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Essays on the Accumulation, Distribution and Taxation of Wealth

Supervised by: Thomas PIKETTY

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Thèse dirigée par : Thomas PIKETTY

Date de soutenance: le 1 juillet 2020

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Clara Martínez-Toledano
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Confined in Madrid

A mi padre, por su bondad, cariño, generosidad y alegría infinita.

Summary

This thesis analyzes the accumulation, distribution and taxation of wealth, using the Spanish context as a laboratory. The first two chapters have a particular focus on housing. In the first chapter, we reconstruct Spain's national wealth from 1900 to 2017. By combining new sources with existing accounts, we estimate the wealth of both private and government sectors and use a new asset-specific decomposition of the long-run accumulation of wealth. We find that during the 20th century, the national wealth-to-income ratio remained within a relatively narrow range—between 400 and 600%—until the housing boom of the early 2000s led to an unprecedented rise to 800% in 2007. Our results highlight the importance of land, housing capital gains and international capital flows as key elements of wealth accumulation.

In the second chapter, I study the implications of housing booms and busts for wealth inequality, examining two episodes over the last four decades in Spain. I combine fiscal data with household surveys and national accounts to reconstruct the entire wealth distribution and develop a new asset-specific decomposition of wealth accumulation to disentangle the main forces behind wealth inequality dynamics (e.g., capital gains, saving rates). I find that the top 10% wealth share drops during housing booms, but the decreasing pattern reverts during busts. Differences in capital gains across wealth groups appear to be the main drivers of the decline in wealth concentration during booms. In contrast, persistent differences in saving rates across wealth groups and portfolio reshuffling towards financial assets among top wealth holders are the main explanatory forces behind the reverting evolution during housing busts. I show that the heterogeneity in saving responses is consistent with the existence of large differences in portfolio adjustment frictions across wealth groups and that tax incentives can exacerbate this differential saving behavior. These results provide novel empirical evidence to enrich macroeconomic theories of wealth inequality over the business cycle.

In the third chapter, we study the effect of annual wealth taxes on migration. We analyze the unique decentralization of the Spanish wealth tax system following the reintroduction of the tax in 2011. Madrid is the only region that did not reintroduce the wealth tax. Using linked administrative wealth and income tax records, we exploit the quasi-experimental variation in tax rates generated by the reform to understand the mobility responses of high wealth individuals and the resulting effect on wealth tax revenue and wealth inequality. Aggregating the individual data to the region-year-wealth tax filer level, we find that five years after the reform, the stock of wealthy individuals and the stock of wealth "residing" in the region of Madrid increased, respectively, by 11% and 12% relative to other regions prior to the reform. Using an individual choice model, we show that conditional on moving, Madrid's zero tax rate increased the probability of changing one's fiscal residence to Madrid by 24 percentage points. We show that Madrid's status as a tax haven exacerbates regional wealth inequalities and erodes the effectiveness of raising tax revenue and curving wealth concentration.

Keywords: wealth; housing; inequality; asset prices, saving; tax; mobility

JEL codes: D31, H31, G51

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General Introduction

This thesis covers several topics at the intersection of contemporary macroeconomics, inequality and taxation research. In particular, it analyzes the accumulation, distribution and taxation of wealth, using the Spanish context as a laboratory. The three chapters follow an explicit logical progression and the first two have a particular focus on housing. In the first chapter, we reconstruct Spain's national wealth from 1900 to 2017 and use the new series to better understand the determinants of long-run wealth accumulation. In the second chapter, I reconstruct wealth distribution series since the 1980's for Spain and use them to study the implications of housing booms and busts for wealth inequality. In the third chapter, we study the effect of the decentralization of the Spanish annual wealth tax on mobility and how these migration responses affect regional wealth inequalities and revenues.

The importance of focusing on "Wealth"

Wealth has gained increasing attention from both the academic community and public opinion. This renewed interest is largely motivated by three recently established empirical facts. First, household wealth has grown faster than national income in the last four decades in advanced economies, with similar levels to those observed in the eighteenth and nineteenth centuries (Piketty and Zucman, 2014a). Second, wealth inequality among individuals has increased at different speeds across countries since the 1980's, rising, for instance, much faster in the United States than in continental Europe (Alvaredo et al., 2018). Third, cross-border positions represent a significant fraction of total household wealth, in particular, assets held by households in offshore tax havens account for 8% of the global financial wealth (Zucman, 2013).

Despite this progress in documenting the evolution of aggregate wealth and its distribution, very little is still known on the determinants of both wealth accumulation and wealth inequality. This is likely due to the scarcity of countries for which both consistent long-run aggregate and distributional wealth data are available and the difficulty to quantify the importance of each determinant. This thesis breaks new grounds on these issues by reconstructing harmonized long-run aggregate and distributional wealth series consistent with national accounts for the case of Spain. The new series are used to study the determinants of both wealth accumulation and wealth inequality. In particular, I analyze in great detail the role of housing in explaining wealth dynamics. I focus on housing since it is the main asset in most individual portfolios (Saez and Zucman, 2016; Garbinti, Goupille, and Piketty, 2019) and it forms the lion's share of 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, 2014a).

In this context of growing inequalities, progressive wealth taxation has received renewed interest as a tool to raise revenue and curb inequality. Following Piketty's (2014) call for a global wealth tax and recent proposals to tax wealth in the United States, much of the academic and policy discussions have focused on whether wealth taxes are enforceable if taxpayers avoid or evade them. This thesis sheds new light on these issues by studying the role of wealth taxes for migration.

The Spanish case

When analyzing the evolution and determinants of both wealth accumulation and wealth inequality, Spain is a country that clearly deserves international scholars' attention for three main reasons. First, the Spanish economy has experienced large swings in asset prices, constituting an ideal laboratory to examine the determinants of aggregate wealth dynamics and its distribution. In particular, Spain has underwent two housing booms (1985-1991, 1998-2007) and busts (1992-1995, 2008-2014) in the last forty years.

Second, after entering the Eurozone in the late 1990s, together with Greece and Portugal, the country has experienced the largest deterioration in its net foreign asset position. Nonetheless, the factors driving the growth of Spain's foreign liabilities are clearly distinctive. According to the IMF's data on international investment positions, in Greece and Portugal the growth of public debt explained the increase in the negative foreign asset position, while in Spain this rise was mainly driven by the increase in private debt. Since this rise in private debt happened together with the recent housing boom and bust, we can study the complex interaction among the two.

Third, Spain is one of the few countries in the world that has an annual wealth tax and publicly available statistics on individual incomes and asset ownership based on tax records. Moreover, contrary to most countries, the wealth tax has been recently decentralized to the regions. Hence, Spain constitutes an ideal setting to study the role of taxation in inducing mobility of individuals across regions and in shaping wealth inequalities and tax revenues.

The evolution and determinants of long-run wealth accumulation

For a long time, empirical research on the evolution and determinants of wealth accumulation was hampered by lack of data. It is not until the 1990s and 2000s that national statistical offices started to publish time series of national wealth, following the release of the 1993 System of National Accounts guidelines, that included wealth for the first time. This interest in estimating national wealth was a common practice until the early twentieth century, but it nearly disappeared following the 1914-1945 capital shocks due to first, the new emphasis on short-run output fluctuations following the Great Depression, and second, because of the difficulty to compute and make annual comparisons of the current market value of wealth given the large asset price movements between the wars.[1]

Despite the absence of widespread national balance sheets, empirical research on wealth gained increasing attention from scholars and the public in recent decades. A first effort to put together historical balance sheets in recent decades was carried by Goldsmith in 1985 and 1991. The second major impetus came from the studies of Piketty, 2014 and Piketty and Zucman, 2014b who presented a new study of long-term dynamics of the wealth-to-income ratios for a set of advanced countries.

The researchers' key finding was that the relationship between wealth and income was not stable over time. On the contrary, wealth-to-income ratios followed a strong U-shaped pattern over the twentieth century, most prominently in Europe. Together, these results have incentivized researchers to reconstruct the dynamics of national wealth in other countries while adopting a long-term perspective (e.g., Waldenström, 2017, Kumar, 2019). The first chapter of this thesis contributes to this new wave of long-run studies of wealth by reconstructing for the first time a consistent national

[1] Piketty and Zucman, 2014b document that the first statistics on national wealth were published in the late seventeenth and early eighteenth centuries in the United Kingdom (Petty (1664); King (1696)) and in France (Boisguillebert (1695); Vauban (1707)). The publication of national wealth estimates grew in the nineteenth and early twentieth centuries with new series in the United Kingdom (Colqhoun (1815), Giffen (1889); Bowley (1920)), France (Foville (1893); Colson (1903)), Germany (Helfferich (1913)) and the United States (King (1915)).

balance sheet for Spain from 1900-2017. The new series reveal hat Spain's national wealth-to-income ratio has followed a J-shaped evolution during the twentieth century that differs from the U-shaped trends observed in other developed countries. The Spanish context also serves as a useful case-study to highlight the importance of land, housing capital gains and international capital flows as key drivers of long-run wealth accumulation.

Wealth inequality over the business cycle: Savings vs. Capital gains

Wealth has grown faster than national income in advanced countries in recent decades (Piketty and Zucman, 2014a) and at the same time, wealth concentration trends have diverged, rising, for instance, much faster in the US than in continental Europe (Alvaredo et al., 2018). Yet, very little is known on the complex interaction between the evolution of aggregate household wealth and its distribution.

These interactions are of particular importance during asset booms and busts. Wealth levels and portfolio composition along the distribution might significantly change—either mechanically through asset price changes, saving responses, or a combination of both—and consequently, trends in medium to long-term wealth inequality could revert. Wealth inequality matters in the determination of aggregates such as consumption (Carroll, Slacalek, and Tokuoka, 2014, Krueger, Mitman, and Perri, 2016). Thus, understanding the determinants of wealth inequality dynamics at different phases of the economic cycle is of interest to gauge the risks of business cycles and set appropriate stabilization policies.

Thse second chapter of this thesis breaks new grounds on these issues by studying how large house price fluctuations shape the wealth distribution examining the Spanish context. I develop a novel asset-specific decomposition of wealth accumulation that I use to identify the key forces (e.g., capital gains, saving rates) behind the observed wealth inequality dynamics. This new decomposition is critical to better understand saving responses, which have attracted much less scrutiny than asset prices in the analysis of wealth inequality dynamics over the business cycle (Kuhn, Schularick, and Steins, 2018). This chapter provides novel ingredients to generate realistic wealth dynamics in quantitative models of wealth inequality (Achdou et al., 2017, Benhabib and Bisin, 2018, De Nardi and Fella, 2017, Gomez, 2019, Hubmer, Krusell, and Smith Jr., 2019).

The role of wealth taxes for mobility to tax havens

Rising capital shares of income and associated increases in inequality observed in many developed countries have spurred new interest in the taxation of wealth. Many of the academic and policy discussions have focused on whether wealth taxes are enforceable if taxpayers avoid or evade them. The reason is that taxpayers might respond by hiding assets in tax havens, as there is evidence that a significant fraction of financial assets owned by the wealthy is held offshore (Alstadsæter, Johannesen, and Zucman, 2019; Zucman, 2015). In part, this was a motivating factor in Piketty's 2014 call for a global wealth tax: "if all countries do not implement a wealth tax, then mobile capital would simply flow to tax havens where wealth tax rates are zero".

Despite the relevance of annual wealth taxes in recent policy debates, evidence on the behavioral responses to wealth taxes is relatively small (Brülhart et al., 2016; Londoño-Vélez and Ávila-Mahecha, 2018; Seim, 2017) and on migration, in particular, almost non-existent. Moreover, very little is known about how these behavioral responses might shape regional wealth inequalities between sending and receiving regions. The lack of studies on wealth taxes has been partly driven by limited sources of exogenous variation in wealth taxes, which often times are implemented at the national level. Given the difficulty of cross-country comparisons, little variation in wealth taxes exists across individuals or regions within a country. Furthermore, any study of migration must know where the taxpayer originated and migrated to, which requires potential harmonization of multiple countries' administrative tax records.

The third chapter of this thesis moves a step forward by studying the effect of annual wealth taxes on migration. We take advantange of the unique decentralization of the Spanish wealth tax system in 2011, after which all regions raised positive tax rates except from Madrid. Our findings reveal that Madrid's status as a tax haven has attracted a disproportionally share of wealthy. We show that these migration responses have exacerbated regional wealth inequalities and eroded the effectiveness of raising tax revenue and curving wealth concentration.

Outline and Summary

Chapter 1 was written with Miguel Artola and Luis Bauluz, and is titled "Wealth in Spain, 1900-2017: A Country of Two Lands". In this chapter, we take a historical perspective and reconstruct Spain's national wealth from 1900 to 2017. By combining new sources with existing accounts, we estimate the wealth of both private and government sectors and use a new asset-specific decomposition of the long-run accumulation of wealth. We find that during the 20th century, the national wealth-to-income ratio remained within a relatively narrow range—between 400 and 600%—until the housing boom of the early 2000s led to an unprecedented rise to 800% in 2007. Our results highlight the importance of land, housing capital gains and international capital flows as key elements of wealth accumulation. This first chapter has been accepted for publication at *The Economic Journal.*

Chapter 2 was my *Job Market Paper*, and is called "House Price Cycles, Wealth Inequality and Portfolio Reshuffling". Business cycle dynamics shape the wealth distribution through asset price changes, saving responses, or a combination of both. The aim of this chapter is to study the implications of housing booms and busts for wealth inequality, examining two episodes over the last four decades in Spain. I combine fiscal data with household surveys and national accounts to reconstruct the entire wealth distribution and develop a new asset-specific decomposition of wealth accumulation to disentangle the main forces behind wealth inequality dynamics (e.g., capital gains, saving rates). I find that the top 10% wealth share drops during housing booms, but the decreasing pattern reverts during busts. Differences in capital gains across wealth groups appear to be the main drivers of the decline in wealth concentration during booms. In contrast, persistent differences in saving rates across wealth groups and portfolio reshuffling towards financial assets among top wealth holders are the main explanatory forces behind the reverting evolution during housing busts. I show that the heterogeneity in saving responses is consistent with the existence of large differences in portfolio adjustment frictions across wealth groups and that tax incentives can exacerbate this differential saving behavior. These results provide novel empirical evidence to enrich macroeconomic theories of wealth inequality over the business cycle.

Chapter 3 was written with David Agrawal and Dirk Foremny, and is named "*Paraísos Fiscales*, Wealth Taxation and Mobility". Wealth taxation has received renewed attention as a revenue source to fund public programs and to curb wealth inequality. Yet, evidence on the behavioral responses to wealth taxes is relatively small and on migration responses to wealth taxes, in particular, almost non-existent. The goal of this chapter is to shed new light on this topic and study the effect of annual wealth taxes on migration. We analyze the unique decentralization of the Spanish wealth tax system following the reintroduction of the tax in 2011. Madrid is the only region that did not reintroduce the wealth tax. Using linked administrative wealth and income tax records, we exploit the quasi-experimental variation in tax rates generated by the reform to understand the mobility responses of high wealth individuals and the resulting effect on wealth tax revenue and wealth inequality. Aggregating the individual data to the region-year-wealth tax filer level, we find that five years after the reform, the stock of wealthy individuals and the stock of wealth "residing" in the region of Madrid increased, respectively, by 11% and 12% relative to other regions prior to the reform. Using an individual choice model, we show that conditional on moving, Madrid's zero tax rate increased the probability of changing one's fiscal residence to Madrid by 24 percentage points. We show that Madrid's status as a tax haven exacerbates regional wealth inequalities and erodes the effectiveness of raising tax revenue and curving wealth concentration.

Chapter 1

Wealth in Spain, 1900-2017: A Country of Two Lands

Wealth is gaining increasing attention from both the academic community and public opinion. Large swings in asset prices and the significance of cross-border positions within the Eurozone—to name just two recent significant economic trends—point to the importance of studying wealth aggregates. Thus, constructing and strengthening national wealth statistics based on sectoral balance sheets has been the object of increasing attention from various institutions (Financial Stability Board and International Monetary Fund, 2009). In this sense, Spain is a country that clearly deserves international scholars' attention. Since entering the Eurozone in the late 1990s, the Spanish economy underwent a large housing boom followed by an equally exceptionally large bust. The country also experienced a sharp deterioration in its net foreign asset position and a more recent rise in public indebtedness. Although academics and the media have been quick to analyse this process, the truth is that many studies are limited by the lack of a complete set of national balance sheets. Additionally, the absence of long-run series makes it more difficult to determine the historical significance of recent developments.

This study tracks for the first time the historical evolution of Spanish national wealth since the beginning of the twentieth century. Our aim is to analyse and document the long-term dynamics of wealth, with a particular focus on the evolution and determinants of the recent housing boom and bust. We present two long-run series. The first, based on a market value approach, provides the net wealth of the personal and government sector using a census method. Following this approach, we construct a complete and detailed balance sheet including nonfinancial, financial and offshore assets. The second consists of a book value approach, in which national wealth is derived by calculating the value of domestically produced assets through the perpetual inventory method, valuing non-produced assets through a census-like method, and adding the net foreign position. One of the advantages of this last approach is that it allows us to decompose housing wealth into that of buildings and underlying land, which is key to understanding the forces that have driven up the value of dwellings in recent decades. To our knowledge, this study is the first to compare the evolution of both measures of national wealth over a period covering more than a century. Furthermore, we not only decompose the accumulation of national wealth into a volume effect (through savings) and a price effect (capital gains/losses) but also go beyond previous studies and differentiate between wealth accumulation in housing and non-housing assets.

Our main finding is that Spain's national wealth-to-income ratio has followed a J-shaped evolution during the twentieth century that differs from the U-shaped trends observed in other developed countries (Piketty and Zucman, 2014, Waldenström, 2017). Both the market- and book value-based national wealth-to-income ratios for Spain remained for most of its history in a relatively narrow range—between 400 and 600%—until the housing boom of the early 2000s led to an unprecedented rise of almost 800% in 2007. In this manner, Spain's national wealth-to-income ratio level was the highest among all countries with available records since the beginning of the twentieth century. The singular evolution of wealth in Spain is explained by different peculiarities.

First, we document that the shift from high agricultural land value to high urban land value, which occurred in other advanced countries, was particularly fast in Spain. Agricultural land constituted the most important wealth component in the early twentieth century, while urban land value became the most important component in the early twenty-first century. Second, we also present evidence that in Spain, contrary to other rich countries, capital gains based on a sustained increase in the relative price of assets were fundamental for wealth accumulation during the very long term, especially since the 1950s. Our results point to housing as the most important driver, accounting for 80% and 82% of total capital gains over the 1950-2017 and 1980-2017 periods, respectively. Third, Spain was heavily dependent on foreign finance since the late nineties; namely, its increase in net foreign liabilities was the largest among developed countries. We present new empirical evidence that illustrates how the private sector contributed to the large decrease in net foreign assets, most importantly through the issuance of debt securities by Spanish monetary institutions. This process in turn fostered an increase in household indebtedness and an unprecedented housing boom. We perform an empirical analysis that supports the hypothesis that international capital flows were significantly related to housing prices in Spain during the 2000s, even after controlling for credit demand and financial conditions (in particular, declining interest rates and loosening credit standards). We observe that access to international credit by Spanish credit institutions seems to have played a significant role in the evolution of the real estate market in Spain.

The rest of the paper proceeds as follows. Section II discusses previous studies examining other countries and Spain. In Section III, we briefly introduce the key concepts, methods, and sources being used. Section IV presents the most important long-term trends in the evolution of wealth aggregates and considers the Spanish case from an international perspective. In Section V, we perform a quantitative analysis that relates foreign capital flows with the growth in household credit and the evolution of the real estate market. Finally, Section VII concludes. This study is accompanied by a methodological appendix (*Spain Wealth Appendix*), and the complete set of results is provided in an Excel file (*Spain Wealth Database*).

1.1 Literature review

1.1.1 Long-run evolution of national wealth

The study of wealth based on the national accounts framework is a relatively new phenomenon. National statistical offices did not start to compute national wealth through sectoral balance sheets until 1993, and progress thus far remains uneven: some countries provide very complete and long sets of national balance sheets, while others offer only partial results.

This slow development occurred despite research on wealth drawing increasing interest from scholars and the public. A major stimulus arose from the study of the evolution, composition, and distributional patterns of household wealth. J. B. Davies et al., 2011 estimated household wealth for 39 economies as of 2000 using sectoral balance sheets and survey data; the cited study was extended to 2000-2018 using the Global Wealth Report series edited by Shorrocks, J. Davies, and Lluberas, 2018. The other major impetus in wealth research originated from the studies by Piketty, 2014 and Piketty and Zucman, 2014. Piketty and Zucman, 2014 presented a new study of long-term dynamics of the wealth-to-income ratios for a set of advanced countries. The researchers' key finding was that the relationship between wealth and income was not stable over time. On the contrary, wealth-to-income ratios followed a strong U-shaped pattern over the twentieth century, most prominently in Europe. Together, these results have incentivized researchers to reconstruct the dynamics of national wealth in other countries while adopting a long-term perspective (Waldenström, 2017, Kumar, 2019).

In Spain, the first reliable estimate of the wealth stock was obtained by a group of researchers at the Universidad de Deusto, 1968, who performed an impressive wealth census for 1965 that covered all nonfinancial assets (agricultural land, housing, business assets, etc.) in great depth. In recent decades, the literature examining Spain grew impressively through new estimates of the capital stock (e.g., Mas Ivars, Perez García, and Uriel Jiménez, 2000, Prados de la Escosura and J. R. Rosés, 2010). The other major development occurred after the Bank of Spain began to develop a modern system of financial accounts. This set of results later incentivised the development of some complementary sources of data on wealth aggregates, such as various estimates of the value of residential buildings and the creation of the Survey of Household Finances in 2002. Using these records, Naredo, Carpintero, and Marcos, 2008 built the first comprehensive balance sheet for various institutional sectors in Spain from 1995 to 2007. These sources, however, are limited in terms of time coverage and wealth definition. Moreover, as we detail in the following section, some assets—most importantly, dwellings—are substantially overvalued. We go one step forward from previous estimates and provide for the first time a comprehensive dataset on Spanish wealth consistent with national accounts since 1900.

1.1.2 Determinants of the increase in housing prices since the late 1990s

The recent rise in wealth to national income ratios has been mostly related to the increase in housing assets' prices (Piketty and Zucman, 2014; Rognlie, 2014; Bonnet et al., 2014). This literature corresponds to scholars' increasing interest in understanding the long-term evolution of housing markets (Davis and Heathcote, 2007; Knoll, Schularick, and Steger, 2017) and in particular, the recent rise in housing prices (Mankiw and Weil, 1989; Favara and Imbs, 2015; Saiz, 2010; Glaeser, Gyourko, and Saks, 2005; Gyourko, Mayer, and Sinai, 2013). Scholars have pointed to various underlying mechanisms, and many explanations seem to apply to the Spanish housing boom of the early 2000s. The first strand of the literature has focused on the positive impact of population increases on housing prices (Mankiw and Weil, 1989; Combes, Duranton, and Gobillon, 2019). In Spain, the increase in the foreign-born population—from 2% of the working-age population in 2000 to 14% in 2008—seems to be one of the principal causes of the increase in housing prices. González and Ortega, 2013 and Sanchís-Guarner, 2017 quantify this effect and show that between one-third and one-half of the increase in housing prices during the 2000s is explained by foreigners arriving in Spain. A second set of studies have related changes in the credit market—through loose monetary conditions and soft lending standards—to the housing boom. For example, Jordà, Schularick, and Taylor, 2015 show the causal relationship between loose monetary conditions and the rise in housing prices due to the expansion of mortgage credit. The authors argue that Spain during the 2000s is a fruitful subject for a case study to analyse, given the significant difference between the Taylor rule's policy rate and the actual interest rate set by the ECB. Jiménez et al., 2014 and Akin et al., 2014 also present evidence of too relaxed lending standards and excessive risk-taking by financial institutions during the recent Spanish housing boom.

Other scholars have emphasized the importance of foreign capital flows and housing booms (Sá, Towbin, and Wieladek, 2014), especially with regard to the USA (Bernanke, 2005; Himmelberg, Mayer, and Sinai, 2005; Favilukis et al., 2012; Ferrero, 2015). However, research examining European countries has been more limited, with most analyses focusing on the Eurozone's current account imbalances (Belke and Dreger, 2013), and the relationship between debt inflows and domestic credit growth (Hale and Obstfeld, 2016; Lane and McQuade, 2014). The literature on Europe has hardly considered the impact on housing prices. In Spain, Fernández-Villaverde, Garicano, and Santos, 2013 and Jimeno and Santos, 2014 have already highlighted the importance of foreign capital inflows to understanding the recent credit and real estate boom. Nonetheless, these studies only briefly document the importance of capital flows, and neither perform a detailed analysis of the channel nor quantify its importance. In Section V, we build upon the research of this last group of scholars and conduct a descriptive and quantitative analysis that relates foreign capital flows with the growth in household credit and the evolution of the real estate market.

1.2 Concepts, methodology, and empirical estimate

In this study, we use the concepts of national income and wealth from the international system of national accounts (SNA 2008, ESA 2010). Wealth is calculated by providing, for a particular point in time, a balance sheet that records the economic value of assets owned and liabilities owed by an institutional unit or group of units at prevailing market prices. At the country level, national wealth can be defined by two related but different measures. The first follows what Piketty and Zucman, 2014 call the *market value of wealth*, which is the sum of personal and government net wealth. In this definition, corporate capital is captured mostly by the market value of equity holdings owned by households and the government. This approach differs from SNA standards, which are referred to by Piketty and Zucman as the *book value of wealth*, i.e., the sum of nonfinancial assets of all resident sectors and the net foreign wealth.

We reconstruct national wealth comprehensively by adopting these different perspectives[1]. First, we compute national wealth at market value during 1900-2017 by calculating the household and government net worth positions. For both sectors, we estimate financial wealth—financial claims net of liabilities—to which we add nonfinancial assets. Households' nonfinancial assets are decomposed into three categories: housing (that includes the value of both the structure and the underlying land), agricultural land, and unincorporated business assets other than agricultural land. Similarly, for the government sector, we decompose nonfinancial assets into produced assets (buildings and constructions, machinery and equipment), land underlying public buildings, and forest land owned by local authorities.

In this procedure, we follow the SNA recommendation that uses the census-like method as the best valuation technique. Values of agricultural land and housing, which clearly constitute the two most important asset components in the long run, are estimated by multiplying the observed quantities (land areas or housing stock) by representative unit prices. For each period, we gathered the most refined data on prices to consider variations due to regional differences and diversity of uses (e.g., differentiating by crop types in agriculture, or between price-regulated and non-regulated houses). Both wealth aggregates include the value of the underlying land and produced assets (cultivated crops and dwellings, respectively). For housing, we combine and adjust various available sources (Bank of Spain, IVIE, and the Ministry of Public Works) of data on housing prices to produce a more accurate estimate. We perform thorough robustness checks for our housing wealth series, considering all other possible sources and methods. In particular, we compare our series to available estimates by Naredo, Carpintero, and Marcos, 2008, Pérez and Uriel, 2012, Bank of

[1] In this section, we briefly summarize our approach. The appendix provides a thorough and more detailed discussion of the sources, concepts and methodology used to reconstruct our wealth series between 1900 and 2017. We also include therein several robustness checks we have performed to prove the reliability of our series.

Spain and J. Carmona, Lampe, and J. Rosés, 2014. We also consider Spain from an international perspective, using the house price series in Jordà, Knoll, et al., 2019 and the housing wealth series from household wealth surveys. Overall, regardless of which source or method we use, the trends and levels in housing wealth are broadly similar.

Values of nonfarm unincorporated business assets owned by the household sector are estimated by taking as a starting point the results of the Survey of Household Finances available for 2002-2014 and subsequently upgrading the declared values to account for undervaluation and top-coding. We extend the results until the early 1980s by assuming the evolution to be similar to that of assets of nonfinancial corporations. For the public sector, we use the series of Mas Ivars, Pérez García, et al., 2015 for government-produced assets and add the value of the underlying land and forests.

In the second step, we compute the net financial wealth for the public, personal, and foreign sectors since the early twentieth century. For all three sectors, reconstructing financial assets and liabilities from 1970 to the present is a straightforward exercise based on figures reported in Financial Accounts by the Bank of Spain. Our main addition, as we detail below, is to provide the first complete estimate of offshore wealth owned by Spanish households. Producing a consistent estimate for the rest of the twentieth century is a far more complex process, given the lack of official estimates. Our calculations for the personal sector are based on a two-stage approach. First, we calculate the aggregate market value of each asset type, which is simpler for claims (e.g., currency, deposits and loans) assessed at their nominal value than for assets (e.g., bonds and shares) that are valued at the prevailing market prices.[2] The second step involves computing the share of each asset owned by households, deducting the holdings of other institutional sectors—mostly corporations or the government—using a wide variety of auxiliary accounts (e.g., financial yearbooks, balance sheets of banking and insurance companies, and government accounts).

