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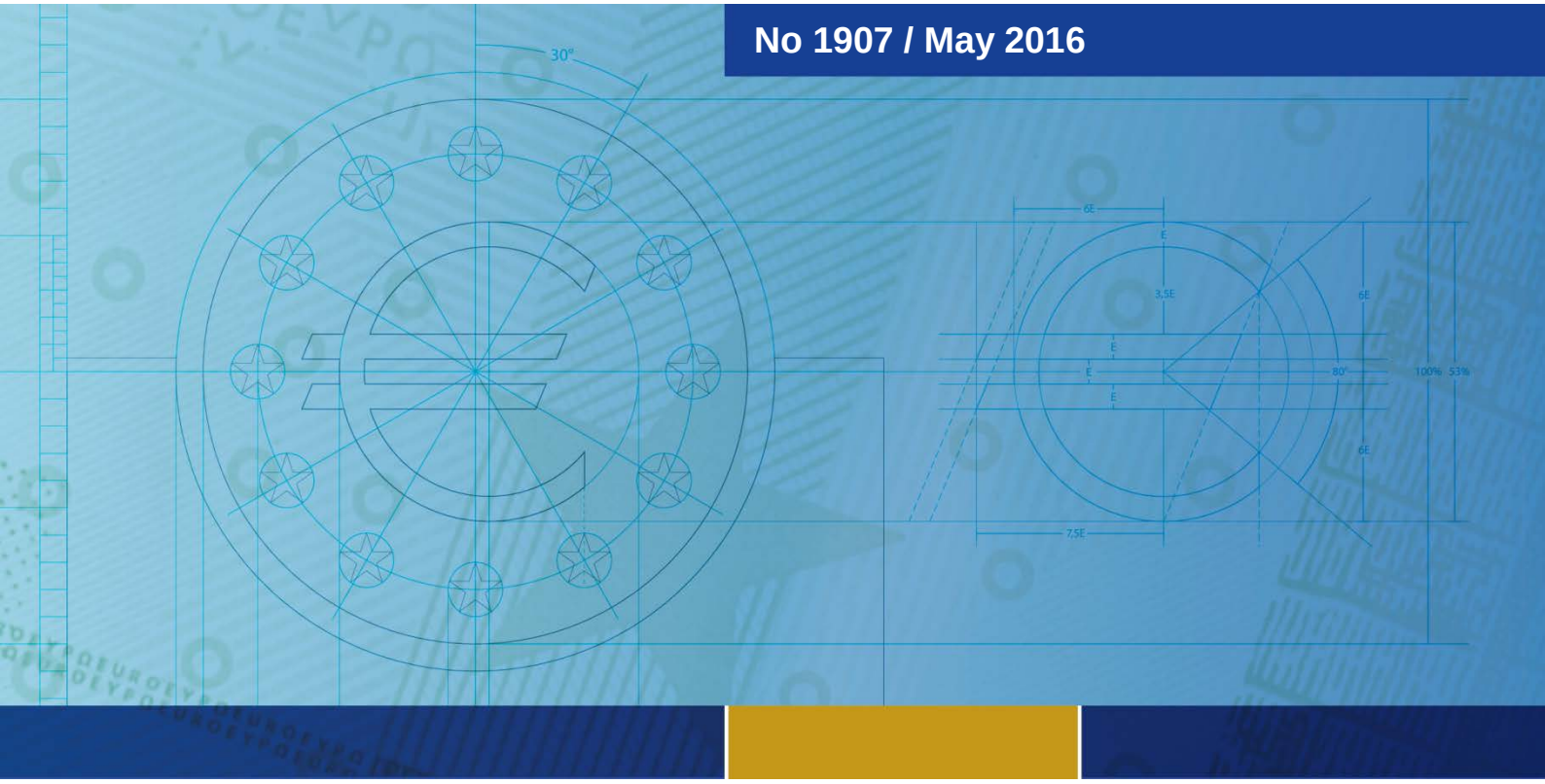
Estimating the top tail of the wealth distribution



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Abstract

Wealth survey data suffers simultaneously from under-representation at the top and underreporting of assets. Addressing both problems, I use the Household Finance and Consumption Survey to provide new estimates of the holdings of real assets, financial assets and liabilities and net wealth of the top one percent in Austria, Belgium, Finland, France, Germany, Italy, Spain and The Netherlands. Especially for countries doing little or no oversampling of the rich, financial asset and real asset shares held by the top 1 percent are substantially higher then survey data suggests.

