Distributional accounts: a tool for monitoring the distribution of household wealth and debt components

Rationale

This article presents annual distributions of aggregate wealth and debt components of Spanish households by income and wealth. Distributions for the period 2002 to 2020 are estimated drawing on the seven available waves of the Spanish Survey of Household Finances, while those for the latest period (2021-2022) are predictions.

Takeaways

- Distributional wealth and debt accounts allow us to monitor the distribution of aggregate wealth and debt among different groups of households when microeconomic data are lacking.

- For the period 2020 to 2022, the model estimates that households in the bottom two quintiles of the income distribution saw their share of total housing wealth and debt for purposes other than house purchase rise, by 0.6 pp and 0.4 pp, respectively. By contrast, their share of bank deposits, shares and debt for house purchase is estimated to have fallen, by 0.2 pp, 0.1 pp and 0.3 pp, respectively.

- Also for the period 2020 to 2022, the model estimates that households in the top income decile saw their share of total housing wealth and debt for purposes other than house purchase fall, by 0.5 pp and 1.1 pp, respectively, while their share of bank deposits and debt for house purchase is estimated to have risen, by 0.5 pp and 1.2 pp, respectively.

Keywords

Households, temporal disaggregation, inequality, wealth, housing, financial assets, debt, bank deposits, investment funds.

JEL classification

D31, E21, E27, G51.

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Introduction to distributional accounts

There is high demand, from international organisations[1] and some areas of economic research, for information on aggregate household wealth and debt distribution by income and wealth. In particular it is important to have distributional information that is higher frequency and less lagged than the data generally obtained from microeconomic surveys or administrative sources.[2] Distributional accounts meet this need, as they allow us to monitor household wealth and debt distribution when microeconomic data are unavailable. They also provide data for analysis of various key economic issues, such as studies on the aggregate response to savings or debt shocks based on macroeconomic models with heterogeneous agents (Battistini, Di Nino and Gareis, 2023).

There are two empirical approaches for preparing distributional accounts. The first uses administrative data from aggregated and disaggregated sources, bearing in mind that the latter may include tax data.[3] As tax data do not always include the equity value of individuals' different wealth and debt instruments, this approach estimates the value of each instrument by capitalising the tax revenue generated. Thus, for instance, the aggregate value of listed shares is estimated by capitalising dividend payouts. For assets that do not generate taxable income, housing wealth or pension funds, additional assumptions are needed to estimate how their aggregate value is distributed. In this case, aggregate wealth distributions over a long period are calculated simultaneously for different institutional sectors and countries. Recently this approach has been used to draw up real-time inequality indicators (see Blanchet, Saez and Zucman (2022) for the United States).[4]

The second approach uses microeconomic survey data related to the different National and Financial Accounts aggregates, which can be complemented by other administrative data. As survey data do not generally have a long track record, the main aim of this approach is to provide up-to-date monitoring of wealth and debt distributions. Both the Federal Reserve System in the United States and the European Central Bank have published a series of previous studies analysing the correspondence between the micro- and macroeconomic data. In this context, macroeconomic series are used to interpolate and predict wealth and debt distributions in the periods for which there are no microeconomic data available.[5] Every quarter the Federal Reserve

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1 G20 Data Gaps Initiative I.16.

2 For instance, the results of the 2021 wave of the Household Finance and Consumption Survey (conducted every three years by the Eurosystem countries) were published in summer 2023. In Spain, the *Panel de Hogares de la Agencia Tributaria* currently provides data up to 2019 (https://sede.agenciatributaria.gob.es/Sede/en_gb/estadisticas/muestras-datos-fiscales/panel-hogares.html).

3 Saez and Zucman (2016); Piketty, Saez and Zucman (2018); Piketty, Yang and Zucman (2019); Artola, Bauluz and Martínez-Toledano (2021), and Blanchet and Martínez-Toledano (2023).

4 These results are published here: https://realtimeinequality.org/.

5 Batty et al. (2020), Ahnert, Kavonius, Honkkila and Sola (2020), and Engel, Riera, Grilli and Sola (2022). For Spain, see Bover, García-Uribe, Gómez-García, Velilla and Urcelay (forthcoming).

publishes results obtained using the Survey of Consumer Finances, the US equivalent of Spain's Survey of Household Finances *(Encuesta Financiera de las Familias* (EFF)). This is the methodology used here.[6]

This article presents distributional accounts for the largest components of total wealth that have conceptual correspondence with the macroeconomic aggregates available (housing wealth, bank deposits, listed shares and debt).[7] Investment funds are also analysed as they have showed great dynamism since 2020, despite being less comparable in quantitative terms.[8] Using this methodology, annual wealth and debt distributions observed and estimated drawing on the EFF waves between 2002 and 2022 are presented by household groups with different income and net wealth levels. For this purpose, the EFF data are combined with data from the Financial Accounts of the Spanish Economy (FASE) and the Banco de España's Statistical Bulletin (SB) and Summary Indicators (SI).

For the period 2020 to 2022, the model estimates that households in the bottom two quintiles of the income distribution saw their share of housing wealth and investment funds increase and their share of the value of bank deposits decrease. On these estimates, their share of total debt for house purchase also fell, while their share of all other debt rose. The estimates also show that between 2020 and 2022, households in the top income decile saw their share of housing wealth, investment funds and shares decrease, their share of bank deposits and debt for house purchase increase, and their share of all other debt fall.

Methodology

Before distributional accounts for Spain can be estimated, a correspondence must be established between the aggregate macroeconomic series and the microeconomic data, given that the aggregates are used to predict the value of the wealth and debt components held by each group.[9]

One first noteworthy feature of the methodology used in this article is that it does not require that the total wealth and debt that households report to the EFF coincide with the corresponding totals in the Financial Accounts or other aggregate sources such as the Banco de España's Summary Indicators. If the values do not coincide, the difference between the aggregate value reported in the EFF and the value of the corresponding aggregates would be distributed in some

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6 A common assumption in the first approach is that all household groups earn the same returns on their assets, which may not always be the case (see Fagereng, Guiso, Malacrino and Pistaferri, 2016).

7 According to EFF2020, total household assets are the sum of the value of a household's main residence (41.7%) and other real estate properties (27.8%), business related to self-employment (8%), jewellery and works of art (1.1%), bank deposits (8.6%), investment funds (2.5%), listed shares (2.1%), unlisted shares and other equity (3.1%), pension schemes and insurance (2.9%), fixed-income securities (0.1%) and other financial assets (2.2%). This analysis covers approximately 82.6% of total asset value. The assets not compared have lower conceptual comparability with the aggregated sources. As regards the value of debt, this article considers all the components included in the Financial Accounts.