Estimates for the government sector before 1970 are much easier to obtain. We proxy public net financial wealth by computing the value of the asset side of all state-owned equity holdings (e.g., the public railway company RENFE) and deducting as liabilities the market values of public debt. Computing Spain's net foreign wealth prior to 1970 cannot be performed through the census-like method, given the scarcity of sources;

[2]Corporate shares are the assets with the value that is most sensitive to changes in market prices. Listed shares have been valued according to stock market prices, while the values of unlisted shares have been derived by applying similar valuation ratios and subsequently applying a 20% discount for illiquidity.

therefore, we calculate the current account balance and add the variation in foreign exchange reserves. This procedure is relatively widespread since a surplus in the current account makes a country a net creditor to the rest of the world, and vice versa. We perform one final correction by accounting for households' offshore wealth. We construct our series following the methodology of Zucman, 2013 in combination with aggregate tax records on foreign holdings by Spanish residents. Nonetheless, due to the uncertainties related to these calculations, we do not include offshore assets in our benchmark series and present them only when decomposing total financial assets and the net foreign asset position.

Following a different approach, we compute the book value of national wealth for 1900-2017 by aggregating all types of nonfinancial assets in the Spanish economy, to which we add the net foreign wealth. The estimate is obtained regardless of the sector owning these assets. We decompose them into the following groups: agricultural land, housing, subsoil assets, non-residential constructions, machinery and equipment, transport equipment, and inventories. The values of the first two are calculated through the census approach, as noted previously, and produced assets are valued using the perpetual inventory method (PIM). We are not the first to use the PIM to reconstruct the stock of produced assets in Spain, and we benefited greatly from previous analyses (e.g., Prados de la Escosura and J. R. Rosés, 2010, Mas Ivars, Perez García, and Uriel Jiménez, 2000, Mas Ivars, Pérez García, et al., 2015). However, our estimates are slightly different, as we use geometric patterns of depreciation, and include the most recent data on Spain's historical national accounts from Prados de la Escosura, 2017. We also go one step further by decomposing the value of housing and non-residential buildings between structures and the underlying land. We do so by following the residual approach, as detailed in Eurostat and OECD, 2015 and used in Davis and Heathcote, 2007 for the US housing stock during 1930-2000. Using this method, we calculate the value of land as a residual by deducting the PIM estimates of the values of residential structures from the market value of the housing stock. Estimates of produced assets' values are sensitive to assumptions on depreciation rates and, therefore, so is the land residual. We use the depreciation pattern that puts us closest to official national accounts. In the appendix, we show that using substantially higher or lower depreciation rates does not alter in a significant manner the results of this paper[3].

[3]The only assets that cannot be valued by either the census-like estimate or the perpetual inventory method are mineral reserves. We estimate their values through the net price method, which is a second-best procedure. However, given the low levels of natural resources in Spain (e.g., the value-added share of extractive industries has been always below 2% of GDP), any inaccuracy should have a negligible effect on the top-line estimates of national wealth.

Finally, from 1995 onwards, we also calculate the book value of national wealth using a second definition that computes the balance sheet of corporations—both financial and nonfinancial entities—and adding their net wealth to the market value definition of the national wealth. Data on corporate nonfinancial assets is derived from the Central Balance Sheet Data Office of the Bank of Spain.

In addition to building sectoral balance sheets and various measures of national wealth, we also present a decomposition of the accumulation of national wealth into a volume effect (through savings) and a price effect (through capital gains or losses) in both multiplicative and additive forms. We do this by following the methodology proposed by Piketty and Zucman, 2014 in the appendix to the cited paper, which relates the accumulation of national savings to the evolution of national wealth and obtains the capital gains component as a residual.

However, we also go one step further and perform the same decomposition for housing and non-housing wealth separately, therefore disentangling the influence of various wealth subcomponents in the aggregate. To this end, we start from the definition of national wealth as the sum of the value of domestic nonfinancial assets and the net foreign wealth, $W_N = A^{NF} + NFW$, which we further decompose into housing and non-housing wealth, $W_N = W^H + W^{NH}$. In this expression, housing wealth is the market value of dwellings, while non-housing wealth is the sum of values of other types of capital and the net foreign wealth. Similarly, we decompose national saving into domestic investment (net of depreciation) and foreign saving, $S_N = I + S_F$, which we then decompose into housing investment and non-housing national saving, $S_N = S^H + S^{NH}$. Consequently, each component of national saving is mapped to its corresponding component in the national wealth.

We consider the multiplicative and additive accumulation models (equations 1.1 and 3.4, respectively) separately for each of these two components of national wealth. Between two given years (t and $t + 1$), these decompositions can be specified as follows:

$$W^i_{t+1} = (W^i_t + S^i_t)(1 + q^i_t) \tag{1.1}$$

$$W^i_{t+1} = W^i_t + S^i_t + KG^i_t \tag{1.2}$$

where i stands for housing or non-housing components of national wealth (W) and national saving (S). In addition, $(1 + q_t)$ and KG_t are the residual components that capture increases in the relative price of wealth with respect to consumption goods.

While the results of this study use the market value definition of national wealth, in the appendix we present the same analysis under the book value definition and the results are quite similar.

1.3 Results

This section documents the evolution of wealth in Spain since 1900. Consistently with the existing literature, we report most results as a share of national income. In this manner, stocks are more easily interpretable in real terms and relative to the total income of Spanish residents. We start with the evolution of personal wealth (Section IV.I) and subsequently proceed to present the key findings on the evolution of the national balance sheet by adopting an international perspective (Section IV.II). Very detailed estimates of public wealth have also been computed, but since they hardly affect the evolution of national wealth in the long term, we do not include the respective analysis in this paper. All information on public wealth is available in the appendix.

1.3.1 Personal wealth

Figure 1.1 presents the ratio of personal wealth to national income since 1900. The results indicate that the wealth of Spanish households started at relatively high levels (600% of national income), and subsequently hovered for most of the twentieth century between four and five times the national income until the recent economic boom led this ratio to record levels of almost 800%. To understand this long-run evolution, it is useful to first consider the composition of gross assets (Figure 1.2, upper panel).

One of the most surprising facts is that nonfinancial assets, particularly agricultural and housing land, have always represented the bulk of households' assets. In aggregate, real assets constituted 76% of gross assets in 1900 and 69% in 2017. Behind this seeming continuity, there has been a profound transformation. In the first decades of the century, the composition of Spanish personal wealth followed the conditions of an underdeveloped economy, as agricultural land and farm capital (i.e., livestock and machinery) were the main assets that individuals owned. In fact, until the 1950s, the most important changes in the ratio of wealth to national income occurred as a by-product of the change in the relative share of agriculture in the economy and the evolution of land prices. When land prices declined in real terms (e.g., during the inflationary years of the First World War, and the 1930s), the personal wealth-to-income ratio decreased. The importance of agricultural land also explains the paradoxical result of the Civil War. When Spanish national income fell precipitously (circa 16%), the aggregate wealth remained almost constant in real terms, as destruction and losses in capital assets were compensated by the increase in land prices. Finally, the irreversible decline in agriculture that finally occurred in Spain starting from the mid-1950s contributed to the decline of the wealth-to-income ratio.

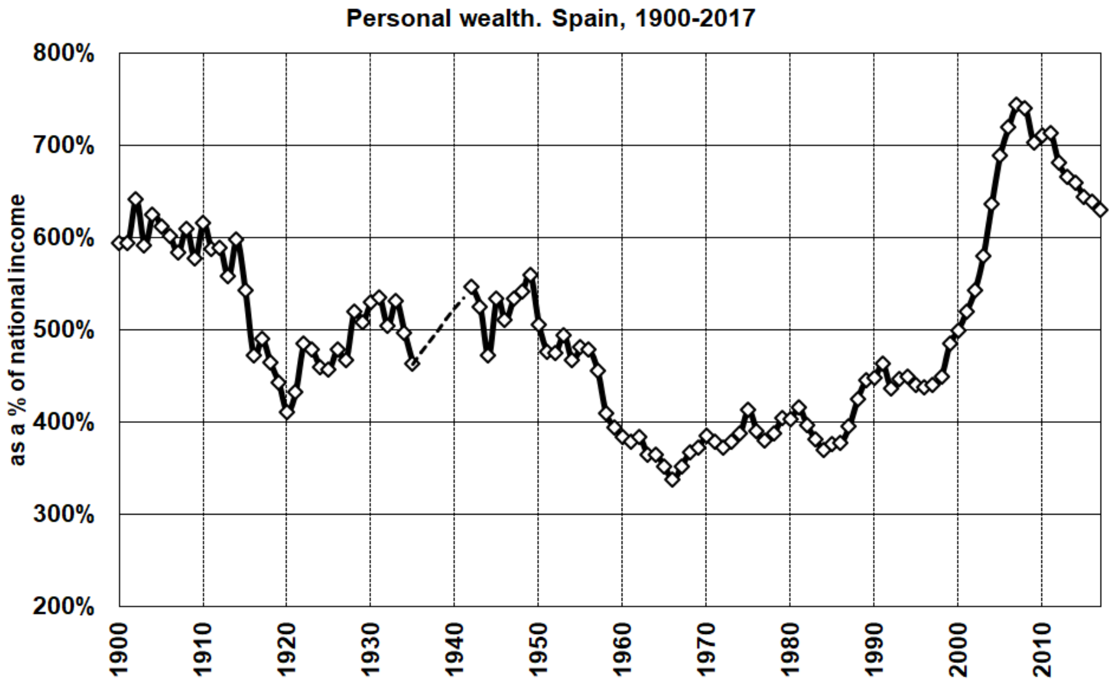


Figure 1.1: Personal wealth. Spain, 1900-2017

Notes: This figure depicts personal wealth as a fraction of national income during 1900-2017 in Spain. Personal wealth is the sum of values of nonfinancial and financial assets less that of financial liabilities for households and the NPISH sector. Computations were made using National Accounts and other sources. Due to the lack of data for the Civil War period, results for 1936-1941 are linearly interpolated. See Table 1 in the data appendix.

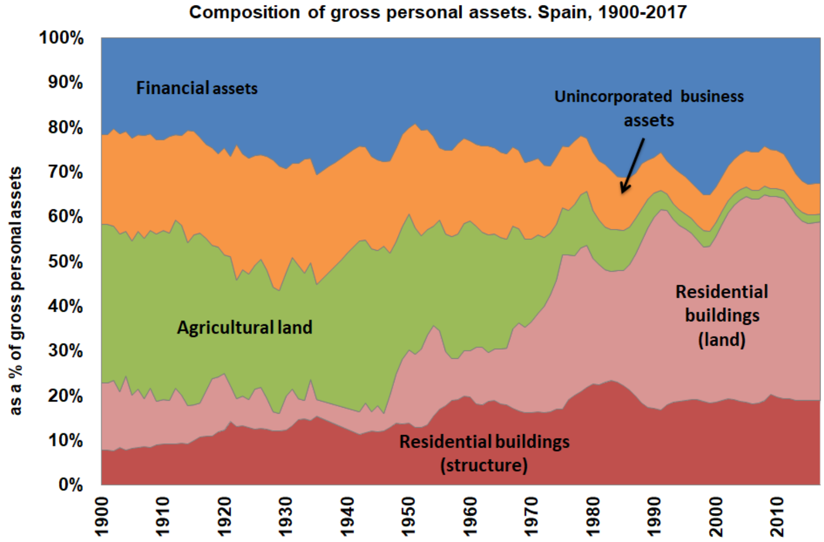
During the golden era of the Spanish economy (1950-1973), income and wealth grew at similar high paces, and housing rapidly became the most important component of private balance sheets. From the mid-1980s, and especially during the boom after the turn of the century, housing led the growth of personal wealth to an unprecedented level of 740% in 2007. In 2017, the most recent year with available data, the ratio of personal wealth to national income stood at 619%, a level similar to that in 2004

(635%). After the most severe economic crisis in more than seventy years, the wealth of Spanish households remains at relatively high levels due to the resilience of the housing market.

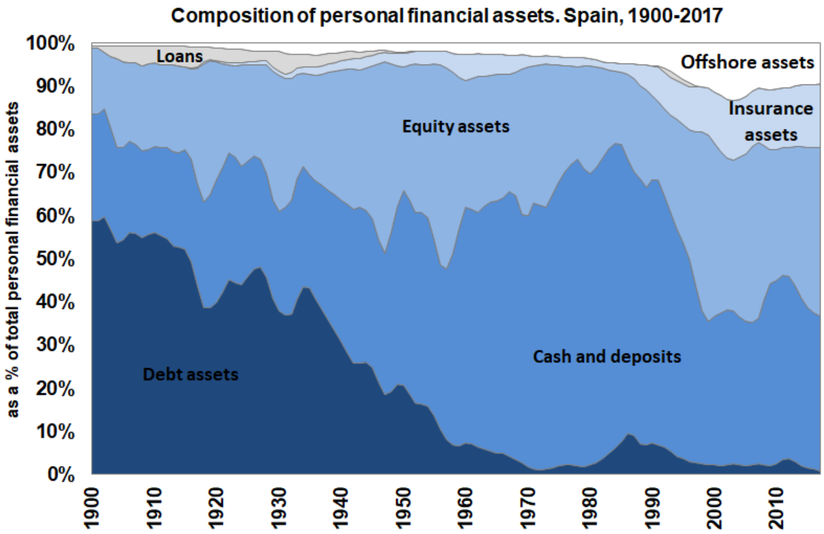
As Figure 1.2 (upper panel) shows, it is not the replacement cost of dwellings but the value of the land underlying them that mostly determined the evolution of housing in the post-war decades. From this perspective, the evolution of Spanish household wealth over the twentieth century can be described as the transition from agricultural to residential land. This rise in housing assets' values can be related both to the structural transformation of the Spanish economy and to changes in the institutional framework. In relation to the former, the housing stock grew rapidly in the wake of the rapid urbanization process that occurred during the 1950s and 60s. Later, as the economy specialized in tourism, the housing stock grew at a higher rate than implied by demographics.

Various institutional changes also help explain the upward trend of Spanish housing prices since the middle of the twentieth century. The most important change was the abolition in the 1940s of the legal requirement that caused each building to have one single owner (M Artola Blanco, 2012). Consequently, homeownership became more widespread, rising in urban areas from levels of less than 30% in 1950 to more than 80% at present. The second relevant institutional change relates to the housing tax policies promoted by Franco's regime and democratic governments, which have always included an implicit subsidy for homeownership. Spain has low levels of property taxes, as cadastral values are far below market ones, and owner-occupied dwellings are subject to important exemptions from income tax (on capital gains if proceeds are reinvested, and on imputed rents on the primary residence since 1999; additionally, mortgage interest payments could be deducted until 2012). Although no study has aimed to quantify the long-term contribution of these policies to the increase in home prices in the case of Spain, evidence for other countries points to a very significant role (Poterba, 1984, Gruber, Jensen, and Kleven, 2020).

Another important explanation of the growth of housing wealth is related to the change in credit markets (Figure 1.3). By any standard, private indebtedness stood at very low levels (namely, below 20% of national income) during the first half of the twentieth century, which seems to be at odds with the fact that household balance sheets were relatively strong, and therefore individuals could have increased their leverage for investment purposes. However, the main private asset at that time (namely, agricultural land) was scarcely used as collateral to obtain loans, given the associated high transaction costs (Juan Carmona and Simpson, 2003). The housing



(a) Composition of gross personal assets. Spain, 1900-2017



(b) Composition of personal financial assets. Spain, 1900-2017

Figure 1.2: Portfolio composition of the personal sector, 1900-2017

Notes: The top figure (panel a) displays the composition of gross personal assets as shares of total gross personal assets during 1900-2017 in Spain. Gross personal assets are decomposed into residential buildings (valued as the replacement cost of the structure), land underlying residential buildings, agricultural land, unincorporated business assets, and financial assets. The bottom figure (panel b) displays the composition of personal financial assets as shares of total personal financial assets during 1900-2017 in Spain. Personal financial assets are composed of debt securities, cash and deposits, equity shares, insurance claims, loans, and offshore assets. Note that the asset category "other" is excluded from this graph since we have the data for this series only from the 1970s onwards. Due to the lack of data for the Civil War period, results for 1936-1941 are linearly interpolated. See Tables 3.f and 3.g in the data appendix.

mortgage market was actually more dynamic, although it was mostly driven by loans extended to large urban owners. After the 1950s, there was a radical shift in credit markets, as the development of the banking sector, most importantly of savings banks, enabled broader sections of the population to obtain loans. The development of household credit thus became closely connected with the real estate cycle, as each boom (the mid-1960s, 1986-1991, and 1999-2007) fostered the growth of household debt to increasingly higher levels.

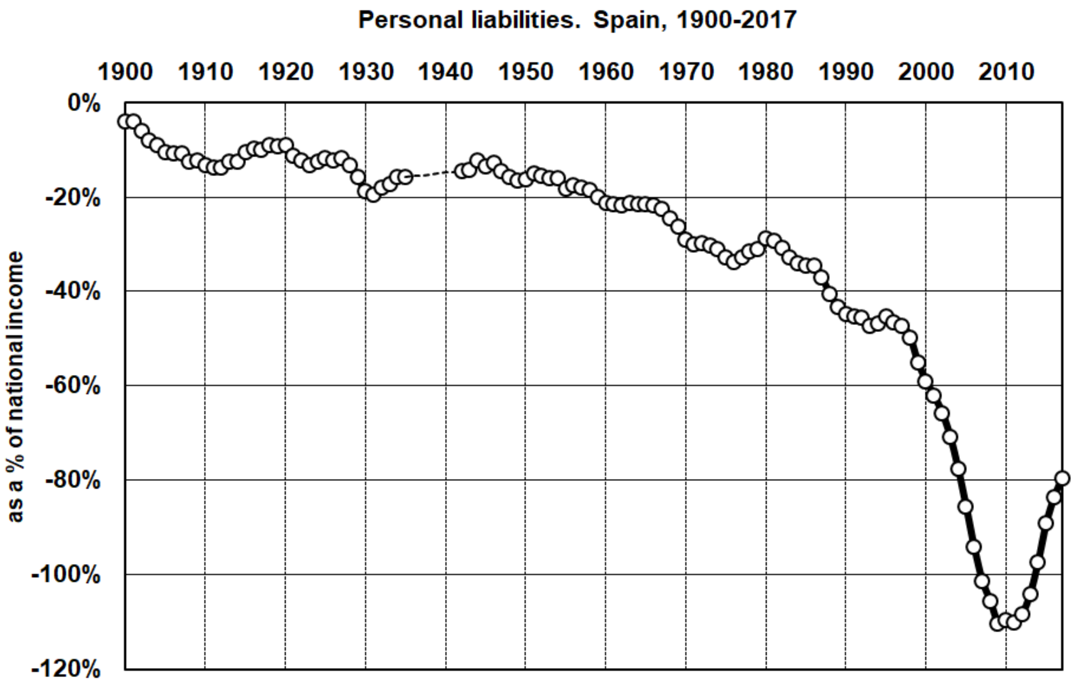


Figure 1.3: Personal liabilities. Spain, 1900-2017

Notes: This figure depicts personal financial liabilities as a percentage of national income during 1900-2017 in Spain. Computations were made using National Accounts and other sources. Due to the lack of data for the Civil War period, results for 1936-1941 are linearly interpolated. See Table 3.a in the data appendix.

The significant weight of real assets should not conceal the equally remarkable transformation in the composition of households' financial assets (Figure 1.2, lower panel). Until the Civil War, debt securities were the most important claim, with a share that fluctuated from 40 to 60% of gross financial assets. This fact attests not only to the prominence of public debt and railway debentures in relation to equity shares in capital markets but also implicitly to the investment preferences of wealthy families at the time. Considering that wealth (particularly financial assets) was heavily concentrated (Alvaredo and Miguel Artola Blanco, 2017), and given that the banking system was largely underdeveloped and lacked any form of deposit insurance, it seemed normal for rich households to lend directly to the government or corporations. Unsurprisingly, high inflation since 1936 constituted a major wealth shock, as the value of most fixed income securities was rapidly wiped out.

Beginning in the 1960s, the composition of personal financial assets in Spain started to resemble the conditions of a developed country. Banking deposits became the most widespread tool for channelling households' savings, and many unincorporated businesses turned into limited-liability companies (Tafunell, 2005). Thus, by the time the Franco's regime ended in 1978, Spain started to experience a process of financialization and deregulation with three noticeable effects. First, in recent decades increasing co-movement between financial and nonfinancial assets has been observed, which followed similar trends documented on the global scale (Jordà, Knoll, et al., 2019). The process of financialization also led to an exponential rise in offshore assets. In 2012, offshore assets amounted to 195 billion euros, i.e., 23% of both national income and net personal financial wealth. This estimate is higher than 8% obtained by Zucman, 2013 for all countries worldwide. In fact, the bulk in offshore assets has increased on average the wealth share of the top 1% from 22.7% to 25.7% since the mid-eighties (Martínez-Toledano, 2019). Hence, offshore wealth constitutes a non-negligible part of the portfolio of households in Spain and must be considered when analysing the long-run evolution of wealth. Third, in Spain, pension assets have had an almost residual weight until the present. The rise of an unfunded social security system since late Francoism has undoubtedly influenced households' preferences to accumulate real estate assets.

1.3.2 National wealth

To the best of our knowledge, this is the first study that presents results on national wealth from both book value and market value perspectives, and covers a period of over a century. Altogether, all three series evolve very similarly over this long period (Figure 1.4, upper panel).[4] The national wealth-to-income ratio followed a trend similar to that of the personal wealth-to-income ratio we described in Section IV.I and remained in a relatively narrow range during the twentieth century—between 400 and 600%—until the real estate boom of the early 2000s led to an unprecedented rise to almost 800% in 2007, the highest value among all countries with available records since 1900. Overall, the long-term dynamics of national wealth in Spain were dictated mostly by the evolution of two real assets—agricultural land and housing—that almost invariably represented 60 to 70% of total nonfinancial assets

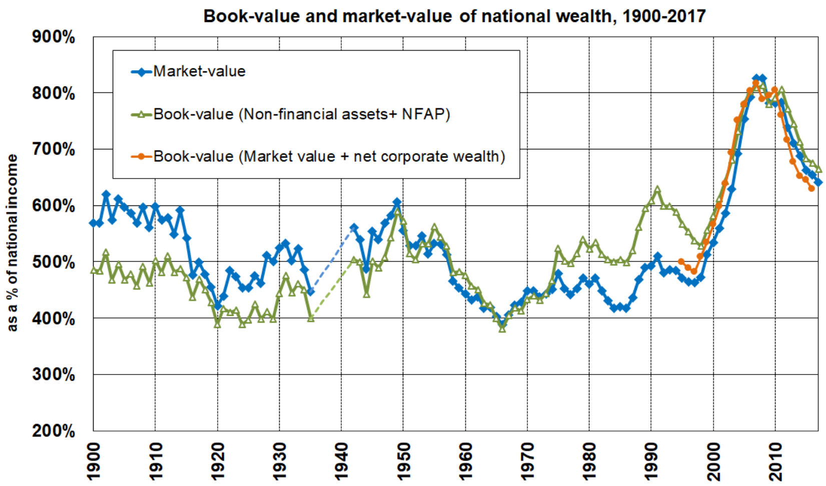
[4] Given the resemblances among the three series, we will focus only on the market value series and abstract from the book value series in the following sections.

(Figure 1.4, lower panel).

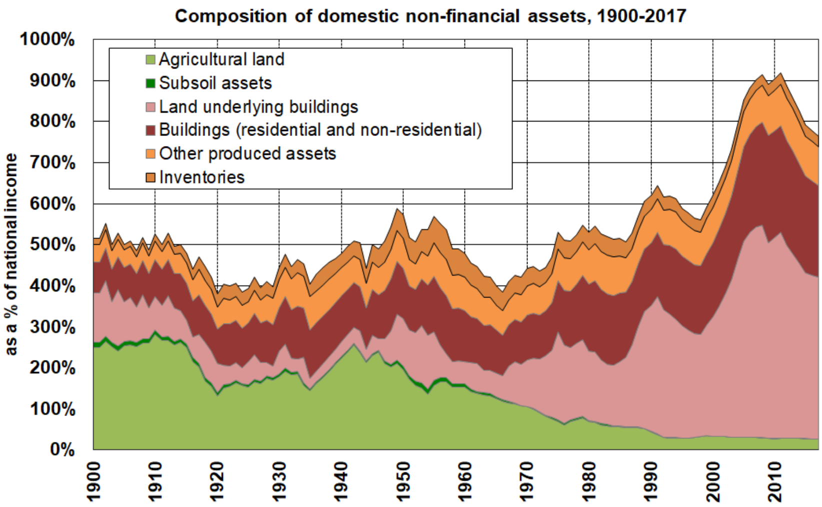
From an international perspective, Piketty and Zucman, 2014 show that European economies followed a marked U-shaped evolution in their wealth-to-income ratios over the twentieth century. In contrast, in *New world* countries (i.e., Canada and the US) the trend was much smoother (fluctuating around 3 to 5 times the national income), but still followed a similar U-shaped pattern. As Figure 1.5 shows, Spain followed a unique path. It started from lower values than did core European countries (namely, 6 times the national income as opposed to almost 7 times), and subsequently experienced a significant but smaller decrease during the World War I years. Thereafter, and contrary to other countries, Spain's national wealth fluctuated for the remainder of the century at relatively high values of between 4 and 5 times the national income. Only in the late 1990s did wealth-to-income ratios begin to follow the trend of fast growth, which concluded in a striking increase during the 2000s. From this perspective, a J-shaped curve may better than a U-shaped figure represent the broad evolution of Spain since 1900.[5] Three peculiarities mark the long-run accumulation of wealth in Spain.

First, the specific asset composition of the Spanish national wealth contributes to explaining this different evolution. Figure 1.6 depicts the evolution of the values of agricultural land (upper panel) and housing (lower panel) as a percentage of national income. The first figure shows that the value share of agricultural land in Spain ultimately followed a long-term decline similar to changes in other European economies, but did so with some delay that was exacerbated by the partial ruralization in the 1940s. This evolution is consistent with the latecomer dimension of Spain, with agriculture playing a large role well into the twentieth century. The second figure shows that housing wealth had a similar weight to that in other economies during the first half of the century, but rose much faster beginning in the 1960s, reaching at the peak of the housing boom the highest ratio among countries with available data. Indeed, the evolution of these two assets determined the high values for Spain in the middle decades of the twentieth century, a period in which these ratios reached their lowest levels in other advanced economies. Overall, these results indicate that land has played a much more significant role in the evolution of wealth in Spain compared to other advanced countries since both agricultural and housing wealth are largely driven by this non-produced element.

[5]Note that with the book-value wealth estimate the J-shaped pattern is less visible and it is closer to a hockey-stick pattern, fluctuating at relatively constant values of 4-to-5 times national income until 1990s, after which it also increases dramatically. The reasons for the divergence between the market and the book value series during the first decades of the 20th century are mainly due to productive capital. For a detailed explanation see appendix (pages 66-67).



(a) Book value and market value of national wealth, 1900-2017



(b) Composition of domestic nonfinancial assets, 1900-2017

Figure 1.4: National wealth and domestic nonfinancial assets, 1900-2017

Notes: The top figure (panel a) compares national wealth at market and book values as a percentage of national income during 1900-2017 in Spain. National wealth at market value (blue line) is the sum of personal and government net worth. In contrast, national wealth at book value (green line) is the sum of values of nonfinancial assets of all domestic sectors and the net foreign wealth. The difference between both definitions can be traced to the corporate sector, particularly to the mismatch (or residual wealth) that exists between the corporate book value of equities and the market value. Specifically, adding corporate wealth to the market value of national wealth (orange line) equals the book value definition. The bottom figure (panel b) depicts the composition of domestic nonfinancial assets as a fraction of national income during 1900-2017 in Spain. Domestic nonfinancial assets are decomposed into buildings (valued as the replacement cost of the structure), land underlying buildings, natural resources (agricultural land and subsoil assets), and other produced assets (buildings and constructions, machinery and equipment, and transport equipment). Due to the lack of data for the Civil War period, results for 1936-1941 are linearly interpolated. See tables 3.a and 3.c in the data appendix.

