# House Price Cycles, Wealth Inequality and Portfolio Reshuffling*

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**Abstract**

This paper studies the determinants of wealth inequality during housing booms and busts. I examine two episodes over the last four decades in Spain by combining fiscal data with household surveys and national accounts. I find that heterogeneity in capital gains is the main driver behind the fall in wealth inequality during housing booms, while heterogeneity in saving rates and portfolio choices are the main explanatory forces of the rise in wealth concentration during housing busts. Top wealth holders are better at timing the market and reshuffling their portfolios, as they appear to be subject to less portfolio adjustment frictions.

**Keywords:** Housing, Wealth Inequality, Asset Prices, Portfolio Reshuffling

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# I Introduction

The rapid rise in aggregate wealth levels (Piketty and Zucman, 2014) and wealth disparities (Alvaredo et al., 2018b) across advanced economies in recent decades has spurred a renewed interest in understanding the evolution and determinants of wealth inequality. While the bulk of the empirical literature has focused on the long-run trends in wealth inequality, very little is still known on the forces behind the short to medium-term fluctuations in wealth inequality around asset price booms and busts. Understanding the determinants of wealth inequality dynamics at different phases of the economic cycle is quite relevant, given that changes in the wealth distribution have been found to matter in the determination of aggregates such as consumption (Krueger et al., 2016).

The short to medium-term interactions between aggregate wealth and the wealth distribution are particularly important during housing booms and busts. Housing is the main asset in most individual portfolios (Badarinza et al., 2016) and it forms the lion's share of the total return on aggregate wealth (Jordà et al., 2019). Moreover, the recent rise in household wealth to national income ratios has been mainly driven by capital gains on housing (Piketty and Zucman, 2014; Artola et al., 2021). Analyzing the implications of house price cycles for wealth inequality is, however, an empirical challenge. This is likely due to the difficulty of finding settings with multiple housing booms and busts episodes, that make it possible to generalize the results, and with sufficiently rich data sources. Evidence on the determinants of wealth inequality during periods of large house price fluctuations has thus so far been elusive.

This paper breaks new ground on these issues by studying the determinants of wealth inequality during house price cycles. I examine the Spanish context, an ideal laboratory since the country has experienced two housing booms and busts in the last forty years and it has reliable statistics on individual asset ownership going back to the 1980s. I combine individual tax returns with household surveys and national accounts to reconstruct the entire wealth distribution. I then develop an asset-specific decomposition of wealth accumulation that I use to identify the key forces (e.g., rates of return, saving rates, labor incomes, portfolio choices) behind the observed wealth inequality dynamics. This new decomposition is critical to better understand heterogeneities in portfolio choices, which have attracted much

less scrutiny than asset prices in the nascent literature studying the determinants of wealth inequality dynamics over the business cycle (Kuhn et al., 2020). My analyses reveal that top wealth holders time better the market, reshuffling their portfolio away from housing towards financial assets at the beginning of busts. Portfolio adjustment frictions appear to prevent middle and bottom wealth holders from undertaking the same type of reshuffling. This novel source of heterogeneity constitutes thus an additional ingredient to generate realistic wealth dynamics in quantitative models of wealth inequality (Benhabib and Bisin, 2018).

The backbone of this study is the measurement of the wealth distribution. In Spain, wealth tax returns only cover the very top of the wealth distribution and wealth surveys are only available since the 2000s. I thus rely on the capitalization method—recently used by Saez and Zucman (2016) to reconstruct the US wealth distribution—to recover the entire wealth distribution going back to the 1980s. This approach involves the application of a capitalization factor to the distribution of capital income from tax records to arrive at 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 national accounts. To ensure full consistency with national accounts, I then account for assets and individuals that do not generate taxable income flows by means of household surveys, following the mixed capitalization-survey method recently developed by Garbinti et al. (2021). Wealth distribution series have been found to be sensitive to the assumption of constant capitalization factors by asset class in the US context (Smith et al., 2021). I perform numerous robustness checks with wealth tax returns, household surveys, and other official sources to make sure that the mixed capitalization-survey method derives credible estimates in terms of levels, asset composition and trends of the Spanish wealth distribution.

The new wealth distribution series show that the top 10% wealth share declines during housing booms—to the benefit of the bottom 50% wealth group and even more of the middle 40% wealth group—but the decreasing pattern reverts during housing busts. These findings hold in both episodes (1985-1995, 1998-2014). I also show that these results apply to the house price cycle of the early 2000s in France and the US using the wealth distribution series of Garbinti et al. (2021)

and Saez and Zucman (2016), respectively.[1] The international resemblance in the dynamics is because of similar asset composition along the distribution. As in France and the US, bottom deciles in Spain own mostly financial assets in the form of cash and deposits, whereas primary residence is 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, unincorporated business assets, other owner-occupied and tenant-occupied housing gain importance, and financial assets—mainly equities—gradually become the dominant form of wealth.

I then develop a new asset-specific decomposition of wealth accumulation that I use in combination with the wealth distribution series to run simulation exercises and analyze whether the observed dynamics are purely mechanical—due to differences in rates of return—or driven by other forces. This is an extension of the standard wealth accumulation decomposition used by Saez and Zucman (2016) in which the three forces driving wealth inequality dynamics are differences in labor income, rate of return and saving rates across the distribution.[2] The novelty of this decomposition is that it breaks down the composition of savings by asset class (i.e., housing, unincorporated business assets, financial assets), making it possible to improve our understanding of portfolio choice dynamics across wealth groups.

Using counterfactual simulations, I document that heterogeneity in capital gains is the main driver of the decline in wealth concentration during housing booms, while heterogeneity in saving behavior appears to be the main force behind the increase in wealth concentration during housing busts. I show that capital gains contribute to reducing top 10% wealth concentration levels during booms (by 5% on average during the recent housing boom) for two main reasons. First, middle and bottom wealth groups have a larger share of housing in their portfolio. Second, capital gains on housing are higher on average than on financial assets.

[1] This paper takes house price cycles as given. To ensure that the empirical regularities that are uncovered do not depend on the context-specific forces generating the housing booms and busts, I explore different episodes with different macroeconomic contexts and several countries. The literature has mainly emphasized credit conditions (e.g., Jiménez et al., 2014, Guerrieri and Uhlig, 2016; Jordà et al., 2015), expectations (e.g., Burnside et al., 2016; Glaeser and Nathanson, 2015; Kaplan et al., 2020; Mayer et al., 2011), housing supply (e.g., Glaeser et al., 2008), international capital flows (e.g., Artola et al., 2021; Himmelberg et al., 2005; Sá et al., 2014) and population increases (e.g., Combes et al., 2019; Gonzalez and Ortega, 2013; Mankiw and Weil, 1989), as potential sources behind the origins of housing booms and busts.

[2] Note that the rate of return is the sum of the flow return and the rate of capital gain.

However, differences in capital gains do not seem to explain why top wealth concentration patterns revert during housing busts, given that the gains are no longer different across wealth groups. Instead, the main explanatory forces appear to be the greater saving rates among top wealth holders, coupled with a better timing of the market, reshuffling their portfolio away from housing towards financial assets at the beginning of busts.[3] Portfolio reshuffling among top wealth holders is the only channel that contributed to reducing the bottom 50% wealth share during the recent housing bust (by 24% on average). The results hold for both house price cycle episodes. I perform the same asset-specific decomposition with the French (Garbinti et al., 2021) and US wealth distribution series (Saez and Zucman, 2016) and show that these findings also apply to the house price cycle of the early 2000s in these two countries. Hence, these results are not specific to the Spanish context and seem to generally hold for housing booms and busts episodes.

Lastly, I explore potential mechanisms behind the heterogeneity in portfolio choices along the wealth distribution during housing busts. I focus on five main candidate explanations: portfolio adjustment frictions, real estate market dynamics, risk aversion, financial literacy and/or financial advisory, and expectations on house prices. It is beyond the scope of this paper to conclusively rule in or rule out any particular theory. However, I can shed light on the likely relevance of theories by computing additional moments with the Spanish data.

I find that these moments are consistent with theories based on heterogeneity in portfolio adjustment frictions. Contrary to middle and bottom wealth holders, I show that top wealth holders are in a better position to reshuffle their portfolio towards financial assets because they are subject to fewer "broadly defined" portfolio adjustment frictions. First, top wealth holders have higher saving rates, so that they have fewer difficulties to incur transaction costs (e.g., capital gains taxes) associated with selling real estate. Second, top wealth holders have lower indebtedness attached to real estate. Consequently, when it comes to selling, they are less constrained by the evolution of the value of their property relative to the value of their mortgage. Third, top wealth holders have much larger holdings of real estate

[3]The other two channels, flow rates of return and labor income inequality, pushed wealth concentration down during the housing bust. Hence, they cannot be the explanatory forces behind the rise in wealth concentration during housing busts.

for investment purposes (i.e., tenant-occupied housing). Contrary to housing for consumption purposes (i.e., owner-occupied housing), housing for investment is not subject to additional transaction costs such as those concerning moving to another property. Hence, top wealth holders can liquidate these types of properties more easily. Using wealth surveys, I provide direct evidence about the reshuffling among top wealth holders through the sale of housing for investment and not through the sale of housing for consumption. On the contrary, I show that bottom and middle wealth holders—who mainly have housing for consumption—did not sell their stock of housing during the recent bust.

This paper contributes to four main strands of the literature. First, there is a growing theoretical and empirical literature analyzing the determinants of wealth inequality dynamics (e.g., Bach et al., 2020; Blanchet and Martínez-Toledano, 2022; Cioffi, 2021; De Nardi, 2004; De Nardi and Fella, 2017; Fagereng et al., 2019; Feiveson and Sabelhaus, 2019; Fagereng et al., 2020; Gomez, 2019; Gomez and Gouin-Bonenfant, 2020; Greenwald et al., 2021; Hubmer et al., 2021; Jones, 2015; Kuhn et al., 2020; Nekoei and Seim, 2022; Xavier, 2021). While these studies have mainly focused on the implications of asset prices, interest rates and bequests for wealth inequality, my results reveal that portfolio choice heterogeneity is also a key driver of wealth inequality dynamics. To my knowledge, this is the first study documenting and quantifying the importance of differences in portfolio reshuffling across wealth groups in shaping the wealth distribution over the business cycle.

Second, this work also relates to the literature that has incorporated explicit heterogeneity into models of the macroeconomy (e.g., Achdou et al., 2022; Aiyagari, 1994; Auclert, 2019; Auclert et al., 2020; Benabou, 1996; Berger et al., 2018; Boar and Midrigan, 2022; Castañeda et al., 2003; Heathcote et al., 2009; Krueger et al., 2016; Krusell and Smith, 1998; Piazzesi and Schneider, 2016). These models are usually built with the aim of analyzing the macroeconomic and distributional implications of particular shocks or policies. This paper shows that the differences in the degree of portfolio reshuffling across wealth groups appear to be consistent with the existence of lower portfolio adjustment frictions among top wealth holders, as they own housing for investment which is less costly to liquidate. The selling of housing might likely have non-negligible welfare implications, as those who trade will have potentially more resources available to consume than those who do not trade. In fact,

using wealth surveys I show that top wealth holders—those who sell housing—do not experience any drop in consumption during the bust, while middle and bottom wealth holders—who do not trade—do experience a fall in consumption. Hence, the novel empirical regularities that this study uncovers—differences in portfolio reshuffling that appear to come through differences in portfolio adjustment frictions across wealth groups—could be useful to enrich quantitative models of wealth inequality to better assess the macroeconomic and distributional implications of business cycles.

Third, this work also builds upon the growing literature measuring the wealth distribution (e.g., Acciari et al., 2021; Albers et al., 2022; Alvaredo et al., 2018a; Garbinti et al., 2021; Kopczuk and Saez, 2004; Roine and Waldenström, 2009; Saez and Zucman, 2016; Smith et al., 2021). These studies have documented long-term wealth inequality trends, but abstracting from cyclical effects. This paper provides comprehensive long-term evidence on the main determinants behind changes in the wealth distribution during housing booms and busts. Kuhn et al. (2020) show that large increases in house prices during housing booms lead to substantial wealth gains for leveraged middle-class households in the US. I go one step further by also studying other channels such as heterogeneity in labor incomes and portfolio choices. In particular, my results reveal the importance of differences in households' market-timing and portfolio reshuffling across the wealth distribution for explaining wealth inequality fluctuations along house price cycles.

In the past, the wealth distribution in Spain has been analyzed using wealth tax records (Alvaredo and Saez, 2009) and wealth survey data (Anghel et al., 2018), but the coverage in terms of distribution and time span was limited. The new wealth distribution series constructed in this paper are 100% consistent with national accounts, cover the full distribution over the period 1984-2015, and provide complete long-run evidence on the evolution of wealth inequality over the last four decades in Spain.

Finally, this study contributes to the literature analyzing the role played by housing in the portfolio decisions of households (e.g., Campbell, 2006; Chetty et al., 2017; Cocco, 2004; Flavin and Nakagawa, 2008, Grossman and Laroque, 1990; Guiso et al., 2002). In particular, it relates to the studies examining the implications of the dual role of housing as both a consumption good and an investment good (e.g., Brueckner, 1997; Flavin and Yamashita, 2002). These studies emphasize

that households' holdings of real estate are determined—at least in part—by their consumption demand for housing services, imposing a constraint on the portfolio problem. However, they abstract from the role of housing as a pure investment good or the implications of these portfolio decisions for wealth inequality. The results of this paper emphasize that the larger exposure to housing as a pure investment good by top wealth holders appears to be a key channel through which they can reshuffle their portfolio away from housing towards financial assets during housing busts. Middle and bottom wealth holders only own housing for consumption, so that they cannot undertake the same time of reshuffling. These findings thus call for heterogeneous agents macroeconomic models in which individuals can have multiple houses—some in which they live in and others that are acquired purely for investment purposes—and in which transaction costs are larger for those properties meant for consumption.

The layout of the paper is as follows. Section II discusses the concepts, data and methodology used to construct the wealth distribution series. In Section III, I first present the main patterns in real house prices and aggregate wealth. I then analyze wealth inequality dynamics during housing booms and busts. Lastly, I develop a new asset-specific decomposition of wealth accumulation and carry counterfactual simulation exercises to understand the key drivers of the dynamics of wealth inequality during housing booms and busts. In Section IV, I propose and explore several candidate explanations for the differences in market-timing and portfolio reshuffling across wealth groups. Finally, Section V concludes.

# II Concepts, Data and Methodology

This section describes the concepts, data and methodology used to construct the joint wealth and income inequality database for Spain over the period 1984-2015, which will then be used to study the determinants of short to medium-term fluctuations in wealth inequality during housing booms and busts.

## II.A Aggregate Wealth: Concept and Data Sources

The wealth concept used is based upon national accounts (System of National Accounts, SNA) 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 financial assets net of liabilities, I rely on the latest and previous financial accounts (European System of Accounts 2010 and 1995, Bank of Spain) for the period 1996-2015 and 1984-1995, respectively. Financial accounts report wealth quarterly and I use mid-year values.

Households' financial assets include equities (i.e., stocks, investment funds and financial derivatives), debt assets, cash, deposits, life insurance and private pensions. Households' financial liabilities are composed of loans and other debts. The wealth concept used only considers the household sector and excludes non-profit institutions serving households (NPISH). 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 approximately 1-3% of household financial wealth between 1995 and 2017 in Spain, according to financial accounts. Hence, it is a negligible part of wealth and excluding it should not alter the results.

For non-financial wealth, it is not possible to rely on non-financial accounts based on the SNA. 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.[4] 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 by Artola et al. (2021). 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.[5] Unincorporated business assets have been constructed using the five waves of the Survey of Household Finances (2002, 2005, 2008, 2011, 2014) 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.[6]

I exclude collectibles since they amount to less than 1% of total household

[4]The Spanish National Statistics Institute (INE) has recently started to publish series on fixed assets by institutional sector since 2000, but they are incomplete as they do not include non-produced non-financial assets, such as sub-soil resources, agricultural land or urban land.

[5]Net housing wealth is the result of deducting real estate debt from household real estate wealth. Note that real estate debt is approximated by total household liabilities. This a quite reasonable approximation since real estate property debt accounts for 80-88% of total household debt over the period 2002-2014, according to the Survey of Household Finances.

[6]A detailed explanation of the sources and methodology used in order to construct these two series can be found in the online appendix of Artola et al. (2021).

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 SNA and there are no statistics about consumer durables owned by Spanish households for the period prior to 2002.[7]

## II.B Distribution of Wealth: The Mixed Income Capitalization-Survey Approach

The wealth distribution series are constructed by allocating the total household wealth as defined in the previous subsection to the various groups of the distribution. I do so by using the Mixed Income Capitalization-Survey Method (MICS) developed by Garbinti et al. (2021), which consists of the following three steps. First, the distribution of taxable capital income is calculated. 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 income and wealth surveys are used in order to account for both income at the bottom of the distribution and assets that do not generate taxable income.

### II.B.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). Three different databases are available: two personal income tax panels that range from 1982-1998 and 1999-2014, respectively, and personal income tax samples for 2002-2015. For the benchmark series, I use the first income tax panel for 1984-1998, the second panel for 1999-2001 and all income tax samples for 2002-2015.[8] I also rely on the full second panel 1999-2014 to carry robustness checks. The micro-files provide information for a large sample of taxpayers, with detailed

[7] 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.

[8] 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.

income categories and an oversampling of the top.[9] The income categories I use are interest, dividends, effective and imputed housing rents, as well as the profits of sole proprietorships.[10] 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 and consequently, they manage their income taxes independently. Combined these two regions represent about 6-7% and 8% of Spain in terms of population and gross domestic product, respectively, according to the Population Census and the regional national accounts developed by the Spanish Statistical Institute (INE).

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 across units. The reason is that individuals in a couple with income, for example, at the 90th percentile are not as well off as a single 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 (e.g., Spain, Italy) and in others (e.g., 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 member of the couple.[11] In 2015, for instance, this operation converts 19,480,423 tax units into 22,945,329 individual units in the population aged 20 or

[9]Personal income tax samples are more exhaustive (i.e., 2,700,593 tax units in 2015) than the panels (i.e., 390,613 tax units in 1999). This is the reason why I rely on the tax samples for constructing the benchmark series.

[10]Note that imputed housing rents exclude primary residence from the period 1999-2015. I explain the way in which I account for primary 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.

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

above, that is, approximately 18% of units are converted.[12]

One limitation of using personal income tax returns to construct income shares in the Spanish case is that not all individuals are obliged to file. There exist some labor income and capital income thresholds under which individuals are exempted from filing. In 2015, for instance, the labor income threshold when receiving labor income from one single source was 22,000 euros and 12,000 euros 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 euros for imputed rental income and/or Treasury bills. This implies that over the period 1999-2015, approximately one third of the adult population was exempted from filing, according to the microfiles. I account for the missing adults by first calculating the difference between the population totals by age and gender of the Population Census with the population totals of the micro-files. I then create new observations for all the missing individuals. By construction, my series perfectly match the Population Census 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 labor and also some capital income. Hence, I need to account for this missing income, otherwise I would be overestimating the amount of wealth held by the middle and top of the distribution. For that, I rely on the Survey of Household Finances for the period 1999-2015 and on the Household Budget Continuous Survey for the period 1984-1998. Appendix A.1 explains in detail the imputation method followed using the two surveys.

