production work of services. However, countries should be careful that the benefit/tax is actually connected to production. For example, in the Netherlands, all households with children up to 18 years old receive child allowances regardless of whether they actually care for the children. Similarly, motor vehicle taxes in the Netherlands are levied as a holding tax: the amount taxed does not depend on whether the vehicle is actually used and if so, how much it is being used. For these reasons, we do not regard child allowances and motor vehicle taxes as being relevant for unpaid household service work. Real estate taxes and water sewerage taxes are already included in National Accounts under other taxes on production in the generation of income account of the Dutch household sector. Because of all these reasons, we do not make any adjustments to the existing SNA taxes and subsidies on production. Internationally, the practice of not adjusting taxes and subsidies is shared by several other countries, such as France (Poissionier and Roy, 2017), Spain (Casero and Angulo, 2008) and the UK (Webber *et al*, 2016).

Intermediate consumption / gross fixed capital formation

The consequence of broadening the production boundary to include non-market productive activities is that final consumption in the SNA has to be redefined into final consumption, intermediate use, and household capital. In our database we do that both on the macro and micro level. We take the integrated household database as the starting point for these adaptations.

For each household group, the reallocation of final consumption is made following Annex 4.1 in the UNECE Guide on Valuing Unpaid Household Service Work (2017). When the annex indicates that a commodity is used for both final consumption and intermediate consumption we assume a 50-50 share. For each household group the sum of the final consumption, intermediate use, and household capital is decided on an aggregated level. For this aggregate level the share in total consumption is decided (see: appendix 1), and this share is added to the household database. We prefer taking the share over the absolute values from the HBS, because there are gaps between the reported micro totals in the HBS and the macro totals in the SNA. In the integrated household database, these data gaps are already closed. This share per COICOP component is linked to households according to their common characteristic with the household database. Preferably this is the income quintile of micro

disposable income. If this is not available we use the composition of the household. This approach equals the one taken when constructing the household database.

We aim to include the non-market activities to the macro total, and the household level, but also to the individuals in our dataset. In our household database, final consumption by individual is decided by the household consumption and equivalence scales. We use the oxford modified equivalence scale⁸ to allocate the household consumption over households. This approach remains the same for the final consumption part, but intermediate use is allocated within the household according to the hours spent on non-market activities, as we do for household capital⁹.

Consumption of fixed capital

After reallocating certain household durables from household final consumption expenditure to gross fixed capital formation (GFCF), we calculate consumption of fixed capital by applying a straight-line Perpetual Inventory Method (PIM) model. This model requires three pieces of information, namely the value of capital formation of these household durables over a time span of multiple years (at least as long as the expected service lives), the expected asset life lengths (see Annex 4.3 in the UNECE Guide) and the price changes of these fixed assets. A straight-line model is considered to be appropriate in case of household durables, since households are assumed to use these in full capacity until they break down completely. Following the formulas as presented by Meinen et al. (1998), we first calculate the gross capital stock as the sum of past purchases of household durables, valued at current year prices. We do this separately for each category of household durables because of different expected service lives. Information about final consumption expenditure on durables each year is available in National Accounts, but at a less detailed level, 2 digits, than the 3 digits as presented in Annex 4.3 in the UNECE Guide. We consider three categories, home furnishing, household appliances and vehicles. For each of these categories, we calculate expected service lives as the average of the asset life lengths as shown in Annex 4.3. For the price index, we use consumer price index figures to the spending categories 051000 Furniture, home decoration, 053000 Household appliances and 071000 Purchase of vehicles.

Secondly, we compute the consumption of fixed capital (CFC) by category as straight line depreciation with the expected service life and the average gross capital stock of the current and the previous year. Hereby, we assume an evenly distribution of acquisitions of household durables over the year. Finally, we sum the yearly GFCF and CFC figures over the categories and we express CFC as a percentage of GFCF. To determine consumption of fixed capital per household, we combine this percentage with the household capital in the SNA household database.