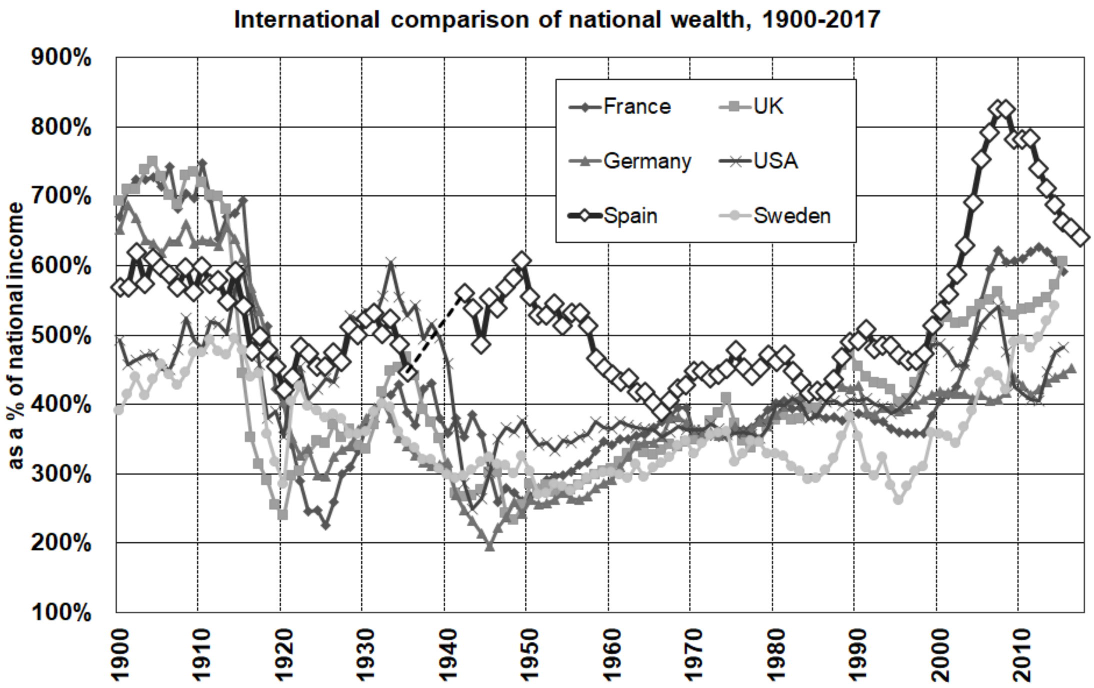


Figure 1.5: International comparison of national wealth, 1900-2017

Notes: This figure depicts national wealth as a percentage of national income during 1900-2017 in Spain, France, Germany, Sweden, the UK, and the US. The series for France, Germany, Sweden, the UK and the US are taken from the World Inequality Database. See Table 5.b in the data appendix.

Second, Spain was heavily dependent on foreign finance since the late 1990s. In fact, its decline in net foreign assets was one of the largest among developed countries (Figure 1.7, upper panel). Whereas for most developed countries the net foreign asset position has not deteriorated by more than 50% of national income in the last three decades, in Spain it surpassed more than 100% of national income in the 2000s. As Figure 1.7 (upper panel) shows, Greece and Portugal experienced similar declines in net foreign assets relative to national income. However, as we document in Section VI, the factors driving this decline in Spain are very different from those in Greece and Portugal. Furthermore, as Figure 1.7 (bottom panel) shows, our calculations for households' assets in tax havens can have a significant impact on Spain's international position, reducing it by one quarter.

Third, Spain also exhibits some striking differences in the decomposition of the long-term accumulation of national wealth into new savings (the volume effect) and changes in relative prices (the capital gains effect). Table 1.1 compares the decomposition of national wealth accumulation into volume and capital gains effects during three periods (1900-2016, 1900-1950, and 1950-2016) and for countries with available data (France, the UK, Germany, Sweden, and the US). In the longest period

(1900-2016), volume effects were the dominant force in total wealth accumulation for all countries. In Spain, this force was relatively more important over this period, with capital gains explaining 46% of the total accumulation of wealth in real terms.

However, it seems preferable to use 1950 as a cut-off point, given that most wealth-to-income ratios approached their lowest levels in that year. From 1950 to 2016, Spain exhibits the most remarkable differences. Savings explain a large part of wealth accumulation in France, Germany, Sweden, and the US, while capital gains are only a key driver of the accumulation of national wealth in the UK. Spain stands out in this respect because capital gains account for 52% of the total accumulation of national wealth.

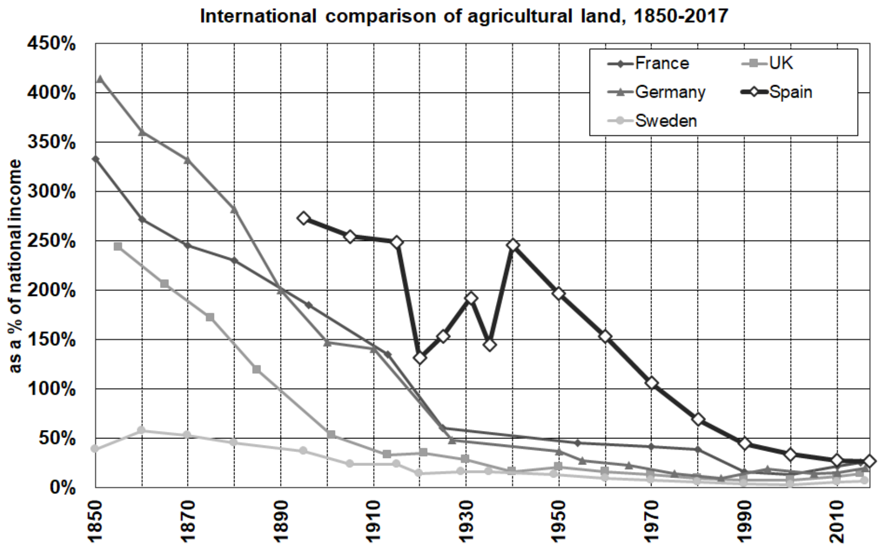
Accumulation of national wealth in
Spain, the US, the UK, Germany, France, and Sweden, 1900-2016

	1900-2016			1900-1950			1950-2016		
	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate
	g_w	$g_{ws} = s/\beta$	q	g_w	$g_{ws} = s/\beta$	q	g_w	$g_{ws} = s/\beta$	q
Spain	2.8%	1.4%	1.3%	0.9%	0.7%	0.1%	4.1%	1.9%	2.1%
		54	46		87	13		48	52
United States	3.0%	2.2%	0.7%	2.9%	2.3%	0.5%	3.1%	2.2%	0.9%
		75	25		81	19		70	30
United Kingdom	1.6%	1.2%	0.4%	-0.4%	0.6%	-1.1%	3.3%	1.7%	1.5%
		76	24		-150	250		53	47
Germany	1.9%	2.3%	-0.3%	-0.7%	0.5%	-1.2%	3.9%	3.6%	0.3%
		116	-16		-83	183		92	8
France	2.1%	1.9%	0.3%	-0.6%	0.3%	-0.8%	4.2%	3.1%	1.1%
		88	12		-52	152		74	26
Sweden	3%	2.8%	0.2%	2.4%	1.2%	1.2%	3.5%	4.1%	-0.5%
		93	7		48	52		115	-15

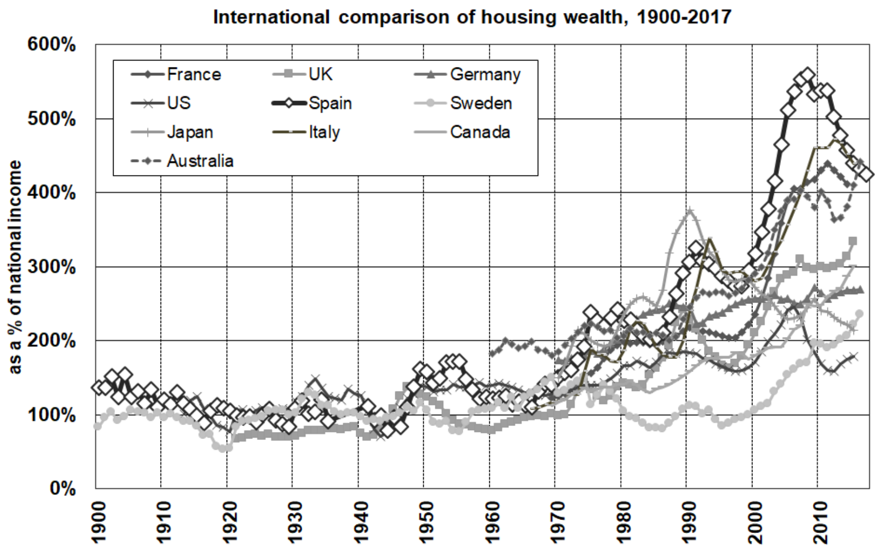
Table 1.1: Accumulation of national wealth in Spain, the US, the UK, Germany, France, and Sweden, 1900-2016 (multiplicative decomposition)

Notes: This table illustrates the accumulation of national wealth in Spain, the US, the UK, Germany, France, and Sweden during 1900-2016. Savings-induced wealth growth includes war destructions. Computations were made using national accounts and other sources. The results for the US, the UK, Germany, and France originate from Piketty and Zucman, 2014, and for Sweden, from Waldenström, 2017. The small numbers below the savings and capital gains growth rates are the percentages of each in the total growth rate. Results for the US cover the period until 2015. Results for Spain cover the period until 2017, to make them comparable with all other calculations in both the paper and appendix that extend until 2017. Results obtained for periods extending until 2016 or 2017 are virtually identical.

To provide a more in-depth analysis, Table 1.2 shows a detailed decomposition



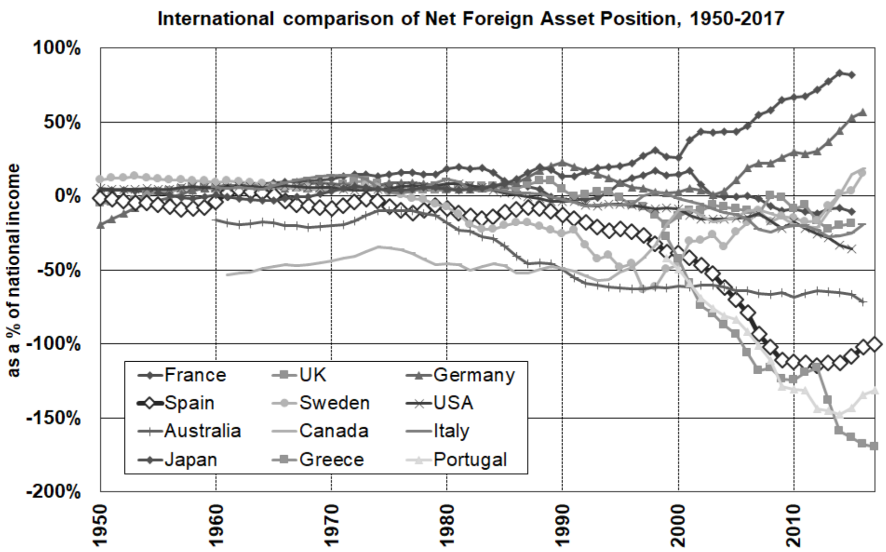
(a) International comparison of agricultural land, 1850-2017



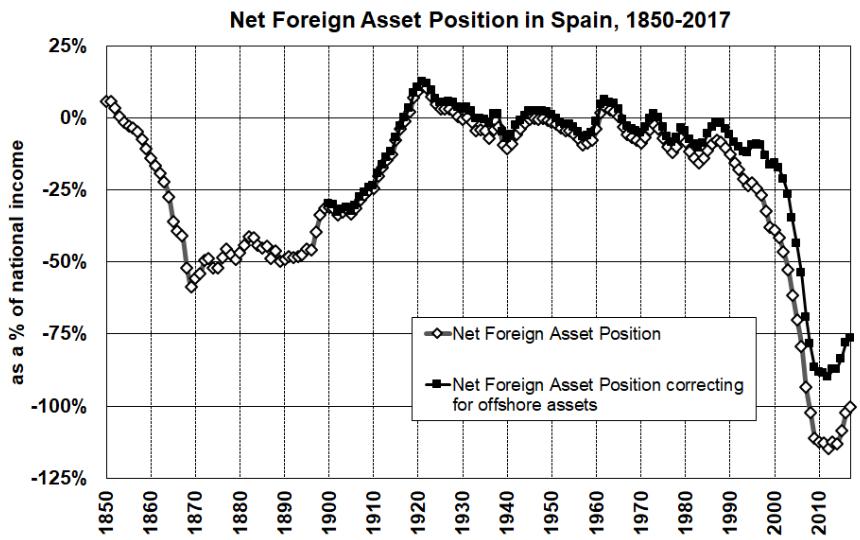
(b) International comparison of housing wealth, 1900-2017

Figure 1.6: International comparison of agricultural land and housing wealth, 1900-2017

Notes: The top figure (panel a) depicts the value of agricultural land as a percentage of national income during 1850-2017 in Spain (data only available since 1986), France, Germany, Sweden, and the UK. The series for France, Germany, and the UK are taken from Piketty and Zucman, 2014 and are linked to the latest updates of these data in the World Inequality Database. Data for Sweden originate from Waldenström, 2017 and are linked to the latest updates made by the author at the World Inequality Database (see Table 5.e in the data appendix). The bottom figure (panel b) depicts housing wealth as a percentage of national income during 1900-2017 in Spain, Australia, Canada, France, Germany, Italy, Japan, Sweden, the UK, and the US. Data for all series are from the World Inequality Database except for Spain; data for the latter represents our own calculations. All series incorporate the value of the edification and the value of the land underlying the edification. See Table 5.f in the data appendix.



(a) International comparison of the net foreign asset position, 1950-2017



(b) Net foreign asset position in Spain, 1850-2017

Figure 1.7: Long-term evolution of the net foreign asset position

Notes: The top figure (panel a) depicts the net foreign asset position as a percentage of national income during 1950-2017 for Spain, Australia, Canada, France, Germany, Greece, Italy, Japan, Portugal, Sweden, the UK and the US. Data are from the World Inequality Database, except for Greece and Portugal, data for which were obtained from the Eurostat. See Table 5.d in the data appendix. The bottom figure (panel b) displays the net foreign asset position in Spain during 1850-2017 together with the net foreign asset position corrected for offshore assets for the subperiod of 1900-2017. The net foreign asset position was calculated from 1970 onwards using the Financial Accounts of the Bank of Spain and for the historical period by revising the data of Prados de la Escosura and J. R. Rosés, 2010 on the current account balance. Offshore assets are derived using mainly the data of Zucman, 2013; Zucman, 2014; Zucman, 2015 and statistics gathered since 2012 by tax authorities on the assets held abroad by Spanish residents. See Table 3.b in the data appendix.

specific to the Spanish case[6]. We divide the national wealth among housing, other types of capital and foreign wealth and subsequently calculate the saving and capital gains rates for the three subsectors. From 1950 to 2017, Spain experienced a period of rapid growth and industrialization, which occurred together with high rates of saving and consequently a new wave of investment. In this context, asset price variations in the housing market played a fundamental role in the growing value of national wealth, to the point that rising housing prices explain 70% of capital gains observed between 1950 and 1980 and 82% of those between 1980 and 2017. Regardless of which metric is chosen, housing has become the most important driver of Spain's balance sheet.

Accumulation of national wealth in Spain, 1900-2017
(Additive decomposition)

	Savings (% total cumulative net savings)			Capital gains (% total capital gains)		
	Housing	Other types of capital	Foreign	Housing	Other types of capital	Foreign
1900-1950	34%	64%	2%	49%	8%	43%
1950-2017	57%	79%	-36%	80%	21%	-1%
1950-1980	42%	93%	-35%	70%	-1%	31%
1980-2017	63%	73%	-36%	82%	28%	-10%

Table 1.2: Accumulation of national wealth in Spain, 1900-2017 (Additive decomposition)

Notes: This table illustrates the accumulation of national wealth in Spain during 1900-2017 using an additive decomposition. Savings include war destructions. National wealth is decomposed into housing, other types of capital, and foreign wealth. The table shows that, e.g., housing accounts for 34% of total cumulative net savings over 1900-1950.

1.4 International capital flows and housing prices

In the previous section, we showed that in the 2000s wealth increased in Spain much faster than did income and that this increase was mainly driven by higher urban land values. This trend was unique relative to the country's history and to the evolution of wealth-income ratios in other developed countries. As previously documented in the literature review, explaining this unique path is particularly

[6]We present this analysis for the market value-based national wealth series, the results for which are practically identical to those for the book value-based series.

challenging since there are many potential mechanisms that could have led to this rise. In this section, we build on the studies by Bernanke, 2005, Himmelberg, Mayer, and Sinai, 2005, Favilukis et al., 2012 and Ferrero, 2015 examining the US and analyse the relationship between foreign capital flows, the growth in household credit and the evolution of the real estate market. We believe this channel to be of particular interest, given that the unprecedented growth of Spain's wealth-to-income ratio in the 2000s due to rising urban land values occurred at the same time the country became heavily dependent on foreign finance. We first perform a descriptive analysis, and subsequently complement it with an empirical analysis, following Favilukis et al., 2012.

When it comes to analysing international capital flows, Spain is in a unique position if we compare it to other European countries. Within the EU, together with Greece and Portugal, Spain has experienced the largest deterioration in its net foreign asset position in the years preceding the crisis. However, the factors driving the growth of Spain's foreign liabilities are clearly distinctive. According to the IMF's data on international investment positions, in Greece and Portugal the growth of public debt explained the increase in the negative foreign asset position, while in Spain this rise was mainly driven by the increase in private debt.

Table 1.3 (upper panel) shows that from the late 1990s to 2007, Spanish financial institutions—mostly commercial banks—were the main actors increasing foreign funding. The increase in foreign liabilities of Spanish monetary institutions occurred mainly through the issuance of banks' debt securities rather than through other sources of funding (e.g., deposits, loans or equity) (Table 1.3 (bottom panel)). Towards the end of the housing boom, private banks suffered a sharp reduction in their net foreign liabilities, as some of their traditional funding channels closed, and they had to resort to funding provided through the Bank of Spain and the ECB's TARGET system (Whelan, 2014). Since then, private deleveraging and the growth in public debt have made the government sector the main contributor to Spain's negative foreign position.

During the 2000s, two important and deeply interrelated changes took place in the Spanish mortgage market. The first change was that banks began to use new sources of funding to fuel credit issuance. Traditionally, banks relied solely upon deposits to fund mortgages, but from the start of the 2000s, they increasingly resorted to the issuance of bonds secured by their mortgage portfolios. This process was different from the rise in asset-backed securities that occurred at the same time in the US mortgage market, as Spanish banks mostly issued covered bonds, a type of debt that is guaranteed both by a special pool of mortgages and by the issuer. Figure 1.8 (upper panel) summarizes this fundamental change by relating the value of mortgage securities (i.e., covered bonds and other debt assets) to the outstanding volume of mortgages held by financial institutions. Securitization rose from almost negligible levels in 1996 (3%) to very high levels in 2012 (60%), given that overcollateralization requirements would imply a maximum of 80%.

Net foreign asset position of the Spanish economy by institutional sector

	National Economy	Nonfinancial corporations	Financial institutions	*incl. the Central Bank*	*incl. Other monetary financial institutions (OMFIs)*	*incl. Other financial institutions*	General government	Households and NPISHs
1997	-28%	-24%	7%	13%	-11%	4%	-17%	6%
2002	-48%	-34%	4%	5%	-22%	20%	-26%	8%
2007	-99%	-52%	-38%	6%	-45%	1%	-17%	9%
2012	-111%	-43%	-41%	-27%	-16%	3%	-33%	6%
2017	-98%	-51%	-9%	-20%	-15%	26%	-51%	13%

(a) Net foreign asset position of the Spanish economy by institutional sector

Net foreign asset position of the Spanish economy by asset type

	National Economy	Currency and deposits	Debt securities	Loans	Equity and investment funds	Insurance, pension and standardized guarantee schemes	Other accounts
1997	-28%	0%	-1%	-4%	-24%	0%	0%
2002	-48%	-18%	1%	-13%	-19%	0%	1%
2007	-99%	-18%	-45%	-19%	-15%	0%	-1%
2012	-111%	-48%	-41%	-24%	-1%	0%	4%
2017	-98%	-43%	-41%	-17%	0%	0%	2%

(b) Net foreign asset position of the Spanish economy by asset type

Table 1.3: Net foreign asset position of the Spanish economy (as a percentage of national income), 1997-2017

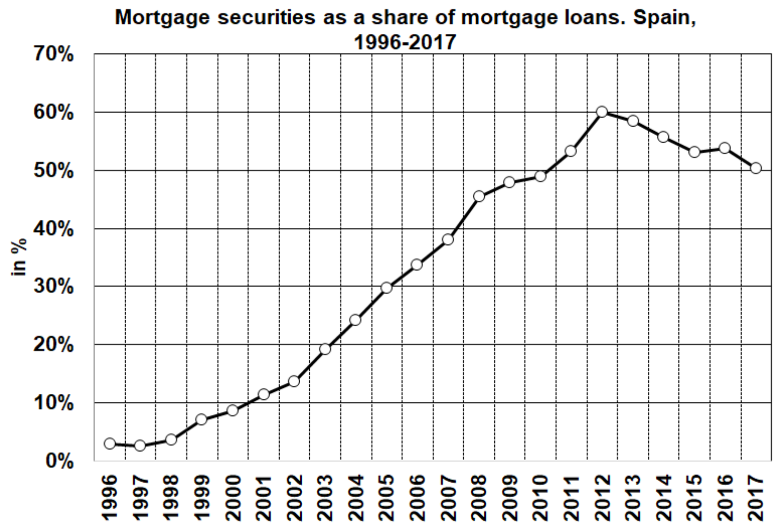
Notes: This table decomposes Spain's net foreign asset position in five benchmark years. Panel a presents the net foreign assets of the four main institutional sectors and further decomposes the financial sector into three subsectors. Panel b presents the net foreign position according to the net positions held by Spanish residents in six asset classes. Data are derived from the financial accounts compiled by the Bank of Spain.

The other major change occurred as Spanish monetary institutions became more integrated in international capital markets after the country entered the Eurozone. Foreign investors became the main buyers of this unprecedented volume of Spanish financial debt securities, as this channel seemed to perfectly suit the interests of all parties involved. Spanish banks obtained funding for longer time horizons, and foreigners could invest in a safe asset with no currency risk to earn an attractive yield. This last phenomenon is shown in Figure 1.8 (bottom panel), which compares the spreads of Spanish public debt and covered bonds versus the equivalent German assets. Although both trends evolve very similarly in the long term, this should not conceal the fact that Spanish covered bonds offered an extra 0.5% return versus equivalent German bonds over the period of 2002-2007.

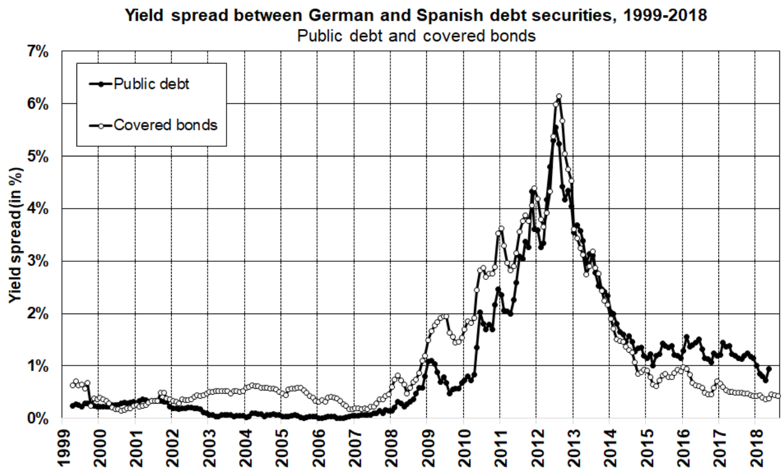
Figure 1.9 summarizes these changes by examining the balance sheet of Spanish monetary institutions. On the asset side, the share of households' loans (mainly mortgages) as a share of total financial assets rose steadily from 16% to 28%, while on the liabilities side, debt securities issued by Spanish banks and owned by foreign investors increased from 0% to almost 10% as a share of total liabilities. The striking resemblance in the magnitudes of these two trends serves as a starting point for analysing the influence of foreign capital flows on housing prices. In the US, Favilukis et al., 2012 investigate the importance of foreign credit in explaining the recent housing price cycle. Using time series data, the authors isolate the influence of international lending on housing prices while controlling for the three most important factors that could potentially affect both housing prices and foreign credit: local demand for mortgage credit, monetary conditions and lending standards. Once these alternative factors are taken into account, they observe that the supply of international credit plays a negligible role in explaining variations in the US real estate values. They rationalize this finding by showing that the rise in the US international indebtedness during the housing up-and-down moves was almost entirely driven by US Treasury and agency debt. This is in stark contrast with the Spanish experience that was led by mortgage securities, as we showed above.

We follow closely the two-step approach of Favilukis et al., 2012 and test if the international supply of credit influenced Spanish real estate values.[7] First, we investigate the pure correlations between credit standards, international capital flows, and interest rates with housing prices over the recent housing price cycle. In the second set of regressions, we examine the role played by supply-side factors (i.e., real interest rates, lending standards and international capital flows) in explaining housing

[7]Credit demand, monetary policy and lending standards have already been observed to be relevant factors driving the recent Spanish housing boom and bust (e.g., González and Ortega, 2013, Sanchís-Guarner, 2017, Jordà, Schularick, and Taylor, 2015, Akin et al., 2014).



(a) Mortgage securities as a share of mortgage loans, Spain, 1996-2017



(b) Yield spread between German and Spanish debt securities, 1999-2018

Figure 1.8: Market for debt securities in Spain

Notes: The top figure (panel a) depicts the value of mortgage securities (covered bonds and other assets) issued by Spanish banks as a percentage of the total volume of mortgages held by these financial institutions. The bottom figure (panel b) displays the yield spread between Spanish and German debt securities during 1999-2018. The black line traces the spread between 10-year bonds of both governments. The grey line shows the spread between covered bonds issued by monetary institutions of these two countries. Information on government bonds' yields has been taken from the respective central banks, while data on covered bond yields are derived from Markit iBoxx Indices.

prices, after having excluded the influence of credit demand on the growth in the supply of international credit. In these specifications, the main explanatory variable of interest is the residual of a regression of international capital flows on credit demand together with control variables for credit standards and real interest rates. The rationale behind this approach is to capture variation in the supply of foreign lending that is independent from the state of the economy (i.e., changes in credit demand) or from expectations about future economic conditions (i.e., changes in real interest rates). While this time series approach cannot fully exclude the presence of omitted variables, we indeed account for the factors that the literature identifies as the most relevant to explaining the supply of international credit. Contrary to the US case, we observe that in Spain foreign capital flows influence housing prices, as do credit demand, lending standards and interest rates.

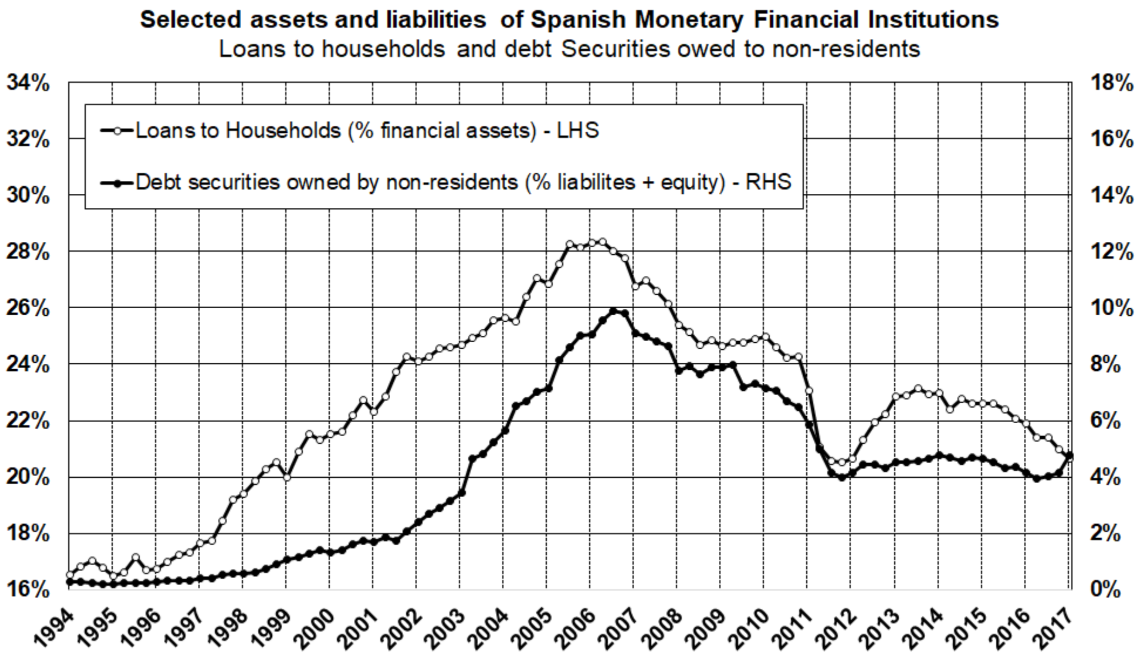


Figure 1.9: Selected assets and liabilities of Spanish monetary financial institutions

Notes: This figure displays two key components of the balance sheet of Spanish Monetary Financial Institutions. First, the share of loans granted to households as a percentage of total financial assets (LHS). Second, the share of debt securities issued by Spanish Monetary Financial Institutions and owned by non-residents, as a percentage of liabilities plus shareholders' equity (RHS). All data is derived from the Bank of Spain's Financial Accounts.