8 The methodology used in this article is based on the similarity between the FASE and the EFF data. The correspondence between the EFF and the FASE data for bank deposits and listed shares is greater than for investment funds (see Bover, García-Uribe, Gómez-García, Velilla and Urcelay (forthcoming)).

9 Bover, García-Uribe, Gómez-García, Velilla and Urcelay (forthcoming).

Comparison between the EFF data and the macroeconomic aggregates

Components	Correlations of levels (a)	Correlations of rates of change (b)
Housing wealth	0.94	0.95
Bank deposits	0.99	0.79
Investment funds	0.96	0.84
Listed shares	0.81	0.76
Debt for house purchase	0.85	0.98
Debt for purposes other than house purchase	0.79	0.83

SOURCE: Banco de España: EFF, FASE, Statistical Bulletin and Summary Indicators.

a Correlation of the levels of the aggregate of each main wealth component between the EFF and the corresponding macroeconomic source used for the 2002-2020 estimate.
b Correlation of the three-yearly rates of change of the aggregate of each main wealth component between the EFF and the corresponding macroeconomic source used for the 2002-2020 estimate.

way between households, although this could make the results highly sensitive to small changes in the assumptions.[10] Although there is some discrepancy between the aggregate series constructed using the EFF and the macroeconomic sources, the correlations between the two variables are over 94% for housing, investment funds and bank deposits, and between 79% and 85% for listed shares and debt (see Table 1).

As a first step, the data from the seven waves of the EFF are used to measure the aggregate value of the analysed wealth and debt components held by each income and net wealth group. The aggregate value of each group is then correlated with the aggregate taken from the macroeconomic sources using linear regression models (Chow and Lin, 1971). In this way, interpolations of the aggregates in each group are obtained at the points in time where there are no distributional data or predictions since the last observation available in the EFF. The methodology is described in detail in the appendix. One advantage of this method is that it uses, for the purposes of interpolation and extrapolation, the complete time correlation between the micro- and macroeconomic series, rather than a simple interpolation between two points in time. The Federal Reserve is implementing variations of this methodology (Batty et al., 2020). In keeping with previous studies, the next sections of this article set out estimates of distributional accounts for different income and net wealth groups.

Importantly, the literature on distributional accounts provides no systematic measures of the accuracy of the estimates. One reason for this is that the existing studies tend to combine statistical data from different sources, which makes it difficult to achieve a common framework for accuracy measures. For instance, tax records may not be representative of the total population, and the concepts included in the surveys may be different from those included in the aggregates, which is why interim statistical adjustments are made. In addition, some of the interim estimates are drawn up using only a small number of observations. One method sometimes used is to

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10 Kennickell, Lindner and Schürz (2021).

evaluate the model's prediction errors, taking the difference between the predictions and the observed distributions for a given year (Batty et al., 2020). However, to be fully reliable, this procedure must be validated over many years and such a long period is not always available. In this article, certain standard errors are provided in the footnotes.[11]

Results for real and financial wealth components

This section illustrates how some real and financial wealth components have evolved according to the aggregated sources.[12] The methodology described is then used to decompose this aggregate into income and wealth groups. Specifically, it looks at housing wealth and financial assets (bank deposits, investment funds and shares).

According to the EFF2020 (Banco de España, 2022), housing and other real estate properties accounted for 69.5% of the value of households' total assets in 2020. Following a pronounced sequence of rises and falls between 2002 and 2013, the aggregate value of housing according to the Banco de España's SI grew by 12.2% in nominal terms between 2020 and 2022 (see Chart 1.a). Chart 1.b shows that, between 2011 and 2020, the share of housing wealth of households in the top income decile rose from 24% to 26.6%, while the share of households in the bottom two quintiles of the income distribution fell from 24.5% to 19.5%. According to the estimated model, the downward trend seen for households in the bottom two quintiles reversed slightly between 2020 and 2022, with their estimated share of housing wealth increasing by 0.6 pp to 20.1%, while the share of the top income group decreased by 0.5 pp.[13]

By net wealth group, between 2011 and 2020 the share of housing wealth held by the top 10% of households rose from 33.2% to 38.5%, an increase of 5.3 pp. Between 2002 and 2011, this group's share of aggregate housing wealth grew by 3 pp. In turn, between 2011 and 2020, the bottom 50% of households went from holding 20.3% of housing wealth to 14.9%. According to the estimates in Chart 1.c, in 2022 the share of housing wealth of households with below median wealth rose, to 15.7%, while the share of those with net wealth above the 90th percentile of the distribution stood at around 36.7%, 1.8 pp less than in 2020.

According to the EFF2020, financial assets account for 21.4% of households' total assets. This analysis focuses on the financial assets that have greater conceptual correspondence with the aggregates, namely bank deposits and listed shares. Moreover, as mentioned in the methodological
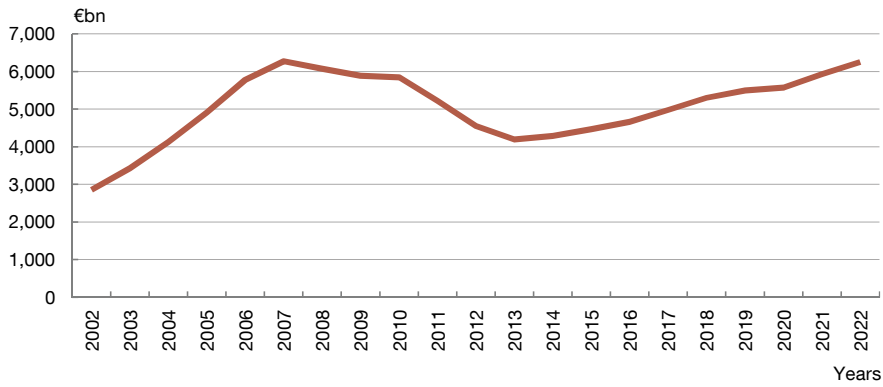
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11 To calculate the standard errors in the predicted aggregate value of each group's assets or debt, the analytical expressions of the matrix of variances and covariances of Quilis's high frequency series estimates (2001) are used. The standard errors of the shares are estimated using the delta method. Given the length of the series used, there is no discussion as to whether or not the changes are statistically significant.