Return to capital

In the output method, a return to capital is included in the market prices of the products that are used to come to a valuation of unpaid household service work. Therefore, the UNECE Guide suggests to estimate a return to capital for the input method to ensure that services activities are not under- or overvalued compared to the output approach. The Guide recommends to use the interest rate for government bonds as a yield for this. However, the Eurostat Proposal for a Handbook (EC, 2003)

⁸ The oxford modified equivalence scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

⁹ This does not include dwellings, as they are already included in the SNA. Therefore, the existing household database figures will be used for dwellings.

suggests not to add a return to any capital element. They acknowledge that there is a lot of discussion about whether it should or should be added, but they argue that ignoring it is in line with the measurement of other non-market output in the SNA, where it is valued at the sum of costs. For example, non-market output of NPISH provided to households free of charge is estimated as the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes less subsidies on production. A second argument in favor of ignoring any return to capital is that the interest rate on 10-year government bonds in the Netherlands was only 0.29 percent in 2016¹⁰, which makes the potential undervaluation of the input method very small.

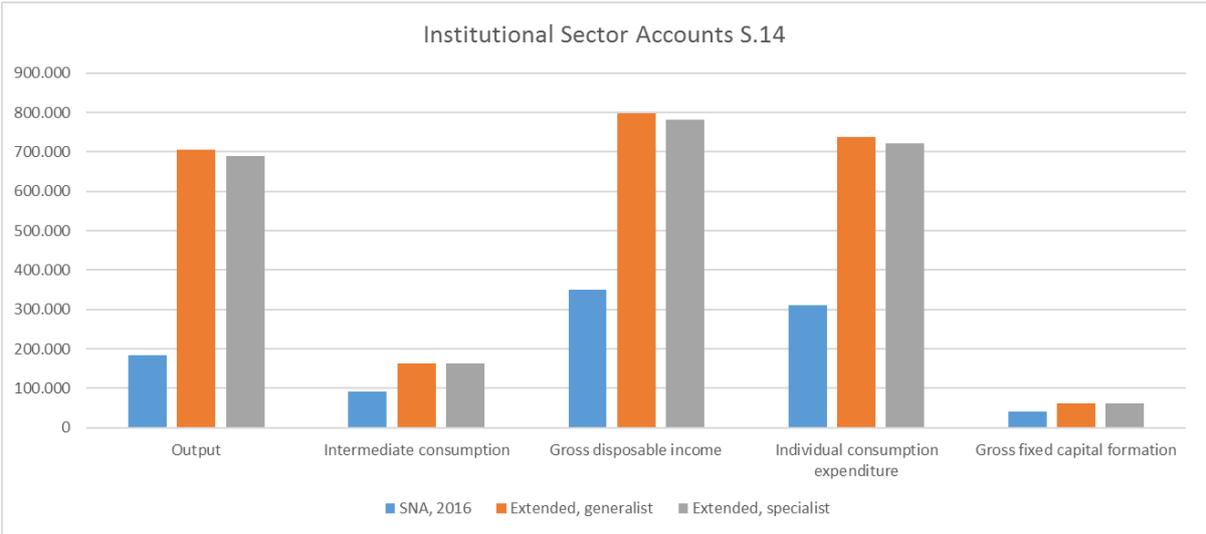
Final consumption expenditure

Finally, the existing figures on household final consumption expenditure are adjusted by adding the output of the household unpaid service work (this is by definition fully consumed by the household sector as well), and subtracting the values of final consumption that have been allocated to intermediate consumption and gross fixed capital formation. We allocate the consumption of childcare to the children within the household, and the consumption of adult care to the adults. The production that cannot be consumed within the households (for example: services of childcare produced by taking care of grandchildren, neighbors, cousins and nieces), is reallocated proportionally to all other households with children, because we cannot identify the exact households that consume this. Therefore the remainder of the production is considered to benefit everyone in the household. This is allocated over the household according to the equivalence scales. This is consistent with the approach to allocate final consumption over individuals.

Results

Macroeconomic consequences

Figure 1: Macroeconomic results



¹⁰ Source: Dutch Central Bank Statistics (DNB)

Our results in Figure 1 show that on a macro level, output under the extended production boundary concept is almost 4 times as high as the standard SNA-figure. Differences between the generalist and specialist wage approach are entirely due to a different imputed compensation for labour input. One would probably expect the outcomes of the specialist approach to be somewhat higher than outcomes of the generalist method. However, table 2 shows that activities that are valued lower get a high share because of the relatively high number of hours spent on these activities.