Finally, before capitalizing the capital income shares, it is important to make sure 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 coherently distributed, neither the wealth distribution estimates will be. In appendix B, I explain in detail the specific

[12] Given the incentives of the tax code to file separately whenever both individuals in the couple receive income—the reductions for filing jointly usually do not compensate for the increase in the tax base—there are more married couples filing individually the further we move up in the income distribution. The Spanish Personal Income Tax Guide (*Guía de la Declaración de la Renta*) is published on an annual basis and it includes a more detailed explanation in Spanish about how personal income tax filing works in Spain.

[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 micro-files to match the Population Census totals excluding Basque Country and Navarra, but without taking age and gender into consideration.

personal income tax 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.

### II.B.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.

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 $r_j$, his investment income by asset type is[14]:

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

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:

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

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

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

In the following paragraphs, I explain how this formal setting is applied to the Spanish case in order to obtain the wealth distribution series.

There are five categories of capital income in personal income tax data: effective and imputed rental income (excluding primary residence since 1999), business income from self-employment, interest and dividends. Tax return income for each category is weighted to match aggregate national income from national accounts. I

[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.

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 the previous subsection, income tax data exclude the regions of Basque Country and Navarra. Therefore, before mapping the taxable income to each wealth category, income and wealth in national accounts need to be adjusted to exclude 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 these two regions. Unfortunately, neither the Bank of Spain nor the National Statistics Institute have constructed regional national accounts with disaggregated information by asset type yet, so that 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, according to the Spanish regional accounts from INE and La Caixa Catalunya (2004).

Once income and wealth have been adjusted, a capitalization factor is computed for each category as the ratio of aggregate wealth to tax return income, every year since 1984.[16] In 2015, for instance, business income accounts for about 20.6 billion euros and business assets from self-employees for 575.6 billion euros. Hence, the rate of return on business assets is 3.6% and the capitalization factor is equal to 27.9. Table 1 shows that flow returns (and thus capitalization factors) vary across asset types, being for most of the period higher for financial assets than for business assets and housing.This is consistent with the findings of Jordà et al. (2019), who show that the rate of return on equities has outperformed on average the rate of return on housing since the 1980s, but not in previous decades. This procedure ensures consistency with aggregate national income and wealth accounts. Having wealth distribution series which take all aggregated wealth into account is especially relevant for the purpose of this paper, which is to understand how periods of large changes in housing prices shape the entire wealth distribution.

[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.

[16] Note that the tax return income is rescaled so as to match the income components from national accounts. This ensures consistency both in the stocks and the flows.

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. In the following subsection, I carefully account for the assets that do not generate taxable income.

### II.B.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: primary residence[17], life insurance, investment and pension funds.[18] These assets account for a large part of total household wealth, namely around 40-50% of total net household wealth according to Artola et al. (2021). Nonetheless, 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 wealth survey, the Survey of Household Finances (SHF).

This survey is elaborated every three years since 2002 by the Bank of Spain. It provides a representative picture of the structure of 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 Spanish 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, making it possible 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 A.2 explains in detail the imputation method used relying on the survey.

[17] Imputed rents on primary residence are exempted since 1999. Hence, I only need to impute primary residence for the period 1999-2015.

[18] Unreported offshore assets do also not generate taxable income. Following Alstadsæter et al. (2019), I re-calculate the wealth distribution series accounting for unreported offshore assets. Due to the uncertainties related to these calculations, I do not include offshore assets in my benchmark series. Appendix C describes the methodology used to account for unreported offshore assets in detail and presents the adjusted wealth distribution series.

| | Flow return | Real capital gains | Total return |
|---|---|---|---|
| **1984-2015** | | | |
| **Net personal wealth** | 5.0% | 2.7% | 7.9% |
| **Housing assets** | 1.3% | 3.0% | 4.3% |
| **Business assets** | 7.2% | 3.0% | 10.4% |
| **Financial assets** | 10.2% | -2.6% | 7.3% |
| **Liabilities** | 1.0% | 1.0% | 2.0% |
| **1985-1991 (1st housing boom)** | | | |
| **Net personal wealth** | 6.6% | 5.3% | 12.3% |
| **Housing assets** | 1.7% | 7.0% | 8.8% |
| **Business assets** | 8.5% | 7.0% | 16.1% |
| **Financial assets** | 13.7% | -6.6% | 6.2% |
| **Liabilities** | 1.5% | -2.4% | -0.9% |
| **1991-1995 (1st housing bust)** | | | |
| **Net personal wealth** | 5.7% | 0.2% | 5.9% |
| **Housing assets** | 1.1% | -1.5% | -0.5% |
| **Business assets** | 11.3% | -1.5% | 9.6% |
| **Financial assets** | 11.5% | -1.4% | 9.9% |
| **Liabilities** | 0.9% | -0.5% | 0.5% |
| **1998-2007 (2nd housing boom)** | | | |
| **Net personal wealth** | 4.3% | 6.6% | 11.2% |
| **Housing assets** | 1.0% | 8.3% | 9.3% |
| **Business assets** | 7.3% | 8.3% | 16.2% |
| **Financial assets** | 8.8% | 0.1% | 8.9% |
| **Liabilities** | 0.6% | 7.3% | 7.9% |
| **2008-2014 (2nd housing bust)** | | | |
| **Net personal wealth** | 3.7% | -4.2% | -0.7% |
| **Housing assets** | 1.4% | -5.7% | -4.4% |
| **Business assets** | 3.0% | -4.7% | -1.8% |
| **Financial assets** | 8.3% | -4.2% | 3.7% |
| **Liabilities** | 0.9% | -3.3% | -2.4% |

TABLE 1: AVERAGE ANNUAL RATES OF RETURN IN SPAIN, 1984-2015

Notes: This table reports the average total returns on household wealth by asset category over the 1984-2015 period in Spain. The total returns are the sum of the flow returns and of the real rates of capital gains from national accounts. The returns are gross of all taxes but net of capital depreciation. Real capital gains correspond to asset price inflation in excess of consumer price inflation. The rates of return are reported for the full period 1984-2015 and further decomposed for the two different housing booms and busts (1985-1991, 1992-1995, 1998-2007 and 2007-2014). All figures are presented in percentages.

# III Interactions between House Price Cycles and the Wealth Distribution

This section presents the main results of the paper. The first subsection describes the evolution of real house prices and aggregate household wealth in Spain over the period 1984-2015, and identifies the housing booms and busts episodes. The second subsection documents the dynamics of the wealth distribution during the different house price cycles. Finally, the third subsection uses a new asset-specific decomposition of wealth accumulation to quantify the relative importance of each channel (i.e., heterogeneity in rates of return, saving rates, labor incomes and portfolio choices) in explaining the observed dynamics of the wealth distribution.

## III.A Evolution of Real House Prices and Aggregate Household Wealth

Spain is an ideal laboratory to understand the interactions between housing booms and busts and the wealth distribution for three main reasons. First, the country has experienced two house price cycles over the period 1984-2015 and it has reliable statistics on individual asset ownership going back to the 1980s. This makes it possible to analyze in detail the implications of large asset price changes for wealth inequality taking a long-term perspective. Housing booms and busts are house price cycles in which house price growth is considered large enough. There is no consensus about the threshold that needs to be chosen. In this paper, I follow a similar approach to International Monetary Fund (2009) and identify housing boom and busts as periods in which the four-quarter moving average of the annual growth rate of real housing prices falls above (below) 2.5%. According to this methodology, Spain had two housing booms (1985-1991, 1998-2007) and two housing busts (1991-1995, 2007-2014) during this period of time (Figure 1). Appendix D discusses alternative methodologies that have been used to identify housing booms and busts. No matter which methodology is used results are very similar.

Second, these house price fluctuations have come together with important aggregate wealth fluctuations and changes in portfolio composition, which might have thus affected the wealth distribution. In fact, the country reached an unprecedented level in its household wealth to national income ratio, almost doubling during this period of time. Household wealth amounted to 359% in 1984 and it grew up during

the first housing boom up to 435% in the early 1990s. During the housing bust of the mid-1990s it stabilized and from 1998 onwards, it started to increase more rapidly reaching the peak of 727% of national income at the end of the second housing boom in 2007. After the burst of the crisis in 2008, it dropped and it has been decreasing since then. In 2015, the household wealth to national income ratio amounted to 629%, a level which is similar to the wealth to national income ratio of 2004, but much higher than the household wealth to national income ratios of the 1980s and 1990s (Figure 2a). The level of household wealth to national income that Spain reached in 2007 is the highest among all countries with available records in the early twenty-first century (Figure 2b).

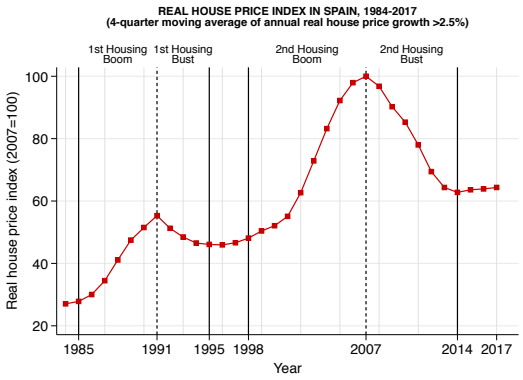


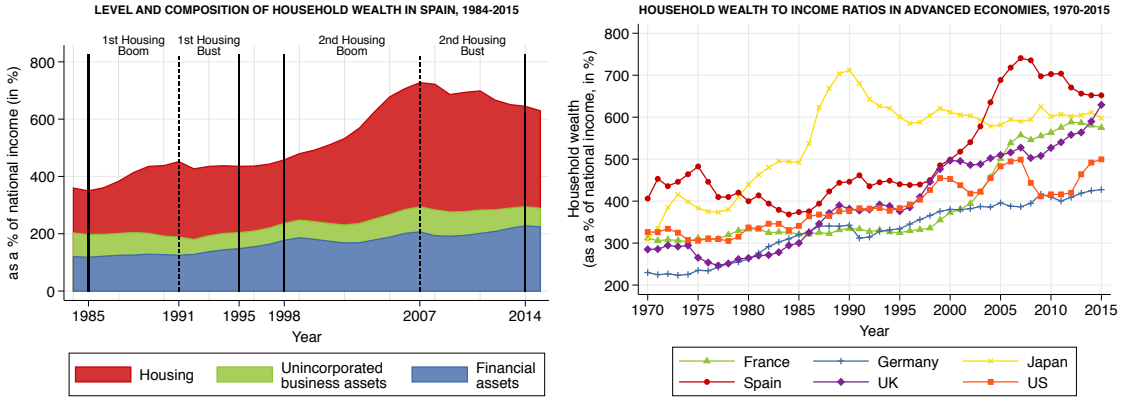

FIGURE 1: REAL HOUSE PRICE INDEX IN SPAIN, 1984-2015

Notes: This figure depicts Mack and Martínez-García (2011)'s real house price index in Spain over the period 1984-2015. The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.

Third, the macroeconomic scenarios and intensities of the two house price cycles were quite different. The recent housing bust happened together with an economic crisis and a stock market crash, whereas there was no stock market collapse nor economic crisis at the turning point of the old housing boom.[19] Furthermore, whereas during the first and second boom housing prices rose on average 11.6% and 11.8% by year, respectively, the decline in house prices was larger during the recent housing bust (5.7% on average by year) than during the old housing bust (3.6% on average by year). The rise in total real estate transactions was also much larger during the second episode than during the first one. This was largely due to an increase in

[19]Spain went under a profound economic crisis during the 1990s, but it did not start until 1993 ending up in 1995.

the stock of new dwellings, many of which were acquired through mortgage loans.[20] These differences might be strongly related to the fact that the recent house price cycle took place in a scenario with low interest rates and lax lending standards, while at the time of the old house price cycle interest rates were higher and lending standards tighter. These differences across the two episodes are useful to understand whether there are some common regularities across the two episodes in the way housing booms and busts interact with the wealth distribution, despite these occurring under different macroeconomic scenarios and house price cycle intensities.




(a) Level and composition of household wealth in Spain, 1984-2015

(b) Household wealth to income ratios in advanced economies, 1970-2015

FIGURE 2: AGGREGATE HOUSEHOLD WEALTH: SPAIN VS. ADVANCED ECONOMIES

Notes: The figure depicts on panel a the level and composition of aggregate household wealth from 1984 to 2015 expressed as a percentage of national income. This figure has been constructed using the national income series from the Spanish National Statistics Institute (INE), the series on financial assets from the Financial Accounts of Bank of Spain and the series of housing and unincorporated business assets from Artola et al. (2021). The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode. Panel b compares the evolution of household wealth as a percentage of national income in Spain versus other advanced countries since 1970. The series for the rest of countries are extracted from the World Wealth and Income Database.

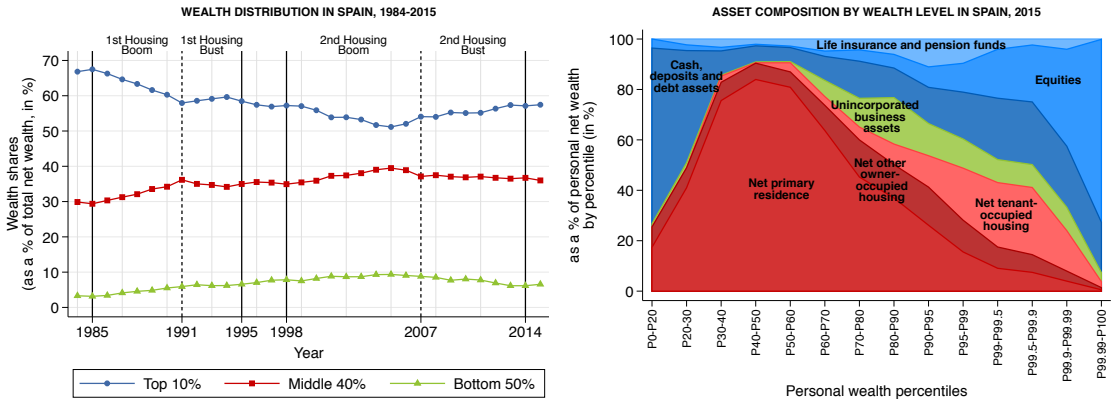
## III.B Wealth Inequality Dynamics during Housing Booms and Busts

Before moving into the analysis of the determinants behind the dynamics of the wealth distribution, I first need to document the fluctuations of wealth inequality

[20] Figure D2 depicts the digitized series on the evolution of the total number of real estate transactions and new mortgage loans attached to real estate in Spain since 1980.

along house price cycles. The high level of disaggregation of the Spanish wealth distribution series, together with the existence of the two housing boom-busts episodes, allows me to carry a comprehensive long-term study on how house price cycles shape the wealth distribution.

Figure 3a displays the wealth distribution in Spain over the period 1984-2015 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 3 to 10%, the middle 40% has concentrated between 29% and 40% of total net wealth and the top 10% between 51% and 68% over the period of analysis. Focusing on the dynamics during the two house price cycles, it can be observed that top 10% wealth concentration decreased during the two housing boom episodes and increased during the two housing busts. Both bottom—to a low extent—and middle wealth holders—to a large extent—benefit from housing booms.




(a) Wealth distribution, 1984-2015 (b) Asset composition by wealth level, 2015

FIGURE 3: WEALTH DISTRIBUTION AND ITS COMPOSITION IN SPAIN

Notes: This figure depicts on panel a the breakdown of the wealth distribution in Spain for years 1984-2015 into three groups: top 10%, middle 40% and bottom 50%. The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode. Panel b depicts the asset composition by wealth group in 2015.

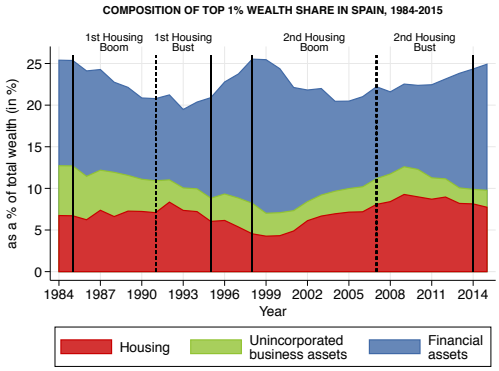
Contradictory movements in relative asset prices have an important impact on the dynamics of the wealth distribution, because asset composition is very different across wealth groups. As it is shown on Figure 3b, bottom deciles of the distribution own mostly financial assets in the form of cash and deposits, whereas primary residence is the main form of wealth for the middle of the distribution in 2015. As we move toward the top 10% and the top 1% of the distribution, unincorporated

business assets, secondary owner-occupied and tenant-occupied housing gain importance, and financial assets (mainly equities) gradually become the dominant form of wealth. The same general pattern applies for the period 1984-2015, except that unincorporated assets have lost importance over time, due mainly to the reduction in agricultural activity among self-employees.[21] To make sure that the series and facts are robust, in appendix E I have carried different robustness checks using other sources, such as wealth surveys, and I have also tested some of the methodological assumptions (i.e., constant asset-specific rates of return). The levels and composition of my series are almost identical to the ones obtained using the direct reported wealth from the surveys.

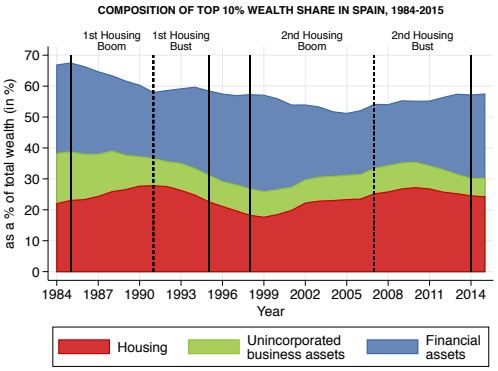
When decomposing the evolution of the wealth shares going to the bottom 50%, middle 40%, top 10% and top 1% by asset class, the impact of asset price movements on wealth shares, particularly the impact of the 2000 stock market boom and the 2007 housing bust, are clearly captured (Figure 4). One particularity of the Spanish case is that housing constitutes a very important asset in 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 2012 the top 10% and 1% of the wealth distribution in Spain own 26% and 9% of total net wealth in housing, respectively, in France these figures are 19% and 5%, respectively (Garbinti et al., 2021).

Nonetheless, the negative correlation between wealth concentration and housing booms and the positive correlation during housing busts is not specific to the Spanish context. Figure 5a depicts the real house price index in Spain, France and the US. All three countries experienced a housing expansion over the period 1998-2007, but the length and dimension of the housing contraction after 2007 was quite different across the three countries. Figure 5b shows the evolution of the top 10% wealth share in these three countries. In line with the findings for Spain, both in France and the US the evolution of 10% wealth concentration is different during housing expansions and contractions. The top 10% wealth share stabilized in the US and declined in France during the 1998-2007 housing expansion and increased during

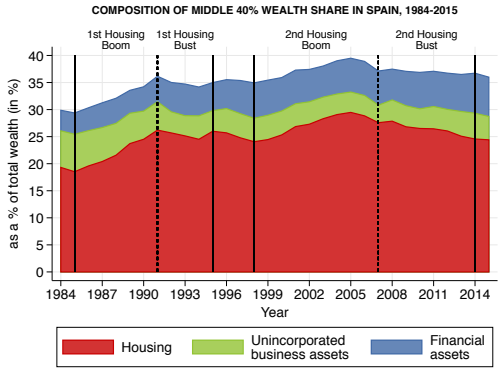
[21] Note that equities include both listed and unlisted equities and unlisted equities include incorporated business assets.