12 Data on "Household housing real-estate wealth" from the Summary Indicators are used as a measure of housing wealth. The FASE data series on deposits, listed shares and investment fund shares or units of households and non-profit institutions serving households are used as measures of bank deposits, listed shares and investment funds.
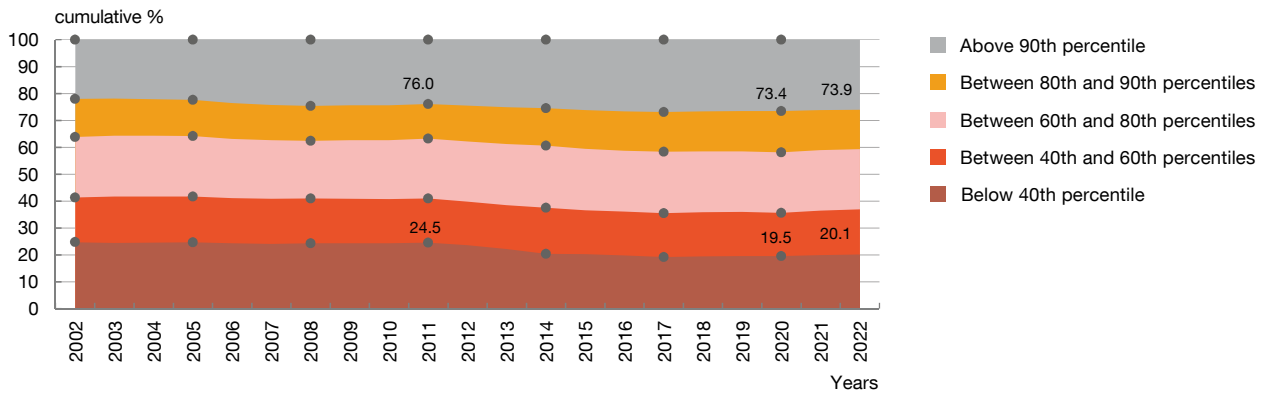
13 The standard error of the share of housing wealth in the distribution in 2022 is 0.19 pp for the top income group and 0.14 pp for the bottom income group. Therefore, the estimated changes between 2020 and 2022 would be slightly more than two standard errors for each group.
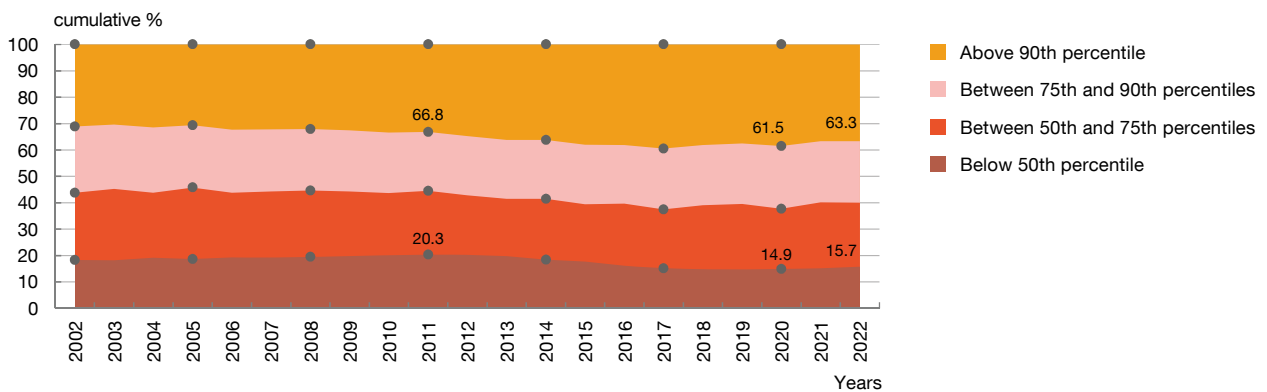
Chart 1
Housing wealth

1.a Households' housing wealth (a)

1.b Distributional accounts for housing wealth, by income group (b)

Above 90th percentile
Between 80th and 90th percentiles
Between 60th and 80th percentiles
Between 40th and 60th percentiles
Below 40th percentile

1.c Distributional accounts for housing wealth, by net wealth group (b)

Above 90th percentile
Between 75th and 90th percentiles
Between 50th and 75th percentiles
Below 50th percentile

SOURCE: Banco de España.

a Summary Indicators, Banco de España (Quarterly release). Figures refer to the last quarter of each year.
b Distribution of housing wealth according to the EFF by income group (1.b) or net wealth group (1.c). Figures represented by the dots are from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.

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section, investment funds are also considered owing to their growth over the period from 2020 to 2022.

Bank deposits make up 8.6% of households' total assets (EFF2020). According to the FASE, households' bank deposits were one of the asset categories that experienced the most growth (9.6% in nominal terms) between 2020 and 2022. Between 2017 and 2020, the share of bank deposits of households in the top income decile increased from 28.1% in 2017 to 30.3% in 2020. Conversely, the share of the aggregate value of bank deposits of households in the bottom two income quintiles fell from 15.6% to 15.4% (see Chart 2.b). The model predicts a continuation of this pattern, with households in the bottom two income quintiles seeing their share of the value of bank deposits falling by around 0.2 pp between 2020 and 2022 (see Chart 2.b). In turn, the top income decile accounted for an estimated 30.8% of the aggregate value of bank deposits in 2022, 0.6 pp more than in 2020.[14] The remaining 54% corresponds to households with income between the median and the 90th percentile, whose share is estimated to have decreased by 0.4 pp since 2020.

According to the EFF2020, at the end of 2020 investment funds accounted for 2.5% of households' total assets. Chart 3.a shows the changes in the aggregate value of households' investment funds, which is estimated to have increased by 7.8% in nominal terms between 2020 and 2022. Between 2017 and 2020, the top income decile saw its share of the aggregate value of investment funds rise from 47.2% to 56.4%, a larger increase (9.2 pp) than that seen for its share of bank deposits (2.2 pp). By contrast, the bottom two quintiles saw their share fall from 11.6% to 6.3% between 2017 and 2020. The estimate for the period 2020-2022 suggests that this trend was partially reversed, with the share of households in the bottom two income quintiles growing from 6.3% in 2020 to 7.4% in 2022 (an increase of 1.1 pp) and the value of the investment funds held by households in the top income decile decreasing from 56.4% to 55.8% (a drop of 0.6 pp).[15] Also on these estimates, by net wealth group, in 2022 79.2% of the value of investment funds was concentrated in the top net wealth decile and 2% in the 50% of households with lower net wealth.