We use as the main measure of international capital flows the growth in net foreign holdings of debt securities issued by Spanish monetary institutions, measured as a share of the GDP.[8] To measure credit standards, we use a standardized version of the loan margin for households purchasing dwellings that is reported by Spanish banks in the Bank Lending Survey (BLS). A positive value of this variable indicates

[8]Nonetheless, we also consider the correlations of housing prices with two other more common measures of capital flows: the current account balance and the net foreign asset position. These two metrics exhibit lower correlations (see Table 6 in appendix). This finding confirms observations of Obstfeld, 2012 and Lane and McQuade, 2014 that the current account is not the best indicator of capital flows.

an easing of credit conditions. To measure credit demand, we use the net percentage of banks that report having experienced an increase in households' demand for mortgage credit in the previous quarter in the BLS. For real interest rates, we use the nominal ten-year rate of the Spanish public debt obtained from the Bank of Spain statistics, less the expected inflation rate reported by a panel of experts from FUNCAS. Finally, nominal housing prices are based on property appraisals, and the series is the same as that used to construct our housing wealth series. We convert the series into constant prices using the inflation rate from the Spanish National Institute of Statistics. Observations are available on a quarterly basis and range from the last quarter of 2002 to the last quarter of 2017.[9]

Table 1.4 (columns 1-4) reports the results of regressions of real housing price growth on credit standards, real interest rates and the growth in net foreign holdings of debt securities. Columns 1-3 show that all three variables play a role in explaining housing price growth and that real interest rates are the most important driver. What is important for our analysis is that international capital flows are significant in all regressions, even after controlling for credit standards and/or real interest rates (column 4). These results contrast with those of Favilukis et al., 2012 for the US, where international capital flows do not seem to affect home prices.

In columns 5 and 6, our main explanatory variable of interest is the residual of the regression of international capital flows on credit demand. We continue to use as additional explanatory variables our measure of credit standards and the real ten-year public debt yield. Note that isolating credit demand from the foreign lending effect is quite relevant in the Spanish context during the 2000s, as a large part of the rise in housing prices was driven by the boom in foreign-born population (González and Ortega, 2013 and Sanchís-Guarner, 2017). Column 5 shows that the residual capital flow measure remains significant and explains by itself almost the same amount of variation in the housing price growth, approximately 15% (column 5), as that explained by the raw series of the growth in net foreign holdings of debt securities (20%, column 3). The results also remain significant after all other variables are included as additional regressors (column 6).

Even though identification is a challenge in this type of macroeconomic time series approach, the evidence presented supports the hypothesis that international capital flows were significantly related to housing prices in Spain during the 2000s. Hence, together with changing demographics and monetary policy, the access to international credit by Spanish credit institutions seems to have played a significant role in the

[9] See the companion appendix covering methodology for details on the series.

evolution of the real estate market in Spain.

	(1)	(2)	(3)	(4)	(5)	(6)
CS (Margin)	0.008**			0.002		0.002
	(2.623)			(0.735)		(0.919)
rr10yr		-0.010***		-0.008***		-0.009***
		(-4.778)		(-3.837)		(-3.735)
ΔND/GDP			0.182***	0.113**		
			(2.931)	(2.298)		
Res. CD					0.159**	0.103**
					(2.495)	(2.093)
Constant	0.000	0.019***	-0.001	0.014**	0.000	0.016**
	(0.049)	(2.695)	(-0.329)	(2.073)	(0.023)	(2.185)
R-squared	0.124	0.398	0.200	0.472	0.145	0.460

Table 1.4: Quarterly regressions of real housing price growth on international capital flows growth, credit standards and real interest rates, 2002-2017

Notes: This table presents the results of quarterly regressions of real housing price growth on credit standards, real interest rates and the growth in net foreign holdings of debt securities. To measure international capital flows, we use the growth in net foreign holdings of debt securities issued by Spanish monetary institutions, excluding the Bank of Spain, measured as a share of GDP (ΔND/GDP). For credit standards (CS), we use the loan margin reported by Spanish banks in the Bank Lending Survey (BLS) compiled by the Bank of Spain. This margin is specific to loans extended to households for the purchase of dwellings and should be understood as a spread over the relevant market reference rate (e.g., EURIBOR, LIBOR or the interest rate swap of the corresponding maturity for fixed-rate loans), depending on the characteristics of the loan. The survey reports the net percentage of banks that claim to have higher margins. A positive value of this variable therefore indicates a tightening of credit conditions, while a negative value indicates an easing. We standardize the credit standards variable by dividing by the standard deviation and subtracting its mean based on data for the full sample. For real interest rates (rr10yr), we use the nominal ten-year rate of the Spanish public debt, obtained from the Bank of Spain statistics, less the expected inflation rate reported by a panel of experts from FUNCAS. Nominal housing prices are based on property appraisals, and the series is included in the housing market indicators released by the Bank of Spain. We convert the series into constant prices using the inflation rate data from the Spanish National Institute of Statistics. The credit demand variable (CD) we use is that included in the BLS compiled by the Bank of Spain. This measure is specific to changes in demand for loans granted to households for the purchase of dwellings. The respective survey tracks the net percentage of banks that report having experienced an increase in the demand for loans in the previous quarter. A positive value of this variable therefore indicates an increase in demand, while a negative value indicates a decrease. We standardize the credit demand variable by dividing by the standard deviation and subtracting its mean based on data for the full sample. Res. CD is thus the residual variable of a regression of our measure of international capital flows (ΔND/GDP) on our measure of credit demand (CD). Observations are available on a quarterly basis and range from the last quarter of 2002 to the last quarter of 2017. Hence, all regressions have 61 observations in total. Newey-West standard errors using four lags are reported in parentheses.

1.5 Concluding comments

This study reconstructs Spain's national balance sheet from the beginning of the twentieth century to the present under both the market value and book value definitions. We also present a new asset-specific decomposition of long-run movements in the value of wealth, housing and other assets into a volume effect (through savings) and a price effect (through capital gains or losses).

Overall, the national wealth-to-income ratio followed a J-shaped curve during the twentieth century, and reached in 2007 the highest value among all countries with available records since 1900. Another peculiarity of Spain is that agricultural land and housing have always represented the most important components of national and personal sector balance sheets. Contrary to other developed economies, in Spain price variations in these two assets played a significant role in shaping wealth accumulation and can therefore explain why capital gains constituted a fundamental driver of wealth accumulation in the very long term. The increase in asset prices became more important during 1950-2017, especially due to housing wealth that accounted for 83% of total capital gains. We also present new descriptive and empirical evidence supporting the hypothesis that international capital flows were significantly related to the housing boom and bust of the early 2000s.

Our findings have broader implications for policymaking. First, the dramatic variation in Spain's land prices has been at the core of the Spanish and the European economic crises over the preceding decade. Had policymakers gained access to the wealth series and the saving-price decomposition of this paper, they could have observed that Spain was experiencing capital gains of an unprecedented magnitude. Consequently, given that housing is a complex asset to measure, as it combines a produced element (dwellings) with a non-produced one (land), it seems highly recommendable that authorities collect more specific information (statistics on prices, developable land, surveys of household portfolios, etc.) on a more regular basis.

Our results also point to a direct link between the international supply of capital flows and the make-up of the recent Spanish housing boom and bust. The economic crisis of 2007-2013 exposed serious flaws in the euro's original design, which had provided for rapid convergence in interest rates among country members and a rapid increase in cross-border positions, yet also led to important misallocations in capital investment and asset pricing. In the future, stronger monitoring of international capital markets and their interaction with local asset values is highly advisable.

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Chapter 2

House Price Cycles, Wealth Inequality and Portfolio Reshuffling

The evolution and determinants of wealth inequality are currently at the center of the academic and political debate. This renewed interest is largely motivated by two well-established empirical facts. First, household wealth has grown faster than national income in the last four decades, with similar levels and trends across advanced economies (Piketty and Zucman, 2014). Second, wealth concentration trends have diverged over the same period of time, rising, for instance, much faster in the US than in continental Europe (Alvaredo, Chancel, et al., 2018). Despite this recent progress, little is known on the complex interaction between the evolution of aggregate household wealth and its distribution. These interactions are of particular importance during asset booms and busts. Wealth levels and portfolio composition along the distribution might significantly change—either mechanically through asset price changes, saving responses, or a combination of both—and consequently, trends in medium to long-term wealth inequality could revert. Wealth inequality matters in the determination of aggregates such as consumption (Carroll, Slacalek, and Tokuoka, 2014, Krueger, Mitman, and Perri, 2016). Thus, understanding the determinants of wealth inequality dynamics at different phases of the economic cycle is of interest to gauge the risks of business cycles and set appropriate stabilization policies. The extent to which these dynamics are purely mechanical or respond to changes in saving behavior is still an open question.

The dynamics of wealth inequality are even more relevant during housing booms and busts. Housing is the main asset in most individual portfolios (Saez and Zucman, 2016, Garbinti, Goupille, and Piketty, 2019) and it forms the lion's share of 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 Blanco, Bauluz, and Martínez-Toledano, 2020). 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 ups and downs episodes, that make it possible to generalize the results, and with sufficiently rich data sources. Evidence on the interaction between large house price fluctuations and wealth inequality has thus so far been elusive.

This paper breaks new grounds on these issues by studying how housing booms and busts shape the wealth distribution. I examine the Spanish context, an ideal laboratory since the country has experienced two housing booms (1985-1991, 1998-2007) and busts (1992-1995, 2008-2014) 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 a novel asset-specific decomposition of wealth accumulation that I use to identify the key forces (e.g., capital gains, saving rates) behind the observed wealth inequality dynamics. This new decomposition is critical to better understand saving responses, which have attracted much less scrutiny than asset prices in the analysis of wealth inequality dynamics over the business cycle (Kuhn, Schularick, and Steins, 2018). Lastly, I examine several candidate explanations behind the observed saving dynamics: heterogeneity in portfolio adjustment frictions, real estate market dynamics and tax incentives. I explore the latter in more depth exploiting a novel personal income and wealth tax panel and quasi-experimental variation created by a large reform in the Spanish personal income tax during the recent house price cycle. In conjunction, these analyses provide novel ingredients to generate realistic wealth dynamics in quantitative models of wealth inequality (Achdou et al., 2017, Benhabib and Bisin, 2018, De Nardi and Fella, 2017, Gomez, 2019, Hubmer, Krusell, and Smith Jr., 2019).

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, Goupille, and Piketty, 2019. Wealth distribution series have been found to be sensitive to the assumption of constant capitalization factors by asset class in the US context (Smith, Zidar, and Zwick, 2019). I perform numerous robustness checks with wealth tax returns and household surveys 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. Overall, this series constitutes an ideal basis to understand the dynamics of wealth inequality during housing booms and busts.

The new wealth distribution series shows 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, Goupille, and Piketty, 2019 and Saez and Zucman, 2016, respectively. 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 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 asset prices—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.[1] 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

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

saving dynamics across wealth groups, especially during asset booms and busts.

My findings suggest that differences in capital gains are the main drivers of wealth inequality dynamics during housing booms, while differences in saving behavior are the main forces during housing busts. I show that capital gains contribute to reducing wealth concentration levels during booms 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. However, differences in capital gains do not seem to explain why top wealth concentration patterns revert, given that rates of capital gain almost fully converge across wealth groups during housing busts. Instead, persistent differences in saving rates across wealth groups and portfolio reshuffling towards financial assets among top wealth holders appear to be the main explanatory forces behind the reverting pattern in wealth concentration during housing busts.[2] The results hold for both house price cycle episodes (1985-1995, 1998-2014). Using wealth surveys, I document that large changes in the composition of savings among top wealth holders during housing busts are not only due to channeling new saving towards financial assets, but also due to dissaving in housing (i.e., tenant-occupied housing). I perform the same asset-specific decomposition with the French (Garbinti, Goupille, and Piketty, 2019) 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 France and the US. 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 saving behavior along the wealth distribution during housing busts. I focus on three main candidate explanations: differences in portfolio adjustment frictions, real estate market dynamics and tax incentives. Contrary to middle and bottom wealth holders, I show 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 savings, so that they have fewer difficulties to incur in transaction costs (e.g., capital gains taxes) associated to selling real estate. Second, top wealth holders have lower indebtedness attached to real estate. Consequently, when it comes to sell, they are less constrained by the evolution of the value of their property relative to the value of their mortgage. Third, top

[2]Persistent differences in flow rates of return across the whole distribution 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. Labor income inequality does not strike as an important factor either, since labor income shares remain quite stable along the wealth distribution over this period.

wealth holders have much larger holdings of real estate 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. In fact, I document using the Spanish Survey of Household Finances (SHF) that while bottom wealth holders did not sell their stock of housing during the recent bust, the top 10% wealth group did sell 10% of their stock of tenant-occupied housing and almost none of their stock of owner-occupied housing.[3]

Real estate market dynamics could be a competing explanation for the larger portfolio reshuffling among top wealth holders during housing busts. Both housing demand and housing prices could evolve differently across time and space affecting wealth groups in an heterogeneous manner. If the dynamics of the real estate market are such that there is a higher demand for the type of properties owned by top wealth holders during the housing bust, this could explain why they managed to dissave more in real estate. Using the Spanish Survey of Household Finances, I document that indeed primary residences and other properties owned by bottom and middle wealth holders have different characteristics (e.g., value, size) than properties owned by the top. However, using information (e.g., number of listings, number of contacts received by listing, offer price) on the universe of 2009 property listings from the largest Spanish commercial real estate website (*El Idealista*), I find that the demand for housing was not significantly different in districts with the highest average house price versus the rest of districts.[4] Furthermore, top wealth holders might have decided to dissave relatively more in housing than middle and bottom wealth holders if the value of their properties had not declined or had declined less. Nonetheless, I show that top wealth holders live in municipalities whose average house price has experienced a similar evolution to municipalities in which bottom and middle wealth holders reside. This evidence suggests that real estate market dynamics are not driving the differential saving behavior across wealth groups during housing busts.

I also document that institutional factors such as tax incentives can exacerbate differences in saving behavior along the wealth distribution. In particular, I examine

[3]Spain has—contrary to the US—a mortgage recourse system, meaning that the lender can go after the borrower's other assets or sue to have his or her wages garnished, if money is still owed on the debt after the collateral is sold. Hence, this type of system constitutes another potential friction for why financial distressed individuals—mainly at the bottom of the wealth distribution—might have not sold their houses.

[4]The demand index I use is directly elaborated by *El Idealista*. It is based on the number of e-mails received by listing normalized by a factor, to make it comparable across space and time.

a large reform introduced in 2007 on the Spanish personal income tax aimed at incentivizing saving on financial assets. Financial income (i.e., interest, dividends, short-term capital gains) that used to be taxed under a progressive tax schedule with the rest of income components, started to be taxed at a flat rate of 18%. The reform implied substantial tax variation across individuals, largely benefiting top wealth holders. Using a novel personal income and wealth tax panel, I exploit quasi-experimental variation created by the reform to estimate behavioral responses to the Spanish personal income tax in a differences-in-differences setting. I compare the evolution of reported interest income for individuals who experience a tax cut (treatment group) with individuals who experience a slight tax increase (control group) after the reform.[5] I find that interest income increased on average 76% more for individuals who experienced a tax cut relative to those who experience a slightly tax increase. The effect is increasing with the size of the tax cut. Counterfactual simulations with the wealth distribution series reveal that the capital income tax reform explains on average 60% of the growth rate in the top 10% wealth share during the recent housing bust. In conjuction, these analyses suggest that portfolio adjustment frictions appear to be the most plausible explanation for the differential saving behavior across wealth groups during housing busts and that behavioral responses to tax incentives can exacerbate this behavior.[6]

This paper contributes to four main literatures. First, there is a nascent theoretical and empirical literature analyzing the determinants of wealth inequality dynamics (Bach, Calvet, and Sodini, 2018, Bach, Calvet, and Sodini, 2019, Fagereng, Blomhoff Holm, et al., 2019, Fagereng, Guiso, et al., 2019, Gomez, 2019, Hubmer, Krusell, and Smith Jr., 2019, Kuhn, Schularick, and Steins, 2018). While these studies have mainly focused on the implications of asset prices and rates of return for wealth inequality, my results reveal that behavioral components, and in particular saving responses, are also important factors behind wealth inequality dynamics. To my knowledge, this is

[5] I focus on interest because dividends and capital gains are quite volatile and even more so during the crisis, so that any type of saving response is very hard to identify.

[6] I also briefly discuss other candidate explanations in appendix B.8: differences in risk aversion, financial literacy, financial advisory and expectations on house prices. First, using the SHF I show that the fraction of households reporting not to be willing to take any financial risk is decreasing with wealth. Second, using the 2016 Spanish Survey of Financial Competences (SFC) I document that both financial knowledge and independent financial advising are positively correlated with economic outcomes, such as income. Nonetheless, differences in risk aversion, financial knowledge and financial advising could only explain why bottom wealth holders did not invest as much as top wealth holders in financial assets, but not why only top wealth holders sold housing and why only housing for investment purposes. Third, top wealth holders could have also dissaved more in housing if they had more pessimistic expectations about the future evolution of house prices. However, Bover, 2015 finds using the SHF no significant association of such beliefs with wealth during the recent housing bust.

the first study documenting how changes in the composition of savings across wealth groups shape the wealth distribution over the business cycle. Moreover, these studies have barely documented or explained why saving rates change in the way they do. This paper moves one step forward and uses quasi-experimental evidence from a large Spanish reform to quantify for the first time by how much capital income tax cuts contribute to changes in saving behavior and wealth concentration.

Second, this work also relates to the literature measuring wealth distributions (Alvaredo, Atkinson, and Morelli, 2018, Garbinti, Goupille, and Piketty, 2019, Kopczuk and Saez, 2004, Kuhn, Schularick, and Steins, 2018, Roine and Waldenström, 2009, Saez and Zucman, 2016, Smith, Zidar, and Zwick, 2019). These studies have documented long-term wealth inequality trends, but abstracting from cyclical effects. This paper is the first to provide comprehensive long-term evidence on how housing booms and busts shape the wealth distribution. Kuhn, Schularick, and Steins, 2018 have recently shown that housing booms lead to substantial wealth gains for leveraged middle-class households in the US. However, the extent to which this pattern persists or not throughout housing busts has received much less attention so far. In Spain, the wealth distribution has been analyzed in the past 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 covers the full distribution over the period 1984-2015 and provides complete long-run evidence on the evolution of wealth inequality over the last four decades in Spain.

Third, I also contribute to the literature studying how inequality evolves over the business cycle (Barlevy and Tsiddon, 2006, Bonhomme and Hospido, 2017, Castañeda, Dıaz-Giménez, and Rıos-Rull, 1998, Heathcote, Perri, and Violante, 2010, Kuznets and Jenks, 1953, Storesletten, Telmer, and Yaron, 2004). These studies find that income inequality is countercyclical—with some exceptions at the top of the income distribution—but they do not analyze the implications of cyclical effects for wealth inequality.[7] This paper shows that wealth inequality is also countercyclical in the context of housing booms and busts.

Finally, this study contributes to the literature on housing and portfolio choice (Campbell, 2006, Chetty, Sándor, and Szeidl, 2017, Cocco, 2004, Guiso, Haliassos, and Jappelli, 2002). These studies analyze the role played by housing in the portfolio decisions of households, but they abstract from the implications of these decisions for

[7]Fawaz, Rahnamamoghadam, and Valcarcel, 2012 find that the relationship is procyclical in some developing countries.

wealth inequality. The results of this paper emphasize the importance of portfolio choice and in particular, differences in portfolio rebalancing across wealth groups, in shaping wealth inequality dynamics.

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 and I then analyze wealth inequality dynamics during housing booms and busts. Lastly, I develop a new asset-specific decomposition of wealth accumulation and carry some 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 observed asset-specific saving responses. Finally, Section V concludes.

2.1 Concepts, Data and Methodology

This section describes the concepts, data and methodology used to construct the Spanish wealth distribution series over the period 1984-2015, which will then be used to study the implications of housing booms and busts for wealth inequality. Further methodological details of the Spanish specific data sources and computations can be found in the appendix and all detailed calculations in the companion data appendix.

2.1.1 Aggregate Wealth: Concept and Data Sources

The wealth concept used is based upon national accounts 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 (ESA) 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 pensions. Households' financial liabilities are composed of loans and other debts. It is important to mention that pension wealth excludes Social Security pensions, since they are promises of future government transfers. As stated in Saez and Zucman, 2016, including them in wealth would thus call for including the present value of future health care benefits, future government education spending for one's children, etc., net of future taxes. Hence, it would not be clear where to stop.

The wealth concept used only considers the household sector (code S14, according to the System of National Accounts (SNA)) and excludes non-profit institutions serving households (NPISH, code S15). There are three reasons which explain this decision. First, due to lack of data, non-profit wealth is not easy attributable to individuals. Second, income from NPISH is not reported in personal income tax returns. Third, non-profit financial wealth amounts to approximately 1-3% of household financial wealth between 1995 and 2017 in Spain (Table B1). Hence, it is a negligible part of wealth and excluding it should not alter the results.

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

For non-financial wealth, it is not possible to rely on non-financial accounts based on the 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. 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 Blanco, Bauluz, and Martínez-Toledano, 2020. 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.[8] 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

[8]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 as Table B2 in appendix shows, real estate property debt accounts for 80-88% of total household debt over the period 2002-2014 according to the Survey of Household Finances.

assets held by non-financial corporations also constructed by the Bank of Spain.[9]

I exclude collectibles since they amount to less than 1% of total household wealth and they are not subject to the personal income tax. Furthermore, consumer durables, which amount to approximately 10% of total household wealth, are also excluded, because they are not included in the definition of wealth by the SNA and there are no statistics about consumer durables owned by Spanish households for the period prior to 2002.[10]

2.1.2 Distribution of Wealth: The Mixed 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 proceed with 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.

2.1.2.1 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[11]. I also use the full second panel 1999-2014 to carry robustness checks. The micro-files provide information for a large sample of taxpayers, with detailed

[9] A detailed explanation of the sources and methodology used in order to construct these two series can be found in the appendix of Artola Blanco, Bauluz, and Martínez-Toledano, 2020.

[10] 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. See Table B3 in appendix.

[11] 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.[12] The income categories I use are interest, dividends, effective and imputed housing rents, as well as the profits of sole proprietorships.[13] 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 Navarre, are excluded, as they do not belong to the Common Fiscal Regime (*Régimen Fiscal Común*), because they manage their income taxes directly. Combined these two regions represent about 6-7% and 8% of Spain in terms of population and gross domestic product, respectively (Tables B4 and B5).

The unit of analysis used is the adult individual (aged 20 or above), rather than the tax unit. Splitting the data into individual units has on the one hand the advantage of increasing comparability as across units since individuals in a couple with income for example at the 90th percentile is not as well off as an individual with the same level of income. On the other hand, it is also more advantageous for making international comparisons, given that in some countries individual filing is possible (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.[14] In 2015, for instance, this operation converts 19,480,423 tax units into 22,945,329 individual units in the population aged 20 or above, that is, approximately 18% of units are

[12]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.

[13]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.

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

converted.[15]

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.[16] For instance, over the period 1999-2015, approximately one third of the adult population was exempted from filing (Table B6). I account for the missing adults by first calculating the difference between the population totals by age and gender of the Spanish 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.[17] 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, we need to account for this missing income, otherwise we 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 B.1.1 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.2.1, I explain in detail the particular aspects of the reforms which could potentially affect my methodology and how I deal with them in

[15] 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 2015 Spanish Personal Income Tax Guide (*Guía de la Declaración de la Renta 2015*) includes a more detailed explanation in Spanish about how personal income tax filing works in Spain.

[16] In the 2015 Spanish Personal Income Tax Guide (*Guía de la Declaración de la Renta 2015*) the Spanish Tax Agency includes a more detailed explanation in Spanish about how personal income tax filing works in Spain for tax year 2015.

[17] 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 Navarre but without taking age and gender into consideration.

order to ensure consistency in the series across the whole period of analysis.

2.1.2.2 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[18]:

$$y_{ij} = r_j * a_{ij} \tag{2.1}$$

and his total investment income:

$$y_i = \sum_{j=1}^{J} r_j * a_{ij} \tag{2.2}$$

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

$$a_{ij} = \frac{y_{ij}}{r_j} \tag{2.3}$$

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

$$w_i = \sum_{j=1}^{J} \frac{y_{ij}}{r_j} \tag{2.4}$$

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 then

[18]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.

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).[19]

As it was mentioned in the previous subsection, income tax data exclude the regions of Basque Country and Navarre. 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 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.[20]

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. 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.

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

[20]As it has already been mentioned, total gross domestic product in Basque Country and Navarre accounts for approximately 8% of total gross domestic product over the period 1984-2016 (Table B5). This assumption seems reasonable since the share of housing wealth in Basque Country and Navarre also amounts to approximately 8% of total housing wealth (Table B7).

AVERAGE ANNUAL RATES OF RETURN IN SPAIN, 1984-2015

	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 2.1: 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.

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 (Table 2.1).[21] 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 specially relevant for the purpose of this paper, which is to understand how periods of large changes in housing prices shape the entire wealth distribution.

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

2.1.2.3 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[22], life insurance, investment and pension funds.[23] Although these assets account for a large part of total household

[21] The rate of return on housing using National Accounts is very low for international standards, particularly during the most recent period (2002-2015). This can be explained by the fact that differences in housing wealth growth versus housing rental income growth were much larger in Spain than in the rest of advanced economies. One potential explanation are the large differences in demand for renting (low) versus buying (high) dwellings in Spain, which have led to a larger increase in housing versus rental prices. In fact, the home-ownership ratio for primary residences is approximately 80% according to the 2011 Census of dwellings (INE) and the calculations of the Bank of Spain (Table B8). One cannot, however, fully disregard the existence of some type of measurement error in the construction of the rental income and/or housing wealth series. Nonetheless, the methodology used in this paper relies on the assumption of equal returns by asset class along the wealth distribution and in appendix B.4 I show that this is a plausible assumption in the Spanish context. Hence, the existence of some type of measurement error should not alter the wealth distribution series in a significant matter.

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

[23] Unreported offshore assets do also not generate taxable income. Following Alstadsæter, Johannesen, and Zucman, 2019, I re-calculate the wealth distribution series accounting for unreported offshore assets by assigning proportionally to the top 1% wealth group the annual estimate of unreported offshore wealth of Artola Blanco, Bauluz, and Martínez-Toledano, 2020. Due to the uncertainties related to these calculations, I do not include offshore assets in my benchmark series. Appendix B.3 describes the methodology used to account for unreported offshore assets in detail and presents the adjusted wealth distribution series.

wealth, namely around 40-50% of total net household wealth (Table B9), 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).

As it was mentioned in the beginning of this section, 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. Appendix B.1.2 explains in detail the imputation method used relying on the survey, which is very similar to the one developed by Garbinti, Goupille, and Piketty, 2019 for France.

To make sure that the imputations are correctly done, in B.4 I have carried different robustness checks using the Survey of Household Finances. The levels and composition of my series are almost identical to the ones obtained using the direct reported wealth from the survey.

2.2 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 different housing booms and busts episodes. The second subsection documents the wealth inequality fluctuations and uses a new asset-specific decomposition of wealth accumulation to better understand the observed dynamics during house price cycles.

2.2.1 Evolution of Real House Prices and Aggregate Household Wealth

Spain is an ideal laboratory to understand the implications of housing booms and busts for wealth inequality for three main reasons. First, the country has experienced two house price cycles over the period 1984-2015, which makes it possible to analyze in detail the implications of large asset price changes for wealth inequality taking a long-term perspective. The first house price cycle started in 1984 and ended up in 1995, with 1991 as turning point. The second house price cycle started in 1996 and finished in 2014, with 2007 as turning point. 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 will follow a similar approach to International Monetary Fund, 2009 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%. 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 2.1). Appendix B.5 discusses alternative methodologies that have been used to identify housing booms and busts. No matter which methodology is used results are very similar.

Second, the dimensions of the two house price cycles were quite different. 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). Moreover, the rise in total real estate transactions was much larger during the second episode than during the first one (Figure B3a). The larger increase was partly due to an increase in the stock of new dwellings (Figure B3b), many of which were acquired through mortgage loans (Figure B3c). Moreover, 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.[24] This heterogeneity across the two episodes is useful to understand the implications of housing booms and busts for wealth inequality under different economic scenarios and house price cycle intensities.

