

Cashing in on Wealth: Links between Wealth and Income Inequality from the Lens of Distributional Wealth Accounts

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Abstract

In past years, there have been several projects to include distributional aspects in the national accounts' framework. Household distributional information will also be covered in the forthcoming version of the System of National Accounts. Additionally, increasing emphasis has been put on covering all material aspects of welfare in the same framework: income, consumption, and wealth. Several recent projects have followed such an integrated approach, covering these three dimensions in both micro data sources and in their application in distributional national accounts.

Our starting point is the Distributional Wealth Accounts (DWA), an experimental quarterly dataset currently under development by the European System of Central Banks. DWA integrates the Household Finance and Consumption Survey with macroeconomic statistics on household balance sheets (from the financial and non-financial Quarterly Sector Accounts, QSA). In this article, using the same data sources – namely, retrieving distributional data from the HFCS -- we extend the DWA framework to also cover income accounts. In particular, we present estimates of the distributions of different capital income sources, such as interest, dividends and real estate rents, and analyse their development over time in the same framework as the corresponding stocks (i.e. asset holdings). In doing so, we provide implied rates of return on households' investments in financial assets and how they vary over the distribution of income and wealth.

The rich information available in the DWA, complemented with data on income, will allow us to shed new light on the links between the income and wealth dimensions of inequality: how capital income, varying with the level and portfolio composition of wealth, feeds into overall inequality.

¹ 29 July 2022: preliminary/work in progress. This study builds on previous work of the Expert Group on Distributional Financial Accounts (EG-DFA). We are thankful for useful comments by Henning Ahnert, Pau Gayà Riera and Pierre Sola. Any errors or omissions remain entirely our own. The authors carried out parts of this work during their employment at the European Central Bank (ECB). Still, any views expressed in this paper are those of the authors and are not representative of the views of the ECB or the European System of Central Banks. L. Teles Morais gratefully acknowledges the financial support of the Portuguese Science Foundation (FCT) through PhD grant no. SFRH/BD/140788/2018, during which parts of this work were carried out. This paper uses data from the Europystem Household Finance and Consumption Survey. The results published and related observations and analysis may not correspond to results or analysis of the data producers.

1. Introduction

Distributional accounts of household income and wealth have during the past ten years been a central development area in economic statistics. The G20 Data Gaps initiative covers household distributional information and sets it as a priority.² Additionally, the future updated System of National Accounts is expected to include guidance on the distribution of household income, consumption and wealth.³

In December 2015, in the context of the European System of Central Banks (ESCB), the Expert Group on Linking Micro and Macro data for Household Sector (EG LMM) was established to investigate the linkage between Household Finance and Consumption Survey (HFCS) - a household survey covering households' asset and liabilities launched in 2011- and Financial Accounts. Some papers concerning the data linking were written before establishing the EG LMM and they also provided a starting point for this work.⁴ The work of this group did not only focus on the linkage as such but also on the main differences between the two statistics and the reasons for the gap between the two. This discussion focused mainly around missing rich as due to quite unequal wealth distribution, few wealthy households might impact considerably on the distributional results.⁵ The EG LMM delivered its final report in 2019 and Expert Group on Distributional Financial Accounts (EG DFA) was established to continue this work.⁶

Development of the distributional non-financial accounts is already in progress by two separate expert groups led by Eurostat and the OECD, however they cannot be directly linked with the distributional household balance sheets from the experimental Distributional Wealth Accounts (DWA), the dataset prepared by the EG DFA.

The purpose of this paper is to create distributional income accounts consistent with the distributional wealth accounts developed by the EG DFA. We are using the HFCS as a source of distributional information on wealth and on income, as this is done in the case of DWA. The purpose is to connect these income accounts with the balance sheet developed in the context of EG DFA. This allows us (1.) to analyse the plausibility of the estimation methods and to investigate an optimal way of estimating consistent income accounts and balance sheets; and (2.) to attempt to integrate income flows from financial investments and other household assets. We then present a few initial insights on the distribution of such income flows, as well as on the joint distribution of income and wealth, that can be obtained from this exercise.

This paper is organised as follows: First, we discuss the data and methodology, i.e. we provide a short description of the non-financial accounts and HFCS and how these data are interlinked. We also discuss the linkage of the balance sheet and income items and how the distributional wealth accounts are estimated. After this discussion, we focus on how consistent income and wealth accounts are estimated and then we discuss the results of this paper. Finally, we conclude.

² Recommendation 9 covers household distributional information. See: IMF, G20 DGI Recommendations and Data.

³ See: United Nations 2021.

⁴ Kavonius and Törmälehto 2010. Honkkila and Kavonius 2013. Kavonius and Honkkila 2013.