Gross disposable income more than doubles as a result of including non-SNA household production. However, households do not actually experience this additional income as such, because it is not available for spending. It is merely an imputed value of the consumption of own-produced services: if they want to buy similar services in the markets they would have needed this additional income to maintain living standards. Consumption increases by the value of additional output, but some part of existing final consumption expenditure is reallocated to intermediate consumption and gross fixed capital formation, as is reflected in Figure 1 as well.

Our macroeconomic results could be considered an upper boundary of full income, due to our use of gross wages over net wages. In the literature, it is recommended to use net wages if the purpose is to calculate full disposable income, because household disposable income does not include social contributions and taxes paid (EC, 2003). However, it is acknowledged that wage statistics are based on gross wages and that it is often difficult to get figures for net wages. However, on the other hand, we excluded leisure and volunteer work, and did not count hours spent on secondary activities.

Household income distribution

Unpaid household activities have a huge impact on the macro totals. Focusing on the distribution over households, we find that these impacts are quite evenly distributed if compared with gross disposable income. The additional income using the specialist wage falls between 30.1 bn euros for the lowest income decile, and 50.6 bn euros for the ninth income decile. For the generalist wage this is 31.2 bn euros for the bottom and 52.1 bn euros for the top decile. The relative increase from disposable income is highest in the bottom decile though.