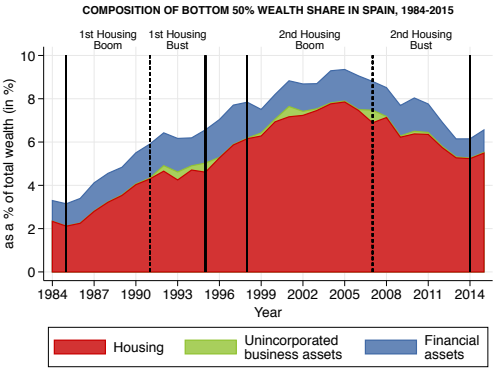

(a) Composition of top 1% wealth share




(b) Composition of top 10% wealth share




(c) Composition of middle 40% wealth share

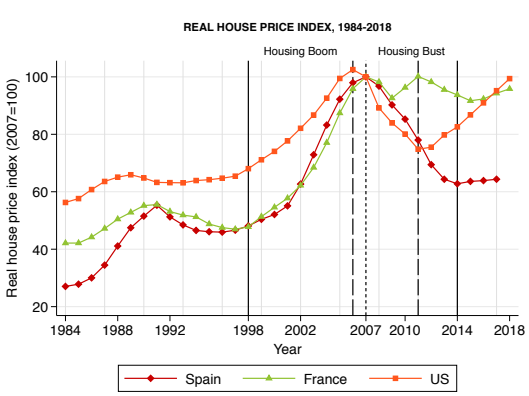



(d) Composition of bottom 50% wealth share

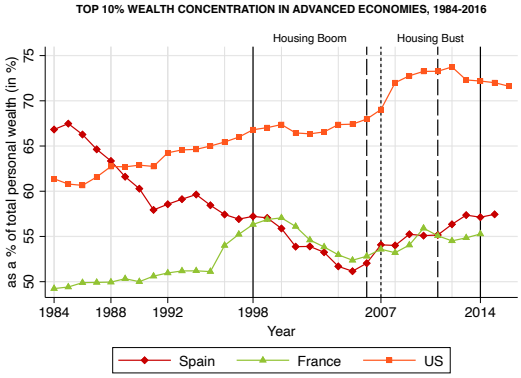
FIGURE 4: ASSET COMPOSITION ACROSS THE WEALTH DISTRIBUTION IN SPAIN, 1984-2015

Notes: The figure displays the composition of top 1% (panel a), top 10% (panel b), middle 40% (panel c) and bottom 50% (panel d) wealth shares in Spain using the mixed capitalization-survey method for the period 1984-2015.

the housing contraction. Hence, the dynamics of wealth inequality during housing booms and busts in Spain appear to be in line with the dynamics observed in other settings.




(a) Real House Price Index, 1984-2018




(b) Top 10% Wealth Concentration, 1984-2016

FIGURE 5: INTERNATIONAL COMPARISON OF REAL HOUSE PRICES AND TOP WEALTH SHARES

Notes: Panel a in the figure depicts the real house price index in Spain, France and the US over the period 1984-2018. The base year is set to 2007. The real house price series are the ones published by the OECD, except from Spain which is the series constructed by Mack and Martínez-García (2011). Panel b in the figure depicts the top 10% wealth share in Spain, France and the US over the period 1984-2016. The series for France is the one constructed by Garbinti et al. (2021) and for the US by Saez and Zucman (2016). All three series are fully comparable, as they are all consistent with national accounts. All three countries experienced a housing expansion starting in 1998 (vertical solid black line). However, the expansion ended in 2007 in France and Spain (vertical short-dashed black line) and one year earlier, in 2006, in the US (vertical long-dashed black line). The housing contraction ended up in 2014 (vertical solid black line) in Spain and France, and in 2011 in the US (vertical long-dashed black line).

## III.C Determinants of Wealth Inequality Dynamics during Housing Booms and Busts

The aim of this section is to first analyze which are the underlying forces driving the dynamics of wealth inequality during housing booms and busts, and second, to quantify their importance by means of a new asset-specific wealth accumulation decomposition and counterfactual simulations.

### III.C.1 A New Asset-Specific Decomposition of Wealth Accumulation

Are the observed dynamics entirely due to differences in rates of return or are there any other non-mechanical forces (i.e., labor income, saving rates, portfolio

reshuffling) driving the dynamics? To answer this question, my starting point is to decompose the wealth distribution series using the following transition equation:

$$W^g_{t+1} = (1 + q^g_t) \cdot [W^g_t + s^g_t \cdot (Y^g_{L_t} + r^g_t \cdot W^g_t)], \tag{5}$$

where $W^g_t$ stands for the average real wealth of wealth group g at time t, $Y^g_{L_t}$ is the average real labor income of wealth group g at time t, $r^g_t$ the average rate of return of group g at time t, $q^g_t$ the average rate of real capital gain of wealth group g at time t and $s^g_t$ the synthetic saving rate of wealth group g at time t.[22] By convention, savings are assumed to be made before the asset price effect $q^g_t$ is realized. The saving rate is synthetic because the identity of individuals in wealth group g changes over time due to wealth mobility.

I first follow the same approach as Garbinti et al. (2021) and Saez and Zucman (2016) and calculate the synthetic saving rates that can account for the evolution of average wealth of each group $g$ as a residual from the previous transition equation. This is a straightforward calculation since I observe variables $W^g_t$, $W^g_{t+1}$, $Y^g_{L_t}$, $r^g_t$ and $q^g_t$ over the whole period 1984-2015. Hence, the three forces that can affect the dynamics of wealth the wealth distribution are inequality in labor incomes, rates of return and saving rates.

I then go one step forward and also develop a new asset-specific wealth accumulation decomposition by breaking down the previous transition equation by asset class: net housing, business assets and financial assets.[23] The transition equation is as follows:

$$W^g_{t+1} = W^g_{H,t+1} + W^g_{B,t+1} + W^g_{F,t+1}, \tag{6}$$

where

$$W^g_{H,t+1} = (1 + q^g_t) \cdot [W^g_{H,t} + s^g_{H,t} \cdot (Y^g_{L_t} + r^g_t \cdot W^g_t)] \tag{7}$$

$$W^g_{B,t+1} = (1 + q^g_t) \cdot [W^g_{B,t} + s^g_{B,t} \cdot (Y^g_{L_t} + r^g_t \cdot W^g_t)] \tag{8}$$

[22] 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.

[23] Mian et al. (2020) and Bauluz et al. (2022) have recently used similar asset-specific wealth accumulation decompositions to analyze the composition of savings.

$$W^g_{F,t+1} = (1 + q^g_t) \cdot [W^g_{F,t} + s^g_{F,t} \cdot (Y^g_{L_t} + r^g_t \cdot W^g_t)] \tag{9}$$

This new asset-specific wealth decomposition makes it possible to quantify not only the relative importance of each channel, but also the role played by each asset in explaining the saving dynamics along the wealth distribution. By construction, the sum of the saving rates in equations 7-9 adds up to the total saving rate for wealth group $g$. This decomposition is critical for better understanding the determinants of wealth inequality during housing booms and busts, as I will show that differences in portfolio reshuffling across wealth groups are key to understand the observed wealth inequality dynamics.

Before quantifying the relative importance of each channel, it is relevant to first understand the dynamics of the different forces that can shape the wealth distribution according to the wealth accumulation decomposition. Figure 6a depicts the evolution of labor income shares for the different wealth groups over the 1984-2015 period. Overall, the evolution of labor income inequality has been quite stable throughout the whole period, with some moderate fluctuations. The middle 40% share declined during the first housing boom and it then remained stable until 2010, after which it started to increase at the expense of the decline in the bottom 50% share. This is consistent with the large increase and high levels of unemployment, especially among the young, during the recent housing bust.[24] The top 10% share increased during the mid-1980s and decreased during the beginning of the 2000s, a period of rapid economic growth. Despite these fluctuations, the shares are overall quite stable and there is nothing particular in the observed labor income dynamics which appears to have played an important role in explaining the evolution of wealth inequality during housing booms nor busts.

Rate of return inequality is the second potential force driving wealth inequality dynamics. It might arise due to differences in flow rates of return or real capital gains along the distribution. Figure 6b displays the evolution of flow rates of return and Figure 6c that of real capital gains for the different wealth groups over the 1984-2015 period. Flow rates of return have considerably fallen in the last thirty years, following similar trends across the whole wealth distribution. This is mainly

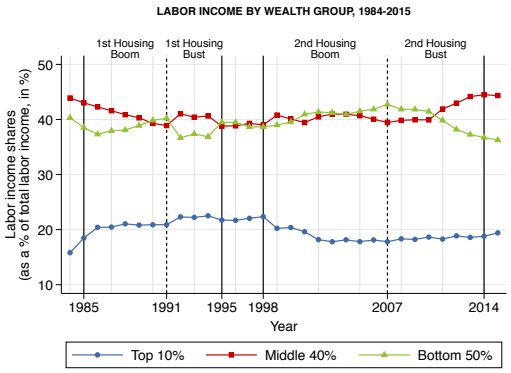
[24] According to the Spanish Statistics Institute (INE), the unemployment rate almost tripled between 2007 and 2014 (from 8.42% to 23.70%).

due to the fall in returns on some financial assets, such as interest rates. However, differences in rates of return levels across wealth groups are still quite important. The further up one moves along the distribution, the higher are the average rates of return.[25] This is consistent with the large portfolio differences that were previously documented. Top wealth groups own more financial assets, such as equities, that have higher rates of return than for instance deposits during the last two decades. Persistent differences in rates of return over time across the whole distribution seem to perpetuate the high levels of long-run wealth concentration. Nonetheless, because trends are quite similar across wealth groups, they do not seem to be the main drivers of wealth inequality dynamics during housing booms and busts.

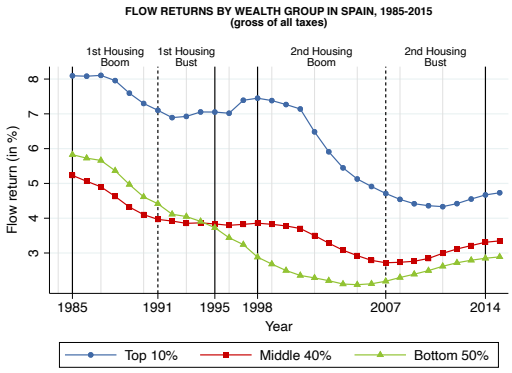
Contrary to flow rates of return, differences in real capital gains along the distribution do seem to considerably change during housing booms and busts (Figure 6c). Capital gains increase during housing booms and decline during housing busts across all wealth groups. During housing booms, capital gains are larger on average for the middle 40% and bottom 50% of the wealth distribution than for the top 10%. The reason is that the middle and the bottom have a larger share of housing in their portfolio than the top and consequently, they benefit more from the larger increase in capital gains on housing relative to financial assets (Table 1). In contrast, the differences in capital gains across all wealth groups disappear during housing busts, as capital gains on housing and financial assets are no longer that different. Hence, the heterogeneity in capital gains across wealth groups appears to be a relevant force behind the fluctuations of the wealth distribution along house price cycles.

Finally, the third force which can potentially drive wealth inequality dynamics is heterogeneity in saving rates across the wealth distribution. Figure 6d depicts synthetic saving rates for the top 10%, middle 40% and bottom 50% over the period 1985-2015. 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 24% of their income annually, and the middle 40% and bottom 50%, who save 10% and 3% of their income on average, respectively. The level of stratification is similar to the one obtained for France and the US (Garbinti et al., 2021; Saez and Zucman, 2016).

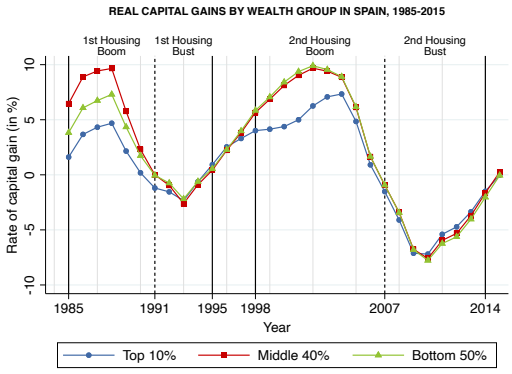
[25] Bach et al. (2020) and Fagereng et al. (2020) also document a positive relationship between returns and wealth for Sweden and Norway, respectively.



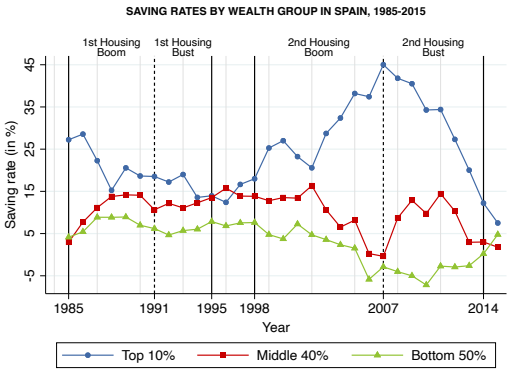

(a) Labor income by wealth group




(b) Flow returns by wealth group



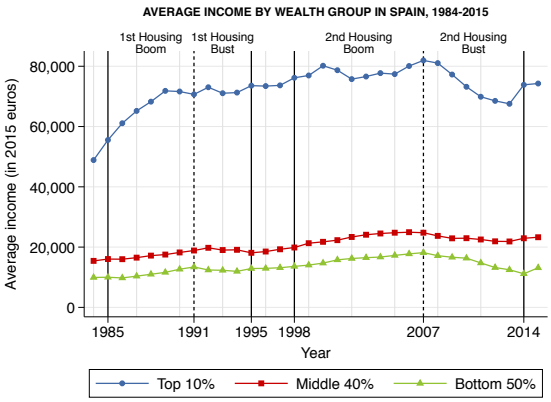

(c) Real capital gains by wealth group



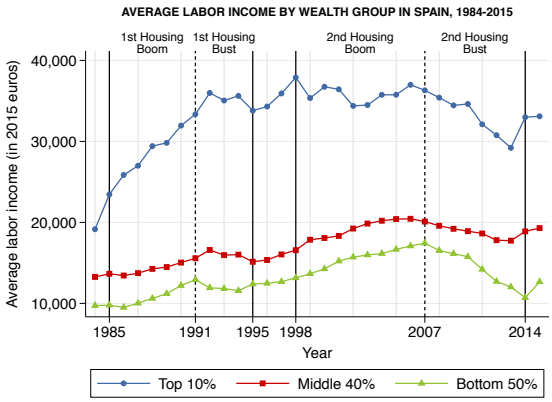

(d) Saving rates by wealth group

FIGURE 6: WEALTH ACCUMULATION DECOMPOSITION BY WEALTH GROUP IN SPAIN, 1984-2015

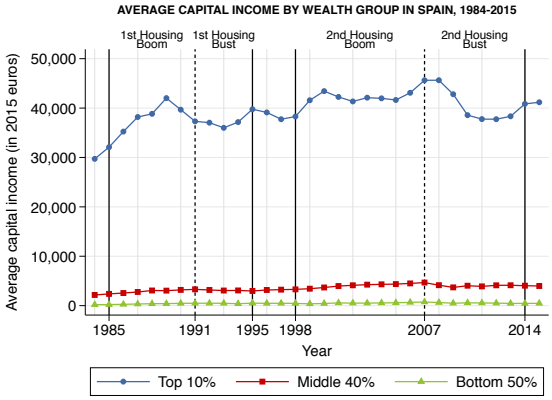
Notes: The figure depicts the distribution of labor income (panel a), flow rates of return (panel b), real capital gains (panel c) and synthetic saving rates (panel d) among the top 10%, middle 40% and bottom 50% wealth groups over the period 1984-2015 in Spain. The flow rates of return, real capital gains and synthetic saving rates are displayed using a five year moving average from 1985 up to 2015. The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.




(a) Average income by wealth group




(b) Average labor income by wealth group




(c) Average capital income by wealth group

FIGURE 7: AVERAGE INCOME BY WEALTH GROUP IN SPAIN, 1984-2015

Notes: The figure depicts average income (panel a), average labor income (panel b) and average capital income (panel c) for the top 10%, middle 40% and bottom 50% wealth groups over the period 1984-2015. These series are calculated based on the available information in tax records and the mixed capitalization-survey method used to construct the wealth distribution. Income variables are deflated to 2015 euros using Spain's consumer price index from OECD statistics. The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.

Differences in saving rates across wealth groups increase during booms and decrease during busts. However, contrary to real capital gains, saving rate levels remain higher for the top than for the middle and bottom of the distribution during busts. The stratification in saving rates was more remarkable during the recent episode than during the old one because of differences in the intensity of the house price cycle. The larger increase in saving rates for the top during the recent than during the old boom is mainly due to purchases of secondary owner-occupied and tenant-occupied housing. According to our wealth series, the share of individuals

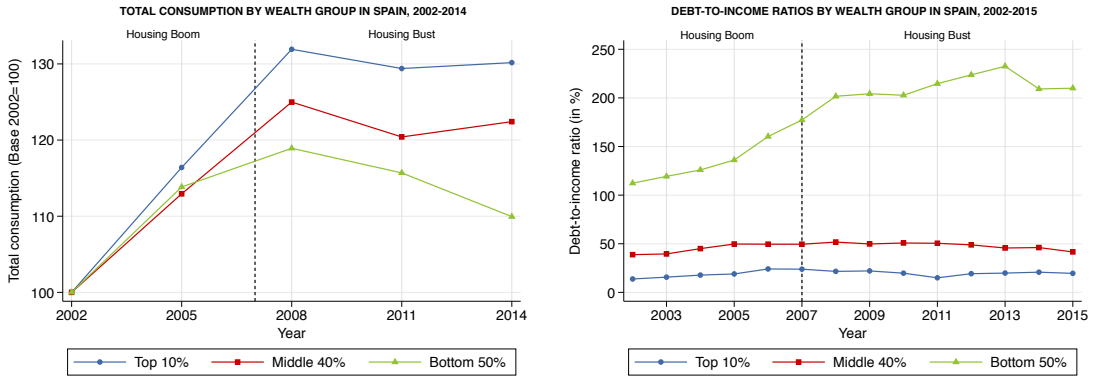
owning a secondary residence rose from 58% to 72% over the period 1998-2007. This finding is also consistent with the large increase in the total number of dwellings transacted during the recent housing boom, which did not happen during the old episode (Figure D2). The saving rate for the top 10% wealth group remained at a higher level than for the other wealth groups during the recent housing bust, but it considerably fell. There are two main reasons that explain this drop. First, both average labor and capital income declined for the top 10% wealth group (Figure 7). Second, total consumption that had strongly increased during the boom, remained nearly constant for this group during the bust (Figure 8a). Hence, top wealth holders had to reduce their savings to smooth consumption.