Listed shares are the last financial asset class considered. According to the EFF2020, they account for 2.1% of households' total assets. Chart 4.a shows the changes in the aggregate value of the stock of listed shares held by households since 2002, with an estimated increase of 4% in nominal terms between 2020 and 2022. The model estimates that, between 2020 and 2022, households in the top income decile saw their share of the value of listed shares fall from 66.9% to 65%, while households in the bottom two quintiles saw their share fall by barely 0.1 pp. Therefore, households with income between the 40th and 90th percentiles increased their share by around 2 pp during this period. In turn, in 2022, households in the top net wealth decile held 86.2% of the aggregate value, while households in the bottom half held around 2%.
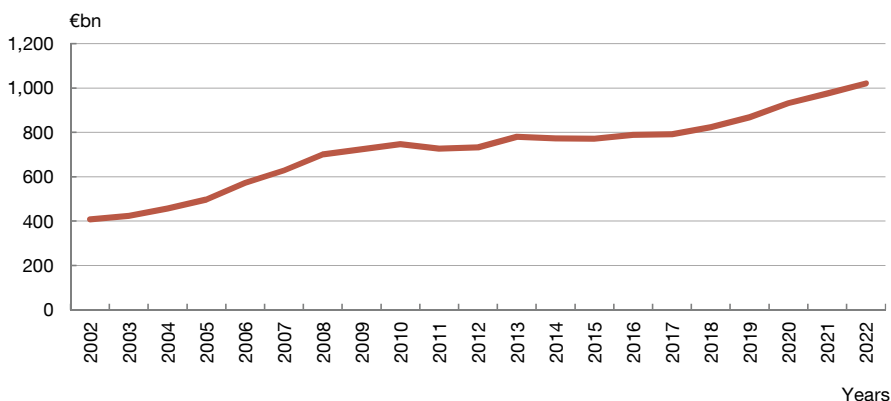
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14   The standard error of the share of bank deposits in 2022 is 0.26 pp for the top income group and 0.22 pp for the bottom two income quintiles. Therefore, the change in the estimated share of bank deposits of the highest income group between 2020 and 2022 (0.6 pp) would be greater than two standard errors. The size of the estimated decrease seen by the lower income group (0.2 pp) would be around one standard error of the prediction for 2022.

15   The standard error of the share of the aggregate of investment funds in 2022 is 0.16 pp for the top income group and 0.84 pp for the bottom income group. Therefore, the estimated changes between 2020 and 2022 represent at least two standard errors for the higher income group and 1.4 standard errors for the lower income group.
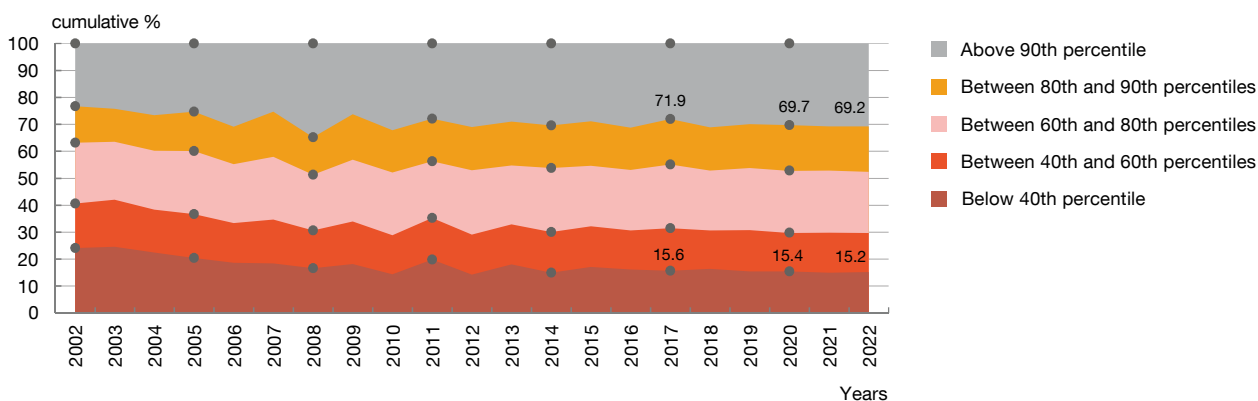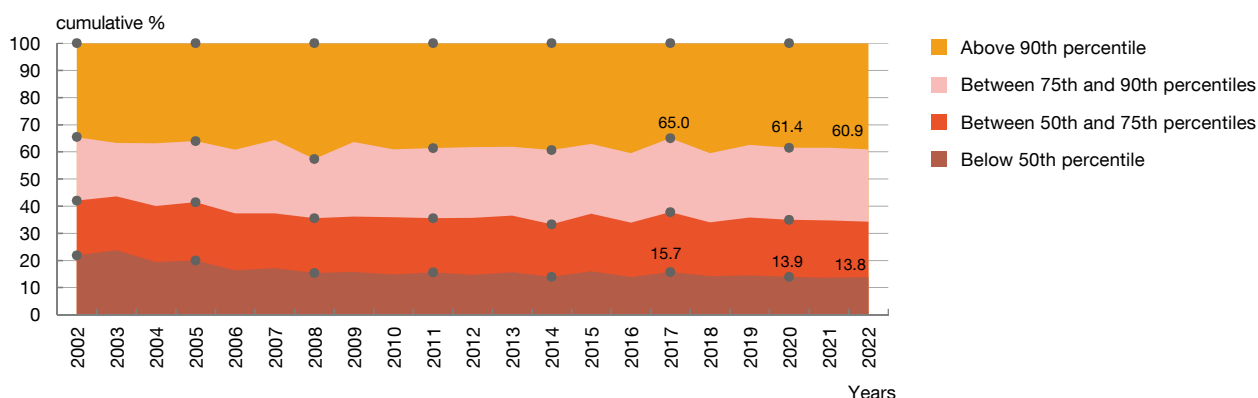
Chart 2
Bank deposits

2.a Bank deposits, households and NPISHs (a)

€bn

2.b Distributional accounts for bank deposits, by income group (b)

cumulative %

Legend:
- Above 90th percentile
- Between 80th and 90th percentiles
- Between 60th and 80th percentiles
- Between 40th and 60th percentiles
- Below 40th percentile

2.c Distributional accounts for bank deposits, by net wealth group (b)

cumulative %

Legend:
- Above 90th percentile
- Between 75th and 90th percentiles
- Between 50th and 75th percentiles
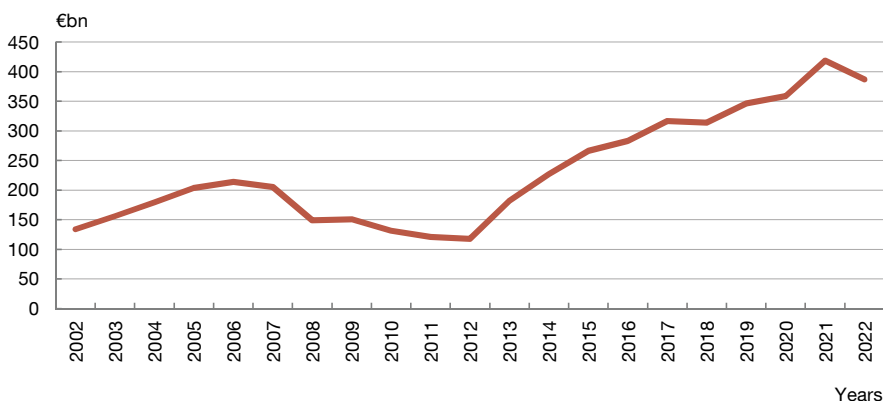- Below 50th percentile

