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Abstract

This paper combines different sources (tax records, national accounts, wealth surveys) and the capitalization method in order to deliver consistent, unified wealth distribution series for Spain over the 1984-2013 period, with detailed breakdowns by age over the 1999-2013 sub-period. Wealth concentration has been quite stable over this period for the middle 40% and bottom 50%, with shares ranging between 5-10% and 30-40%. Since the end of the nineties Spain has experienced a moderate rise in wealth inequality, with significant fluctuations due to asset price movements. Housing concentration rose during the years prior to the burst of the bubble, due to the larger increase in secondary dwelling acquisitions (quantity effect) by upper wealth groups, and decreased afterwards. The housing bubble had, however, a neutral impact on wealth inequality. Rich individuals substituted financial for housing assets during the boom, and compensated for the decrease in real estate prices during the bust by selling some of their dwellings and accumulating more financial assets. Even though housing reduces the levels of wealth inequality over the period, the bulk in secondary residence, together with offshore assets, large capital gains and different rates of return and savings rates across groups have contributed to keeping the same high levels of wealth concentration of the 1980s in the late 2000s.

Keywords: Wealth Inequality, Housing, Offshore Assets, Spain

JEL Classification: D3, N3, R2

1 Introduction

Both the evolution and determinants of wealth inequality are currently at the center of the academic and political sphere. This is largely due to the debate generated by Thomas Piketty's prominent book, *Capital in the Twenty-First Century* (Piketty (2014)), in which he warns that the tendency of returns on capital to exceed the rate of economic growth threatens to generate extreme inequalities. Moreover, he also emphasizes the importance of analyzing empirically the historical evolution of wealth distributions. Research on wealth inequality has, however, a long tradition which dates back to the late 19th century and beginning of the 20th century, in which a number of authors started to study wealth among the living using mainly French and British inheritance data.[1] Nonetheless, it is only after the first half of the 20th century that academics started to construct long run homogeneous historical series on top wealth shares (Lampman (1962) for the US, Atkinson and Harrison (1978) for the UK, Piketty et al. (2006) for France and Roine and Waldenström (2009) for Sweden).

There exist five main methods and/or sources to analyze wealth inequality. The first is the estate multiplier method, that provides a snapshot of the wealth distribution at the time of death using estate tax records data. The main difficulty is how to generalize from decedents to the full population. The second possible approach is to use surveys of household finances. Contrary to the estate multiplier method, one advantage of using survey data is that it allows to characterize the middle and bottom of the wealth distribution. Nevertheless, even though most of these surveys oversample wealthy households, concentration at the top tends to be underestimated because of misreporting or top coding. The third available source are wealth tax returns. Wealth tax data cover very well the top of the distribution, but three main limitations remain. First, there are very few countries in the world which have a wealth tax (i.e. Spain, France, Norway, Uruguay, etc.). Second, only very wealthy individuals are subject to the tax, making it impossible to analyze the middle and bottom of the distribution. Third, many assets are exempted from this tax, so that it is not possible to have a whole picture of the wealth distribution. The fourth is the capitalization method, which consists of applying a capitalization factor to the capital income distribution to arrive to the wealth distribution. The main advantages of the capitalization technique are that it is based on income data, which are much easier to obtain than wealth data, and that the top is very well covered. The main limitation is, as in the case of the wealth tax, that there are also some assets whose generated income is not subject to the tax. Finally, one

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[1] See Piketty (2011) for the main references in this literature.

can also analyze the upper part of the distribution using lists of high-wealth individuals, such as the annual Forbes 400 list. The drawback in this case is that named lists are limited to a very small group of top wealth-holders and have non-systematic coverage.

Despite the immense literature on the analysis of wealth distributions, two important gaps remain. First, there is still no consensus on the method of analysis that should be adopted, since there are conflicting results depending on which of the techniques or sources are used. For instance, Saez and Zucman (2016) find that wealth considerably increased at the top 0.1% in the US over the last two decades using the income capitalization method, contrary to the results obtained by Kopczuk and Saez (2004) using the estate multiplier method. Second, due to data limitations, empirical evidence on the determinants of wealth concentration is still scarce. There is some evidence that the surge in top incomes and offshore wealth (Saez and Zucman (2016), Alstadsæter et al. (2017)), and the increase in saving and rates of return inequality (Garbinti et al. (2017), Saez and Zucman (2016)) have pushed toward wealth concentration in the last two decades. However, it is still unclear which are the distributional effects of specific economic phenomena, such as housing bubbles.

The aim of this research is to analyze wealth inequality in Spain using a mixed survey-capitalization method from 1984 up to 2013, with a particular focus on the years of the housing boom and bust. By analyzing Spain I will contribute to the literature of wealth inequality in five ways. First, Spain experienced a unprecedented increase in aggregate wealth due to a boom in housing between 2000 and 2008. Hence, it is interesting to analyze the distributional effects of this economic phenomenon which have not been deeply studied so far. Second, Spain has high-quality personal income tax micro-files with detailed income for each tax unit and income category over the period 1984-2013, as well as publicly available administrative aggregate data on personal wealth held by Spanish residents abroad. Thus, they allow to provide a careful estimation of the evolution and composition of Spanish wealth shares from bottom to the top, with breakdowns by age for the 1999-2013 sub-period and a correction for offshore assets. To my knowledge, the few studies that have analyzed wealth concentration in Spain using administrative data have only focused on the top 1%, have never corrected for offshore assets, and survey data (Survey of Household Finances, Bank of Spain) are only available for four waves since 2002. Third, I go one step forward previous distributional studies and further decompose wealth accumulation by asset type. This new asset-specific decomposition allows me to quantify not only the relative importance of each channel (income, saving rate and rate of return inequality), but also the role

played by each asset to explain the channels that drive the observed dynamics of the distribution of wealth. Fourth, using the steady-state formula developed by Garbinti et al. (2017) I carry simulations to better understand which are the key forces (unequal labor incomes, unequal rates of return and/or unequal saving rates) behind long term wealth inequality dynamics in Spain. Fifth, Spain is one of the few countries in the world that has a wealth tax and for which microfiles from wealth tax records are available. Thus, from the methodological point of view, it is interesting to test the capitalization method by first comparing the wealth shares using the income capitalization method with the shares using wealth tax returns and by second calculating the distribution of the rates of return.

The starting point of the mixed capitalization-survey approach used in this work involves the application of a capitalization factor to the distribution of capital income to arrive to an estimate of the wealth distribution. Capitalization factors are computed for each asset in such a way as to map the total flow of taxable income to total wealth recorded in Financial and Non-financial accounts. When combining taxable incomes and aggregate capitalization factors, it is assumed that within each asset class capitalization factors are the same for each individual. By using this methodology, I am able to obtain wealth distribution series consistent with official financial and non-financial household accounts. In Spain, as in most of countries, not all assets generate taxable income. We account for them by allocating them on the basis of how they are distributed, in such a way as to match the distribution of these assets in the Survey of Household Finances developed by the Bank of Spain. The assets which we account for are main owner-occupied housing, life insurance, investment and pension funds.

The wealth distribution in Spain has been analyzed in the past using three different data sources. Firstly, Alvaredo and Saez (2009) use wealth tax returns to construct long run series of wealth concentration for the period 1982 to 2007. The progressive wealth tax has high exemption levels and only the top 2% or 3% wealthiest individuals file wealth tax returns. Thus, they limit their analysis of wealth concentration to the top 1% and above. They find that top wealth concentration decreases at the top 1% from 19% in 1982 to 16% in 1992 and then increases to almost 20% in 2007. However, in contrast to the top 1%, they obtain that the 0.1% falls substantially from over 7% in 1982 to 5.6% in 2007. Durán-Cabré and Esteller-Moré (2010) also use wealth tax returns to analyze the distribution of wealth at the top and obtain similar results. Their approach complements theirs by offering a more precise treatment of the correction of fiscal underassessment and tax fraud in real estate, which is the main asset in Spaniards' portfolios.

Secondly, Azpitarte (2010) and Bover (2010) use the 2002 Survey of Household Finances developed by the Bank of Spain in order to analyze the distribution of wealth at the top. This analysis can be carried out because the survey is constructed doing an oversampling of wealthy households. Azpitarte (2010) presents results for the top 10-5%, 5-1% and 1%. Bover (2010) provides shares for the top 50%, top 10%, top 5% and top 1%. Their estimates for the top 1% are very similar, 13.6% and 13.2%, respectively. However, they are much lower than the results of Alvaredo and Saez (2009) using wealth tax returns, who obtain that the top 1% holds 20% of total wealth. The OECD has also published recently a report in which they analyze wealth inequality across countries (OECD (2015)) using household survey data. They find that the top 1% holds 15.2% in 2011 and that wealth inequality in Spain is lower relative to the average of other 16 OECD countries.

Finally, Alvaredo and Artola (2017) use inheritance tax statistics to estimate the concentration of personal wealth at death in Spain between 1901 and 1958. They compare their results with the estimates among the living of Alvaredo and Saez (2009) for the period between 1982 and 2007. They find that concentration of wealth at the top 1% of the distribution was approximately three times larger during the first half of the 20th century than at the end of the same century. Unfortunately, there are no inheritance data available for the current decades. Hence, it is quite relevant to use the capitalization method instead.

My findings show that wealth concentration has been quite stable over this period for the middle 40% and bottom 50%, with shares ranging between 5-10% and 30-40%. Since the end of the nineties Spain has experienced a moderate rise in wealth concentration, with significant fluctuations due to asset price movements. Housing concentration rose during the years prior to the burst of the bubble, due to the larger increase in secondary dwelling acquisitions (quantity effect) by upper wealth groups, and decreased afterwards. The housing bubble had, however, a neutral impact on wealth inequality. Rich individuals substituted financial for housing assets during the boom, and compensated for the decrease in real estate prices during the bust by selling some of their dwellings and accumulating more financial assets. Even though housing reduces the levels of wealth inequality, the bulk in secondary residence, together with offshore assets, large capital gains and different rates of return and savings rates across groups have contributed to keeping the same high levels of wealth concentration of the 1980s in the late 2000s. Simulations using the steady-state formula of Garbinti et al. (2017) confirm the findings of France that small changes in key parameters can have large effects on steady-state wealth concentration.

The trends and levels in the wealth shares are very similar to the ones obtained by Alvaredo and Saez (2009) using wealth tax returns. Moreover, I test the assumption underlying the capitalization technique, that within each asset class capitalization factors are the same for each individual and I find using the wealth tax micro-files, that rates of return for deposits and fixed-income securities are flat along the distribution. Hence, the mixed capitalization-survey approach seems to be quite a consistent method to analyze the full wealth distribution in Spain over time.

The layout of the paper is as follows. Section 2 discusses the wealth concept and data used, together with an analysis of the aggregate trends in wealth in the last three decades in Spain. In Section 3 I formalize and explain the procedure used in order to obtain wealth shares from income tax and survey data. Results for the period 1984-2013, derived from using the mixed survey- capitalization method, are presented in Section 4, as well as a comparison with the trends in other countries. In Section 5 I examine the impact of the housing bubble on wealth inequality. A new asset-specific decomposition of wealth accumulation and some simulation exercises are presented in Section 6 in order to better understand the key drivers of the dynamics of wealth inequality in Spain. In Section 7 I correct the wealth distribution series for offshore assets. In Section 8 I compare my results with other sources and I test the capitalization method. Finally, Section 9 concludes. All Figures and Tables to which the text refers to are included in the appendix at the end of the paper. An Excel file ("Data Appendix") includes the complete set of results.

2 Wealth: Concept, Data and Aggregate Trends

This section describes the wealth concept used and the trends in the evolution of aggregate wealth over the period of analysis (1984-2013). Complete methodological details of the Spanish specific data sources and computations are presented in the online data appendix.

2.1 Wealth Concept and Data Sources

The wealth concept used is based upon national income categories and it is restricted to net household wealth, that is, the current market value of all financial and non-financial assets owned by the household sector net of all debts. For net financial wealth, that is, for both financial assets and liabilities, the latest (ESA 2010, Bank of Spain) and previous (ESA 95, Bank of Spain) Financial Accounts are used for the period 1996-2013 and 1984-1995, respectively.

Financial Accounts report wealth quarterly and I use mid-year values.

Households' financial assets include equities (stocks, investment funds and financial derivatives), debt assets, cash, deposits, life insurance and pensions. Households' financial liabilities are composed of loans and other debts. It is important to mention that pension wealth excludes Social Security pensions, since they are promises of future government transfers. As it is stated in Saez and Zucman (2016), including them in wealth would thus call for including the present value of future health care benefits, future government education spending for one's children, etc., net of future taxes. Hence, it would not be clear where to stop.

My wealth concept only considers the household sector (code S14, according to the System of National Accounts (SNA)) and excludes non-profit institutions serving households (NPISH, code S15). There are three reasons which explain this decision. First, due to lack of data, non-profit wealth is not easy attributable to individuals. Second, income from NPISH is not reported in personal income tax returns. Third, non-profit financial wealth amounts to around only 1% of household financial wealth between 1996 and 2014 in Spain. Hence, it is a negligible part of wealth and excluding it should not alter the results.

Spanish Financial Accounts report financial wealth for the household and NPISH sector and also for both households and NPISH isolated as separate sectors. However, the level of disaggregation of the Balance Sheets in the latter case is lower than in the case in which households and NPISH are considered as one single sector. For instance, whereas the Balance Sheet of the sector of households and NPISH distinguishes among wealth held in investment funds and wealth held in stocks, the Balance Sheet of the household sector only provides an aggregate value with the sum of wealth held in these two assets. In order to have one value for household wealth held in investment funds and one value for household wealth held in stocks, I assume that they are proportional to the values of households' investment funds and stocks in the Balance Sheet of households and NPISH.

For non-financial wealth, it is not possible to rely on Non-financial Accounts based on the System of National Accounts. Even though there are some countries that have these accounts, such as France and United Kingdom, no institution has constructed these type of statistics for Spain yet. I need to use other statistics instead. My definition of household non-financial wealth consists of housing and unincorporated business assets and I rely on the series elaborated in Artola et al. (2017). Housing wealth is derived based on residential units and average surface from census data on the one hand, and average market prices from property appraisals, on the

other hand.[2] Unincorporated business assets have been constructed using the four waves of the Survey of Household Finances (2002, 2005, 2008, 2011) elaborated by the Bank of Spain and extrapolated backwards using the series of non-financial assets held by non-financial corporations also constructed by the Bank of Spain.[3]

I exclude collectibles since they amount to only 1% of total household wealth and they are not subject to the personal income tax. Furthermore, consumer durables, which amount to approximately 10% of total household wealth, are also excluded, because they are not included in the definition of wealth by the System of National Accounts.[4]

2.2 Aggregate Wealth Stylized Facts (1984-2013)

Understanding how wealth has evolved in aggregate terms is crucial in order to later interpret the dynamics in the wealth distribution series.

From a historical perspective, the ratio of personal wealth to national income has followed a U-shaped evolution over the past century, a pattern also seen in other advanced economies (Artola et al. (2017); Piketty and Zucman (2014)). However, this process was initially delayed with respect to leading European countries. This finding is consistent with a long post-Civil war economic stagnation and the larger importance of agriculture in Spain. During my period of analysis, from 1984 onwards, I distinguish three stylized facts on the evolution of the level and composition of the stock of wealth in Spain.

The first stylized fact is that the household wealth to national income ratio has almost doubled during that period of time. Household wealth amounted to around 380% in the late eighties and it grew up to around 470% in the mid-nineties. From 1995 onwards, it started to increase more rapidly reaching the peak of 728% of national income in 2007. After the burst of the crisis in 2008, it dropped and it has been decreasing since then. In 2014, the household wealth to national income ratio amounted to 646%, a level which is similar to the wealth to national income ratio of years 2004 and 2005, but much higher than the household wealth to national income ratios of the eighties and nineties (Figure A.1).

The second stylized fact determines the existence of temporal differences not only in the growth of total net wealth (as it was pointed out in the first stylized fact), but also in the growth

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[2]Net housing wealth is the result of deducting mortgage loans from household real estate wealth. Note that mortgage debts are approximated by total household liabilities.

[3]A detailed explanation of the sources and methodology used in order to construct these two series can be found in data appendix of Artola et al. (2017).

[4]The shares of both collectibles and consumer durables over total household wealth are obtained using the Survey of Household Finances developed by the Bank of Spain.

of its components. In the late eighties the growth in net housing was more than double the growth in financial assets. During the nineties this trend reversed and financial assets started to rise faster due mainly to the dot-com bubble. After the stock market crash of 2000, housing prices increased rapidly surpassing financial assets. The value of dwellings reached the peak in 2008, after which the housing bubble burst and the drop in housing wealth was larger than in financial assets (Figures A.1 and A.2).

The third and last stylized fact points out the increase in the importance of net housing in the asset portfolio of households. Even though dwellings are during the whole period the most important asset held by households, always representing more than 40% of total household net wealth, the composition of household wealth has not evolved homogeneously over time and it has lost importance in times when financial assets significantly increase (i.e. dot-com bubble). The increase in the fraction of housing in the total portfolio of households has also been exacerbated by the steady decrease in the fraction of unincorporated business assets (from 23% in 1984 up to 11% in 2014), due mainly to the reduction in the importance of agriculture (Figure A.2).

3   The Mixed Capitalization-Survey Approach (1984-2013)

The main goal of this article is to construct wealth shares by allocating the total household wealth depicted in Figure A.1 to the various groups of the distribution. For that, it is needed to proceed with the following three steps. First, I start by calculating the distribution of taxable capital income at the individual level. Second, the taxable capital income is capitalized. Third, I account for wealth that does not generate taxable income. This is a mixed method and not the pure capitalization technique, because the survey method is used in order to account for both wealth at bottom of the distribution and assets that do not generate taxable income.

3.1   The Distribution of Taxable Capital Income

The starting point is the taxable capital income reported on personal income tax returns. I use micro-files of personal income tax returns constructed by the Spanish Institute of Fiscal Studies (*Instituto de Estudios Fiscales (IEF)*) in collaboration with the State Agency of Fiscal Administration (*Agencia Estatal de Administración Tributaria (AEAT)*). They have three different types of files: two personal income tax panels that range from 1982-1998 and 1999-2012, respectively, and personal income tax samples for 2002-2013. I use the first income tax panel

for 1984-1998[5], the second panel for 1999-2011 and all income tax samples for 2002-2013. The micro-files provide information for a large sample of taxpayers[6], with detailed income categories and an oversampling of the top. The income categories I use are interest, dividends, effective and imputed housing rents, as well as the profits of sole proprietorships.[7] The micro-files are drawn from 15 of the 17 autonomous communities of Spain, in addition to the two autonomous cities, Ceuta and Melilla. Two autonomous regions, Basque Country and Navarra, are excluded, as they do not belong to the Common Fiscal Regime (*Régimen Fiscal Común*), because they manage their income taxes directly. Combined these two regions represent about 6% and 8% of Spain in terms of population and gross domestic product, respectively.[8]

The distribution of taxable income is derived excluding capital gains. There are two reasons for that. First, realized capital gains are not an annual flow of income. Second, they are a very volatile component of income, with large aggregate variations from year to year depending on stock price variations. Hence, the wealth distribution series could be distorted by including them.

The unit of analysis used is the adult individual (aged 20 or above), rather than the tax unit. Splitting the data into individual units has on the one hand the advantage of increasing comparability as across units since individuals in a couple with income for example at the 90th percentile are not as well off as an individual with the same level of income. On the other hand, it is also more advantageous for making international comparisons, given that in some countries individual filing is possible (i.e. Spain, Italy) and in others (i.e. France, US) not. Since in personal income tax returns the reporting unit is the tax unit, I need to transform it into an individual unit. A tax unit in Spain is defined as a married couple (with or without dependent children aged less than 18 or aged more than 18 if they are disabled) living together, or a single adult (with or without dependent children aged less than 18 or aged more than 18 if they are disabled). Hence, only the units for which the tax return has been jointly made by a married couple need to be transformed. For each of these units I split the joint tax returns into two separate individual returns and assign half of the jointly reported capital income to each

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[5]Even though the first panel is available since 1982, I decided to start using it from 1984 since I found some inconsistencies between the files for 1982 and 1983 and subsequent years.

[6]Personal income tax samples are more exhaustive (i.e. 2,161,647 tax units in 2013) than the panels (i.e. 390,613 tax units in 1999).

[7]Note that imputed housing rents exclude main residence from the period 1999-2013. I explain the way in which I account for main residence in the following subsection. Moreover, profits of sole proprietorships are considered as a mixed income, so that I assume as it is commonly done in the literature that 70% of profits are labor income and 30% capital income.

[8]These figures have been obtained using Regional National Accounts and the Census of Population of the Spanish Statistics Institute (*Instituto Nacional de Estadística (INE)*).

member of the couple.[9] For 2011, for instance, this operation converts 19.38 million tax units into 23.07 million individual units in the population aged 20 or above, that is, approximately 19% of units are converted.[10]

One limitation of using personal income tax returns in order to construct income shares in the Spanish case is that not all individuals are obliged to file. There exist some labour income and capital income thresholds under which individuals are exempted from filing. In 2013, for instance, the labour income threshold when receiving labour income from one single source was 22,000 euros and 11,200 when receiving it from two or more sources. The capital income threshold was 1,600 euros for interest, dividends and/or capital gains and 1,000 for imputed rental income and/or Treasury bills.[11]Approximately one third of the population is exempted from filing.[12] I account for the missing adults using the Spanish Population Census for the period 1984-2013 by comparing the population totals by age and gender of the micro-files with the population totals of the Census excluding País Vasco and Navarra and I then create new observations for all the missing individuals. By construction, my series perfectly match the Census population series by gender and age.[13] These new individuals, although being the poorest since they do not have to file the personal income tax, earn some labour and also some capital income in the form of interest from checking accounts or deposits. Hence, we need to account for this missing income, otherwise we would be overestimating the amount of wealth held my the middle and the top of the distribution. For that, I rely on the Survey of Household Finances for the period 1999-2013 and on the Household Budget Continuous Survey for the period 1984-1998. Appendix C explains in detail the imputation method followed using the two surveys. The imputations are quite robust since as it is shown in Figure A.16, the bottom 50% wealth share with the SHF is almost identical to the one using the capitalization method.

Finally, before capitalizing the capital income shares, it is important to check that income is distributed in a coherent way and that there are no significant breaks across years due to, for instance, tax reforms or the use of different data sources. If already the income data are not

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[9]Since business income from self-employment is a mixed income, only the part corresponding to capital income is split among the couple.

[10]Given the incentives of the tax code to file separately whenever both individuals in the couple receive income, there are more married couples filing individually the further we move up in the income distribution. See AEAT (2013) for a more detailed explanation in Spanish of how personal income tax filing works in Spain.

[11]See AEAT (2013) for a more detailed explanation in Spanish of how personal income tax filing works in Spain.

[12]This figure has been obtained comparing the total number of personal income tax filers with the population totals of the Spanish Population Census.

[13]The oldest personal income tax panel that I use for the period 1984-1998 does not include information about age nor gender. Hence, for this period of time I simply adjust the the micro-files to match the Census population totals excluding País Vasco and Navarra but without taking age and gender into consideration.

coherently distributed, neither the wealth distribution estimates will be. In appendix C, I explain in detail the particular aspects of the reforms which could potentially affect my methodology and how I deal with them in order to ensure consistency in the series across the whole period of analysis.

3.2 The Income Capitalization Method

In the second step of the analysis the investment income approach is used. In essence, this method involves the application of a capitalization factor to the distribution of taxable capital income to arrive to an estimate of the wealth distribution.

3.2.1 A formal setting

The income capitalization method used in this paper may be set out formally as follows. An individual i with wealth w invests an amount a_{ij} in assets of type j, where j is an index of the asset classification $(j = 1, .., J)$. If the return obtained by the individual on asset type j is r_j[14], his investment income by asset type is:

$$y_{ij} = r_j * a_{ij} \tag{1}$$

and his total investment income:

$$y_i = \sum_{j=1}^{J} r_j * a_{ij} \tag{2}$$

Rearranging equation (1), the wealth for each individual by asset type is, thus, the following:

$$a_{ij} = y_{ij}/r_j \tag{3}$$

By rearranging equation (2), the total wealth for each individual is:

$$w_i = \sum_{j=1}^{J} y_{ij} * r_j \tag{4}$$

In the next subsection, this formal setting is applied to the Spanish case in order to obtain the wealth distribution series.

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[14]Note that the capitalization method relies on the assumption that the rate of return is constant for each asset type, that is, it does not vary at the individual level.

3.2.2 How the Capitalization Technique Works for the Spanish Case

There are five categories of capital income in personal income tax data: effective and imputed (excluding main residence) rental income, business income from self-employment, interest and dividends. Tax return income for each category is weighted in order to match aggregate national income from National Accounts. I then map each income category (e.g. business income from self-employment) to a wealth category in the Financial Accounts from the Bank of Spain (e.g. business assets from self-employment).[15]

As it was mentioned in Section 3.1, income tax data exclude the regions of País Vasco and Navarra. Therefore, before mapping the taxable income to each wealth category, income and wealth in National Accounts need to be adjusted excluding the amounts corresponding to these two regions. Ideally, if one would know the amount of wealth and income in each category by region, one could simply discount the wealth and income corresponding to País Vasco and Navarra. Unfortunately, neither the Bank of Spain nor the National Statistics Institute have constructed Regional National Accounts with disaggregated information by asset type yet, so another methodology needs to be used. I assume that income and wealth in each category are proportional to total gross domestic product and housing wealth excluding these two regions, respectively.[16]

Once income and wealth have been adjusted accordingly, a capitalization factor is computed for each category as the ratio of aggregate wealth to tax return income, every year since 1984. This procedure ensures consistency with the Bank of Spain aggregate wealth data by construction. In 2013, for instance, there are about 19.4 billion euros of business income and 612.8 billion euros of business assets from self-employees generating taxable income. Hence, the rate of return on taxable business assets is 3.2% and the capitalization factor is equal to 31.6. As it is shown in Figure A.3, rates of return (and thus capitalization factors) vary across asset types, being for instance higher for financial assets than for business assets.[17]

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[15]Capital gains are excluded from the analysis. The reason is that they are not an annual flow of income and consequently, they experience large aggregate variations from year to year depending on stock price variations. By including them, the trends in the wealth distribution series could be biased since we observe large variations in capital gains from year to year.