In contrast, saving rates for the middle 40% and bottom 50% declined during the recent housing boom and increased during the bust, remaining very stable during the old episode. In line with top wealth holders, middle and bottom individuals also purchased dwellings during the recent house price cycle. Figure 9b shows that the middle 40% mainly purchased secondary owner-occupied housing, since the share of individuals owning secondary owner-occupied housing rose from 25% to 33% over the period 1998-2007. Figure 9c shows that the home-ownership ratio rose from 38% to 42% for the bottom 50% over the period 1999-2007, mainly due to the purchase of primary residences.[26]

Nonetheless, both middle and bottom individuals acquired their new dwellings by getting on average highly indebted. Figure 8b depicts the evolution of debt-to-income ratios by wealth group during the recent house price cycle. Debt-to-income ratio levels significantly differ across wealth groups. They are much higher for the bottom 50% wealth group (100-230%), than for the middle 40% wealth group (38-52%) and the top 10% wealth group (13-24%). The bottom 50% wealth group experienced the largest increase in its ratio of indebtedness during the recent house price cycle. It doubled from 100 to 200% during the housing boom and remained at very high levels during the housing bust. The high indebtedness among bottom wealth holders might explain why this is the group with the largest drop in consumption during the housing bust (Figure 8a). Hence, the saving rates among

[26] The home-ownership ratio keeps growing after 2007. This is most likely due to the fact that many of the purchased dwellings were actually transacted after 2007 since they were under construction. In fact, Figure D2b shows that the number of new registered dwellings remains quite high over the period 2008-2010.

middle and bottom wealth holders might have remained much more stable during the old house price cycle, as the growth in new mortgage loans attached to real estate was not as strong as during the recent housing boom and bust (Figure D2).




(a) Total consumption by wealth group (b) Debt-to-income ratios by wealth group

FIGURE 8: CONSUMPTION AND DEBT BY WEALTH GROUP IN SPAIN, 2002-2015

Notes: This figure depicts on panel a the change in total consumption by wealth group in Spain over the period 2002-2014. These series are calculated using the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). Consumption includes both expenditures on durables and non-durables. Expenditure on durable goods is obtained as the depreciation value of the stock of the household equipment of real estate property and the value of household vehicles and other modes of transport. I use the same depreciation values as in Bover (2006). Consumption is deflated to 2014 euros using the consumer price index from the Spanish Statistics Institute (INE). Panel b compares the distribution of debt by wealth group in Spain over the period 2002-2015. Debt is imputed into the tax data so as to match the distribution of debt in the Survey of Household Finances (SHF) (see Appendix A.2). The vertical dashed black line at 2007 denotes the turning point from the housing boom to the housing bust.

To better understand the saving patterns of the different wealth groups, I then rely on the new asset-specific decomposition that makes it possible to look at the composition of the saving rate by asset class. In particular, I focus on the share of saving on net housing and on financial assets.[27] Figure 10 documents one striking novel fact: saving rates on housing and financial assets are much more volatile for the top 10% wealth group than for the middle 40% and bottom 50% wealth groups during housing boom and busts. Saving rates on housing rise and remain very high for the top group during booms and significantly drop during housing busts. For the middle 40%, saving rates also increase—but much less—during the beginning of

[27] To simplify the analysis, I do not show the saving rate on unincorporated business assets, since they account on average for less than 15% of total net household wealth and consequently, they play a minor role in explaining wealth inequality dynamics.

the boom and start decreasing at the end of the boom, remaining stable throughout busts. For the bottom 50%, the saving rate on housing was quite stable during the old episode and became significantly negative during the recent episode. These differences are largely due to the fact that the level of indebtedness on real estate among bottom wealth holders was much more pronounced during the recent than during the old house price cycle.[28]

Saving rates on financial assets for the top group experience the opposite dynamics to saving rates on housing. They decline during housing booms and sharply rise during housing busts. On the contrary, saving rates on financial assets remain quite stable for middle and bottom groups across the whole period. These findings appear to be independent of the total saving rate, since the total saving rate fluctuated much more during the recent episode than the old one, but I still find large asset-specific saving rate fluctuations during the old housing boom and bust. They also seem to be independent of the level of households' indebtedness, since the fluctuations in saving rates are similar in both episodes, but indebtedness was much higher during the recent house price cycle.[29]

I also provide direct evidence about differences in portfolio choice dynamics across wealth groups by means of the Spanish Survey of Household Finances (SHF). First, I analyze the reported attitudes towards saving across wealth groups during the recent housing boom and bust (Figure 11). Figure 11a shows that while the probability to save on real estate increased more for top wealth holders than for the middle and bottom wealth groups during the boom, it declined more during the bust. The same pattern holds when controlling for saving (Figure 11b), although the differential effect becomes smaller. Moreover, the probability of top wealth holders to save on financial assets increased more than for the rest of wealth groups during the housing bust, even when controlling for saving (Figures 11c, 11d).

Second, I also analyze changes in the stock of housing across wealth groups during the recent housing boom and bust. Top wealth holders did dissave in real estate. According to the SHF, the change in the stock of tenant-occupied real estate

[28] The increase in new mortgage loans attached to real estate was quite modest during the old house price cycle (Figure D2).

[29] In appendix F, I carry different robustness checks to ensure that the results are not driven by mobility along the wealth distribution and that they hold even when using alternative wealth accumulation specifications.


(a) Top 10% wealth group

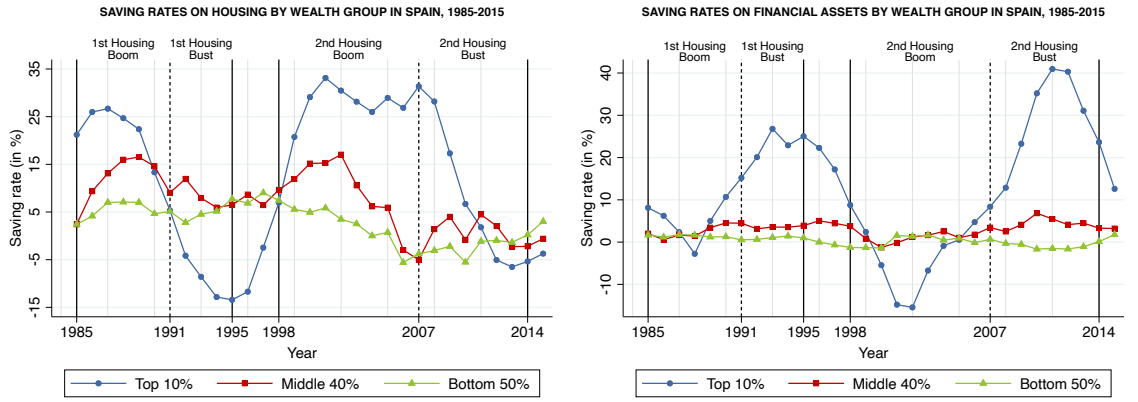
(b) Middle 40% wealth group

(c) Bottom 50% wealth group

FIGURE 9: COMPOSITION OF HOME-OWNERSHIP RATIOS IN SPAIN, 1999-2015

Notes: The figure depicts the composition of home-ownership ratios for the bottom 50% (panel a), middle 40% (panel b) and top 10% (panel c) wealth groups over the period 1999-2015. The home-ownership ratio is decomposed into the share of individuals who only own their primary residence, those who own at least another residence which they occupy on top of their primary residence (other owner-occupied housing), those who own at least another residence which they rent out (tenant-occupied housing) and finally, those who own both tenant- and other owner-occupied housing on top of their primary residence. The decomposition is not shown for the period 1984-1998 since tax records do not present such level of disaggregation. This decomposition is carried based on the available information in tax records and the mixed capitalization-survey method used to construct the wealth distribution.

declined by 20% between 2005 and 2011 for the top 10% wealth group, while it kept rising for the middle 40% wealth group (Figure 12a). The dissaving in real estate was almost entirely due to sales of tenant-occupied properties, since the fall in the total stock of real estate almost mirrors the drop in the stock of tenant-occupied housing (Figure 12c). In fact, the number of owner-occupied real estate properties owned by middle and top wealth groups kept rising during the bust (Figure 12c) and there




(a) Saving rates on net housing by wealth group

(b) Saving rates on financial assets by wealth group

FIGURE 10: ASSET-SPECIFIC SAVING RATES BY WEALTH GROUP IN SPAIN, 1985-2014

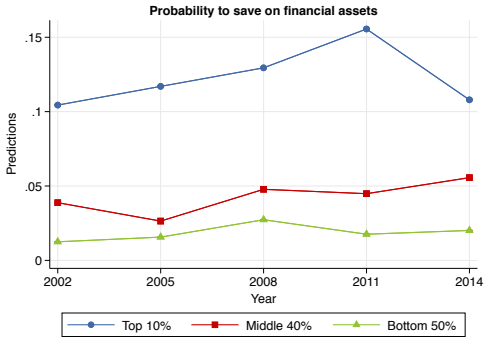
Notes: Panels a and b plot the synthetic saving rates on net housing and financial assets for the top 10%, middle 40%, and bottom 50%, respectively. Saving rates are displayed using a five year moving average from 1985 up to 2015. The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.

was almost no decline in the number of owner-occupied primary residences among top wealth holders (Figure 12d). Real estate available for rent started to increase between 2011 and 2014 for the top 10% wealth group. However, this rise does not seem to be due to new purchases but to changes in housing occupancy status, since the total stock of real estate excluding primary residence remained constant over this period of time.

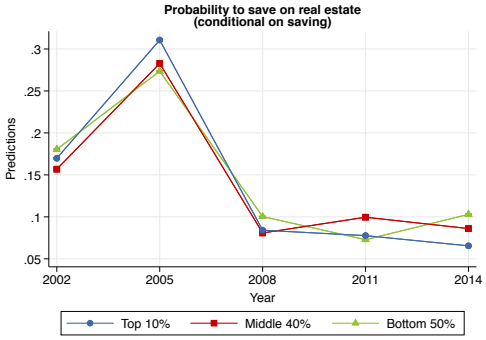
These results confirm that top wealth holders do reshuffle their portfolio during housing busts by selling some of their properties. But who do they sell these properties to? Figure 12d shows that some of the bottom and middle wealth holders keep accumulating housing during the housing bust, so that they are likely purchasing some of these properties. Moreover, foreign real estate transactions also significantly increased during the housing bust both in absolute terms and relative to the total number of transactions (Figure D1). Hence, top wealth holders might have also sold some of their properties to foreigners. Taken together, these analyses provide additional supporting evidence that portfolio reshuffling was much more pronounced among top wealth holders.

Finally, to externally validate these results, I perform the same asset-specific

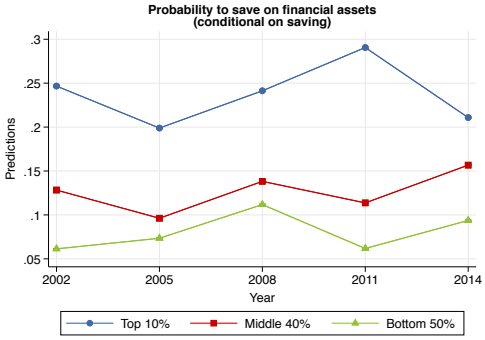

(a) Probability to save on real estate




(b) Probability to save on financial assets



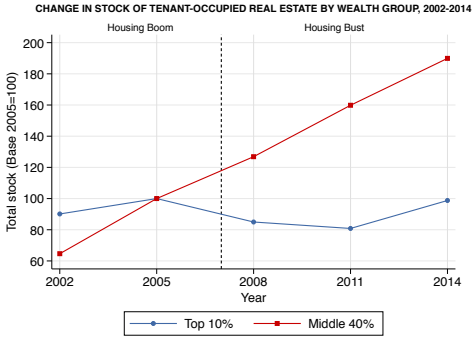

(c) Probability to save on real estate (conditional on saving)



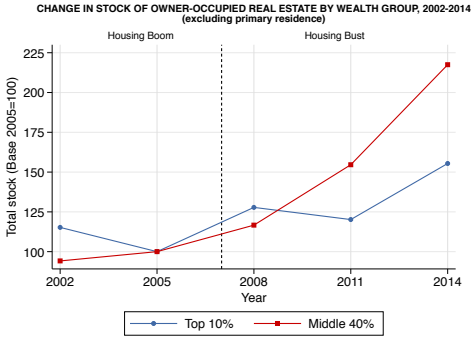

(d) Probability to save on financial assets (conditional on saving)

FIGURE 11: ATTITUDES TOWARDS SAVING, 2002-2014

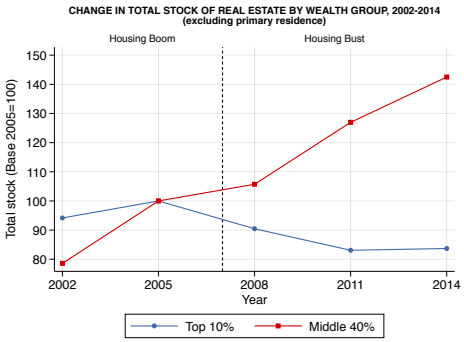
Notes: The figure depicts the probability to save on real estate (panel a) and on financial assets (panel b) over the period 2002-2014. Panels c and d show the same probabilities conditional on being a saver. These results are obtained after carrying logit regressions with the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014).



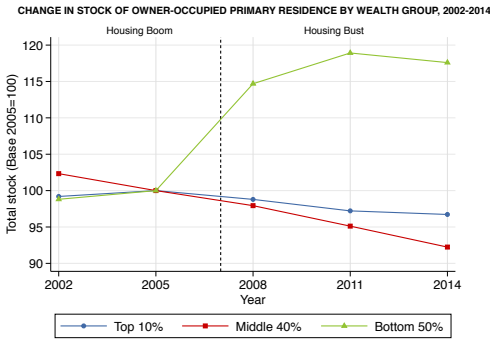

(a) Change in stock of tenant-occupied real estate




(b) Change in stock of owner-occupied real estate




(c) Change in total stock of real estate (excluding primary residence)




(d) Change in stock of owner-occupied primary residence

FIGURE 12: STOCK OF REAL ESTATE BY WEALTH GROUP IN SPAIN, 2002-2014

Notes: The figure depicts the evolution in the stock of real estate by wealth group over the period 2002-2014 in Spain. Changes in the stock of real estate are shown for tenant-occupied real estate (panel a), owner-occupied real estate (panel b), total real estate excluding primary residence (panel c) and owner-occupied primary residence (panel d). These series are indexed to base year 2005 and are calculated using the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). Changes between $t$ and $t+1$ are calculated using the longitudinal dimension of the survey by comparing two consecutive waves and fixing the wealth group to year $t$. The vertical dashed black line at 2007 denotes the turning point from the housing boom to the housing bust.

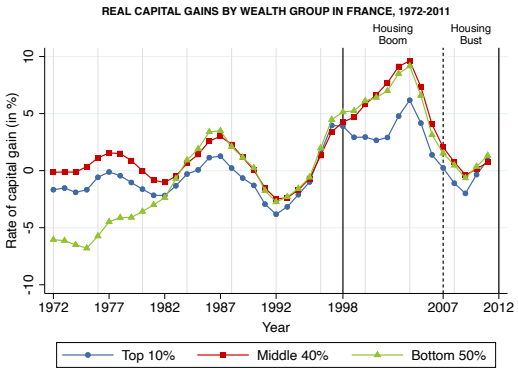
decomposition of wealth accumulation for France and the US using the wealth distribution series of Garbinti et al. (2021) and Saez and Zucman (2016), respectively. France and the US also experienced a housing boom and bust over the period 1998-2014 and 1999-2011, respectively (Figure 5a). Figures 13a and 14a depict the distribution of real capital gains, saving rates and asset-specific saving rates for France and the US, respectively. As in the case of Spain, capital gains are larger for the middle and bottom of the distribution during the boom and they almost fully converge across wealth groups during the bust. Moreover, saving rates are larger for the top than for the middle and the bottom. Figures 13c and 14c also show that saving rates on housing for the top increase during the expansion and decrease during the contraction. Furthermore, Figures 13d and 14d document that saving rates on financial assets increase in France and the US during the housing contraction, as documented for the Spanish case. Hence, this evidence suggests that the results are not specific to the Spanish context and that they seem to generally hold for house price-cycle episodes.

### III.C.2 Counterfactual simulations

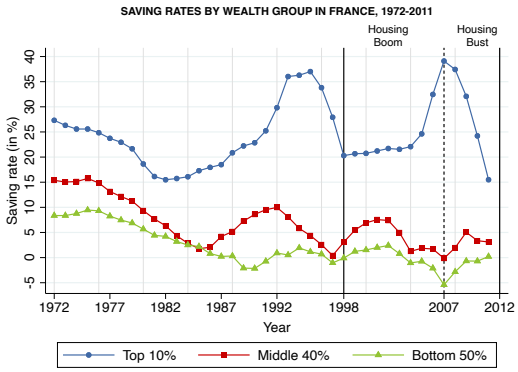
To assess the importance of each channel in explaining the dynamics of the wealth distribution, I perform several counterfactual simulations. In particular, I study the evolution of wealth inequality in a world without changes in portfolio composition, rates of return, savings rates and labor income shares. I shut down each channel one at a time, by fixing the portfolio composition, rates of return, asset prices, savings and labor income shares for each wealth group to that of 1998. The reason why I select 1998 is because this is the last year of stable wealth shares before the beginning of the most recent house price cycle.

Figure 15 compares the baseline top 10%, middle 40% and bottom 50% wealth shares to the counterfactual wealth shares over the period 1984-2015. Figure 15a shows that differences in capital gains are the main drivers of the decline in wealth concentration during housing booms, as all the other channels barely alter the top 10% wealth share during the housing boom. In particular, capital gains contribute to reducing top 10% wealth concentration by 5% on average during the recent housing boom.