Key words: HFCN, wealth

JEL:E22, E44, G01

Non technical summary

Measuring how wealth is distributed in the population is of considerable importance for both policy-makers and economic research. The distributional consequences of tax and other measures are often an important element in the design of government policies. Wealth is relatively skewly distributed and a large literature tries to measure the concentration of wealth. The wealth holdings of the top one percent is one such measure (among a variety of measures).

The birth of the Eurosystem Household Finance and Consumption survey has added a substantive new source of household wealth information for euro area countries. When attempting to measure concentration of wealth, wealth surveys have the advantage that they are designed to be representative of the population. However, despite this intention, household surveys often suffer from non-response or selective under-reporting. Wealth surveys are no exception to this.

The problems with household wealth surveys become clearer when the data are compared with the balance sheet of households in national accounts. Although there are conceptual differences, a significant part of the difference seems to stem from under-reporting of assets by households participating in the surveys and the under-representation of rich households in such surveys. This paper addresses these concerns and adjusts the surveys for under-reporting and under-representation before constructing new measures of the wealth shares of the top one percent richest households.

The paper provides new estimates of the top one percent shares of real assets, financial assets, liabilities and net wealth for Austria, Belgium, Finland, France, Germany, Italy, Spain and The Netherlands. The shares of financial assets and real assets held by the top one percent calculated from the adjusted surveys are much higher than unadjusted direct survey estimates. In particular this is the case for surveys where there is little over-sampling of the wealthy. These results provide the lesson that any cross-country comparison of wealth concentration is a perilous exercise as the quality of the data sub-

stantially influences the estimates of wealth concentration. The adjustments to the data proposed here improve the concentration estimates, however better data collection and further research on the exact nature of under-reporting should make estimates more robust in the future.

1 Introduction

Wealth is heavily concentrated at the top of the distribution. However, exact measurement of wealth at the top has remained elusive. Comparison across countries is treacherous by the considerable variation of methods and data used for measurement. This is all the more an unsatisfactory situation as wealth concentration has important implications for tax and other government policies.

The wealth measurement literature has used various methods to construct top wealth shares. For countries where there is a wealth tax, measurement is relatively straightforward. Wealth tax records however are available for very few countries around the globe. A second source of information are inheritance tax records. Wealth among the living might however be different than wealth at death. Third, income tax records have been used to infer wealth from reported capital income. Here, researchers face the difficulty of having to assume certain rates of return to infer the value of the capital earning the income. Rates of return can differ across households. More recently, the literature has turned to wealth surveys of households to infer the wealth distribution. A better understanding of the benefits and pitfalls of using such data for wealth measurement is urgently needed, as it is often the only data at hand.

Wealth surveys have two advantages. First, they are commonly designed to capture all components of wealth. Wealth tax records, inheritance or income tax records might be less informative if large tax exemptions exist. Second, surveys are designed to be representative of the household population. So, in principle, they are informative of the entire wealth distribution. However, they also have two serious drawbacks. First, non-response that is unequal across the distribution can lead to biased samples. Second, biases can occur due to underreporting. These problems have to be addressed when using these surveys to estimate top wealth shares.

Vermeulen (2014) uses the US Survey of Consumer Finances (SCF), the UK Wealth

and assets survey and the newly released *Household Finance and Consumpton Survey* (HFCS) to construct new measures of the top tail of the wealth distribution. He first establishes that the non-response at the top is considerable but than shows that it can be remedied by replacing the top survey observations with an estimated Pareto distribution. This is done by pooling of top wealth holders of the survey, with billionaires from the Forbes World's billionaires list. The top wealth shares estimated this way increase relative to the direct survey estimates, often by multiple percentage points.

This paper builds on Vermeulen (2014) and extents it to address besides the non-reporting at the top, also the problem of underreporting. It proposes a method that deals simultaneously with non-reporting at the top and underreporting problems when estimating top wealth shares. It then uses the HFCS to construct new measures of the top tail of the wealth distribution for Germany, France, Spain, Italy, Belgium, Austria, Finland and The Netherlands. The paper also provides new estimates of the shares of real assets, financial assets and liabilities held by the top 1 percent wealth holders.