⁵ For example, the missing rich was applied in distributional wealth context in: Chakraborty et. al. 2016 which is available updated in: Chakraborty et. al. 2019. The methodology was further developed for instance in: Chakraborty and Waltl 2018. Cantarella et. al. 2021.

⁶ The final report is available: ECB 2020.

2. Data and methodology

2.1. Data HFCS and QSA

The Household Finance and Consumption Survey (HFCS) has been set up as a decentralised ex-ante harmonised multi-national survey to collect micro data on household finances in the euro area as well as some EU countries outside the euro area. The survey focuses on household finances, including detailed information on assets and liabilities. The survey also covers income, few variables on consumption, demographics, inheritances/gifts and employment. Each euro area country (National Central Bank together with a survey agency or National Statistical Institute) is expected to conduct its own survey. The survey output is harmonised, having a common set of target variables rather than questions, with a blueprint questionnaire available. In addition, to maximise data comparability, survey methodologies across different HFCS countries have been a priori harmonised to a large degree by introducing common recommendations on issues like survey mode, sampling, weighting, imputation and variance estimation. The survey is triannual and so far there have been three survey waves on which the data have been released in April 2013, December 2016 and March 2020 respectively.

We use a combination of macroeconomic data from different sources, which together both provide accounts of the financial and non-financial assets of the household sector. This includes various aspects of households' financial balance sheets covering their evolution over time (i.e. price changes and other changes in volume), at a quarterly frequency. Finally, we also use data on income, from quarterly accounts of non-financial transactions. For the purposes of this paper (in line with ECB practice) we label this integrated accounting system and dataset Quarterly Sector Accounts (QSA). The accounts are integrated, encompassing the transaction accounts and the balance sheet including other changes. The accounts for the euro area aggregate are compiled by the ECB according to the European System of Accounts (ESA2010), which is the European application of the System of National Accounts 2008 (SNA2008). The country level non-financial data are typically compiled by the National Central Banks, in some cases statistical offices. The QSA start from Q1 1999, and while they are quarterly, consistent annual data are also available.

The national accounts system is closed and the whole system covering the income accounts and balance sheet should be consistent. This consistency appears in two ways. First, the non-financial transactions, including the income items, should be consistent with the financial transactions. However, this consistency would require financial transaction accounts, not only balance sheets, and only the latter ones are covered by the distributional balance sheets. Second, the property income flows should be consistent with the underlying assets, i.e. the income flows divided by the underlying balance sheets should correspond with the benchmark rates of returns.⁷

In the next subsection, we explain our proposed methodology to link the microeconomic information on distributions from the HFCS, with the macroeconomic aggregates obtained from the QSA. We rely heavily on work performed over the past years, while augmenting it to incorporate components of household income.

2.2. Update of the linkage

In the context of the work of the Expert Group on the Distributional Financial Accounts (EG DFA), the distributional wealth accounts are already created and also applied in this paper. The

⁷ This aspect of the income flows and balance sheets have been analysed in: Kavonius and Honkkila 2016. Honkkila et. al. 2018.

corresponding estimation method and in particular, the applied linkage is reported in ECB (2020). The EG DFA work does not cover the income linkage, however the income linkage between Household Finance and Consumption Survey (HFCS) and National Accounts, is presented in Kavonius and Törmälehto (2010) and an updated version is presented in Honkkila and Kavonius (2013), however only linkage for income instruments with a closer correspondence is available. We provide linkage also for income instruments without a direct correspondence, benefiting also from the distributional information available in the DWA.

Table 1. Ty	vpology betwee	n Household H	Finance and	Consumption	Survey (HFCS) and	l national/sector	accounts -	items with a
direct inco	me correspond	ence							

Household wealth survey	EAA/national accounts	Comment
Employee income	D11 Wages and salaries	The NA concept does not include employee stock options which are covered by the HFCS. Additionally, wages and salaries in kind are included in the NA which are not part of the HFCS.
Self-employment income, Rental income from real estate property	(B4 Entrepreneurial income) OR B3G Mixed income	Theoretically, the best correspondence is to the entrepreneurial income. This is, however, available only for few countries and thus, the most comparable item is mixed income. However, this does not include the property income items. Therefore, the most appropriate way of comparing these income types is to compare the aggregate of entrepreneurial income and property income Rental income in NA cannot be separated from the other entrepreneurial income.
Income from public pensions Income from occupational and private pensions Income from unemployment benefits Income from regular social transfers	· D62 Social benefits	Theoretically, social benefits are available in NA broken down by social security benefits in cash, private funded social benefits, unfunded employee social benefits and social assistance benefits in cash. However, this detail of data is not available in international sources.
Income from private transfers	D75 Miscellaneous current transfers	This NA item covers transfers from the other sectors. However, the transfers between different households are often consolidated.
Income from financial investments	D421 Interest, dividends and D422 Withdrawals from income of quasicorporations, D41G	It should be noted that the NA concept covers also interest and dividends received/paid by unincorporated enterprises. Additionally, in the standards national accounts the interest flows exclude FISIM. However, the interest flows are in many countries available also without FISIM correction