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

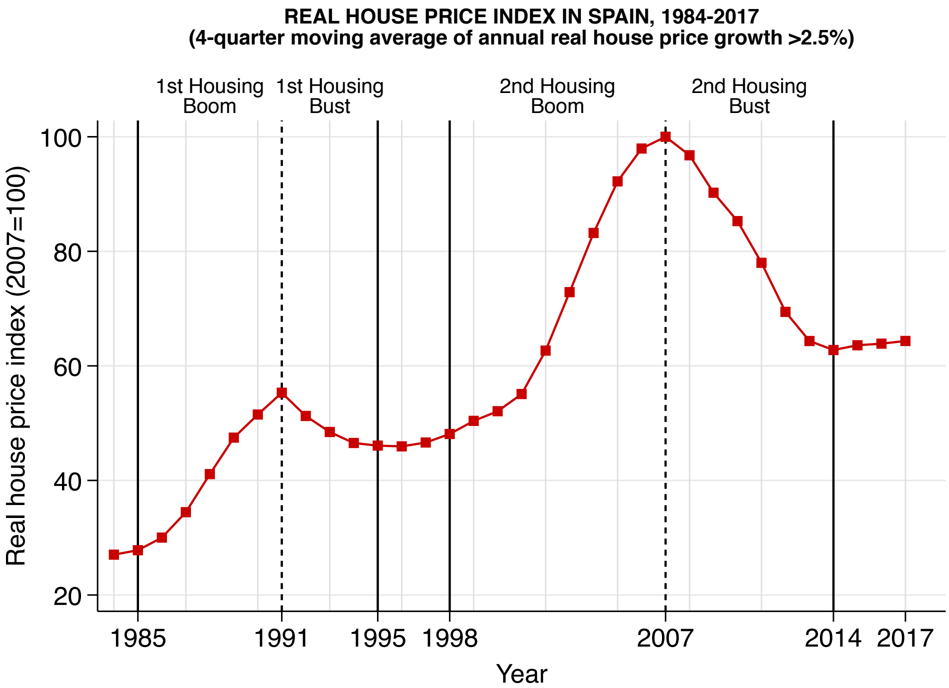
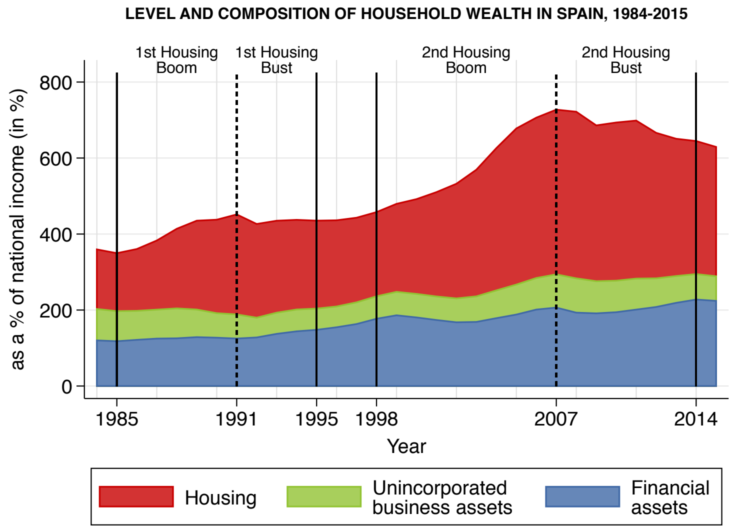
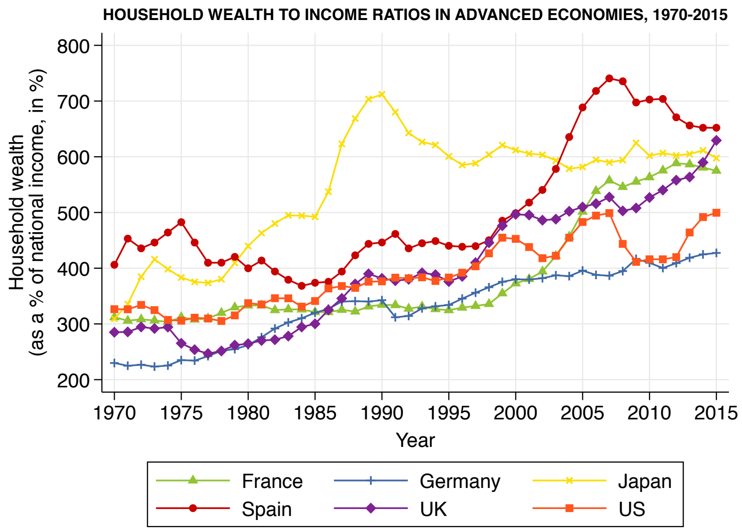


Figure 2.1: Real house price index in Spain, 1984-2015

Notes: This figure depicts Mack and Martínez-García, 2011's real house price index in Spain over the period 1984-2015. Housing booms and busts are identified following a similar methodology to International Monetary Fund, 2009. Housing booms (housing busts) are defined as periods when the four-quarter moving average of the annual growth rate of real housing prices falls above (below) 2.5%. For a more detailed explanation of the methodology used to identify house price cycles and housing boom and busts read appendix B.5. 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) Level and composition of household wealth in Spain, 1984-2015



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

Figure 2.2: Aggregate household wealth: Spain vs. Advanced economies

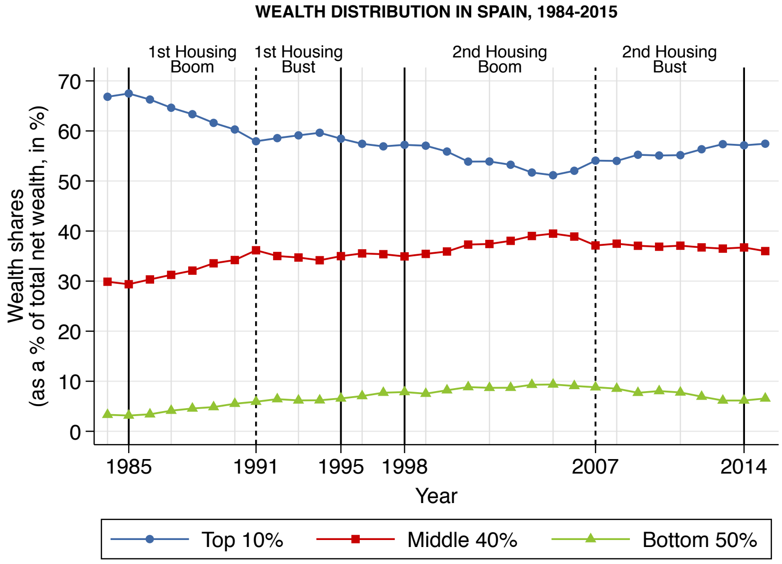
Notes: The figure depicts on panel a the level and composition of aggregate household wealth from 1984 to 2015 expressed as a percentage of national income. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security. 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 Blanco, Bauluz, and Martínez-Toledano, 2020. 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.

Third, Spain 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 2.2a). 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 2.2b).

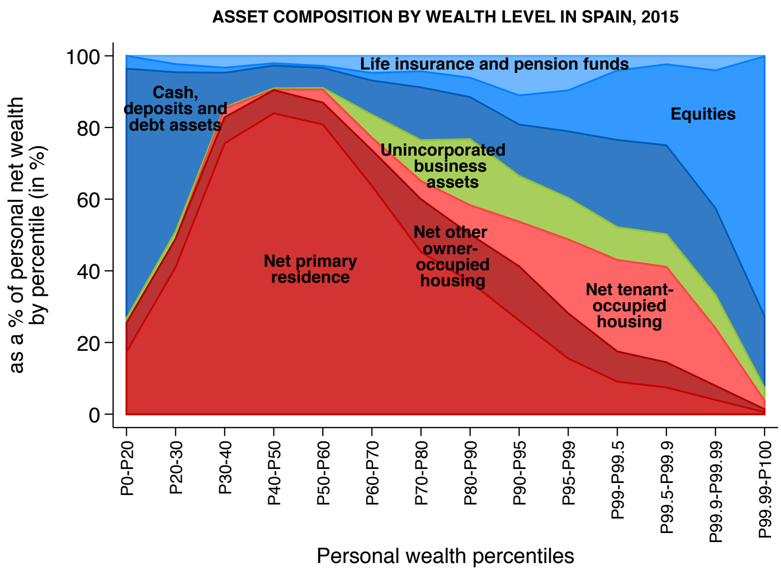
2.2.2 Wealth Inequality Dynamics during Housing Booms and Busts

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 the first comprehensive long-term study on how housing ups and downs shape the wealth distribution.

Figure 2.3a 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. Wealth levels, thresholds and shares for 2015 are reported on Table 2.2. In 2015, average net wealth per adult in Spain was about 150,000 euros. Average wealth within the bottom 50% of the distribution was slightly less than 20,000 euros and their wealth share was 6.4%. Average wealth within the next 40% of the distribution was slightly more than 132,000 euros and their wealth share was 36%. Finally, average wealth within the top 10% was nearly 830,000 euros (i.e., about 5.6 times average wealth) and their wealth share was 57.4%.



(a) Wealth distribution, 1984-2015



(b) Asset composition by wealth level, 2015

Figure 2.3: 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. Wealth includes net housing (primary, other owner-occupied and tenant-occupied housing), unincorporated business assets and financial assets (cash, deposits, equities, life insurance reserves and pension funds). Wealth shares are constructed by capitalizing taxable income and accounting for the assets that do not generate taxable income (primary residence (1999-2015), life insurance, pension and investment funds) using income and wealth surveys. The unit of analysis is the adult individual (+20), excluding the regions of Basque Country and Navarre since they do not belong to the Common Fiscal Regime and hence, they are not included in personal income tax samples.

WEALTH THRESHOLDS AND SHARES IN SPAIN, 2015

Wealth group	Number of adults	Wealth threshold	Average wealth	Wealth share
Full population	35,082,703	0€	147,395€	100%
Bottom 50%	17,541,352	0€	19,413€	6.6%
Middle 40%	14,033,081	61,890€	132,643€	36.0%
Top 10%	3,721,375	284,390€	829,942€	57.4%
incl. Top 1%	372,138	1,416,646€	3,393,448€	24.9%
incl. Top 0.1%	37,214	4,894,606€	12,482,984€	10.2%
incl. Top 0.01%	3,721	19,130,185€	51,017,990€	4.3%

Table 2.2: Wealth thresholds and shares in Spain, 2015

Notes: This table reports statistics on the distribution of wealth in Spain in 2015 obtained using the mixed capitalization-survey method. The unit is the adult individual (20-year-old and over; net wealth of married couples is split into two). Fractiles are defined relative to the total number of adult individuals in the population.

In terms of long-term dynamics, Figure 2.3a shows that top 10% wealth concentration followed a decreasing trend since the 1980s that reverted at the the beginning of the 2000s. This decline happened at the expense of wealth gains for both middle and bottom wealth groups. Focusing on the dynamics during the two house price cycles, I find 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—to a large extent—wealth holders benefit from housing booms. 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 2.3b, 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.[25]

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

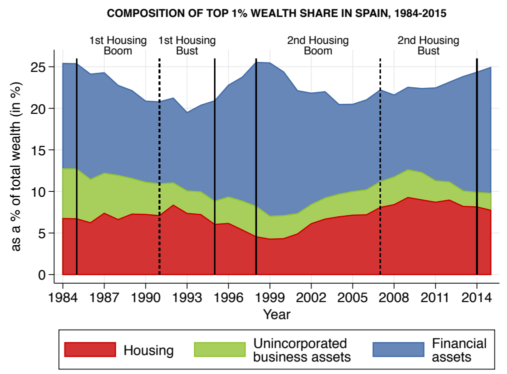
[25]Equities include both listed and non-listed equities and that non-listed equities include incorporated business assets.

2007 housing bust, are clearly captured (Figure 2.4). 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, Goupille, and Piketty, 2019).[26]

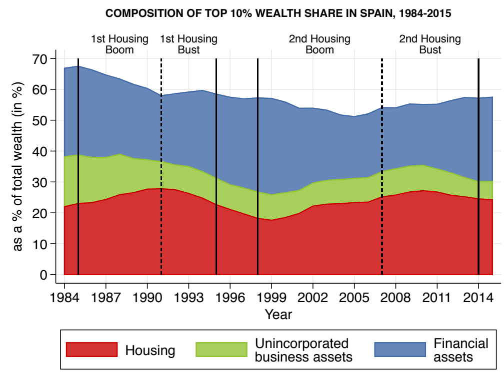
The negative correlation between wealth concentration and housing expansions and the positive correlation during housing busts seems to hold in other countries too. Figure B4a depicts the real house price index in Spain, France and the US. All three countries experienced a housing expansion over the period 1998-2007, but the length and dimension of the housing contraction after 2007 was quite different across the three countries. Figure B4b shows the evolution of the top 10% wealth share in these three countries. Wealth concentration was higher in Spain than in the US during the 1980s, but since the 1990s trends have diverged. In Spain, top 10% wealth concentration declined and has converged to the levels of the rest of Western European countries such as France (Garbinti, Goupille, and Piketty, 2019). In contrast, wealth concentration in the US has been steadily increasing since the late 1980s and it is currently much higher than in continental Europe. 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 the housing contraction.

Kuhn, Schularick, and Steins, 2018 also document using long-term survey data that housing booms lead to substantial wealth gains for leveraged middle-class households and tend to decrease wealth inequality in the US. However, the evolution of wealth inequality during housing busts and the extent to which these dynamics are purely mechanical or not are still open questions which I address in the next subsection.

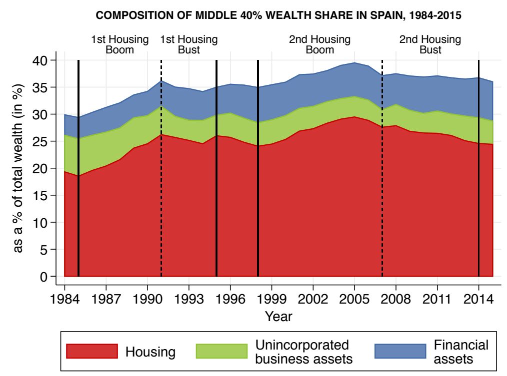
[26]The Spanish wealth distribution series can be also decomposed by age over the period 1999-2015. Appendix B.6 summarizes the main results regarding the dynamics of wealth inequality by age.



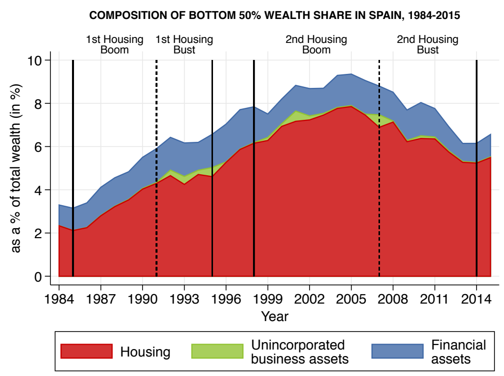
(a) Composition of top 1% wealth share



(b) Composition of top 10% wealth share



(c) Composition of middle 40% wealth share



(d) Composition of bottom 50% wealth share

Figure 2.4: 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. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security.

2.2.3 Determinants of Wealth Inequality Dynamics during Housing Booms and Busts

The drop in wealth inequality during booms and the increase during busts would be mechanical if all individuals kept their portfolio composition fixed—that is, they did not sell any of their assets nor buy or acquire new assets—so that the decline and increase would be entirely explained by differences in capital gains along the distribution. During housing booms, capital gains on housing are usually larger than on financial assets. Consequently, because the middle and bottom of the wealth distribution have a larger share of housing in their portfolio than the top, they experience larger wealth gains, all else equal. On the contrary, during housing busts, capital gains on housing tend to fall more than on financial assets. As a result, because the middle and bottom of the wealth distribution have a larger share of housing in their portfolio than the top, they experience larger wealth losses, all else equal. Table 2.1 shows that indeed capital gains on housing were larger than on financial assets during both housing booms and lower than on financial assets during both housing busts in Spain.

The aim of this section is thus to analyze which are the underlying forces driving the dynamics of wealth inequality during housing booms and busts and quantify its importance. Are the observed dynamics entirely due to differences in capital gains or are there any other forces (i.e., labor income, saving rates) driving the dynamics? To answer this question, my starting point is to decompose the wealth distribution series using the following transition equation:

$$W_{t+1}^g = (1 + q_t^g) \cdot [W_t^g + s_t^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^g)], \tag{2.5}$$

where W_t^g stands for the average real wealth of wealth group g at time t, $Y_{L_t}^g$ is the average real labor income of wealth group g at time t, r_t^g the average rate of return of group g at time t, q_t^g the average rate of real capital gains of wealth group g at time t and s_t^g the synthetic saving rate of wealth group g at time t.[27] By convention, savings are assumed to be made before the asset price effect q_t^g is realized. The saving rate is synthetic because the identity of individuals in wealth group g changes over time due to wealth mobility.

I follow the same approach as Garbinti, Goupille, and Piketty, 2019 and Saez and

[27] 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.

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_t^g, W_{t+1}^g, $Y_{L_t}^g$, r_t^g and q_t^g over the whole period 1984-2015. Hence, the three forces that can affect the dynamics of wealth inequality are inequality in labor incomes, rates of return and saving rates.

In this paper, I go one step forward and 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. The transition equation is as follows:

$$W_{t+1}^g = W_{H,t+1}^g + W_{B,t+1}^g + W_{F,t+1}^g, \tag{2.6}$$

where

$$W_{H,t+1}^g = (1+q_t^g) \cdot [W_{H,t}^g + s_{H,t}^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^g)] \tag{2.7}$$

$$W_{B,t+1}^g = (1+q_t^g) \cdot [W_{B,t}^g + s_{B,t}^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^g)] \tag{2.8}$$

$$W_{F,t+1}^g = (1+q_t^g) \cdot [W_{F,t}^g + s_{F,t}^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^g)] \tag{2.9}$$

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 my purpose of understanding how housing booms and busts shape the wealth distribution. The reason is that during these episodes one should expect housing to play a relative more important role than other assets in explaining wealth inequality dynamics.

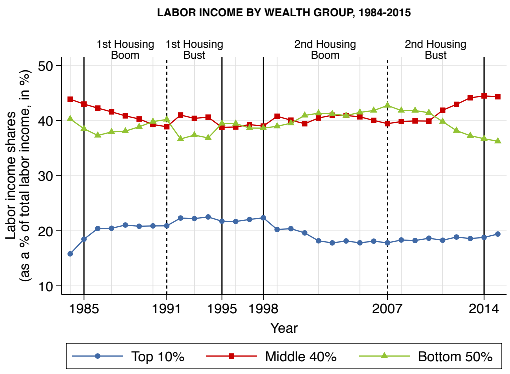
The first potential force which can drive wealth inequality dynamics is labor income inequality. Figure 2.5a depicts the evolution of labor income shares for the different wealth groups over the 1984-2015 period. Overall, the evolution of labor income inequality has been quite stable throughout the whole 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, specially among the young, during the recent housing bust.[28] 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 seems 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 2.5b displays the evolution of flow rates of return and Figure 2.5c of real capital gains for the different wealth groups over the 1984-2015 period. Rates of return have considerably fallen in the last thirty years, following similar trends across the whole wealth distribution. This is mainly 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 significant. The further up one moves along the distribution, the higher are the rates of return.[29] This is consistent with the large portfolio differences that were previously documented, that is, top wealth groups own more financial assets, such as equities, that have higher rates of return than for instance housing. 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.

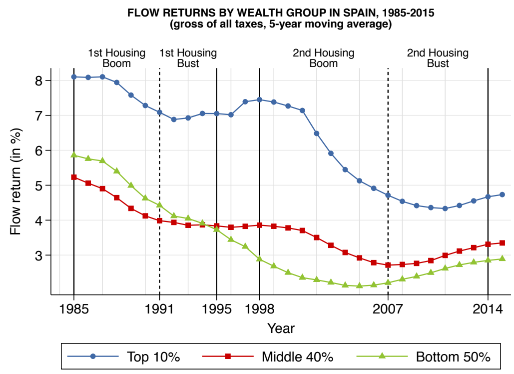
Contrary to flow rates of return, differences in real capital gains along the distribution do seem to considerably change during housing booms and busts (Figure 2.5c). Capital gains increase during housing booms and decline during housing busts across all wealth groups. During housing booms, capital gains are larger 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 2.1). In contrast, differences in capital gains almost fully converge across all wealth groups during housing busts. Figure 2.6

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

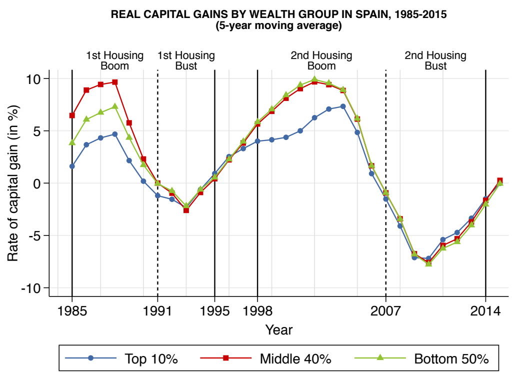
[29]Bach, Calvet, and Sodini, 2019 and Fagereng, Guiso, et al., 2019 also document a positive relationship between returns and wealth for Sweden and Norway, respectively.



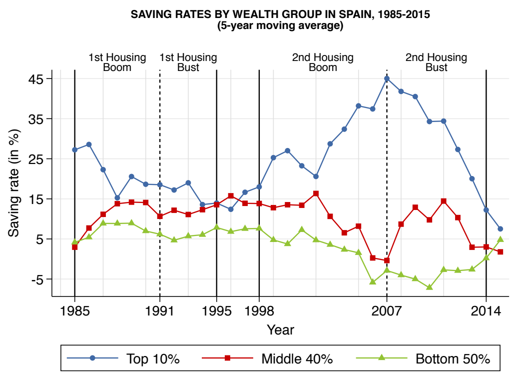
(a) Labor income by wealth group



(b) Flow returns by wealth group



(c) Real capital gains by wealth group



(d) Saving rates by wealth group

Figure 2.5: 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 return is the ratio of average income to average wealth in wealth group g. 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. The synthetic saving rate s_t^g for wealth group g in year t is defined so that $W_{t+1}^g = (1+q_t^g) \cdot [W_t^g + s_t^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^g)]$, where W_t^g stands for the average real wealth of wealth group g at time t, $Y_{L_t}^g$ is the average real labor income of wealth group g at time t, r_t^g the average rate of return of group g at time t, q_t^g the average rate of real capital gains of wealth group g at time t and s_t^g the synthetic saving rate of wealth group g at time t. 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.

compares the evolution of the benchmark top 10% wealth share with the evolution of the simulated top 10% wealth share using the wealth accumulation decomposition and setting the rate of capital gain equal to zero all along the wealth distribution. Differences in capital gains appear to reduce wealth concentration during housing booms but do not seem to explain the reverting evolution during housing busts. These results could be confounded by the existence of stock market booms and busts. For instance, the larger convergence in capital gains across wealth groups during housing busts relative to housing booms could be simply explained because housing busts take place together with stock market crashes, as it happened during the recent episode. Interestingly, rates of capital gain also nearly converged during the old housing bust, a period in which there was no stock market collapse.

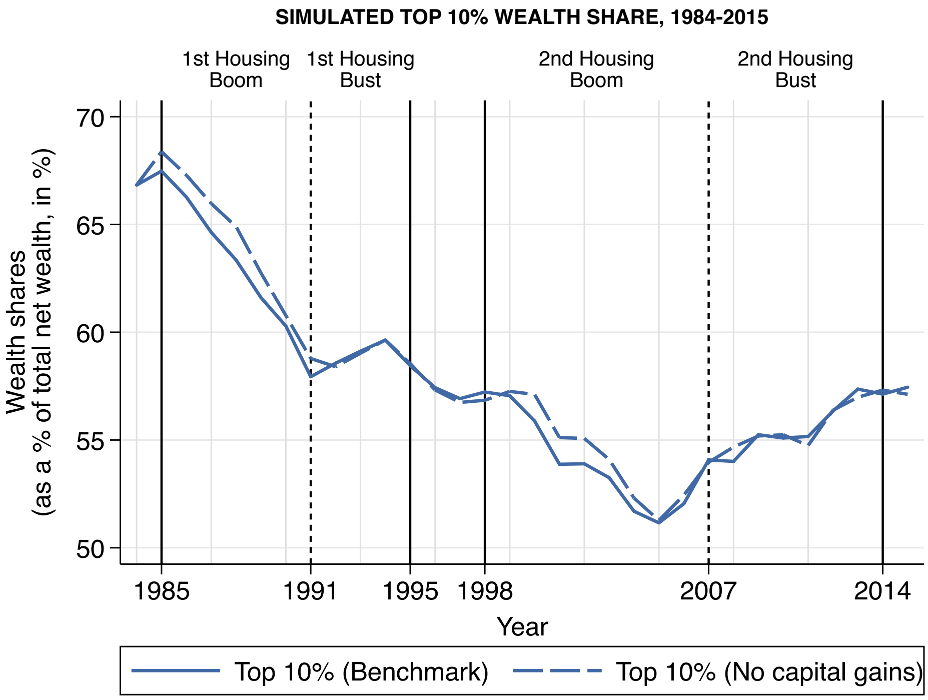


Figure 2.6: Simulated top 10% wealth share in Spain, 1984-2015

Notes: This figure compares the evolution of the benchmark top 10% wealth share (solid line) with the simulated evolution of the top 10% wealth share (dashed line) using the wealth accumulation decomposition and setting the rate of capital gain equal to zero all along the wealth distribution. Capital gains appear to have contributed to decreasing wealth concentration during housing booms but not during housing busts. 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.

By construction, differences in capital gains across wealth groups only come from differences in portfolio composition, since the methodology used relies on the assumption of constant rates of capital gain by asset class along the wealth distribution.

These results could be biased if rates of capital gain by asset class were different across wealth groups. For financial assets, this is less of a concern for two main reasons. First, as it has already been shown, individuals in bottom wealth groups hold mainly deposits—which do not generate capital gains—so that most capital gains on financial assets are earned by top wealth groups. Second, I use different rates of capital gain for each financial asset class (i.e., debt securities, equities, investment funds, life insurance and pension funds) instead of a single rate of capital gain for all financial assets. In contrast, I only rely on one rate of capital gain for housing. This could be a concern if housing price growth was different along the wealth distribution during house-price cycles.

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 B5a 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 versus non-coastal municipalities (Figure B5b) and between municipalities with different population size (Figure B5c). These results are also in line with Fagereng, Guiso, et al., 2019, who document that heterogeneity in rates of return is much lower for housing than for most financial assets using Norwegian data.

Finally, the third force which can potentially drive wealth inequality dynamics is heterogeneity in saving rates across the wealth distribution. Figure 2.5d 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. These figures are similar to the ones obtained for France and the US (Garbinti, Goupille, and Piketty, 2019, Saez and Zucman, 2016).

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 residences, both owner-occupied and tenant-occupied housing. As it is shown on Figure B9a, the share of individuals owning a secondary residence rose from 58% to 72% over the period 1998-2007. This is 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 B3a). 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 (Figure 2.7). Second, total consumption remained nearly constant (Figure 2.8a), so that they 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, contrary to the stability in saving rates for these two groups during the old episode. Middle and bottom individuals also purchased new dwellings. Figure B9b 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 B9c shows that the homeownership ratio rose from 38% to 42% for the bottom 50% over the period 1999-2007, mainly due to the purchase of primary residences.[30] However, both middle and bottom individuals acquired their new dwellings by getting on average highly indebted.

Figure 2.8b 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 ratio of indebtedness for the bottom 50% experienced the largest changes during the house price cycle. It doubled from 100 to 200% during the housing boom and remained at very high levels during the housing bust. These patterns are also consistent with the large increase in the total number of new mortgage loans attached to real estate during the recent housing boom, which did not happen during

[30]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 B3b shows that the number of new registered dwellings remain quite high over the period 2008-2010. Another potential explanation for this increase can be mobility along the wealth distribution.

the old episode (Figure B3c).

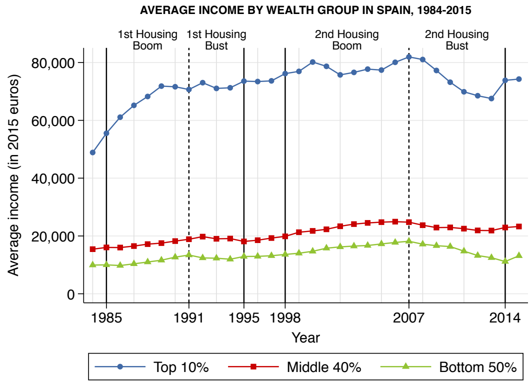
The rise in consumption and in total income was larger than the saving capacity for the middle 40% and bottom 50% wealth groups, which explains why their saving rates significantly declined over the period 1998-2007. In contrast, the increase in the saving rate for the middle and bottom wealth group during the recent housing bust was due to a drop in consumption to increase savings for prudential reasons (Figure 2.8a). The drop in consumption for the bottom wealth group was much larger than for the top wealth group, since they also experienced a larger decline in total income, in particular labor income (Figure 2.7), and they still managed to slightly increase their saving rate.

