



# HOW DID THE GREEK FINANCIAL CRISIS IMPACT ON HOUSEHOLDS? A COMPARISON BETWEEN THE TWO WAVES OF THE HFCS\*

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## I INTRODUCTION

The impact of the global financial crisis and the sovereign debt crisis in the euro area was substantial, especially in countries with high fiscal and macroeconomic imbalances, such as Greece. In particular, with respect to Greece, the cumulative structural weaknesses of the domestic economy, the country's high external and fiscal debts, political uncertainty and delays in the implementation of the economic adjustment programmes, compounded by the unfavourable global environment, led to a deep and extensive recession. GDP in Greece declined by 24% in nominal terms and by 22% in real terms over the period 2009-2014. This occurred amid intense fiscal consolidation (which had a detrimental effect on the real economy) and radical reforms in labour and product markets in order for the public debt-to-GDP ratio to be reduced and the international cost and price competitiveness of Greece to be restored.

The sharp decline in output was followed by a decrease in employment and a surge in unemployment to historically high levels, from 9.6% in 2009 to 26.5% in 2014. At the same time, a significant drop in the market value of most real and financial assets was observed, in line with falling prices in global capital and real estate markets and the weakening of domestic consumer and investor demand. The decline in Greek GDP largely reflects the drop in consumption, which in turn is due to the considerable decrease in consumers' confidence and the deterioration of households' finances.

The goal of this study is to investigate to what extent the crisis affected the finances of Greek households at the microeconomic level for the period 2009-2014, using data from the two waves of the Eurosystem's Household Finance and Consumption Survey (hereinafter the HFCS). With respect to Greece, the first wave of the HFCS was conducted in 2009 and the

sample consists of 2,971 households, whereas the second wave of the HFCS was conducted in 2014 with a sample of 3,003 households.<sup>1</sup>

The HFCS is an important source of microeconomic data at the household level, as it provides detailed information about households' assets, loans, net wealth, income and consumption. The European sample of the first wave comprises more than 62,000 households in 15 euro area countries, including Greece. The European sample of the second wave comprises more than 84,000 households in 18 euro area countries (i.e. all euro area countries except Lithuania), as well as in Hungary and Poland.<sup>2</sup>

A remarkable characteristic of the HFCS dataset is that, due to the microeconomic structure of the data, there is heterogeneity of economic indicators across households, such as wealth, income, assets, debt and consumption, which cannot be captured by aggregate statistics. Also, there is heterogeneity not only across households but also between countries. Therefore, the micro data of the HFCS are of major importance as they enable us to investigate cross-country differences in households' decisions with respect to assets, loans, income and consumption. In addition, the data analysis of the HFCS helps us gain a deeper insight into the effects of monetary policy, financial stability and fiscal adjustment on specific groups of households.<sup>3</sup>

The two waves of the HFCS for Greece in 2009 and 2014, respectively, enable us to examine

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1 For the core results of the first wave of the HFCS in 2009, see Tzamourani (2013).

2 More information about the methodology of the HFCS and in particular about the structure and the content of the questionnaire, sample design, weighting and multiple imputation for the first and the second wave of the HFCS is provided in the Household Finance and Consumption Network methodological reports, HFCN (2013) and HFCN (2016), respectively.

3 Christelis and Pérez-Duarte (2013) demonstrate the usefulness of the HFCS data.

whether the key economic indicators of households are affected during the crisis. In particular, this study will explore to what extent Greek households' net wealth, assets, loans, income and consumption have changed over the crisis period. Moreover, the study will test whether the variation in the economic indicators is statistically significant.

The paper is organised as follows: In Section 1 the main sample characteristics of the first and the second wave of the HFCS are presented. In Section 2 a comparative analysis of the distribution of Greek households' net wealth is provided, with respect to the two waves of the HFCS in 2009 and 2014. Moreover, a comparative analysis of the components of net wealth, i.e. assets and loans, is presented. In Section 3 the distribution of household income is described, whereas in Section 4 the distribution of household food consumption for both waves of the HFCS is analysed. In the last section the main conclusions of the study are summarised.