[16]Total gross domestic product in Spain excluding País Vasco and Navarra accounts for approximately 92% of total gross domestic product. This figure is obtained using Regional National Accounts constructed by the National Statistics Institute. The share of housing wealth excluding País Vasco and Navarra amounts to approximately 92% of total housing wealth. This figure has been obtained using a study elaborated by the financial institution *La Caixa* (Caixa Catalunya (2004)), in which they provide the value of housing wealth by region.

[17]The rate of return on housing using National Accounts is very low for international standards, particularly during the most recent period (2002-2013). This can be explained by the fact that the differences in growth between housing wealth and housing rental income were much larger in Spain than in the rest of advanced economies. One potential explanation are the large differences in demand for renting (low) versus buying (high)

The capitalization method is well suited to estimating the Spanish wealth distribution because the Spanish income tax code is designed so that a large part of capital income flows are taxable. However, as it has been already mentioned, tax returns do not include all income categories. In Section 3.3, I carefully account for the assets that do not generate taxable income.

3.3 Accounting for Wealth that Does not Generate Taxable Income

The third and last step consists of dealing with the assets that do not generate taxable income. In Spain, there are four assets whose generated income is not subject to the personal income tax: Main owner-occupied housing[18], life insurance, investment and pension funds. Although these assets account for a large part of total household wealth, namely 32.8% for main residence and 8.1% for life insurance, investment and pension funds in 2013, the fact that they do not generate taxable income does not constitute a non-solvable problem for one main reason: Spain has a high quality Survey of Household Finances (SHF).

As it was mentioned in Section 3.1, this survey provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top. This is achieved on the basis of the wealth tax through a blind system of collaboration between the National Statistics Institute and the State Agency of Fiscal Administration which preserves stringent tax confidentiality. The distribution of wealth is heavily skewed and some types of assets are held by only a small fraction of the population. Therefore, unless one is prepared to collect very large samples, oversampling is important to achieve representativeness of the population and of aggregate wealth and also, to enable the study of financial behavior at the top of the wealth distribution. Hence, this survey is extremely suitable for this analysis and it allows to allocate all the previous assets on the basis of how they are distributed, in such a way as to match the distribution of wealth for each of these assets in the survey. Appendix C explains in detail the imputation method using the survey.

In order to make sure that the imputations are correctly done, I conducted sensitivity tests and applied several alternative imputation methods for tax-exempt assets and I find that the overall impact on wealth distribution series is extremely small. Furthermore, I also calculate wealth shares with and without conducting my imputation method using the four waves of the

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dwellings in Spain, which have led to a larger increase in housing versus rental prices. In fact, the home-ownership ratio is approximately 80% at present (Census of dwellings, INE, 2011). Nonetheless, one cannot fully disregard the existence of some type of measurement error in the construction of the rental income and/or housing wealth series.

[18]This is the case from 1999 onwards, since until 1998 imputed rents from main residence were subject to the personal income tax. Hence, we only need to impute main residence for the period 1999-2013.

wealth survey and I obtain very similar results (Figure A.4).

4 Trends in the Distribution of Wealth (1984-2013)

4.1 Wealth Inequality Series

This section presents the benchmark unified series for wealth distribution in Spain over the period 1984-2013 and the breakdowns by asset category (1984-2013) and age (1999-2013).

The wealth levels, thresholds and shares for 2013 are reported on Table B.1. In 2013, average net wealth per adult in Spain was about 150,000 euros. Average wealth within the bottom 50% of the distribution was slightly less than 20,000 euros, i.e. about 13% of the overall average, so that their wealth share was close to 7%. Average wealth within the next 40% of the distribution was slightly more than 135,000 euros, so that their wealth share was close to 37%. Finally, average wealth within the top 10% was about 0.85 million euros (i.e. about 5.6 times average wealth), so that their wealth share was about 56%.

Figure A.5 displays the wealth distribution in Spain decomposed into three groups: top 10%, middle 40% and bottom 50%. The wealth share going to the bottom 50% has always been very small ranging from 6 to 9%, the middle 40% has concentrated between 32% and 39% of total net wealth and the top 10% between 53% and 61% over the period of analysis. Looking at the dynamics, the top 10% wealth share drops from the mid-eighties until beginning of the 1990s, at the expense of the increase in both the middle 40% and the bottom 50% of the distribution. The top 10% wealth share increases during the nineties, decreases until the mid-2000s and increases again until the burst of the housing bubble in 2008, after which it decreases and stabilizes at a similar level to the mid-nineties.

Despite the documented substantial changes in the level and composition of aggregate household wealth during this period due mainly to movements in relative asset prices (see Section II), changes in overall wealth inequality have been moderate. Nonetheless, the contradictory movements in relative asset prices have an important impact on the composition of the different wealth groups, because they own very different asset portfolios. As it is shown on Figure A.6, the bottom 50% of the distribution own mostly financial assets in the form of deposits in 2013, whereas housing assets are the main form of wealth for the middle of the distribution. As we move toward the top 10% and the top 1% of the distribution, financial assets (other than deposits) gradually become the dominant form of wealth. The same general pattern applies for the

period 1984-2012, except that unincorporated assets have lost importance over time, due mainly to the reduction in agricultural activity among self-employees.

By decomposing by asset categories the evolution of the wealth shares going to the bottom 50%, middle 40%, top 10% and top 1%, the impact of asset price movements on wealth shares, particularly the impact of the 2000 stock market boom and the 2007 housing bubble burst, are clearly captured (Figures A.7 and A.8). One particularity of the Spanish case is that housing is a very important asset of the portfolio of households even at the top of the distribution. This has been the case during the whole period of analysis, but it has become more striking in the last fifteen years due to the increase in the value of dwellings. For instance, whereas in Spain the top 10% and 1% of the wealth distribution own 26% and 8% of total net wealth in housing, respectively, in France these figures are 19% and 5%, respectively (Garbinti et al. (2017)).

Moving to the analysis by age, I find that average wealth is always very small at age 20 (less than 10% of average adult wealth), then rises sharply with age until age 60-65 reaching 160-180% of average adult wealth, and moderately decreases (around 150%-120% of average adult wealth) at ages above 65 (Figure A.9). Contrary to the pure life-cycle model with no bequest (the standard Modigliani triangle), average wealth does not seem to sharply decline at high ages and it remains at very high levels, which means that old-age individuals die with substantial wealth and transmit it to their offspring. This age-wealth profile has changed over the 1999-2013 period. Old individuals (+60) are better-off and the young (20-39) worse-off after the economic crisis, since the average wealth for the old relative to total average wealth is larger in 2013 than in 2001. This is consistent with the large increase in youth unemployment (Scarpetta et al. (2010)) after the burst of the bubble and at the same time the stability in Social Security pension payments. When decomposing the wealth distribution series by age, I find that wealth inequality is more pronounced for the young (20-39) than for the old (+60) and middle-old (40-59), for which wealth inequality is almost as large than for the population taken as a whole (Figure A.9).

4.2   International Comparison

In order to have an idea about the level of wealth concentration in a country, it is always very interesting to make comparisons across nations. Saez and Zucman (2016) estimate the distribution of wealth in the US using the income capitalization method. They find that wealth concentration has followed a U-shaped evolution over the past 100 years. It was high in the beginning of the twentieth century, fell from 1929 to 1978, and has continuously increased since

then. Their series of wealth shares reveal that the rise in wealth inequality is almost entirely due to the rise of the top 0.1% share.

When comparing the top 10% and top 1% wealth share in Spain versus the US, I observe that concentration in Spain is lower than in the US over the whole period, but that these these differences have increased in the last two decades due to the huge rise in wealth concentration in the US (Figure A.10). On the contrary, the levels of wealth inequality in Spain are quite similar to the ones observed in France and Sweden. Spain had a larger top 10% and top 1% during the eighties, but since the nineties Spain has converged to the levels of the rest of European countries. Even though all series I compare use the capitalization method, comparisons should be made carefully since there are important methodological differences across countries.

5 The Impact of the Housing Bubble on Wealth Inequality

In the past fifteen years Spain has experienced a dramatic business cycle with a large housing based boom followed by a bust and consequently, a large rise in unemployment and significant effects on public finances. The high level of disaggregation of the wealth distribution series allows a good understanding of the impact of the housing bubble on wealth inequality. To my knowledge, this is the first academic paper analyzing the effect of this economic phenomenon on wealth inequality with such a high level of disaggregation.

In Spain, as in the rest of developed countries, housing wealth has contributed to smoothing wealth inequality in the long-run. As it is shown on Figure A.11, wealth concentration at the top 1% is approximately 10% lower including housing wealth over the period 1984-2013. The reason is that the bottom 90% of the distribution has a larger share of housing out of their total portfolio of assets. However, despite the huge boom and bust in housing wealth during the 2000s, the two series on Figure A.11 show similar trends and total wealth concentration at the top 1% is nearly constant. In other words, the housing bubble had a neutral effect on wealth inequality.

In order to understand this puzzling result, I first look at the composition of net housing wealth over time. Figure A.12 shows that the fraction of total net housing owned by the top 1% increased considerably between 2005 and 2009, the years in which housing prices skyrocketed, at the expense of the decrease in housing concentration of the middle 40%. The 10-1% wealth group also increased its share but very moderately. From 2010 onwards housing concentration started to decrease again reaching in 2013 a similar level to the one observed in 2004. This is

the case using capitalized (panel (a)) or survey shares (panel (b)).

As it is shown on both panels of Figure A.13, the fraction of main residence owned by the middle 40% and the top 1% stays almost unchanged during the whole boom and bust period. However, the composition of secondary housing evolves in a similar manner to the composition of total net housing wealth, with the top 1% rising its concentration between 2005 and 2009 and decreasing it afterwards, at the expense of the opposite evolution of the middle 40% (Figure A.14). Hence, the observed changes in housing concentration during the 2000s are due to secondary housing.

The observed rise in secondary housing inequality can be due to a quantity effect, that is, rich individuals acquiring relative more secondary dwellings than poor individuals, or to a price effect, namely properties of rich individuals experiencing relative larger increases in prices than the ones of poorer individuals. In order to understand which of the two effects plays a larger role, I have calculated the distribution of home-ownership ratios by occupation status (quantity effect) and the distribution of housing prices (price effect).

Figure A.15 displays the home-ownership ratio of the middle 40% by occupation status (main residence, secondary owner-occupied housing and secondary tenant-occupied housing). In this wealth group, 95% of individuals own or partly own at least one dwelling and nearly three quarters of individuals had only a main residence in 1999. The fraction of only main residence owners fell during this period of time up to less than 70%, since some of them acquired secondary housing, mainly secondary owner-occupied housing. For the top 1% the fraction of only main residence owners is much smaller in 1999 (20%), since most individuals within the top 1% own at least two dwellings. The fraction of individuals owning secondary housing has increased much more than for the middle 40% and most individuals have moved from accumulating one or two dwellings to three or more. After 2009, the distribution of home-ownership ratios stabilized.

Figure A.16 depicts the p90-99 and p99 to p50-90 housing price ratios for the period 1999-2013. The distribution of housing prices has been calculated by assigning to each individual in the distribution of capitalized wealth shares, the average housing price in the municipality in which they declare having their main residence. The series of housing prices used is elaborated by the Ministry of Public Works and it is based on property appraisals. The two ratios stayed constant between 2005 and 2009, which are the years in which housing concentration at the top increases and slightly increased afterwards. Overall, these findings are supportive evidence that the increase in housing concentration during the housing bubble is mainly due to a quantity

effect.

Why if housing concentration increased at the top during the bubble and decreased afterwards, total wealth concentration has almost stayed unchanged? One plausible explanation is that individuals at the top 1% substituted financial for housing assets during the boom and started to accumulate more financial assets during the bust in order to compensate for the losses in housing due to the fall in prices. Figure A.12 shows how the fraction of total financial assets held by the top 1% decreased during the boom years. This is consistent with the idea that wealthy individuals can better diversify their portfolios and invest more in risky assets when their prices are increasing and disinvest more when bad times arrive in order to acquire other assets.[19] In the next section I present more evidence on the substitution of assets by the rich when presenting the asset-specific decomposition of wealth accumulation.

6   An Asset-Specific Decomposition of Wealth Accumulation: Model and Simulations

In order to understand which are the underlying forces driving the dynamics of wealth inequality in Spain, I decompose the wealth distribution series using the following transition equation:

$$W_{t+1}^g = (1 + q_t^g)[W_t^g + s_t^g(Y_{L_t}^g + r_t^g W_t^g)], \tag{5}$$

where W_t^g stands for the average real wealth of wealth group g at time t, $Y_{L_t}^g$ is the average real labor income of wealth group g at time t, r_t^g the average rate of return of group g at time t, q_t^g the average rate of real capital gains of wealth group g at time t[20] and s_t^g the synthetic saving rate of wealth group g at time t. The saving rate is synthetic because the identity of individuals in wealth group g changes over time due to wealth mobility.

I follow the same approach of Garbinti et al. (2017) and Saez and Zucman (2016) and calculate the synthetic savings rates that can account for the evolution of average wealth of each group g as a residual from the previous transition equation. This is straightforward since I observe variables W_t^g, W_{t+1}^g, $Y_{L_t}^g$, r_t^g and q_t^g in my 1984-2013 wealth distribution series. Hence, the three forces that can affect the dynamics of wealth inequality are income, saving rate and rate of return inequality.

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[19]Guiso et al. (2002) provide a good review of the literature on household portfolios.

[20]Real capital gains are defined as the excess of average asset price inflation, given average portfolio composition of wealth group g, over consumer price inflation.

In this paper, I go one step forward and further decompose the previous transition equation into three asset components: net housing, business assets and financial assets.[21] The transition equation is as follows:

$$W_{t+1}^g = W_{H,t+1}^g + W_{B,t+1}^g + W_{F,t+1}^g, \tag{6}$$

where

$$W_{H,t+1}^g = (1 + q_t^g)[W_{H,t}^g + s_{H,t}^g(Y_{L_t}^g + r_t^g W_t^{H,g})] \tag{7}$$

$$W_{B,t+1}^g = (1 + q_t^g)[W_{B,t}^g + s_{B,t}^g(Y_{L_t}^g + r_t^g W_t^{B,g})] \tag{8}$$

$$W_{F,t+1}^g = (1 + q_t^g)[W_{F,t}^g + s_{F,t}^g(Y_{L_t}^g + r_t^g W_t^{F,g})] \tag{9}$$

This new asset-specific decomposition allows me to quantify not only the relative importance of each channel (income, saving rate and rate of return inequality), but also the role played by each asset to explain the channels that drive the observed dynamics of the distribution of wealth. In Spain, this is quite relevant because as it has previously been mentioned, housing has played a relative more important role in explaining the dynamics of wealth inequality over time than in other countries.

The top panel of Figure A.19 depicts synthetic saving rates for the top 10%, middle 40% and bottom 50% over the period 1986-2012. Consistent with the high levels of concentration that we observe during this period in Spain, there is a high level of stratification between the top 10% who save on average 39% of their income and the middle 40% and bottom 50% who save 13% and 3% of their income on average. These figures are similar to the ones obtained for France and the US (Garbinti et al. (2017), Saez and Zucman (2016)). All three groups used to save more between mid 1980s and mid 1990s than from that date onwards. Nonetheless, the fall in the savings rate for the bottom 50% has been larger on average than for the middle 40 % and top 10%. Whereas the bottom 50% had average savings rates of 5% and 1% between 1986-1996 and 1997-2012, respectively, the middle 40% and top 10% had savings rates of 17% and 56% between 1986-1996 and of 10% and 27% between 1997-2012.

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[21] Artola et al. (2017) do a similar decomposition for analyzing the dynamics of aggregate wealth in Spain but they calculate real capital gains as a residual.

Analyzing more deeply the evolution of savings rates, two main facts are worth noting. First, there is a sharp decline in the savings rate for the top 10% between 1996 and 2001. As one can see on Figure A.20, rich individuals started to sell their financial assets and to accumulate housing assets (Figure A.19, panel (b)). This is most likely due to the sharp fall in interest rates that happened during the second half of the nineties (Sinn and Wollmershäuser (2012)). Second, the housing bubble increased the stratification in saving rates between the rich and the poor during the boom years and decreased during the bust. The top panel of Figure A.19 shows how during the years prior to the burst of the bubble the savings rate increased for the top 10%, since they were accumulating more housing and decreased for the middle 40% and bottom 50%, who were also accumulating housing but by getting highly indebted (see bottom panel of Figure A.19). After the burst of the bubble the top 10% sold some of their housing assets and started to accumulate more financial assets in order to compensate for the decrease in housing prices. Nonetheless, the total saving rate for the top 10% decreased during these years, probably because they had to consume a larger fraction of their income. The middle 40% instead started to save more in order to repay the housing mortgages, so that the stratification in saving rates across the two wealth groups was reduced. Hence, the fact that rich individuals continued investing during the bust by substituting housing assets for financial assets and that at the same time the middle 40% increased its saving contributed to neutralizing wealth concentration during this tumultuous period of housing price swings.

Figure A.21 displays the evolution of flow rates of return (including capital gains) for the different wealth groups over the 1984-2013 period. The further up one moves along the distribution, the higher are the rates of return. This is consistent with the large portfolio differences that were previously documented, that is, top wealth groups own more financial assets like equity with higher rates of return than for instance housing (Figure A.3).

In line with Garbinti et al. (2017), this wealth accumulation decomposition allows to do simple simulations in order to illustrate some of the key forces at play. One simple simulation exercise is to analyze the structural impact of capital gains and savings, i.e stripped of large short run fluctuations, on top wealth concentration. Panel (a) of Figure A.22 reports the simulated top 1% wealth shares when replacing either the time varying rates of real capital gains or both the time varying rates of real capital gains and the time varying saving rates by their averages over the period 1984-2012. The simulated series fixing both capital gains and savings rates is smoother than the observed series but they are both quite similar. On the contrary, the simulated series

fixing only capital gains shows lower levels of concentration in the 1980s and a gradual increase in inequality from the 1990s onwards. Hence, capital gains contributed to keeping the same high levels of wealth concentration of the 1980s in the late 2000s. The importance of capital gains in explaining the historical evolution of aggregate wealth in Spain has already been highlighted in Artola et al. (2017), in which they find that capital gains explain half of the total growth of national wealth over the period 1900-2010.

Panel (b) of Figure A.22 reports the simulated top 1% wealth shares when replacing either the time varying rates of real capital gains or both the time varying rates of real capital gains and the time varying saving rates by their averages over the period 1984-1998. The top 1% share would have decreased a lot more by 2012. In other words, the housing bubble of the 2000s contributed to keeping the same high levels of wealth concentration, since concentration at the top 1% over the 1999-2012 period would have been substantially lower had housing prices not increased so fast relative to other asset prices.

Finally, I use the synthetic saving rates and the rates of return by wealth group in order to simulate steady-state trajectories for the top wealth shares in coming decades. In order to do so I use the steady-state formula derived in Garbinti et al. (2017). They assume that the relative capital gain channel disappears, that is, that all asset prices rise at the same rate in the long-run and manipulate transition equation (5) to obtain the following steady-state equation:

$$sh_w^g = (1 + \frac{s^p r^g - sr}{g - s^g r^g})\frac{s^p}{s} sh_{YL}^g, \tag{10}$$

where sh_w^g and sh_{YL}^g stand for the share of wealth and labor income, respectively, held by wealth group g, g is the economy's growth rate, s the average saving rate and r the aggregate rate of return.[22]

Differences across savings rates and rates of return across wealth groups can generate important multiplicative effects, which can lead to very different levels of steady-state wealth concentration. In order to illustrate the strength of these multiplicative effects, I use these estimates of s^g and r^g by wealth group in order to simulate steady-state trajectories for the top wealth shares in coming decades.

Figure A.23 reports the top 10% wealth share assuming that the same inequality of saving rates that we observe on average over the 1984-2012 period (namely 39.5% for the top 10% wealth group, and 10.1% for the bottom 90%) will persist in the following decades, together with

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[22]In Appendix E of Garbinti et al. (2017) it is explained in detail how this equation is derived.

the same inequality of rates of return and the same inequality of labor income. The top 10% wealth share under this scenario would converge toward a similar level to that observed in the mid-eighties, approximately 60% of total wealth. If I instead assume that the same inequality of saving rates that we observe on average over the 1984-1998 period (namely 55.9% for the top 10% wealth group, and 13.6% for the bottom 90%) would have persisted over the period 1999-2012 and during the following decades, together with the same inequality of rates of return and the same inequality of labor income, the top 10% wealth share would have risen reaching a steady-state level of wealth concentration higher than the one we had over the 1984-2012 period (approximately 66%).

Finally, assuming that the same inequality of saving rates that we observe on average over the 1999-2012 period (namely 21.9% for the top 6.2% wealth group, and 13.6% for the bottom 90%) would have persisted during the following decades, together with the same inequality of rates of return and the same inequality of labor income, the top 10% wealth share would have decreased up to a steady-state level of wealth concentration of nearly 53%. Hence, as it was shown by Garbinti et al. (2017) for France, small changes in the key parameters can significantly change the steady-state wealth concentration levels.

7   Offshore Assets and Wealth Inequality

In Spain, as in most countries, official financial data fail to capture a large part of the wealth held by households abroad such as the portfolios of equities, bonds, and mutual fund shares held by Spanish persons through offshore financial institutions in tax havens (Banco de España (2011)). Zucman (2013) estimates that around 8% of households' financial wealth is held through tax havens, three-quarters of which goes unrecorded. Moreover, he also provides evidence that the share of offshore wealth has increased considerably since the 1970s. This fraction is even larger for Spain. According to Zucman (2015), wealth held by Spanish residents in tax havens amounted to approximately 80 billion euros in 2012, which accounts for more than 9% of household's net financial wealth. Furthermore, Alstadsæter et al. (2017) find using micro-data leaked from offshore financial institutions and population-wide wealth records in Norway, Sweden, and Denmark, that the probability to disclose evading taxes rises steeply with wealth. Hence, by not incorporating offshore wealth in our wealth distribution series, both total assets and wealth concentration would be substantially underestimated.

In order to adjust the wealth distribution series for offshore assets I use Artola et al. (2017) historical series on offshore wealth. They rely on two main data sources: Zucman (2013, 2014), whose series mainly come from the Swiss National Bank (SNB) statistics, and the unique information provided by the 720 tax-form. Since 2012, Spanish residents holding more than 50,000 euros abroad are obliged to file this form specifying the type of asset (real estate, stocks, investment funds, deposits, etc.), value, and country of location. This new form aims to reduce evasion by imposing large fines in case taxpayers are caught not reporting or misreporting their wealth. In an attempt to increase future revenue and reduce further evasion, the Tax Agency also introduced a tax amnesty in 2012.

Artola et al. (2017) calculate separately reported assets, that is, claims held abroad by Spanish residents and declared to the Spanish tax authorities, from unreported offshore wealth. Given that the Spanish Tax Agency cross-checks across all taxes reported income and wealth by taxpayers, income generated by reported assets in the wealth tax and 720 tax-form should be included in personal income taxes. Hence, I will only correct the series for unreported offshore assets. Artola et al. (2017) derive the series of unreported financial offshore wealth by first comparing total wealth held in Switzerland by Spanish residents with assets declared in this country in the 720 tax-form. In 2012, the comparison shows that 23% of offshore wealth was reported to tax authorities (Figure A.24). This figure is consistent with Zucman (2013) estimate that around three quarters of offshore wealth held abroad goes unrecorded. According to the 720 tax-form, Switzerland concentrated in 2012 24% of total offshore wealth held by Spanish residents in tax havens. They extrapolate this series by applying the fraction of unreported assets observed in Switzerland to the rest of tax havens that appear in the 720-tax form.[23]

The series ranges between 1999 and 2014, since the statistics on total offshore held in Switzerland are only available for this period of time. They extrapolate the series backwards using the total amount of offshore wealth that flourished in the 1991 Spanish tax amnesty (10,367 million euros) and the proportion of European financial wealth held in offshore havens estimated by Zucman (2014) for the years prior to 1991.[24]

Offshore assets increased rapidly during the eighties, nineties and beginning of the 2000s and stabilized after 2007, a period in which Spanish tax authorities have become stricter with tax

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[23]Note that the series of offshore assets excludes deposits, since they are already included in Financial Accounts. Real assets are also not included since most of them are declared to be in non-tax havens and I am only focusing on offshore wealth held in tax havens.

[24]For a more detailed explanation of how the series of unreported and reported offshore assets are constructed, read the appendix in Artola et al. (2017).

evasion by introducing the 720 tax-form and implementing a tax amnesty in 2012 (Figure A.25, panel (a)). Unreported offshore wealth amounted to 149,520 million euros in 2012, which represents 8.6% of personal financial wealth.[25] Investment funds represent 50% of total unreported offshore assets, followed by stocks with 30%, and deposits and life insurance with 18% and 2%, respectively (Figure A.25, panel (b)).

I correct the wealth distribution series by assigning proportionally to the top 1% the annual estimate of unreported offshore wealth. This is consistent with an official document of the Spanish Tax Agency (Ministerio de Hacienda y Administraciones Públicas (2016)) stating that the majority of reported foreign assets by Spanish residents are held by top wealthholders and that these assets represent 12% and 31% of the total wealth tax base in 2007 and 2015, respectively.[26] Furthermore, Alstadsæter et al. (2017) also find that the top 1% in Scandinavian countries accumulates almost all the disclosed assets of tax amnesties.

Wealth concentration is larger during the 2000s than in the eighties, contrary to what it is observed when offshore assets are not taken into account (See Figure A.26). The top 1% wealth share average over 2000-13 is 23.6%, versus 21.3% when disregarding offshore wealth. This increase is quite remarkable, taking into account that during that period of time the country experienced a housing boom and both non-financial and financial assets held in Spain grew considerably as it was discussed in section II. In line with Alstadsæter et al. (2017), this finding also suggests that the historical decline in wealth inequality over the twentieth century that happened in Spain and the rest of analyzed countries (Alvaredo and Artola (2017), Piketty (2014)), may be much less spectacular in actual facts than suggested by tax data.