Table 2. Typology between Household Finance and Consumption Survey (HFCS) and national/sector accounts - items without a direct income correspondence

Household wealth	EAA/national	Comment				
Other income	No corresponding item	Holding gains, which are the major part of this item, are price changes in the NA.				
Life insurance	D441 Investment income attributable to insurance policy holders, receivable					
Voluntary pension insurance	D442 Investment income payable on pension entitlements, receivable	The HFCS questions refer to the current value (stock) of the corresponding instrument and the NA concept is income flow.				
Mutual funds	D443 Investment income attributable to collective investment, receivable					
No taxes available. The distribution of employment and property income is a proxy.	D5 Taxes on income and wealth					
Distribution of employee income as a proxy.	D61 Social security contributions	In the case of disposable income the part which is employer, the income is netted out and thus, only the payments by employee remaining.				
	D71 Net non-life insurance premiums D72 Non-life insurance claims	In net terms these are not relevant and are dropped from the analysis.				
Distribution of housing wealth (i.e. current price of household main residence) as a proxy	Imputed rent OR B2G Operating surplus, gross	As imputed rents are technically "entrepreneurial income from owner-occupied housing", it is from the analytical point of view, better to analyse imputed rents. Operational income could be used in the analysis which is also the largest component of the imputed rents. The HFCS does not include imputed rents and therefore, the stock data (price of the main residence) are used in breaking down the data.				
Distribution of outstanding amount of total liabilities as a proxy	D41G interest, paid	The HFCS does not include paid interest and therefore, outstanding amounts have to be used as a proxy.				

Table 1 and Table 2 show a typology between the HFCS and national/sector accounts. The income instruments presented in the tables cover the main components of disposable income. Table 1 is showing the linkage for instruments with direct correspondence as presented in Kavonius and Törmälehto (2010) and Honkkila and Kavonius (2013) and Table 2 shows instruments which do not have direct correspondence in two statistics. These are practically flows which appear as income flows in the national accounts but are not covered in the HFCS. Practically, to estimate distribution of these flows, either a distribution of a related flow needs to be used (e.g. in the case of taxes) or the distribution of the underlying asset of the income flow. The grey area in the table which covers

income flows related insurances and mutual funds are broken down by using the corresponding underlying assets. This is the same approach as applied in Kavonius and Törmälehto (2021).

Concerning the rest of the items, for which do not have a direct correspondence between the HFCS and EAA and therefore distributional information cannot be directly derived from the HFCS, the distributional information from the corresponding balance sheet item is used as a proxy. In case the distributional information for the corresponding balance sheet item is not available, the distributional information from a related flow is used as a second-best proxy. In particular, for the case of imputed rents, we compute a rough estimate, for each household, of the gross rental income that would be obtained from its residence if it were to be rented. This is calculated based on a dataset of rental yields at the country level from a private sector source⁸ and the value of the household main residence in the HFCS.

2.3. Vertical linkage

In practice, there are two linkages between income and wealth. These linkages are called vertical linkages. The first one is the linkage between non-financial and financial transaction. The connecting balancing item is net lending/borrowing. However, with the current data availability does not allow to estimate this for distributional accounts. There are three issues hindering this. First, there is not enough data in the HFCS to estimate the breakdown for consumption and capital account and thus, estimate the distributional net lending/borrowing. Second, the distributional balance sheets do not cover the corresponding transactions and therefore, the estimation of distributional financial accounts net lending/borrowing is not possible. Third, even at the macro level the financial and non-financial net lending/borrowing for household sector is rarely consistent.

Therefore, we focus here on a specific aspect, namely the consistency of property income and underlying assets. As in Honkkila, Kavonius and Lefebvre (2018) and Kavonius and Honkkila (2016), we focus on the consistency of interest income and underlying assets. According to ESA2010, interest (D.41) is property income receivable by the owners of a financial asset for putting it at the disposal of another institutional unit. It applies to the following financial assets: (a) deposits (AF.2); (b) debt securities (AF.3); loans (AF.4) and other accounts receivable (AF.8).⁹ For the other property income flows there is not such a direct relation between the income flow and underlying assets as in the case of interests, i.e. there is no reference rate for instance for paid dividends.