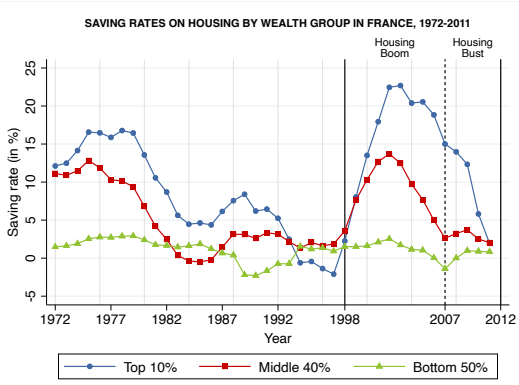
Instead, differences in saving rates across wealth groups and portfolio reshuffling



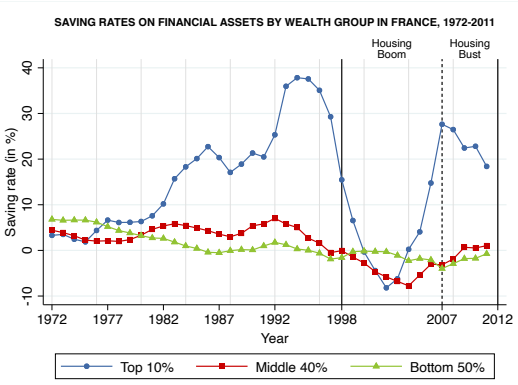

(a) Real capital gains by wealth group




(b) Saving rates by wealth group



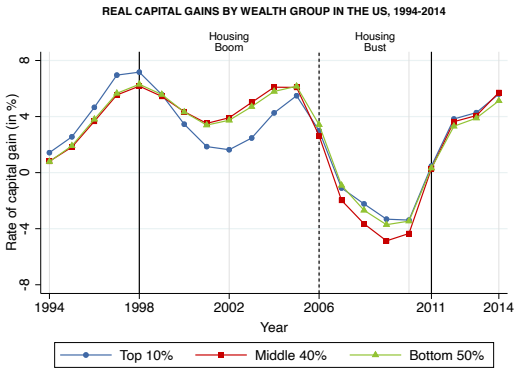

(c) Saving rates on housing by wealth group



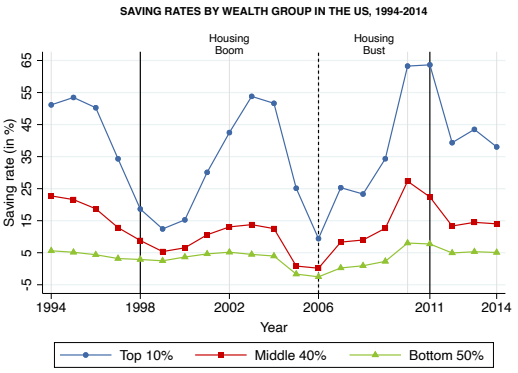

(d) Saving rates on fin. assets by wealth group

FIGURE 13: REAL CAPITAL GAINS AND SAVING RATES BY WEALTH GROUP IN FRANCE, 1972-2011

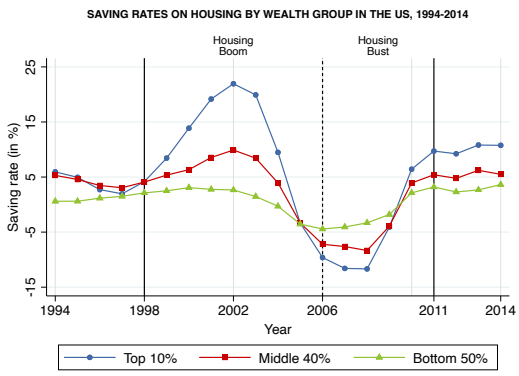
Notes: The figure depicts the distribution of real capital gains (panel a), synthetic saving rates (panel b), synthetic saving rates on housing (panel c) and synthetic saving rates on financial assets (panel d) among the top 10%, middle 40% and bottom 50% wealth groups using a five year moving average over the period 1972-2011 in France. These calculations have been derived using the wealth distribution series of Garbinti et al. (2021).



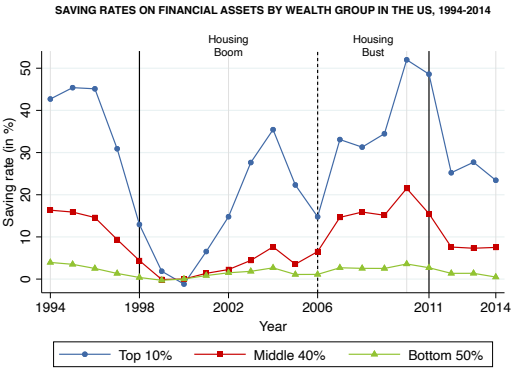

(a) Real capital gains by wealth group




(b) Saving rates by wealth group



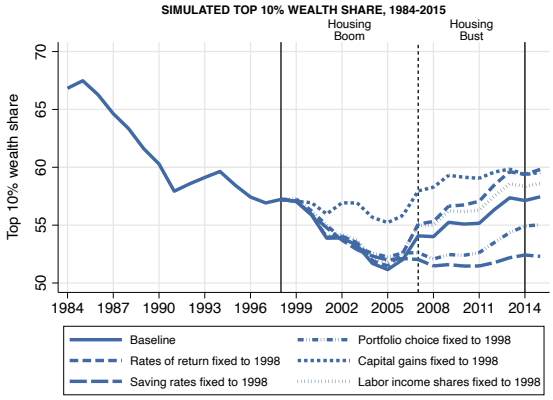

(c) Saving rates on housing by wealth group



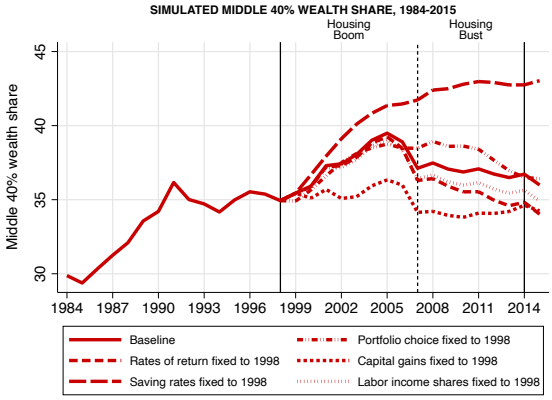

(d) Saving rates on fin. assets by wealth group

FIGURE 14: REAL CAPITAL GAINS AND SAVING RATES BY WEALTH GROUP IN THE US, 1994-2014

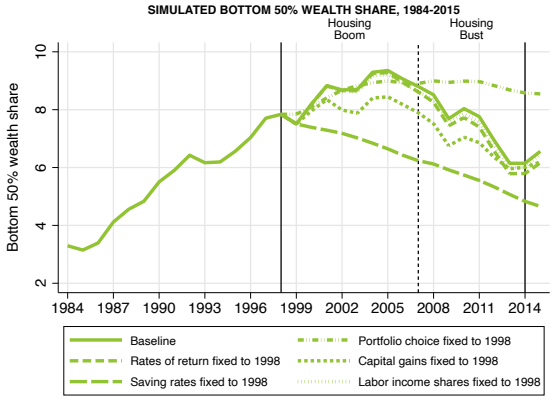
Notes: The figure depicts the distribution of real capital gains (panel a), synthetic saving rates (panel b), synthetic saving rates on housing (panel c) and synthetic saving rates on financial assets (panel d) among the top 10%, middle 40% and bottom 50% wealth groups using a five year moving average over the period 1994-2014 in the US. These calculations have been derived using the wealth distribution series of Saez and Zucman (2016).




(a) Simulated top 10% wealth share




(b) Simulated middle 40% wealth share




(c) Simulated bottom 50% wealth share

FIGURE 15: SIMULATED WEALTH SHARES IN SPAIN, 1984-2015

Notes: The figure compares the baseline wealth distribution series (top 10%, middle 40%, bottom 50%) to the counterfactual wealth shares in a world without changes in portfolio reshuffling, rates of return, asset prices, savings and labor incomes. Each channel is shut down one at a time, by fixing the portfolio composition, the distribution of rates of return, asset prices, savings and labor incomes to that of 1998.

towards financial assets among top wealth holders appear to be the main explanatory forces behind the reverting pattern in wealth concentration during housing busts. In particular, they contribute to push top 10% wealth concentration up during housing busts by 7 and 5% on average, respectively. The other two channels, rates of return and labor income inequality, pushed wealth concentration down during the housing bust. Hence, they cannot be the explanatory forces behind the rise in wealth concentration during housing busts. Figure 15c shows that portfolio reshuffling among top wealth holders is the only channel that contributed to reducing the bottom 50% wealth share (by 24% on average) during the recent housing bust. All the other channels appear to have push the wealth share for this wealth group up.

# IV Heterogeneity in Portfolio Reshuffling along the Wealth Distribution: Candidate Mechanisms

This section aims to discuss several potential explanations behind the observed differences in portfolio reshuffling along the wealth distribution, as documented in the previous section. There are different theories which can explain why the rich appear to be better at timing the market by reshuffling their portfolio away from housing towards financial assets at the beginning of housing busts. I focus on five main candidate explanations: portfolio adjustment frictions, real estate market dynamics, risk aversion, financial literacy and/or financial advisory, and expectations on house prices. It is beyond the scope of this paper to conclusively rule in or rule out any particular theory. However, I can shed light on the likely relevance of theories by computing additional moments with the Spanish data. In this section, I will mainly focus on the recent house price cycle since most empirical evidence is only available from the 2000s. I find that these moments are consistent with theories based on heterogeneity in portfolio adjustment frictions and less supportive of models based on pure differences across wealth groups in real estate market dynamics, risk aversion, financial knowledge and/or advising, or house price expectations.

## IV.A Portfolio Adjustment Frictions

One plausible explanation for why top wealth holders reshuffle their portfolio more during house price cycles is because they might be subject to fewer portfolio adjustment frictions than middle and bottom groups. These frictions are broadly defined and I will discuss them throughout the section. First, housing is indivisible and subject to transaction costs, such as capital gains or personal income taxes (e.g., Flavin and Nakagawa, 2008; Grossman and Laroque, 1990; Guren et al., 2021; Kaplan et al., 2018; Kaplan and Violante, 2014). Middle and bottom groups are on average more indebted than top wealth holders (Figure 8b) and have a lower saving rate (Figure 6d). Hence, they have more difficulties to incur the transaction costs which involve selling a house.

Furthermore, most individuals in these two groups own owner-occupied housing that they use as primary residence (Figures 9b and 9c). Thus, housing is mainly a consumption good for them. Apart from the previous transaction costs, there are other costs (e.g., moving costs) they need to incur when it comes to selling

their primary residence, which might prevent these individuals from selling their houses (Venti and Wise, 1984). In fact, Figure 12d shows that the stock of primary residences did not fall for bottom wealth holders during the housing bust.

Finally, bottom wealth holders have large mortgages relative to their income (Figure 8b). Housing prices significantly drop during housing busts, so that they would have less incentives to sell their houses if the selling value did not more than compensate for the remaining mortgage value.

For top wealth holders, adjustment frictions seem to be much less pronounced. They are less indebted and have higher savings, so that they can incur more easily housing transaction costs. Moreover, most individuals within the top 10% wealth group own more than a primary residence and a large fraction of housing is for investment purposes (i.e., tenant-occupied housing), which is less costly to sell (Figure 9a). In consistence with these arguments, Figure 12 shows that only top wealth holders sold housing during the bust, in particular, housing for investment.

For all these reasons, differences in portfolio adjustment frictions along the wealth distribution appear to be consistent with larger portfolio reshuffling among top wealth holders during house price cycles. These findings call for heterogeneous agents macroeconomic models in which individuals can have multiple houses attached to different mortgage levels—some in which they live in and others that are acquired purely for investment purposes—and in which transaction costs are larger for those properties meant for consumption.

## IV.B Real Estate Market Dynamics

A competing explanation to the existence of portfolio adjustment frictions among middle and bottom wealth holders relates to the dynamics of the real estate market. Both housing demand and housing prices could evolve differently across time and space affecting wealth groups in an heterogeneous manner. Top wealth holders might own properties with different characteristics than properties owned by middle and bottom wealth holders. If the dynamics of the real estate market are such that during housing busts there is only demand for the type of properties owned by top wealth holders, this could explain why they managed to dissave more in real estate.

Properties owned by bottom and middle wealth holders do have different characteristics than properties owned by the top. According to the SHF, top wealth holders

own primary residences that are on average more expensive and larger in size. In addition, their other real estate properties are also on average more expensive. However, there is no evidence of higher demand for more expensive properties. Table 2 reports the characteristics of the stock of properties available for sale in districts with the highest average price of each Spanish municipality versus the rest of districts in 2009. The data used contains information on the universe of listings at the district level from the largest commercial real estate website in Spain, *El Idealista*. The stock of properties available for sale is on average larger in districts with the highest average price of each municipality than in the rest of districts. However, the demand index is not significantly different across the two types of districts. Hence, this evidence is consistent with top wealth holders willing to dissave relatively more than middle and bottom wealth holders during the housing bust.

Another reason why top wealth holders might have decided to sell relatively more their properties than middle and bottom wealth holders could be that their market prices did not decline or declined less. Nonetheless, as it was already shown in Section III, average house prices have followed a similar evolution across wealth groups during the recent housing boom and bust (Figure E5a). It is only after 2015—when average house prices started to rise for the first time since the end of the housing boom—that ratios have started to considerably diverge. The homogeneity in the evolution of house prices in Spain can also be seen when comparing the evolution of average house prices between coastal and non-coastal municipalities (Figure E5b) and between municipalities with different population size (Figure E5c). Average house prices declined during the housing crisis across all types of municipalities. Overall, these results suggest that real estate dynamics do not appear to be behind the differential saving behavior across wealth groups.

## IV.C Risk aversion

Heterogeneity in portfolio reshuffling can also happen due to differences in attitudes towards risk along the wealth distribution. It is widely accepted that Pratt (1964) and Arrow (1974)'s measure of absolute risk aversion should be declining with wealth. For instance, Guiso and Paiella (2008) show empirically that risk aversion is decreasing with wealth for the case of Italy. The theoretical literature has also developed models in which agents are heterogeneously exposed to aggregate

| | Districts with highest price | | Rest of districts | | | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Diff. | P-value |
| Sale price per m2 | 2675.01 | 1094.68 | 1956.00 | 795.22 | -719.01 | 0.00 |
| Surface per m2 | 107.63 | 59.47 | 127.00 | 82.05 | 19.37 | 0.00 |
| Demand index | 0.01 | 0.02 | 0.01 | 0.01 | 0.00 | 0.11 |
| Available stock | 5.22 | 5.64 | 3.92 | 2.65 | -1.30 | 0.00 |
| Rental price per m2 | 8.43 | 5.81 | 7.01 | 3.98 | -1.42 | 0.01 |
| N | 363 | | 1,192 | | | |

TABLE 2: REAL ESTATE DEMAND: RICH DISTRICTS VS. REST, 2009

Notes: This table reports summary statistics on real estate properties available for sale and for rent in Spanish districts with the highest average price per square meter versus the rest in 2009. These calculations are obtained based on the universe of listings from the largest commercial real estate website in Spain, *El Idealista*. The demand index is directly elaborated by *El Idealista* and it is based on the number of e-mails received by listing normalized by a factor to make it comparable across space and time.

risk (e.g., Cioffi, 2021; Gomez, 2019).[30] The evidence for Spain goes in the same direction. Table 3 shows using the Survey of Household Finances that the fraction of households reporting not to be willing to take any financial risk is significantly lower for the top 10% wealth group relative to the middle 40% wealth group and even lower relative to the bottom 50% wealth group. Hence, top wealth holders might have reshuffled their portfolio towards financial assets, because they are less risk averse than middle and bottom wealth holders. However, risk aversion can only explain why bottom and middle wealth holders do not invest as much as top wealth holders in risky financial assets (e.g., stocks) during housing busts, but not why only top wealth holders accumulate more safe assets (e.g., deposits) and why they only sell housing for investment purposes.

## IV.D Financial Knowledge and Financial Advising

Heterogeneity in financial knowledge and advising across wealth groups can also be behind the observed differences in saving behavior across wealth groups during housing busts. There is evidence of a positive empirical link between financial

[30] Bach et al., 2020 and Fagereng et al., 2020 have recently shown empirically that differences in risk exposure are important determinants of persistent return heterogeneity. Bach et al. (2020) also document that risk compensation is not enough to fully account for it. Returns differ systematically by education and they differ systematically even when monetary returns carry no risk.

| | | Fraction of risk averse | | | Difference | | |
|---|---|---|---|---|---|---|---|
| **Year** | **N** | **T10% (1)** | **M40% (2)** | **B50% (3)** | **(1)-(2)** | **(1)-(3)** | **(2)-(3)** |
| 2002 | 5,141 | 0.61 | 0.80 | 0.84 | -0.19*** | -0.24*** | -0.05*** |
| 2005 | 5,950 | 0.64 | 0.83 | 0.87 | -0.20*** | -0.23*** | -0.04*** |
| 2008 | 6,194 | 0.58 | 0.84 | 0.90 | -0.26*** | -0.32*** | -0.06*** |
| 2011 | 6,103 | 0.70 | 0.87 | 0.92 | -0.18*** | -0.23*** | -0.05*** |
| 2014 | 6,116 | 0.62 | 0.86 | 0.92 | -0.24*** | -0.30*** | -0.06*** |

TABLE 3: ATTITUDES TOWARDS RISK BY WEALTH GROUP IN SPAIN, 2002-2014

Notes: This table reports the fraction of households by wealth group who report that are not willing to take any financial risk. These calculations have been carried with the the five waves of the Spanish Survey of Household Finances constructed (SHF) by Bank of Spain.

knowledge and wealth holdings (Behrman et al., 2012), in particular, stock holdings (Van Rooij et al., 2011). Lusardi et al. (2017) develop a stochastic life cycle model with endogenous financial knowledge accumulation and show that financial knowledge accumulation is a key determinant of wealth inequality.[31]

In Spain, financial knowledge is also positively correlated with economic outcomes, such as income. Using the 2016 Spanish Survey of Financial competences (SFC), I find that a larger fraction of top income holders respond correctly to each of the financial literacy questions than middle and bottom income holders (Table 4).[32]

One could argue that financial knowledge would not be needed if individuals could rely on financial advisers. However, there is evidence showing that advice more often serves as a complement to, rather than a substitute for, financial capability: individuals with higher incomes, educational attainment, and levels of financial literacy are most likely to receive financial advice in the US context (Collins, 2012). Using Dutch data, Von Gaudecker (2015) also looks at the relationship between investment diversification (return loss), financial knowledge, and financial advice, and he finds that the least financially informed were unlikely to do well on diversifica-

[31] For a survey on the theoretical and empirical literature about financial literacy, see Lusardi and Mitchell (2014).

[32] Ideally, one should looked at the relationship between financial knowledge and wealth (not income), but the SFC does not ask about the amount of households' wealth holdings. Nonetheless, income and wealth are highly correlated, so that one can already learn about the gradient for wealth by looking at income.

tion. In Spain, the probability of getting financial advice is also higher among top income holders (Table 4). Differences across groups are not very large, but this is most likely because individuals are ranked by income and not wealth. This evidence suggests that top wealth holders might have reshuffled their portfolio more during the housing bust because they were more financially informed. However, once again differences in financial information seem to only explain why bottom and middle wealth holders did not invest as much as top wealth holders in financial assets (e.g., stocks), but not why top wealth holders only sold housing for investment purposes.

| | **Income group** | | | **Difference** | | |
|---|---|---|---|---|---|---|
| | **T10% (1)** | **M40% (2)** | **B50% (3)** | **(1)-(2)** | **(1)-(3)** | **(2)-(3)** |
| **Knowledge** | | | | | | |
| Diversification | 0.70 | 0.51 | 0.41 | 0.19*** | 0.30*** | 0.11*** |
| Interest rates | 0.59 | 0.48 | 0.40 | 0.11*** | 0.20*** | 0.08*** |
| Inflation | 0.76 | 0.62 | 0.47 | 0.14*** | 0.29*** | 0.15*** |
| **Advisor** | 0.03 | 0.02 | 0.01 | 0.01*** | 0.02*** | 0.01*** |

TABLE 4: FINANCIAL KNOWLEDGE AND ADVICE BY INCOME GROUP IN SPAIN, 2016

Notes: This table reports the fraction of households who answer correctly to financial literacy questions on diversification, interest rates and inflation by income group, as well as the fraction who gets independent financial advising. These calculations have been carried using the 2016 Survey of Financial Competences (SFC) elaborated by Bank of Spain.