## 2 MAIN SAMPLE CHARACTERISTICS

Prior to the presentation of households' net wealth, we discuss some characteristics of the

household sample structure of the two waves of the HFCS in 2009 and 2014. Table 1 presents descriptive statistics with respect to household size and housing status, whereas Table 2 provides information about the age, education and work status of the household reference person.<sup>4</sup> It should be noted that the Greek HFCS data for both waves are cross-sectional, without a panel component. This means that the second wave of the Greek HFCS does not include households that had participated in the first wave of the Greek HFCS.<sup>5</sup>

In Table 1 we observe that the percentage of Greek households with only one member increased in the second wave of the HFCS compared with the first wave, from 20% in 2009 to 26% in 2014. With respect to housing status, the percentage of households that are outright owners is relatively higher in the first

<sup>4</sup> A reference person is defined as the household member who is the most knowledgeable on household assets, loans, income and consumption, associated with both the household as a whole and its individual members. 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 until a unique reference person is identified: one of the partners of a registered or de-facto marriage with dependent children, one of the partners of a registered or de-facto marriage without dependent children, a lone partner with dependent children, the person with the highest income, the eldest person.

<sup>5</sup> From the 18 countries of the second wave of the HFCS, seven countries (Belgium, Germany, Spain, Italy, the Netherlands, Cyprus and Malta) used a panel component.

**Table 1 Household size and housing status in the 1st and 2nd wave of the HFCS**

	1st wave 2009	2nd wave 2014
	%	%
<i>Household size</i>		
1	20.1	25.7
2	28.3	29.5
3	24.2	19.9
4	23.3	19.1
5+	4.1	5.9
<i>Housing status</i>		
Owners-outright	58.5	60.7
Owners with mortgage	13.9	11.4
Renters-others	27.6	27.9

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

**Table 2 Age, education and work status of the household reference person in the 1st and 2nd wave of the HFCS**

	1st wave 2009	2nd wave 2014
	%	%
<i>Age of the reference person</i>		
16-34	15.2	12.5
35-44	20.7	18.0
45-54	17.7	19.9
55-64	18.6	18.0
65-74	15.5	16.1
75+	12.4	15.4
<i>Education of the reference person</i>		
Basic education	45.7	39.3
Secondary	33.4	42.4
Tertiary	20.8	18.3
<i>Work status of the reference person</i>		
Employee	39.7	36.5
Self-employed	18.9	14.4
Retired	34.7	39.3
Other not working	6.6	9.8

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

wave compared with the second wave, from 59% to 61%. The percentage of households that are owners with a mortgage on the household's main residence decreased from 14% to 11% during the crisis period, whereas the percentage of households that are renters has remained the same (28%) for both waves of the HFCS.

In Table 2 we observe that the percentage of reference persons with basic education has visibly declined in the second wave in relation to the first wave, from 46% to 39%, while the percentage of reference persons with secondary education has increased from 33% to 42%. Furthermore, the percentage of reference persons who are retired has increased from 35% in 2009 to 39% in 2014. It is also worth mentioning that the share of reference persons who are not working has increased from 6.6% to 9.8%. This is mainly due to the rise in unemployment during the crisis.

### 3 HOUSEHOLD NET WEALTH

#### 3.1 NET WEALTH DISTRIBUTION

Comparing the HFCS data in 2009 with the HFCS data in 2014, household net wealth, assets, loans, income and consumption of 2009 are expressed at constant prices of base year 2014, using the harmonised index of consumer prices (HICP) as a deflator.<sup>6</sup> It should be noted that this study is based on the median of the above economic indicators rather than the mean because the median is not affected by extreme values.

Moreover, it is important for our analysis to examine whether any change in household net

<sup>6</sup> The questions about assets and loans refer to the time of the interview, whereas the questions about income and consumption refer to the last twelve months prior to the date of the interview. The interviews of the first wave were conducted in 2009, whereas the interviews of the second wave were conducted in 2014.

**Table 3 Household net wealth percentiles in the 1st and 2nd wave of the HFCS**

Percentiles	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in percentiles
	Household net wealth (in EUR)	Household net wealth (in EUR)		
P <sub>10</sub>	2,011	588	-70.8	-2.2**
P <sub>20</sub>	15,947	6,967	-56.3	-3.1***
P <sub>30</sub>	51,763	29,369	-43.3	-5.1***
P <sub>40</sub>	78,474	49,238	-37.3	-7.0***
P <sub>50</sub>	108,649	65,030	-40.1	-7.9***
P <sub>60</sub>	138,356	85,266	-38.4	-6.9***
P <sub>70</sub>	177,281	110,384	-37.8	-6.8***
P <sub>80</sub>	234,985	151,513	-35.5	-6.7***
P <sub>90</sub>	353,573	238,900	-32.4	-4.3***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

\*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.

wealth, assets, loans, income and consumption between the two waves of the HFCS is statistically significant. As already mentioned, the HFCS is a sample-based survey and hence the estimations are subject to sampling error. For the estimation of sampling errors, 1,000 replicate weights are produced, using the bootstrap method, based on the sample design. We apply these replicate weights, which are linked to the sample design, to accurately estimate sampling errors. A detailed methodology for the estimation of sampling errors is provided in the Appendix.