Figure 2: Equivalised full income by income group

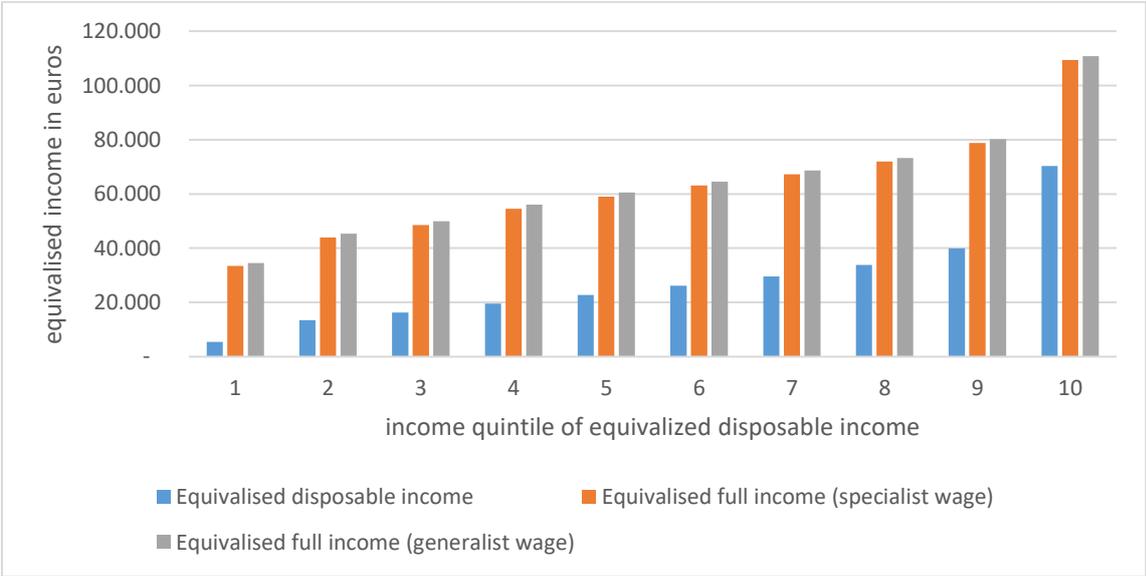
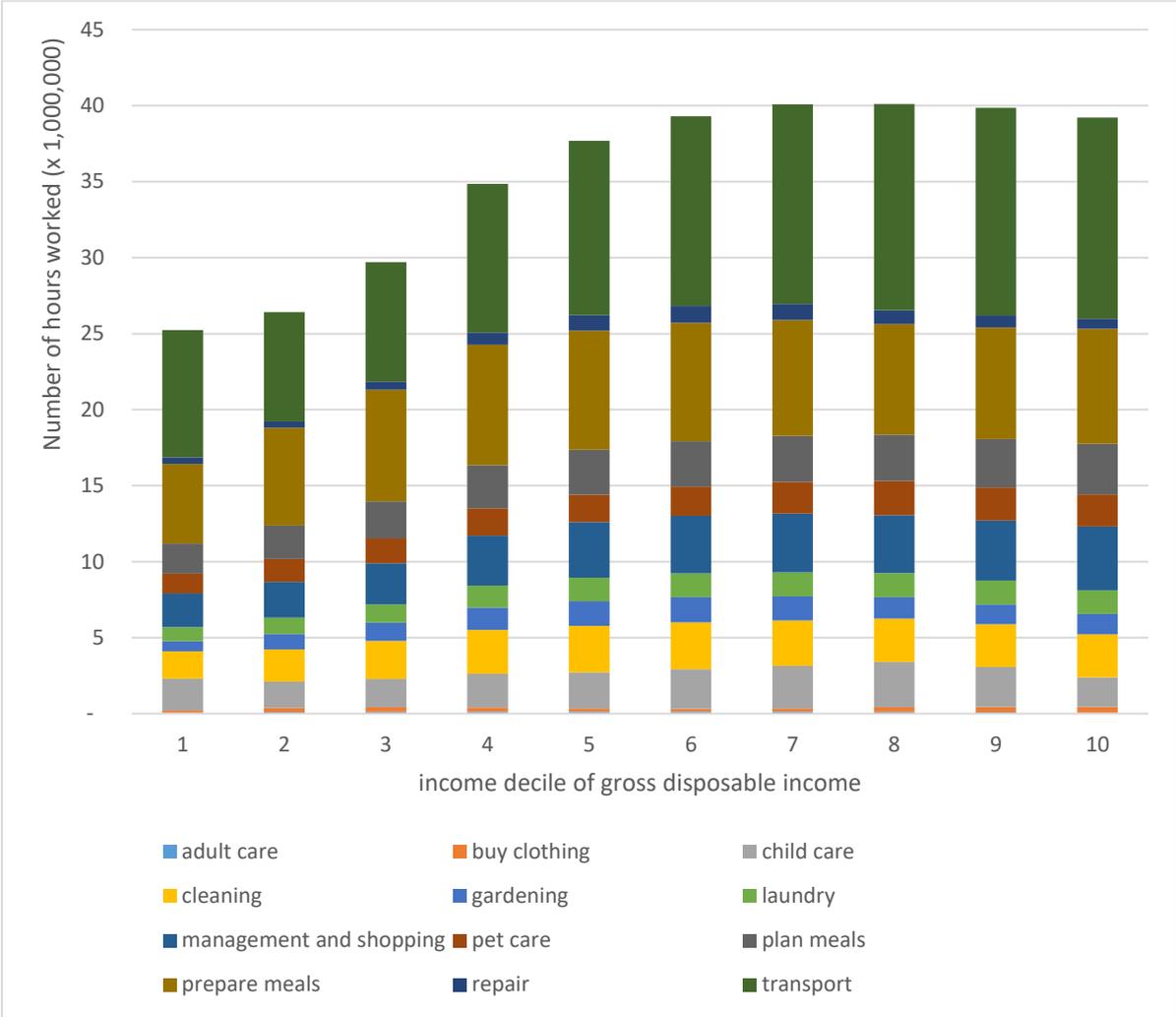