SOURCE: Banco de España.

a FASE, Banco de España (Quarterly release). Sum of transferable deposits and other deposits – households and NPISHs. Data refer to the last quarter of the year.
b Distribution of the total value of bank deposits according to the EFF by income group (2.b) or net wealth group (2.c). The values represented by the dots are obtained from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.
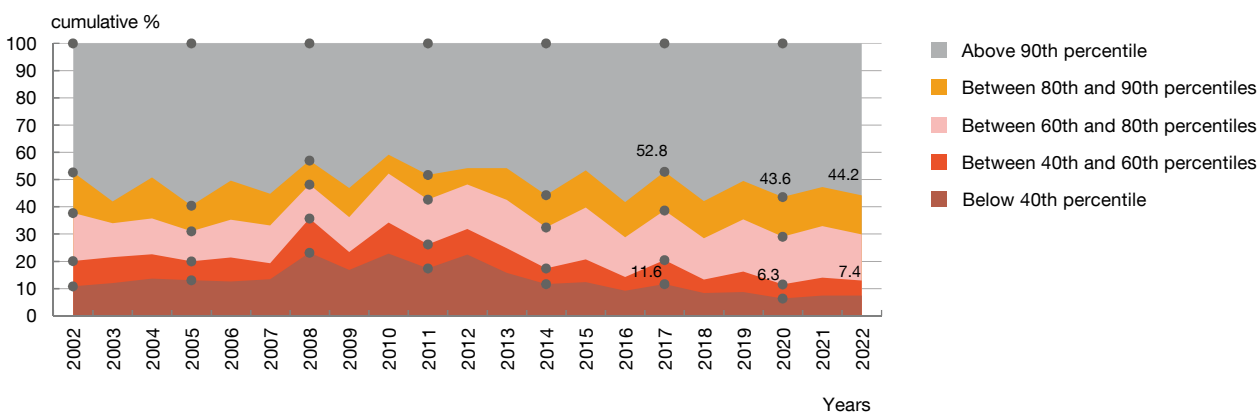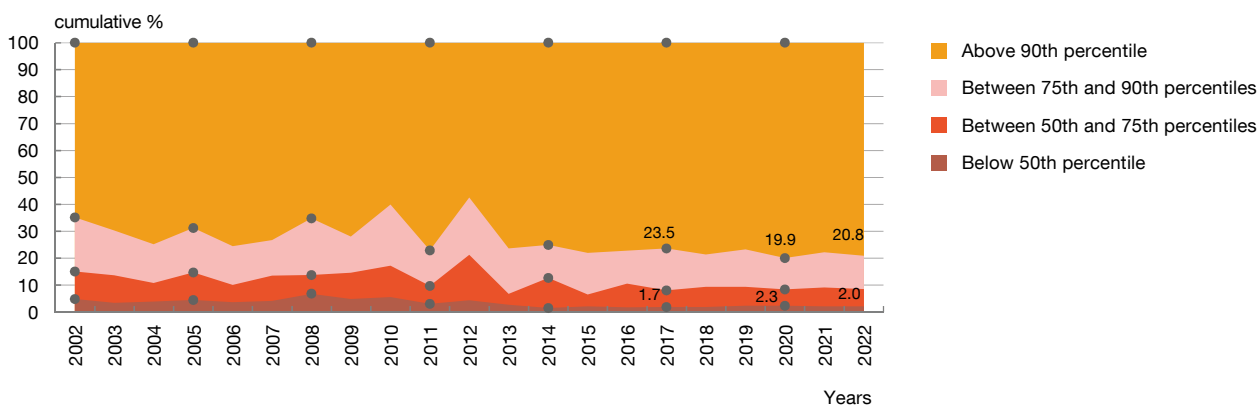
Chart 3
Investment funds

3.a Investment fund shares or units

€bn

3.b Distributional accounts for investment funds, by income group (b)

cumulative %

- Above 90th percentile
- Between 80th and 90th percentiles
- Between 60th and 80th percentiles
- Between 40th and 60th percentiles
- Below 40th percentile

3.c Distributional accounts for investment funds, by net wealth group (b)

cumulative %

- Above 90th percentile
- Between 75th and 90th percentiles
- Between 50th and 75th percentiles
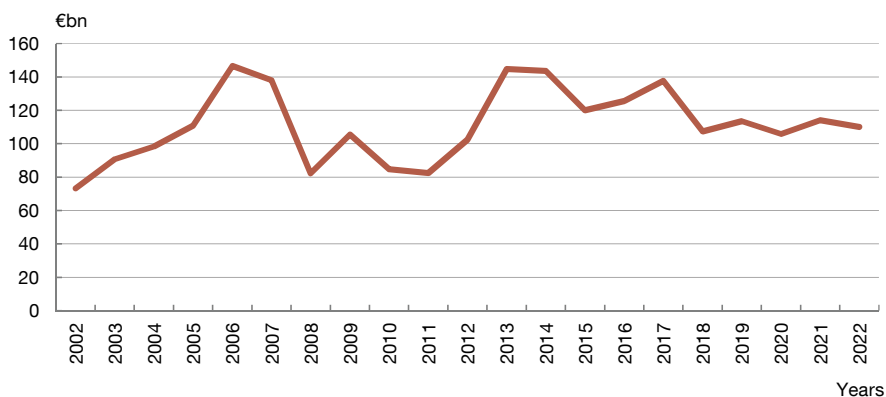- Below 50th percentile

SOURCE: Banco de España.