Table 3 presents the data from the second wave of the HFCS in 2014 on the net wealth distribution of Greek households, and compares them to those of the first wave HFCS data of 2009. Specifically, the value of household net assets, i.e. household net wealth, which is derived if household debt is deducted from household assets, is shown. As expected, household net wealth has significantly decreased during the crisis period. In particular, the 50th percentile (P<sub>50</sub>), that is median household net wealth, was €108,649 in 2009, whereas in 2014 it came to €65,030, down by

40%.<sup>7</sup> It is really useful to explore whether this change in net wealth is statistically significant. As shown in Table 3, the t-stat of the change in household net wealth is -7.9, which means that the change in median net wealth is statistically significant at 1%.

It is important to explore whether the decline in household net wealth is reflected across the entire distribution, apart from its median. Table 3 shows that the decrease in household net wealth is noticeable across the range of the distribution. According to the t-statistic, the drop in net wealth is statistically significant from the 10th percentile (P<sub>10</sub>) to the 90th percentile (P<sub>90</sub>). In particular, the decline in the net wealth of the 10th percentile is statistically significant at 5%, whereas for the remaining percentiles it is statistically significant at 1%. Overall, we observe that the magnitude of the decrease in wealth is higher in richer households, i.e. from the 60th percentile (P<sub>60</sub>) upwards, in relation to the corresponding magnitude for poorer households. The 10th percentile of the net wealth dis-

<sup>7</sup> We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

**Table 4 Household median net wealth in the 1st and 2nd wave of the HFCS by income percentiles and housing status**

Net wealth	1st wave 2009	2nd wave 2014
	Median (in EUR)	Median (in EUR)
<i>Income percentiles</i>		
P <sub>1</sub> -P <sub>20</sub>	54,740	32,532
P <sub>20</sub> -P <sub>40</sub>	78,620	50,663
P <sub>40</sub> -P <sub>60</sub>	111,879	62,480
P <sub>60</sub> -P <sub>80</sub>	130,080	85,045
P <sub>80</sub> -P <sub>90</sub>	177,136	106,980
P <sub>90</sub> -P <sub>100</sub>	255,583	137,519
<i>Housing status</i>		
Owners-outright	151,784	93,251
Owners with mortgage	127,764	64,263
Renters-others	5,776	3,035

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

tribution decreased from €2,011 in 2009 to €588 in 2014, that is, by €1,423 in absolute terms or 71% during the crisis. The 90th percentile was €353,573 in 2009, whereas in 2014 it was €239,900. This shows that net wealth decreased by €114,673 or by 32% relative to the upper tail of the net wealth distribution.<sup>8</sup>

### 3.2 HOUSEHOLD WEALTH BY INCOME AND HOUSING STATUS

Table 4 presents median household net wealth for the two waves of the HFCS, classified by income and housing status. As expected, we observe that median household net wealth increases with household income. The drop in median net wealth in 2014 compared with 2009 is obvious in all income levels. Moreover, we find that in both waves median net wealth for outright owners is higher than median net wealth for owners that have a mortgage on the household's main residence, which is reasonable. As to income percentiles, we find that there is a significant decline in net wealth in 2014 compared with 2009 for outright owners, homeowners with mortgage and renters.

### 3.3 HOUSEHOLD ASSETS AND LOANS

To deepen our understanding on why household net wealth has decreased during the crisis, we need to analyse its components, specifically assets and loans. Table 5 compares HFCS data on the assets of Greek households in 2014 with the corresponding HFCS data in 2009. In particular, the value of total assets, which comprise real and financial assets, is presented. With regard to real assets, that is fixed assets, the value of total real estate property is shown, which is the major component of fixed assets (90% in 2009 and 88% in 2014) and consists of households' main residence and other real estate property. With respect to financial assets, we report the value of deposits, which constitute the major component of households' financial assets (88.1% in 2014 and 80.7% in 2009).<sup>9</sup>

<sup>8</sup> For the wealth distribution, see Avery, Elliehausen and Kennickell (1988), Kennickell (2009), Bover (2010), Honkkila and Kavonius (2013), Piketty and Zucman (2014) and Vermeulen (2016).