This means that paid and received gross¹⁰ interest should be consistent with these stocks, i.e. if these interest flows are divided by these stocks, the result should be either actually paid or received interest rate. It is important to notice that consistency does not mean one to one consistency with some reported market interest rate. The reason is that these "implicit paid/received interest rates" are based on interests that are paid/received on stocks which follow different interest contracts and therefore, the levels of these implicit rates cannot even correspond with the market interest rates. The correspondence and consistency should therefore appear in the development of the actual time series. The level of actual market interest rate and the implicit interest rate should even be different, but the development/trend of these series should follow each other.

Additional way of look the consistency is the rate of returns. This linkage is presented in Kavonius and Törmälehto (2021, table 2). In this particular case, the problem is that there is not clear benchmark rate to which compare with. Therefore, the plausibility is rather based on the plausibility of time series developments in the different distributional categories.

⁸ Global Property Guide.

⁹ ESA2010, 4.42.

¹⁰ i.e. without FISIM adjustment. FISIM stands for Financial Intermediation Services Indirectly Measured. It is an estimate of the value of the services provided by financial intermediaries, such as banks, for which no explicit charges are made.

2.4. Estimation of distributional wealth accounts

The Distributional Wealth Accounts (DWA) are household distributional balance sheets including financial and non-financial balance sheets developed by the EG DFA. Practically, the balance sheets are estimated by linking financial accounts and non-financial balance with the HFCS. The methodology is in a nutshell the following: First, the balance sheet items in the national accounts are linked with the HFCS. The methodological correspondence between different items is classified to be either high, medium or low. Currently, the data set covers only items with the high and medium comparability. These items cover roughly 90% of the total assets and liabilities of households. The only items which they do not include are currency, pension entitlements and other accounts payable/receivable. Moreover, social security pensions are not considered here, as they are not considered as part of household's financial wealth in the national accounts.¹¹.

After the linking the data, the key issue is that the HFCS does not provide a full coverage of the national accounts, remaining gaps depend on country and specific asset type. Therefore, the large remaining gap has to be adjusted with differences which are known between the two statistics. The steps are the following:

- The different household populations between of the HFCS is adjusted to correspond national accounts population. This decreases the difference roughly by one percentage points.
- As the HFCS output harmonised survey and the actual surveys may vary from country to country, the country specific improvements to the link are implemented. These are mainly related to housing.
- The national accounts housing data as available from the ESA 2010 Transmission Programme covers not only the land underlying dwellings, but also other land held by households. Additionally, the data are reported together with non-profit institutions serving households. The housing numbers are cleaned so that they cover only dwellings and their underlying land which are held by households.
- The missing rich households are included in the DWA sample. The HFCS cover well middleclass household but typically, it misses rich households. As wealth is typically quite unequally distributed (considerably more than income), this has considerable impact in some countries. The impact varies depending on how inequal the country is as well as what kind of oversampling strategies country has applied in order to capture this missing rich.¹²
- Finally, the households in the DWA sample gross up to the level of the national accounts for each instrument. This implies that each household receive relatively the same amount of assets at instrument level as the remaining gap between the HFCS and national accounts. It should be noted that this might change the order of the households in the sample (as the adjustments for individual instruments are different).

For this paper, and thus, for the income items the population correction, the country level concept application, missing rich household adjustment and final grossing up are relevant. However, we do not implement the missing rich corrections. This has some impact on the property income but the issue is that the wealth rich and income rich are not often the same households. The income rich have often high labour income as well as high property income and not necessarily high net wealth. Therefore, just including wealthy households with the estimated property income of wealth rich would be clearly misleading. Additionally, as the income is typically more equally distributed than wealth, the missing wealthy rich households impact less on these results. Therefore, we leave the implementation of the missing income rich households for later research.

¹¹ The detailed linkage and the principles of the methodology are presented in ECB 2020.

¹² Methodology for estimation of the the missing rich was applied in distributional wealth context in: Chakraborty et. al. 2016 which is available updated in: Chakraborty et. al. 2019. It was further developed for instance in: Chakraborty and Waltl 2018. Cantarella et. al. 2021.

3. Results and discussion

In this section, we present the results obtained from applying the described procedures to link income components in the HFCS to the quarterly sector accounts, in an analogous framework to the DWA. Throughout, we try to facilitate comparisons with the DWA time series and wealth concepts. We first provide a comparison of the aggregates obtained from the raw HFCS data with the Sector Accounts, looking at the coverage gaps – for an indication of the comparability of the two sources – and to assess the plausibility of implied average return rates. Second, we provide the main results in this paper, i.e. estimates of the distribution of different income sources linked to the financial and non-financial assets in the sector accounts and in the DWA.

In all cases, we look at results for the euro area and focus on results for 2017, matching HFCS wave 3 (the last available), with additional results for the three HFCS waves mostly shown in the Appendix.