To better understand the saving patterns of the different wealth groups it is quite useful to look at the composition of the saving rate by asset class, in particular at the share of saving on net housing and on financial assets.[31] Figure 2.9 documents one striking 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. This finding is 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.[32]

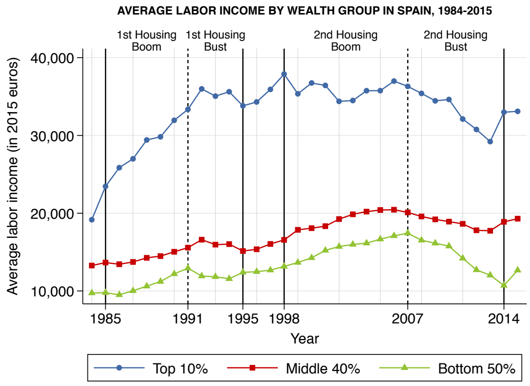
In contrast, saving rates on housing fluctuate much less for the middle 40% and bottom 50% wealth groups. For the middle 40%, saving rates also increase during the beginning of the boom and start decreasing at the end of the boom, remaining stable throughout busts. For the bottom 50%, the saving rate on housing was quite stable during the old episode and became significantly negative during the recent episode. During the old episode very few individuals within the bottom 50%

[31]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. This saving rate can be found in the appendix (Figure B6).

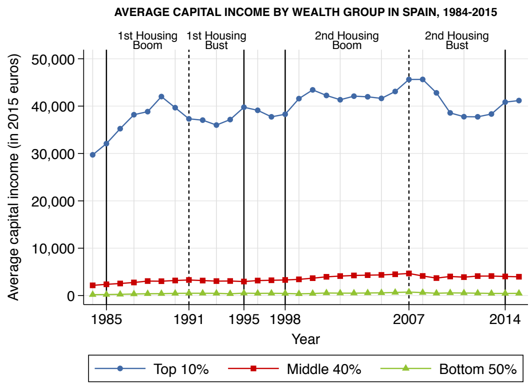
[32]Asset-specific saving rates are derived by breaking down the total saving rate, so that they are also synthetic. The identity of individuals in wealth group g changes over time due to wealth mobility. Consequently, the observed saving dynamics could be simply driven by increasing mobility of individuals from bottom groups to upper groups and viceversa during the housing crisis. In appendix B.7, I explore wealth mobility during the recent housing boom and bust using a complementary longitudinal personal income tax panel. I find that there is no more wealth mobility within the top 10% wealth group around the turning point of the recent house price cycle. Furthermore, I replicate the analysis restricting the sample to individuals who remain within the same wealth group throughout the boom and bust and show that all results hold. Hence, this evidence confirms that the findings are not driven by mobility along the wealth distribution.



(a) Average income by wealth group



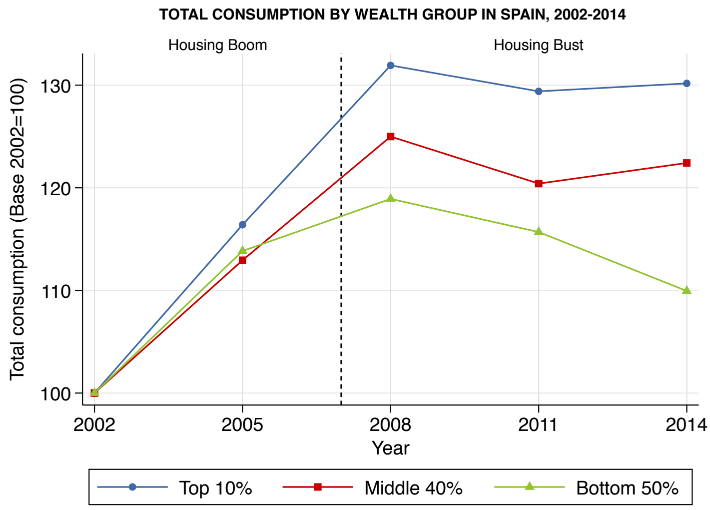
(b) Average labor income by wealth group



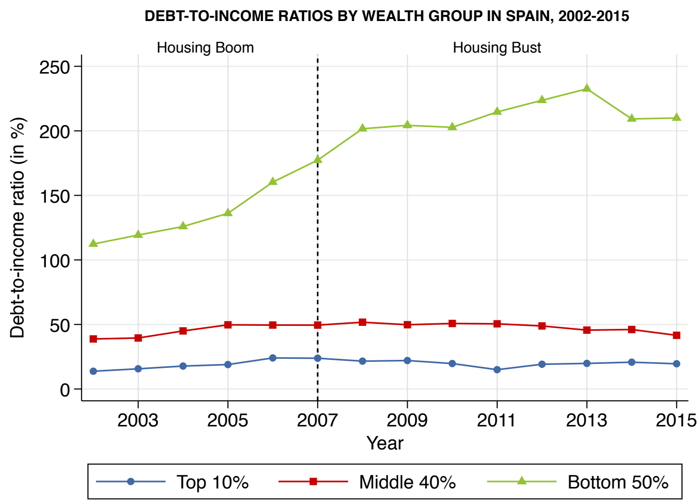
(c) Average capital income by wealth group

Figure 2.7: 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.



(a) Total consumption by wealth group, 2002-2014



(b) Debt-to-income ratios by wealth group, 2002-2015

Figure 2.8: Consumption and debt by wealth group in Spain

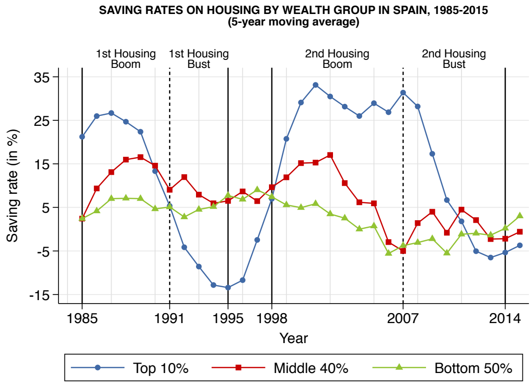
Notes: This figure depicts on panel a the change in total consumption by wealth group in Spain over the period 2002-2014. These series are calculated using the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). Consumption includes both expenditures 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 et al., 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 B.1.2). The vertical dashed black line at 2007 denotes the turning point from the housing boom to the housing bust.

purchased a house—the increase in new mortgage loans attached to real estate was quite modest (Figure B3c)–, contrary to the recent housing boom, which was marked by a large increase in households' indebtedness on real estate. Nonetheless, their saving capacity on housing was not enough to compensate the rise in consumption and total income during the recent episode. 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.[33] On the contrary, saving rates on financial assets remain quite stable for middle and bottom groups across the whole period.[34]

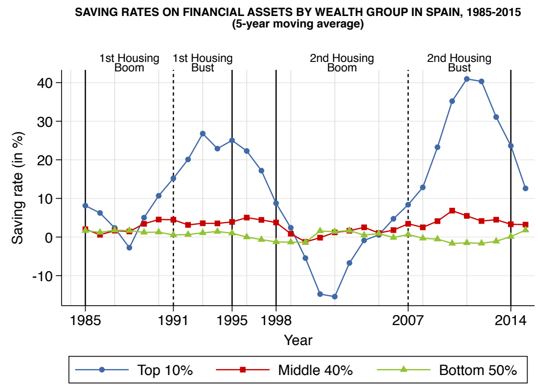
To externally validate these results, I have performed the same asset-specific decomposition of wealth accumulation for France and the US using the wealth distribution series of Garbinti, Goupille, and Piketty, 2019 and Saez and Zucman, 2016, respectively. France and the US also experienced a housing expansion and contraction over the period 1998-2014 and 1999-2011, respectively (Figure B4a). Figures B11a and B12a 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 B11c and B12c also show that saving rates on housing for the top increase during the expansion and decrease during the contraction. Furthermore, Figures B11d and B12d document that saving rates on financial assets increase in France and the US during the housing

[33] 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, specially 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. $W_{H,t+1}^g = (1 + q_{H,t}^g) \cdot [W_{H,t}^g + s_{H,t}^g \cdot (Y_{L_t}^g + r_t^g \cdot W_t^{H,g})]$). Figures B7a and B7b show that fluctuations are slightly attenuated for the top 10% wealth group when using the alternative decomposition. For instance, the saving rate on housing grows less during the housing boom and also declines less during the housing bust. Nonetheless, what is important for my exercise is that the same dynamics persist under this new alternative specification. The only exception are the fluctuations of the saving rate on financial assets during the first housing boom. The rates on capital gain on financial assets were significantly low but increasing during the mid-1980s (Figure B25) and consequently, by construction, the saving rates with the alternative decomposition declining.

[34] Using the SHF, I have also analyzed the reported attitudes towards saving to test the valididy of changes in the composition of saving across the wealth distribution documented on Figure 2.9. Figure B8a shows that the probability to save on real estate increased more for top wealth holders than for the middle and bottom wealth groups during the boom and it declined more during the bust. The same pattern holds when controlling for saving (Figure B8b), 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 B8c, B8d). Overall, this is supporting evidence that portfolio rebalancing was much more pronounced among top wealth holders.



(a) Saving rates on net housing by wealth group in Spain, 1985-2015



(b) Saving rates on financial assets by wealth group in Spain, 1985-2015

Figure 2.9: Asset-specific saving rates by wealth group in Spain, 1984-2014

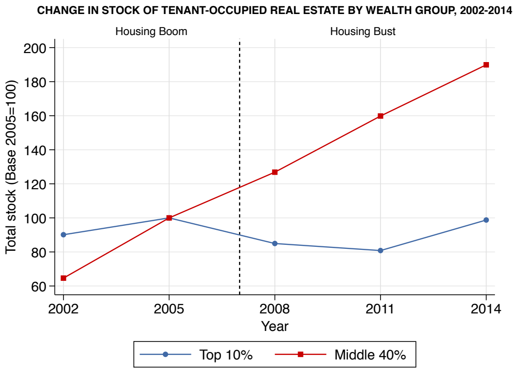
Notes: Panels a and b plot the synthetic saving rates on net housing and financial assets for the top 10%, middle 40%, and bottom 50%, respectively, using a five year moving average from 1985 up to to 2015. Synthetic saving rate $s^g_{A,t}$ for wealth group g in year t is defined so that $W^g_{A,t+1} = (1+q^g_t)\cdot[W^g_{A,t} + s^g_{A,t}\cdot(Y^g_{L_t} + r^{g\,g}_{t\;H,t})]$, where $W^g_{A,t}$ stands for the average value of asset A (i.e., net housing or financial assets) of wealth group g at time t, $s^g_{A,t}$ the synthetic saving rate on asset A of wealth group g at time t and the rest of variables are the same as in Figure 2.5. For each wealth group, the sum of these two saving rates each year, together with the saving rate on business assets are equal to the total annual saving rate by wealth group. 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.

contraction, as documented for the Spanish case. Hence, this evidence suggests that the results are not specific to the Spanish context and that seem to hold generally for house price-cycle episodes.

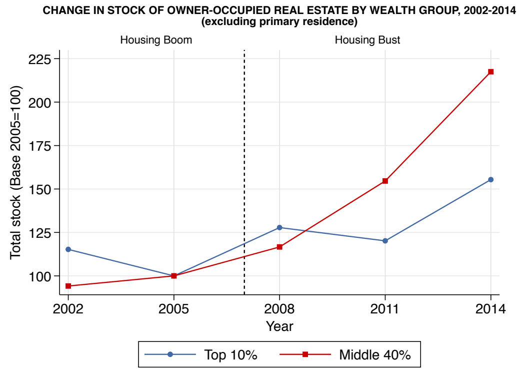
There are three complementary explanations behind the large changes in the composition of saving from housing to financial assets among top wealth holders during housing busts. First, their total saving rate declines during housing downs and consequently, they have less saving capacity to purchase housing—an indivisible asset—which requires either a large amount of saving, or requesting a mortgage.

Financial assets are much more divisible and one can put large or small amounts of saving into deposits, debt securities, stocks, investment funds, etc. Hence, because of the indivisibility nature of housing, top wealth holders might have decided to put their new lower savings into financial assets. Second, the fall in the total saving rate might also prevent them from accumulating real estate, which is not only indivisible but also associated with larger transaction costs than financial assets (Jordà et al., 2019). Third, changes in the composition of saving from housing to financial assets might also be due to dissaving in housing. Top wealth holders who purchased real estate properties for investment purposes—either during the housing boom (Figure B9a) or before—might decide to sell them. They can use the additional liquid wealth to smooth their consumption or purchase financial assets and diversify their portfolio, with the aim of reducing their wealth losses.

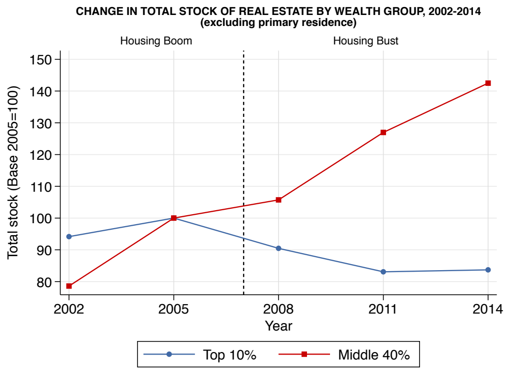
Top wealth holders did dissave in real estate. According to the Survey of Household Finances, the change in the stock of tenant-occupied real estate declined by 20% between 2005 and 2011 for the top 10% wealth group, while it kept rising for the middle 40% wealth group (Figure 2.10a). Real estate dissaving 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 2.10c). In fact, the number of owner-occupied real estate properties owned by middle and top wealth groups kept rising during the bust (Figure 2.10c) and there was almost no decline in the number of owner-occupied primary residences among top wealth holders (Figure 2.10d). Real estate available for rent started to increase between 2011 and 2014 for the top 10% wealth group. However, this rise is not 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 suggest that top wealth holders did sell some of their properties to lower wealth groups that decided to buy during the bust, when prices were lower. Foreign real estate transactions also significantly increased during the housing bust both in absolute terms and relative to the total number of transactions (Figure B10). Hence, top wealth holders might have also sold some of their properties to foreigners. In the next section, I discuss different candidate explanations for the observed differences in the dynamics of asset-specific saving rates along the wealth distribution.



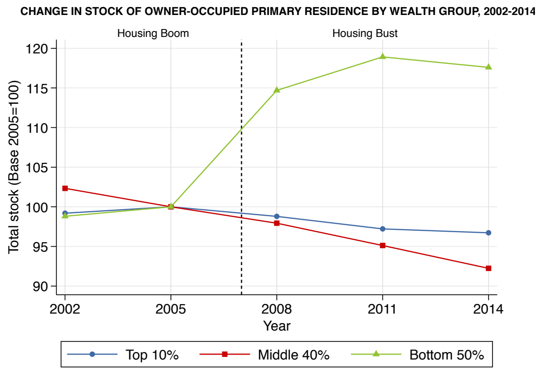
(a) Change in stock of tenant-occupied real estate



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



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

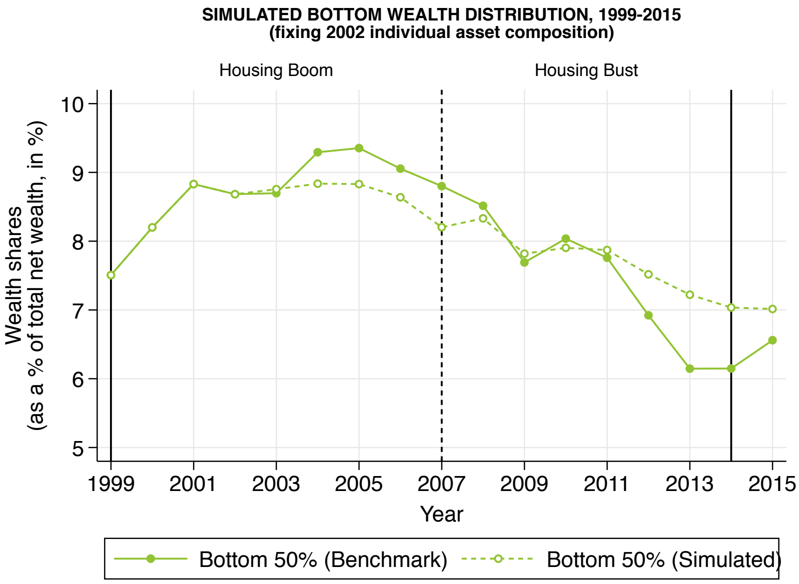


(d) Change in stock of owner-occupied primary residence

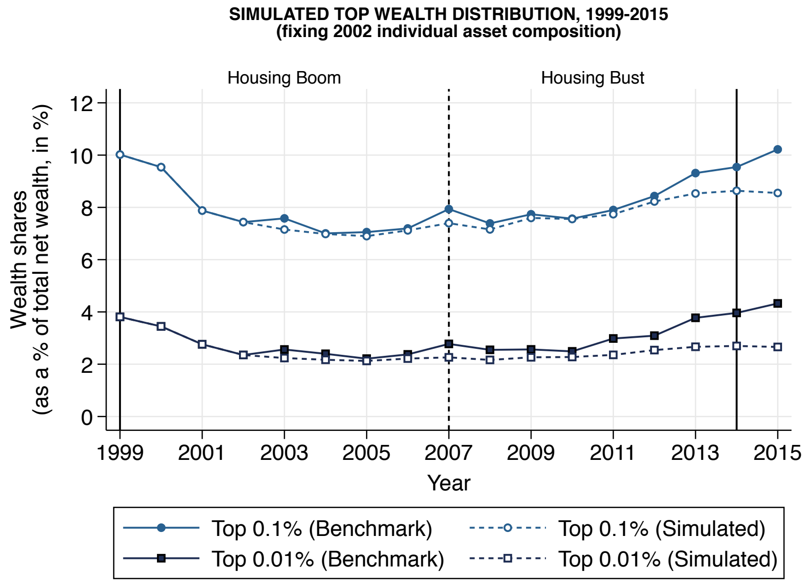
Figure 2.10: Stock of real estate by wealth group in Spain, 2002-2014

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 consecutives 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.

Finally, I document by means of counterfactual simulations that these changes in the composition of saving among top wealth holders contribute to increasing wealth concentration during housing busts. For that, I fix the individual asset composition, so that changes in portfolio composition over time only come from changes in the composition of aggregage wealth. Very top wealth holders benefit the most at the expense of wealth losses for the bottom. Figure 2.11 compares the evolution of the benchmark wealth shares with the evolution of the simulated wealth shares fixing the indidivual asset composition to 2002 for bottom and very top wealth groups. While top 0.1% and top 0.01% wealth shares keep rising during the housing bust—mainly due to portfolio reshuffling towards financial assets—they would have remained nearly constant under the counterfactual scenario. In constrast, the bottom 50% wealth group would have experienced fewer wealth losses during the housing bust if they had invested less on housing during the housing boom. Hence, changes in the composition of saving appear to have an important explanatory force for the reverting pattern in wealth concentration during housing busts.



(a) Simulated Bottom Wealth Distribution



(b) Simulated Top Wealth Distribution

Figure 2.11: Simulated wealth distribution fixing 2002 asset composition, 1999-2015

Notes: The figure depicts the simulated bottom (panel a) and top (panel b) wealth distribution series fixing the individual asset composition to year 2002 from 2003 up to 2015. Only changes in the composition of assets coming from changes in the aggregate composition of household wealth are allowed.

2.3 Nature of Asset-Specific Saving Responses

This section aims to understand the observed differences in the dynamics of asset-specific saving rates along the wealth distribution, as documented in the previous section. There are different factors which can explain why the rich change their asset composition of saving more than the middle and the bottom during house price cycles. I explore empirically three candidate explanations: portfolio adjustment frictions, real estate dynamics and tax incentives. I also briefly discuss with the support of empirical evidence other potential explanations, such as risk aversion, financial literacy, financial advisory and expectations on house prices. In this section, I will mainly focus on the recent house price cycle since most empirical evidence is only available from the 2000s.

2.3.1 Portfolio Adjustment Frictions

One plausible explanation for why the rich change substantially more their composition of saving—from housing to financial assets and viceversa—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 refer to different potential candidates throughout the section. First, selling houses involves high transaction costs.[35] Middle and bottom groups were highly indebted (Figure 2.8b) and consequently, had a very low saving rate (Figure 2.5d). Hence, they would have had difficulties to incur in the high transaction costs which involve selling a house. Second, most individuals in these two groups own owner-occupied housing that they use as primary residence (Figures B9b and B9c). Thus, housing is mainly a consumption good for them. Apart from transaction costs, there are other costs associated to selling a primary residence (mobility costs, searching costs, etc.), which might have prevented these individuals from selling their houses. In fact, Figure 2.10d shows that the stock of primary residences did not fall for bottom wealth holders during the housing bust. Third, they are also highly indebted, in particular bottom wealth holders had very large mortgages relative to their income that were acquired

[35]In Spain, as in most countries, there are both costs for the buyer and seller of a house. The buyer has to pay notary fees (600-1,000 euros), property registry costs (450-600 euros), the property transaction tax (4-11% of the property value) and property valuation costs (only if a mortgage is needed, approx. 800 euros). The seller has to pay personal income taxes for the capital gains generated from the sale (19-23%) and the *plusvalía*, which is another capital gains tax payed at the local level over the increase of the value of the ground the property is on. The tax liability is calculated on the basis of three factors: the period of ownership, the location of the property and the tax-assessed ground value.

during the housing boom (Figure 2.8b). Housing prices significantly dropped during the housing bust, 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. Fourth, Spain has—contrary to the US—a mortgage recourse system, meaning that the lender can go after the borrower's other assets or sue to have his or her wages garnished, if money is still owed on the debt after the collateral is sold. Hence, this type of system constitutes another potential friction for why financial distressed individuals might not sell their houses.

For top wealth holders, adjustment frictions seem to be much less pronounced. First, they are less indebted and have higher savings, so that they can incur more easily in housing transaction costs. Second, 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 (Figures B9a). In consistence with these arguments, Figure 2.10 shows that only top wealth holders sold housing during the bust and in particular, housing for investment. For all these reasons, differences in portfolio adjustment frictions along the wealth distribution appear to be consistent with larger fluctuations in asset-specific saving rates among top wealth holders during house price cycles.

2.3.2 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 the housing bust 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. Top wealth holders own primary residences that are on average more expensive and larger in size (Table B11). In addition, their other real estate properties are also on average more expensive (Table B12). However, there is no evidence of higher demand for more expensive properties. Table 2.3 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.[36] Hence, this evidence is consistent with top wealth holders willing to dissave relatively more than middle and bottom wealth holders during the housing bust.

REAL ESTATE DEMAND: RICH DISTRICTS VS. REST, 2009

	Districts with with highest price		**Rest of districts**			
	Mean	SD	Mean	SD	Diff.	P-value
Sale price/m2	2675.01	1094.68	1956.00	795.22	-719.01	0.00
Surface/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/m2	8.43	5.81	7.01	3.98	-1.42	0.01
N	363		1,192			

Table 2.3: 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.

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 B5a). 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 versus non-coastal municipalities (Figure B5b) and between municipalities with different population size (Figure B5c). Average house prices declined during the housing crisis across all types of municipalities. Overall,

[36]The demand index is directly elaborated by *El Idealista*. It is based on the number of e-mails received by listing normalized by a factor, to make it comparable across space and time.

these results suggest that real estate dynamics are not behind the differential saving behavior across wealth groups.

2.3.3 Tax incentives

Tax incentives could also potentially influence differences in saving behavior along the wealth distribution. In this section, I explore a key institutional change—a large decline in capital income taxes—which exacerbated the increase in both saving rates on financial assets and wealth concentration during the recent housing bust. To my knowledge, this if the first time that quasi-experimental evidence is used to quantify how capital income taxes shape wealth inequality dynamics.

2.3.3.1 Institutional Setting

In 2007, a large reform was introduced on the personal income tax aimed at incentivizing savings. Before the reform, the Spanish personal income tax was a dual tax with a progressive tax schedule for all income components except from long-term capital gains— those generated over more than one year—which were subject to a 15% flat tax (Figure B13a). With the 2007 reform, a significant change in the tax schedule was introduced. Both long-term capital gains, together with financial income (i.e., interest and dividends) and short-term capital gains, that used to be taxed under the progressive tax schedule, started to be taxed at a flat rate of 18% (Figure B13b).[37] The reform was announced in 2005, approved in November 2006 and in place as of 1st of January 2007.

The introduction of the flat tax on financial income created a wedge between the taxation of financial income and the rest of capital income components, such as rental and business income. Moreover, it implied substantial tax variation across individuals, larger than the major tax acts in the United States (Gruber and Saez, 2002) in the 1980s and comparable to the large Danish personal income tax reforms in the 1980s and 1990s (Kleven and Schultz, 2014).

[37] The 2007 reform also increased the minimum exempted from 3,400 to 9,000 euros and introduced an exemption of 1,500 euros on dividends. The saving schedule was slightly modified from 2010 until 2014 with a flat tax rate of 19% for the first 6,000 euros of reported financial income and a 21% rate for financial income above 6,000 euros.

2.3.3.2 Tax Variation, Data and Empirical Strategy

To give a clear sense of the large identifying variation, Figure B14a shows the mechanical variation in marginal net-of-tax rates by pre-reform income tax bracket using the 1999-2014 personal income tax panel. All taxpayers except those in the bottom bracket experienced a drop in the marginal tax rate on financial income, with larger declines for upper brackets (30-50%) than for middle brackets (7-14%). Taxpayers in the bottom bracket prior to the reform experienced a slight increase in their marginal tax rate on financial income (3%), because their marginal tax rate was 15% prior to the reform. The incentives to save in assets generating interest and dividends were thus larger for personal income tax filers in upper brackets prior to the reform, since they experienced the largest tax cuts. The reason why this reform is directly linked to the large increase in the saving rate on financial assets for the top 10% wealth group, is because income and wealth are strongly correlated, and consequently, the fraction of personal income taxpayers in upper brackets is larger within the top 10% wealth group, than within the middle 40% and bottom 50% wealth groups (Figure B14).

To analyze whether the introduction of the flat tax incentivized saving on financial assets, I rely on the 1999-2014 personal income tax panel linked to a novel dataset on wealth tax records for those taxpayers who are rich enough to file the wealth tax[38]. Information on wealth tax records is available for the period 1999-2007, since the wealth tax was suppressed during 2008-2010 and the number of wealth taxpayers significantly decreased after its reintroduction in 2011, because of a higher exemption threshold.

To estimate behavioral responses to the 2007 reform, I use a balanced panel of taxpayers and I compare the evolution of financial income of the groups who experienced a tax cut (treatment) with the group who experienced a slight tax increase (control) before and after the reform using a differences-in-differences approach. Taxpayers in the two groups have different income levels by construction. Hence, one potential thread for identification is that they might have different saving behaviors for reasons different to the reform. For instance, they could save differently because they were differently affected by the housing crisis.

To deal with this issue, I restrict my analysis to personal income taxpayers who also file the wealth tax prior to the reform, so that both groups have closer wealth levels

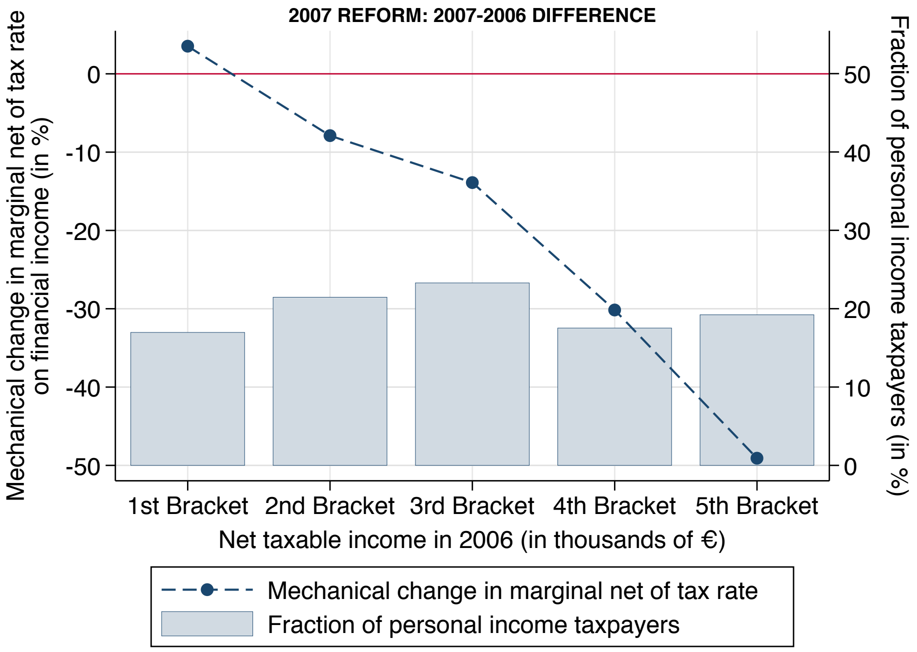
[38]The wealth tax exemption threshold over the period 1999-2017 was 108,182.2 euros of net taxable wealth. Appendix B.2.2 provides a recount of wealth taxation in Spain.

and hence, they are more comparable in terms of their saving behavior. Wealth taxpayers account on average for 15% of the sample of personal income taxpayers over the pre-reform period 2004-2006. Figure 2.12 shows the mechanical variation in marginal net-of-tax rates by income tax bracket among personal income (upper panel) and wealth taxpayers (bottom panel). As expected, the fraction of wealth taxpayers who are in the top personal income tax bracket is quite large, but there are still some taxpayers within the lowest personal income tax bracket, that I will use as control group.

