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Abstract

This article describes the methodologies used in the first wave of the Central Bank of the Republic of Turkey – Household Finance and Consumption Survey (CBRT-HFCS). Particularly, we summarize design and implementation of the CBRT-HFCS in terms of questionnaire, sampling, collection of data and fieldwork, non-response, weighting and construction of replicate weights. The CBRT-HFCS provides data on assets, liabilities, income and credit constraints of Turkish households, which is designed to be compatible with the European Central Bank – Household Finance and Consumption Survey (ECB-HFCS). This survey uniquely ensures a comparable data set for the Turkish households with 19 Euro area countries as well as Croatia, Poland and Hungary participating in the ECB-HFCS and fills a significant data gap in Turkey. The CBRT-HFCS also oversamples wealthy households based on unit house prices at the neighborhood level. Oversampling is a common approach applied in many wealth surveys, enabling to better capture balance sheet of the top tail of wealth distribution, which is new to household surveys conducted by the Turkish Statistical Institute (TURKSTAT).

Key words: *Sampling Design, Oversampling, Wealth Distribution*

JEL codes: *C83, D31*

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Non-Technical Summary

This paper summarizes the methodologies used in the first wave of the Central Bank of the Republic of Turkey – Household Finance and Consumption Survey (CBRT - HFCS). European Central Bank (ECB) - HFCS collects household-level data on households' finances and consumption in the euro area through a harmonized survey. So far, ECB - HFCS has been implemented three waves in 2010, 2014 and 2017, respectively. In this context, CBRT - HFCS Project has been realized using European Union (EU) Instrument for Pre-Accession Assistance-II (IPA-II) funds. The fieldwork of the CBRT - HFCS was carried out between 23 September 2019 and 11 February 2020. The CBRT - HFCS provides data on household balance sheets and related economic and demographic variables, including income, private pensions, employment, measures of consumption and credit constraints of Turkish households, which is designed to be compatible with the ECB - HFCS. CBRT - HFCS uniquely ensures a comparable data set for the Turkish households with 19 Euro area countries as well as Croatia, Poland and Hungary participating in the ECB - HFCS and fills a significant data gap in Turkey. In addition, CBRT - HFCS data will be very useful to bridge the gap between findings from micro-economic and aggregate data sets.

This paper provides an intimately view of the data collection process and the methods applied. We summarize design and implementation of the CBRT - HFCS in terms of questionnaire, sampling, collection of data and fieldwork, non-response, weighting and construction of replicate weights. There are 222 questions in the CBRT - HFCS questionnaire, including 201 core, 13 non-core and 8 additional questions relating household listing, real assets and their financing, other liabilities and credit constraints, private businesses and financial assets, intergenerational transfers and gifts, consumption and saving that are asked to the household as a whole; employment, pensions and insurance policies and income that are asked individual family members.

The total sample size of CBRT - HFCS is 36,000 addresses with 24,000 main addresses and 12,000 substitute addresses. The final sample size is planned to give estimates at both Turkey and NUTS1 level. The CBRT - HFCS oversamples wealthy households by including more wealthy people in the survey based on unit house prices at the neighborhood level. Oversampling is a common approach applied in many wealth surveys, enabling to better capture balance sheet of the top tail of wealth distribution, which is new to household surveys conducted by the Turkish Statistical Institute (TURKSTAT). Oversampling method based on wealth indicators is used for the first time in household surveys in Turkey (Ceritoğlu and Sevinç, 2020). At the end of the fieldwork 12,302 households were interviewed. In the CBRT - HFCS survey, the response rate is 46.55% for the whole sample, while the response rate among wealthy households is 43.33%. Since this is the first wave of the CBRT - HFCS, its response rate should be compared with the first waves of the European countries that implemented the ECB-HFCS. Household response rates to the first wave of the ECB - HFCS range from less than 20% to around 70%.

Survey weights are needed for various reasons in household surveys. Different selection probabilities due to sampling design, correction for non-response, frame imperfections and statistical adjustments for estimators. The nonresponse adjustment is applied to the design weights of households depending on the two-stage sampling design to minimize the possible bias which might results from the correlation between household characteristics with non-response behavior. Integrative calibration is made by population projection distribution in terms of sex-age group, NUTS2 and urban-rural groups and household size distribution. As in other household surveys, editing and imputation are applied where needed. In addition, variance estimation is implemented to some important variables which is crucial for the use of survey data since it allows identifying statistical significance of estimates obtained from the sample.

1. Introduction

Turkey suffers from chronic low private saving ratio and high current account deficit as a ratio of Gross Domestic Product (GDP). The saving-investment gap does not only lead to a high current account deficit, but also leaves the Turkish economy vulnerable against short-term capital flows. For that reason, increasing domestic and in particular private saving ratios has been among the primary objectives of the policymakers. Such policy measures are included in previous five-year development plans, which are prepared by the former Ministry of Development (currently Presidency of Turkey, the Department of Strategy and Budget). Only recently, "Saving and Consumption Tendencies" special expert commission has convened within the framework of 11th Development Plan and a subsequent report was published in 2019. In the discussions emphasis was placed upon measures to raise both household and firm savings in the next years. Channeling financial savings to long-term instruments, which have higher return rates and providing financial literacy education for young individuals emerge as the most promising policy proposals to raise household saving ratios.

According to the Turkish Statistical Institute (TURKSTAT) Institutional Sector Accounts, the ratio of domestic savings to GDP increased from 21.9% in 2009 to 26.8% in 2020.[1] Moreover, the ratio of household savings to gross household disposable income was realized at 10.9% in 2020, which was 10.5% in 2009. The ratio of household savings increased up to 15.4% in 2018, but despite the increase in the domestic saving ratio over time, the Turkish economy still generates current account deficits (Ceritoğlu and Cılasun, 2017). The saving-investment gap, which is the difference between domestic savings and gross fixed capital formation, was realized as 2.9% of GDP on annual average between 2009 and 2020.[2] However, the ratio of gross fixed capital formation to GDP was 27.4% in 2020, which resulted in a reduced saving-investment gap of 0.5% as a ratio of GDP in 2020. In the past, the government introduced both voluntary and compulsory private pension systems and applied macro-prudential policies in order to tackle this structural problem. This issue has been raised under many strategic plans. It was one of the main topics of the 10th Development Plan (2014-2018), which underlined the fact that high quality data is needed for a deeper understanding of household consumption and saving behavior.