3.1. Aggregate level comparison

Based on the linkage described in Section 2, and the data available from the HFCS on the distribution of income, we are able to directly compare the following income items:

- social benefits (comprising pensions, unemployment benefits and other regular transfers)
- labour income
- income from financial investments (including dividends and interest)
- other current transfers
- mixed income, which includes property income, from real estate or business assets.

For a first look at how comparable the HFCS and national accounts sources might be, we compute the coverage ratio for each of these items, i.e. the ratio of the estimate for the total in the HFCS and corresponding aggregates from the National Accounts. These are reported in Figure 1, for HFCS wave 3.



Figure 1 – Raw HFCS coverage ratios for income variables, wave 3, euro area

Overall, the data on wages and social transfers from the micro and macro sources are quite comparable, with high coverage ratios across all countries (usually above 80%, with very few cases of over-coverage). For the other items, the gap is much wider. In particular, wide gaps are observed in income from financial investment and mixed income (which includes property income). Typically, these income sources are expected to be more important for households with greater wealth. The coverage gap in current transfers is also very high, but this is typically a very small item compared to other income sources (in the vast majority of countries, it is below 3% of the total sum of these five items).

Looking further back, there are no major differences in the comparison for the case of past HFCS waves (1 and 2), as can be observed in Figure 11.

The "mixed income" category incorporates two important income sources, property income and dividends or other income from non-financial business investments. Currently these cannot be split in the QSA data, so matching these income components is a significant challenge. For this reason, at this stage vertical discrepancies can only be reasonably analysed with respect to financial investments. A summary of the variables used for the comparison is given in **Erro! A origem da referência não foi encontrada.** below, showing the totals for income from financial investments, and total financial assets (including deposits, listed shares, investment fund shares, bonds and unlisted equity shares) for the euro area household sector. Values reported refer to quarterly sector accounts and totals estimated from the raw HFCS sample, respectively.

T 0 0 1	F ••••		
 Income from financial	Financial	~	

Table 3. Income from financial investments and financial assets, HFCS and OSA, wave 3, euro area

Source	Income from financial investments	Financial assets	Gross rate of return		
Quarterly sector accounts	586.4	14795.1	4.0%		
Raw HFCS (DWA wealth					
concept)	134.6	6990.7	1.9%		
(Coverage ratio HFCS / QSA)	23.0%	47.3%	-		
Source: Authors calculations based on OS	A HECS and DWA data				

Source: Authors calculations based on QSA, HFCS and DWA data.

Similar to income from financial investments, the coverage of financial assets covered by the HFCS is also quite low in wave 3. However, at close to 50% it is still substantially higher than the coverage on the income side. This means the implied average gross return rate, computed simply as the ratio of total income to total financial assets, is also quite different. The FA return rate, 4%, is about double of that observed in the HFCS.

As the HFCS/QSA coverage is different between the asset stocks and the corresponding income flows, establishing the source of these differences in the implied rate of return is not straightforward. For example, the lower implied return in the HFCS could come either from higher under reporting for income than for assets or for any sampling issues that lead to excluding households with higher returns. In Figure 2 we compare the average gross returns observed also in the periods matching the previous waves of the HFCS.





We can observe that this sizeable disparity was already present in wave 2, but not in wave 1. Overall, while the return rate observed in the HFCS declines smoothly over this period, in the QSA data it jumps between 2010 and 2014 (periods matching HFCS waves 1 and 2), then dropping by 2017. As

shown in Figure 3 below, the coverage of financial investments income by the HFCS was the highest in wave 1, at 50%, then dropping to about 50% to 25% in wave 2.



Figure 3 – Coverage ratios HFCS/QSA of income from financial investments and financial assets

Source: Authors calculations based on QSA, HFCS and DWA data.

As the coverage of financial assets remained broadly at the same level, it cannot be excluded that the low return rates observed in the HFCS are, to a certain extent, a product of the undercoverage of financial income. In this sense, there is potential for a matching exercise to improve on the raw HFCS data, if it is to be used to analyse the returns to the financial wealth of households in the euro area.

3.2. First glance at the distributions of income and wealth

We begin by presenting the overall distributions of household net wealth and income in our linked dataset. Throughout the ensuing results and discussions, household total income and total net wealth refer to the following concepts:

- Total gross income refers to household income before taxes, comprising income components available in the QSA and linked to the HFCS data (including: wages, social benefits,¹³ other current transfers, income from financial investments and mutual funds, from life and non-life insurance and voluntary pensions). Additionally, also imputed rents are incorporated. As described in Section 2, only some of these items are linked directly to corresponding distributions in the HFCS.
- **Total net wealth** refers to household wealth, i.e. financial and non-financial assets, net of liabilities. Assets are composed of deposits, debt securities, listed shares, unlisted shares and other equity, investment fund shares, life insurance and voluntary pension claims, housing wealth, "non-financial business wealth" (i.e. non-financial assets used for production purposes) while liabilities are composed of mortgage and non-mortgage loans.