<sup>9</sup> Many researchers have examined the household asset allocation; see, among others, Chiuri and Jappelli (2003), Campbell (2006), Jappelli (2010), Van Rooij, Lusardi and Alessie (2011), Christelis et al. (2013) and Arrondel et al. (2016).

**Table 5 Median value of household assets in the 1st and 2nd wave of the HFCS**

Value of assets	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in medians
	Median (in EUR)	Median (in EUR)		
Total assets	117,461	73,420	-37.5	-8.4***
Total real assets	121,677	78,087	-35.8	-8.6***
Real estate property	127,795	80,203	-37.2	-6.9***
Household main residence	106,340	69,834	-34.3	-12.7***
Other real estate property	65,900	49,167	-25.2	-2.3**
Total financial assets	4,631	1,995	-56.9	-4.1***
Deposits	3,856	1,987	-48.5	-2.9***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.  
 \*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.

In Table 5 we observe that the median value of household assets decreased during the crisis from €117,461 in 2009 to €73,420 in 2014, i.e. down by 37.5%. This change is statistically significant at 1% (t-stat = -8.4). With respect to fixed assets, it is clear that the median value of real estate property shrank by 37%, from €127,795 in 2009 to €80,203 in 2014. This drop is statistically significant at 1% with t-stat = -8.6. In particular, the median value of households' main residence decreased during the crisis by 34%, from €106,340 in 2009 to €69,834 in 2014. This negative change is statistically significant at 1% (t-stat = -12.7). The median value of other real estate property declined by 24%. This change, in absolute terms, is statistically significant at 5% (t-stat = -2.3). The sharp drop in the value of real estate property is mainly due to the recessionary state of the economy, which is a result of the fiscal adjustment, as well as to higher taxation of real estate.<sup>10</sup> The decrease in the value of real estate property is reflected in the drop of the real estate price index, which is compiled by the Bank of Greece, from 97.9 in 2009 to 64.3 in 2014. Turning to household financial assets, Table 5 shows that the median value of financial assets decreased from €4,631 in 2009 to €1,995 in 2014. This change is statistically significant at 1% with t-stat = -4.1. We also observe that deposits, which are the major component of financial assets, dropped by

48.5%. In particular, the median value of deposits in 2009 was €3,856, whereas in 2014 the median value of deposits stood at €1,987. This drop in deposits is also statistically significant at 1% (t-stat = -2.9). This may be attributed mainly to the decrease in household income and the increase in taxation and social security contributions, as well as to the rise in unemployment during the crisis.

With regard to household debt, the HFCS data in 2014 showed that household debt was lower compared with the HFCS data in 2009. In particular, in 2014, 27.1% of households reported having an outstanding debt, whereas in 2009 the corresponding percentage was 36.6%. In Table 6 data on the outstanding balances of debt of Greek households in 2009 and 2014 are provided.

We observe that the median value of outstanding debt decreased during the crisis by 21.6%, from €15,425 in 2009 to €12,097 in 2014. As clearly seen, the change in the outstanding balance of debt is not statistically significant (t-stat = -1.3). The decrease in household debt is noticeable across all types of debt during the crisis period. The median value of the outstanding balance of mortgage debt

<sup>10</sup> The study by Christelis (2015) is indicative of the effects on the real estate market from increased taxation during the crisis in Greece.

**Table 6 Household debt by loan type in the 1st and 2nd wave of the HFCS**

Household debt	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in medians
	Median (in EUR)	Median (in EUR)		
Total debt	15,425	12,097	-21.6	-1.3
Mortgage debt	43,410	35,261	-18.8	-1.4
With mortgage on household main residence	41,902	34,619	-21.0	-1.2
With mortgage on other property	44,311	34,222	-22.8	-1.0
Non-mortgage debt	4,591	2,936	-36.0	-2.6***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.  
 \*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.

declined by 18.8%, from €43,410 in 2009 to €35,261 in 2014. However, this drop is not statistically significant as the t-stat is -1.4. The median value of the outstanding balance of non-mortgage debt decreased from €4,591 in 2009 to €2,936 in 2014, which is equivalent to a 36% drop over the crisis. This drop is statistically significant at 1%, with t-stat = -2.6. The decrease in household debt may reflect the subdued lending activity of the banking system, coupled with debt repayment during the crisis. Overall, the decrease in household net wealth is attributed primarily to the drop in the value of real estate and secondarily to the drop in deposits.