Table 3: Full income by income decile of equivalized gross disposable income

Income group	Consumption units	Gross disposable income	Additional income (specialist)	Full income	Gross disposable income	Additional income (specialist)	Full income
		Total (million euros)			Equivalized (euros)		
1	1.078.789	5.945	30.107	36.052	5.511	27.908	33.419
2	1.025.089	13.815	31.271	45.086	13.477	30.506	43.983
3	1.097.087	17.866	35.339	53.206	16.285	32.212	48.497
4	1.194.443	23.360	41.734	65.093	19.557	34.940	54.497
5	1.259.479	28.732	45.653	74.384	22.813	36.247	59.060
6	1.298.449	33.909	48.027	81.936	26.115	36.988	63.103
7	1.314.753	38.968	49.445	88.413	29.639	37.608	67.247
8	1.312.260	44.420	50.025	94.446	33.850	38.122	71.972
9	1.301.686	52.054	50.565	102.619	39.989	38.846	78.836
10	1.286.438	90.432	50.235	140.667	70.297	39.049	109.346

When comparing households it is important to account for economies of scale. We do that for disposable income, and use the same equivalence scales for the unpaid household activities as well. The additional income is still 40% higher in the top than in the bottom decile. These results depend largely on the household composition per income group. The highest income decile consists of the same number of households, but not the same number of individuals. In our methodology, the only distinctive characteristic of household composition is whether or not there is a child in the household. Using other household characteristics proved not possible due to the small sample size of the time use survey, as there was not enough coverage for such detailed groups. However, it seems plausible that larger households spend more time on these unpaid activities, as some of them depend on the number of people. Also it seems plausible that richer households spent more time in activities that involve spending money, like buying clothes or management and shopping. If we look at the number of hours per household income group, we see that planning of meals, taking care of pets, management and shopping, and transport are mostly undertaken by the richest households, while hours spent on adult care, child care, gardening and repair are higher for the middle income groups. In all activities the bottom three income deciles have the lowest number of hours worked, which results in the lower additional income (**Table 3**).

Figure 3: Total hours worked in unpaid activities per household income group



In **Table 3** and **Figure 2** households are ranked according to the equivalised gross disposable income. Adding unpaid household production to the income concept changes the ranking. As we have seen larger households work more hours and have larger production. Therefore, they are likely to shift to a higher income group. Calculating the gini coefficient on these new rankings shows an increase from 0.322 to 0.193 (generalist) or 0.196 (specialist). We can conclude that inequality changes drastically if the unpaid household production is included in the income concept. This finding is already recognized by the UNECE guide. The choice for the specialist or generalist wage does not influence the distributions largely though. The number of hours worked are a major factor in this calculation, and because larger households have more hours to spend, or need to spend more hours, they accordingly have a higher additional income. We did not include leisure time though, in case this is valued at market prices as well it would possibly lead to new insights again.

Gender breakdown

Including the production of non-SNA household services decreases the income gap between men and women. Under the SNA income concept, men earn on average 1.9 times as much as women. Under the extended income concept, this difference becomes only 1.2 times. The decrease in the income gap has its origin in the gender difference in number of hours spent on unpaid household activities. Women spent on average 26 hours a week, whereas men spent on average only 20 hours a week. A more detailed breakdown by activity shows that men spend on average more time on the activities repair and gardening, whereas women are responsible for most of the household activities laundry, child care, cleaning and the preparation of meals.

For consumption, the gender differences actually becomes a bit larger when including non-SNA household work. This is related to the use of the oxford modified equivalence scale in which the household head counts with a factor 1 compared to a factor 0.5 for each additional adult member. Since men earn on average a higher income than women, they are more often classified as being the household head than women.