8 Reconciliation and Test of the Capitalization Method with Other Sources

8.1 Comparison with Other Sources

8.1.1 Wealth Tax

The wealth tax in Spain was introduced for the first time in 1978 as by law 50/1977. Initially, it was meant to be "transitory" and "exceptional". The tax rate was relatively small, with a

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[25]This figure is larger than the estimate of 80,000 million euros in Zucman (2015). Note that Zucman's estimate is an extrapolation using Swiss National Banks statistics, but that Artola et al. (2017) use administrative data on reported wealth held by Spanish residents abroad.

[26]Note that according to Alvaredo and Saez (2009) Spanish wealth tax filers belong approximately to the top 1% of the wealth distribution.

maximum of 2%. The aim of the Spanish wealth tax was basically to complement the Spanish personal income tax, which had limited redistributive goals. Tax filing was done on an individual basis, with the exception of married couples under joint tenancy. Since 1988, married couples can file individually.

In 1992, a major reform by the Law 19/1991 put an end to the transitory an exceptional character of the tax. It established a strictly individual filing and introduced changes in some of the included components as well as in their valuation rules. In year 2008, the tax was not abolished but a bonus of 100% was introduced by law 4/2008. Nevertheless, the economic crisis and the lack of funds of the Spanish Inland Revenue, reactivated the wealth tax from exercise 2011 (payable in 2012) up to 2015 (payable in 2016).

Alvaredo and Saez (2009) use wealth tax returns and the Pareto interpolation method to construct long run series of wealth concentration for the period 1982 to 2007. The progressive wealth tax has high exemption levels and only the top 2% or 3% wealthiest individuals file wealth tax returns. Thus, they limit their analysis of wealth concentration to the top 1% and above. This is a general limitation of using wealth tax data, the middle and bottom of the distribution can not be analyzed. They find that top wealth concentration decreases at the top 1% from 19% in 1982 to 16% in 1992 and then increases to almost 20% in 2007. However, in contrast to the top 1%, they obtain that the 0.1% falls substantially from over 7% in 1982 to 5.6% in 2007. Durán-Cabré and Esteller-Moré (2010) also use wealth tax returns to analyze the distribution of wealth at the top and obtain similar results to them. Their approach complements theirs by offering a more precise treatment of the correction of fiscal underassessment and tax fraud in real estate, which is the main asset in Spaniards' portfolios.

Results using wealth tax data and the capitalization method are quite similar, specially for the top 0.1% and 0.01% (Figure A.27). In line with the trends observed in Alvaredo and Saez (2009), my estimates also reveal a fall in concentration at the top 1% during the eighties and an increase in concentration during the nineties. Concentration is larger using capitalized income shares rather than wealth taxes at times in which asset prices significantly grow, such as the years previous to the burst of the dot-com bubble.

There are several conceptual and methodological differences across the two methods which might explain these differences. First, Alvaredo and Saez (2009) use financial wealth from both households and non-profit institutions serving households in their wealth denominator, rather than only financial household wealth. Second, they exclude pensions and business assets from

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the wealth denominator. Hence, they use slightly different wealth aggregates as the ones used in this paper (Table B.2). Third, they use real state wealth at cadastral value as reported in the wealth tax and update it based on the differences between real state wealth at market value. In contrast, I use the series of housing wealth at market prices of Artola et al. (2017) and impute main residence housing wealth for the period 1999-2013 using the Survey of Household Finances. Another difference is that they use the Pareto interpolation method in order to obtain top wealth shares because they have tabulated data. Finally, they use the tax unit and not the individual unit as unit of analysis. The exclusion of business assets and pension funds, together with the different valuation of housing wealth seem to be the biggest determinants in the differences observed in the shares using the two methods, given that the differences are more pronounced for the rich (top 1%) than for the very rich (top 0.1% and top 0.01%), with the rich owning relative more real assets and pension funds than the very rich.

8.1.2 The Survey of Household Finances

The Survey of Household Finances provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top, as it was already pointed out in section III. It exists for four waves (2002, 2005, 2008 and 2011) and it is elaborated by the Bank of Spain. Azpitarte (2010) and Bover (2010) use the 2002 survey in order to analyze the distribution of wealth at the top. Azpitarte (2010) presents results for the top 10-5%, 5-1% and 1%. Bover (2010) provides shares for the top 50%, top 10%, top 5% and top 1%. Their estimates for the top 1% are very similar, 13.6% and 13.2%, respectively. However, they are lower than the results of Alvaredo and Saez (2009) using wealth tax returns and the results using the capitalization method, which find that the top 1% holds approximately 20% of total net wealth.

The OECD has also published a paper (OECD (2015)) in which they construct top wealth shares using the 2011 SHF. They find that concentration at the top is lower than the OECD average, considering other sixteen countries. Comparing their results with the ones using tax data, we find that the top 1% is lower than in the case wealth tax or capitalized income data are used. For instance, the top 1% in 2011 using capitalized income data is 22.2% and the one obtained by OECD (2015) is 15.2%.

There are notable differences in terms of definitions and methodology between our estimates and the studies using the SHF. First, we use individual units while the SHF uses households

to define each fractile. Second, they use a different definition of wealth. Azpitarte (2010) includes collectibles, Bover (2010) also considers consumer durables on top of collectibles, and OECD (2015) excludes pension wealth and incorporates collectibles and consumer durables to its definition of wealth as well.

In an attempt to do a more consistent comparison across the two methods, I have also constructed the wealth distribution series with the SHF, under the same definition of wealth splitting households into individuals and assigning wealth proportionally to all members of the household, except daughters and sons, who are only given a fraction of wealth held in bank accounts. Moreover, only individuals aged 20 and above are considered. Even though trends are the same, levels are still quite different across the two methods (Figure A.28, panel (a)). Whereas the top 10% holds 57.4% using the capitalization method in 2011, it only concentrates 47.6% using the survey-method. Contrary to what happens at the top 10%, the middle 40% and the bottom 50% concentrate more wealth using the survey (44.7% and 7.7%, respectively) than the capitalization method (36.1% and 6.5%, respectively). However, if on top of the previous adjustments, I calculate the SHF wealth shares using the same population and wealth totals as in the capitalization method, that is, the ones consistent with the Census of Population and National Accounts, results are almost identical (Figure A.28, panel (b)). This is also the case for the very top of the distribution (top 1% and 0.01%).

In general, it is a challenge for wealth surveys to accurately capture wealthy individuals because of limited sample size and low response rates at the very top. Thus, as it is the case with income, wealth shares tend to be lower using survey data instead of tax data. This is the case in the US, as documented by Saez and Zucman (2016). Nonetheless, this does not seem to be the case in Spain, since after adjusting for population and wealth totals results are almost the same. Hence, the Spanish SHF is extremely useful not only to analyze the bottom and middle of the distribution, which as it has already be mentioned it is not entirely possible using only tax data, but also to understand the wealth inequality dynamics of the top.

8.2 Testing the Capitalization Method

As in Saez and Zucman (2016), I obtain the wealth estimates at the individual level by assuming that within a given asset class, everybody has the same capitalization factor. Computing wealth shares by capitalizing income consists of allocating the wealth for each asset recorded in the Non-financial and Financial Accounts to each group of the distribution based on how the

income for this asset is distributed. Hence, this method does not require to know the exact rate of return for each asset type, as long as the distribution of each capital income category is similar to the distribution of its corresponding wealth category.

Figure A.28, panel (b) is already a test for the well-behaved wealth inequality trends using the capitalization method. Nonetheless, I go one step forward and test whether rates of return are flat along the distribution using the micro-files from personal income tax records linked to wealth tax records for the period 2002-2007. This allows me to calculate the individual rate of return on deposits and fixed-income securities as the ratio of the interest they earn in these assets and the total value they hold in these assets. Whether ranking individuals by the total amount of deposits and fixed-income securities they owned or by total net wealth, rates of return are flat along the distribution (See Figure A.29).[27]

As another robustness check, I use the SHF and compare the wealth shares using direct reported wealth, with the shares calculated by capitalizing the income from the survey. These wealth shares include the same assets as the benchmark capitalized shares in this paper, except for owner-occupied housing, life insurance, pension and investment funds. The reason is that the SHF does not include the income generated by these assets in any of the four waves. Results using direct and capitalized wealth shares are very similar (See Figure A.30).

9   Conclusion

This paper presents unified wealth distribution series for Spain from bottom to the top over the period 1984 to 2013. They are obtained by combining different sources (tax records, national accounts, wealth surveys) and a mixed capitalization-survey method. Results point out that wealth concentration has been quite stable over this period for the middle 40% and bottom 50%, with shares ranging between 5-10% and 30-40%. Since the end of the nineties Spain has experienced a moderate rise in wealth concentration, with significant fluctuations due to asset price movements. These findings are consistent with the Survey of Household Finances and the estimations based on wealth taxes.

I also find that housing concentration rose during the years prior to the burst of the bubble, due to the larger increase in secondary dwelling acquisitions (quantity effect) by upper wealth

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[27]Results presented here are only for 2005, but they are very similar for the rest of years available (2002-2007). Ideally, rates of return for all asset categories should be computed, but unfortunately for the rest of assets it is not possible to perfectly link the income with the wealth reported, since the income generated by many assets (i.e. main residence, investment funds, etc. is exempted from the personal income tax.

groups, and decreased afterwards. Nonetheless, the impact of the housing bubble on wealth concentration was neutral. The main reason is that rich individuals substituted financial for housing assets during the boom, and compensated for the decrease in housing prices during the bust by selling some of their housing assets and accumulating more financial assets. Even though housing has reduced the levels of wealth inequality over the period 1984-2013, the bulk in secondary housing, together with offshore assets, large capital gains, and different rates of return and savings rates across groups have contributed to keeping the same high levels of wealth concentration of the 1980s in the late 2000s.

The answer to why Spaniards have such a strong taste towards housing even at the top of the distribution is still open. Some potential explanations are that housing has benefited from relatively more fiscal advantages than other assets (Haugh and Martínez-Toledano (2017), Ortega et al. (2011)), loose credit markets and low interest rates (Akin et al. (2014), Glaeser et al. (2017)). Other potential explanations are that housing is mainly a cultural phenomenon from Southern Europe (Huber and Schmidt (2017)) and that external factors such as immigration (Onrubia Fernández (2010) Taltavull de La Paz and White (2012)) and foreign investment (Rodríguez and Bustillo (2010)) have boosted the importance of housing in Spain, specially in the last two decades.

Even though my findings are helpful to understand the almost non-studied impact of a housing bubble on wealth inequality, extrapolating these results to other countries needs to be done carefully. Spain is a country in which rich individuals have a very particular portfolio composition with a large fraction of housing in their asset portfolio, that is, even before the housing boom rich individuals had a higher taste towards housing than in other countries. If rich individuals would not have purchased more and more dwellings during the bubble, wealth concentration could have potentially fallen. Therefore, the effects of a housing bubble on wealth concentration might not be neutral in countries in which rich individuals do not have these preferences towards housing.

Further research is needed on the evolution of wealth inequality over time and more specifically, on the effect of large short-run fluctuations such as housing bubbles on wealth concentration. There are conflicting results among studies that need to be better explained. Although sometimes it may be forgotten, how wealth is concentrated extremely matters from the policy point of view. It can help in the designing of policies aimed at achieving a more equitable system that at the same time could create new sources of economic growth.

References

AEAT (2013). Guía de la declaración de la renta 2013. *Agencia Estatal de Administración Tributaria.*

Akin, Ö., Montalvo, J. G., Villar, J. G., Peydró, J.-L., and Raya, J. M. (2014). The real estate and credit bubble: evidence from spain. *SERIEs Journal of the Spanish Economic Association.*

Alstadsæter, A., Johannesen, N., and Zucman, G. (2017). Tax evasion and inequality. Technical report, Working Paper, Norwegian University of Life Sciences.

Alvaredo, F. and Artola, M. (2017). Wealth Concentration at Death and Wealth inequality in Spain, 1901-2010. Working Paper, Paris School of Economics.

Alvaredo, F., Atkinson, A. B., and Morelli, S. (2017). Top wealth shares in the uk over more than a century. *WID.world Working Paper.*

Alvaredo, F. and Saez, E. (2009). Income and Wealth Concentration in Spain from a Historical and Fiscal Perspective. *Journal of the European Economic Association*, 7(5):1140–1167.

Artola, M., Estévez, L., and Martínez-Toledano, C. (2017). Wealth in Spain, 1900-2014. A Country of Two Lands. Working Paper, Paris School of Economics.

Atkinson, A. B. and Harrison, A. J. (1978). *Distribution of personal wealth in Britain.* Cambridge University Press.

Azpitarte, F. (2010). The household wealth distribution in Spain: the role of housing and financial wealth. *Hacienda pública española*, 194:65–90.

Banco de España (2007). Encuesta financiera de las familias (eff) 2005: métodos, resultados y cambios entre 2002 y 2005. *Boletín económico*, 12.

Banco de España (2011). Nota metodólogica de las cuentas financieras de la economía española. *Notas Estadísticas. Banco de España*, 5:1–59.

Blanchet, T., Fournier, J., and Piketty, T. (2016). Generalized pareto curves: Theory and applications. *WID.world Working Paper.*

Bover, O. (2010). Wealth inequality and household structure: US vs. Spain. *Review of Income and Wealth*, 56(2):259–290.

Caixa Catalunya, L. (2004). Informe sobre el Consumo y la Economía Familiar, Report Mono-gráfico: El Crecimiento del stock de riqueza de las familias españolas y su impacto sobre el consumo en el período 1995-2003: Una versión territorial.

Castaneda, A., Diaz-Gimenez, J., and Rios-Rull, J.-V. (2003). Accounting for the us earnings and wealth inequality. *Journal of Political Economy*, 111(4):818–857.

Cowell, F. A. and Kerm, P. (2015). Wealth inequality: A survey. *Journal of Economic Surveys*, 29(4):671–710.

Durán-Cabré, J. M. and Esteller-Moré, A. (2010). Tax Data for Wealth Concentration Analysis: an Application to Spanish Wealth Tax. *Review of Income and Wealth*, 56(3):620–631.

Fernández, J. O., Ruíz, M. d. C. R., Míguez, S. D. D. S., López, C. P., et al. (2007). Progresividad y redistribución a través del irpf español: Un análisis de bienestar social para el periodo 1982-1998. *Hacienda Pública Española*, pages 81–124.

Garbinti, B., Goupille, J., and Piketty, T. (2017). Accounting for wealth inequality dynamics : Methods, estimates and simulations for france (1800-2014). WID.world Working Paper.

Glaeser, E. L., Santos, T., and Weyl, E. G. (2017). *After the Flood: How the Great Recession Changed Economic Thought.* University of Chicago Press.

Guiso, L., Haliassos, M., and Jappelli, T. (2002). *Household portfolios.* MIT press.

Haugh, D. and Martínez-Toledano, C. (2017). The distribution of taxable income and fiscal benefits in Spain. new evidence from personal income tax returns (2002-2011). *OECD Working Paper*.

Huber, S. J. and Schmidt, T. (2017). Cross-country differences in homeownership: A cultural phenomenon? *Working Paper, Universidad Pompeu Fabra*.

Kopczuk, W. (2015). What Do We Know about the Evolution of Top Wealth Shares in the United States? *The Journal of Economic Perspectives*, 29(1):47–66.

Kopczuk, W. and Saez, E. (2004). Top Wealth Shares in the United States, 1916-2000: Evidence From Estate Tax Returns. *National Tax Journal*, 57(2):445–87.

Lampman, R. J. (1962). *The share of top wealth-holders in national wealth 1922-56: a study by the National Bureau of Economic Research.* Princeton University Press.

Lundberg, J. and Waldenström, D. (2017). Wealth inequality in sweden: What can we learn from capitalized income tax data? *Review of Income and Wealth, forthcoming.*

Ministerio de Hacienda y Administraciones Públicas (2016). *Efecto del 720 y el 750 en el Impuesto sobre el Patrimonio.* Nota de Prensa.

OECD (2015). In It Together: Why Less Inequality Benefits All.

Onrubia Fernández, J. (2010). Vivienda y población inmigrante en españa: situación y políticas públicas. *Presupuesto y Gasto Público*, 4(61):273–310.

ONRUBIA FERNÁNDEZ, J. and PICOS SÁNCHEZ, F. (2012). Diseño, contenido y aplicaciones del nuevo panel de declarantes de irpf 1999-2007. *Revista de Economía Aplicada*, 20(60).

Ortega, E., Rubio, M., and Thomas, C. (2011). House purchase versus rental in spain. *Moneda y Crédito: Revista de Economía*, pages 109–144.

Piketty, T. (2011). On the long-run evolution of inheritance: France 1820-2050. *Quarterly Journal of Economics*, 126(3).

Piketty, T. (2014). *Capital in the 21st Century.* Harvard University Press.

Piketty, T., Postel-Vinay, G., and Rosenthal, J.-L. (2006). Wealth concentration in a developing economy: Paris and france, 1807–1994. *The American economic review*, 96(1):236–256.

Piketty, T. and Saez, E. (2003). Income inequality in the United States: 1913-1998. *Quarterly Journal of Economics*, 118:1–39.

Piketty, T. and Zucman, G. (2014). Capital is back: Wealth-income ratios in rich countries, 1700-2010. *Quarterly Journal of Economics*, 129:1255–1310.

Rodríguez, C. and Bustillo, R. (2010). Modelling foreign real estate investment: The Spanish case. *The Journal of Real Estate Finance and Economics*, 41(3):354–367.

Roine, J. and Waldenström, D. (2009). Wealth concentration over the path of development: Sweden, 1873–2006. *The Scandinavian journal of economics*, 111(1):151–187.

Saez, E. and Zucman, G. (2016). Wealth inequality in the united states since 1913: Evidence from capitalized income tax data. *The Quarterly Journal of Economics*, 131(2):519–578.

Scarpetta, S., Sonnet, A., and Manfredi, T. (2010). Rising youth unemployment during the crisis. *OECD Publishing*.

Sinn, H.-W. and Wollmershäuser, T. (2012). Target loans, current account balances and capital flows: the ecb's rescue facility. *International Tax and Public Finance*, 19(4):468–508.

Taltavull de La Paz, P. and White, M. (2012). Fundamental drivers of house price change: the role of money, mortgages, and migration in spain and the united kingdom. *Journal of Property Research*, 29(4):341–367.

Vermeulen, P. (2016). Estimating the top tail of the wealth distribution. *The American Economic Review*, 106(5):646–650.

Zucman, G. (2013). The Missing Wealth of Nations: Are Europe and the US net Debtors or net Creditors?*. *The Quarterly Journal of economics*, 128(3):1321–1364.

Zucman, G. (2014). Taxing across borders: Tracking personal wealth and corporate profits. *The Journal of Economic Perspectives*, pages 121–148.

Zucman, G. (2015). The Hidden Wealth of Nations. *University of Chicago Press Economics Books*.

Level and composition of household wealth, Spain 1984-2014
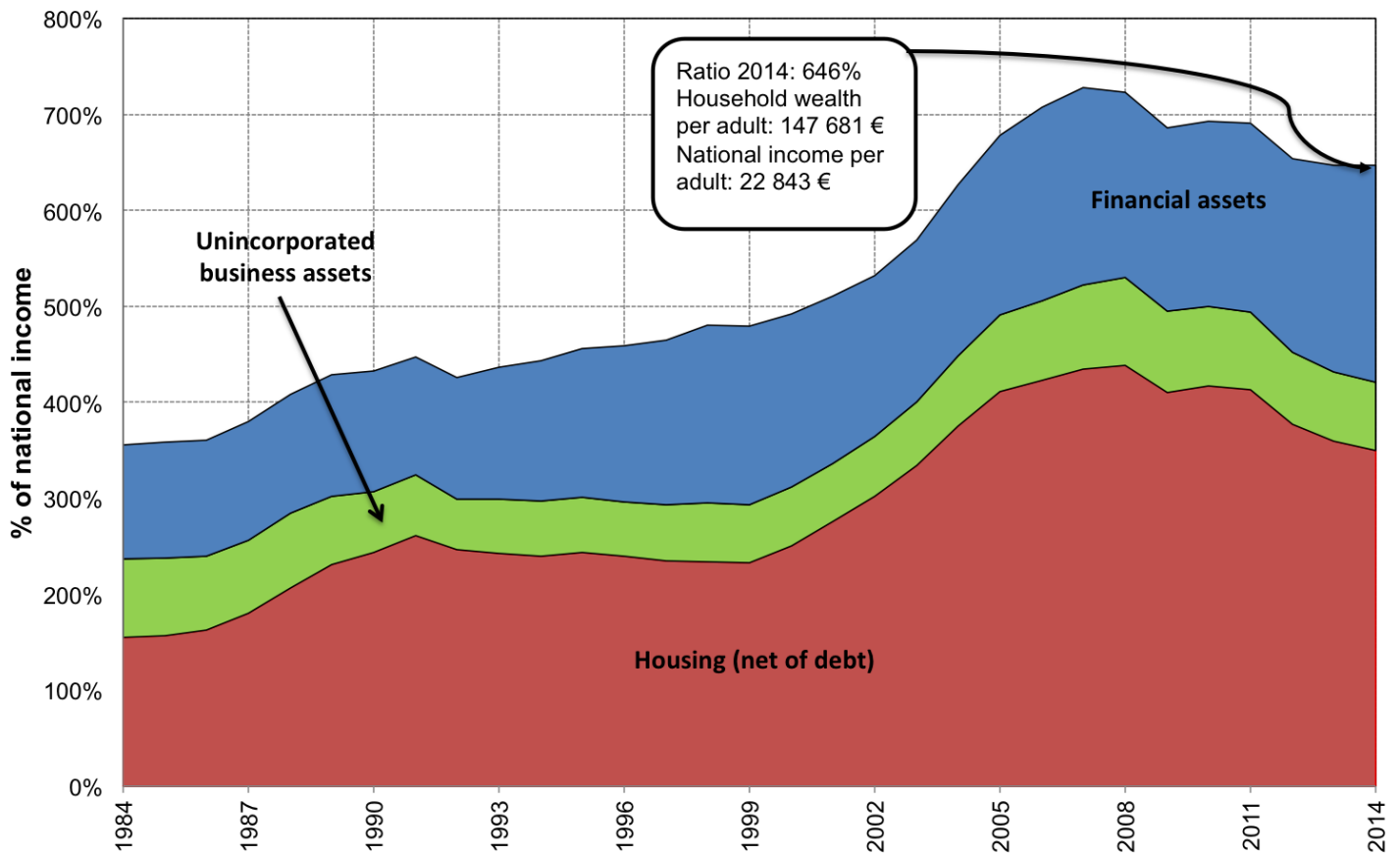
Figure A.1: Level and composition of household wealth, Spain 1984-2014

Notes: The figure depicts the level and composition of aggregate household wealth from 1984 to 2014 expressed as a percentage of national income. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security.