TURKSTAT conducts many household surveys *i.e.* Household Budget Survey (HBS), Household Labor Force Survey (LFS) and Survey on Income and Living Conditions (SILC). However, these surveys do not produce micro-economic data about households' assets and liabilities. In particular, these surveys do not provide data about financial variables. Thus, household saving can only be calculated as the

[1] https://data.tuik.gov.tr/Bulten/Index?p=Institutional-Sector-Accounts-2020-37186

[2] We observe a strong and negative relationship between the GDP growth rate and the savings-investment gap in Turkey. The savings-investment gap is significantly widened in high growth years such as 2011, when the annual GDP growth rate was 11.2%, but the saving-investment gap was also realized at 4.7% as a ratio to GDP.

difference between household disposable income and consumption expenditures from HBS. Hence, it is not possible to monitor changes in net wealth, which is a better indicator of household savings.

Additionally, higher income groups are not captured sufficiently in these surveys as in many household surveys from developing countries. As wealthy households hold the majority of financial assets and liabilities, household savings might be under-estimated using micro-economic data from available TURKSTAT surveys. At the same time, wealthy households keep a variety of financial assets. Therefore, the lack of detailed data on financial assets and liabilities of households generates an important data gap, which prevents the policymakers to make decisions while pursuing goals for economic development.

Finally, it is not possible to analyze the distribution of household financial assets and liabilities for different social and demographic groups using available data in Turkey. However, the presence of a micro-economic data set, which captures household heterogeneity, would allow academicians and researchers to analyze the impact of public policies on targeted groups. The presence of such a data set would also enable us to discover how monetary policy affects different socio-demographic groups and to better assess the health of the financial system. As a result, the Central Bank of the Republic of Turkey (CBRT) -– Household Finance and Consumption Survey (HFCS) Project has been realized using European Union (EU) Instrument for Pre-Accession Assistance-II (IPA-II) funds. The CBRT-HFCS is designed to be compatible with the European Central Bank -– Household Finance and Consumption Survey (ECB-HFCS).[3] In this direction, a survey that collects such information will close an important data gap and will be very useful to bridge the gap between findings from micro-economic and aggregate data sets.

The survey questionnaire contains several sensitive questions, since households are asked to disclose the amount of their financial assets and liabilities, including the values of assets that they keep at home or at bank vaults. Moreover, the CBRT-HFCS has a special sampling design for oversampling of wealthy households, who are difficult to reach in household surveys, especially because they live in gated communities. At the same time, the targeted number of home visits is quite large, since the survey is planned to provide data for 12 geographic regions at NUTS1 level. Therefore, the establishment of such a sophisticated country-wide survey presents unique challenges at various levels. Methodological reports for such household surveys that are carried out in advanced economies are readily available (Osier, 2016; Faiella and Gambacorta, 2017; Albacete *et al.*, 2019; HFCN, 2020a). In this respect, this paper provides an in-depth account of the CBRT-HFCS for guiding future research in Turkey and in similar emerging market economies.

[3] https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html

The outline of this paper is as follows: Section II briefly describes the survey questionnaire. Section III explains sampling design, in particular the replacement rule and oversampling of wealthy households. Section IV explains fieldwork and collection of data in detail. Section V describes non-response adjustment and weighting methods. Section VI discusses construction of replicate weights. Finally, section VII concludes this paper.

2. The CBRT-HFCS Questionnaire

The CBRT-HFCS questionnaire consists of two main parts and it is composed of nine sections as in the original ECB-HFCS:

i) Questions relating to the household as a whole (*household listing*, *real assets and their financing*, *other liabilities and credit constraints*, *private businesses and financial assets*, *intergenerational transfers and gifts*, *consumption and saving*) and

ii) Questions relating to individual family members (*employment*, *pensions and insurance policies*, *income*).[4]

Data on demographic characteristics of households such as household size and age, gender and education levels of all family members are collected in *household listing* section in the beginning of the survey. Questions in *real assets and their financing*, *other liabilities and credit constraints*, *private business and financial assets*, *intergeneration transfers as gifts* and *consumption and saving* sections gather data at the household level, while questions in *employment*, *pensions and insurance policies* and *income* sections are asked for all family members (HFCN 2020a). All core questions from the 2017 wave of the ECB-HFCS are already included in the CBRT-HFCS. The questionnaire includes four additional follow-up questions about outstanding housing debt to make it easier to understand and to answer by the respondents. Furthermore, this survey comprises specific questions on the distribution of households' financial assets, participation in Islamic banking services, minimum wage and formal employment, which is indicated by registration to the Social Security Institution due to current job.[5] In this manner, the CBRT-HFCS gains a special character, which is unique to Turkey. As a result, there are a total of 222 questions in the CBRT-HFCS, including 201 core, 13 non-core and 8 additional questions (Table 2.1).

[4] https://www.ecb.europa.eu/home/pdf/research/hfcn/HFCS_Questionnaire_2017.pdf?c480c6404bfd45ffa694d784e192ff0
[5] See appendix 1 for additional questions.

Table 2.1: The Number of Questions in the CBRT-HFCS

		Core Questions	Non-Core Questions	Additional Questions
1.	Demographics (*Household listing*)	9	4	-
2.	Real assets and their financing	60	1	4
3.	Other liabilities and credit constraints	27	1	-
4.	Private businesses and financial assets	34	1	2
5.	Employment	12	5	2
6.	Pensions and insurance policies	16	1	-
7.	Income	24	-	-
8.	Intergeneration transfers as gifts	8	-	-
9.	Consumption	11	-	-
	Total	**201**	**13**	**8**

However, there are a few differences between the CBRT-HFCS and the ECB-HFCS in terms of the questionnaire and the implementation of the interviews. First, questions in *employment*, *pensions and insurance policies* and *income* sections are asked for family members, who are 15 and older rather than 16, following TURKSTAT fundamental labor force indicators. Second, net individual and household disposable income data are compiled in the CBRT-HFCS rather than gross disposable income. Third, all questions in the survey are directed to the Financially Knowledgeable Person (FKP) in the family, who is knowledgeable about both the household's financial situation and the employment and income conditions of all members. Thus, the designation of the FKP before the start of the survey is one of the most important tasks of the interviewers.[6]

In order to raise public awareness, the CBRT prepared a website to announce the Project to the public before the start of the fieldwork. The survey firm sent an advance letter to all selected addresses. In addition, the survey firm acquired an e-mail address and established a phone landline to inform the individuals, who asked for more information about the CBRT-HFCS Project. The contact information was provided to households in the advance letters. Moreover, the interviewers wore visible identification cards and they brought a copy of the advance letter with them for every home visit. The interviewers

[6] A family member who plays a greater role than the rest of them in at least one important issue is selected as the FKP. Bringing income into the family or gender is not the main criteria in the selection of the FKP. He/she does not have to be the highest income earner in the family, but he/she is responsible for managing household income and consumption expenditures. The FKP characteristics play an important role on household consumption and saving decisions.

informed households that they were performing the survey as part of the Project and they were only involved in the CBRT-HFCS Project during the fieldwork.[7]

Home visits were carried out by interviewers with specific training. Moreover, interviews were conducted using computer-assisted personal interviewing (CAPI) programs, where custom checks were built into the interviewers' tablets for data controls. Besides, wealthy households are oversampled in the CBRT-HFCS using a specific sampling design based on unit house prices at the neighborhood level, which is different from previous TURKSTAT household surveys (Ceritoğlu and Sevinç, 2020). In addition, in the survey there are standardized questions to determine the FKP as well as questions, which are answered by the interviewers relating to the appearance and the location of the households' dwelling.[8] Their answers provided "*paradata*", which were particularly helpful when editing and imputing data after the fieldwork was completed. Paradata was also used to assess the success of the oversampling method.