Figure 4: Full income and consumption by gender, specialist wage approach

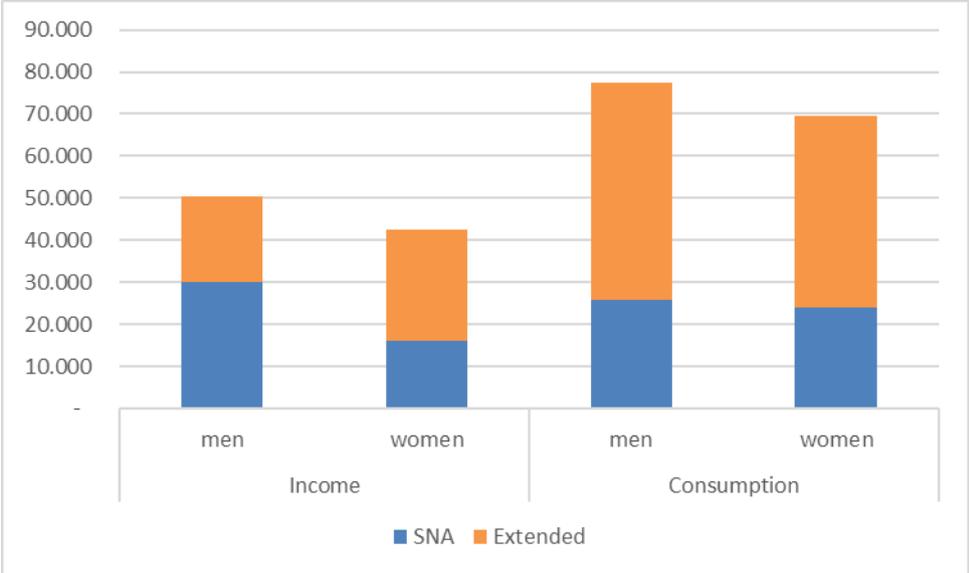
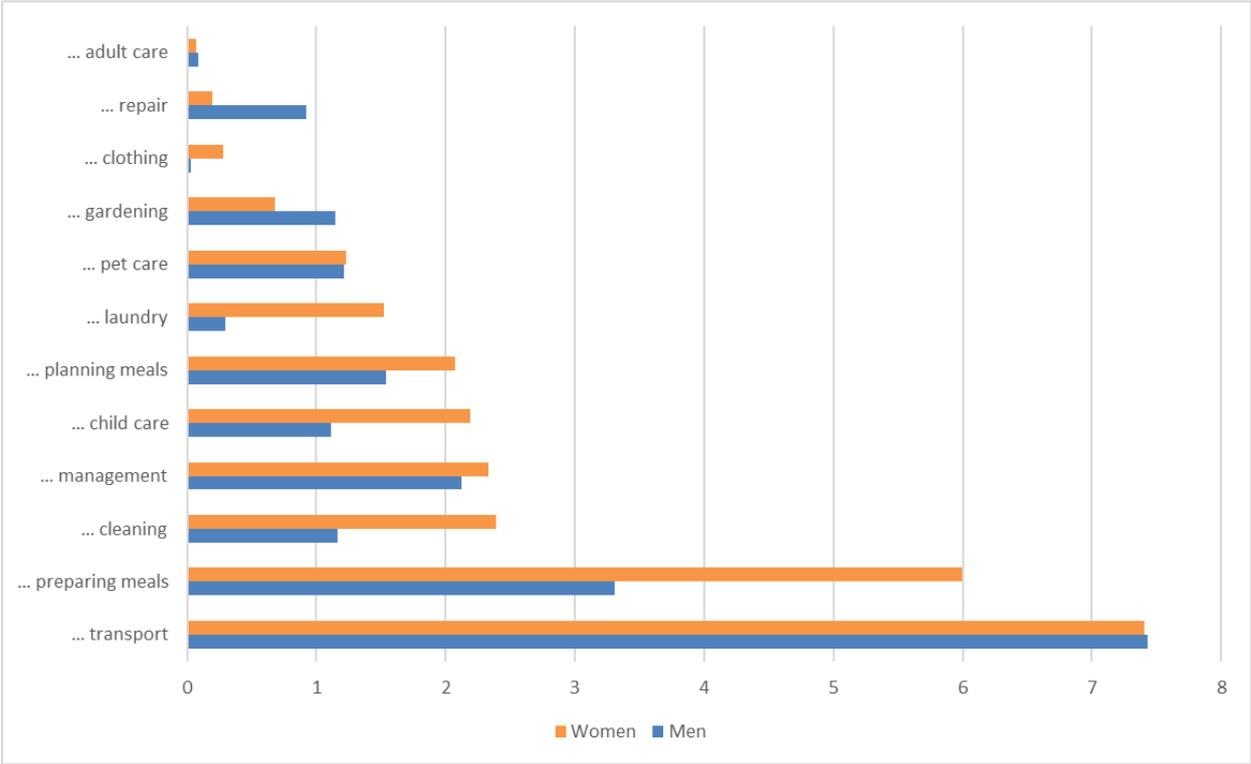
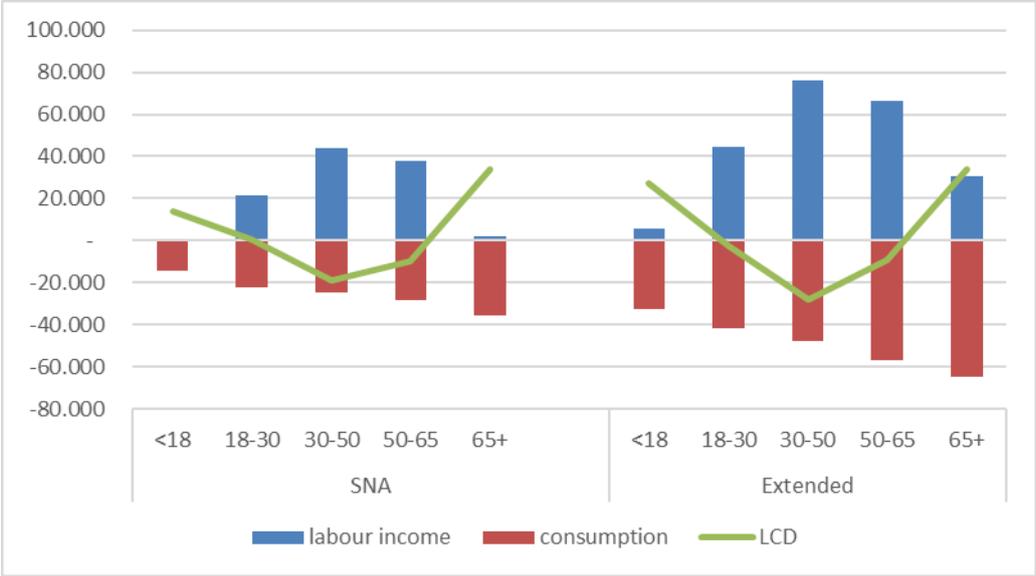