Composition of aggregate household wealth, Spain 1984-2014
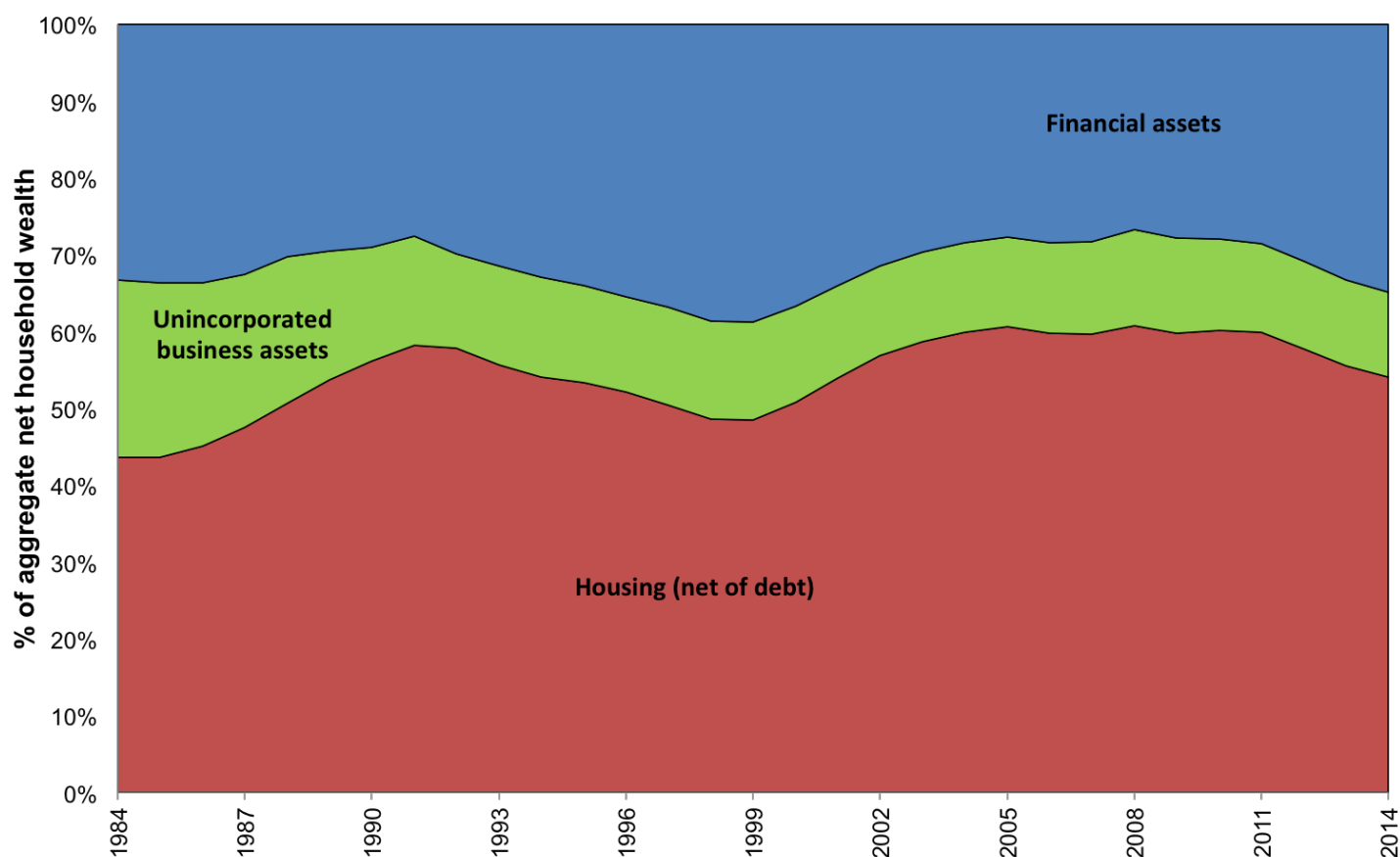
Figure A.2: Composition of household wealth, Spain 1984-2014

Notes: The figure displays the composition of aggregate household wealth from 1984 to 2013 expressed as a percentage of total net household wealth. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security.
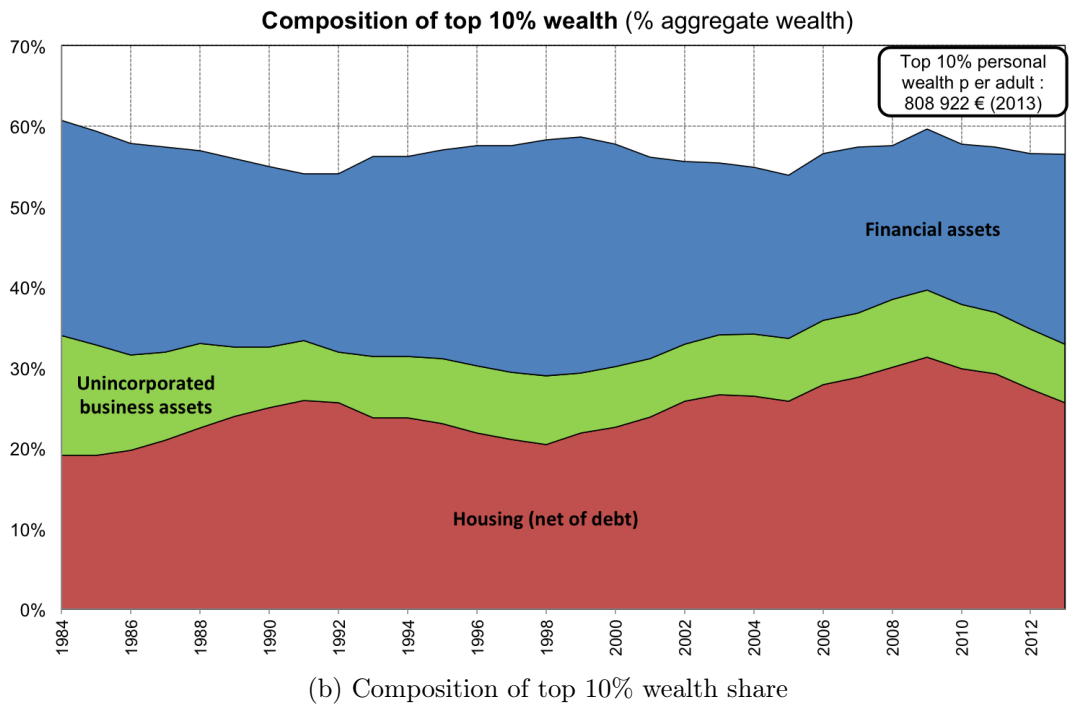
Figure A.3: Flow returns in Spain, 1984-2014 (gross of all taxes)

Notes: The figure depicts flow returns in Spain from 1984 to 2014 gross of all taxes. Returns are calculated using National Accounts as the ratio between the income generated by each asset and the total value of each asset. Housing includes owner- and tenant-occupied housing. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investm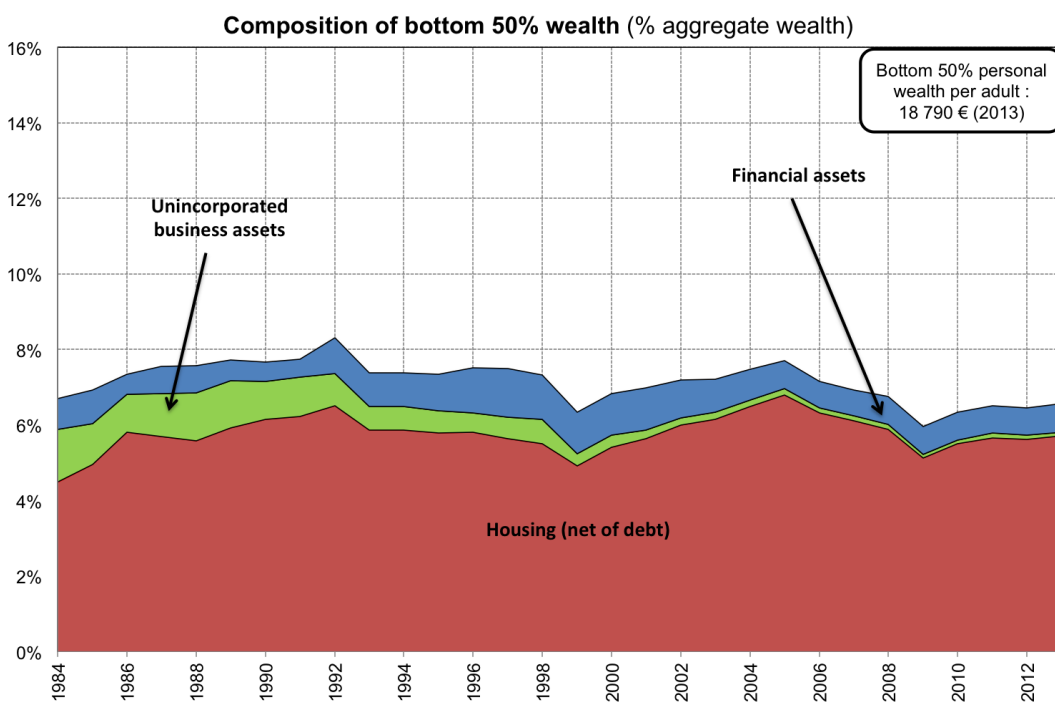ent funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security. Source: Appendix Table ***.

Direct vs. Imputed Wealth

(using Spanish Survey of Household Finances)
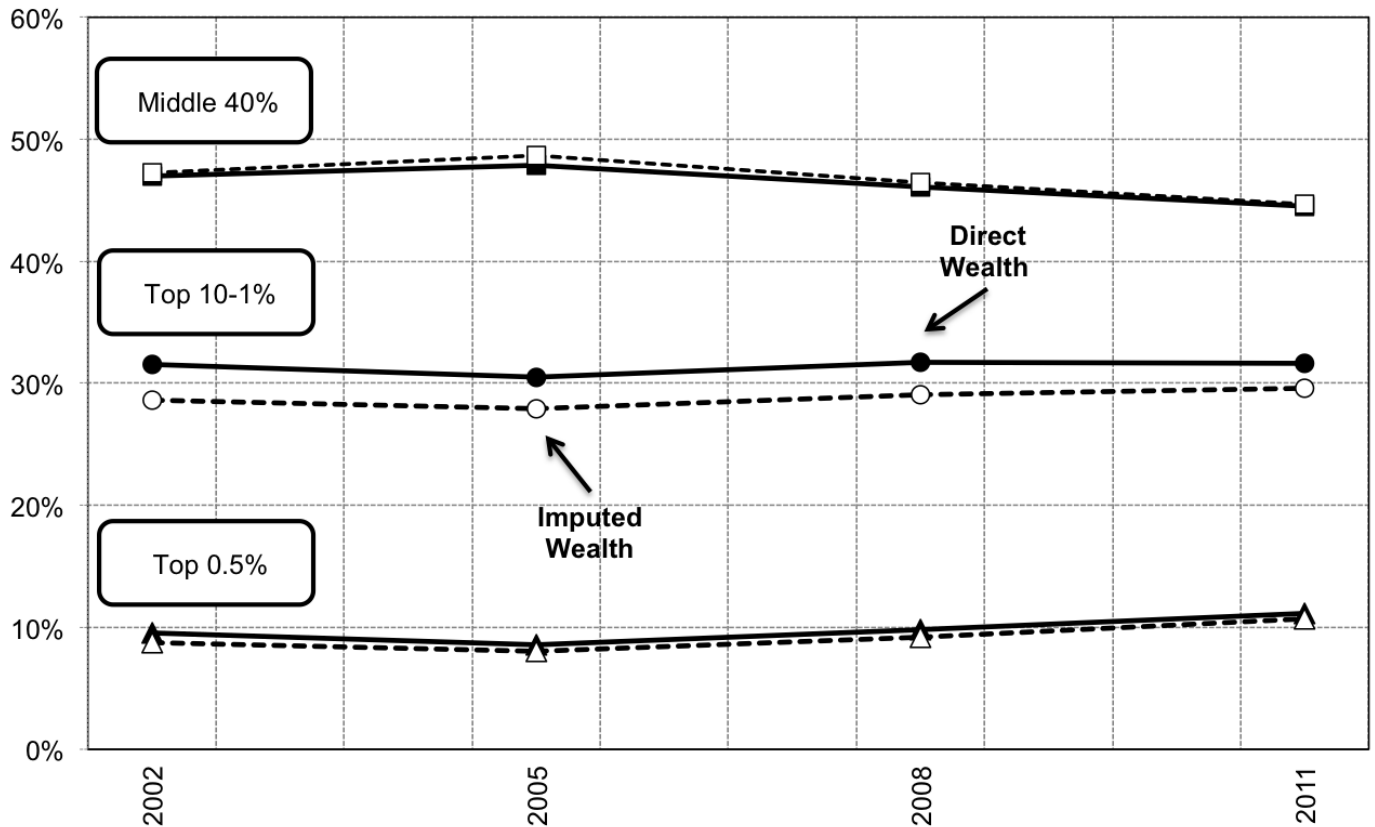
Figure A.4: Direct vs. Imputed Wealth

Notes: The figure depicts wealth shares for the middle 40%, top 10-1% and top 0.5% using the direct wealth (solid line) and the imputed wealth (dashed line) of Survey of Household Finances respondents. Imputed assets are main owner-occupied housing, life insurance reserves, pension and investment funds. They are imputed by grouping individuals according to their age, labor and capital income and calculating the share that each group owns. For a more detailed explanation of the imputation method see Section 3.3 in the paper. Wealth includes net housing (owner- and tenant-occupied housing net of mortgage debt), unincorporated business assets, equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, life insurance reserves and pension funds, excluding Social Security. For the SHF of year t, wealth is measured in t but capital and labor income are measured in year $t-1$. These findings are robust to splitting the wealth distribution into different groups as the ones presented here. Sources: SHF micro-data.
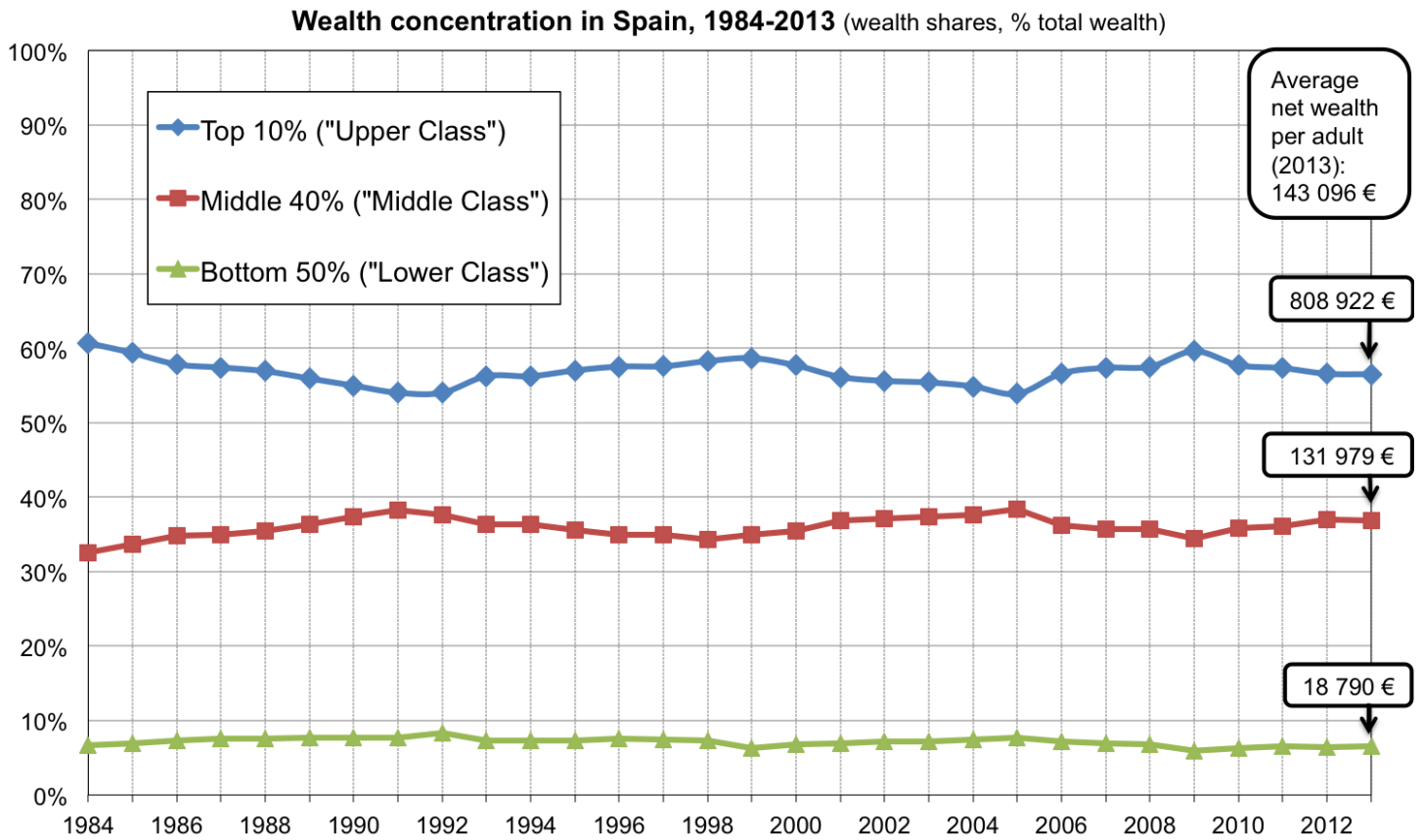
Figure A.5: Wealth concentration in Spain, 1984-2013

Notes: The figure depicts the breakdown of the wealth distribution in Spain for years 1984-2013 into three groups: top 10%, middle 40% and bottom 50%. Wealth includes net housing, unincorporated business assets and financial assets (equities, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves, pension and investment funds). Wealth shares are c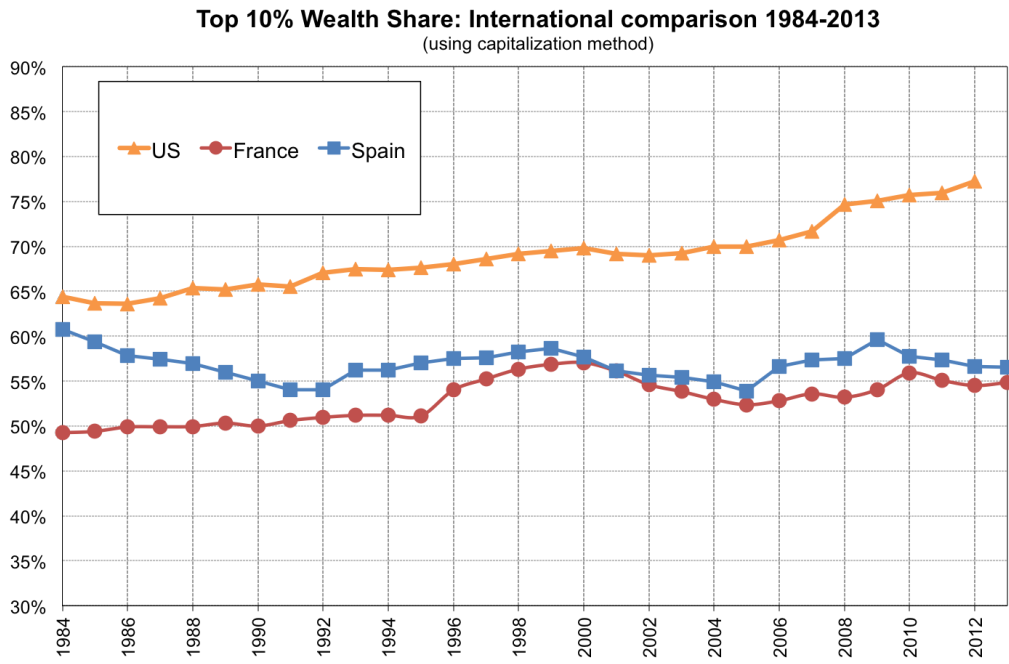onstructed by capitalizing taxable income and accounting for the assets that do not generate taxable income (main residence (1999-2013), life insurance, pension and investment funds) with the SHF. The unit of analysis is the adult individual (+20).

Figure A.6: Asset composition by wealth level, Spain 2013

Notes: The figure depicts the asset composition by wealth group for the period 1984-2013 using the mixed capitalization-survey method. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships.

Composition of top 1% wealth (% aggregate wealth)

Top 1% personal
wealth per adult :
3 013 457 € (2013)

Financial assets

Unincorporated
business assets

Housing (net of debt)

(a) Composition of top 1% wealth share

Composition of top 10% wealth (% aggregate wealth)

Top 10% personal
wealth p er adult :
808 922 € (2013)

Financial assets

Unincorporated
business assets

Housing (net of debt)

(b) Composition of top 10% wealth share
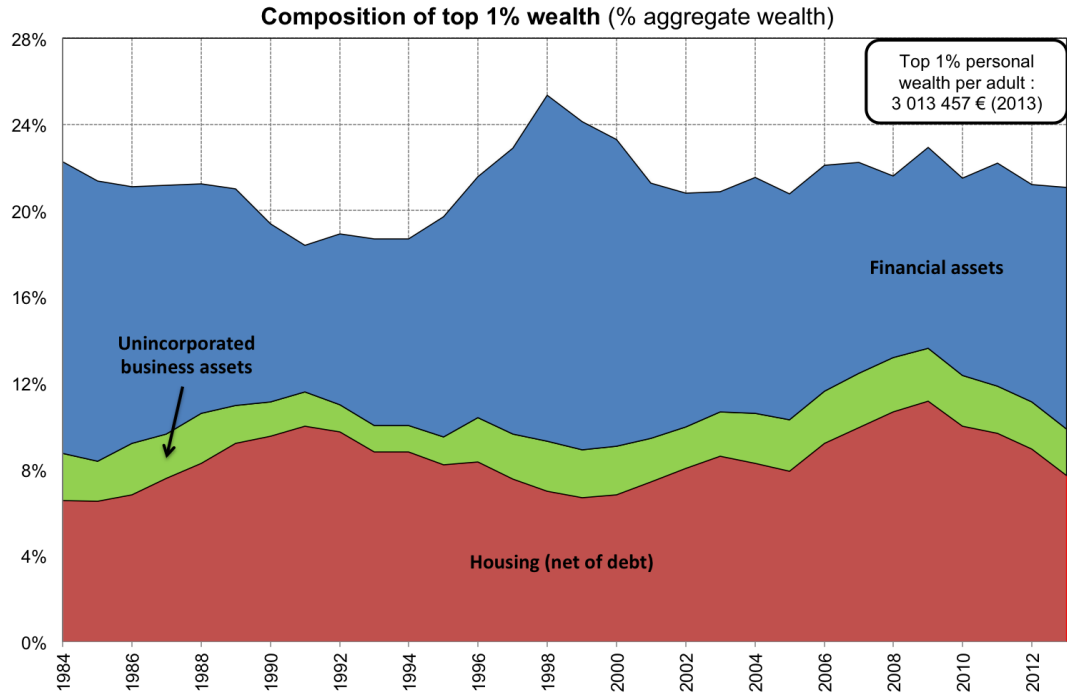
Figure A.7: Composition of the top of the wealth distribution, Spain 1984-2013

Notes: The figure displays the composition of the top 1% (panel a) and top 10% (panel b) wealth shares in
Spain using the capitalization method for the period 1984-2013. Net housing includes owner- and
tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities.
Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets
cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life
insurance reserves and pension funds, excluding Social Security.

Composition of middle 40% wealth (% aggregate wealth)

Middle 40% personal
wealth per adult :
131 979 € (2013)

Unincorporated
business assets

Financial assets

Housing (net of debt)

(a) Composition of middle 40% wealth share

Composition of bottom 50% wealth (% aggregate wealth)

Bottom 50% personal
wealth per adult :
18 790 € (2013)

Financial assets

Unincorporated
business assets

Housing (net of debt)
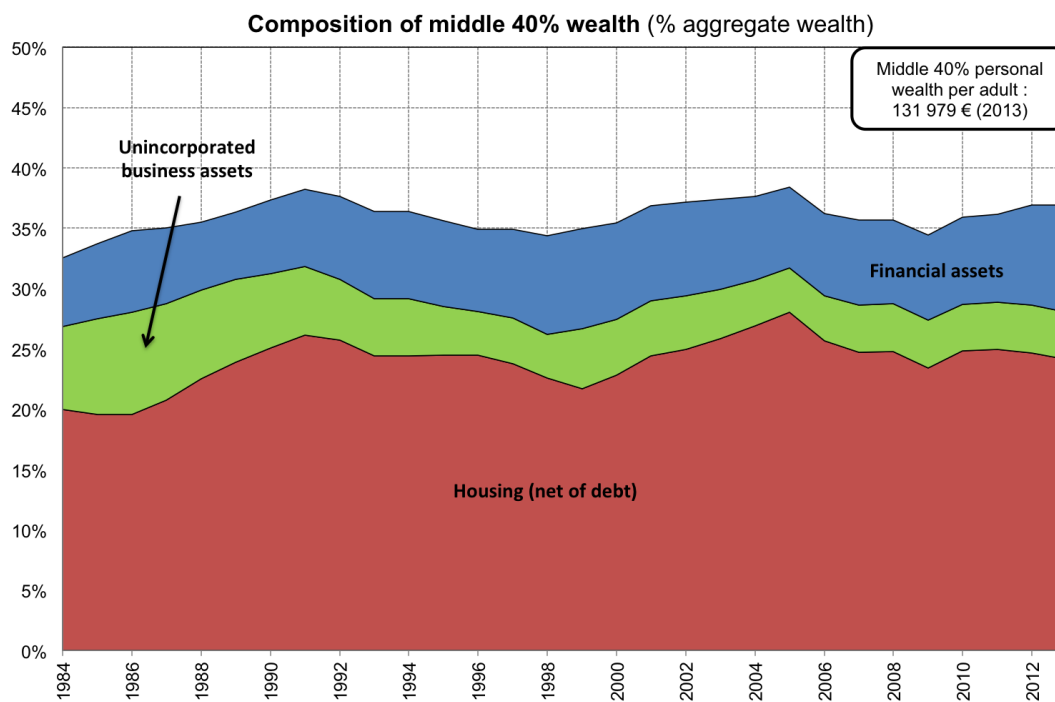
(b) Composition of bottom 50% wealth share

Figure A.8: Composition of the bottom of the wealth distribution, Spain 1984-2013

Notes: The figure displays the composition of the middle 40% (panel a) and bottom 50% (panel b) wealth shares in Spain using the capitalization method for the period 1984-2013. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security.

42
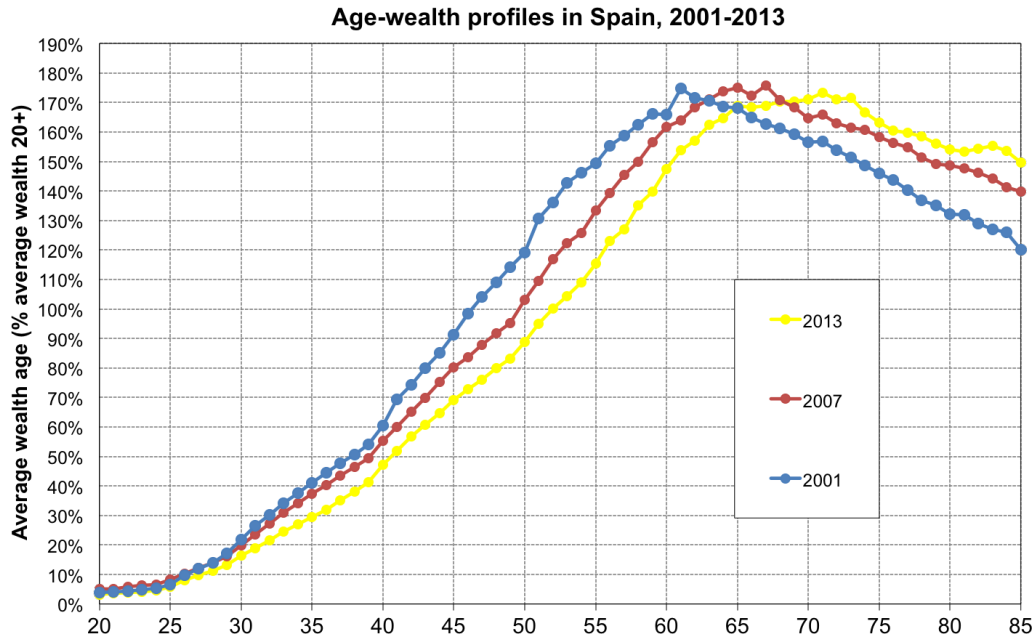
(a) Age-wealth profiles in Spain, 2001-2013
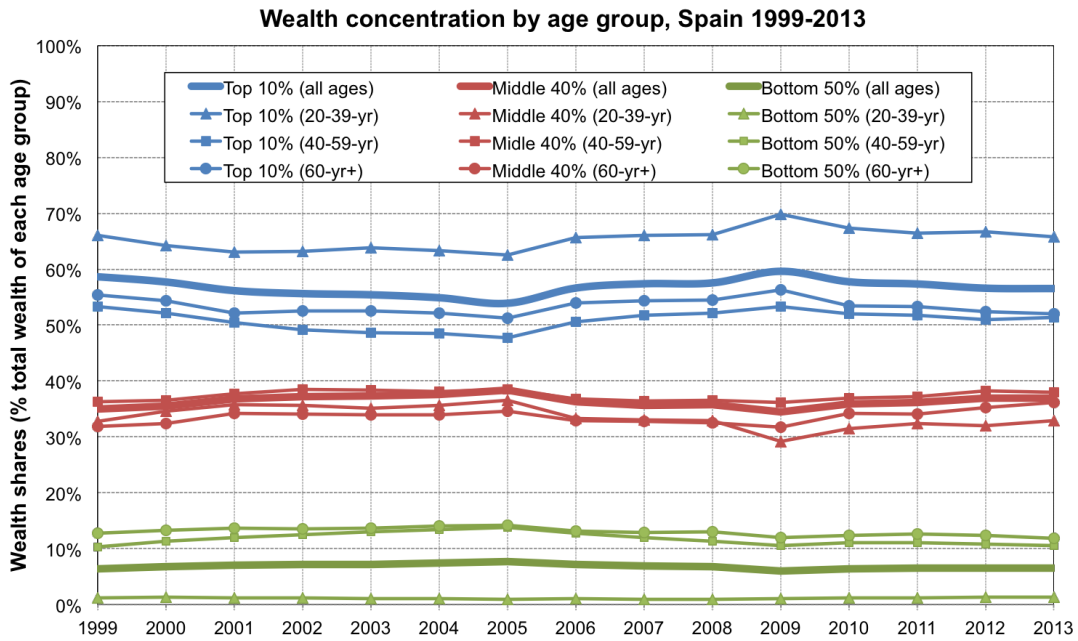
(b) Wealth concentration by age group, 1999-2013

Figure A.9: Wealth concentration by age, 1999-2013

Notes: The figure in panel (a) displays age-wealth profiles as a % of average wealth for years 2001, 2007 and 2013 in Spain. The figure in panel (b) depicts the breakdown of the wealth distribution in Spain over the period 1999-2013 into three age groups: the young (20-39), the middle-old (40-59) and the old (+60). Both figures have been elaborated based on the benchmark series using the mixed capitalization-survey method. Results are only available from 1999 onwards, since there is no information available on age in the micro-files for previous years.