For a better evaluation of households' financial burden we compare some indicative financial burden ratios for indebted households of

both waves of the HFCS, such as the debt-to-income ratio or the debt-to-assets ratio. As shown in Table 7, the median debt-to-income ratio rose in percentage terms from 47.1% in 2009 to 53.1% in 2014 and the median debt-to-assets ratio increased from 14.8% to 17.3%, respectively. The increase in both ratios is attributed to a great extent to the decline in income and the drop in the value of households' assets, as a result of the fiscal adjustment and the recession. For households that have mortgage debt on their main residence, we calculate the median loan-to-value ratio. According to Table 7, we can see that this ratio has increased during the crisis from 31.6% in 2009 to 42.4% in 2014, reflecting the sharp drop in the value of household main residence. However, it is worth mentioning that the variations in all three financial burden

**Table 7 Household financial burden indicators of the 1st and 2nd wave of the HFCS**

Financial burden indicators (%)	1st wave 2009	2nd wave 2014	t-stat of difference in ratios
	Median	Median	
Debt-to-income ratio	47.1	53.1	0.7
Debt-to-assets ratio	14.8	17.3	0.8
Loan-to-value ratio of household main residence	31.6	42.4	1.5
Debt service-to-income ratio	14.8	8.8	-4.9***
Mortgage debt service-to-income ratio	16.3	18.1	1.2

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.  
 \*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.



ratios are not statistically significant over the crisis period.

Furthermore, two additional financial burden indicators are presented, which are more directly associated with households' financial strain. The first is the debt service-to-income ratio, which is the median ratio of total monthly debt payments to household gross monthly income. This ratio decreased during the crisis from 14.8% in 2009 to 8.8% in 2014. This change is statistically significant at 1%, with  $t\text{-stat} = -4.9$ . Households seem to bear lower debt servicing costs during the crisis, possibly because they renegotiate their loans with better terms, such as lower or fixed interest rates or lower monthly debt payments. However, this is not the case for the second financial burden ratio, i.e. the mortgage debt service-to-income ratio, which is the median ratio of total monthly mortgage debt payments to household gross monthly income. We observe a slight increase in the mortgage debt service-to-income ratio during the crisis. In particular, the ratio rose from 16.3% in 2009 to 18.1% in 2014. This may be due to the significant decline in monthly household income during the crisis, which has a stronger impact

on debt repayment for mortgage loans compared with non-mortgage loans. However, it is worth mentioning that the increase of the ratio is not statistically significant ( $t\text{-stat} = 1.2$ ).<sup>11</sup>

#### 4 HOUSEHOLD INCOME

The HFCS includes questions on the income of each household member and of the household as a whole. In particular, for each household member aged 16 plus, there was a question for employee income, self-employment income, pension income and unemployment benefits. Total gross household income is derived by adding labour income and non-labour income for all household members aged 16 plus. Labour income is the sum of employee income and self-employment income. Non-labour income is derived by adding pension income, income from social transfers, income from private transfers, rental income from real estate property, income from private business, and income from financial investments (dividends, interest on bonds, deposits, etc.).

<sup>11</sup> Hintermeier and Koeniger (2011), Christelis et al. (2017) and Bover et al. (2016), among others, investigate household debt allocation across countries.

**Table 8 Percentiles of annual gross household income in the 1st and 2nd wave of the HFCS**

Percentiles	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in percentiles
	Annual household income (in EUR)	Annual household income (in EUR)		
P <sub>10</sub>	7,758	6,569	-15.3	-2.4**
P <sub>20</sub>	11,729	9,924	-15.4	-6.7***
P <sub>30</sub>	15,533	12,207	-21.4	-6.7***
P <sub>40</sub>	19,179	15,003	-21.8	-7.0***
P <sub>50</sub>	23,492	17,465	-25.7	-8.5***
P <sub>60</sub>	28,453	20,312	-28.6	-8.6***
P <sub>70</sub>	34,209	24,336	-28.9	-8.2***
P <sub>80</sub>	42,259	30,454	-27.9	-8.0***
P <sub>90</sub>	56,865	39,737	-30.1	-7.9***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

\*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.