Finally, the ECB-HFCS questionnaire already contains questions about the education status and professions of the parents of the household members[9] as well as questions about private health insurance ownership and the health status of the household head and his/her spouse. These questions are included in the CBRT-HFCS, which were not asked in previous TURKSTAT surveys. Hence, the compilation of detailed data on households' real and financial assets and liabilities and covering these important, but less-known topics raises the significance of the CBRT-HFCS. Thus, the CBRT-HFCS closes an important data gap, which will enable academicians and researchers to contribute to the existing literature on the Turkish economy by utilizing this fresh data set.[10]

3. Sampling Design

3.1. General Features of Sample Design

Sampling can be expressed as selecting from the entire population a set of units from which results can be drawn about the behavior of the entire population. Similar to the method used by other countries who conduct HFCS, CBRT-HFCS is based on a probabilistic sample design where each household in the target population has an *ex-ante* defined non-zero probability of being part of the

[7] The fieldwork of the CBRT-HFCS was carried out between 23 September 2019 and 11 February 2020. The Euro / TL conversion rate occurred as approximately 6.48 in this period.
[8] See appendix 2 for interviewer questions.
[9] All eligible household members aged 15+.
[10] See appendix 3 for basic concepts.

sample. The sampling frame[11] of the CBRT-HFCS was composed by the registers of the Address Based Population Registration System (ABPRS) and the National Address Database (NAD).

The sample is selected following a two-stage design which is called two-stage stratified cluster sampling:

- *The first stage*: The primary selection units (PSUs) are Blocks, which constitute approximately 100 (between 80-120) household addresses.
- *The second stage*: The households from the selected blocks at the first stage. In particular, such secondary sampling unit (SSU) is the address. A specific number of sample addresses are determined from the blocks through a systematic selection method by the TURKSTAT. Briefly, in the second stage a sample of households is determined.

Probability Proportional to Size (PPS) selection was used for selecting the blocks. The number of household addresses in each block has been defined as the measure of size in the PPS selection. At the second stage, households (SSU's) were selected by "systematic selection" from the sampled blocks. The sample design strata are described by geographic regions (NUTS) and area types (urban and rural) for this survey and as well as for surveys conducted by TURKSTAT. To get homogenous groups in the sample selection, urban-rural and NUTS information was used in the implicit stratification. Moreover, since the blocks have been selected systematically once ordered in a geographical sequence defined as "serpentine", they form a very efficient further implicit stratification, where each selected block is part of an implicit stratum. In this way, the coverage of households in all geographic regions is tried to be guaranteed.

3.2. Replacement Rule

Specifying sample size is a difficult step due to basic requirements, precision requirements, cost constraints and practical considerations. A large sample size, including substitute household addresses, is required in order to reach the minimum total net sample size of 12,000 households and to obtain a well distributed net sample over PSUs and NUTS1 regions in Turkey. 24,000 main addresses from 2,000 blocks (hence twelve main addresses from each block) and 12,000 substitute addresses (six substitute addresses per each block) with total sample size of 36,000 addresses form the sample of the study. Replacement of an address in a sample happens when a non-responding address is replaced by another substitute address during the fieldwork. At this stage, a strategy has been developed to use substitute addresses. According to this strategy, if twelve main addresses in a block are visited and the number of successful interviews is more than or equal to six, the household visits for that block are terminated. On

[11] Sampling frame is a list of household addresses that defines the target population.

the other hand, if the number of successful interviews is less than six after three visits to each address, a substitute address list containing six addresses is given to the interviewer to increase the number of successful interviews to six. When the number of successful interviews reaches six, the household visits for that block end.[12] Interviewers should visit the addresses at least three times until contact with household member. These visits should be at different times, such as weekdays, weekends, and different times of the day. This substitution strategy is followed to ensure that 50% response rate is reached in blocks as well as in whole sample. As in the ECB-HFCS, the use of substitute addresses in the CBRT-HFCS is inferior to strict controls. Survey firm employs an application using GPS that checks whether an interviewer follows the correct procedure. Thanks to this application, the interviewers first visit the main addresses in sufficient numbers. Otherwise, the sampling design may be damaged in case of using directly substitute addresses. The possibility to visit substitute addresses, especially when it is challenging to reach main addresses, may affect the interviewer's behavior of completing main addresses and discourage them from trying to get answers from main addresses (Elliot, 1993). For this reason, addresses are not given to the interviewers unless they finish visiting the main addresses.

3.3. Oversampling Wealthy Households

As well underlined by ECB (HFCN, 2020a), wealth related surveys usually have the scope of pursuing two competing objectives: on the one hand, representing the behavior of "typical" individual households and on the other hand, representing a substantial fraction of total wealth. For the former target, it is optimal that the sample proportionally represents the population as a whole; alternatively, for the second scope, the sample should adequately represent total wealth. Since wealth distribution is highly uneven, a given level of precision would either require a rather large (and costly) sample or, if efficiently designed, a sample which should include a disproportionally high number of wealthy households. The countries that applied the HFCS use oversampling based on the data they have and best expressing wealth. As can be expected, the data that help capturing wealthy people the most are personal income and wealth taxes (Bricker *et al.*, 2016). Spain, France, Estonia, Latvia, Luxembourg and Finland use these taxes data to identify wealthy households. Belgium, Germany, Greece, Poland and Portugal employ variables related to housing. The others variables that are used for determining wealthy households can be listed as electricity consumption, regional income, personal education and labor status (HFCN, 2020b).