The results are based on an augmented version of the Distributional Wealth Accounts dataset compiled by the ECB. These data are combined with linked data on different income sources, based on the same sample taken from the HFCS, along the lines explained in Section 2. This combined dataset allows us to explore the distribution of overall household income and wealth including all of these components, as well as their distributions and the joint distribution of income and wealth, after – in both cases – making them consistent with the sector accounts totals. In most of the analyses below, we collect households into decile groups, based either on their positions in the marginal distributions of total income or based on their net wealth across the full sample (i.e. all countries) for each period/wave.

Figure 4 shows the overall picture. The green, solid lines show the distribution of net wealth, conditional on income (i.e. by total gross income decile group) in the left panel and unconditional (by

¹³ Social benefits here refer to "social benfits other than social transfers in kind" (D.62 in ESA 2010).

wealth decile group) on the right panel. Likewise, the red, dashed lines show the distribution of income, unconditional on the left panel, and conditional on wealth decile on the right panel.





Source: Authors calculations based on QSA, HFCS and DWA data.

As commonly observed, the distributions of income and wealth are both strongly unequal and rightskewed. In both cases, the top two deciles hold more than 50% of total income/wealth, although with a clear difference between the two, as wealth is visibly more unequal than income. The top 10% share of wealth is around 60%, while the top 10% share of income is only 36.7%.

A first look at the joint distributions shows already a complex pattern. Although the sharing of wealth across income deciles is already more equal than the marginal distribution of wealth, still the highest income households are far more likely to also have high wealth – the top 10% earners hold about 40% of wealth. Conversely, the wealth-richest households have a reasonably high income, but the distance to the wealth-middle class is not so large. This is consistent with a joint distribution where wealthy households do not necessarily earn large incomes at the same time.

Some further insight into the characteristics of the joint distribution of income and wealth as estimated in our data can be obtained from Table 4, which reports how the population is distributed jointly by different income and wealth decile groups. Each cell reports the share of population belonging both to the income decile in the vertical axis and the wealth decile in the horizontal axis. Note that, if all households belonged to the same decile in the marginal distributions of both income and wealth, there would be 10% of the population in each cell of the main diagonal in the matrix in Table 4, while all others would be zero.

		Net wealth decile										
		1	2	3	4	5	6	7	8	9	10	Total
Income decile	1	2.2%	1.7%	1.3%	1.4%	0.9%	0.6%	0.5%	0.5%	0.4%	0.4%	10.0%
	2	1.3%	2.1%	1.8%	1.3%	1.3%	0.9%	0.5%	0.4%	0.2%	0.3%	10.0%
	3	1.0%	2.0%	1.6%	1.0%	1.3%	1.2%	0.7%	0.4%	0.3%	0.3%	10.0%
	4	1.2%	1.4%	1.4%	1.2%	1.1%	1.2%	1.0%	0.8%	0.5%	0.3%	10.0%
	5	1.0%	1.0%	1.1%	1.1%	1.0%	1.2%	1.3%	1.1%	0.7%	0.4%	10.0%
	6	1.1%	0.8%	1.0%	1.1%	1.1%	1.1%	1.2%	1.2%	0.9%	0.5%	10.0%
	7	0.9%	0.5%	0.7%	1.0%	1.1%	1.2%	1.4%	1.4%	1.2%	0.8%	10.0%
	8	0.8%	0.3%	0.6%	1.0%	1.0%	1.2%	1.2%	1.4%	1.5%	1.0%	10.0%
	9	0.4%	0.2%	0.4%	0.6%	0.9%	0.9%	1.3%	1.7%	2.1%	1.7%	10.0%
	10	0.2%	0.1%	0.1%	0.3%	0.3%	0.5%	0.8%	1.3%	2.2%	4.3%	10.0%
	Total	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	100.0%

Table 4. Cross-tabulation of the joint distribution of population by income and wealth deciles, wave 3, euro area

Source: Authors calculations based on QSA, HFCS and DWA data.

Conversely, we observe that only 18.6% -- the sum of the main diagonal elements -- of households belong to the same decile in both distributions. (Notice that, even if the matrix were to be constructed with quintiles, still only 32.7% of households would lie on the main diagonal.) While there is some correspondence, it is not substantial, particularly when we look at the middle classes by income, which appear to be quite spread across the wealth distribution.