a FASE, Banco de España (Quarterly release). Consolidated value of investment fund shares or units – households and NPISHs. Data refer to the last quarter of the year.
b Distribution of the total value of investment funds according to the EFF by income group (3.b) or net wealth group (3.c). The values represented by the dots are obtained from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.
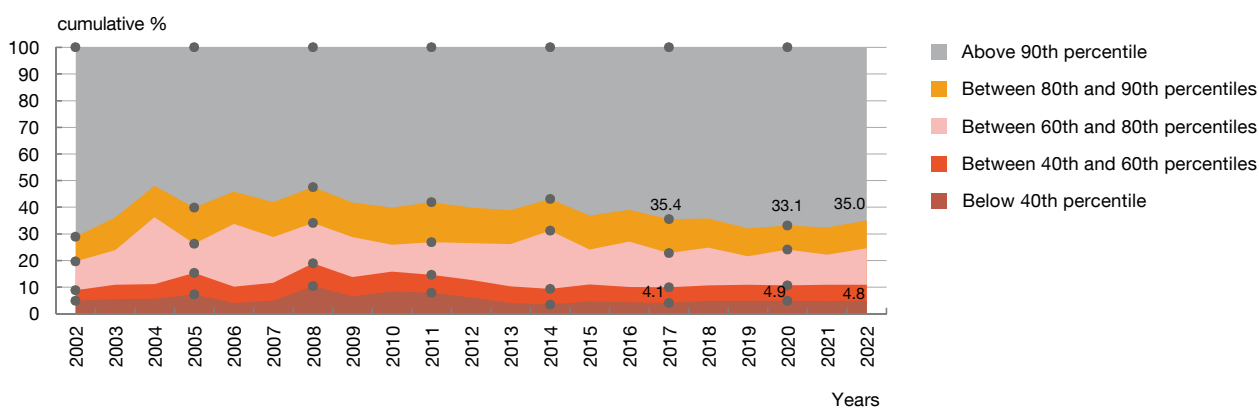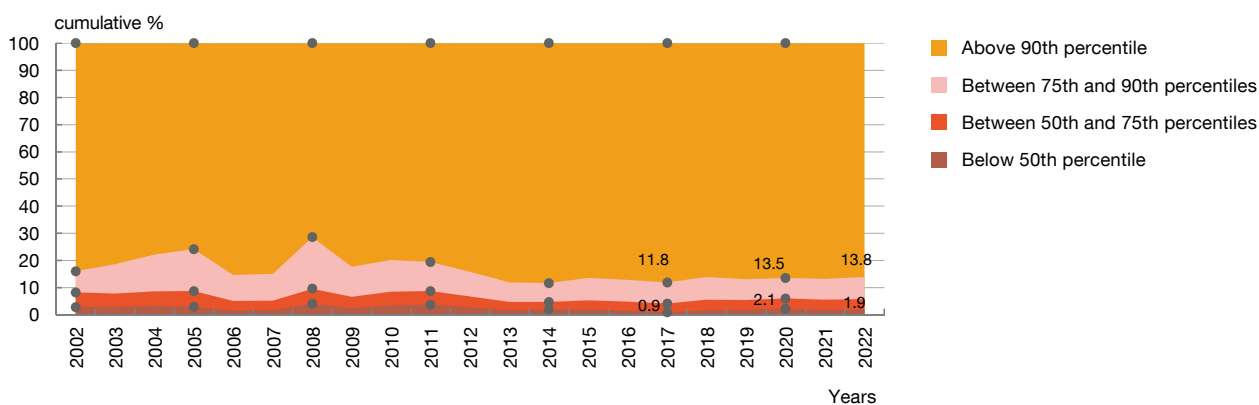
Chart 4
Listed shares

4.a Listed shares, households and NPISHs (a)

€bn

4.b Distributional accounts for listed shares, by income group (b)

cumulative %

- Above 90th percentile
- Between 80th and 90th percentiles
- Between 60th and 80th percentiles
- Between 40th and 60th percentiles
- Below 40th percentile

4.c Distributional accounts for listed shares, by net wealth group (b)

cumulative %

- Above 90th percentile
- Between 75th and 90th percentiles
- Between 50th and 75th percentiles
- Below 50th percentile

SOURCE: Banco de España.

a FASE, Banco de España (Quarterly series). Volume of listed shares – households and NPISHs. Data refer to the last quarter of the year.
b Distribution of the total value of listed shares according to the EFF by income group (4.b) or net wealth group (4.c). The values represented by the dots are obtained from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.

Results for debt components

Debt incurred for the purchase of real estate properties accounted for 84% of households' outstanding debt, according to the EFF2020. Chart 5.a shows how aggregated debt for house purchase has evolved since 2002 according to the Statistical Bulletin. It varied only 0.9% (in nominal terms) between 2020 and 2022. Between 2011 and 2020, the top income decile's share of debt for house purchase increased from 20.2% to 25.2%, while the share of the bottom two income quintiles fell from 15.2% to 13.8% (see Chart 5.b). The model estimates that this pattern continued between 2020 and 2022, with the top income group seeing a 1.2 pp increase in their share of debt for house purchase and the bottom group a 0.3 pp decrease. Thus, debt for house purchase appears to have continued to build up, particularly in the top income decile.

Chart 6.a shows the changes in the aggregate value of outstanding debt for purposes other than house purchase[16] since 2002 according to the Statistical Bulletin, with an estimated increase of 0.8% (in nominal terms) between 2020 and 2022. Chart 6.b shows that, between 2008 and 2020, households in the bottom two income quintiles saw their share of debt for other purposes rise from 12.5% to 20.3%, while households in the top decile saw a fall from 24.8% to 22.6%. The model estimates a continuation of this pattern in 2022, with debt increasing by around 0.4 pp for households in the bottom income group and decreasing by around 1.1 pp for households in the top group.

The results differ by net wealth group. In 2014, households with below median wealth accounted for 59.6% of total debt for house purchase (see Chart 5.c). From that year on, the share of debt for house purchase of lower net wealth households decreased to stand at 45.6% in 2020. By contrast, over the same period, households with net wealth between the 50th and 90th percentiles of the distribution saw their share of this type of debt increase from 29.9% to 42.5%. The estimates for 2022 suggest that the distribution of debt for house purchase remained on this same downward path for lower net wealth households and upward path for average and higher net wealth households. Households with below median net wealth increased their share of debt for other purposes from 46.1% in 2017 to 52% in 2020 (see Chart 6.c). The estimates suggest that the debt for other purposes of these households rose to 52.8% in 2022.
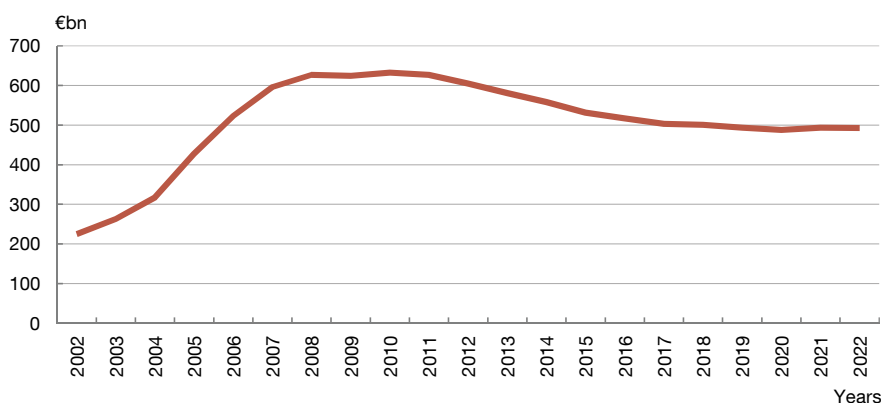
Conclusions