2 The problem of non-response and underreporting

Non-response is a serious problem in household wealth surveys. For instance, for the HFCS the response rate for the countries considered here is between 18.7 percent and 82.2 percent. When non-response is purely random, this poses no problem. A simple non-response adjustment of the survey weights of the respondent households would suffice. However, there is substantial evidence that richer households have higher non-response rates (Kennickell & Woodburn 1997). In Vermeulen (2014) this is referred to as the *differential non-response problem*. This problem causes biased survey weights and truncation at the top. For instance, according to the HFCS survey, the richest German household has a wealth of only 76 million euro, the richest Italian household has wealth of only 26 million euro. Other countries show similar low numbers for the richest household

in the survey. Those countries however have a considerable number of billionaires. Effectively, the highest wealth echelons are missing from household surveys. Only in the case of oversampling of the wealthy, where the rich non-respondents are known to be sampled from a special frame, selectively adjusting the survey weights can be done (as is done in the US SCF e.g.). However, even selective non-response adjustment is no remedy for truncation at the top.

A second problem is underreporting. Underreporting leads to biases if it differs across the distribution. For instance, financial assets tend to be more underreported, whereas rich households tend to have larger portfolio shares of these assets. This leads to a *differential underreporting problem.*

At the individual household level, the survey data itself does not provide evidence of underreporting. It is only in rare instances that survey data can be matched with administrative records where proof of misreporting can be established. Neri and Ranalli (2012) provide such evidence using the Italian survey on household income and wealth.

The evidence of underreporting is indirect. Aggregate wealth totals constructed using wealth surveys are often substantially below aggregate totals to be found in national accounting data. In the system of national accounts, the balance sheet of the household sector provides the aggregate value, at a particular point in time, of all assets and liabilities that are held by households. Total net wealth of the household sector can be obtained as the sum of all financial assets and real assets from which then liabilities are subtracted. In principle, the value of the aggregate net wealth constructed using a representative survey and the balance sheet from the national account should match, not perfectly, but at least reasonably well. In practice, they often don't.

There are a number of reasons besides underreporting and the missing tail in surveys which can lead to discrepancies. First, the values reported in the survey might not refer to the same date as the national accounts. Especially with rapidly changing asset prices such as quoted shares this might be problematic. Second, the value of houses are

Table 1: Missing wealth in surveys

	Real assets	Financial assets	Liabilities	Net Wealth
Germany	15	58	29	30
Austria	-8	62	59	12
France	17	61	33	32
Spain	16	63	39	24
Italy	-5	80	60	23
Belgium	-21	42	24	6
Finland	-1	63	12	22
Netherlands	13	68	16	47

Notes: Survey aggregate underestimation as percentage of national accounts. Author's calculations from Eurosystem Household Finance and Consumption Network (2013a)

generally self-reported in surveys. Third, the concepts asked for in surveys might not directly correspond to the concepts measured in the national accounts. Fourth, national accounting data are not without their own flaws and have estimation error.

3 Missing wealth

The combination of non-response and underreporting leads to a general missing wealth problem in surveys. Table 1 shows the fraction of missing real assets, financial assets and liabilities that are missing (as a percentage of the national accounts).[1] There is considerable discrepancy between the measures of financial assets, real assets and liabilities measured by the survey versus the balance sheet of the household sector in the national accounts.

Especially a substantial fraction of financial assets seem to be missing from the surveys, to a lesser extent this is also true for liabilities. As richer households tend to have

[1]The HFCS definition of real assets consists of the sum of the household main residence (when owned), other real estate property, vehicles, valuables (art or jewellery e.g.), the value of self-employed businesses of household members. The definition of financial assets consists of deposits, mutual funds, bonds, investments in non-self employed private businesses, publicly traded shares, managed investment accounts, money owed to the household, other financial assets, private pension plans and whole life insurance. The definition of liabilities consists of the outstanding amount of mortgages, debt on credit cards and overdrafts, and any other non-collateralized loans (Eurosystem Household Finance and Consumption Network, 2013b).

higher shares of financial assets (and lower shares of liabilities) this skews top wealth shares downward. It seems unlikely that such large differences can be explained by simple valuation differences with the national accounts. Underreporting and the missing tail seem more likely causes. Note that in a few cases, for real assets, there is an overestimation of aggregates by the surveys. This is potentially due to an overestimation of housing wealth by households.