Top 10% Wealth Share: International comparison 1984-2013
(using capitalization method)

(a) Top 10% wealth share: International comparison, 1984-2013 (using capitalization method

Top 1% wealth share: International comparison 1984-2013
(capitalization method)
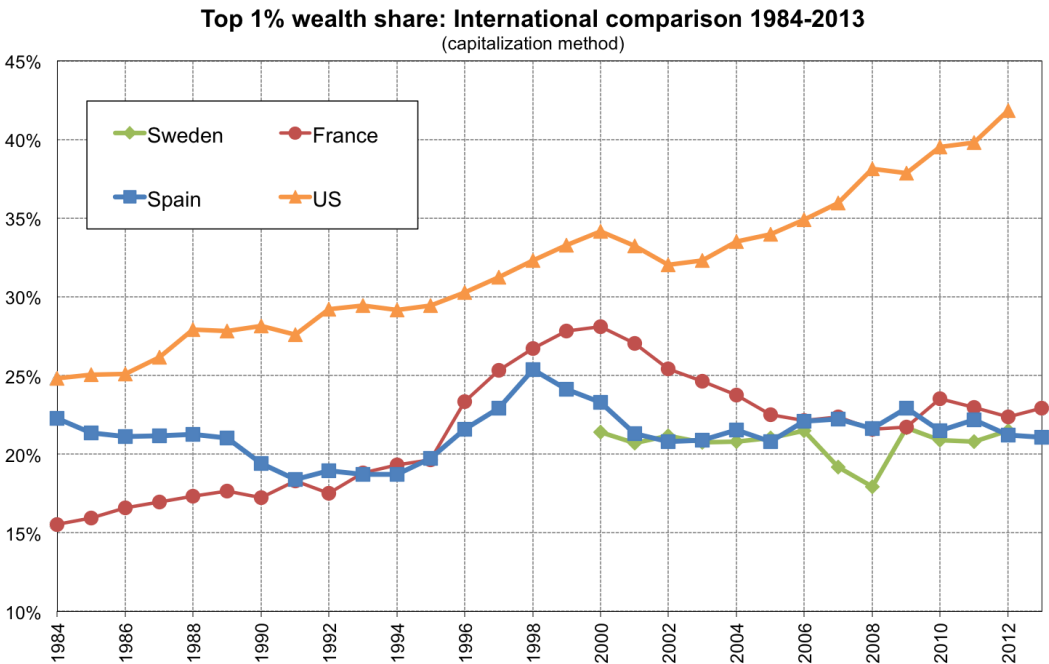
(b) Top 1% wealth share: International comparison, 1984-2013 (using capitalization method)

Figure A.10: International comparison of top wealth shares, 1984-2013

Notes: The figure compares the top 10% (panel (a)) and 1% (panel (b)) wealth shares in Spain with the rest of countries (US (Saez and Zucman (2016), France (Garbinti et al. (2017)), Sweden (Lundberg and Waldenström (2017), only top 1%) for which the capitalization has been used. Comparisons should be made carefully since there are important methodological differences across countries.

Top 1% wealth share in Spain, 1984-2013
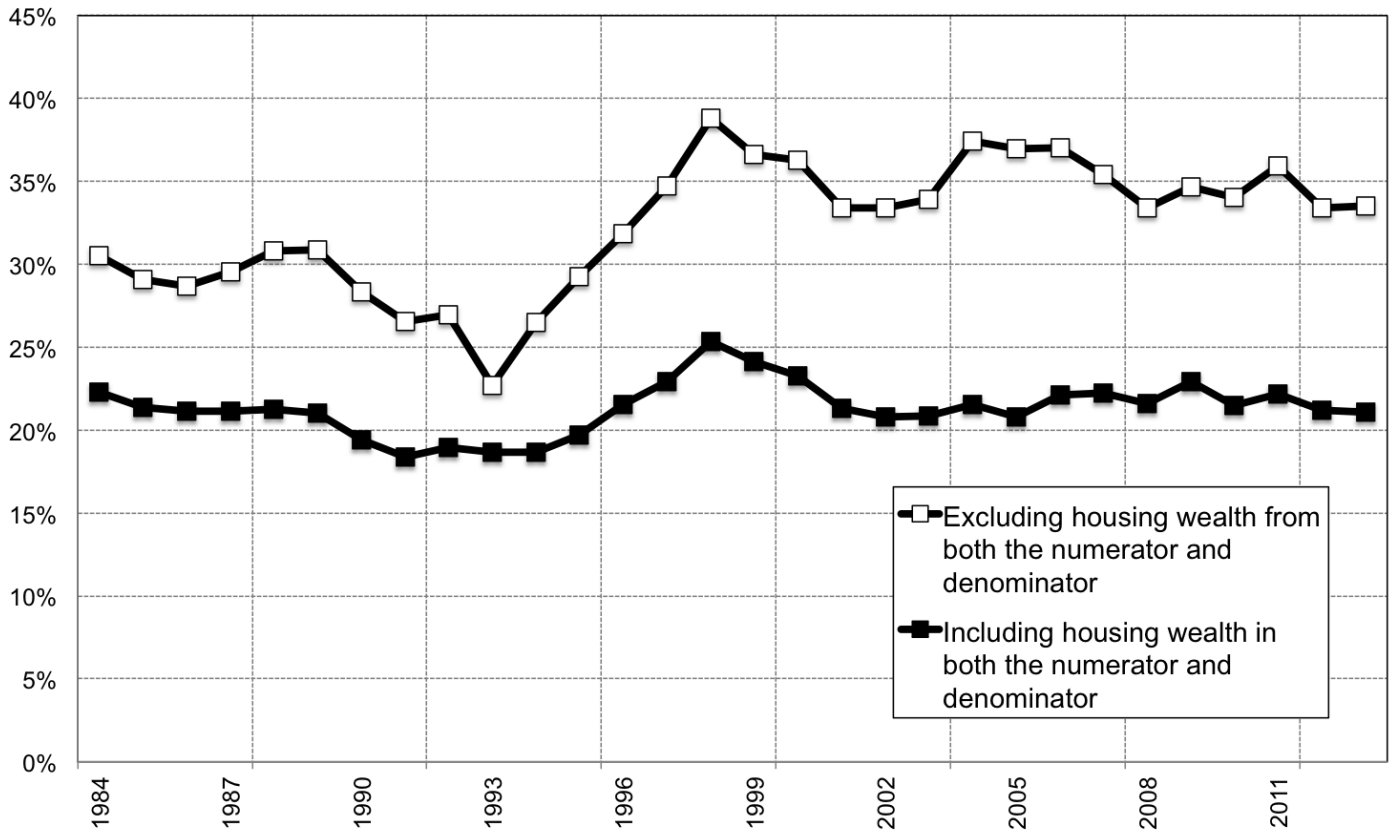
Figure A.11: Top 1% wealth share excluding and including net housing wealth, Spain 1984-2013

Notes: The figure depicts the top 1% wealth share including and excluding net housing wealth for the period 1984-2013 using the mixed capitalization-survey method. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities.

Composition of housing by wealth group, Spain 1984-2013
(using capitalized shares)
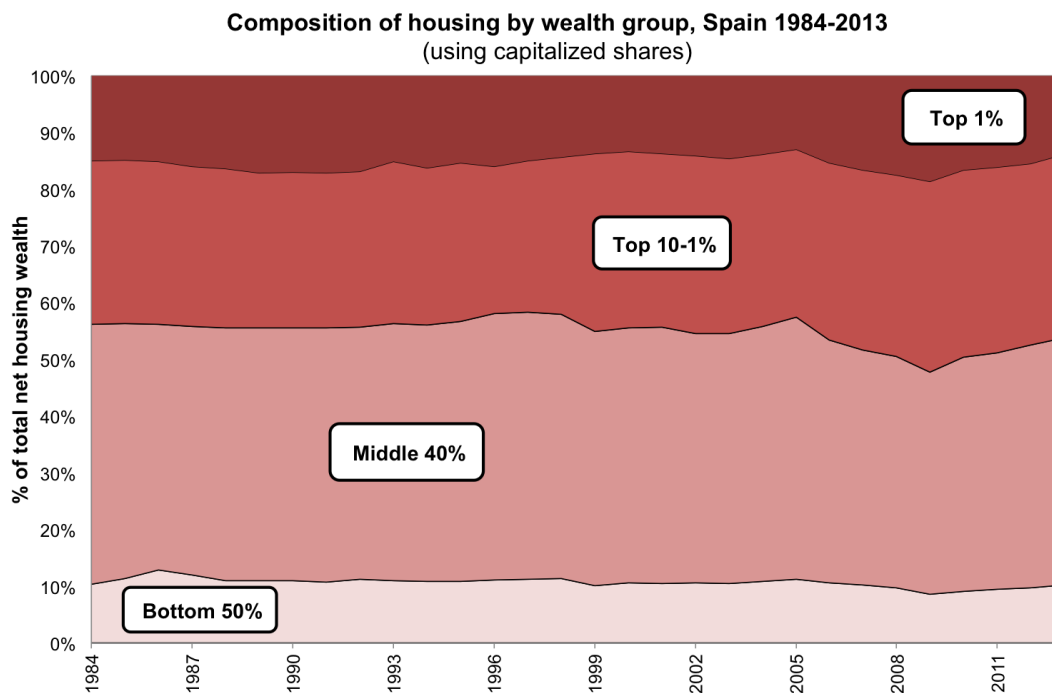
(a) Composition of housing by wealth group (using capitalized shares), Spain 1984-2013

Composition of housing by wealth group, 2002-2011
(using the Survey of Household Finances)
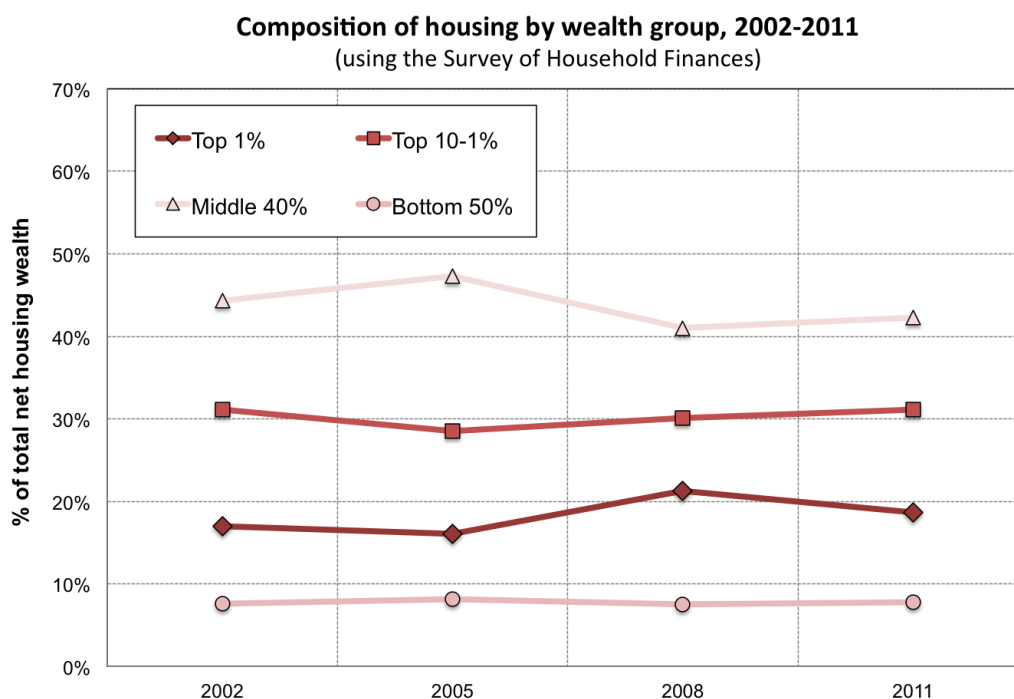
(b) Composition of housing by wealth group (using the SHF), Spain 2002-2011

Figure A.12: Composition of housing by wealth group, Spain

Notes: The figure depicts the composition of housing by wealth group (top 1%, top 10 to 1%, middle 40% and bottom 50%) in Spain using the mixed capitalization-survey method (panel (a)) for the period 1984-2013 and the Survey of Household Finances (panel (b)) for the period 2002-2011.
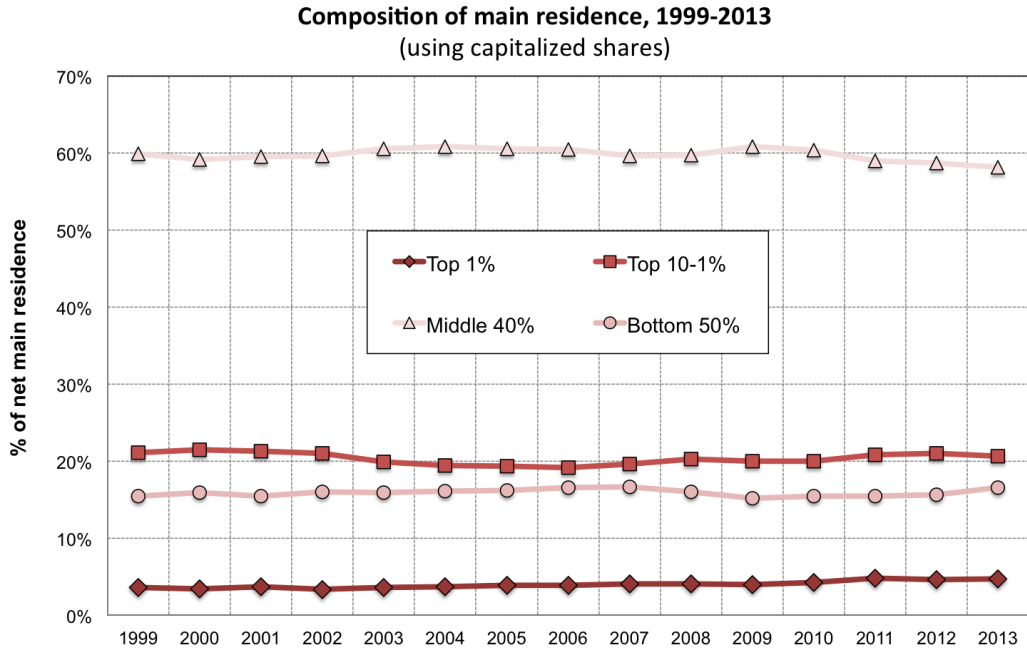
Composition of main residence, 1999-2013
(using capitalized shares)

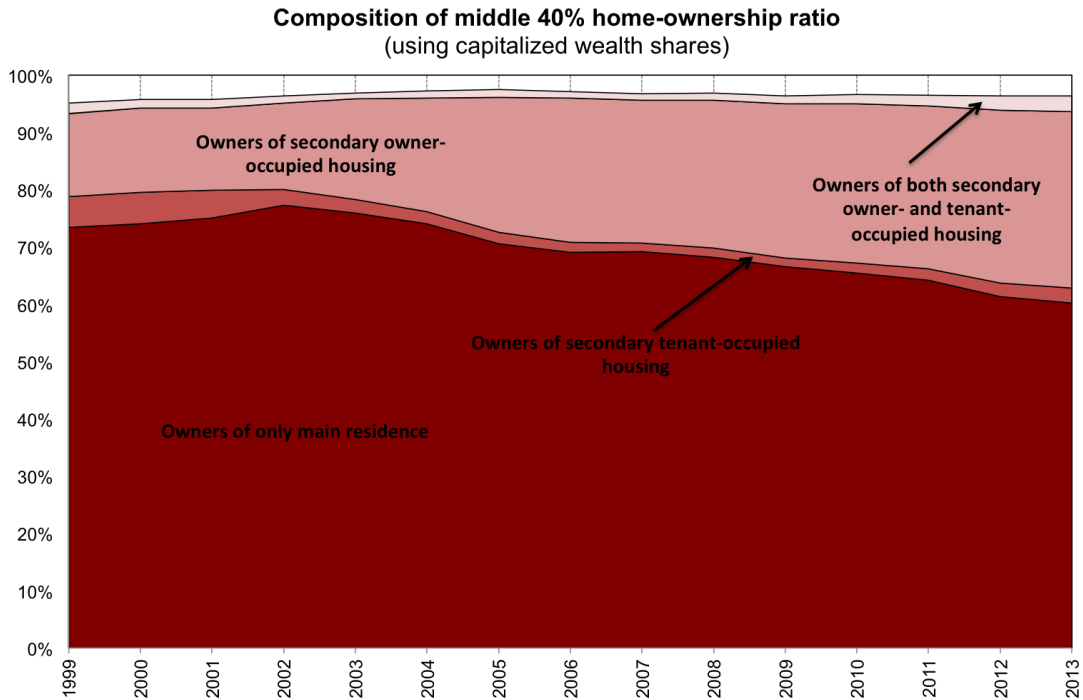(a) Composition of main residence housing by wealth group (using capitalized shares), Spain 1999-2013

**Composition of main residence, 2002-2011**
(using the Survey of Household Finances)
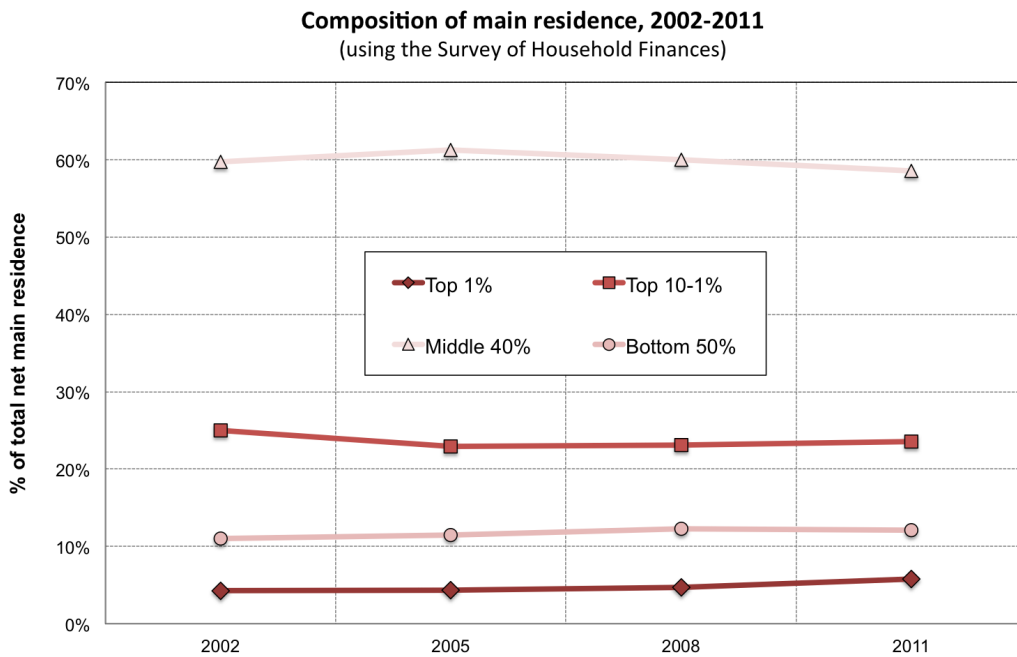
(b) Composition of main residence housing by wealth group (using the SHF), Spain 2002-2011

Figure A.13: Composition of main residence housing by wealth group, Spain

Notes: The figure depicts the composition of main residence housing by wealth group (top 1%, top 10 to 1%, middle 40% and bottom 50%) in Spain using the mixed capitalization-survey method (panel (a)) for the period 1999-2013 and the Survey of Household Finances (panel (b)) for the period 2002-2011.

Composition of secondary housing, 1999-2013
(using capitalized shares)
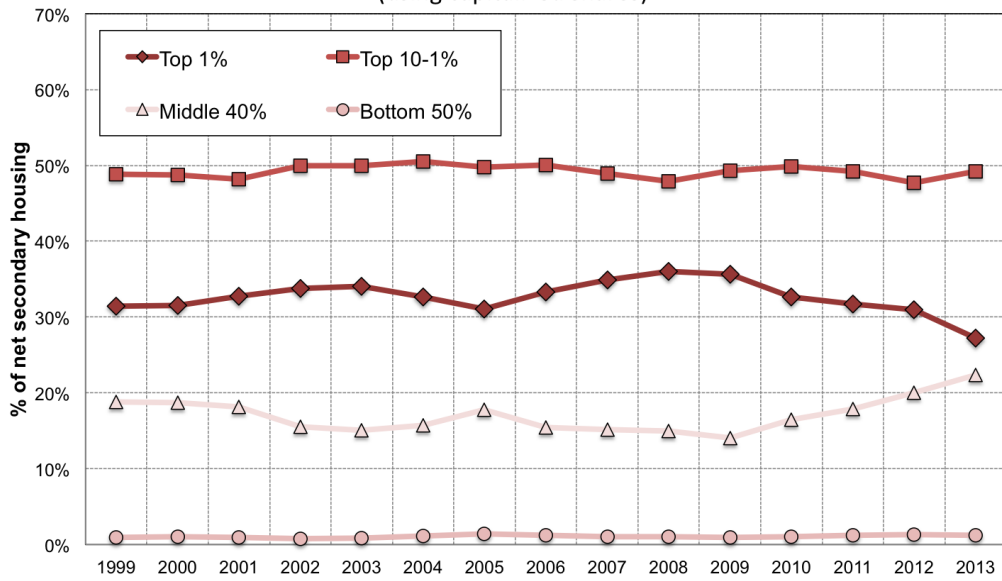
(a) Composition of secondary residence housing by wealth group (using capitalized shares), Spain 1999-2013

Composition of secondary housing, 2002-2011
(using the Survey of Household Finances)
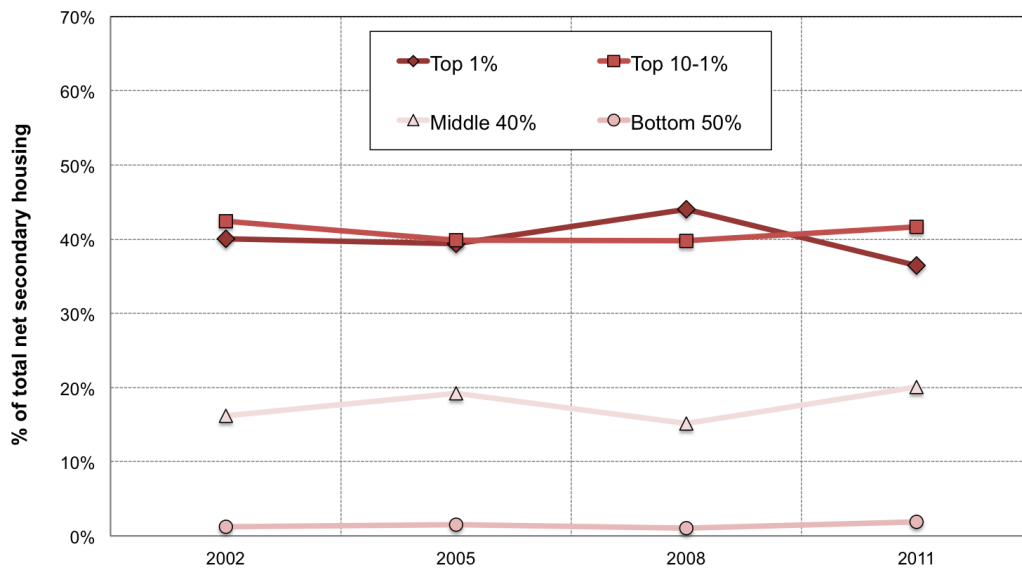
(b) Composition of secondary residence housing by wealth group (using the SHF), Spain 2002-2011

Figure A.14: Composition of secondary residence housing by wealth group, Spain

Notes: The figure depicts the composition of secondary residence housing by wealth group (top 1%, top 10 to 1%, middle 40% and bottom 50%) in Spain using the mixed capitalization-survey method (panel (a)) for the period 1999-2013 and the Survey of Household Finances (panel (b)) for the period 2002-2011.