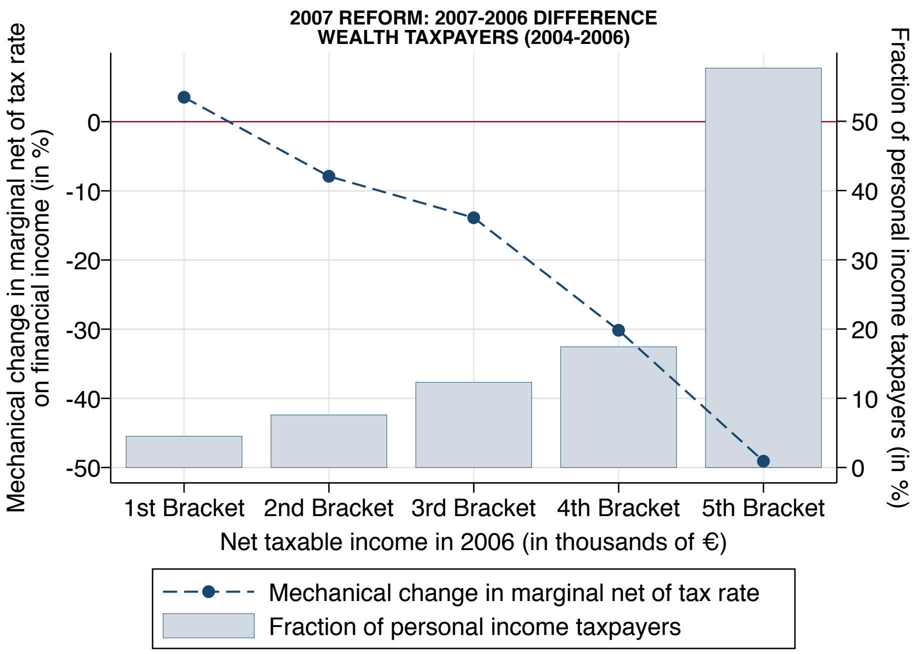
The empirical analysis is based on a standard differences-in-differences event study specification, i.e

$$log\ Y_{it} = \sum_{j \neq 2006} \beta_j \cdot Year_{j=t} \cdot Treat_i^{pre} + \gamma_i + \eta_t + v_{it}, \tag{2.10}$$

where Y_{it} denotes the interest income of taxpayer i in year t, $Year_{j=t}$ is a dummy equal to one when the year equals t, $Treat_i^{pre}$ is an indicator for being in the treatment group based on pre-reform behavior, γ_i is a taxpayer fixed effect, η_t is a year fixed effect, and v_{it} is an error term. The differences-in-differences coefficient β_t captures the effect of the tax reform in year t relative to the pre-reform year, 2006. To increase persistence, I focus on individuals with the same status in several consecutive pre-years. As a baseline, treatment status is assigned based on three pre-reform years (2004-2006).



(a) Mechanical changes in net of tax rates on financial income among personal income taxpayers



(b) Mechanical changes in net of tax rates on financial income among personal wealth taxpayers

Figure 2.12: Mechanical changes in marginal net of tax rates on financial income

Notes: This figure depicts the mechanical changes in marginal net of tax rates (dashed lines) due to the 2007 reform among personal income taxpayers (panel a) and among wealth taxpayers (panel b). Each panel shows the 2007-2006 differences in percent. The figure also shows the size of each group as a share of all taxpayers (bars).

2.3.3.3 Descriptive Statistics

Before investigating behavioral responses to changes in the income tax, I present descriptive statistics in Table 2.4. Column 1 shows means of income and demographics for individuals in the full income tax panel and columns 2-7 means of wealth, income and demographics for individuals in the wealth tax panel by treatment status.[39] The treatment group is decomposed by pre-reform income tax bracket. As previously discussed, the assignment of treatment status is based on pre-reform variables and restricts attention to individuals whose status stays constant during 2004-2006.

SUMMARY STATISTICS BY INCOME BRACKET, 2004-2006

	All	**Wealth taxpayers**					
		All	**Control**	**Treatment**			
			1st Br.	**2nd Br.**	**3rd Br.**	**4th Br.**	**5th Br.**
Wealth		1,225,844	265,217	363,615	397,458	497,604	1,489,324
Debt ass.		36,561	12,356	15,117	16,304	17,536	43,221
% Housing		0.32	0.33	0.37	0.38	0.38	0.31
% Fin. ass.		0.60	0.63	0.56	0.57	0.55	0.61
Income	41,349	193,517	9,266	16,667	26,101	38,331	248,022
Labor inc.	20,979	51,735	3,167	5,370	11,132	17,273	64,724
Age	47.96	57.91	65.46	62.67	62.04	60.54	56.68
% Men	0.71	0.71	0.40	0.47	0.54	0.58	0.77
% Married	0.70	0.76	0.62	0.68	0.68	0.71	0.79
% Self-empl.	0.27	0.37	0.14	0.23	0.22	0.24	0.42
N	800,079	71,211	693	3,192	5,661	8,208	53,457

Table 2.4: Summary statistics, 2004-2006

Notes: This table presents the summary statistics for the full sample of personal income tax filers and the subsample of wealth tax filers which include the control (wealth taxpayers within the 1st bracket) and the treatment group (wealth taxpayers within the 2nd-5th bracket) prior to the reform. All variables report mean values over the period 2004-2006. Taxable wealth, taxable total income, taxable labor income and taxable debt assets are reported in euros.

The following points are worth highlighting. First, my population of interest is very different from the general population in the full personal income tax panel. This is to be expected given that I focus on wealth taxpayers. The treatment and control groups consist of individuals who are older, more self-employed and richer in terms of income than the average individual filing personal income taxes. Third, the difference between labor income and total income (including capital income) is relatively small in the full sample, but large among the wealthy who receive most of their income in the form of asset returns. Finally, there are some noticeable differences in pre-reform

[39] Information on wealth is only available for the sample of wealth taxpayers within the personal income tax panel.

means for the treatment and control groups. This is to be expected given how these groups are defined. Wealth taxpayers who experience a capital income tax cut (treatment group) are much wealthier, hold more of their wealth in financial assets and less in housing, and are more self-employed than wealth taxpayers who experience a slight capital income tax increase (control group). These differences become larger when comparing wealth taxpayers in upper personal income tax brackets. This lack of balance could be a concern for the differences-in-differences approach, but only insofar as it affects the credibility of the parallel trends assumption.

2.3.3.4 Results

Graphical evidence on the evolution of average interest among the two groups shows that interest experienced similar trends before the reform (Figure B15a).[40] Hence, the paralell trends assumption seems to be satisfied. After the reform, trends in average interest income started to diverge rising much faster for the treatment than for the control. Both groups experienced a large decline in reported interest income between 2008 and 2010. This is mainly due to the banking crisis that Spain experienced during this period of time. Many banks, which were having large losses, did not distribute coupon payments on debt securities and consequently, individuals earned less interest income. Reported interest have declined since 2011 due mainly to the decline in interest rates.

Results from the differences-in-differences estimation show that average interest increased on average 76% more for the treatment relative to the control after the reform (Table 2.5, columns 1-2).[41] When decomposing the treatment group by pre-reform income bracket (columns 3-6), I find that average interest increased on average more for all treatment groups relative to the control and that the effect is larger the larger the tax cut. This explains why the effect is largest for individuals in the fifth bracket prior to the reform and lowest for individuals in the second bracket prior to the reform.[42]

[40] I focus on interest because dividends and capital gains are quite volatile and even more so during the crisis, so that any type of saving response is very hard to identify.

[41] Note that this increase can be due to a price effect—rise in interest rates—or due to a quantity effect—increase in holdings. At the time, interest rates were close to zero so that one can assume that the effect is entirely a saving response (quantity effect).

[42] Results are robust to different treatment windows (TableB13) and after restricting the sample to taxpayers reporting positive interest prior to the reform (TableB14).

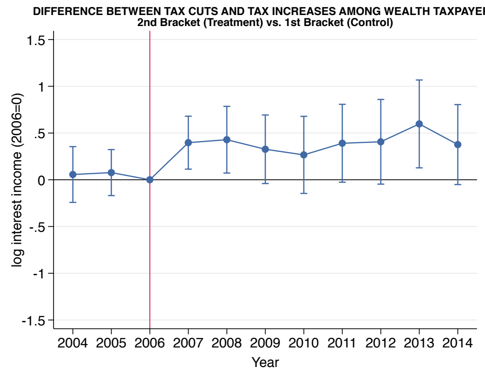
DIFFERENCES-IN-DIFFERENCES RESULTS

	T1 (2nd-5th Br.)		T2 (2nd Br.)	T3 (3rd Br.)	T4 (4th Br.)	T5 (5th Br.)
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.517***	0.516***	0.516***	0.516***	0.516***	0.516***
	(3.89)	(3.70)	(3.70)	(3.70)	(3.70)	(3.70)
Treat	0.322**					
	(2.05)					
Post·Treat	0.560**	0.564***	0.354**	0.360**	0.463***	0.614***
	(3.68)	(4.03)	(2.28)	(2.43)	(3.18)	(4.38)
Indiv. FE		X	X	X	X	X
N	260,089	260,089	14,200	23,244	32,566	197,687

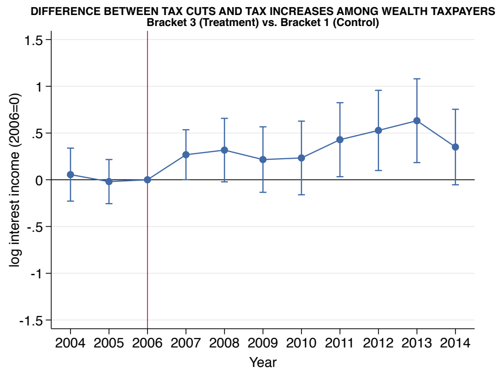
Table 2.5: Differences-in-differences results

Notes: The table presents the results from the differences-in-differences estimation for groups that were differently affected by the 2007 reform. The figure is based on a balanced panel of wealth taxpayers who are observed throughout the period 2004-2014. The treatment-control definition is based on the reform-induced tax variation (2004-2006) for the different groups shown in Figure 2.11b, with first treatment (T1) being an aggregation of groups who experience an increase in the marginal net-of-tax rate due to the reform (2nd-5th bracket) and the control being the group who experiences a decline in the marginal net-of-tax rate (1st bracket). The treatment group is also split by personal income tax bracket, into those who experience the largest net-of-tax rate increases (5th bracket) and those who experience smaller net-of-tax rate increases (4th, 3rd brackets) and even smaller net-of-tax rate increases (2nd bracket) (T2-T5). 95% confidence intervals are based on standard errors clustered at the individual level. The coefficient of interest ($Post \cdot Treat$) is larger than 0.1, so that it cannot be directly interpreted as an effect of $Post \cdot Treat \cdot 100$ per cent and one needs to use the technical equation $\Delta y = 100 \cdot (e^{Post \cdot Treat} - 1)$. Hence, average interest increased on average 75% (column 1) more for the treatment relative to the control after the reform, under the specification without individual fixed effects, and 76% (column 2), under the specification with individual fixed effects. Average interest increased on average 42% (43%, 59%, 85%) more for the second (third, fourth, fifth) bracket relative to the control (1st bracket) after the reform (columns 3-6).

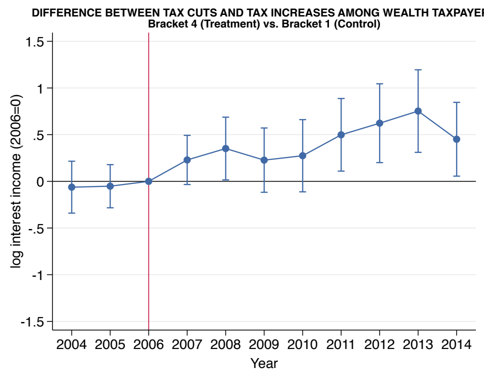
Figure 2.13 plots the differences-in-differences coefficients decomposing the treatment group by pre-reform income bracket. The paralell trends assumption seems to be satisfied since they are non-significant prior to the reform. Coefficients become significant immediately after the reform and increase over time with the exception of years 2009 and 2010. The 2009 banking crisis affected more the treatment than the control group, so that the differential effect becomes non-significant during these two years.



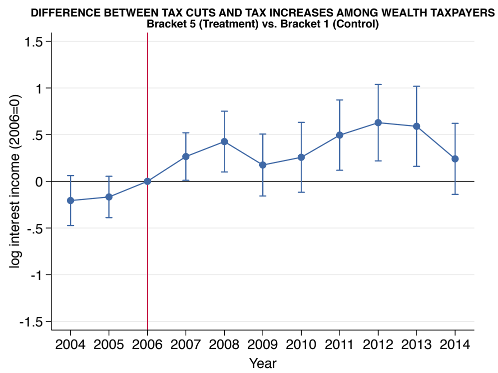
(a) Differences-in-Differences Results (2nd vs. 1st Bracket)



(b) Differences-in-Differences Results (3rd vs. 1st Bracket)



(c) Differences-in-Differences Results (4th vs. 1st Bracket)



(d) Differences-in-Differences Results (5th vs. 1st Bracket)

Figure 2.13: Difference between tax cuts and tax increases among wealth taxpayers by pre-reform income bracket, 2004-2014

Notes: The figure shows the differences-in-differences event-study results normalized to zero in the pre-reform year 2006 for groups that were affected differently by the 2007 reform. The figure is based on a balanced panel of wealth taxpayers who are observed throughout the period 2004-2014. The vertical line at 2006 denotes the last pre-reform year. The treatment group is split by personal income tax bracket, into those who experience the largest net-of-tax rate increases (5th bracket) and those who experience smaller net-of-tax rate increases (4th, 3rd brackets) and even smaller net-of-tax rate increases (2nd bracket). The treatment-control definition is based on the reform-induced tax variation (2004-2006) for the different groups shown in Figure 2.11b, with the control being the group who experiences a decline in the marginal net-of-tax rate (1st bracket). 95% confidence intervals are based on standard errors clustered at the individual level.

2.3.3.5 Wealth Inequality Simulations

Finally, I simulate the counterfactual evolution of wealth inequality absent the capital income tax reform. I estimate wealth across all individuals and years in the panel using the same mixed capitalization-survey method used to construct the benchmark wealth distribution series and apply the annual growth rate of deposits and debt assets of the control group over the period 2007-2014 to the treatment group. Figure 2.14 shows that as expected, the top 10% wealth share would have grown less absent the reform. In particular, according to the counterfactual simulation, the capital income tax reform explains two thirds of the growth rate in the top 10% wealth share over the period 2007-2014.

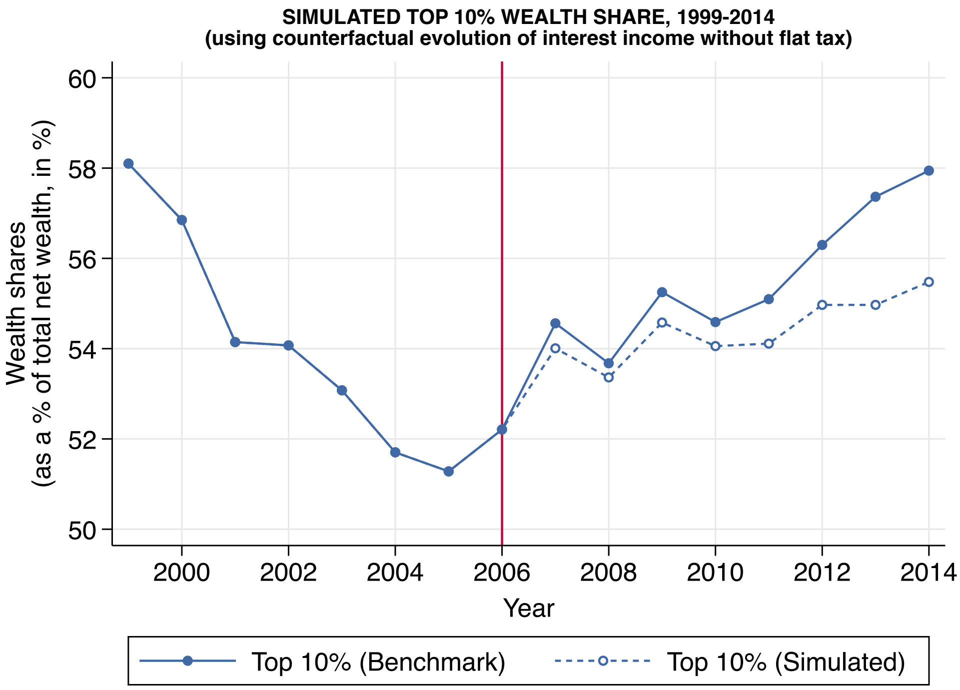


Figure 2.14: Simulated top 10% wealth share in Spain, 1999-2014

Notes: The figure compares the evolution of the top 10% benchmark wealth share (solid line) with the counterfactual top 10% wealth share absent the capital income tax reform (dashed line). The counterfactual wealth distribution has been calculated by first estimating wealth across all individuals and years in the panel using the mixed capitalization-survey method and then applying the annual growth rate of deposits and bonds of the control group over the period 2007-2014 to the treatment group.

The introduction of the flat tax on financial income in 2007 led to an increase in savings on financial assets that was more pronounced for the rich and helps to explain why the increase in saving rates on financial assets and in wealth concentration during the recent housing bust was larger than during the old housing bust. Overall, this section shows that tax incentives can be an important factor behind changes in asset-specific saving rates and wealth inequality dynamics.

2.4 Concluding comments

This paper studies how housing booms and busts shape the wealth distribution. I examine the Spanish context, an ideal setting since the country has experienced two house price cycle episodes in the last forty years. I combine 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., labor income, rates of return, saving rate inequality) driving wealth inequality dynamics. My findings show that the top 10% wealth share decreases during housing booms, but the decreasing pattern reverts during busts. Differences in capital gains along the wealth distribution seem to be the main driver of the drop in wealth concentration during housing busts. Instead, persistent differences in saving rates across wealth groups and portfolio reshuffling towards financial assets among top wealth holders appear to be 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, since 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 commonly highlighted the relevance of asset prices and rates of return in shaping the wealth distribution. My results confirm the importance of asset prices, specially during booms. However, they also reveal that behavioral components, and in particular, saving responses, cannot be neglected to fully understand wealth inequality dynamics. The literature has also overlooked the channels through which these saving responses occur. I present new empirical evidence showing that differences in the dynamics of saving responses along the wealth distribution are consistent with the existence of portfolio adjustment frictions. Moreover, I also exploit quasi-experimental evidence from a large capital income tax reform and show that tax incentives, largely benefiting top wealth holders, can exacerbate this behavior and contribute to the rise in wealth concentration during housing busts. In conjuction, these findings suggest that the current macroeconomics literature could benefit from incorporating lessons from the public and household finance literature.

The time series compiled in this paper and specially, the decompositions of wealth accumulation between valuation effects and saving effects by asset class, might be also 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, specially among bottom wealth holders (i.e., high rates of indebtedness, low saving rates, drop 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 wealth inequality, business cycles and saving behavior. Further research is needed to assess and identify the mechanisms underlying the heterogeneity in saving responses. 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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Chapter 3

Paraísos Fiscales, Wealth Taxation and Mobility

3.1 Introduction

Wealth taxation has received much attention following Thomas Piketty's proposal for a global wealth tax (Piketty, 2014). Recent political debates around the world, including in the United States, have centered around the wealth tax as a revenue source to fund public programs and to curb wealth inequality. These recent policy proposals have led to claims that Americans would give up their citizenship in order to "escape" a progressive wealth tax. In part, this was a motivating factor in Piketty's call for a *global* wealth tax: if all countries do not implement a wealth tax, then mobile capital would simply flow to tax havens where wealth tax rates are zero. Despite the importance of an annual wealth tax in recent policy debates, the evidence on the effect of wealth taxes on behavior is relatively small and the evidence on migration in response to wealth taxes is almost non-existent.[1]

The lack of focus on wealth taxes has been partly driven by limited sources of exogenous variation in wealth taxes, which often times are implemented at the national level. Given the difficulty of cross-country comparisons, little variation in wealth taxes exists across individuals or regions within a country. Furthermore, any study of migration must know where the taxpayer originated and migrated to, which requires potential harmonization of multiple countries' administrative tax records. Thus, several important questions necessary to evaluate wealth tax proposals remain

[1]See Scheuer and Slemrod, 2019, who write: "In sum, the small set of empirical studies of wealth taxes in developed countries have reached no consensus on its effects...."

unanswered. How large are the mobility responses to wealth taxation? What role do wealth tax havens play in undermining wealth taxation? How do these responses affect wealth tax revenue and wealth inequality?

In this article, we answer these questions using arguably exogenous variation in wealth tax rates across sub-national regions (*Comunidades Autónomas*) within Spain. Prior to 2007, Spain had a primarily uniform wealth tax across regions that was briefly suppressed after the onset of the financial crisis. It is only after its reintroduction in 2011, when regions started to substantially exercise their power to change their wealth tax schedules. As a consequence, under this residence-based tax system, large differences in effective tax rates emerged across regions. Madrid plays a special role in this setting as an internal *Paraíso Fiscal* (Fiscal Paradise) with a zero effective tax rate on wealth. The presence of this highly salient and internal tax haven distinguishes Spain from other countries with decentralized wealth taxes, such as Switzerland, where most of the variation results from tax rate differentials, but with all regions levying positive tax rates.[2] This distinction is critical to testing Piketty's claim that tax havens play a special role in possibly undermining wealth taxation. Although variation in tax rates alone generates incentives for relocating wealth, due to salience issues, the decision to adopt or not adopt a wealth tax likely also pays a special role.

In order to estimate mobility of the wealthy, we need data on fiscal residence and wealth tax filing status. To overcome data challenges, we assemble administrative wealth tax records for a stratified random sample in Spain. We merge wealth tax returns prior to 2007 to administrative personal income tax data after decentralization, which allows us to follow the location of (prior) wealth tax filers in the years following the suppression of the primarily centralized scheme and the primarily decentralized wealth tax. The wealth tax data contain detailed information about asset types and the composition of wealth for filers, but following its abolition no wealth tax records were maintained. Nonetheless, because the wealth tax filing threshold increased following the reintroduction of the wealth tax, using wealth tax filing status in 2007 represents a conservative approach to defining our treatment group of wealth tax filers under the new regime. The rich administrative data on both wealth and personal income tax data allows us to refine this treatment classification. We extrapolate personal wealth forward anchoring reported wealth in 2007 and using annual asset-specific rates of return from national accounts combined with individual information

[2]For a discussion of tax competition and tax havens, see Slemrod and J. D. Wilson, 2009. Madrid is unlike much of the stereotypical tax competition and tax havens literature (Hines, 2010; Kessler and Hansen, 2001), where low-tax jurisdictions are small.

from wealth and personal income tax records. The decentralization of the Spanish wealth tax, combined with the accuracy of the wealth extrapolation method and the tracking of the fiscal residence constitutes an ideal setting to study the mobility of taxable wealth.

We proceed in three steps. First, we show descriptive evidence on the number of movers between all pairs of Spanish regions. Following decentralization, the number of moves of wealth tax filers to Madrid is substantially higher than the number of moves to any other region, including the larger regions of Andalusia and Catalonia. Second, we aggregate the individual data to the region-year-wealth tax filer level and compare the population of wealth tax filers in Madrid to the population of wealth tax filers in other regions. We find an 11% and 12% increase in the relative population and wealth in Madrid, respectively, by five years after the decentralization of the wealth tax. These results are robust to a triple difference strategy that also exploits information on the relative population of wealth tax filers and non-filers, such as individuals with a large amount of dividends.

Finally, we turn to an individual location choice model that explains the fiscal residence reported by wealth tax filers as a function of wealth tax rates, individual characteristics, and various fixed effects. The location choice model shows that a 1 percentage point increase in the average wealth tax rate lowers the probability of moving to that region by between 7 and 11 percentage points. Moreover, we can show that only the tax rate of Madrid matters for migration choices: Madrid's population increases due to its zero tax rate, but the populations of all other regions remain unchanged relative to each other. In particular, conditional on moving, Madrid's decision to levy a zero wealth tax raises the probability of migrating to Madrid by 24 percentage points, relative to a pre-decentralization baseline of 37.5%. The latter point suggests that the decision to levy a zero wealth tax rate is critical; smaller regional tax differentials do not appear to matter at the margin.

The key result of our paper can be seen in the raw administrative data (Figure 3.1). After linking administrative wealth tax records in 2007 to administrative personal income tax records, we then follow these individuals that filed wealth taxes in 2007 for the next several years. We then plot, by year, the number of these individuals that have greater than 700,000 Euro of wealth in 2010 and that declare Madrid as their fiscal residence relative to the number of individuals in the average of the remaining 16 regions in Spain. To ease interpretation we normalize both series to be zero in the year prior to decentralization. In the years where the wealth tax was abolished, Madrid and other regions see very little change in the number of wealthy

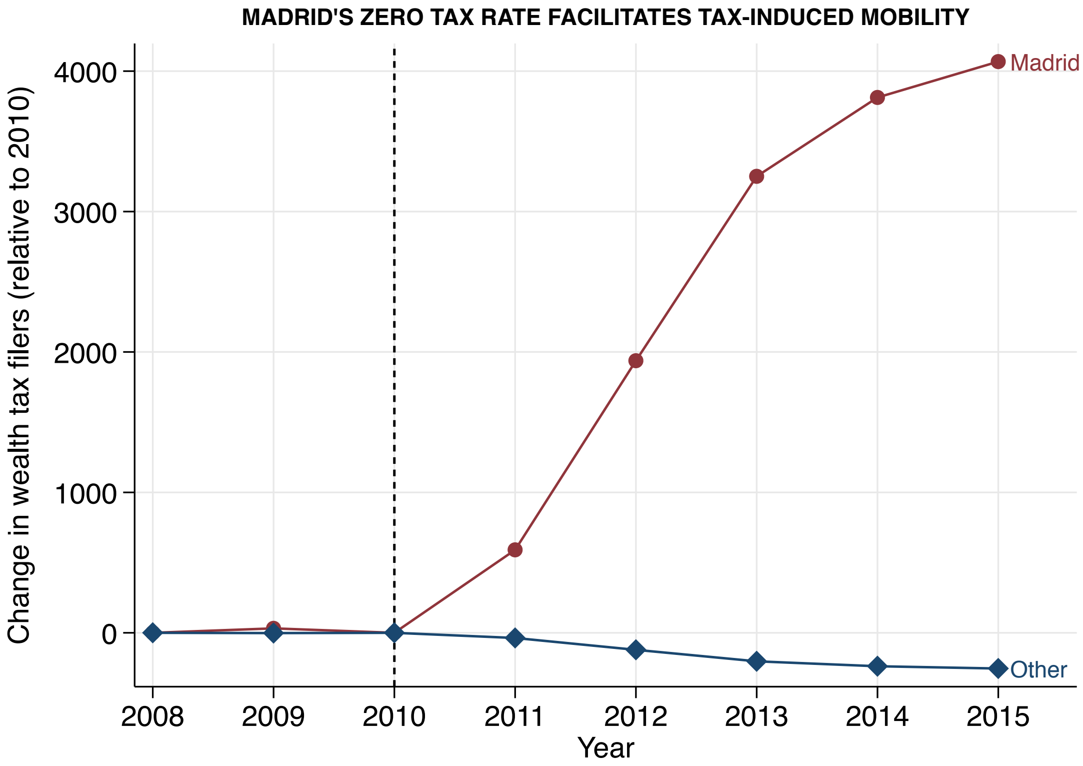


Figure 3.1: Madrid's Zero Tax Rate Facilitates Tax-induced Mobility

Notes: This figure plots the number of wealth tax filers in Madrid and in the average other regions of Spain. A wealth tax filer is an individual that has estimated wealth in excess of 700,000 Euro is 2010 and who filed wealth taxes in 2007. To construct the figure we re-weight our data to be representative of the wealth tax population in 2010 (had the tax not been suppressed in 2007). The locations of wealth tax filers are obtained by matching their 2007 administrative wealth tax records to personal income tax records. We then follow the balanced sample of filers during the period when the wealth tax was not in place (2008-2010) and for the time period the wealth tax was reinstated in decentralized form to the regions (2011-2015). The lines indicate the filers in Madrid and the average number of filers in the other 16 regions. We normalize each series to be zero in 2010 and use the pre-decentralization data to remove group-specific linear time trends. The latter adjustment only slightly changes the orientation of the Madrid line.

individuals. However, following decentralization and Madrid's decision to remain a tax haven, the number of these wealth tax filers declaring Madrid as their fiscal residence increases by over 4,000. The other regions see an average decline of 250 wealth tax filers. Relative to the stock in 2010, this represents a 6% increase in the population of wealth tax filers in Madrid.