Figure 5: Weekly hours spent on unpaid household activities



Lifecycle deficit

Figure 6: Labour income, consumption and life-cycle deficit to age class, specialist wage approach



Extending the production boundary to include non-SNA household production of services also affects the generational breakdown. **Figure 6** shows that both labour income and consumption increase for all age groups. Labour income increases relatively the most for the youngest and oldest age groups: although they have only limited SNA-labour income, they do contribute to household non-market production of services. The relative increase in consumption is highest for the lowest age group. Regarding the life cycle deficit – expressed as the gap between consumption and labour income – we

only see a substantial increase for the lowest age group. They benefit more from the unpaid household services than they contribute themselves. For the age groups 18-30 and 30-50 we see a decrease in the life cycle deficit, meaning that the surplus of income over consumption becomes higher when including household non-market production. For the two oldest age groups, the life cycle deficit remains about equal. They contribute about the same as their additional consumption.

Summary and conclusions

In this paper we enrich the Statistics Netherlands household sector with estimates for unpaid household activities. In our methodology we follow the recommendations of the UNECE Guide on Valuing Unpaid Household Service Work (2017). From the Time Use Survey of 2016 we add hours worked in productive activities to our dataset that covers all individuals and households in the Netherlands.

We find that output under the extended production boundary concept is almost 4 times as high as the standard SNA-figure, and gross disposable income of households more than doubles. Income inequality is much lower if unpaid household production is included in the income concept. The choice for the specialist or generalist wage does not influence the distributions much, and the effect on inequality is similar for both choices. The number of hours worked are a major factor in this calculation. Our results are an upper bound estimate, because we use gross wages. On the other hand, we do not include secondary activities that add to production as well. Including the secondary activity as well would probably create a larger difference between the generalist wage and specialist wage. For the former only the hours spent are necessary, for the latter the diversification in activity is needed.