Composition of middle 40% home-ownership ratio
(using capitalized wealth shares)

(a) Composition of middle 40% home-ownership ratio (using capitalized shares), Spain 1999-2013

Composition of middle 40% home-ownership ratio
(using Survey of Household Finances)
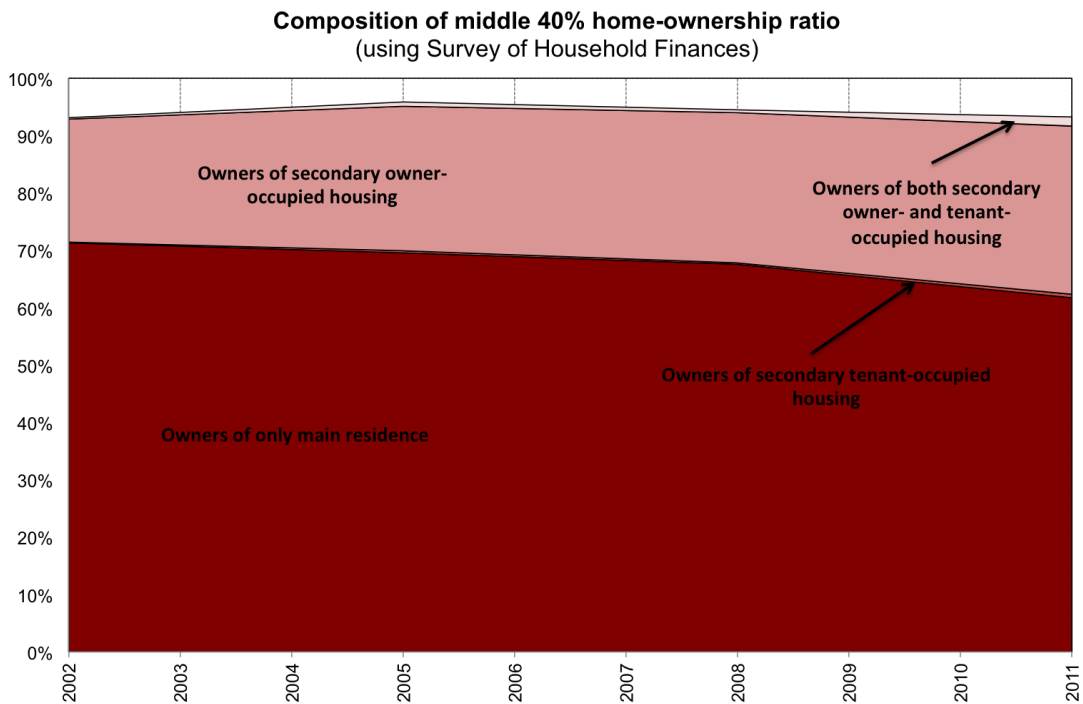
(b) Composition of middle 40% home-ownership ratio (using SHF), Spain 2002-2011

Figure A.15: Composition of middle 40% home-ownership ratio, Spain

Notes: The figure depicts the composition of middle 40% home-ownership ratio in Spain using the mixed capitalization-survey method (panel (a)) for the period 1999-2013 and the Survey of Household Finances (panel (b)) for the period 2002-2011.

Composition of top 1% home-ownership ratio
(using capitalized wealth shares)
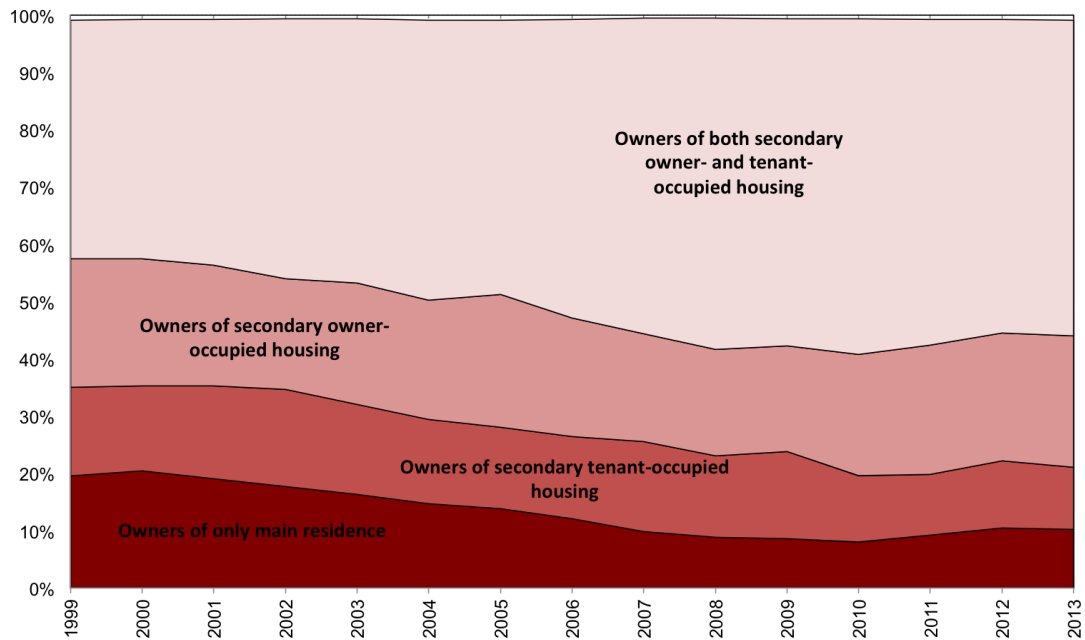
(a) Composition of top 1% home-ownership ratio (using capitalized shares), Spain 1999-2013

Composition of top 1% home-ownership ratio
(using Survey of Household Finances)
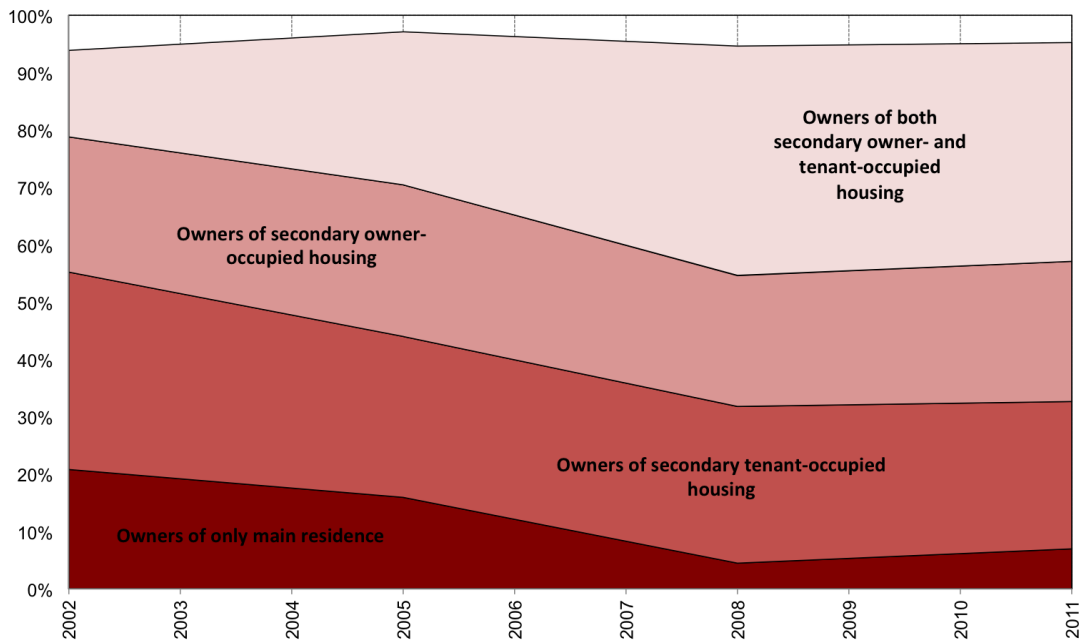
(b) Composition of top 1% home-ownership ratio (using SHF), Spain 2002-2011

Figure A.16: Composition of top 1% home-ownership ratio, Spain

Notes: The figure depicts the composition of top 1% home-ownership ratio in Spain using the mixed capitalization-survey method (panel (a)) for the period 1999-2013 and the Survey of Household Finances (panel (b)) for the period 2002-2011.

Distribution of housing prices, 2005-2013
(using capitalized wealth shares and housing prices at the municipality level)
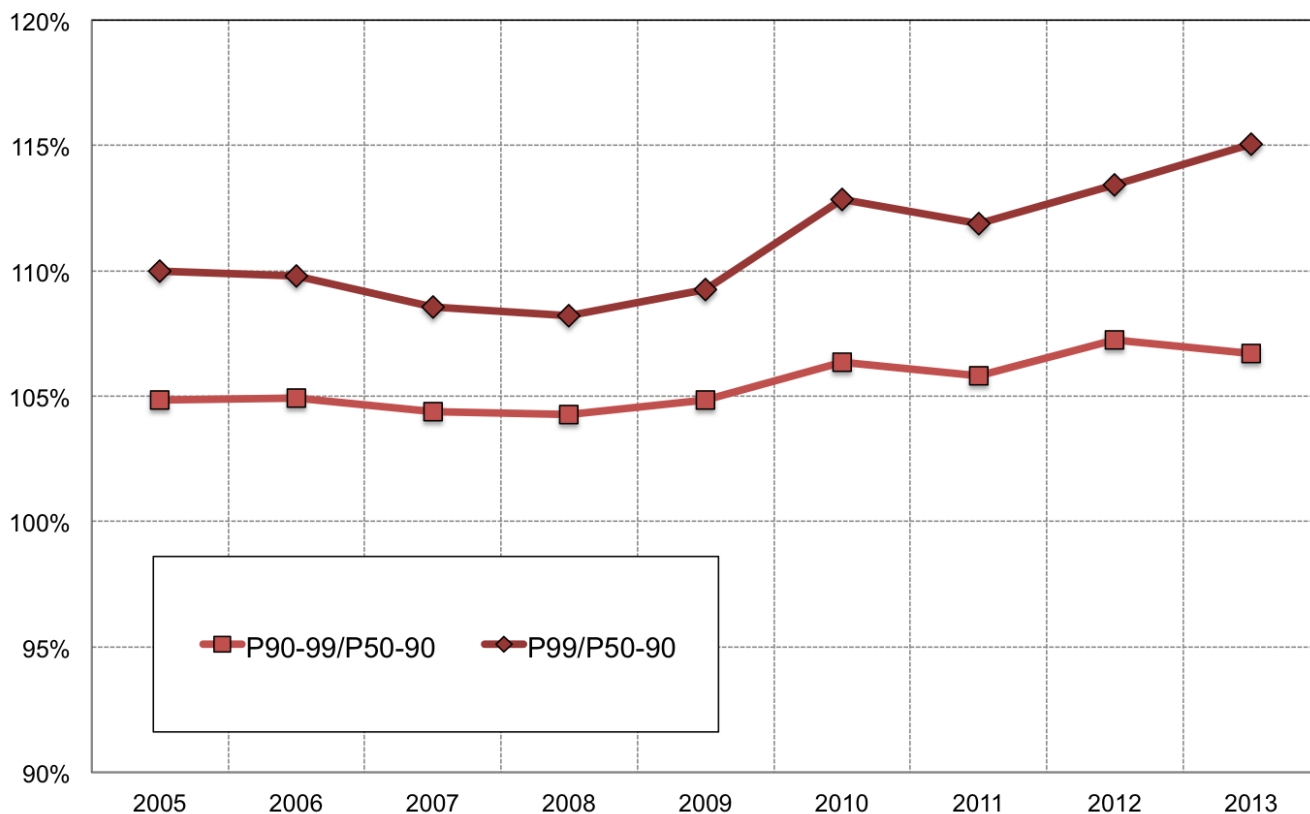
Figure A.17: Distribution of housing prices using capitalized wealth shares and housing prices at the municipality level, Spain 2005-2013

Notes: The figure depicts the p90-99 and p99 to p50-90 housing price ratio in Spain for the period 2005-2013 using the mixed capitalization-survey method. The distribution of housing prices has been calculated by assigning to each individual of the distribution of capitalized wealth shares the average housing price in the municipality in which they declare having their main residence. The series of housing prices used is elaborated by the Ministry of Public Works and it is based on property appraisals.

**Composition of financial assets by wealth group, Spain 1984-2013**
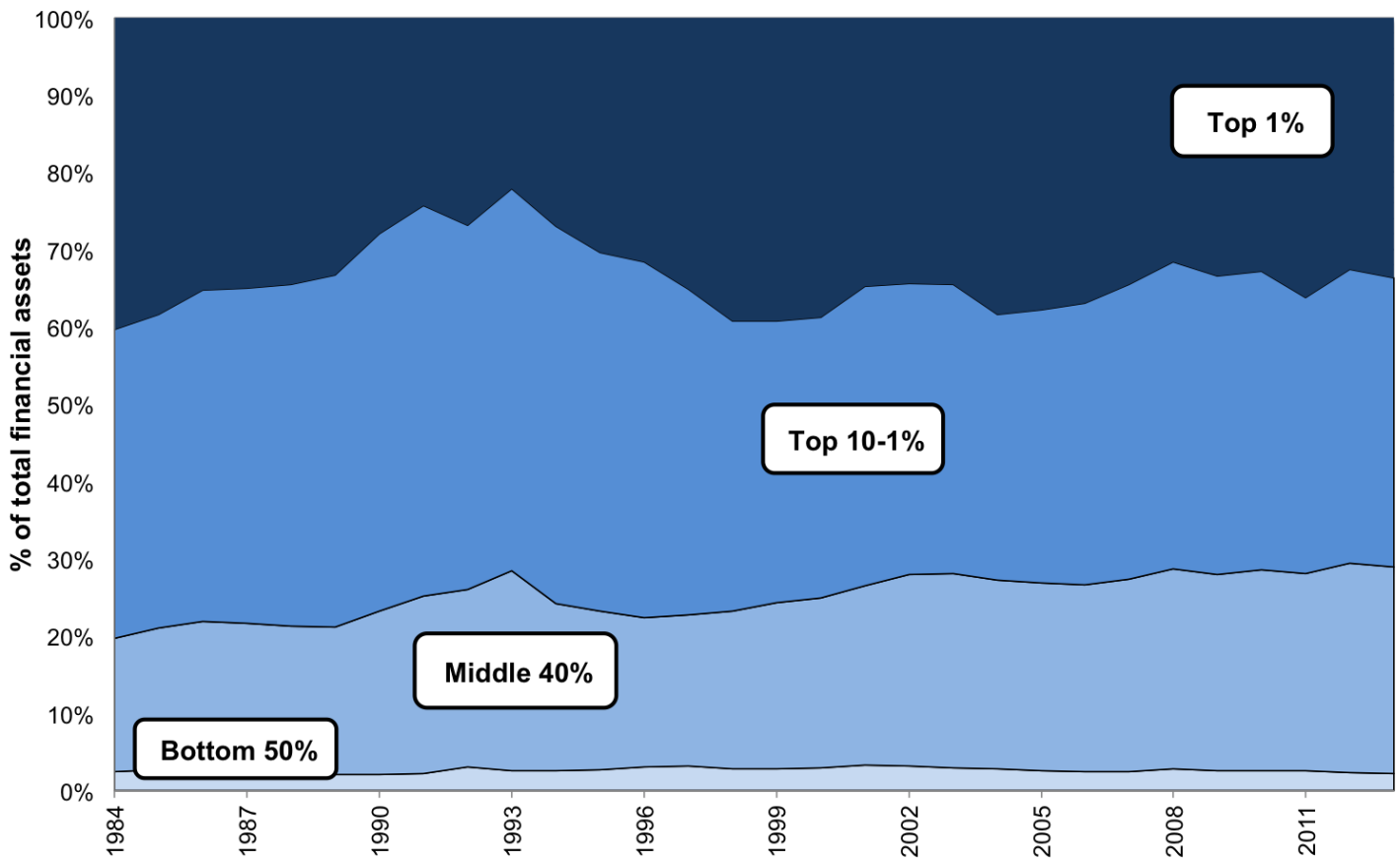
Figure A.18: Composition of financial assets, Spain 1984-2013

Notes: The figure depicts the composition of financial assets by wealth group (top 1%, top 10 to 1%, middle 40% and bottom 50%) in Spain for the period 1984-2013 using the mixed capitalization-survey method. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security.

Saving rates by wealth group in Spain, 1999-2012
(5-year moving average)
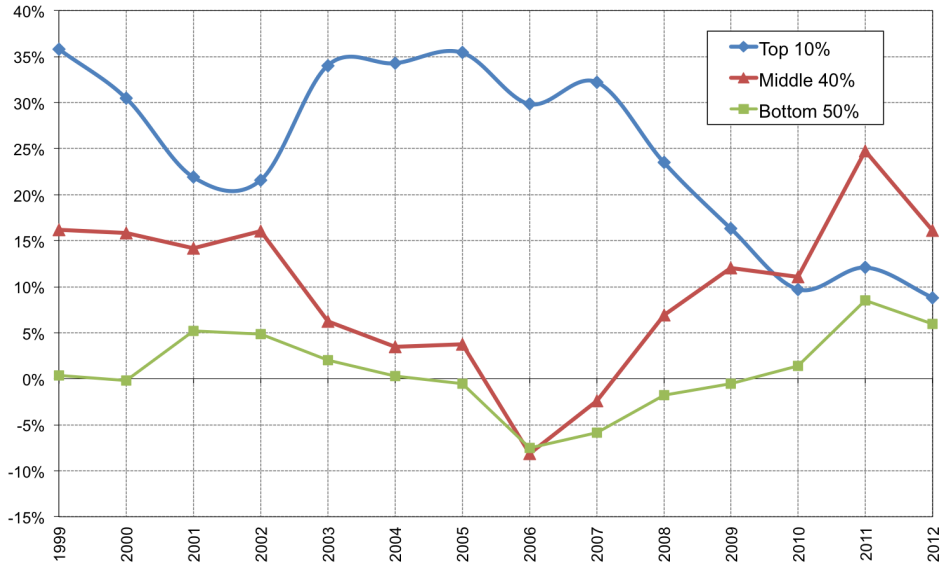
(a) Savings rates by wealth group in Spain, 1986-2012 (5-year moving average)

Flow return by wealth group in Spain, 1984-2012
(3-year moving average)
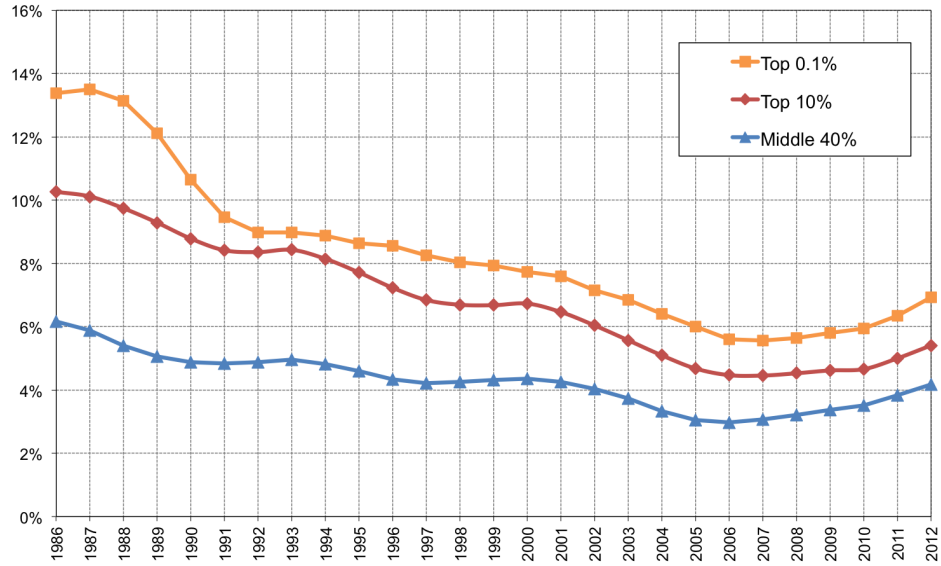
(b) Saving rates on net housing by wealth group in Spain, 1986-2012 (5-year moving average)

Figure A.19: Synthetic saving rates by wealth group, Spain 1986-2012

Notes: Panel (a) plots the synthetic saving rates for the top 10%, middle 40%, and bottom 50% using a five year moving average from 1986 up to to 2012. Synthetic saving rate s_t^g for wealth group g in year t is defined so that $W_{t+1}^g = (1 + q_t^g)[W_t^g + s_t^g(Y_{L_t}^g + r_t^g W_t^g)]$, where W_t^g stands for the average real wealth of wealth group g at time t, $Y_{L_t}^g$ is the average real labor income of wealth group g at time t, r_t^g the average rate of return of group g at time t, q_t^g the average rate of real capital gains of wealth group g at time t and s_t^g the synthetic saving rate of wealth group g at time t. Panel (b) displays synthetic saving rates on housing for the top 10%, middle 40%, and bottom 50% using a five year moving average from 1986 up to to 2012. Synthetic saving rate $s_{H,t}^g$ for wealth group g in year t is defined so that $W_{H,t+1}^g = (1 + q_t^g)[W_{H,t}^g + s_{H,t}^g(Y_{L_t}^g + r_t^g W_{H,t}^g)]$, where $W_{H,t}^g$ stands for the average housing wealth of wealth group g at time t, $s_{H,t}^g$ the synthetic saving rate on housing of wealth group g at time t and the rest of variables are the same as in panel (a).
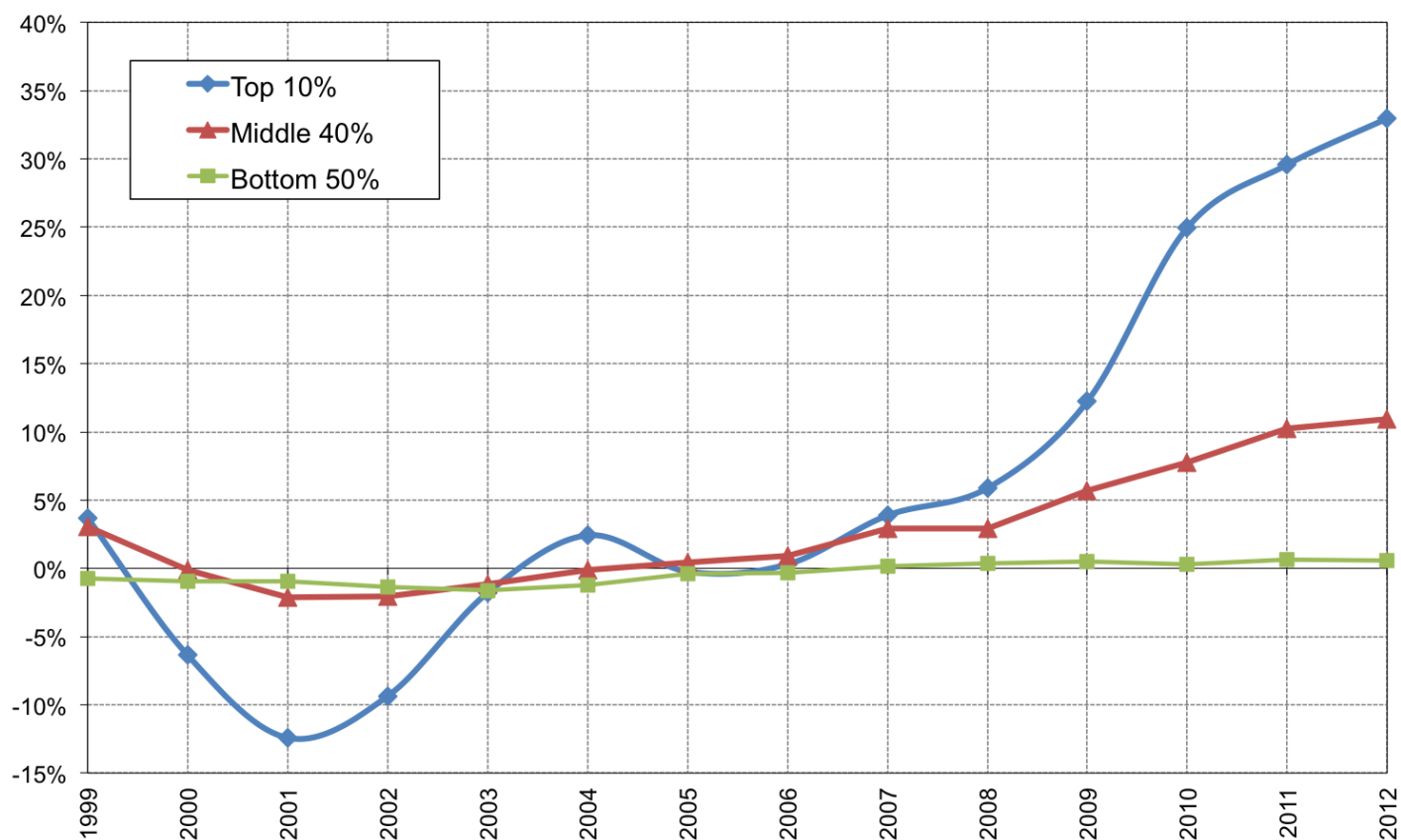
Figure A.20: Saving rates on financial assets by wealth group in Spain, 1986-2012 (5-year moving average)

Notes: This figure displays synthetic saving rates on financial assets for the top 10%, middle 40%, and bottom 50% using a five year moving average from 1986 up to to 2012. Synthetic saving rate $s^g_{F,t}$ for wealth group g in year t is defined so that $W^g_{F,t+1} = (1+q^g_t)[W^g_{F,t} + s^g_{H,t}(Y^g_{L_t} + r^g_t W^g_{F,t})]$, where $W^g_{F,t}$ stands for the average financial assets of wealth group g at time t, $s^g_{H,t}$ the synthetic saving rate on financial assets of wealth group g at time t and the rest of variables are the same as described in panel (a) of Figure A.19.