## IV.E Expectations on House Prices

Differences in expectations on future house prices across wealth groups can be another candidate explanation for why top wealth holders dissave relatively more in real estate during housing busts. Top wealth holders might have dissaved more if they had more pessimistic expectations about the future evolution of house prices. Several studies find evidence on heterogeneous beliefs about asset prices (e.g., Adam and Nagel, 2022; Vissing-Jorgensen, 2003). The theoretical literature has also started to incorporate heterogeneous beliefs into models of the wealth distribution (e.g., Broer et al., 2021).

Bover (2015) analyzes the information on subjective probabilistic expectations on house prices collected in the 2011 Spanish Survey of Household Finances. Households

are asked to distribute ten points among five different scenarios for the change in the price of their homes over the next twelve months. She finds no significant association of such beliefs with household characteristics, except for a not very precise positive effect of household income. In particular, she finds no association with wealth. Hence, negative house price expectations were therefore widespread across groups of the population at the end of 2011 and they do not seem to explain why top wealth holders did reshuffle their portfolio towards financial assets relatively more than middle and bottom wealth holders.

# V Conclusion

While the bulk of the empirical inequality literature has focused on documenting and understanding the forces behind long-run trends in wealth inequality, the drivers behind short to medium-term fluctuations in wealth inequality around asset price booms and busts have received much less scrutiny so far.

This paper aims to fill this gap by studying the determinants of wealth inequality dynamics during housing booms and busts. I examine the Spanish context, an ideal setting since the country has experienced two house price cycle episodes in the last forty years and it has multiple micro and macro data sources (i.e., tax records, income and wealth surveys, national accounts) to reconstruct the wealth distribution. I then develop a new asset-specific decomposition of wealth accumulation to identify the key forces (i.e., heterogeneity in labor incomes, rates of return, saving rates, portfolio choices) driving wealth inequality dynamics. My findings show that top 10% wealth concentration decreases during housing booms, but the decreasing pattern reverts during busts. Using counterfactual simulations, I show that differences in capital gains along the wealth distribution seem to be the main driver of the drop in wealth concentration during housing busts. Differences in saving rates across wealth groups and portfolio reshuffling towards financial assets among top wealth holders appear to be instead the main forces behind the reverting evolution in wealth concentration during housing busts. These results seem to generally hold for housing booms and busts episodes, as I find the same dynamics for the US and France during the house price cycle of the early 2000s.

The theoretical and empirical literature studying the determinants of wealth inequality has recently highlighted the relevance of asset prices, interest rates and

bequests in shaping the wealth distribution. My results confirm the importance of asset prices, especially during booms. However, they also reveal that heterogeneity in portfolio portfolio reshuffling is an important driver of wealth inequality dynamics. In fact, portfolio reshuffling among top wealth holders appears to be the only channel contributing to the reduction of the bottom 50% wealth share during the recent housing bust.

The time series compiled in this paper and especially, the decompositions of wealth accumulation between valuation effects and saving effects by asset class, might be useful for policymakers both at national and international levels to design targeted stabilization policies aimed at mitigating the effects of housing or other economic crises, particularly among bottom wealth holders (i.e., high rates of indebtedness, low saving rates, drops in consumption). The increase in wealth concentration seems to persist beyond housing busts. To the extent that policymakers aim to minimize the distributional consequences of house-price cycles, better monitoring to prevent or at least identify housing booms and busts could be effective to take policy actions before housing crises occur.

For a long time, research on macroeconomics and research on inequality have grown apart. This study is a step forward in understanding the interactions between asset prices, wealth inequality and portfolio choice. I provide initial evidence about the existence of lower portfolio adjustment frictions among top wealth holders, mainly coming through the ownership of housing for investment, which is more liquid than housing for consumption. In other words, top wealth holders have it easier to trade housing for financial assets along the business cycle because they have housing for investment which is subject to less transaction costs. Further research is needed to assess the welfare effects behind these differences in market-timing. I hope these findings will open up new avenues for future empirical and theoretical research on the determinants of inequality over the business cycle.

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# Online Appendix (For Publication Only)

## A Imputation methods

### A.1 Bottom of the income distribution

One limitation of using personal income tax returns to construct income shares is that in many countries—including Spain—not all individuals are obliged to file. There exist some labor income and capital income thresholds under which individuals are exempted from filing. For instance, in Spain over the period 1999-2015, approximately one third of the adult population was exempted from filing, according to the microfiles. These new individuals, although being the poorest since they do not have to file the personal income tax, earn some labor and also some capital income. Hence, one needs to account for this missing income, otherwise one would be overestimating the amount of wealth held by the middle and top of the distribution.

To carry the imputation of the bottom of the income distribution I rely on the Survey of Household Finances for the period 1999-2015 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 five waves: 2002, 2005, 2008, 2011 and 2014. 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 this analysis. The income in the survey is recorded as of the previous year. Thus, the years for which information on income are available are 2001, 2004, 2007, 2010 and 2013. 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/her. 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 imputation procedure I use is as follows. First, using the SHF I classify

individuals into seven age groups: 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 P10-P70 percentiles with respect to the P70-P80 percentiles. Note that I select these percentile groups because they are the ones that better match the distribution of income in the two sources (i.e., tax and survey data). I also compute the fraction of individuals that own each income category by age group. 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 P10-70 fractions of each income component to the same percentiles in the personal income tax data taking into account the SHF fraction of individuals that own each income category.

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). As with the SHF, 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 substantially differ 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 P10-70 to P70-80 fractions of each income component to the P10-P70 percentiles in the personal income tax data.

## A.2 Assets that do not generate taxable income

Since not all assets generate taxable income, one has to account for these missing components to have a complete definition of wealth. In Spain, there are four assets whose generated income is not subject to the personal income tax: primary residence (since 1999), life insurance, investment and pension funds. Although these assets account for a large part of total household wealth, namely around 40-50% of total net household wealth according to the SHF, I can account for them using the SHF.

This survey is elaborated every three years since 2002 by the Bank of Spain. It

provides a representative picture of the structure of 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, making it possible 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.

The imputations are conducted using the five waves of survey (2002, 2005, 2008, 2011 and 2014) and they are based on the methodology developed by Garbinti et al. (2021) 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. 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/her. 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: P0-P30, P30-P59, P60-P69, P70-P79, P80-P89, P90-P94, and equal or above P95. For the imputations to be consistent, I only consider as capital income the one that is subject to the personal income tax (i.e., interest, dividends, rental and business income). Finally, six groups of percentiles are formed according to the labor income individuals have: P0-P50, P50-P90 and equal or above P90. Note that I select these

groups because they are the ones that better match the distribution of assets in the survey.

Once individuals are sorted by gender, age, capital and labor income, I combine them and end up with 336 different groups. One can then calculate which is the share of primary residence, 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 gender, age, capital and labor income. Once the individuals in the tax data are classified into the same 336 groups, the group shares and the within-group ownership shares that are obtained with the survey can be used to calculate the amount of primary residence[33], 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 prior to 1999, primary 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 but no data is available. Nonetheless, life insurance, investment and pension funds were much less important in the asset portfolio of households during the 1980s and beginning of the 1990s and consequently, this assumption should not

[33]Individuals are not indebted in an homogeneous way along the distribution. Hence, I calculate the ratio of primary residence indebtedness for each of the 336 groups using the survey and I apply it to each group when doing the imputation.

affect our results in a significant manner.

# B Adjustment of the income distribution series for personal income tax reforms

The first step when deriving wealth inequality series using the capitalization method consists of constructing the distribution of capital income. In this paper, capital income distribution series are calculated using personal income tax samples. When using tax data for inequality analysis, it is quite 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. This is of high relevance in this work, since if already income data is not coherently distributed, neither the wealth distribution estimates will be. In this section, 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.

The adjustments are mainly carried for the years of the four major reforms (1991, 1998, 2002 and 2006). From 1992, the obligation to file jointly for married couples was removed. I rescale the different income components prior to 1992 to match the labor income series from 1992 onwards. For that, I use as anchor the distribution of labor income in 1992. From 1999, primary residence has been exempted from the personal income tax and substantial reforms were introduced on the exemption thresholds and marginal rates. I rescale the housing rent series prior to 1999 to match the housing rent series from 1999 onwards. For that, I use as anchor the distribution of housing rents in 1999, which relies on the direct effective rents and imputed rents from secondary housing from tax records and the imputed rents from primary residence from the SHF.[34] I also rescale the other income components prior to 1998 using as anchor the distribution of these components in 1999. From 2002, substantial reforms were introduced on the exemption thresholds and marginal rates. Moreover, I use the tax panel for years 1999-2001 and the tax samples for 2002-2015. I rescale the income components prior to 2001 using as anchor the distribution of

[34]Note that the SHF does not include direct information on imputed rents. The imputed rents from primary residence have been calculated by applying the rate of return on housing from national accounts to the stock of primary of residence that has been imputed to each individual (see appendix A.2).

these components in 2002. Between 2007 and 2014, dividends were exempted up to 1,500 euros. I adjust the series of dividends by adding 1,500 euros to each filer that reports positive dividends between 2007 and 2014.

Finally, taxable imputed rents are a fraction of the cadastral or tax-assessed value of the property. I rescale the series of taxable imputed rents every year by applying the annual ratio of total housing wealth at market-value over the tax-assessed value.

# C Accounting for Offshore Wealth to Measure the Wealth Distribution

Tax records, such as the ones used in this paper, are the best available data source to study the top-end of the distribution. Contrary to surveys, they do not suffer from sampling errors and rely on solid information sources such as employee payroll data and bank records. However, this data source is not perfectly accurate due mainly to tax evasion. Our estimated series would not be biased if evasion does not vary over time nor along the distribution. Nonetheless, evasion might vary over time due to changes in tax enforcement strategies, and along the distribution because different groups might have different income sources and/or assets, which are more easy to evade.

Alstadsæter et al. (2019) 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. Torregrosa (2015) also finds that evasion in the personal income tax is increasing as we move towards the top of the income distribution in Spain. Hence, by not incorporating offshore wealth in our wealth distribution series, both total assets and wealth concentration would be substantially underestimated.[35]

In Spain, as in most countries, official financial data fail to capture a large part of the wealth held by households abroad, such as portfolios of equities, bonds, and

[35]Self-employees might also evade taxes and indeed Torregrosa (2015) finds widespread tax evasion among them in the Spanish context. However, Alstadsæter et al. (2019) report that self-employment income accounts for less than 10% of factor-cost GDP in Spain and they argue that the self-employed are scattered throughout the wealth distribution. Hence, non-compliance by these individuals does not appear to be enough to generate sizable evasion rates in any specific segment of the wealth distribution which could bias the wealth distribution estimates. For these reasons and the lack of accurate estimates of self-employment income evasion rates along the income or the wealth distribution, I will only correct my series for unreported offshore assets.

mutual fund shares held by Spanish persons through offshore financial institutions in tax havens.[36] 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.

To adjust the wealth distribution series for offshore assets, I use the historical series of offshore wealth of Artola et al. (2021). They rely on two main data sources: Zucman (2013) and Zucman (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 (e.g., 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. (2021) 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 wealth distribution series for unreported offshore assets. Artola et al. (2021) 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. 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

[36] The Bank of Spain clearly explains in its *Nota Metodológica de las Cuentas Financieras de la Economía Española (2011)* what it is included and what it is not in the Spanish Financial Accounts.

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.[37]

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.[38]

The importance of offshore assets relative to total household financial assets increased rapidly during the 1990s and beginning of the 2000s and declined significantly after 2003, a period in which Spanish tax authorities have become stricter with tax evasion by carrying more audits, introducing the 720 tax-form and implementing a tax amnesty in 2012 (Figure C1, panel a). Unreported offshore wealth amounted to 158,915 million euros in 2012, which represents 9% of household financial wealth.[39] 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 C1, panel b).

I correct the wealth distribution series by assigning proportionally to the top 1% wealth group the annual estimate of unreported offshore wealth. In doing this, I follow Alstadsæter et al. (2019) who find that the top 1% wealth group in Scandinavian countries accumulates almost all the disclosed assets of tax amnesties. According to the authors, there is nothing unique to Scandinavia that could explain the high evasion rates we find at the top. Moreover, this is consistent with an official document of the Spanish Tax Agency (*Efecto del 720 y el 750 en el Impuesto sobre el Patrimonio, Nota de presa, 2016*) stating that the majority of reported foreign assets by Spanish residents are held by top wealth holders.

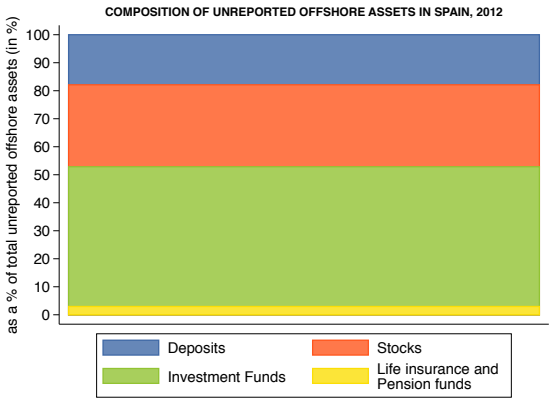
Including offshore assets increases the top 1% wealth share on average from

[37] Note that the series of unreported offshore assets excludes real assets since most of them are declared to be in non-tax havens.

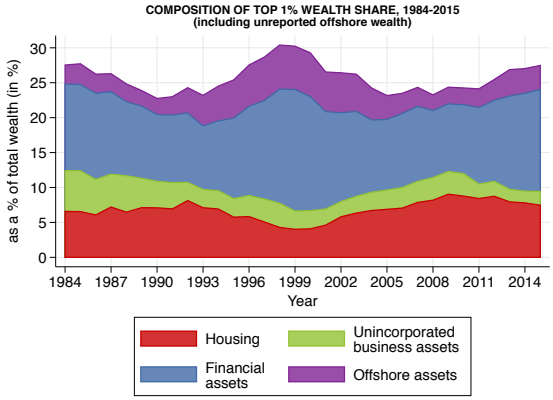
[38] For a more detailed explanation of how the series of unreported and reported offshore assets are constructed, read the appendix of Artola et al. (2021).

[39] 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. (2021) use administrative data on reported wealth held by Spanish residents abroad.


(a) Total Unreported Offshore Wealth in Spain, 1984-2015




(b) Composition of Unreported Offshore Wealth in Spain, 2012




(c) Composition of top 1% wealth share, 1984-2015

FIGURE C1: OFFSHORE WEALTH IN SPAIN, 1984-2015

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 as a share of total household financial assets. The panel (b) figure displays the composition of unreported offshore assets in Spain using the information provided in the 2012 720 tax-form. The panel (c) figure depicts the composition of the top 1% wealth share in Spain including unreported offshore assets both in the numerator and in the denominator.

22.7% to 25.7% over the period 1984-2015 (Figure C1, panel c). This difference 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 at the beginning of the section. In line with other advanced countries (Alstadsæter et al., 2019), this finding suggests that the historical decline in Spanish wealth inequality over the twentieth century (Alvaredo and Artola, 2017), may be much less spectacular in actual facts than suggested by tax data.

# D Identifying Housing Booms and Busts

The identification of housing booms and busts requires two steps. The first step identifies house price cycles and the second step involves the choice of a cut-off value for a house price increase (decrease) which is considered large enough to denote a boom (bust).

House price cycles can be identified in the level of the reference variable or as fluctuations in economic activity around a long-run trend. For this study, the first approach is more suitable. Detrending might not be robust to the inclusion of newly available data (the inclusion of new data can affect the estimated trend and hence the identification of a cycle) and it involves an arbitrary distinction between trend and cycle (there is no consensus about the parametric assumptions that need to be made). Since the aim of this paper is to uncover novel empirical regularities between house boom-bust cycles and wealth inequality and make comparisons across countries, I avoid restrictive parametric assumptions and look at cycles in the level of real house prices.

When identifying house price cycles, one can detect turning points and then choose a cut-off value for a house price increase (decrease) which is considered large enough to denote a boom (bust). Instead, one can also directly choose an increase (decrease) in the growth rate of housing prices large enough to determine what is a housing boom (bust).

First, using the quarterly Spanish real housing price series of Mack and Martínez-García (2011) over the period 1984-2015, I use Harding and Pagan (2002)'s BBQ algorithm to detect turning points. The algorithm is denominated BBQ because it is a quarterly (Q) application of the Bry and Boschan (1971) algorithm designed to find business cycles in monthly data. The algorithm's procedure consists in finding a series of local maxima and minima that allow the segmentation of the time series into expansions and contractions. These types of methods were first proposed by Burns and Mitchell (1946) and later formalized by Bry and Boschan (1971). For the purpose of identifying house price cycles, this method has been used among others by Huber (2018), Bordo and Landon-Lane (2014), Bracke (2013), Igan and Loungani (2012), Kose et al. (2011), Girouard et al. (2006) and Borio and McGuire (2004). Bracke (2013) illustrates the implementation of the algorithm on a quarterly series following three steps:

1. Identification rule: Identification of points which are higher or lower than a window of surrounding observations. Using a window of $j$ quarters on each side, a local maximum $q_t^{max}$ is defined as an observation of the house price series such that $(q_{t-j}, ..., q_{t-1}) < q_t^{max} > (q_{t+1}, ..., q_{t+j})$. Symmetrically, a local minimum $q_t^{min}$ satisfies $(q_{t-j}, ..., q_{t-1}) > q_t^{min} < (q_{t+1}, ..., q_{t+j})$.

2. Alternation rule: A local maximum must be followed by a local minimum, and vice versa. In the case of two consecutive maxima (minima), the highest (lowest) $q_t$ is chosen.

3. Censoring rule: The distance between two turning points has to be at least $n$ quarters, where $n$ is chosen by the analyst in order to retrieve only the significant series movements and avoid some of the series noise.

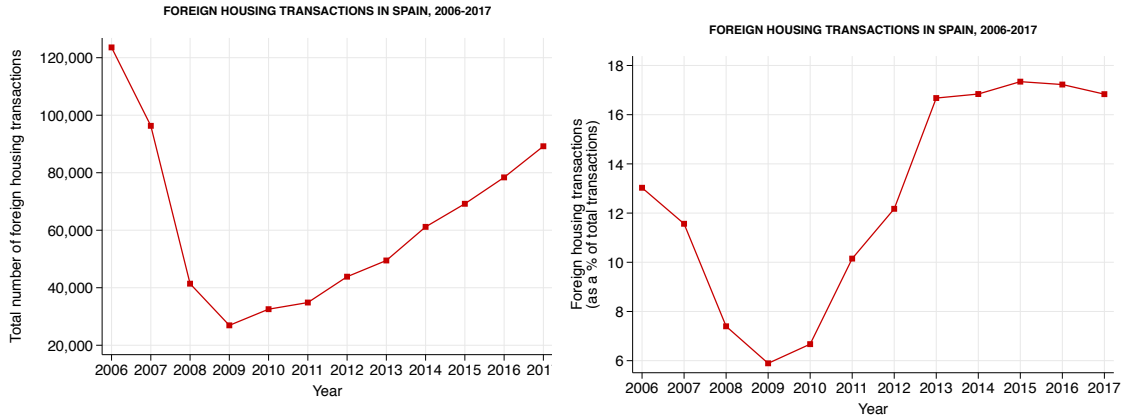
I follow Borio and McGuire (2004), Bracke (2013) and Huber (2018) and choose a rolling window of 13 quarters ($j = 6$) for the identification rule of house price cycles. For the censoring rule, I follow Girouard et al. (2006), Bracke (2013) and Huber (2018) and choose six quarters as minimum distance between two turning points ($n = 6$). I find that Spain had two local maxima during this period of time, the first one in the fourth quarter of 1991 and the second one in the first quarter of 2007. The two local minima were reached on the third quarter of 1996 and the second quarter of 2014.[40]

Once having identified the house price cycles, the second step involves the choice of a threshold which is considered large enough to denote housing booms and busts. The choice of cut-off is rather arbitrary and varies across studies. Girouard et al. (2006) consider housing booms and busts episodes when real house price changes exceed 15%. Kose et al. (2011), Helbling (2005) and Helbling and Terrones (2003) use the quartile as cut-off value. Bordo and Landon-Lane (2014) identify booms when the house price increase is at least 10% within two years. Huber (2018) uses different cut-off values (10%, 15%, 20% and 80% cumulative housing price increase or decrease). No matter which cut-off is chosen, the two Spanish house price cycles (1985-1996 and 1998-2014) are considered housing booms and busts.