To compare gross household income between 2014 and 2009, we will not only focus on median household income but we will also analyse the entire range of the income distribution providing data on the percentiles of the distribution. In Table 8 the percentiles of gross household income are presented, from the 10th percentile ( $P_{10}$ ) to the 90th percentile ( $P_{90}$ ) for the first and the second wave of the HFCS. We observe that there is a clear decline in income across the income distribution in 2014, compared with 2009. The drop in gross household income may be attributed to lower labour income, and lower employee income in particular, coupled with cuts in social benefits as a result of the fiscal adjustment effort in Greece during the crisis. Median household income (see 50th percentile) declined by 26% during the crisis period. In particular, in the first wave of the HFCS median household income amounted to €23,942, whereas in the second wave of the HFCS it came to €17,465. As shown in Table 8, the drop in median income during the crisis is statistically significant, with  $t\text{-stat} = -8.5$ .

At the lower tail of the distribution, i.e. the 10th percentile, income decreased by 15%, from €7,758 in 2009 to €6,569 in 2014. The drop is statistically significant at 5%, with  $t\text{-stat} = -2.4$ . At the upper tail of the distribution, i.e. the 90th percentile, income declined by 30% during the crisis (2009-2014). The 90th percentile in 2009 was €56,865, while in 2014 it was €39,737. The decline at the upper tail of the distribution is statistically significant at 1%, with  $t\text{-stat} = -7.9$ . Looking at the entire range of the household income distribution of both waves, we conclude that the decrease in income is statistically significant across all income percentiles. On the other hand, the magnitude of the income drop is greater in richer households than in poorer households, that is from the 60th percentile upwards.

## 5 HOUSEHOLD CONSUMPTION

The HFCS provides valuable information on household consumption. For the comparison of the two waves of the HFCS we will focus on

**Table 9 Percentiles of household total annual food consumption (at home and outside) in the 1st and 2nd wave of the HFCS**

Percentiles	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in percentiles
	Annual food consumption (in EUR)	Annual food consumption (in EUR)		
$P_{10}$	3,144	2,223	-29.3	-5.5***
$P_{20}$	4,202	2,937	-30.1	-6.4***
$P_{30}$	5,089	3,567	-29.9	-16.3***
$P_{40}$	5,743	4,145	-27.8	-11.9***
$P_{50}$	6,520	4,764	-26.9	-7.3***
$P_{60}$	7,644	5,363	-29.8	-17.0***
$P_{70}$	8,865	5,958	-32.8	-9.8***
$P_{80}$	10,089	6,598	-34.6	-8.2***
$P_{90}$	12,700	8,144	-35.9	-10.2***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the  $P_k$  percentile as the value below which  $k\%$  of observations and above which  $(100-k)\%$  of observations can be found.

\*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.

**Table 10 Percentiles of household annual food consumption at home in the 1st and 2nd wave of the HFCS**

Percentiles	1st wave 2009	2nd wave 2014	Percentage changes (%)	t-stat of difference in percentiles
	Annual food consumption at home (in EUR)	Annual food consumption at home (in EUR)		
P <sub>10</sub>	3,144	2,223	-29.3	-5.5***
P <sub>20</sub>	4,202	2,937	-30.1	-6.4***
P <sub>30</sub>	5,089	3,567	-29.9	-16.3***
P <sub>40</sub>	5,743	4,145	-27.8	-11.9***
P <sub>50</sub>	6,520	4,764	-26.9	-7.3***
P <sub>60</sub>	7,644	5,363	-29.8	-17.0***
P <sub>70</sub>	8,865	5,958	-32.8	-9.8***
P <sub>80</sub>	10,089	6,598	-34.6	-8.2***
P <sub>90</sub>	12,700	8,144	-35.9	-10.2***

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

\*\*\*, \*\*, \* denote significance at 1%, 5% and 10%, respectively.

food consumption, as the questionnaire of the first wave did not include any questions on the consumption of goods and services and the amounts spent by the household on utilities. These data are available only for the second wave of the HFCS. Data on total annual food consumption at home and outside home for Greek households are presented in Table 9. Annual food consumption has significantly decreased during the crisis, mainly due to the decline in income and the rise in unemployment. In particular, median annual food consumption at home and outside home fell from €6,520 in 2009 to €4,764 in 2014, which corresponds to a drop of 27%. The decrease in Greek households' median food consumption is statistically significant, with t-stat = -7.3. At the 10th percentile of the distribution of annual food consumption, a decline of 29% can be observed. Specifically, annual food consumption decreased from €3,144 in 2009 to €2,223 in 2014 (i.e. a decrease of €921 in absolute terms). The decrease is statistically significant, with t-stat = -5.5. At the 90th percentile of the distribution, a 24% decrease is observed for the period 2009-2014. In particular, the change in consumption from

€12,700 in 2009 to €8,144 in 2014, which accounts for a drop of €4,565 in absolute terms, is statistically significant, with t-stat = -10.2. The drop in total annual food consumption in 2014 compared with 2009 is statistically significant across all percentiles of the distribution.