[12] Rule for replacement shall be set as follows: by the time 12 main household addresses visited for each block, if $m_i \geq 6$ interview for the block stops. However, $m_i < 6$ substitute addresses are provided to the interviewers till $m_i = 6$ (where i = 1, 2, ……, 2.000). Here m represents successfully completed household interviews, while i denotes blocks. There may be blocks where $m_i < 6$ even with the substitute addresses. These blocks are expected to be where wealthy households reside, that is the reason for oversampling.

In the CBRT-HFCS oversampling of wealthiest blocks is performed, based on the Residential Property Price Index (RPPI) Database in Turkey: unit house prices are compiled from the CBRT-RPPI database for residential areas; these are calculated on the basis of 5,070 neighborhoods[13] in 567 districts in Turkey (Ceritoğlu and Sevinç, 2020). It is believed that matched neighborhoods with TURKSTAT's sampling frame can represent Turkey with 66.7% coverage and İstanbul with 89.1% in particular. In order to find neighborhoods that wealthy households live extreme value method is applied by using unit house prices of neighborhoods from the CBRT-RPPI database. 500 neighborhoods are found above the extreme value.[14] In this survey, these neighborhoods are assumed to be places where wealthy households live. As expected, these 500 neighborhoods contain summer homes that are mostly second homes in beautiful seaside towns such as Çeşme (İzmir) and Bodrum (Muğla). On the other hand, the fieldwork of CBRT-HFCS begins in September when summer season ends. For this reason, geographically (NUTS2) weighted house prices are computed for years 2016-2018 from the RPPI database. Calculated weighted house prices compared with the distribution of the top income group (1%) obtained from SILC and HLFS to check the validity of using unit house prices to identify wealthy households (Ceritoğlu and Sevinç, 2020). On the basis of this proposed methodology, it was decided to select 500 PSUs as over-sample, and other 1,500 PSUs as traditional sample; such 500 PSUs are clearly concentrated in some (wealthier) provinces: İstanbul (275), Ankara (75), İzmir (50), Muğla (20), Antalya (17), Bursa (15), Adana (11), and so on as those are the NUTS1 regions with highest unit house prices. Considering the 1,500 PSUs from the main sample and the 500 PSUs from the oversampling part, we get a total of 2,000 PSUs; they have been allocated in NUTS1 urban/rural in Turkey as reported in Table 3.1.

[13] Only neighborhoods with 30 or more dwelling appraisal observations in the last three years are included in the analysis. Unit house prices are calculated by dividing the value (TL) to the gross usage area (m^2) at current prices.
[14] The extreme value is found with the help of neighborhood level unit house prices by calculating mean unit house prices and adding two standard deviations of unit house prices at Turkey level.

Table 3.1. Allocation of 2,000 PSUs at NUTS1 urban/rural level

NUTS1		Urban/Rural	Size
TR1	İstanbul	Urban	391
TR2	West Marmara	Urban	80
TR2	West Marmara	Rural	12
TR3	Aegean	Urban	243
TR3	Aegean	Rural	14
TR4	East Marmara	Urban	160
TR4	East Marmara	Rural	7
TR5	West Anatolia	Urban	190
TR5	West Anatolia	Rural	6
TR6	Mediterranean	Urban	207
TR6	Mediterranean	Rural	10
TR7	Middle Anatolia	Urban	72
TR7	Middle Anatolia	Rural	26
TR8	West Black Sea	Urban	100
TR8	West Black Sea	Rural	54
TR9	East Black Sea	Urban	43
TR9	East Black Sea	Rural	16
TRA	North East Anatolia	Urban	71
TRA	North East Anatolia	Rural	40
TRB	Middle East Anatolia	Urban	82
TRB	Middle East Anatolia	Rural	20
TRC	South East Anatolia	Urban	144
TRC	South East Anatolia	Rural	12
Turkey			2,000

4. Collection of Data and Fieldwork

The final questionnaire has a modular structure, and it is composed of a general part addressing aspects relevant to all households and a series of additional sections containing questions relevant to specific subsets of households. Survey information in the CBRT-HFCS is gathered through CAPI, i.e. data collection method in which the interviewer uses a tablet to record the replies of respondents. CAPI is a common method that enables logic checks, skip patterns and validations during the interview in order to increase the quality of the data. It is stated in the literature that this method is the most successful method among other methods as PAPI, CATI and CAWI (Honkkila and Kavonius, 2013).[15] Since data are collected mainly with the aid of computers, using CAPI, the questionnaire can be considered as an "electronic tool", which is essentially a computer program, in addition to storing data also performs a

[15] Paper and Pencil Interview (PAPI), Computer Assisted Telephone Interviews (CATI) and Computer Assisted Web Interviews (CAWI).

number of checks, making it possible to remedy any inconsistencies in the data directly in the presence of the household.

Interviewers were responsible for conducting the pre-test, pilots, and main interviews, ensuring accuracy and completion of all the required elements of the survey, maintaining security of the materials and protecting respondent confidentiality. There also were regional supervisors reporting to field director and their responsibility was to coordinate the field supervisors in their regions to complete the fieldwork with high quality. They were responsible for the quality control in the field via backchecking / accompanied interviewing. They usually travelled in their regions and visited the fieldwork in the cities. Moreover, there were field officers who were in the field every day during the fieldwork and supervised the interviewers. They were responsible for accompanying interviewers, guiding them during the fieldwork, taking actions if necessary, by talking with the regional supervisors. We recognize that it is particularly important to maintain a consistent field force for the duration of the fieldwork period.

Fieldwork implementation has started on 23 September 2019. Initially, the planned duration of fieldwork was around 3 months; however, the fieldwork duration was extended to the end of February 2020 to reach the pre-defined target number of interviews (i.e., 12,000 minimum). Fieldwork has been implemented in 81 provinces, including sub-provincial areas and villages. Before commencement of fieldwork, advance letters were sent to 81 governorates and additional informative letters to headmen and 36,000 addresses in the sample (both main addresses and substitute addresses). Common strategies are followed countries participating in the ECB-HFCS to cope with non-response. Sending advance letter to household is a widely used strategy. Advance letters are known as important tools for both households and interviewers (Osier, 2016). It is included a brief information about the target and sampling of the survey, a call center number and a web page link of CBRT in the advance letter. The information in the web page has similar information to the advance letter to convince households about reliability of the survey. Moreover, considering the case that the advance letter could not reach the household, the interviewers carried a copy of the advance letter. Interviewers also wore identification cards to indicate what they were visiting the household for the CBRT-HFCS Project. At the end of the fieldwork 12,302 households were interviewed in 2,000 Primary Selection Units (PSUs, or blocks), so reaching the minimum of 12,000. In the CBRT-HFCS survey, the response rate is 46.55% for the whole sample, while the response rate among wealthy households is 43.33%. Since this is the first wave of the CBRT-HFCS, its response rate should be compared with the first waves of the European countries that implemented the ECB-HFCS.