4 Estimating top wealth shares

Estimating top wealth shares using survey data has to deal with the twin problem of differential non-response and underreporting. Vermeulen (2014) shows how to deal with the differential non-response problem. A Pareto tail is estimated to approximate the tail of the wealth distribution. To obtain an estimate of the tail, extreme wealth observations from an external source (Forbes World's billionaires) are pooled with the survey data.

Although a Pareto tail adds wealth to the survey, it abstracts from the underreporting problem. Adding a tail to survey data is not necessarily sufficient to achieve aggregate wealth figures close to the national accounts.

Considering the underreporting problem, it is clear what one ideally would like to achieve. Values in the survey should be adjusted for underreporting so that when constructing aggregate numbers from the adjusted survey (in combination with the addition of a tail) one obtains total estimates of net wealth, real assets, financial assets and liabilities that each match the aggregate numbers of the national accounts balance sheet.[2]. Ideally, value adjustment is household and item specific. Households that underreport more should have larger adjustments. Similarly for different items. However, in practice, a household and item specific correction of underreporting is not really feasible, as there is no extraneous information available to construct such adjustment

[2]To the extent that concepts of wealth differ between survey and national accounts, the starting point uses adjusted national accounting data to align concepts.

A feasible alternative is to multiply the real assets, financial assets and liabilities of households by a distinct adjustment factor, which is however identical across households. Although such adjustment factor is identical across households, the different portfolio composition of households implies that net wealth of each household is affected differently. For instance, as financial assets are underreported more strongly, the adjustment has to be bigger. As richer households hold more financial assets, the adjustment for them is larger.

Combining the Pareto tail estimation with the underreporting adjustment leads to the following procedure. First, construct preliminary adjustment factors for real assets, financial assets and liabilities as the ratio of their aggregate value in the national accounts with their aggregate value in the survey. Second, multiply each households' real assets, financial assets and liabilities by the respective factors constructed in step one. This leads to a 'underreporting adjusted survey'. Note that this adjustment doesn't take care of the missing tail. Aggregate survey values are below the national accounts not only because of underreporting, but also because of the missing tail. Therefore such a simple multiply by a factor method initially corrects 'too much'. Third, estimate the Pareto tail on this 'underreporting adjusted survey', using the regression method as in Vermeulen (2014). A net wealth level has to be fixed where the tail starts. Fourth, calculate using the 'underreporting adjusted survey' the ratio of real asset to net wealth, the ratio of financial asset to net wealth and the ratio of liabilities to net wealth for households that have net wealth in the Pareto tail. This is done to split the value of wealth estimated in the tail, into its three components. Fifth, calculate the total real wealth estimated as the sum of the non-pareto tail part of the 'underreporting adjusted survey' plus the real wealth in Pareto tail. For the real wealth in the Pareto tail, take a fraction of the net wealth which you take to be equal to the ratio just calculated in step four. Do so similarly for financial assets and liabilities. Sixth, compare the aggregate value obtained for real assets, financial assets and liabilities with the national accounts. If they are (smaller)

larger then the national accounts, adjust the preliminary adjustment factors (upward) downward and go back to the second step in the procedure. Continue, until aggregate values of real assets, financial assets and liabilities (and therefore also net wealth) match the national accounts.

Such a procedure leads to the construction of an 'underreporting-adjusted survey' together with a Pareto tail from which the top shares can be constructed. The aggregate wealth numbers are consistent with the national accounts, not only along the dimension of net wealth, but also along the dimension of real assets, financial assets and liabilities. Note that this procedure can be easily adapted to have a more granular underreporting adjustment when information is available that identifies certain households to be more prone to underreporting.

5 Estimates of top tail wealth

This section presents new estimates of top tail wealth using the procedure discussed above on HFCS data for the first wave (See Vermeulen (2014) for a discussion of the dataset). First a Pareto tail is estimated for three different thresholds, 500,000 euro, 1 million euro and 2 million euro, combining the 'underreporting-adjusted survey' with Forbes billionaires. This tail is then added to the 'underreporting-adjusted survey' from which the new top tail estimates can be calculated.