Table 10 shows the entire range of distribution of Greek households' annual food consumption at home for both waves of the HFCS. We notice that the decline in annual food consumption at home during the crisis is statistically significant across the distribution range. Median food consumption at home dropped from €5,050 in 2009 to €3,565 in 2014. This negative change is statistically significant, with t-stat = -13.8. Comparing the 10th percentile between the two waves of the HFCS, there is a statistically significant drop in food consumption at home from €2,503 in 2009 to €1,731 in 2014, with t-stat = -3.5. Respectively, at the 90th percentile, there is a statistically significant decline in food consumption at home from €8,804 in 2009 to €5,963 in 2014. Similar to Table 9, relative to the 10th percentile, the drop in consumption is clearly stronger in

**Table 11 Percentage of households reporting that their expenses are lower than their income in the 1st and 2nd wave of the HFCS**

	1st wave 2009	2nd wave 2014
	%	%
<i>Income percentiles</i>		
P <sub>1</sub> -P <sub>20</sub>	9.3	7.2
P <sub>20</sub> -P <sub>40</sub>	17.5	8.5
P <sub>40</sub> -P <sub>60</sub>	19.7	10.0
P <sub>60</sub> -P <sub>80</sub>	22.6	16.1
P <sub>80</sub> -P <sub>90</sub>	32.4	22.0
P <sub>90</sub> -P <sub>100</sub>	48.5	29.3
<i>Housing status</i>		
Owners-outright	24.2	16.0
Owners with mortgage	19.0	8.5
Renters-others	18.3	10.1

Source: 1st and 2nd wave of the Greek HFCS, Bank of Greece.

Note: We define the P<sub>k</sub> percentile as the value below which k% of observations and above which (100-k)% of observations can be found.

richer households that exhibit higher annual food consumption at home. This is in line with the fact that poorer households have a higher marginal propensity to consume, as the bulk of their consumption consists in relatively inelastic expenses.

The HFCS depicts the saving behaviour of households, providing information on the extent to which households' expenses were lower than their income in the past few years.<sup>12</sup> The percentage of Greek households reporting that their expenses were lower than their income in the first wave of the HFCS in 2009 was 21.9%. The corresponding percentage significantly decreased in 2014 to 13.5%. This decrease is statistically significant at 1%, with t-stat = -4.3.

Table 11 presents the share of households reporting that their expenses are lower than their income on the basis of income percentiles and housing status for both waves of the HFCS. We observe, as expected, that the propensity to save in both 2009 and 2014 increases with household income. As we move from lower to upper percentiles, the percent-

age of households reporting that their expenses are lower than their income increases in both waves. On the other hand, the percentage of households that save has declined visibly, relative to 2009, if the focus is on income percentiles. This is attributable to Greek households' significantly lower income and higher taxes during the crisis period, as a result of the fiscal adjustment. We also notice that the saving behaviour of Greek households varies with their housing status. As we would expect, households save more if they are outright owners, compared with those that have a mortgage loan on the household's main residence or compared with renters. However, the percentage of households that are outright owners reporting that their expenses are lower than their income decreased in 2014 compared with 2009, from 24.2% to 16%. The percentage of households that save is slightly higher for owners that have a mortgage loan than for renters in 2009. The saving behaviour of households that are homeowners with a mortgage

<sup>12</sup> The saving behaviour of households receives extensive attention in the literature, such as Guiso et al. (1992), Chang (1994), Browning and Lusardi (1996), Kennickell and Lusardi (2005) and Bover et al. (2016).

has deteriorated in 2014. In particular, 8.5% of owners with a mortgage loan reported that they save, compared with 19% in 2009. The percentage of renters reporting that they save is 10.1%, which is significantly lower than the corresponding percentage in 2009, i.e. 18.3%.