5. Non-response and Weighting

5.1 Weighting

Survey weights are needed for various reasons in household surveys. Different selection probabilities due to sampling design, correction for non-response, frame imperfections and statistical adjustments for estimators (e.g. post-stratification) are some of them listed in the literature (Kish, 1992). Answering these needs, the weighting procedure in the CBRT-HFCS consists of three steps. First, *design weights* ($w^{(0)}$) are constructed based on the selection probabilities of each sampling unit, which is the *household* in CBRT-HFCS, in the gross sample. As a result of two-stage sampling design, it is calculated by the following formula

$$w^{(0)} = 1/p^{(0)} = 1/(p^{(B)} * p^{(H)}),$$

where $p^{(B)}$ is the selection probability of blocks, which differs according to the block size in each NUTS2 region; and $p^{(H)}$ is the selection probability of households which differs according to the listed block size. Systematic selection probabilities were calculated in the selection of households from blocks.

Secondly, *non-response adjusted weights* ($w^{(1)}$) are calculated. This step is required to compensate for unit-non-response because not every household selected in the sample participate successfully in any survey. Moreover, non-response adjustment minimizes the possible bias which might results from the correlation between household characteristics with non-response behavior (i.e. non-randomness of the non-response behavior) (Albacete *et al.*, 2019). Out of 26,427 household visits, 12,302 successful interviews were conducted for the first wave of the CBRT-HFCS. This corresponds to a response rate of 46.6 percent (Figure 5.1). The sensitivity of questions in wealth surveys mostly results in lower response rates compared to income surveys (HFCN, 2013). For instance, response rate in Turkish Survey of Income and Living Conditions (SILC) conducted is much above, 96.3 percent in 2019.[16] Moreover, evidence shows that response rates for wealthier households are expected to be lower (HFCN, 2013). This seems to be valid for the CBRT-HFCS. Response rate for the wealthier households (oversampled households) is 3.3 percentage points lower (43.3 %) than the countrywide response rate in CBRT-HFCS (Figure 5.2.). Lower response rates of wealthier households also reduce the overall response rate in the survey. Although the response rate of the CBRT-HFCS is lower compared to the TURKSTAT surveys, it is close to EU average (Figure 5.3).

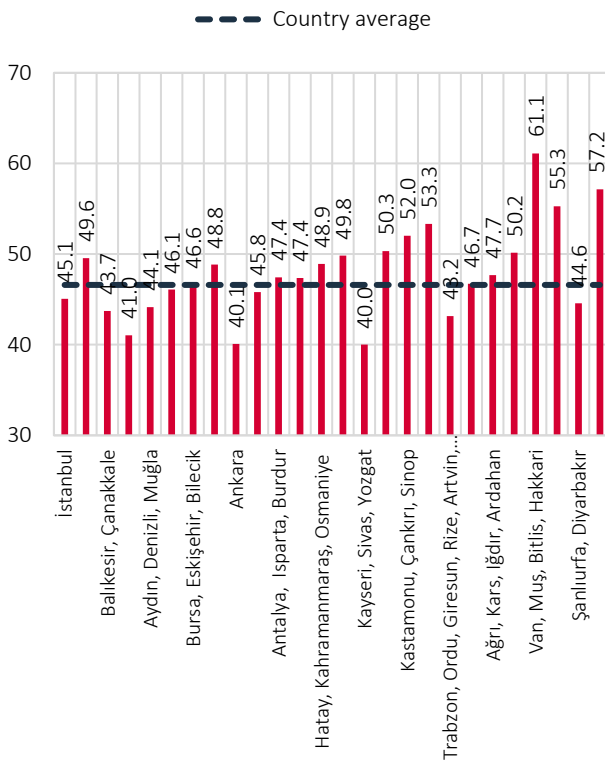
Based on the information from the initial sample, non-response adjustment in the CBRT-HFCS is calculated as

$$w^{(1)} = w^{(0)} * 1/R_h$$

[16] Note that, since TURKSTAT's surveys are compulsory, their response rates are relatively higher in general.

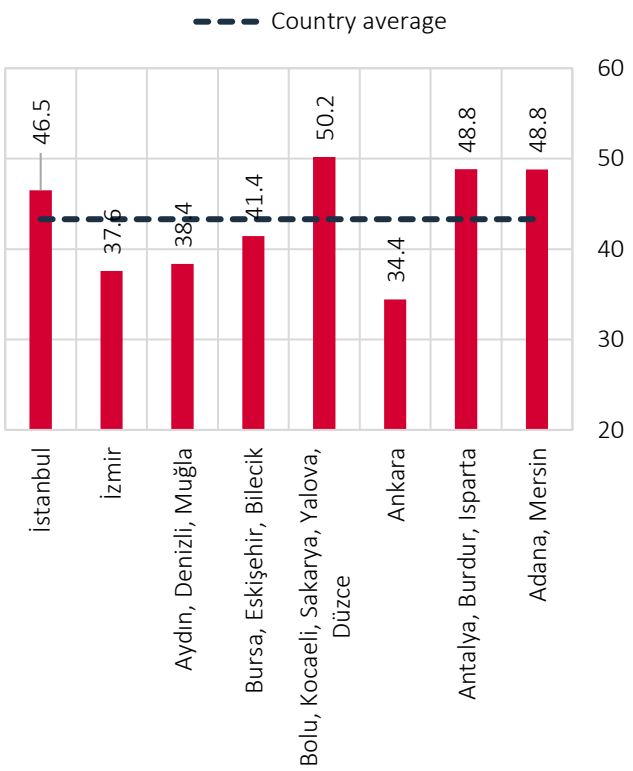
where R_h is the ratio of the number of respondent households divided by number of eligible household addresses in each block h.

Figure 5.1: Response Rates (NUTS2, %)



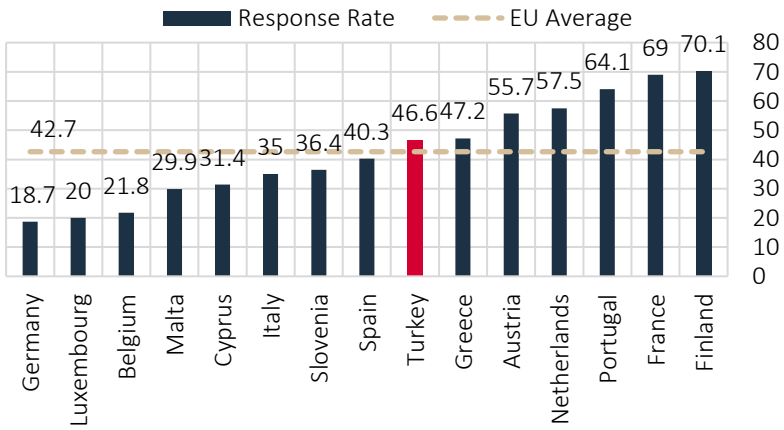
Source: Own calculations using CBRT-HFCS.