Table 2 shows wealth shares of the top one percent. The first column contains the estimates that can be calculated straight from the unadjusted surveys. These are compared with the new estimates which are presented in the second column (The minimum and the maximum of the three mean estimates at the three thresholds is presented. Mean estimates and standard errors for each threshold are given in the Appendix.). Wealth shares of unadjusted surveys are severely biased downward by multiple percentage points. Note that these would affect cross-country comparisons. For instance, whereas the unad-

Table 2: Wealth share of top 1 percent

	survey	estimate	difference
Germany	24	30-31	+6 to +7
Austria	23	31-34	+8 to +11
France	18	20-22	+2 to +4
Spain	15	16-18	+1 to +3
Italy	14	21-21	+7 to +7
Belgium	12	18-20	+6 to +8
Finland	12	15-16	+3 to +4
Netherlands	9	14-17	+5 to +8

Notes: Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires.

Table 3: Financial assets share of top 1 percent

	survey	estimate	difference
Germany	12	18-25	+6 to +12
Austria	6	23-26	+17 to +20
France	24	21-29	-3 to +5
Spain	21	19-24	-2 to +3
Italy	16	22-27	+6 to +11
Belgium	21	22-25	+1 to +4
Finland	19	17-25	-2 to +6
Netherlands	9	14-17	+5 to +8

Notes: Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires.

justed surveys of France and Italy would suggest a higher wealth concentration in France, the estimates suggest no difference between those countries. The estimates are the least different from the unadjusted survey estimates in the case of France, Spain and Finland, the three countries which use individual household information to oversample the wealthy.

Table 3 shows financial wealth shares of the top one percent, whereas Table 4 shows real wealth shares. The share of financial assets for the top 1 percent is estimated to be larger then those obtained from the unadjusted surveys (again with the exception of France, Spain and Finland, likely due to the oversampling of the rich). The difference can be quite large. In Austria, the estimated financial asset holdings of the top percent

Table 4: Real assets share of top 1 percent

	survey	estimate	difference
Germany	25	28-31	+3 to +6
Austria	25	28-31	+3 to +6
France	15	16-17	+1 to +2
Spain	13	13-14	+0 to +1
Italy	14	16-18	+2 to +4
Belgium	7	8-14	+2 to +7
Finland	9	9-11	+3 to +4
Netherlands	5	6-11	+1 to +6

Notes: Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires.

increase from 6 percent to between 23 and 26 percent. The share of real assets for the top 1 percent are also estimated to be larger than the surveys would suggest, although the difference is less strong as is the case for financial assets.

The results illustrate the dangers of making cross-country comparisons on unadjusted survey data. For instance, according to the new estimates, all large countries in the euro area, have very similar financial asset holding for the top 1 percent, around 22 to 25 percent. The unadjusted data would have suggested otherwise, where the German top 1 percent would only have had 12 percent of financial assets. In contrast to the financial assets, the real asset holding shares remain quite different across countries.

6 Conclusion

Wealth surveys are becoming more widely used for wealth distribution measurement. In this context, cross-country comparisons get a lot of attention. Estimates of wealth shares, however, are quite sensitive to non-response and underreporting. This implies that, measures such as the wealth share of the top 1 percent, can differ substantially because of data quality. Adjusting data for underreporting using comparisons with national accounts and adding Pareto tails to wealth considerably improves wealth share estimates. Certainly,

adjustments to the data should be further refined. However extraneous information is needed to do so. Further research and better data in the future should make our estimates of the top of the wealth distribution more robust.

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APPENDIX

TABLE A.1

Percentage ownership share of top 1 percent of households

tail starts at 500.000 euro

	Real assets		Fin. assets		Liabilities		Net wealth	
	data	est	data	est	data	est	data	est
France	15	17	24	21	5	8	18	20
	2	1	1	1	1	1	2	1
Spain	13	14	21	19	3	6	15	16
	1	0	3	1	1	0	1	0
Finland	9	11	19	17	3	4	12	15
	1	0	3	0	0	0	1	0
Germany	25	28	12	25	6	12	24	31
	0	0	1	0	1	0	3	0
Belgium	7	14	21	22	1	5	12	20
	1	1	3	2	1	0	1	1
Austria	25	28	6	26	2	7	23	32
	7	4	3	2	2	1	7	4
Italy	14	18	16	22	6	8	14	21
	1	0	2	0	2	1	1	0
Netherlands	5	11	9	14	2	5	9	15
	1	0	1	1	1	0	1	0

Notes:
Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires. Mean estimate using all five implicates. Standard errors below mean estimate.'data' column shows results of unadjusted survey data. 'est' column shows estimates on underreporting and tail adjusted data.

TABLE A.2.