**Saving rates on net housing by wealth group in Spain, 1999-2012
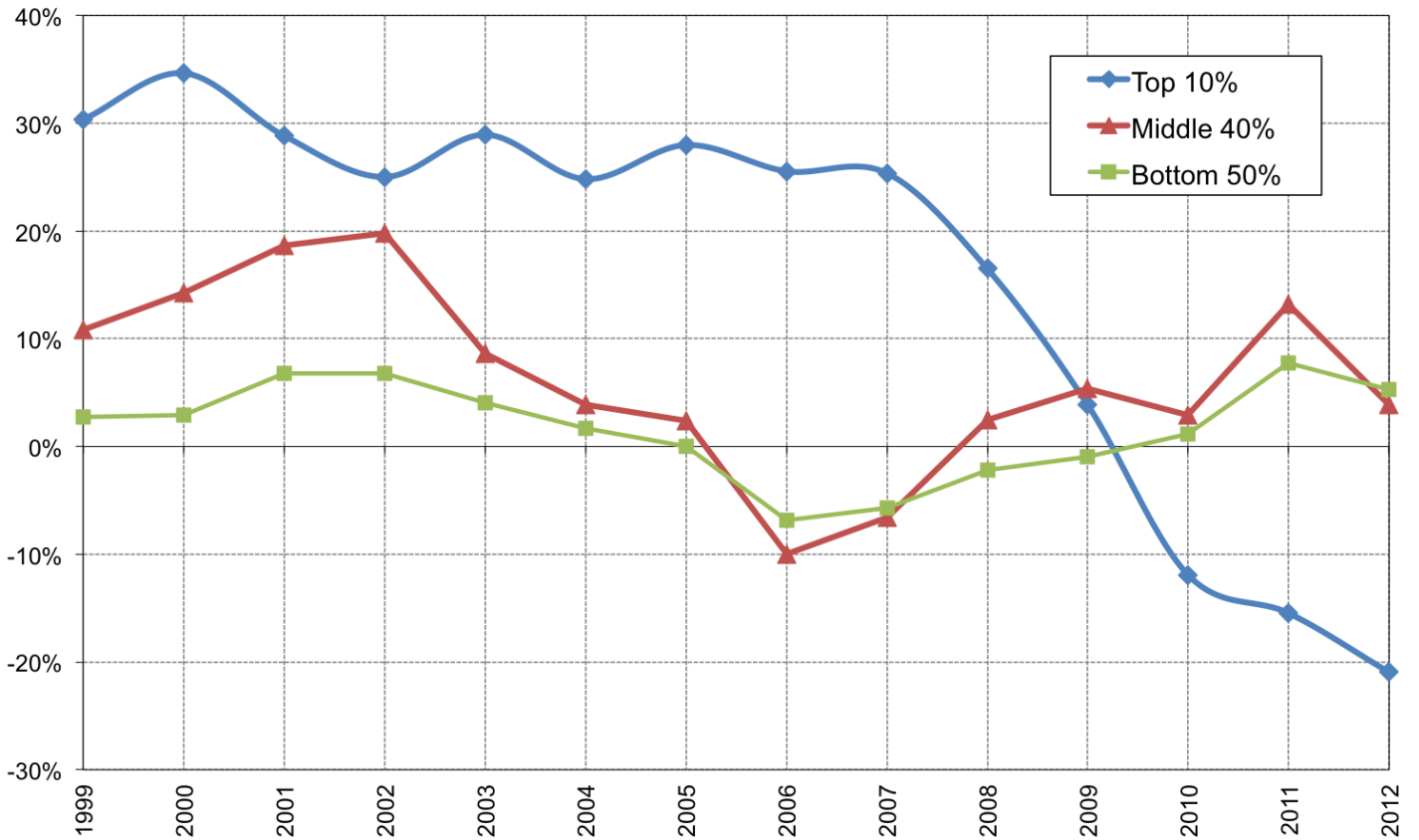(5-year moving average)**

Figure A.21: Total return (flow return + capital gains) by wealth group in Spain, 1984-2012 (3-year moving average)
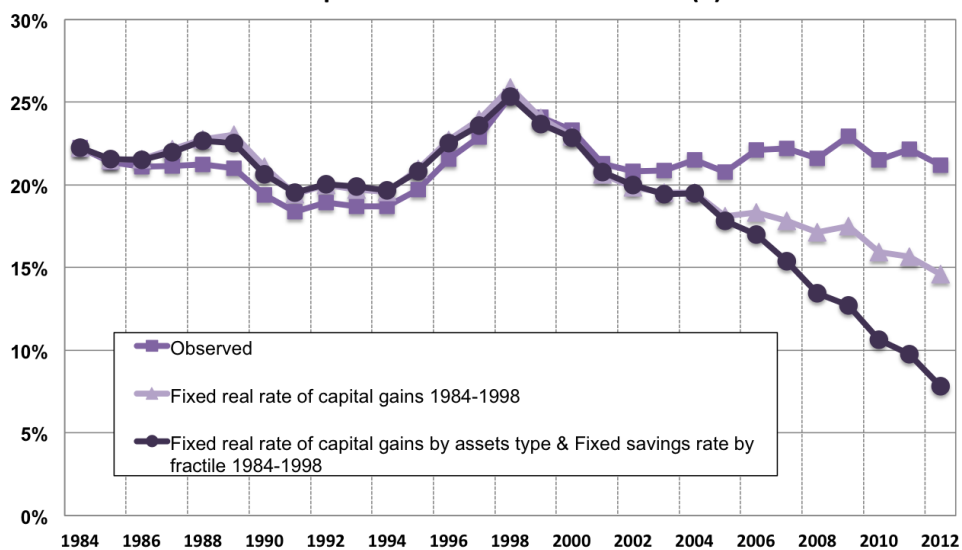
Notes: The figure depicts the top 0.1%, top 10% and middle 40% total returns in Spain using 3-year moving averages over the period 1984-2012. The total return is the sum of the flow return, that is the ratio of average income to average wealth in wealth group g, and capital gains, which are defined as the excess of average asset price inflation, given average portfolio composition of wealth group g, over consumer price inflation.

Top 1% wealth share simulations (1)
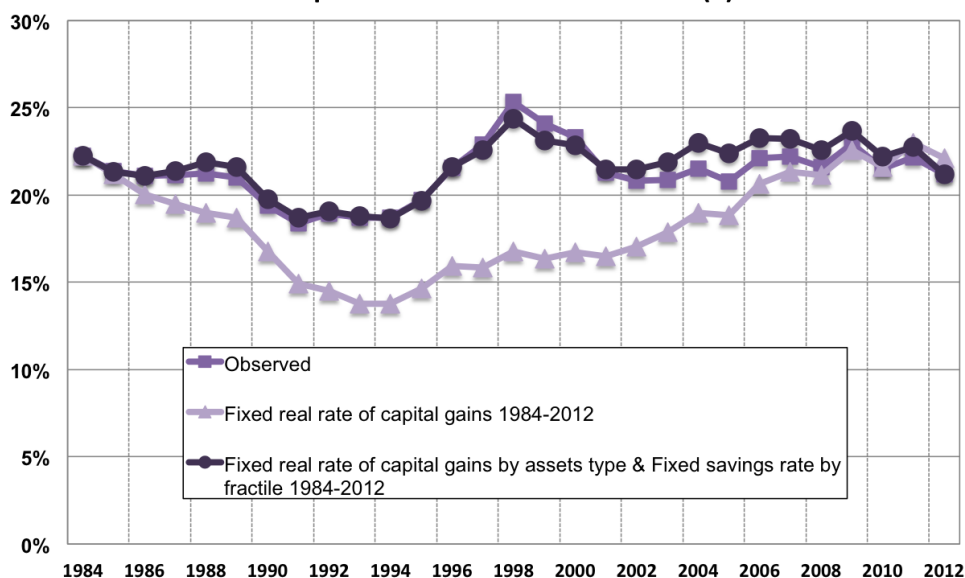
(a) Fixed real capital gains by asset class & Fixed savings rate by fractile 1984-2012

Top 1% wealth share simulations (2)

(b) Fixed real capital gains by asset class & Fixed savings rate by fractile 1984-1998

Figure A.22: Simulations of the top 1% wealth share, Spain 1984-2012

Notes: The figure depicts simulations of the top 1% wealth share simulations under fixed real capital gains by asset class and fixed savings rate by fractile for the period 1984-2012 (panel a) and fixed real capital gains by asset class and fixed savings rate by fractile for the period 1984-1998 (panel b). The simulations are obtained by computing for each year an asset corrected for the short run fluctuations and whose capital gain and savings-induced asset growth rate evolutions are the average ones observed over the period. The asset evolution within each wealth group is then rescaled using this counterfactual evolution. In other words, the method consists of using as capitalization factor the ratio obtained dividing the total flow of returns of each asset by its corrected amount (instead of using the national accounts totals).

Steady-state top 10% wealth share simulation, 1984-2150 (% total wealth)

Steady-state with 1984-1998 saving rates: 55.9% for top 10%, 13.6% for bottom 90%

Steady-state with 1984-2012 saving rates: 39.5% for top 10%, 10.1% for bottom 90%

Steady-state with 1999-2012 saving rates: 21.9% for top 10%, 6.2% for bottom 90%
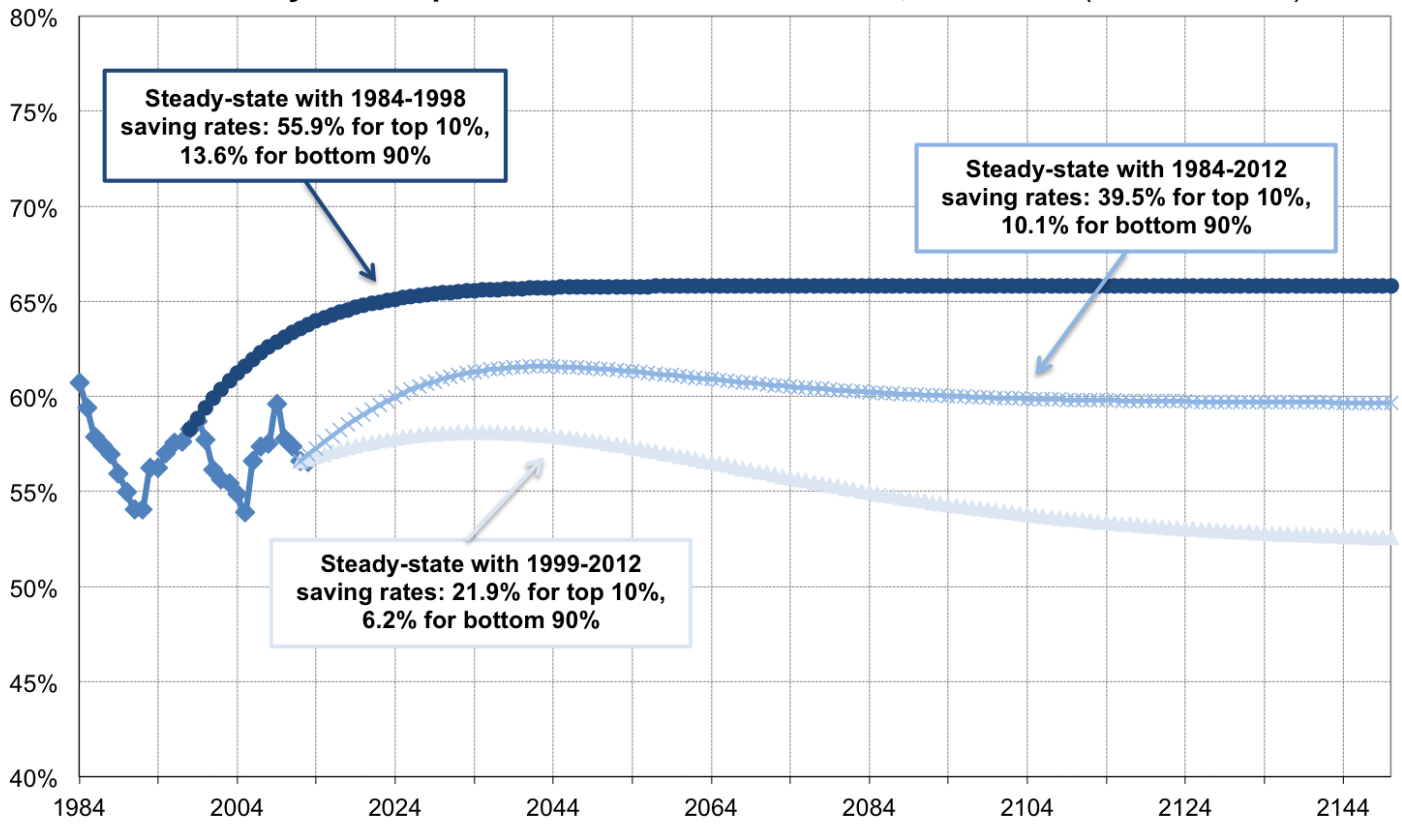
Figure A.23: Steady-state top 10% wealth share simulation, Spain 1984-2150

Notes: The figure depicts the steady-state top 10% wealth share simulation over the period 1984-2150. These simulations are based on the historical values of the parameters g, Y_L^g, r^g, s^g, s^{1-g} and r^{1-g} computed over 1984-2012, 1984-1998 and 1999-2012 periods and that are assumed to be constant over time.

Offshore wealth held by Spanish residents in Switzerland, 1999-2015
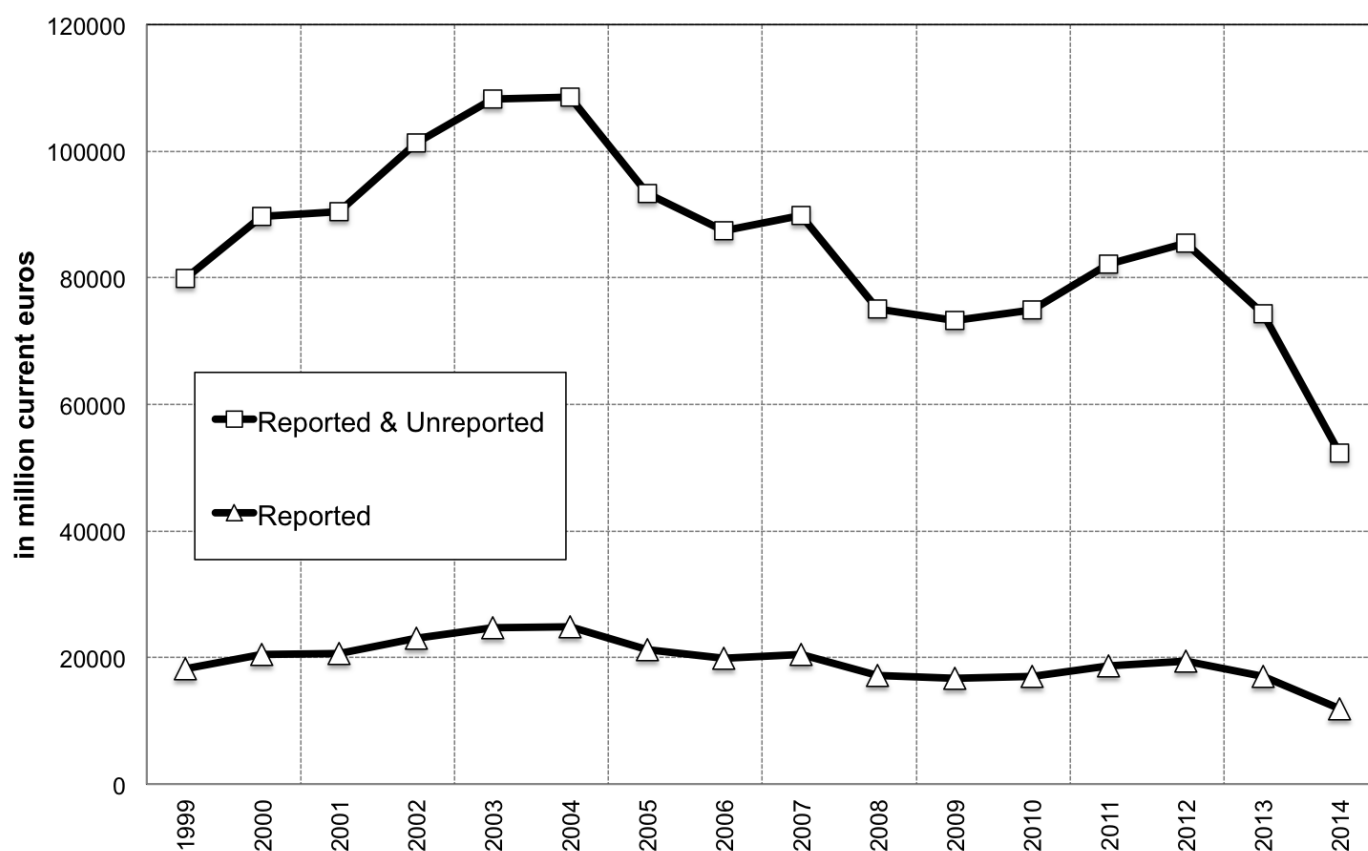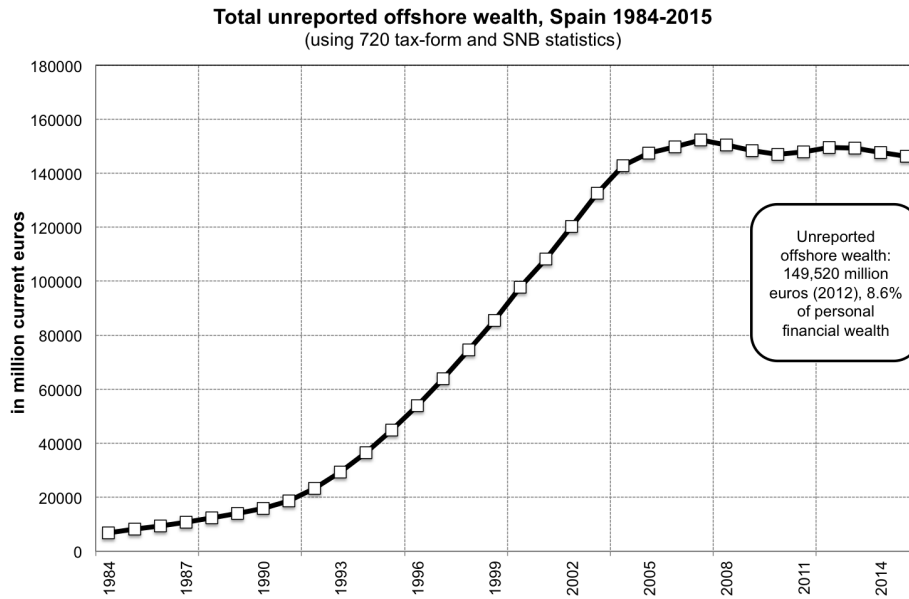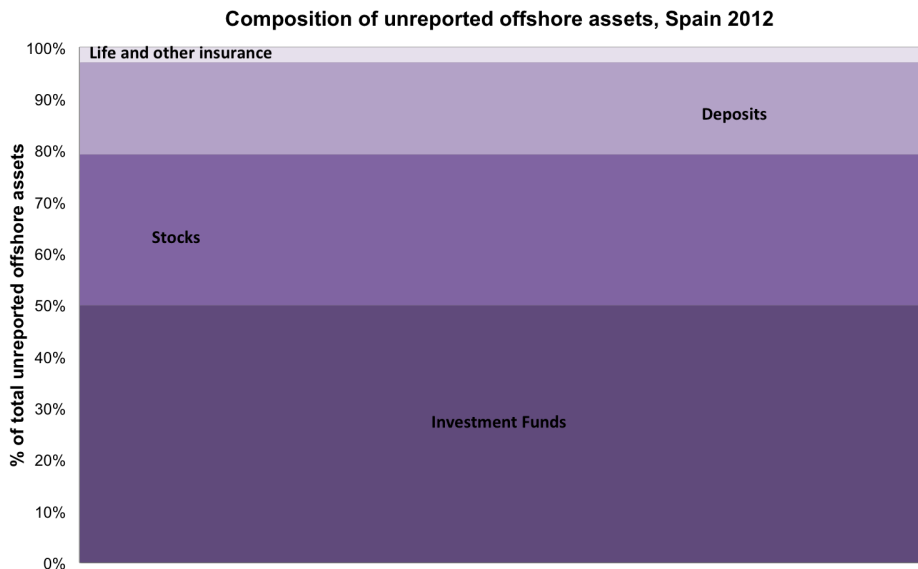(using 720 tax-form and SNB statistics)

Figure A.24: Offshore assets held by Spanish residents in Switzerland, 1999-2015

Notes: The figure displays reported and unreported financial offshore assets (investment funds, stocks, deposits and life (and other) insurance) held by Spanish residents in Switzerland for the period 1999-2015. The two series come from Artola et al. (2017) and have been estimated using Zucman (2013, 2014), whose series mainly come from the Swiss National Bank (SNB) statistics, and the unique information provided by the 720 tax-form. Since 2012, Spanish residents holding more than 50,000 euros abroad are obliged to file this form specifying the type of asset (stocks, investment funds, deposits, etc.), value, and country of location. In 2012, the comparison among the two series shows that 23% of offshore wealth was reported to tax authorities. For a more detailed explanation of how the series of unreported and reported offshore assets are constructed, read Artola et al. (2017) appendix.

Total unreported offshore wealth, Spain 1984-2015
(using 720 tax-form and SNB statistics)

Unreported offshore wealth: 149,520 million euros (2012), 8.6% of personal financial wealth

(a) Total unreported offshore assets, Spain 1984-2015

Composition of unreported offshore assets, Spain 2012

(b) Composition of unreported offshore assets, Spain 2012

Figure A.25: Offshore assets, Spain

Notes: The panel (a) figure depicts total unreported financial offshore assets (investment funds, stocks, deposits and life (and other) insurance) held by Spanish residents in tax havens. This is the series used in order to correct the wealth distribution series for unreported offshore assets. The series comes from Artola et al. (2017) and has been estimated using Zucman (2013, 2014), whose data mainly come from the Swiss National Bank (SNB) statistics, and the unique information provided by the 720 tax-form. Since 2012, Spanish residents holding more than 50,000 euros abroad are obliged to file this form specifying the type of asset (stocks, investment funds, deposits, etc.), value, and country of location.The panel (b) figure displays the composition of unreported offshore assets in Spain using the information provided in the 2012 720 tax-form. For a more detailed explanation of how the series of unreported offshore assets are constructed, read Artola et al. (2017) appendix.

Composition of top 1% wealth share including unreported offshore wealth

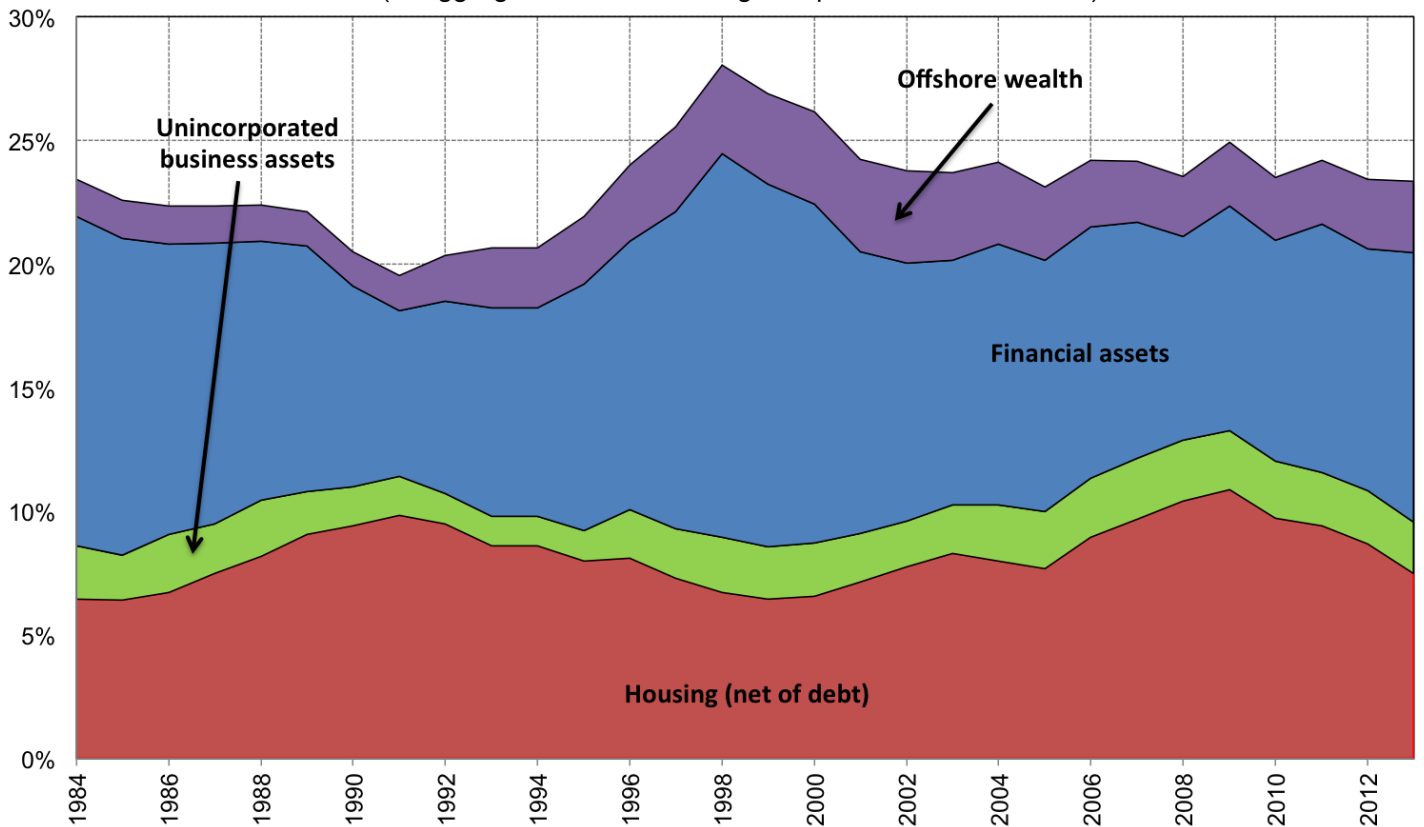(% aggregate wealth including unreported offshore wealth)

Figure A.26: Composition of top 1% wealth share including unreported offshore wealth, Spain 1984-2013