Figure 5.2: Response Rates (Oversampled Households, %)



Source: Own calculations using CBRT-HFCS.

Figure 5.3: Response Rates in Selected EU Countries (%) [(1)]



Source: ECB, CBRT-HFCS.

[(1)] Response rates for EU countries show the first wave results.

Finally, *calibrated weights* are obtained to adjust for non-coverage, which might occur at the PSU level, household level or individual level. This occurs when some portions of the population are removed from the survey based on stratified multi-stage sampling design like the CBRT-HFCS. In order to adjust weights for non-coverage, auxiliary information from the ABPRS is used. Calibrated weights are constructed so that the weighted distribution of the sample according to sex, age (0-4, 5-11, 12-14, 15-17, 18-20, 21-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65+), region (NUTS2 and urban/rural divide) and household size composition (1, 2, 3, 4, 5, 6+) are consistent with the corresponding distribution of the population from the ABPRS.[17]

$$w^{(2)} = w^{(1)} * w_j$$

where w_j is the post-stratification factor for each strata (j) based on age, sex, region and household size. In addition, *trimming* is applied to reduce extreme variations in weights. The trimming procedure to the calibrated units is done by the following formula

$$\frac{1}{L} \leq \frac{w^{(2)}}{\bar{w}} \leq L$$

where $\bar{w}$ is the average value of calibrated weights, and L is the upper bound for adjustment in weights.

5.2. Editing and imputation

Many household surveys involve item non-response, which is acceptable and expected to a certain degree (HFCN, 2013). In a voluntary survey like the CBRT-HFCS[18], covering numerous questions on household assets and finances, individuals are more likely to conceal sensitive information. Moreover, the CRBT-HFCS includes complicated questions, like refinancing/renegotiation of loan using Household Main Residence (HMR) as collateral, which are difficult to answer. Some questions, e.g. net value of the business owned by household memberships, are also not always accurately defined. They all increase the degree of non-response in the CBRT-HFCS (Kennickell, 2017). Thence, data editing and imputation processes are of special in this survey. The first step requires data checks and editing to minimize errors and inconsistencies from the data collected. Logical cross-checks and verifications in the CBRT-HFCS are held both during and after data collection. Because the CBRT-HFCS is conducted on CAPI format, it is designed to block inconsistencies within and between questions, shown on a pop-up screen during interviews, which helps interviewers in identifying reliable values. Raw data are also checked in a weekly basis during the fieldwork to allow interviewers re-contact the households to verify and/or change the unreliable values in a timely manner. Additionally, answers that are considered as

[17] Since the external information used in the calibration process is based on integrating both at individual and household level, this approach is also called "integrative calibration".
[18] Being a voluntary survey, the CBRT-HFCS differs from other household surveys conducted by TURKSTAT.

unreliable or incorrect are turned into missing values after the fieldwork. The second step is to substitute missing values in the data set through imputation.

Imputation in household finance surveys, including the CBRT-HFCS, is required mainly for two reasons. First, use of incomplete data will disregard too much information on essential components of wealth bearing relatively more missing data. Second, inference from incomplete data will be biased if data are missing not at random. Imputation of missing values in the CBRT-HFCS data, as in others, is complicated and very time-consuming. Notwithstanding unavailability of one-size-fits-all process, using similar methodologies preserves data comparability among countries conducting household finance surveys. Hence, we follow the guidelines for imputation proposed by ECB.

Table 5.1 shows summary statistics on item non-response for selected variables in the CBRT-HFCS. The ratio of missing values are higher in monetary questions compared to non-monetary or categorical questions. Missing data in the CBRT-HFCS mostly comes from "don't know" answers relative to "no answer". We also observe that household rarely hide "easy to answer" questions like consumption. A part of missing data in some questions is associated with non-response in a higher order question. For instance, households are asked "number of mortgages or loans using HMR as collateral" when they say "yes" to the question determining whether they have this type of loans. Only households that report at least one such loan are asked several questions to have more information about this loan (e.g. purpose of the loan, the initial amount borrowed etc.). If they do not report any, the follow-up questions are then not asked which adds missing data. Yet, the relative size of this type of missing observations is much lower.

Table 5.1: Summary of the item non-response for Selected Variables, Unweighted Sample (%)

	Has the item		Value for those having the item		
	Yes	Unknown	Amount	Don't Know	No Answer
Own main residence	55.97	0.21	61.89	27.36	10.75
HMR mortgage 1st loan: amount owed	13.44	0.00	73.65	16.47	9.88
Rent main residence	40.09	0.00	95.66	1.95	2.39
Other real estate, first property	12.45	0.00	72.01	16.39	11.60
Own car	57.05	0.00	92.46	5.14	2.40
Labor market status: 1st choice	99.94	0.06	100.00	0.00	0.00
Employee income	34.65	0.00	83.42	8.29	8.29
Pensions	8.80	0.00	89.13	5.58	5.29
Social benefits	6.41	0.00	89.67	5.16	5.16
Amount spent food at home	92.55	7.45	92.55	3.02	4.43
Non-durable expenditure	91.00	9.00	91.00	3.90	5.10

Source: Own calculations using CBRT-HFCS

We use multiple imputation (MI) to fill in missing values in the CBRT-HFCS data as other countries conducting the HFCS (Barceló *et al*., 2020). Since this is the first wave of CBRT-HFCS, we do not attempt to impute all variables in the questionnaire. However, we impute all components of income, consumption and wealth. We also impute variables which are believed to have relevance for the imputation process, e.g. employment status. In total we impute 113 variables, 92 of which are from household data. The MI method we follow is based on a sequential regression procedure (Raghunathan *et al*., 2001). It assumes a truncated normal model for the univariate continuous variable to be imputed. This method can be summarized as follows. First, it runs a truncated regression of the variable being imputed on a broad set of variables without missing values to obtain maximum likelihood parameter estimates and their asymptotic variances. Second, it randomly draws parameters from the asymptotic approximation to its posterior distribution. Third, it calculates predicted values from the truncated normal model with these parameters to obtain missing values. Repeating second and third steps M times, we obtain M sets of imputed values (Stata, 2018).