Percentage ownership share of top 1 percent of households

tail starts at 1.000.000 euro

	Real assets		Fin. assets		Liabilities		Net wealth	
	data	est	data	est	data	est	data	est
France	15	16	24	25	5	7	18	21
	2	1	1	1	1	1	2	1
Spain	13	14	21	23	3	5	15	18
	1	0	3	1	1	0	1	0
Finland	9	10	19	22	3	3	12	16
	1	0	3	1	0	0	1	0
Germany	25	30	12	22	6	10	24	30
	0	1	1	1	1	0	3	0
Belgium	7	11	21	23	1	3	12	19
	1	1	3	2	1	0	1	1
Austria	25	28	6	23	2	6	23	31
	7	3	3	5	2	1	7	1
Italy	14	16	16	24	6	6	14	21
	1	0	2	0	2	0	1	0
Netherlands	5	10	9	17	2	4	9	17
	1	1	1	1	1	1	1	1

Notes:
Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires. Mean estimate using all five implicates. Standard errors below mean estimate.'data' column shows results of unadjusted survey data. 'est' column shows estimates on underreporting and tail adjusted data.

TABLE A.3.

Percentage ownership share of top 1 percent of households

tail starts at 2.000.000 euro

	Real assets		Fin. assets		Liabilities		Net wealth	
	data	est	data	est	data	est	data	est
France	15	16	24	29	5	5	18	22
	2	0	1	1	1	0	2	0
Spain	13	13	21	24	3	4	15	17
	1	0	3	2	1	0	1	1
Finland	9	9	19	25	3	3	12	16
	1	1	3	2	0	0	1	1
Germany	25	31	12	18	6	8	24	30
	0	1	1	1	1	1	3	1
Belgium	7	8	21	25	1	1	12	18
	1	1	3	1	1	0	1	1
Austria	25	31	6	25	2	3	23	34
	7	4	3	10	2	1	7	2
Italy	14	16	16	27	6	6	14	21
	1	0	2	0	2	0	1	0
Netherlands	5	6	9	17	2	1	9	14
	1	1	1	1	1	0	1	1

Notes:
Author's calculations based on HFCS, Eurosystem Household Finance and Consumption Network (2013a) and Forbes World's Billionaires. Mean estimate using all five implicates. Standard errors below mean estimate.'data' column shows results of unadjusted survey data. 'est' column shows estimates on underreporting and tail adjusted data.

Household Finance and Consumption Network

This paper contains research conducted within the Household Finance and Consumption Network (HFCN). The HFCN consists of survey specialists, statisticians and economists from the ECB, the national central banks of the Eurosystem and a number of national statistical institutes.

The HFCN is chaired by Oreste Tristani (ECB) and Carlos Sánchez Muñoz (ECB). Michael Haliassos (Goethe University Frankfurt), Tullio Jappelli (University of Naples Federico II), Arthur Kennickell (Federal Reserve Board) and Peter Tufano (University of Oxford) and act as external consultants, and Sébastien Pérez Duarte (ECB) and Jiri Slacalek (ECB) as Secretaries.

The HFCN collects household-level data on households' finances and consumption in the euro area through a harmonised survey. The HFCN aims at studying in depth the micro-level structural information on euro area households' assets and liabilities. The objectives of the network are:

1) understanding economic behaviour of individual households, developments in aggregate variables and the interactions between the two;
2) evaluating the impact of shocks, policies and institutional changes on household portfolios and other variables;
3) understanding the implications of heterogeneity for aggregate variables;
4) estimating choices of different households and their reaction to economic shocks;
5) building and calibrating realistic economic models incorporating heterogeneous agents;
6) gaining insights into issues such as monetary policy transmission and financial stability.

The refereeing process of this paper has been co-ordinated by a team composed of Oreste Tristani (ECB), Pirmin Fessler (Oesterreichische Nationalbank), Michalis Haliassos (Goethe University Frankfurt) , Tullio Jappelli (University of Naples Federico II), Sébastien Pérez-Duarte (ECB), Jiri Slacalek (ECB), Federica Teppa (De Nederlandsche Bank), Peter Tufano (Oxford University) and Philip Vermeulen (ECB).

The paper is released in order to make the results of HFCN research generally available, in preliminary form, to encourage comments and suggestions prior to final publication. The views expressed in the paper are the author's own and do not necessarily reflect those of the ESCB.

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