Second, I also identify housing booms and busts following the methodology of Bordo and Jeanne (2002) and International Monetary Fund (2009) in which turn-

[40]Note that to determine this last local minimum I only rely on four quarters since the series is available until the second quarter of 2015.

ing points are not determined. In particular, International Monetary Fund (2009) defines housing booms (housing busts) as periods when the four-quarter moving average of the annual growth rate of real housing prices falls above (below) 5%. This methodology is more restrictive in choosing the time frame of a housing boom and bust. Hence, I will follow a similar approach and identify housing boom and busts as periods when the four-quarter moving average of the annual growth rate of real housing prices falls above (below) 2.5%. Under this methodology, the two Spanish house price cycles last from 1985-1995 and from 1998-2014.[41] This is the methodology I use to identify the benchmark time frame for the two Spanish housing booms and busts. These results are robust to the choice of all the above proposed cut-offs of housing price increases or decreases.



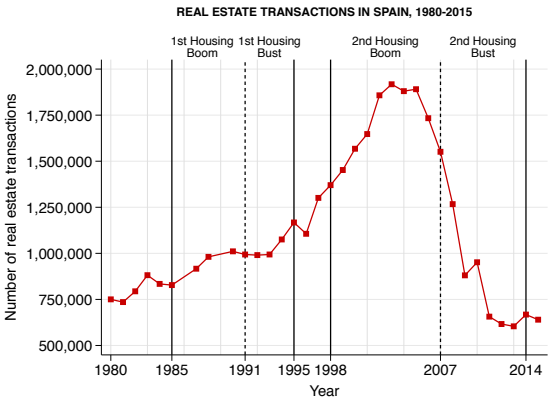

(a) Total number of foreign housing transactions

(b) Foreign to total housing transactions

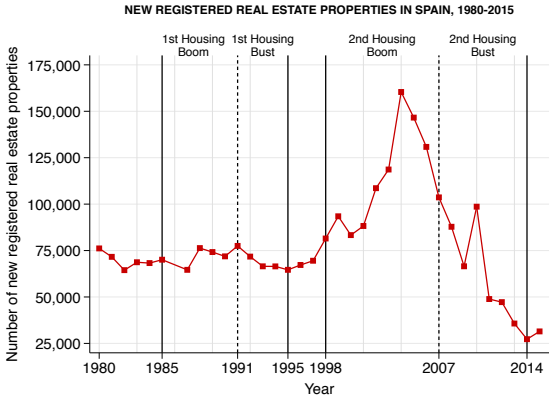
FIGURE D1: FOREIGN HOUSING TRANSACTIONS IN SPAIN, 2006-2017

Notes: This figure depicts the evolution of foreign housing transactions in Spain over the period 2006-2017. Panel a shows the evolution of the total number of foreign transactions and panel b the same evolution but as a share of total transactions. Foreigners include both residents and non-residents at the time of the purchase. This series is provided by the Ministry of Public Works.

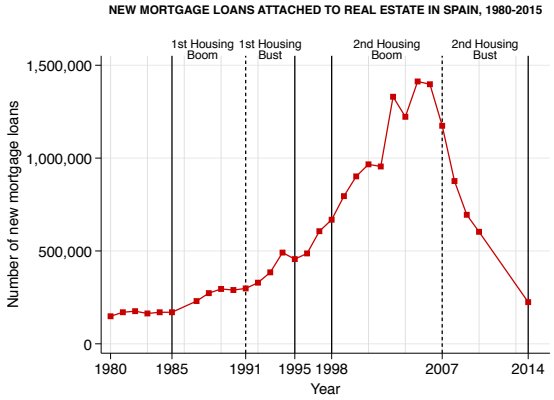
[41] I also use the more restrictive alternative growth rate of 5% and results are very similar: 1986-1993 and 2001-2014.




(a) Number of Real Estate Transactions




(b) Number of New Registered Real Estate Properties




(c) Number of New Mortgage Loans attached to Real Estate

FIGURE D2: REAL ESTATE TRANSACTIONS AND MORTGAGE LOANS IN SPAIN, 1980-2015

Notes: This figure depicts the total number of real estate transactions (panel a), the total number of new registered real estate properties (panel b) and the total number of new mortgage loans attached to real estate (panel c) over the period 1980-2015 in Spain. All three figures are constructed after digitizing the Registrars' Yearbook since 1980 (*Anuario de la Dirección General de los Registros y del Notariado*). The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.

# E Robustness Checks

## E.1 Comparison with Other Sources

### E.1.1 The Survey of Household Finances

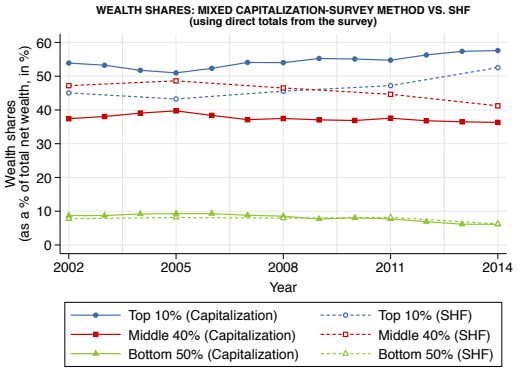
The Survey of Household Finances provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top, as it was already pointed out in section II. It exists for five waves

(2002, 2005, 2008, 2011 and 2014) and it is elaborated by the Bank of Spain.

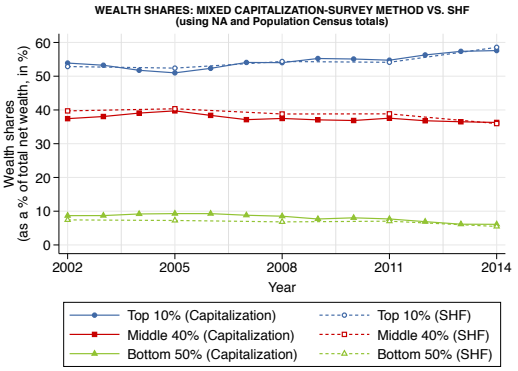
Anghel et al. (2018) use the five waves of the survey to reconstruct the wealth distribution. They present results for the top 10%, 5% and 1% wealth groups. Their estimates are similar in trend to the series of Alvaredo and Saez (2009) using wealth tax returns and the series using the capitalization method, but different in levels. For instance, whereas they find a top 1% wealth share of 13.5% in 2005, the estimates using wealth tax returns and the mixed capitalization-survey method are 18.9% and 20.6%, respectively. There are notable differences in terms of definitions and methodology between our estimates and the study of Anghel et al. (2018). First, in this paper individual units are used while the SHF uses households to define each fractile. Second, they use a broader definition of wealth including collectibles and consumer durables.

In an attempt to do a more consistent comparison across the two sources, I have also constructed the wealth distribution series with the SHF under the same wealth definition and assumptions than for the mixed capitalization-survey method. Households are split into individuals and wealth is assigned proportionally to all members of the household, except from children, who are only proportionally given wealth held in bank accounts. Moreover, only individuals aged 20 and above are considered. Note that the only difference is that the SHF includes the regions of País Vasco and Navarra. Even though trends are the same, levels are still quite different across the two methods (Figures E1a, E1c). For instance, 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).

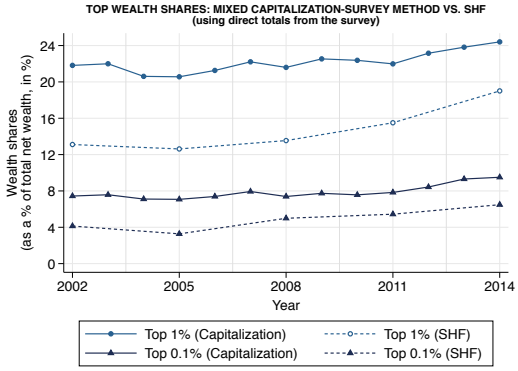
However, if on top of the previous adjustments, I calculate the SHF wealth shares using the same population and wealth totals as in the mixed capitalization-survey method (that is, the ones consistent with the Population Census and National Accounts), results are almost identical (Figure E1b). Figure E1d shows that results are also quite similar when looking at the very top of the distribution (top 1% and 0.1%). The similarities across the two sources and methodologies also exist even when looking at the composition of wealth shares (Figure E2). Hence, the Spanish SHF is extremely useful not only to analyze the bottom and middle of the



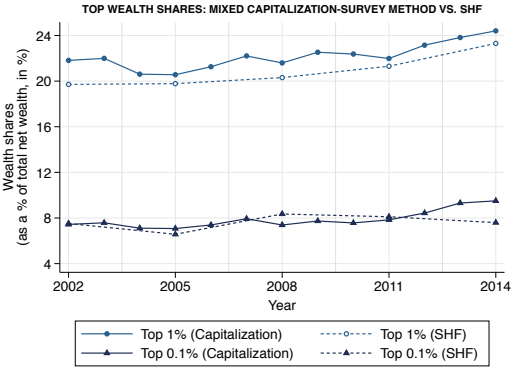

(a) SHF wealth shares using direct totals from the survey




(b) SHF wealth shares using the Census of Population and NA totals



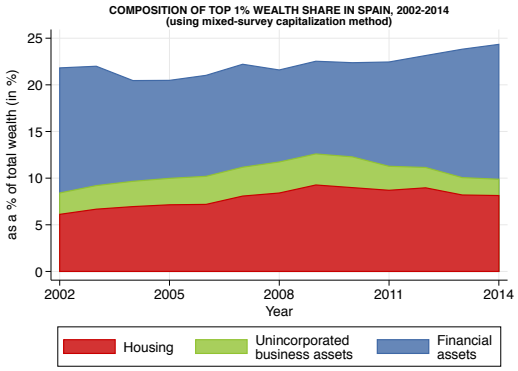

(c) SHF top wealth shares using direct totals from the survey



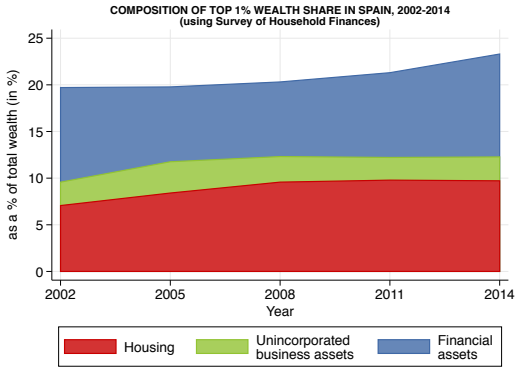

(d) SHF top wealth shares using the Census of Population and NA totals

FIGURE E1: WEALTH SHARES: MIXED CAPITALIZATION-SURVEY METHOD VS. SHF IN SPAIN, 2002-2014

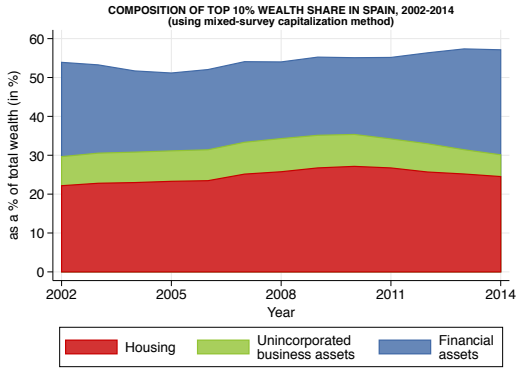
Notes: The figure compares the top 10%, middle 40%, bottom 50%, top 1% and top 0.1% wealth shares in Spain using the capitalization method and the Survey of Household Finances. In panels a and c the SHF wealth shares are calculated using the direct totals of the SHF, whereas in panel b and d the SHF wealth shares are calculated by proportionally rescaling the survey to match the Census of Population and National Accounts totals.



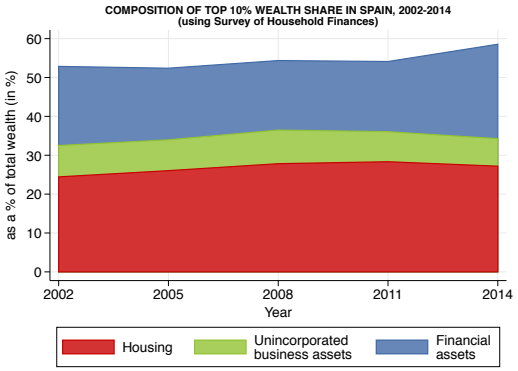

(a) Composition of top 1% wealth share (using mixed survey-capitalization method)




(b) Composition of top 1% wealth share (using Survey of Household Finances)




(c) Composition of top 10% wealth share (using mixed survey-capitalization method)




(d) Composition of top 10% wealth share (using Survey of Household Finances)

FIGURE E2: ASSET COMPOSITION AT THE TOP OF THE WEALTH DISTRIBUTION IN SPAIN, 2002-2014

Notes: The figure displays the composition of top 1% and top 10% wealth shares using the mixed survey-capitalization method (panels a and c) and the Survey of Household Finances (panels b and d) over the period 2002-2014. The same wealth concept and totals are used in all four panels

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 at the top. The main reason why the mixed capitalization-survey method is used is because instead of only five data points, it allows to cover on an annual basis a much longer period of time.

### E.1.2 Wealth Tax

The wealth tax in Spain was introduced for the first time in 1978 by law 50/1977. Initially, it was meant to be transitory and exceptional. The tax rate was relatively small, with a 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 Tax Agency, reactivated the wealth tax from exercise 2011 (payable in 2012) until the present.

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 had high exemption levels and during this period only the top 2-3% wealthiest individuals filed 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. 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, especially for the top 0.1% and 0.01% (Figure E3). 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 1980s and an increase in concentration during the 1990s. Concentration levels are larger using capitalized income shares rather than wealth taxes, especially at times in which asset prices significantly grow, such as the dot-com bubble and the housing boom and bust of the 2000s.

There are several conceptual and methodological differences across the two meth-

ods 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 from the wealth denominator because they are exempted from the wealth tax. Hence, they use slightly different wealth aggregates to the ones used in this paper (Table E1). Third, they use real state wealth at assessed value, as reported in the wealth tax, and update it based on the differences between real state total assessed values and market values. In contrast, I use the series of housing wealth at market prices of Artola et al. (2021) and impute primary residence housing wealth for the period 1999-2015 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 pension funds, together with the different valuation of housing wealth are most likely the biggest determinants in the differences observed in the shares using the two methods. The reason is that 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.

**COMPARISON OF WEALTH AGGREGATES IN SPAIN, 2005**

| | **Capitalization-Survey Method** | **Alvaredo & Saez (2009)** | **SHF** |
|---|---|---|---|
| Net personal wealth | 4,877 € | 5,057 € | 3,853 € |
| Net non-financial assets | 3,524 € | 3,778 € | 3,396 € |
| Financial assets | 1,353 € | 1,279 € | 457 € |

TABLE E1: COMPARISON OF WEALTH AGGREGATES IN 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. Values are reported in current billion euros.

### E.1.3 Idiosyncratic Returns

The underlying assumption in the mixed income capitalization method is that rates of return are constant by asset class along the wealth distribution. Hence,

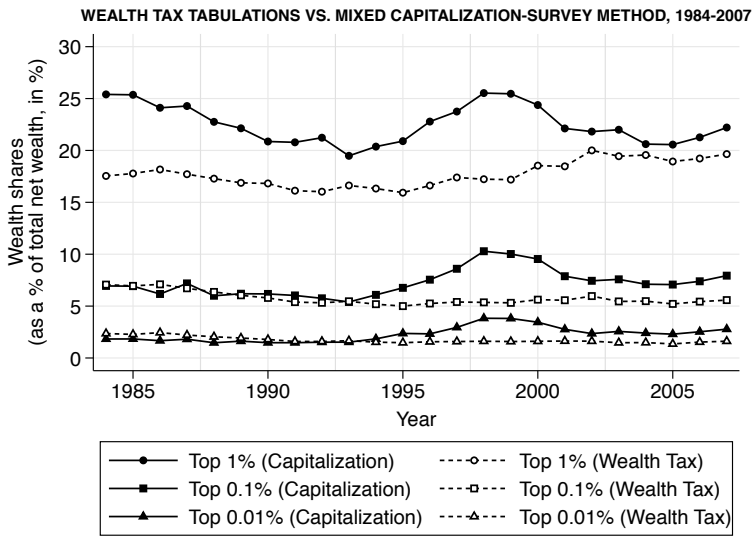



FIGURE E3: WEALTH TAX TABULATIONS VS. MIXED CAPITALIZATION-SURVEY METHOD IN SPAIN, 1984-2007

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).

differences in rates of return (both flows and capital gains) across wealth groups only come by construction from differences in portfolio composition. Although I use different rate of return for a wide set of asset classes (i.e., housing, business assets, debt securities, equities, investment funds, life insurance and pension funds, etc.), my results could be biased if rates of return by asset class were different across wealth groups. To show that this assumption is robust in the Spanish context, I have performed several robustness checks.

First, Figures E1 and E2 are already reliable tests for the well-behaved wealth inequality trends using the mixed capitalization-survey method.

Second, I also 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 also very similar (Figure E4).

Third, to show that differences in house prices across wealth groups are modest in this context, I assign to each individual the average house price of the municipality

in which they reside. I then calculate the average house price by wealth group. Figure E5a shows average house prices for the top 1% and top 10%, middle 40% and bottom 50% wealth groups over the period 2005-2015. Despite the large volatility in house prices during this period of time, the evolution of average house prices has been quite similar across wealth groups. It is only after 2014—when average house prices started to rise for the first time since the end of the housing boom—that house prices across wealth groups have started to diverge. The homogeneity in the evolution of house prices in Spain can also be also seen when comparing the evolution of average house prices between coastal and non-coastal municipalities (Figure E5b) and between municipalities with different population size (Figure E5c). These results are also in line with Fagereng et al. (2020), who document that heterogeneity in rates of return is much lower for housing than for most financial assets using Norwegian data.