In imputation models, we use weights by performing weighted regressions at the first step because the ignorance of sampling design will lead biased results (Zhang *et al*., 2009). Moreover, we determine the set of covariates for each variable separately. To do so, we run regression models including the broadest set of explanatory variables which probably affect the variable to be imputed based on economic theory. Then we include all variables with significant coefficient estimates in the truncated regression model. As an example, Table 5.2 shows the results of OLS regression for the value of car. Attanasio *et al.* (2015) explore household wealth inequality from by focusing on a durable good, which is measured in a detailed manner the Consumer Expenditure Survey (CEX) for the US economy *i.e.* the number of vehicles owned by households. They mention that in there is extensive information about the properties of the cars that households own such as model and production year, whether it is bought new or second-hand. They use this information to impute a value for the cars for which no price is reported. Effectively, they run a hedonic regression, which includes brand, model, year identifiers and several characteristics for cars for which there is no value in the CEX. They then use the parameters of this regression to interpolate the value of all the cars in the survey and to obtain the value of the stock of cars they hold for each household. We followed a similar approach to impute car and home values in the CBRT-HFCS even though our data set is not that rich. Since the CBRT-HFCS data includes a multitude of variables from pensions to social assistance benefits, separate regressions reflect data better than specifying a joint distribution for all variables as in a joint imputation model (Albacete *et al*., 2019).

Table 5.2. OLS Regression of Non-response on the Value of Car

	Coefficient	Robust Standard Error
FKP's age	0.02***	0.01
FKP's age squared	<0.001***	0.00
Education level		
– Primary school	-0.04	0.12
– Secondary school	0.04	0.13
– High school	0.12	0.13
– University and over	0.33*	0.13
Household size	-0.05***	0.01
Home-owner	0.15***	0.03
Rent (1)	<0.001*	0.00
Household total income	<0.001*	0.00
Consumption (goods and services)	<0.001*	0.00
Oversampled wealthy household	0.11**	0.05
Income from main job of FKP	<0.001*	0.00
Constant	9.77***	0.22
Pseudo R-squared	0.27	
Number of obs.	3,163	

Source: Own calculations using CBRT-HFCS.
Note: ***p<0.01, **p<0.5, *p<0.1. Regional (26 NUTS 2) dummies and sampling weights are used.
(1) Rent variable includes both actual and imputed rents.

We evaluate the validity of imputation process by using coefficient of variation of the imputed variables. To do so, we generate 100 sets of imputed values. Then, we calculate coefficient of variation (standard deviation/mean) for the imputed variable by using all imputed values for each unit of observation. The lower the value of coefficient of variation the better the imputation process. A coefficient of variation, which is lower than one, can be signal of a valid process. For instance, mean value of the coefficient of variation (over 216 households) is 0.41 when we impute monthly rent payments. The related minimum and maximum are 0.32 and 0.51, respectively. This implies that the imputation of rent payments does not generate very distinct values.[19]

6. Construction of Replicate Weights

Variance estimation is crucial in the use of survey data since it allows identifying statistical significance of estimates obtained from the sample. As the true value of the variance of an estimator is not known, variance should be estimated (HFCN, 2013). However, in complex designed surveys like

[19] In the CBRT-HFCS imputed rent is collected from households through survey by considering the actual rents of similar dwellings located in the same area as an example. However, this approach may introduce measurement errors due to lack of information about the local housing market or households' subjective evaluations. Imputed rent can also be reconstructed by explanatory variables using the hedonic regression model (Pistaferri, 2015). For instance, in SILC TURKSTAT follows the hedonic regression model approach in the estimation of imputed rent in the calculation of total household income.

HFCS, use of final weights when estimating variances might produce incorrect results. The CBRT-HFCS whose sampling design is described above is not an exception. Indeed, ignoring the complex features of the survey design (e.g. two-stage sampling) and the construction of final weights (e.g. non-response adjustments) might create bias in the variance estimation of the point estimators. Besides, because of the unequal probabilities of selection of sampling units, completely ignoring sample weights might bias estimates as well (Kolenikov, 2010). Therefore, we construct replicate weights for the CBRT-HFCS in addition to final weights.

Two general methods of variance estimation are available in complex survey designs: linearization and replication methods (e.g. jackknife and bootstrap). Whilst replication methods are more appropriate in estimating non-linear statistics (e.g. medians, proportions, quantiles), linearization is more appropriate for linear estimates (e.g. totals and means) (Albacete *et al.*, 2019). Since this is the first wave, standard errors are mainly required for the means and totals in the CBRT-HFCS. Thence, linearized methods might be enough to serve the purpose of variance estimation. However, in order to ensure comparability with HFCS countries, we follow resampling methods for variance estimation.

Resampling methods are based on the creation of multiple sub-samples, i.e. replicates *r*, of the original data. Particularly, the variance of the statistics of interest is estimated by using the parameter estimates for each replicate. However, instead of creating samples for each replicate, a more practical way is to create sampling weights. Assigning zero weights to a sampling unit ensures that it is removed from the sample (Kolenikov, 2010). Jackknife, bootstrap, and balanced repeated replication are most commonly used replication methods in literature. We use rescaling bootstrap method proposed by Rao *et al.* (1992) which is suggested by ECB's Household Finance and Consumption Network (HFCN, 2013).

This method generates replicate samples, which are drawn independently and with replacement in each stratum. In the CBRT-HFCS, replicate sample size m_s is set to $m_s = n_s - 1$, where n_s is the size of stratum s This ensures the efficiency of bootstrap estimators (Kolenikov, 2010). The final estimation weight ($w^{(2)}$) for each observation is rescaled by the factor $n_s / (n_s - 1)$ and multiplied by the frequency of the observation in the replicate sample (HFCN, 2013). We choose 1000 replicates following the usual recommendations in literature (Kolenikov, 2010).

It has implications in the process of calculation of variances (standard errors) of final estimates. In fact, for complex measures from complex surveys, standard errors can only be estimated with re-sampling methods, such as Taylor Linearization techniques (Taylor), Jack-knife Repeated Replications (JRR), Balanced Repeated Replications (BRR), bootstrap, *etc…* (Verma and Betti, 2011). As an example,

Table 6.1 reports the estimated measures of the mean total consumption[20] expenditure at national and NUTS1 levels. Standard errors and 95% confidence intervals, which are calculated using replicate weights, are also reported. Standard errors have a coefficient of variation less than 1.5% for Turkey and less than 7% for all NUTS1 Regions, showing the higher precision of the survey estimates.