Notes: The figure depicts the composition of the top 1% wealth share in Spain including unreported offshore assets both in the numerator and in the denominator. The series of unreported offshore assets used is the one displayed in Figure A.25, panel (a). Unreported offshore assets are assigned proportionally to the top 1%. This is consistent with an official document of Ministry of Finance (Ministerio de Hacienda y Administraciones Públicas (2016)) stating that the majority of reported foreign assets by Spanish residents are held by top wealtholders and that these assets represent 12% and 31% of the total wealth tax base in 2007 and 2015, respectively.
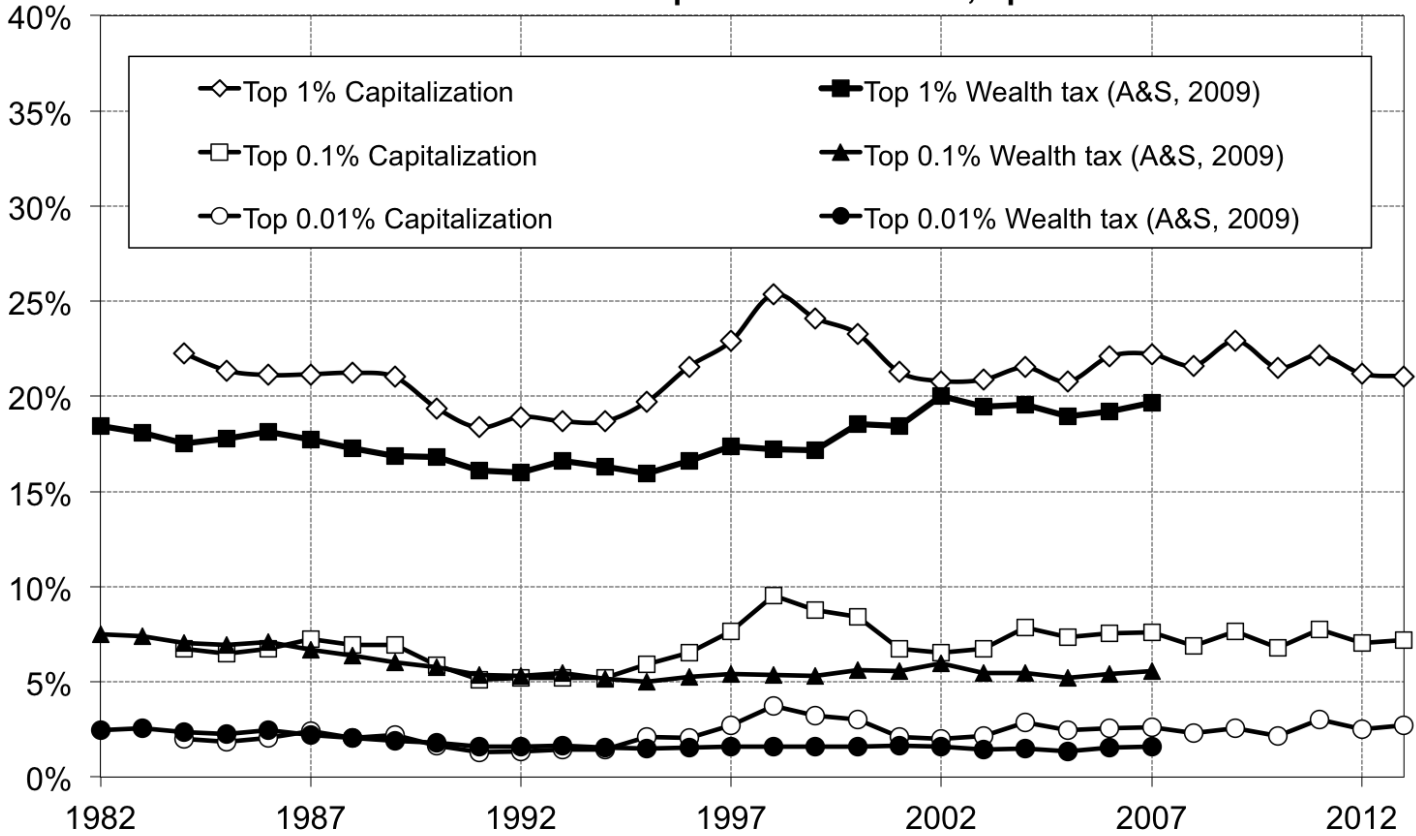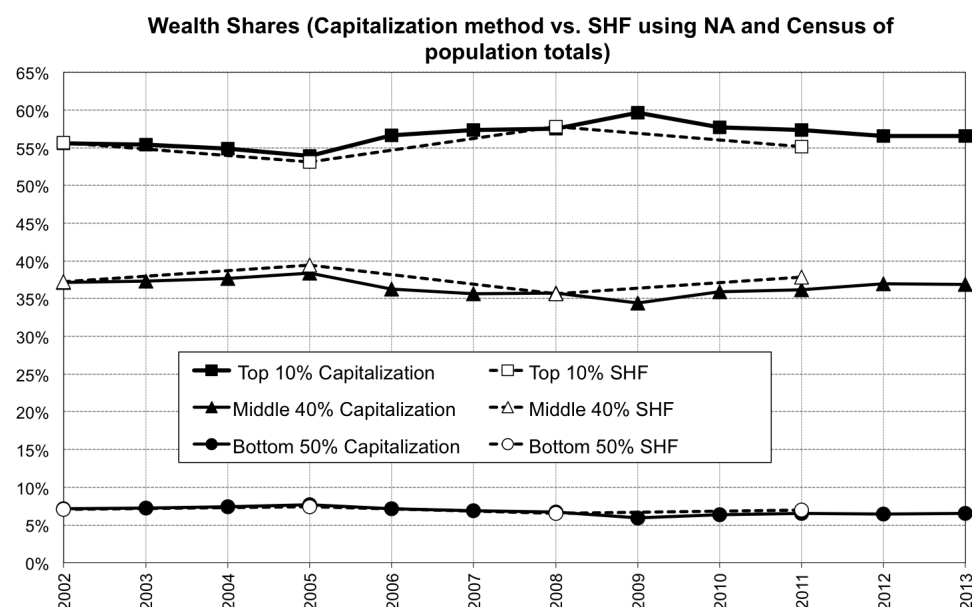
Figure A.27: Wealth tax tabulations vs. capitalization method, Spain 1982-2013

Notes: The figure compares the top 1%, 0.1% and 0.01% wealth shares in Spain using wealth tax tabulations and the capitalization method. The wealth shares using wealth tax tabulations are extracted from Alvaredo and Saez (2009) and they use wealth tax returns and the Pareto interpolation method. There are important differences in the concepts and methodology used in Alvaredo and Saez (2009) and in this paper. First, they consider the wealth of both households and non-profit institutions serving households rather than only household wealth. Second, they exclude pensions from the wealth denominator and they do not include business assets. Third, they use real state declared, being for some individuals the cadastral value. By contrast, we impute wealth from owner-occupied housing using the Survey of Household Finances and the Housing Market Indicators using series at market prices. Finally, one last difference is that they use tax units instead of individual units as units of analysis.

Wealth Shares (Capitalization method vs. SHF)
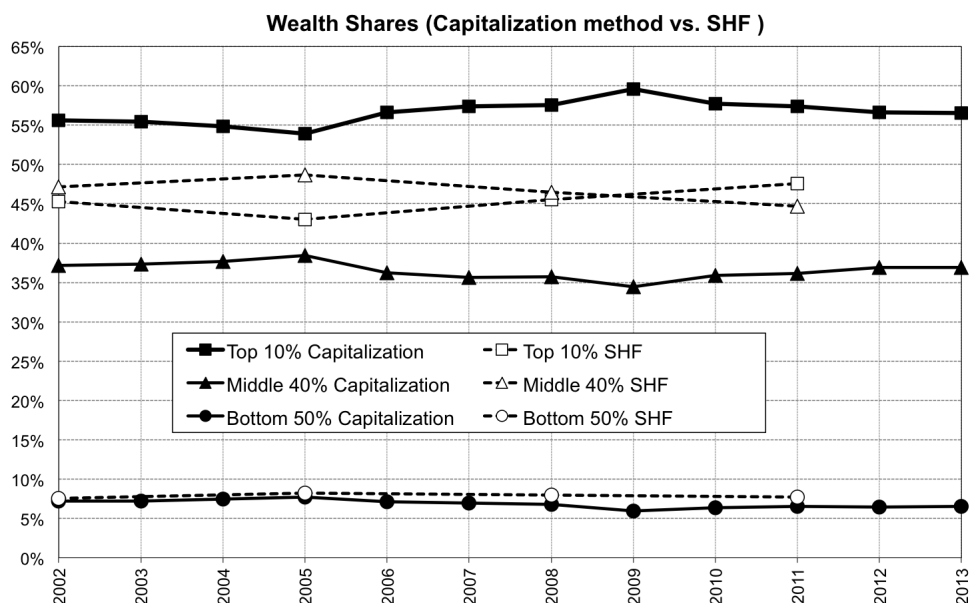
(a) SHF Wealth Shares using direct totals, Spain 2002-2013

Wealth Shares (Capitalization method vs. SHF using NA and Census of population totals)
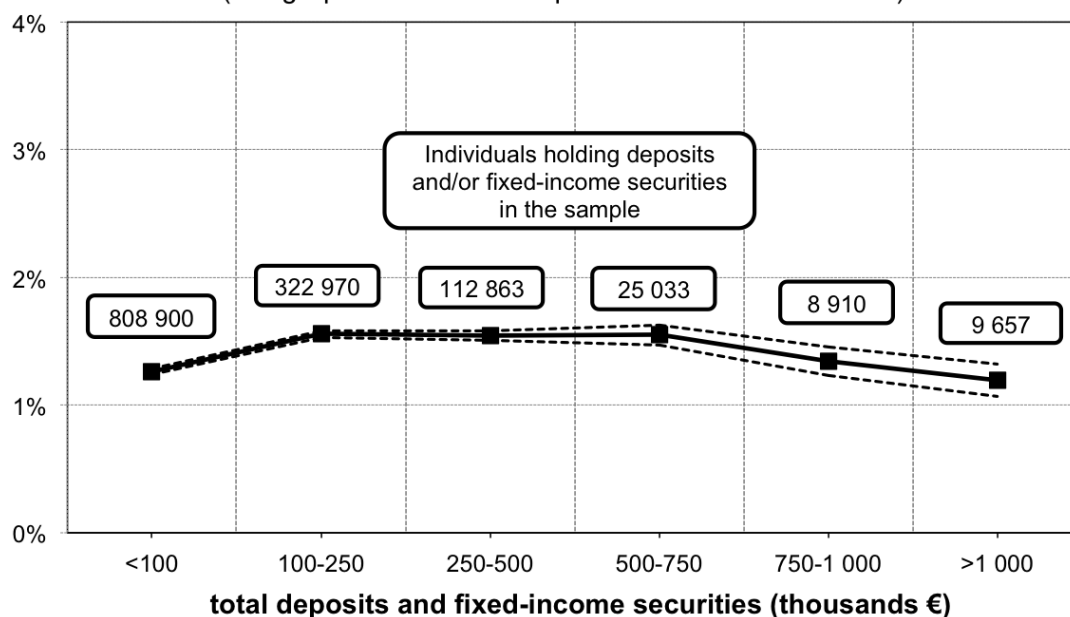

(b) SHF Wealth Shares using Census of Population and NA totals, Spain 2002-2013

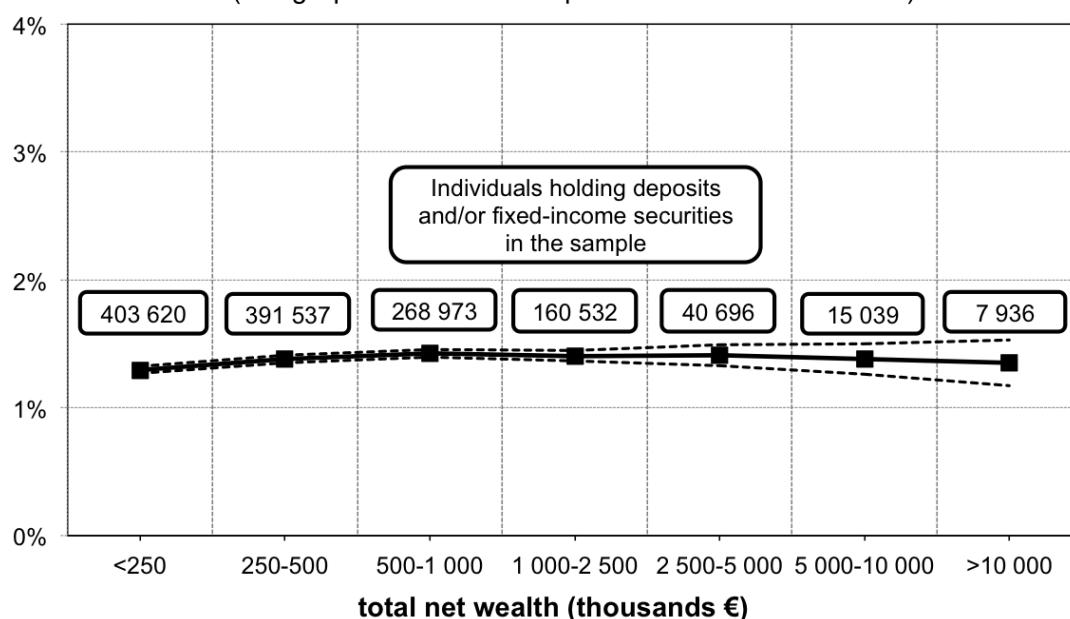Figure A.28: Wealth Shares (Capitalization method vs. SHF), Spain 2002-2013

Notes: The figure compares the top 10%, middle 40% and bottom 50% wealth shares in Spain using the capitalization method and the Survey of Household Finances. In panel (a) the SHF wealth shares are calculated using the direct totals of the SHF, whereas in panel (b) the SHF wealth shares are calculated using the Census of Population and NA totals, that is, the same totals as the ones used in the capitalization technique. This is done by proportionally rescaling the wealth shares to arrive to the Census of Population and NA totals. Note that contrary to the capitalized wealth shares, the SHF includes the regions of País Vasco and Navarra. In both panel (a) and (b), the wealth shares with the survey data have been constructed using the four waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008 and 2011). In order to ensure consistency across methods, households in the survey are split into individuals and wealth is assigned proportionally to all members of the household, except daughters and sons, who are only given proportionally wealth held in bank accounts. Moreover, the population considered excludes individuals aged less than 20.

Rate of return on deposits and fixed-income securities, 2005

(using Spanish wealth and personal income tax returns)

Individuals holding deposits
and/or fixed-income securities
in the sample

808 900   322 970   112 863   25 033   8 910   9 657

<100   100-250   250-500   500-750   750-1 000   >1 000

total deposits and fixed-income securities (thousands €)

(a) Ranking individuals according to total deposits and fixed-income securities

Rate of return on deposits and fixed-income securities, 2005

(using Spanish wealth and personal income tax returns)

Individuals holding deposits
and/or fixed-income securities
in the sample

403 620   391 537   268 973   160 532   40 696   15 039   7 936

<250   250-500   500-1 000   1 000-2 500   2 500-5 000   5 000-10 000   >10 000

total net wealth (thousands €)

(b) Ranking individuals according to total net wealth

Figure A.29: Returns on deposits and fixed-income securities, Spain 2005

Notes: The figure depicts the distribution of the rates of return on deposits and fixed-income securities including confidence intervals. Individuals are ranked according to total deposits and fixed-income securities (panel a) and to total net wealth (panel b). The series have been constructed using Spanish micro-files from personal income tax records linked to wealth tax records for the period 2002-2007. Results presented here are only for 2005, but they are very similar for the rest of years (See Data Appendix). The individual rate of return on deposits and fixed-income securities has been calculated as the ratio of the interest each individual earns in these assets and the total value held in these assets. Individuals with rates of return larger than 10% have been excluded since these high values are most likely due to measurement error. They only account for 3% of the total sample.
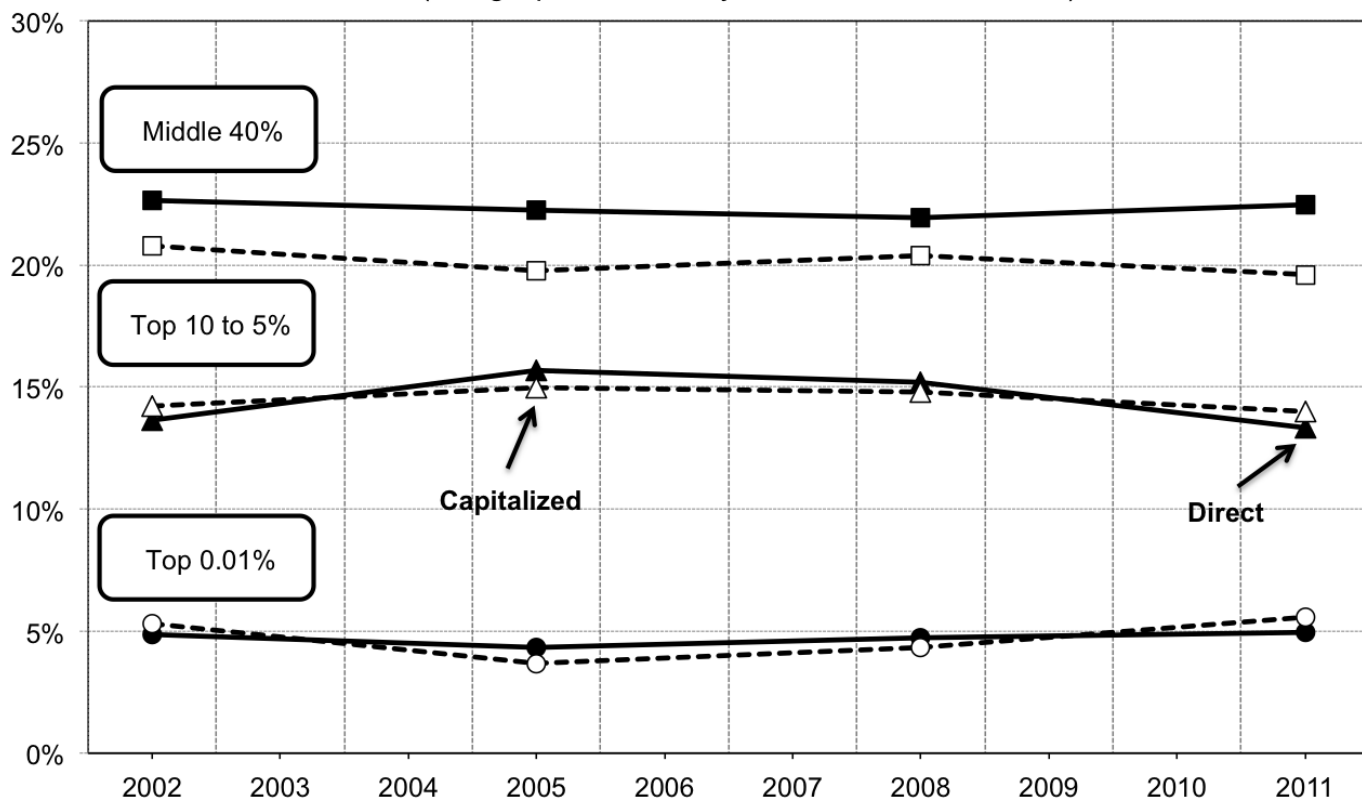
63

Figure A.30: Direct vs. Capitalized wealth, Spain 2002-2011

Notes: The figure compares the middle 40%, 10 to 5% and 0.01% wealth shares in Spain using direct and capitalized wealth shares from the SHF. These wealth shares include the same assets as the benchmark capitalized shares in this paper, except for owner-occupied housing, life insurance, pension and investment funds. The reason is that the SHF does not include the income generated by these assets in any of the four waves.

B   Tables

Wealth thresholds and wealth shares in Spain, 2013

Wealth group	Number of adults	Wealth threshold	Average wealth	Wealth share
Full Population	35 082 703	0 €	143 096 €	100,0%
Bottom 50%	17 541 352	0 €	18 790 €	6,6%
Middle 40%	14 033 081	42 806 €	131 979 €	36,9%
Top 10%	3 508 000	314 926 €	808 922 €	56,5%
incl. Top 1%	350 800	1 376 759 €	3 013 457 €	21,1%
incl. Top 0.1%	35 080	4 748 897 €	10 322 499 €	7,2%

Table B.1: Wealth thresholds and wealth shares in Spain, 2013

Notes: This table reports statistics on the distribution of wealth in Spain in 2013 obtained by capitalizing income tax returns. The unit is the adult individual (20-year-old and over; net wealth of married couples is split into two). Fractiles are defined relative to the total number of adult individuals in the population.

Comparison of wealth aggregates, 2005 (in current billion euros)

	Capitalization method	Alvaredo & Saez (2009)	Survey of Household Finances
Net personal wealth	4 867	5 057	3 491
Net non-financial assets	3 518	3 778	3 118
Financial assets	1349	1 279	434

Table B.2: Comparison of wealth aggregates, Spain 2005

Notes: This table compares the wealth totals used for the capitalization technique with the ones used in Alvaredo and Saez (2009) and the SHF. The wealth totals of the capitalization technique are very similar to the ones used in Alvaredo and Saez (2009), but much larger than the ones of the SHF. This difference is mainly due to financial assets.

C Imputation methods and adjustments for reforms

C.1 Imputation method for the bottom income of the distribution

In order to carry the imputation of the bottom income of the distribution I rely on the Survey of Household Finances for the period 1999-2013 and on the Household Budget and Continuous Survey for the period 1984-1998.

The Spanish Survey of Household Finances (SHF) has been conducted by the Bank of Spain for four waves: 2002, 2005, 2008 and 2011. It is the only statistical source in Spain that allows the linking of incomes, assets, debts, and consumption at the household level and that provides a representative picture of the structure of household incomes, assets and debts at the household level. Therefore, it is extremely suitable for our analysis. The income in the survey is recorded as of the previous year, hence they years for which information on income are available are 2001, 2004, 2007 and 2010. The unit of analysis used in the SHF is the household. Since data in the micro-files are rearranged in order to have individuals as units of analysis, I proceed in the same way with the survey in order to be as consistent as possible. Hence, if the head of the household is not married, I assume that all capital income belongs to him. However, if the head of the household is married, I create a new individual and split the capital income of the household among the two. The new individuals are the partners of the heads of the households that are married and become now head of households.

First, using the SHF I classify individuals into seven age groups: from 20-24, 25-29, 30-39, 40-49, 50-59, 60-69, and above 69 using the SHF and the personal income tax data. I then calculate the fraction of income by category (labor income, interest and dividends, rental income and business income) that each age group has in the P20-P50 percentiles with respect to the P50-P60 and P70-P80 percentiles. I also compute the fraction of individuals that own each income category by age group and assign these fractions to the same groups in the personal income tax data. These fractions are linearly interpolated for the years in between in order to account for the missing income at the bottom across all years. Finally, I assign the SHF P20-50 to P50-60 fractions of labour income to the bottom 3, 4 and 5 deciles and the SHF P20-P50 to P70-P80 fractions of capital income to the bottom 3, 4 and 5 deciles in the personal income tax data.

The Household Budget Continuous Survey (HBCS) was carried out during the 1985-2005 period, with the purpose of providing quarterly and annual information regarding the origin and amount of household income, and the way in which income is used for different consumption

expenses. As of 2006, this survey was replaced by the Household Budget Survey (HBS). I calculate the fraction of income by category (labor income, interest and dividends, rental income and business income) that the P20-P70 percentiles have with respect to the P70-P80 percentiles. Since the shares using the HBCS differ substantially from the shares using the SHF, I stick to the SHF levels and I only use the growth rate in the HBCS shares to extrapolate the series backwards (1984-1998). Finally, once again, I assign the SHF P20-70 to P70-80 fractions of labour and capital income to the bottom 3-7 deciles in the personal income tax data.

C.2 Imputation method for assets that do not generate taxable income

The imputations are conducted using the four waves of the Survey of Household Finances and they are based on the methodology used by Garbinti et al. (2017) for France. I only consider individuals aged 20 or above in order to be consistent with the population of interest in the micro tax data, which are all individuals aged 20 or above. The unit of analysis used in the SHF is the household. Since data in the micro-files are rearranged in order to have individuals as units of analysis, I proceed in the same way with the survey in order to be as consistent as possible. Hence, if the head of the household is not married, I assume that all capital income belongs to him. However, if the head of the household is married, I create a new individual and split the capital income of the household among the two. The new individuals are the partners of the heads of the households that are married and become now head of households.

The first step of the imputation consists of constructing groups of individuals according to their gender, age, labor and capital income. First, individuals are split by gender. Second, individuals are classified into ten age groups: from 20-24, 25-29, 30-39, 40-49, 50-54, 55-59, 60-65, and above 65. Third, they are also grouped according to their capital income into seven brackets of percentiles: P30-P59, P60-P69, P70-P79, P80-P89, P90-P94, and equal or above P95. In order for the imputations to be consistent, I only consider as capital income the one that is subject to the personal income tax. Finally, six groups of percentiles are formed according to the labour income the individuals have: P0-P10, P10-P39, P40-P59, P60-P74, P75-P90 and equal or above P90.

Once individuals are sorted by gender, age, capital and labor income, I combine them and end up with 576 different groups. One can then calculate which is the share of main owner-occupied housing, life insurance, investment and pension funds that corresponds to each group, as well as the fraction of individuals that owns the asset within each group, that is, the within-group

ownership shares. Since the survey is only available for four waves I linearly interpolate the shares for the years in between and I use the 2002 shares for imputing life insurance, pension and investment funds for the period 1999-2001.

The final aim is to impute the value of these assets that do not generate taxable income to the capitalized distribution of income in order to obtain the distribution of total net wealth. For that, I need to construct with the data from the micro-files the same groups by age, capital and labor income. Once the individuals in the tax data are classified into the same 576 groups, the group shares and the within-group ownership shares that are obtained with the survey can be used in order to calculate which is the amount of main owner-occupied housing[28], wealth from life insurance, investment and pension funds from National Accounts that corresponds to each group.Due the limited information on negative net wealth holders in Spain and the small fraction of negative aggregate net wealth over total net wealth (3% according to Cowell and Kerm (2015)) using the Eurosystem Household Finance and Consumption Survey (HFCS) I have decided to set minimum net wealth at zero.

For the period before 1999, main residence is included in personal income tax returns, so that no imputation is needed. Moreover, no imputation is done for life insurance, investment and pension funds for the historical period either, since they are capitalized together with saving accounts, stocks and fixed-income securities. Ideally, each financial asset should be capitalized individually during the historical period too. Nonetheless, life insurance, investment and pension funds were much less important in the asset portfolio of households during the eighties and beginning of the nineties and consequently, this assumption should not affect our results much.

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[28]Individuals are not indebted in an homogeneous way along the distribution. Hence, I calculate the ratio of main residence indebtedness for each of the 576 groups using the survey and I apply it to each group when doing the imputation.