Distributional accounts allow us to monitor the distribution of wealth and debt among different groups of households over time, although they generally rely on a large number of assumptions. Thus, in the absence of detailed up-to-date information on household wealth and debt, one approach consists in capitalising tax revenue, assuming a certain degree of heterogeneity of rates of return on assets across different types of households. By contrast, the approach used here does not require that the micro- and macroeconomic aggregates fully coincide, which raises the question of how best to reconcile the two magnitudes and distribute the differences.
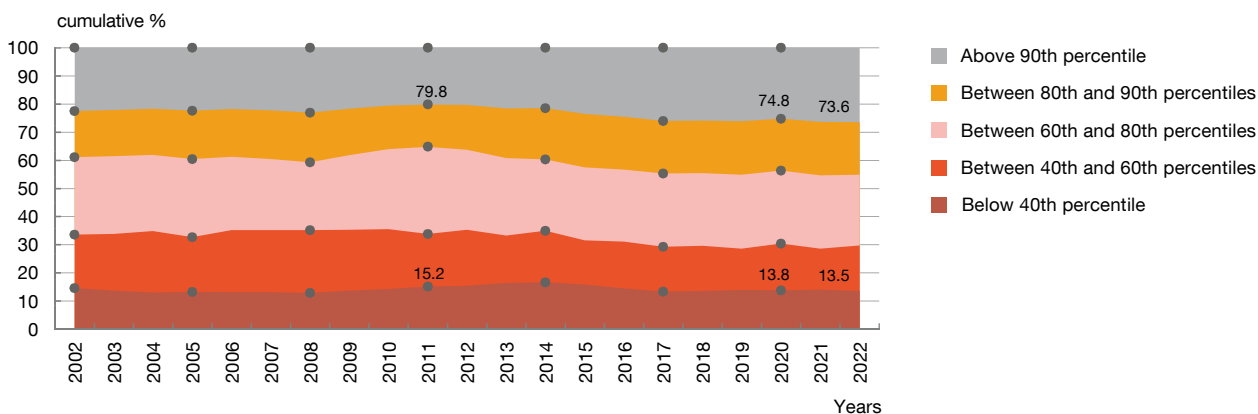
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16 Debt for other purposes includes any type of debt arranged with financial institutions other than debt for house purchase. It can include loans for the purchase of real estate properties other than housing, loans for other purposes, credit card debt or personal loans for the purchase of vehicles.
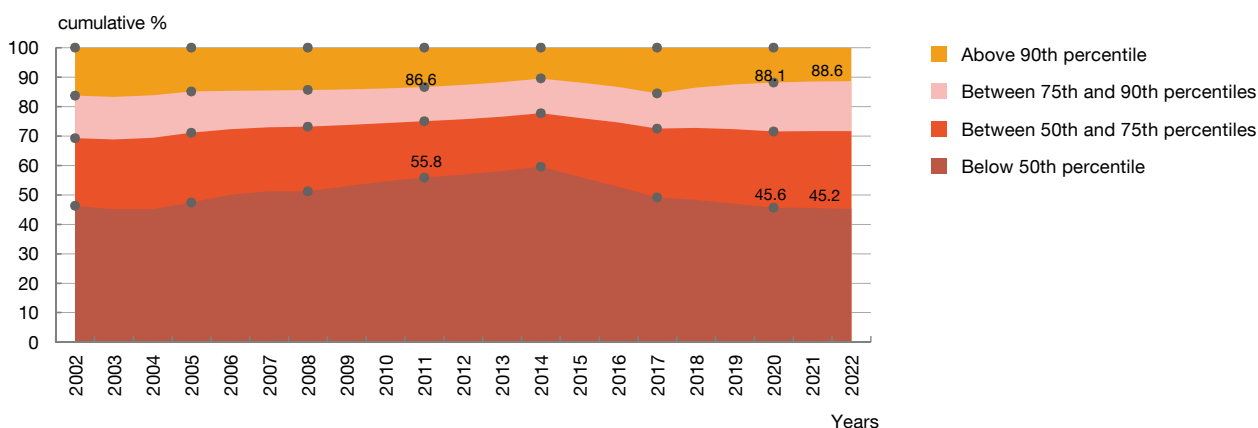
Chart 5
Debt for house purchase

5.a Households' loans for house purchase (a)

€bn

5.b Distributional accounts for debt for house purchase, by income group (b)

cumulative %

Legend:
- Above 90th percentile
- Between 80th and 90th percentiles
- Between 60th and 80th percentiles
- Between 40th and 60th percentiles
- Below 40th percentile

5.c Distributional accounts for debt for house purchase, by net wealth group (b)

cumulative %

Legend:
- Above 90th percentile
- Between 75th and 90th percentiles
- Between 50th and 75th percentiles
- Below 50th percentile

SOURCE: Banco de España.