Extreme differences are relatively rare, but still, we see clearly that a substantial part of relatively income-rich households is at the bottom of the wealth distribution, as suggested by the distributions above. Note that households from the middle quintile (sum of deciles 5 and 6) by income are well represented in the bottom 10% of net wealth ($\sim 2.1\%$), while the inverse occurs much less ($\sim 1.5\%$). Such a pattern would be consistent with the existence of a group of relatively young households with high income, who at an early stage of the life cycle have not yet accumulated substantial wealth.¹⁴

Distributions of different income components and other 3.3. heterogeneities

Distributions of income components

In Figure 5 below, we show the distributions by net wealth decile group of the 5 matched income categories listed earlier and for imputed rents, for the period matching HFCS wave 3. This gives a first picture of the joint distribution of income and wealth in our data.



Figure 5 – Distributions of income variables conditional on net wealth decile, wave 3, euro area

Source: Authors calculations based on QSA, HFCS and DWA data.

The distribution of financial investments and mixed income is clearly more unequal compared to the other categories, with substantially higher share of income received by the top 10% households, and

¹⁴ We aim to complement the current analysis with a life cycle component, taking advantage of the data available in the HFCS on household characteristics including age.

also by the next 10% (decile 9). Financial investments income appears to be more unequal than mixed income. The observed patterns do not seem to change over time, as the full picture across HFCS waves shows (Figure 12 in Appendix).

The distributions reported in Figure 5 can be compared with the distribution of net wealth reported in the previous subsection (Figure 4, right panel), in both cases by net wealth decile groups. Note that the income from financial investments and mixed income, which is generated from the wealth invested in financial and non-financial assets, is less unequally distributed than this underlying wealth. This is corroborated by the analysis of implicit return rates on financial investments performed in the next subsection.

Figure 6 shows the distributions of the same items, but now ordering households by total gross income decile. The patterns look similar, with the difference that now the typically reported pattern of high inequality in labour income can be seen more distinctly.



Figure 6 – Distributions of income variables conditional on total gross income decile, wave 3, euro area

Source: Authors calculations based on QSA, HFCS and DWA data.

Unlike for the distributions conditional on wealth, here some relevant changes over time can be observed (please refer to Figure 13 in Appendix). Notably, the concentration offinancial investments income, after a dip in wave 2 (corresponding to 2014), seems to clearly increase in wave 3. Conversely, it appears that mixed income is becoming more equally distributed over time.

The above patterns show how the income from financial investments and mixed income (investments in non-financial assets) is much more unequal compared to the income sources related to labour earnings (wages and social benefits). Top shares are more than twice as high in the capital income sources (71 and 75.7%, respectively) than in wages (28.7%). This goes in line with the expected

pattern: capital income, originating in financial and non-financial wealth which is highly concentrated at the top, appears to make an important contribution to overall income inequality.¹⁵ It should be noted that, as the coverage gaps observed in some of the above income components are relatively high, these results must be taken with some degree of caution. An important assumption in the linking procedure is that the distribution of the "gap" (i.e. the income amounts added to the micro dataset in order to match the QSA aggregates) is broadly similar to the pre-existing distribution in each instrument. Insofar as this assumption might miss the mark, there would be some degree of error in the presented distributions.

Debt-to-income ratios

Figure 14 and Figure 15 show the development of the debt-to-income ratio across, respectively, total income and net wealth deciles, for wave 3. This ratio presents a crude measure of debt service burden and is commonly used for analyses regarding financial stability.

Figure 7 – Debt-to-income ratios by net wealth decile, wave 3, euro area



Source: Authors calculations based on QSA, HFCS and DWA data.

Figure 8 – Debt-to-income ratios by total gross income decile, wave 3, euro area



Source: Authors calculations based on QSA, HFCS and DWA data.

The ratio is decomposed in mortgage debt and other debts, shown by the red and blue curves respectively, adding up to the total debt-to-income ratio, plotted in green. A mass of very highly indebted households is located at the bottom deciles both by income and wealth. However, there is a clear difference between the income distribution and wealth distribution in this sense. Along the

¹⁵ In follow-up for the final version of this paper we expect to present a more precise decomposition of the contribution of these different income sources to overall inequality.

income distribution this ratio is rather flat for higher deciles, or even moderately increasing except at the very top. High income earners are slightly less indebted, but the difference is not large. Conversely, when looking at this ratio along the wealth distribution, the patterns are more complex. There is a trough in the 2nd decile, with the ratio then increasing over the first few bottom deciles (except the 1st), peaking at decile 5, and then stabilizing or declining slowly, with a second peak at the top. The plots also show that most of this pattern is driven by mortgage debt, except for the peak at the top decile where other debt seems to play a role.

The charts in Appendix show how these figures evolve over the three waves of the HFCS. In both income and wealth distributions, a clear deleveraging pattern can be seen over time, and the mass of highly indebted households at the bottom displays less extreme indebtedness values.