## 6 CONCLUSIONS

This study examines whether and to what extent the crisis has affected the finances of Greek households, using data from the two waves of the HFCS, which were conducted in 2009 and 2014, respectively. The results show that the crisis had a strong negative impact on households' net wealth, assets, income and consumption. Median household net wealth declined during the crisis by 40% and this change is statistically significant. The decrease in the value of household net wealth in 2014 relative to 2009 is visible and statistically significant across the entire distribution. The drop in household net wealth is primarily attributed to the reduced value of their fixed assets, in particular real estate, and secondarily to the lower value of their financial assets. Furthermore, the study points to a decrease in the outstanding balance of total household debt and

mortgage debt, but this variation is not statistically significant. On the other hand, a statistically significant decline in the outstanding balance of non-mortgage debt is observed.

Apart from household net wealth, median household income declined by 26% during the period 2009-2014. The decline is statistically significant across the income distribution. Reduced income and increased taxation had a detrimental effect on household consumption. Median annual food consumption at home and outside home declined by 27%. This drop is statistically significant across the distribution. Household saving shrank over the crisis period. The percentage of households reporting that their expenses are lower than their income fell from 21.9% in 2009 to 13.5% in 2014.

The third wave of the Greek HFCS will be conducted within 2017 and will include additional questions on households' liabilities. In particular, unlike the first and the second wave, the third wave will gather information not only on households' outstanding loans, but also on unpaid taxes, social security contributions or utility bills (electricity, water or phone bills), thereby providing valuable insight into overall household debt.

## APPENDIX SAMPLING ERROR ESTIMATION METHOD

The HFCS uses multiple imputation method for the estimation of missing values.<sup>13</sup> Using this method we can estimate the sampling error. The total variance  $T$  of the estimator for a parameter  $\hat{Y}$  is given by:

$$T = W + \left(1 + \frac{1}{m}\right) Q \quad (1)$$

where  $W$  is the within variance,  $Q$  is the between variance and  $m$  is the number of implicates. The number of implicates  $m$  for the two waves of the HFCS is 5.

To estimate the change in the estimator of the parameter  $\hat{Y}$  between the first wave of the HFCS in 2009 and the second wave of the HFCS in 2014, we use the following formula:

$$Var(\hat{D}) = Var(\hat{Y}_{2009}) + Var(\hat{Y}_{2014}) - 2Cov(\hat{Y}_{2009}, \hat{Y}_{2014}) \quad (2)$$

where  $\hat{D} = \hat{Y}_{2014} - \hat{Y}_{2009}$ , i.e. the change in the estimator of the parameter  $\hat{Y}$  between the two waves,  $Var(\hat{Y}_{2009})$  and  $Var(\hat{Y}_{2014})$  are the variances of  $\hat{Y}_{2009}$  and  $\hat{Y}_{2014}$  respectively, and  $Cov(\hat{Y}_{2009}, \hat{Y}_{2014})$  is the covariance between  $\hat{Y}_{2009}$  and  $\hat{Y}_{2014}$ . As already mentioned, in the case of Greece, both samples from the two waves of the HFCS do not use a panel component and hence they are

statistically independent. Therefore, in our case  $Cov(\hat{Y}_{2009}, \hat{Y}_{2014}) = 0$ . Therefore, (2) is converted as follows:

$$Var(\hat{D}) = Var(\hat{Y}_{2009}) + Var(\hat{Y}_{2014}) \quad (3)$$

The  $t$ -statistic for the change in the estimator of the parameter  $\hat{Y}$  between the two waves is given by the following formula:

$$t_{stat} = \frac{\hat{D}}{std\ err(\hat{D})} \quad (4)$$

where  $std\ err(\hat{D}) = \sqrt{Var(\hat{D})}$

For the degrees of freedom ( $df$ ) we use the following formula:

$$df_m = (m-1) \left[ 1 + \frac{W(\hat{Y}_{2014}) - W(\hat{Y}_{2009})}{(1+m)^{-1}(Q(\hat{Y}_{2014}) - Q(\hat{Y}_{2009}))} \right]^2$$

where  $m$  is the number of implicates,  $W(\hat{Y}_{2014}) - W(\hat{Y}_{2009})$  is the change in the within variance of  $\hat{Y}_{2009}$  and  $\hat{Y}_{2014}$  and  $Q(\hat{Y}_{2014}) - Q(\hat{Y}_{2009})$  is the change in the between variance of  $\hat{Y}_{2009}$  and  $\hat{Y}_{2014}$ .

<sup>13</sup> For details on the multiple imputation method, see Christelis (2011).

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