Table 6.1. Standard Errors, Bootstrap, Consumption (TRY)

	NUTS1	Mean	Standard Error	%95 CI		CV
TR1	Istanbul	2,903.68	65.97	2,774.39	3,032.97	2.27
TR2	West Marmara	2,078.70	110.44	1,862.25	2,295.15	5.44
TR3	Aegean	2,052.02	53.95	1,946.27	2,157.76	2.57
TR4	East Marmara	2,870.15	115.06	2,644.64	3,095.66	4.00
TR5	West Anatolia	1,954.21	59.53	1,837.52	2,070.89	3.14
TR6	Mediterranean	1,448.37	51.15	1,348.11	1,548.63	3.59
TR7	Central Anatolia	1,729.80	104.50	1,524.99	1,934.61	5.96
TR8	West Black Sea	1,950.94	84.40	1,785.52	2,116.37	4.27
TR9	East Black Sea	1,981.82	137.32	1,712.67	2,250.97	6.96
TRA	Northeast Anatolia	1,640.97	68.99	1,505.76	1,776.18	4.34
TRB	Middle East Anatolia	1,405.27	67.25	1,273.46	1,537.07	5.02
TRC	Southeast Anatolia	1,541.94	50.23	1,443.49	1,640.39	3.05
TR	Turkey	2,089.61	27.49	2,035.74	2,143.49	1.31

Source: Own calculations using CBRT-HFCS.

7. Conclusion

This article describes the methodologies used in the first wave of the CBRT-HFCS. Particularly, we summarize design and implementation of the CBRT-HFCS in terms of questionnaire, sampling, collection of data and fieldwork, non-response, weighting and construction of replicate weights. The CBRT-HFCS provides data on assets, liabilities, income and credit constraints of Turkish households, which is designed to be compatible with the ECB-HFCS. This survey uniquely ensures a comparable data set for the Turkish households with 19 Euro area countries as well as Croatia, Poland and Hungary that participate in the ECB-HFCS and fills a significant data gap in Turkey. The CBRT-HFCS also oversamples wealthy households based on unit house prices at the neighborhood level. Oversampling is a common approach applied in many wealth surveys, enabling to better capture balance sheet of the top tail of wealth distribution, which is new to household surveys conducted by TURKSTAT.

[20] Total household consumption expenditure is derived from the question HI0220 in the CBRT-HFCS, which collects data on all household expenses including food and utilities, but it excludes household expenditures on durable goods (e.g., cars, household appliances, etc.), rent, loan repayments, insurance policies, renovation, etc.

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Appendix 1 – Additional Questions

A1. Can you please provide the percentage distribution of your household's financial assets?
Note: It will be distributed as 100% in total.

	%
Gold	
Turkish Lira	
Foreign currency	
Stock market	
Bond / Treasury Bill	
Total	100%

A2. Do you or any other member of your family benefit from the services of Participation Banks (Islamic Banks)?

Yes	1
No	2

A3. Which best describes your (his/her) wage/remuneration situation at your (his/her) current job? SHOW SCREEN

I get minimum wage.	1
I get paid below minimum wage.	2
I get paid above minimum wage.	3

A4. Are you (Is he/she) registered with the Social Security Institution because of this job?

Yes	1
No	2

Appendix 2 – Interviewer Questions

Interviewer note: Mark your observations about the household's dwellings and its surroundings.

SC0100

Type of residence	
1	Detached house
2	Semi-detached house
3	Flat
4	Other

SC0200

Quality of residence	
1	Luxury
2	Upper class
3	Middle class
4	Modest
5	Low income
6	Very low income

SC0300

Location of residence	
1	City center
2	District between city center and suburbs
3	Outskirts of residential area
4	Deserted area, countryside

SC0400

External view of residence	
1	Generally clean and smooth
2	Slightly caught paint or cracks in walls
3	Significant paint, maintenance or repair required
4	Dilapidated

SC0500

Comparison of residence with neighborhood	
1	Worse
2	Similar to neighborhood
3	Better
4	No other houses in sight

SC0600

Quality of surrounding buildings	
1	Luxury
2	Upper class
3	Middle class
4	Modest
5	Low income
6	Very low income

SC0700

Security measures at residence	
1	Doorman
2	Security guard
3	Locked entry
4	External ring only
5	Other
6	Only main door

Appendix 3 – Definitions of Main Concepts

All statistics are calculated using the final estimation weights, which ensure that the figures are representative of the population. Within each country, the sum of estimation weights equals the total number of households in the country, so that the sum of weights in the whole dataset equals the total number of households in the countries participating in the survey. The euro area results correspond to the 19 euro-area countries participating in the survey.

Household reference person in the HFCN: The household reference person is chosen according to the international standards of the so-called Canberra Group (UNECE 2011), which uses the following sequential steps to determine a unique reference person in the household: household type [determined by a one of the partners in a registered or de facto marriage, with dependent children, b) one of the partners in a registered or de facto marriage, without dependent children, and c) a lone parent with dependent children], the person with the highest income, the eldest person.

Household reference person in Turkey: Household reference person is the financially knowledgeable person in the household, who is at least 18 years old.

Net wealth is defined as the difference between total (gross) assets and total liabilities. Total assets consist of real assets and financial assets.

Real assets: Value of the household main residence (for owners), value of other real estate property, value of vehicles (cars and other vehicles, such as boats, planes or motorbikes), value of valuables, value of self-employment businesses of household members investments held in non-self-employment private businesses.

Financial assets: Deposits, publicly traded shares, managed investment accounts, money owed to households as private loans, other financial assets (options, futures, index certificates, precious metals, oil and gas leases, future proceeds from a lawsuit or estate that is being settled, royalties or any other asset), private pension plans and whole life insurance policies.

Total liabilities (debt): Outstanding amount of household main residence mortgages and other real estate property, mortgages outstanding amount of debt on credit cards and credit lines/bank overdrafts, outstanding amounts of other, non-collateralized, loans (including loans from commercial providers and private loans).

Household income is measured as gross income and is defined as the sum of labor and non-labor in-come for all household members. Household income includes the following components: employee income, self-employment income, income from pensions, regular social transfers, regular

private transfers, income from real estate property (income received from renting a property or land after deducting costs such as mortgage interest repayments, minor repairs, maintenance, insurance and other charges), income from financial investments (interest and dividends received from publicly traded companies and the amount of interest from assets such as bank accounts, certificates of deposit, bonds, publicly traded shares etc. received during the income reference period less expenses incurred), income from private business and partnerships and other non-specified sources of income.

Imputed rent is the imputed rent of the dwellings which are occupied by the owners or provided by public organizations or an employee or other type of dwellings occupied by the households without paying rent (such as the household lives in a dwelling which is the owner of the father, relatives and not paying rent).

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