Moreover this paper presents a consistent overview of the effects on inequality on the individual level; between gender, and between age groups. Including the production of non-SNA household services decreases the income gap between men and women. Disposable income of men under the SNA concept is on average 1.9 times as much as of women. Under the extended income concept, this difference becomes only 1.2 times. Women spent on average 26 hours a week, whereas men spent on average only 20 hours a week. Consumption of this household production is allocated somewhat more to men than women.

In the generational context we see that our estimates also affect the inactive population in the market economy where productivity drops when retirement age is reached. We see that they are still highly productive in terms of household activities. The young are (by design) not, but they do benefit from this household production. For this age group, the life cycle deficit increases most.

The recommendations of Stiglitz, Sen and Fitoussi stressed the importance of the household production, pointing out the measurement issues when services move from the market economy to the household sphere, or the other way around. The current framework should be able to capture these on the detailed levels that we published here. However, an insight in the distributions within the household sector requires the use of micro data sources. For disposable income many data sources are available, often integrally. However, the two data sources that are used to estimate the additional income are surveys. For the HBS the sample size is 15 thousand households, which is a large sample compared to previous years. The HBS focuses on the household as the unit of

observation. For our estimates of individual consumption we combine these with equivalence scales, which influences our results of consumption by gender. A better understanding of individual spending would improve these results. The time use survey is an even smaller survey consisting of 2 thousand individuals. To match this with our database, and with the detailed analysis of households and individuals in mind, we stretch the outcomes of that survey to the maximum extent. This means that the imputation in our database is often done on only a few observations.

Last but not least, we did not account for time spent on volunteer work or leisure. This would contribute to our research, but was left out of scope since data availability is even more problematic. Besides, including volunteering and leisure would require even more assumptions in the allocation of income and consumption flows to households and individuals.

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Appendix 1: Share of intermediate use, final consumption and household capital in total spending on commodities.

COICOP category	Reallocation	Income quintile of micro household disposable income				
		Q1	Q2	Q3	Q4	Q5
Food and non-alcoholic beverages	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	0,74	0,76	0,75	0,75	0,76
	Final consumption	0,26	0,24	0,25	0,25	0,24
	Household capital	-	-	-	-	-
Alcoholic beverages and tobacco	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	-	-	-	-	-
	Final consumption	1,00	1,00	1,00	1,00	1,00
	Household capital	-	-	-	-	-
Clothing and footwear	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	0,02	0,03	0,03	0,03	0,02
	Final consumption	0,98	0,97	0,97	0,97	0,98
	Household capital	-	-	-	-	-
Housing, water, and energy	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	1,00	1,00	1,00	1,00	1,00
	Final consumption	-	-	-	-	-
	Household capital	-	-	-	-	-
Furnishing and household appliances	Total	1,00	1,00	1,00	1,00	1,00

	Intermediate consumption	0,54	0,48	0,43	0,43	0,49
	Final consumption	-	-	-	-	-
	Household capital	0,46	0,52	0,57	0,57	0,51
Healthcare	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	-	-	-	-	-
	Final consumption	1,00	1,00	1,00	1,00	1,00
	Household capital	-	-	-	-	-
Transportation	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	0,49	0,54	0,54	0,55	0,51
	Final consumption	0,27	0,14	0,12	0,10	0,10
	Household capital	0,24	0,32	0,34	0,35	0,39
Communication	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	-	-	-	-	-
	Final consumption	1,00	1,00	1,00	1,00	1,00
	Household capital	-	-	-	-	-
Recreation and culture	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	0,05	0,08	0,06	0,06	0,06
	Final consumption	0,95	0,92	0,94	0,94	0,94
	Household capital	-	-	-	-	-
Education	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	-	-	-	-	-
	Final consumption	1,00	1,00	1,00	1,00	1,00
	Household capital	-	-	-	-	-
Restaurants	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	-	-	-	-	-
	Final consumption	1,00	1,00	1,00	1,00	1,00
	Household capital	-	-	-	-	-
Miscellaneous goods and services	Total	1,00	1,00	1,00	1,00	1,00
	Intermediate consumption	0,07	0,11	0,10	0,10	0,09
	Final consumption	0,93	0,89	0,90	0,90	0,91
	Household capital	-	-	-	-	-