a Statistical Bulletin. Credit institutions and specialised lending institutions. Total lending and total non-performing loans to other resident sectors by purpose, loans to households for house purchase. Data refer to the last quarter of the year.
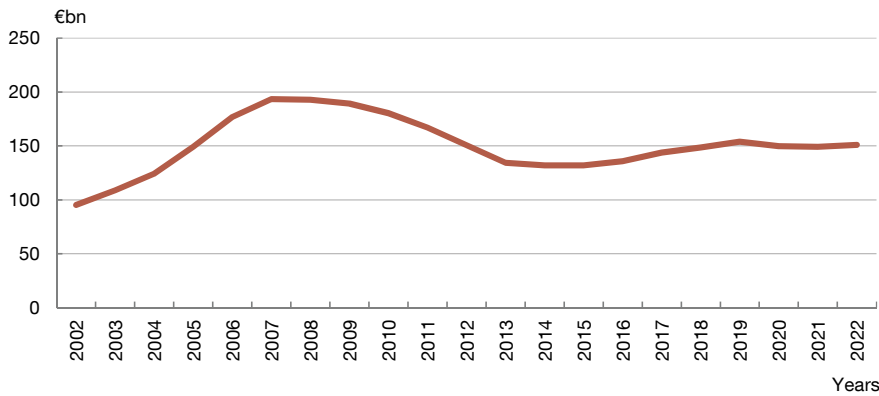**b** Distribution of debt for home purchase according to the EFF by income group (5.b) or net wealth group (5.c). The values represented by the dots are obtained from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.
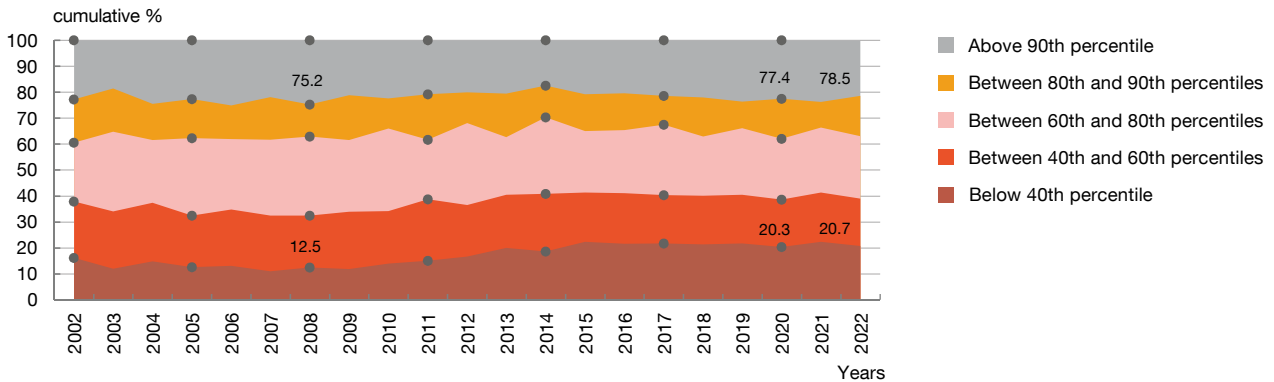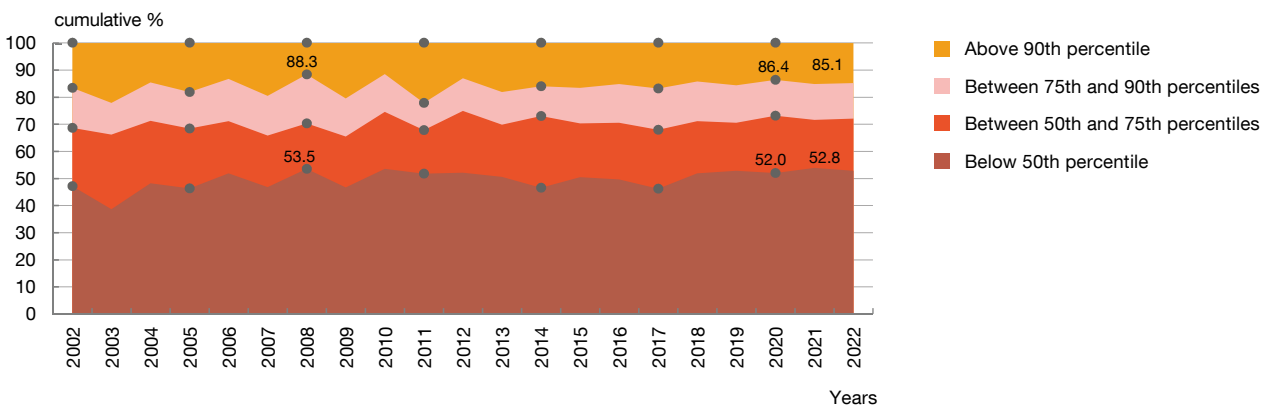
Chart 6
Debt for purposes other than house purchase

6.a Loans to households for purposes other than house purchase (a)

€bn

6.b Distributional accounts for debt for purposes other than house purchase, by income group (b)

cumulative %

- Above 90th percentile
- Between 80th and 90th percentiles
- Between 60th and 80th percentiles
- Between 40th and 60th percentiles
- Below 40th percentile

6.c Distributional accounts for debt for purposes other than house purchase, by net wealth group (b)

cumulative %

- Above 90th percentile
- Between 75th and 90th percentiles
- Between 50th and 75th percentiles
- Below 50th percentile

SOURCE: Banco de España.

a Statistical Bulletin. Credit institutions and specialised lending institutions. Total lending and total non-performing loans to other resident sectors by purpose, loans to households for house purchase, difference between the total and the amount for house purchase. Data refer to the last quarter of the year.
b Distribution of debt for purposes other than house purchase according to the EFF by income group (6.b) or net wealth group (6.c). The values represented by the dots are obtained from the EFF. All other annual values are estimates obtained using the temporal disaggregation method of Chow and Lin (1971), where pre-2020 values are interpolations and post-2020 values are extrapolations.

The estimates presented here show how the share of the main wealth and debt components of the different income and net wealth groups evolved between 2020 and 2022. Specifically, they show that, over that period, households in the bottom two income quintiles saw their share of housing wealth and investment funds rise, by 0.6 pp and 1.1 pp, respectively, while their share of bank deposits, shares and debt for house purchase fell, by 0.2 pp, 0.1 pp and 0.3 pp, respectively, and their share of debt for purposes other than house purchase rose (by 0.4 pp). The estimates also show that, over the same period, households in the top income decile saw their share of total housing wealth, investment funds and listed shares fall, by 0.5 pp, 0.6 pp and 1.9 pp, respectively, while their share of bank deposits and debt for house purchase rose, by 0.5 pp and 1.2 pp, respectively, and their share of debt for all other purposes fell (by 1.1 pp). However, these households have a higher share of all assets, and especially of higher-return and higher-risk assets; specifically, it is estimated that, in 2022, they held 56% of investment funds and 75% of listed shares. Nevertheless, these results should still be interpreted with caution, given the relatively short time dimension of the microdata series and the fact that not all wealth components have been analysed.

The annual wealth and debt distribution series drawing on the EFF also provide an estimation of distributional accounts for Spanish households since 2002 under a small set of assumptions. These results may serve as a reference for evaluating methodologies and alternative assumptions that may be used in the preparation of statistics of this kind for Spain for the last two decades.

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APPENDIX
Description of the temporal disaggregation methodology

After reconciling the wealth concepts, a method for temporal disaggregation of the series is applied drawing on Chow and Lin (1971):

$$Y_g = B' X_g$$

$$X_g = \beta'_g Z + U_g$$

where: Y_g is the aggregated microdata series observed for the income or wealth group g to be interpolated and extrapolated, i.e. the three-year series of EFF data by income or wealth groups; X_g is the unobserved higher-frequency aggregated microdata series, i.e. the annual series of values for population group g; B' is the vector of coefficients that selects values of the matrix X_g; and Z is the instrument used to interpolate Y for each income or wealth group g, i.e. the series of macroeconomic aggregates observed annually. The set of assumptions used is: $E(U_g) = 0$ and $V_g = E(U_g U'_g)$, where $u_{g,t} = a_g u_{g,t-1} + e_{g,t}$, where a_g is estimated together with all the other parameters and can only take values between [-1,1].

The model is estimated using generalised least squares, drawing on EFF2002 to EFF2020 (seven waves) and annual FASE, SI and SB data for 2002 to 2022.