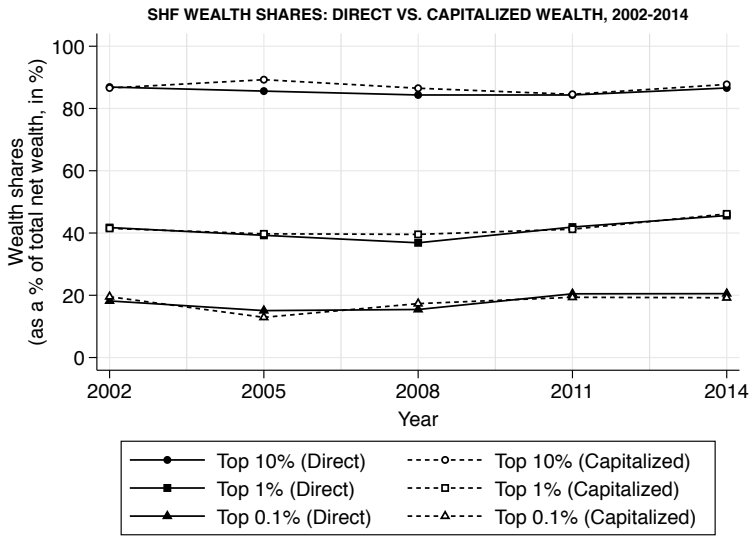


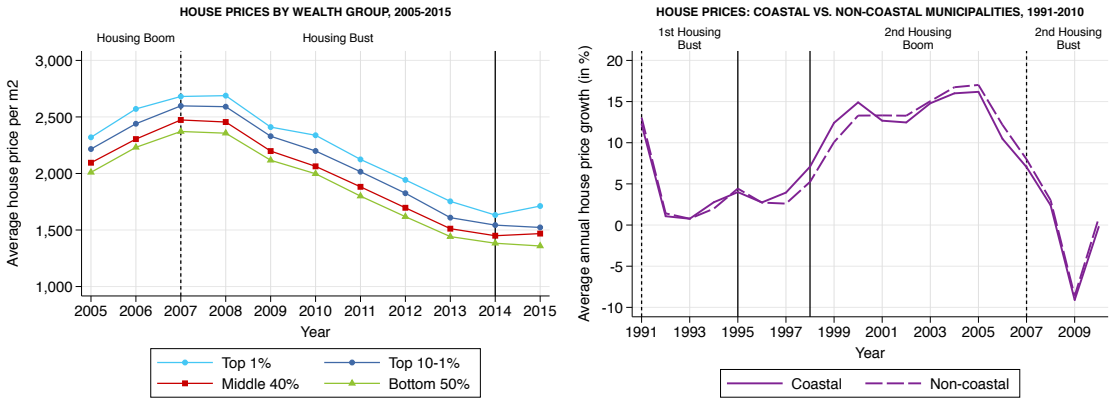

FIGURE E4: SHF WEALTH SHARES: DIRECT VS. CAPITALIZED WEALTH IN SPAIN, 2002-2014

Notes: The figure compares the top 10%, 10 to 1% and 0.1% 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 five waves.

Finally, I also test whether rates of return are flat along the distribution using the micro-files from personal income tax records linked to wealth tax records. This allows me to calculate the individual rate of return on deposits and fixed-income

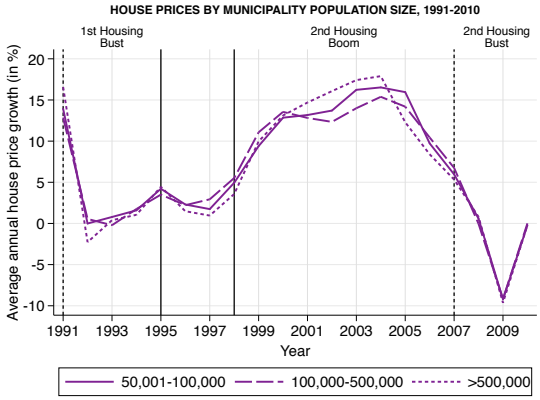
securities as the ratio of the interest they earn in these assets and the total value they hold in these assets. Whether ranking individuals by the total amount of deposits and fixed-income securities they owned or by total net wealth, rates of return are flat along the distribution (See Figure E6).

Overall, these comparisons and tests appear to confirm that the assumption of constant asset-specific rates of return is robust in the Spanish context and that the differences in rates of return across wealth groups mainly come from differences in portfolio composition.




(a) House Prices by Wealth Group, 2005-2015

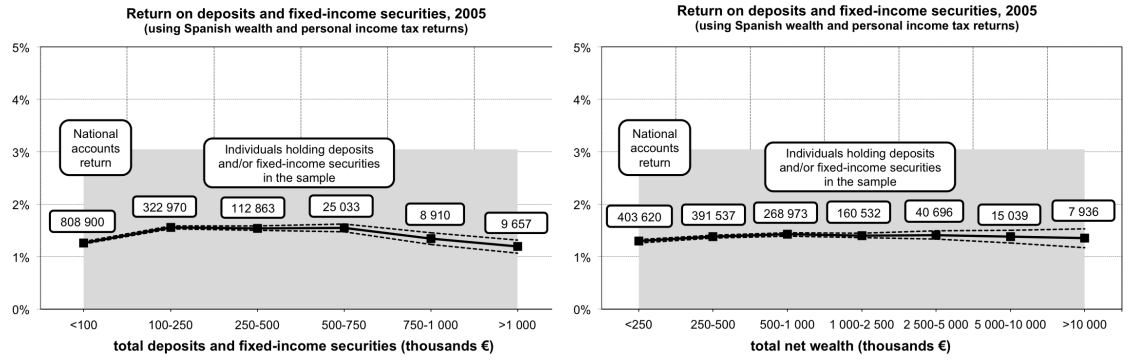
(b) House Prices: Coastal vs. Non-coastal Municipalities, 1991-2010




(c) House Prices by Municipality Population Size, 1991-2010

FIGURE E5: HOUSE PRICE DISTRIBUTION IN SPAIN

Notes: This figure depicts the house price distribution in Spain. Panel a plots average house prices by wealth group in Spain for the period 2005-2015. The series of house prices used is elaborated by the Ministry of Public Works and it is based on property appraisals. Panels b and c show the annual average growth in house prices over the period 1991-2010 in coastal versus non-coastal municipalities (<25,000 inhabitants) and by municipality population size, respectively. The series in the last two panels has been elaborated by the *Instituto Valenciano de Investigaciones Económicas*.




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

(b) Ranking individuals according to total net wealth

FIGURE E6: RETURNS ON DEPOSITS AND FIXED-INCOME SECURITIES, 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. 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.

# F Wealth Mobility and Synthetic Saving Rates

The total saving rates and the asset-specific saving rates calculated using the wealth accumulation decomposition are synthetic, so that the identity of individuals in each wealth group $g$ might change over time due to wealth mobility. Hence, one might think that the large fluctuations in saving rates for the top wealth group are simply due to increasing mobility of individuals from bottom groups to upper groups and viceversa during the crisis. To prove that the results are not driven by mobility, I need a longitudinal dataset so that I can follow individuals over time. I rely on the 1999-2014 personal income tax panel elaborated by the Spanish Statistical Institute in collaboration with the Spanish Tax Agency.[42] I reconstruct the wealth distribution series and carry the wealth accumulation decomposition using the panel and the same mixed capitalization-survey method as for the calculation of the benchmark series. No matter which data source is used (cross-sectional or panel

[42]To construct the benchmark wealth distribution series I rely on this panel only for years 1999-2001 since larger and richer cross-sectional personal income tax samples are available from 2002 onwards.

tax data), wealth shares are almost identical (Figure F1).

My first exercise is to follow Kuhn et al. (2020) and explore wealth mobility across the three groups in the analysis: bottom 50%, middle 40% and top 10%. Table F1 shows the share of individuals who remain within their respective wealth group between subsequent years. The shares are always above 50% and larger for the top 10% wealth group (78% on average) than for the middle 40% (61% on average) and bottom 50% (65% on average).[43] Most individuals that move out of their wealth group between years, remain close to their group. The large fluctuations in saving rates for the top 10% wealth group do not seem to be driven by wealth mobility since the share of individuals who remain within the top 10% wealth group remained quite stable over the years around the peak of the housing boom.

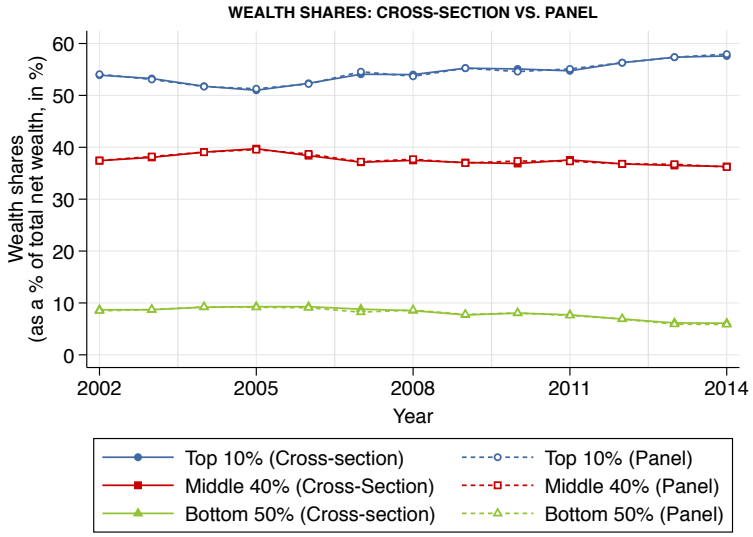



FIGURE F1: WEALTH SHARES: CROSS-SECTION VS. PANEL

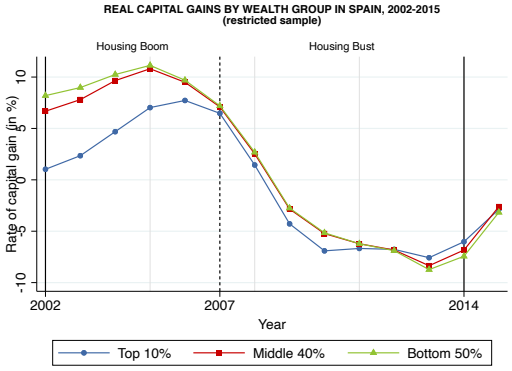
Notes: The figure compares the benchmark wealth distribution series using cross-sectional income tax samples with the wealth distribution series using a the personal income tax panel. All series have been constructed using the mixed capitalization-survey method. Both data sources have been elaborated by the Spanish Institute of Fiscal Studies in collaboration with the Spanish Tax Agency. No matter which of the two sources is used, the series are almost identical.

To further prove that mobility is not explaining the findings, I calculate the asset composition of individuals who remain within their respective wealth group between subsequent years. I then use this asset composition to recalculate the asset-specific

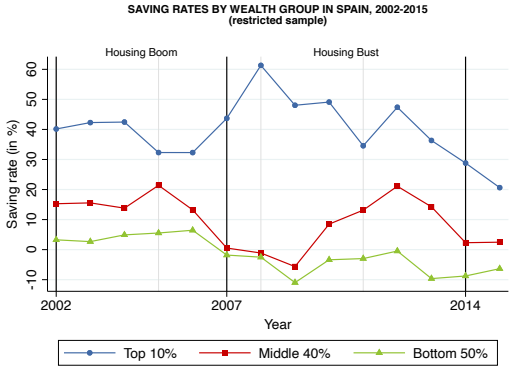
[43] This is consistent with Martínez-Toledano et al. (2019), who find using the Spanish Survey of Household Finances that wealth mobility is larger in bottom and middle deciles than in the top decile over the period 2002-2014.

saving rates. Figure F2 depicts the distribution of real capital gains, saving rates and asset-specific saving rates using the asset composition based on the restricted sample excluding movers. All previous results hold. Figure F2a shows that capital gains are larger for the middle and bottom of the distribution during the boom and they converge during the bust. Figure F2b documents that saving rates are larger for the top than for the middle and the bottom. Figures F2c and F2d also show that during the housing bust saving rates on housing for the top decline and saving rates on financial assets increase. Hence, these two exercises suggest that the results are by no means driven by mobility along the wealth distribution.

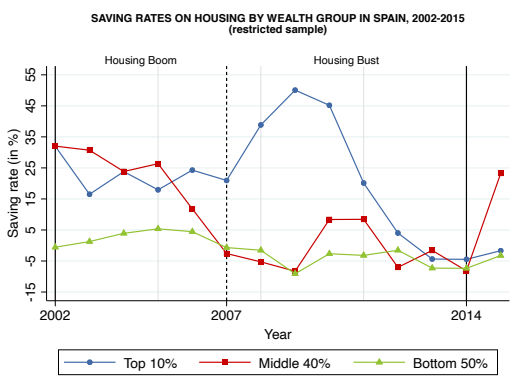
Finally, I carry one additional robustness check. The asset-specific decomposition I use is additive, since I want the asset-specific saving rates to add up to the total saving rate by wealth group. To reach additivity, I need to use wealth group-specific rates of capital gain ($q_t^g$). This could bias the fluctuations in the composition of saving rates, if group-specific rates of capital gain were different by asset class. To make sure that the large fluctuations in the composition of saving, especially for the top 10% wealth group, are not due to the use of group-specific rates of capital gain, I recalculate the asset-specific decomposition using group-and-asset specific rates of capital gain (i.e., $W^g_{H,t+1} = (1 + q^g_{H,t}) \cdot [W^g_{H,t} + s^g_{H,t} \cdot (Y^g_{L_t} + r^g_t \cdot W^{H,g}_t)]$). Figures F3a and F3b show that fluctuations are slightly attenuated for the top 10% wealth group when using the alternative decomposition. Nonetheless, what is important for my exercise is that the same dynamics persist under this new alternative specification.



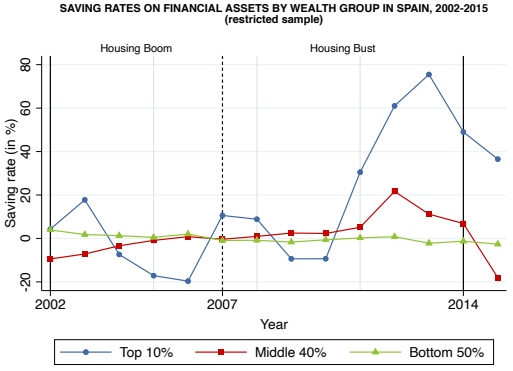

(a) Real capital gains by wealth group




(b) Saving rates by wealth group




(c) Saving rates on housing by wealth group




(d) Saving rates on financial assets by wealth group

FIGURE F2: REAL CAPITAL GAINS AND SAVING RATES BY WEALTH GROUP IN SPAIN, 2002-2015 (restricted sample)

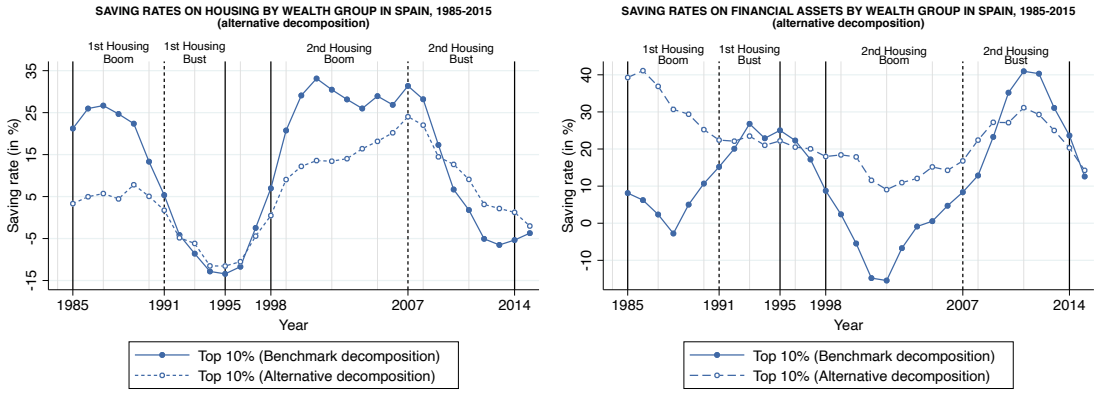
Notes: This figure depicts real capital gains (panel a), saving rates (panel b), saving rates on housing (panel c) and saving rates on financial assets (panel d) by wealth group in Spain, using the asset composition of those individuals who do not change of wealth group (top 10%, middle 40% and bottom 50%) from year $t$ to year $t+1$. This calculation has been done after reconstructing the wealth distribution series under the mixed capitalization-survey method and using a 1999-2014 personal income tax panel elaborated by the Spanish Institute of Fiscal Studies in collaboration with the Spanish Tax Agency.

**WEALTH MOBILITY, 1999-2014**

| Year | Bottom 50% | Middle 40% | Top 10% |
|---|---|---|---|
| 1999 | 0.56 | 0.51 | 0.80 |
| 2000 | 0.60 | 0.53 | 0.76 |
| 2001 | 0.63 | 0.60 | 0.81 |
| 2002 | 0.64 | 0.60 | 0.80 |
| 2003 | 0.65 | 0.62 | 0.77 |
| 2004 | 0.66 | 0.62 | 0.77 |
| 2005 | 0.66 | 0.62 | 0.79 |
| 2006 | 0.67 | 0.62 | 0.78 |
| 2007 | 0.70 | 0.61 | 0.76 |
| 2008 | 0.68 | 0.63 | 0.77 |
| 2009 | 0.68 | 0.63 | 0.78 |
| 2010 | 0.68 | 0.64 | 0.80 |
| 2011 | 0.65 | 0.58 | 0.85 |
| 2012 | 0.65 | 0.68 | 0.72 |
| 2013 | 0.68 | 0.68 | 0.78 |

TABLE F1: WEALTH MOBILITY, 1999-2014

Notes: This table shows wealth mobility across years using a panel of personal income tax records over the period 1999-2014 elaborated by the Spanish Institute of Fiscal Studies. The wealth distribution series have been obtained using the same mixed capitalization-survey method as the one used to obtain the benchmark wealth distribution series. Columns show the wealth group and rows the initial year. Mobility is shown as the share of individuals who remain in the wealth group across subsequent years. For instance, 78% of individuals within the top 10% wealth group remain in this group in 2014.




(a) Saving rate on housing for the top 10% wealth group

(b) Saving rate on financial assets for the top 10% wealth group

FIGURE F3: ALTERNATIVE ASSET-SPECIFIC DECOMPOSITION USING GROUP-AND-ASSET SPECIFIC RATES OF CAPITAL GAIN FOR SPAIN, 1984-2015

Notes: This figure compares the saving rates on housing (panel a) and financial assets (panel b) for the top 10% wealth group in Spain using the benchmark asset-specific decomposition of wealth accumulation with group-specific rates of capital gain, with the saving rates of an alternative asset-specific decomposition using group-and-asset specific rates of capital gain (e.g., $W^g_{H,t+1} = (1+q^g_{H,t})[W^g_{H,t} + s^g_{H,t}(Y^g_{L_t} + r^g_t W^{H,g}_t)]$). The vertical solid black lines denote the beginning and end of the two housing boom-bust cycles (1985-1995, 1998-2014) and the vertical dashed black lines at 1991 and 2007 denote the turning points in each episode.

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