Gross rates of return

In Figure 9 and Figure 10 we observe gross return rates on financial investments, computed as in Section 3.1, across, respectively, total income and net wealth deciles; each with three panels, one for each HFCS wave period.



Figure 9 - Gross rates of return on financial investments by net wealth decile, HFCS waves 1 to 3, euro area

Source: Authors calculations based on QSA, HFCS and DWA data.

There does not seem to be a clear relationship between the rate of return on financial investments and households' position in the wealth distribution. Some vague patterns can be identified: the bottom two deciles (often more asset-rich than other households in the bottom 50% by net wealth) have higher returns than deciles 3 and 4. Then, a slowly increasing pattern can be observed, with a new dip at the top 10%. These patterns can be seen across all HFCS waves, although in the first wave they are much more subdued (as is the overall level of returns). All in all, though, the relationship is ambiguous.

Although these broad patterns can also be observed in the raw HFCS data on income (unreported here), i.e. before any linking step, the differences across deciles are much more pronounced in our linked data .

This part of the results should be taken with particular caution.¹⁶ First, we know there is a substantial number of households at the bottom with large asset holdings, but high indebtedness, present at the bottom of the wealth distribution, and this could explain to some extent why deciles 1 and 2 show higher returns than 3 and 4, for example. Second, in this linked dataset, we perform an adjustment for missing rich households on the asset side but not on the income side. The large drop from decile 9 to

¹⁶ We are looking into this aspect of the data in more detail and hope to provide a more clear picture in a forthcoming version of this working paper.

10 is in part related to this. Finally as participation in the more sophisticated financial assets is generally low, the estimates for the returns in the middle classes are quite noisy. This gives rise to some patterns which the final rescaling to match the QSA aggregates may exacerbate.



Figure 10 - Gross rates of return on financial investments by income decile, wave 3, euro area

Conversely, the relationship with the income level is starkly increasing. As households' income level increases, the returns on financial wealth increase strongly, from close to zero at the bottom to levels clearly above average at the top. No clear differences emerge across waves, regarding the inequality of these returns.

Source: Authors calculations based on QSA, HFCS and DWA data.

4. Conclusions

This paper extends the framework of the Distributional Wealth Accounts to also cover household income, while ensuring consistency of wealth and income distributional accounts. The first part of the paper presents the data and methodology, where the linkage between HFCS and the quarterly sector accounts income items is presented. As in DWA, the distributional information on income is obtained from the HFCS, adjusted for population differences, and grossed up to match the Quarterly Sector Accounts (QSA) aggregates. In the second part of the paper, preliminary results of these distributional income accounts are presented and discussed, focusing on both net wealth deciles as well as gross income deciles. All the data presented are for the euro area and for the years corresponding to the currently available HFCS waves.

With consistent wealth and income distributional accounts, we shed new light on economic inequalities in the euro area, by looking at joint distributions eof income and wealth. Already when looking at the joint distributions of total wealth and income a rather complex pattern is observed. Net wealth is more equally distributed when looking at the distribution per income deciles compared to the distribution per wealth deciles, however the highest income households are still more likely to also have high wealth. We also observe that less than a quarter of households belong to the same decile in both distributions.

With this novel linked dataset, additional relevant indicators may also be observed. In this paper we focus on debt-to-income ratios and on gross rates of return, both analysed in respect to income and wealth deciles. Debt-to-income ratios are rather flat across all income deciles (with the exception of the first income decile), however there are more complex patterns when looking at the wealth deciles, showing higher indebtedness of the middle- and top-income decile. In the case of gross rates of return, a strong increasing pattern may be observed in the distribution per income deciles, whereas only some vague patterns can be identified when looking at the distribution of returns per net wealth deciles.

Overall, the distributional income accounts presented in this paper show promising results, especially for the more equally distributed income components which also tend to have a higher coverage. For the less equally distributed income components the estimation method can still be improved, namely by extending the adjustments, made in the base DWA, for missing wealthy households in the HFCS samples. This project is still a work in progress, and we aim to tackle these points, along with further investigation of the reasons for very low coverage in some income components, for a future version of this working paper.

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Appendix – tables and figures



Figure 11 – Raw HFCS coverage ratios for income variables, all waves

Source: Authors calculations based on QSA, HFCS and DWA data.



Figure 12 – Distributions of income variables conditional on net wealth decile

Source: Authors calculations based on QSA, HFCS and DWA data.



Figure 13 – Distributions of income variables conditional on total gross income decile

Source: Authors calculations based on QSA, HFCS and DWA data.

Figure 14 – Debt-to-income ratios by net wealth decile



Source: Authors calculations based on QSA, HFCS and DWA data.





Source: Authors calculations based on QSA, HFCS and DWA data. Note: log scale in y-axis