We also analyze how the decentralization of the wealth tax has affected tax revenues by means of counterfactual simulations. We first simulate the evolution of revenue absent mobility after decentralization holding the distribution of wealth tax filers in each region at their pre-reform levels. Our results reveal that, conditional on implementing a decentralized system, Spain foregoes on average 4% of total wealth tax revenue over the period 2011-2015 due to mobility (imperfect enforcement), as the tax base shifts from high-tax to low-tax regions. The effects are quite heterogeneous, being largest for regions neighbouring Madrid, relatively poorer and with a large stock of movers to this region and lowest for relatively richer regions. We also simulate the evolution of revenue under a centralized wealth tax system in which all regions would have the uniform statutory wealth tax schedule. Our results reveal that all else equal, abolishing the decentralized system in favor of a centralized system, Spain foregoes on average 60% of total revenue over the period 2011-2015, in large part due to the forgone tax revenue from Madrid remaining a zero tax region. Thus, harmonizing taxes rather than increasing enforcement still allowing Madrid to levy no wealth tax, is a more effective way to increase tax revenue.

Finally, we study whether Spain's decentralization contributed to increasing regional wealth inequalities.[3] For that, we construct new top national and regional wealth distribution series using the personal income and wealth tax panel over the period 2003-2015. Our series are consistent with national accounts and show an increase in top wealth concentration since the onset of the financial crisis. These results are in line with the series using the mixed-capitalization survey method (Martínez-Toledano, 2020). The main novelty in our inequality analysis is that we further decompose the wealth shares at the *regional* level. This is the first attempt to construct harmonized top wealth shares across regions or states within a country. This is of particular importance as it can help to better understand regional disparities and think of policies to improve convergence within countries. For the purpose of this study, the regional decomposition of the top of the wealth distribution is quite interesting, as it allows us to understand how migration of the wealthy might affect regional wealth inequalities. Our new regional wealth distribution series show the existence of significant differences in both level and trend in wealth concentration across Spanish regions. Regions in which the services and industrial sectors are more relevant present higher concentration levels (e.g., Madrid, Catalonia, Valencian Community, La Rioja), while regions in which the agricultural sector is more important have lower wealth concentration levels (e.g., Extremadure, the two Castiles, Asturias). The differences in regional wealth disparities at the top have been exacerbated since the onset of the financial crisis (e.g., due to the different rise in unemployment levels), as wealth concentration has increased in regions with high levels of wealth concentration

[3]For the literature on wealth inequality and progressive wealth taxation, please see Kopczuk and Saez, 2004 Piketty and Saez, 2014, Piketty and Zucman, 2014, Kopczuk, 2013, Kopczuk, 2015, Saez and Zucman, 2016, Smith, Zwick, and Zidar, 2019, Saez and Zucman, 2019a, and Kopczuk, 2019. Alvaredo and Saez, 2009 document wealth inequality in Spain.

and decreased or stagnated in regions with low levels of wealth concentration.

We take advantage of the regional wealth shares to simulate the evolution of wealth inequality absent mobility by holding the distribution of wealth tax filers in each region at their pre-reform levels. As expected, the migration of wealth taxpayers to Madrid has led to a rise in wealth concentration in the region and a drop in wealth concentration in the rest of the country. In particular, between 2010 and 2015 the top 1% wealth share growth rate in Madrid (16%) was almost double the growth rate absent mobility (8.7%). These findings contrast with the almost unchanged evolution of top national wealth concentration under the benchmark scenario with mobility and the counterfactual scenario absent mobility. Overall, the results reveal that Madrid's status as a tax haven has exacerbated regional wealth inequalities and eroded the effectiveness of raising tax revenue and curving wealth concentration.

Until now, evidence for behavioral responses to wealth taxation is based on estimations of taxable wealth elasticities, which places an upper bound on the mobility elasticity (H. Kleven et al., 2019). With respect to the elasticity of taxable wealth, studies generally find large effects: Jakobsen et al., 2018 use administrative wealth records from Denmark; Zoutman, 2016 for The Netherlands; Seim, 2017 for Swedish wealth tax payers, Londoño-Vélez and Ávila-Mahecha, 2018 for Colombia, and Durán-Cabré, Esteller-Moré, and Mas-Montserrat, 2019 for Catalonia. This literature generally does not focus on off-shoring of wealth and its mobility across taxing jurisdictions. Brülhart et al., 2016 use data for Swiss cantons, which allows them to investigate cross-canton adjustments and show that observed responses can mostly be attributed to changes in wealth holdings rather than mobility. In this latter case, mobility responses are estimated across localities in Switzerland, but in 2015, all Swiss cantons levy a positive wealth tax, leaving little room to study the effect of a tax haven, or put differently, adopting or not adopting a wealth tax.

In addition, we contribute to the recent literature on the effect of taxes on mobility. Due to the recent increase in globalization that has led to substantial declines of mobility costs, policymakers must account for mobility of the tax base when setting tax policy. Individuals (and wealth) moving across borders may threaten the ability to engage in progressive redistribution or to raise revenue. Given top-taxpayers contribute a disproportionate share of taxes, much of the literature has focused on this group. Although existing studies present a wide range of estimates, at the margin, taxes appear to be a factor in the locational choices of top earners (Agrawal and Foremny, 2019, Akcigit, Baslandze, and Stantcheva, 2016, Henrik Jacobsen Kleven, Landais, and Saez, 2013, Henrik J. Kleven et al., 2014, Moretti and D. Wilson, 2017, Young and Varner, 2011, Young, Varner, et al., 2016). Gordon and Cullen, 2012 and Lehmann, Simula, and Trannoy, 2014 show that how the semi-elasticity varies over the income distribution is critical for optimal tax rates. As noted in H. Kleven et al., 2019, data and identification challenges are even stronger when studying wealth taxation. For these reasons, few studies have analyzed wealth-tax-induced mobility, although a literature on bequest or estate taxes suggest that the location decisions of the elderly are not very responsive (Brülhart and Parchet, 2014, Bakija and Slemrod, 2004, Conway and Rork, 2006).[4]

Given the literature on tax-induced mobility, what can be concluded about the mobility of wealth taxpayers? In practice, this literature tells us little because the mobility response to the introduction of an annual wealth tax represents a tax change well outside the bounds of any change on capital income or one-time capital taxes. Furthermore, even if we have some evidence on the mobility of capital and wealth itself (Alstadsæter, Johannesen, and Zucman, 2019), this sheds little light on the mobility of the taxpayer who faces mobility frictions not traditionally represented for capital mobility.

Because behavioral responses of high wealth individuals depend on the enforcement environment (Slemrod, 2019), understanding whether individuals can avoid wealth taxes by changing fiscal residence represents an important and understudied topic. The results have important implications for other countries and economic unions (e.g., European Union) considering how to structure their wealth taxes. First, consistent with Piketty's call for a global wealth tax, the case of decentralized taxation in Spain falls victim to the presence of an extremely low tax haven, Madrid. Although a centralized Spanish wealth tax could see migration to outside of the country, the presence of higher international mobility costs could dramatically reduce the mobility of taxpayers (although not necessarily the offshoring of wealth). Furthermore, a centralized tax could be coupled with more appropriate enforcement mechanisms such as an exit tax. This latter point relates to optimal enforcement of the wealth tax. Second, conditional on having a decentralized wealth tax, the ability to avoid wealth taxes depends on the enforcement environment. Following its reinstatement, enforcement and maintaining administrative tax records were partially granted to the regional governments and were coordinated with the central government. Although the central government maintained some authority to audit and enforce wealth tax rules, the highly fragmented system of enforcing tax compliance created easy opportunities for changing fiscal residence that resulted from coordinating enforcement

[4] Moretti and D. Wilson, 2019 focus on the very select Forbes 400 and find that these taxes matter.

policies across many layers of government. Moreover, although legal regulations preventing the immediate change of a fiscal residence were in place, taxpayers found it easy to obtain exceptions to change their fiscal residence. Thus, conditional on the desire to have a decentralized rather than centralized wealth tax, appropriate enforcement measures must be in place to prevent taxpayers from fraudulently changing their fiscal residence via easy to manipulate exceptions, in addition to mitigating tax avoidance strategies via real moves. When setting enforcement policies, the tax authority must consider the possibility that increases in enforcement may only be met with modest success (Johannesen et al., 2018), perhaps because enforcement mechanisms may induce new evasion strategies.

3.2 Institutional Details

The Spanish wealth tax was adopted in 1978 (Law 50/1977). The wealth tax was aimed at complementing the personal income tax and it has been in place until the present, except for its suppression between 2008 and 2010. Law 50/1977 applies to all regions except from Basque Country and Navarre, which do not belong to the Common Fiscal Regime. The wealth tax is a progressive tax on the sum of all individual wealth components net of debts. Since 2011, it is levied only if net taxable wealth (i.e., taxable assets - liabilities) are above 700,000 Euro. The threshold was 108,182.18 Euro over the period 2002-2007. These differences in thresholds are the main explanation for why the number of wealth taxpayers dropped from 981,498 in 2007 (2.7% of the adult population age 20 and above) to 130,216 in 2011 (0.3% of the adult population age 20 and above). Wealth is recorded as of December 31st of every year and filing is done individually. Given that the tax is on individual, and not joint wealth, joint assets are split among spouses with other assets allocated to their owner.

Some exemptions have been progressively introduced on the wealth tax. An individual's main property residence has been exempted up to 150,253.03 Euro since 2000 and up to 300,000 Euro since 2011. Close-held business under the fulfillment of some conditions have been exempted since 1994; pension plans, other financial rights and art treasures are exempt since 1992 and historical heritage has been exempt since its adoption in 1978. Furthermore, there is a ceiling on the total tax liability from personal taxes (i.e., income taxes and wealth taxes) as a fraction of taxable income. This ceiling is in place to limit the total average tax rate on taxpayers with large wealth relative to income. The tax ceiling is set at 60% of taxable income since 2003.

Whenever the total average tax rate exceeds this limit, wealth tax liability is reduced by the excess amount if the reduction accounts for less than 80% of the wealth tax liability, or by 80% otherwise.

Since 1997, the rights to modify the minimum amount exempted and the tax rates were ceded to the regions under the condition of setting a *minimum* bracket and marginal tax rate as the national one. In 2002, the regions were ceded the right to change or include deductions in the wealth tax and the condition of keeping the same minimum bracket and minimum marginal tax rate than the national one was suppressed. All regions kept the national wealth tax schedule (i.e., 0.2-2.5%) during the 1990's and beginning of the 2000's (only a few regions changed the minimum exempted and Cantabria marginally changed the wealth tax schedule in 2006). It is only after the reintroduction in 2011 when the differences in the wealth tax schedule across regions have begun to emerge and have become significant. For instance, Madrid decided to keep the suppression of the wealth tax after 2011, contrary to regions such as Catalonia and Extremadura who have raised the top marginal tax rates (i.e., 2.75% and 3.75%, respectively) above the prior national tax rate, 2.5%. The first panel of Figure 3.2 shows the marginal tax rates under the centralized wealth tax in 2007. The remaining panels of Figure 3.2 show the variation in wealth tax rates across regions following decentralization. The top marginal tax rate on wealth varies by over three percentage points given Madrid has a rate of 0%.

The reintroduction of the wealth tax initially came with substantial uncertainty over when or if it would actually be re-implemented. The central government authorized the reintroduction of the wealth tax in September 2011. This wealth tax applied retroactively for fiscal year 2011. Furthermore, the authorization was sunset to only apply for that fiscal year and the following year. Immediately following the central government's decision, the regional government in Madrid announced to maintain a 100% tax credit. However, many other regions did not formulate their wealth tax schedules immediately. This created additional delays over what each region's tax schedule would look like. For example, Catalonia's was finally approved only in March 2012, but then applied retroactively to fiscal year 2011. In September 2012, the central government announced the extension of the wealth tax until 2013 and this procedure continues annually until today (Durán-Cabré, Esteller-Moré, and Mas-Montserrat, 2019). However, as indicated in Figure 3.2, regional tax rates appear to be relatively constant in 2013 and 2014.

In order to understand how to avoid the wealth tax by "moving," we briefly discuss

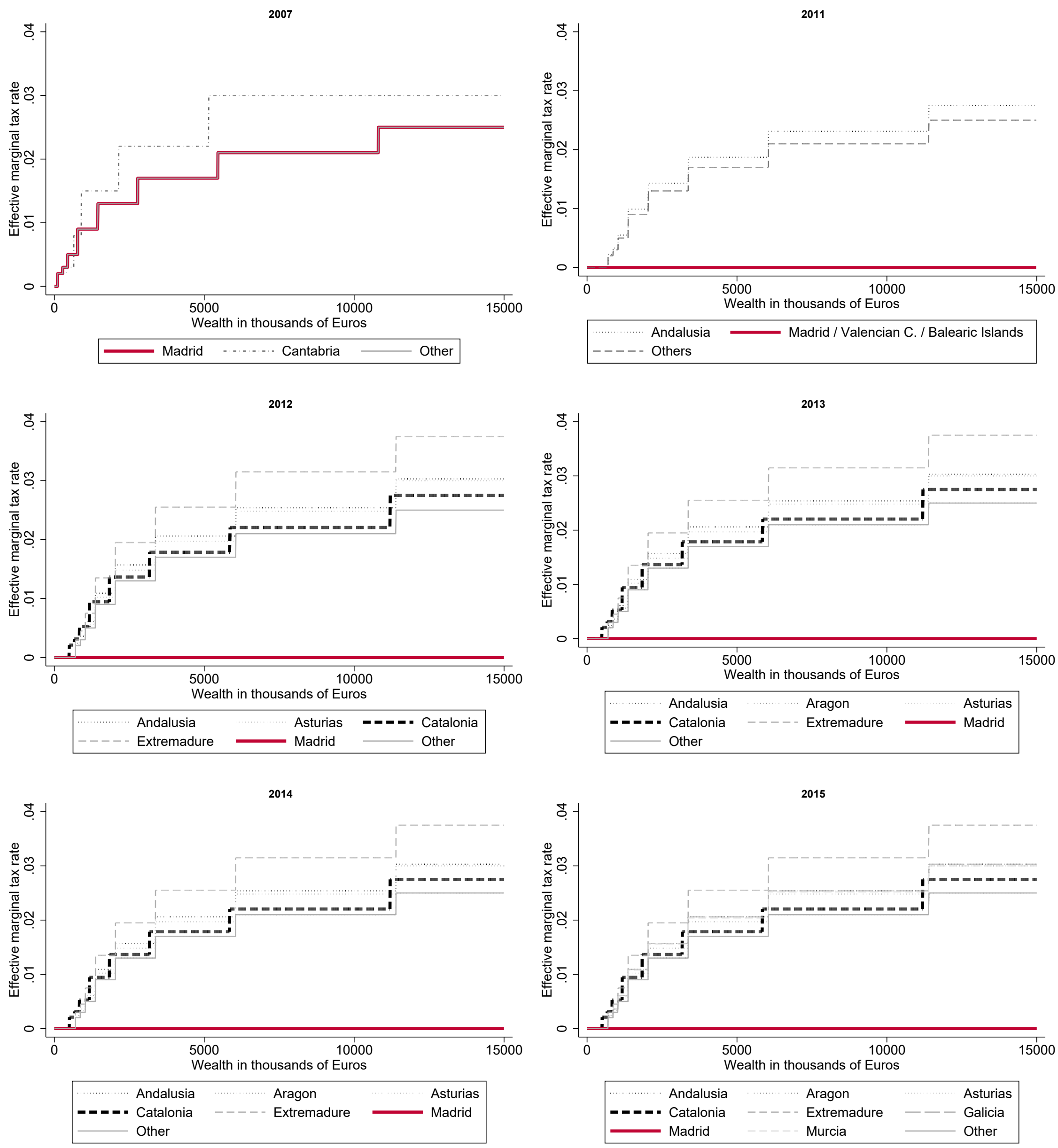


Figure 3.2: Marginal Tax Rates across Regions

Notes: This figure depicts effective marginal tax rates across Spanish regions in 2007 and over the period 2011-2015. The figures have been constructed after digitizing the regional tax books (Libros de tributación autónomica) published by the Spanish Ministry of Finance. Note than in 2007 only the region of Cantabria had a slightly different tax schedule and it is only after 2011 when the large differences in the wealth tax schedule across regions begun to emerge.

how a individual declares their "fiscal residence".[5] Individuals have their fiscal residence in Spain if they they spend more than 183 days in the country during a calendar year or if they have Spain as their main base or centre of activities or economic interests. The wealth tax is payable by both residents and non-residents (if they own property in Spain), although non-residents are only liable on net assets within Spain but miss out most of the exemptions. Updating the fiscal residence for tax purposes can be done on the wealth and income tax forms.

As with personal income taxes, because the wealth tax is authorized by the central government, auditing falls to both the central and regional tax authorities. However, verifying the primary address comes with substantial difficulty to the tax authorities. While our discussion with internal administrators leave them reluctant to disclose information to us, the theoretical literature suggests that enforcement in a multi-tier setting creates coordination problems and the administrative costs of verifying a primary residence may be substantial for the tax authority.

Finally, the decentralization of the wealth tax needs to be considered in the context of other recent Spanish decentralizations. As discussed in Agrawal and Foremny, 2019, the central government also passed provisions in 2011 that allowed the regions to select the tax brackets and tax rates on their half of the personal income tax on labor. This decentralization resulted in regions setting top marginal tax rates on labor income that differed by five percentage points relative to a total top marginal tax rate of approximately 50%. While this decentralization created incentives for high-income individuals to move to low income-tax regions, Spain operates a dual income tax system. Under this dual system, capital income is taxed at a common (central) tax rate. Thus, for high-wealth individuals who likely obtain a substantial fraction of their income from the return to capital, decentralization of the labor income tax provided little additional incentive to move to Madrid. Furthermore, because we can link administrative wealth tax records to personal income tax records, we are able to see the distribution of labor income among wealth tax filing individuals. Figure B1 shows that approximately 80% of wealthy individuals have labor income less than 100,000 Euro. Critically, as shown in Agrawal and Foremny, 2019, the incentives to move in response to the labor income tax decentralization are negligible

[5] Although we use the word "move" or "mobility", it is important to note that a change of fiscal residence may not actually involve a real move. A change of fiscal residence can be broken into two categories: first, real moves that actually involve a taxpayer's relocation to the regions and, second, fraudulent moves where the taxpayer simply declares their primary residence incorrectly. The first of these, if complying with all legal regulations, is a form of tax evasion, while the second of these is illegal, and thus tax evasion.

for incomes below 100,000 Euro.[6]

One might also worry about wealth transfer taxes that are decentralized to the regions. Several points are in order: Spain operates an inheritance tax (not an estate tax). Inheritance taxes have been decentralized to the regions since 1997, and regions first exercised this right prior to 2011, so there is no additional incentive created by this tax starting in 2011. Furthermore, the place of residence for this tax is defined based on the location of the donor over the last *five* years before death is the one that is relevant. Given this long duration of proof, and the fact that we focus on four years following decentralization, we expect little of the new migration to be a result of these taxes.[7]

3.3 Description of Data

We combine two administrative data sets for the empirical analysis, both of them constructed by the Spanish Institute of Fiscal Studies in collaboration with the State Agency of Fiscal Administration. We obtain these confidential records with approval by the Spanish government.

The first data set contains individual level income tax returns over the period 2002-2015. The data reports all cells which have to be filled out in the annual personal income tax declaration. This includes the amount and source of income, personal characteristics (e.g., age, gender, civil status, children), and, critically for our empirical exercise, the fiscal residence of the tax filer. The panel structure of the data allows us to follow individuals over time, and hence trace changes in their fiscal residence across regions. 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 Navarre, are excluded, as they do not belong to the Common Fiscal Regime (Régimen Fiscal Común), because they manage their personal income and wealth taxes independently.

The second data set includes administrative wealth tax returns which contain detailed information about wealth taxpayers' assets and liabilities. This data is available for individuals included in the income tax panel which were subject to the wealth tax between 2002 and 2007. No data exists after the wealth tax was suppressed in 2007. For this reason, after linking the wealth tax data to the personal income tax data, we

[6]To address this possible confounding event, we implement a robustness check where we eliminate all wealth-tax filers that have labor income in excess of 100,000 Euro.

[7]For further institutional details, see appendix C.1.1.

rely on the fiscal residence reported in the income tax returns, as the legal definition for both taxes is the same.

These two data sources are very suitable to analyze wealth mobility across regions because apart from their longitudinal dimension, they provide information for a large sample of personal income taxpayers (i.e. 556,311 units in 2007 out of which 67,820 – approximately 12% – are also wealth taxpayers).

As the panel only includes wealth information until 2007, we have attempted to obtain administrative wealth tax returns following decentralization. We have filed requests with all regional tax authorities, which maintain administrative wealth tax records for their region. Catalonia has granted us access to their wealth tax records. This provides a useful check for us, but even if we had all states with wealth taxes, these data would not be sufficient, as Madrid maintains little administrative records due to 0% tax rate.[8]

The dataset was constructed stratifying by region, income level and main source of income and oversamples the top of the distribution. Given this stratification, the data are meant to be representative of the personal income tax distribution. We re-weight the data to be representative of the total population of personal income taxpayers and wealth taxpayers across regions. First, we re-weight the sample of wealth taxpayers to match regional totals over the period 2002-2007. We then extrapolate these weights forward over the period 2008-2015 by applying to the annual adult population in each region the share of wealth tax filers relative to the adult population in 2007. Finally, we re-weight the subsample of personal income taxpayers that do not file wealth taxes so that after re-weighting the full panel matches the total number of personal income taxpayers in each region and year. Nonetheless, the re-weighting is mainly relevant for the inequality analysis in Section 7.2, as it does not affect any of our regression results.

3.3.1 Wealth Extrapolation Method

In this subsection we describe the method used combining national accounts, wealth tax and personal income tax returns to extrapolate individual personal wealth for years for which we do not have administrative wealth tax records (i.e., 2008 to 2015).

Our main data source are the annual flows and stocks from national accounting. Following Martínez-Toledano, 2020, we first map each personal income category

[8]Approximately 20,000,000 individuals declare personal income taxes every year.

from national accounts to a personal wealth category in non-financial accounts reconstructed by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and financial accounts from the Bank of Spain. The wealth categories we are able to map are urban real estate, business assets, life insurance, deposits, debt assets, shares and debts. Once income and wealth categories are classified, we compute the rate of return for each category as the ratio of aggregate wealth to national income, every year since 2007. We then extrapolate individual personal wealth from 2008 onward using reported wealth in 2007 and the rates of return for each wealth category over 2008-2015. For the inequality analysis, we use the same extrapolation procedure except that we first proportionally rescale individual reported wealth in 2007 to match total reported wealth by asset class and then apply the rates of return.

Asset categories for which the aggregate rate of return is not available (e.g., jewelry, antiques, rural real estate, industrial and intellectual property rights, etc.) are extrapolated forward using the annual growth rate in average reported values from wealth tax records over the period 2011-2015 and linearly interpolating the growth rates for year 2007 and 2011.[9] Note that for some assets (e.g., taxable business assets, liabilities, etc.) we also use this last procedure, as it better matches the evolution of total reported wealth by region. We finally refine the extrapolation adjusting reported urban real estate to account for the exemption on main residence, which was raised from 150,253.03 Euro in 2007 to 300,000 Euro from 2011 onward.

To prove the robustness of our extrapolation method, we first compare extrapolated average regional wealth with actual reported average wealth by the Spanish Tax Agency over the period 2011-2015. Figure B2 shows that the extrapolation matches very well regional average wealth levels in both level and trend. We also compare extrapolated versus actual individual reported wealth levels for Catalonia's wealth taxpayers (Figure B3). The strong correlation between our extrapolated measures and the actually observed wealth measures in these two regions provides strong evidence supporting the consistency of our method.

3.3.2 Tax Calculator

Research on taxes and migration requires knowing the tax liabilities an individual pays in their region of residence and all possible counterfactual regions of residence. Although we have information on the tax liabilities payed by wealth taxpayers in the

[9]The average reported values from wealth tax records have been calculated after digitizing the regional wealth tax statistics published by the Spanish Tax Agency.

region of residence, we do not have information on what tax liabilities they would have payed had they lived in any other region of Spain. As there exists no publicly available wealth tax simulation model for Spain (such as the NBER TAXSIM model for the United States), we have constructed our own tax simulator accounting for all details of the Spanish wealth tax system between 2002 and 2015.

The wealth tax simulator makes it possible to calculate wealth tax liabilities for every region and year. To do this, we comb through thousands of pages of archival and legal documents provided by the Spanish Ministry of Finance.[10] In particular, we collected most parameters of the wealth tax code, such as rates, brackets, exemptions (primary residence, certain business assets, closely held companies), reductions (e.g., disability), and other relevant details from the information officially released each year. Moreover, given that we are able to merge wealth tax and personal income tax administrative datasets, we can also simulate the maximum wealth tax liability cap.

The new wealth tax simulator returns annual wealth tax liabilities, average tax rates, and marginal tax rates for each taxpayer in every region of Spain. For purposes of this study, we define an average tax rate as wealth tax liabilities divided by total wealth. We use the tax calculator to simulate the average and marginal tax rate in the individual's region of residence and hypothetical tax rates if the individual lived in any other region or if all regions would have maintained to the default statutory national wealth tax schedule. This provides us not only with the actual wealth tax liabilities in the region of residence, but also all counterfactual levels of the wealth tax burden across all the different regions of Spain under both a decentralized and centralized wealth tax system. Results of our tax calculator reasonably match the information available on the administrative tax return data for the years where this information is available.

As migration is an extensive margin response, the decision to move to Madrid, or any other region, is based off of the average tax rate. For this reason, the average tax rate is the preferred metric in our regressions. The average tax rate may be less salient to than the top marginal tax rate. However, for very high wealth individuals, the marginal tax rate well approximates the average tax rate and could be viewed as a tax on superstars. When using the average tax rate, we need to simulate it using our tax calculator. For an individual i in year t facing a tax schedule in region j, we simulate the net of average tax rate, $1 - atr_{itj}$, using each individual's time-varying wealth as calculated using the extrapolation methods in section 3.3.1. To address

[10] This information is released each year and summarizes all parameters together with examples how to calculate the tax burden of the personal income tax and the wealth tax, if applied (*Manual Práctico de Renta y Patrimonio*).

measurement error concerns and possible endogeneity resulting from taxable wealth changing over time, we construct a mechanical wealth tax rate $\overline{1 - atr_{itj}}$. To do this, we hold wealth constant at its 2010 level, simulate tax rates for every individual facing a tax schedule in region j and year t. This latter tax rate will provide to be a useful instrument as it will contain only variation that is due to statutory tax system changes in a region and removes any changes due to changing wealth (e.g., due to fluctuations in asset prices or savings).

3.3.3 Treatment and Comparison Groups

In this subsection, we define the samples of treated and comparison individuals that we will use in the subsequent aggregate and individual analyses. As the treatment status must be defined using pre-decentralization data, we face a trade-off of using the raw 2002-2007 administrative data (under the centralized regime) versus 2008-2010 extrapolated data (under the wealth tax suppression). For this reason, we will define two different treatment and three comparison groups and show the results are robust to their specification.

For defining treatment, in our preferred approach we rely on the extrapolated data and focus on individuals that are reasonably believed to be paying wealth taxes under the higher 700,000 Euro threshold in place in most regions from 2011-2015. In particular, we classify an individual as being in the treatment group under the decentralized regime, if their wealth in 2010 is estimated to be above 700,000 Euro, that is the threshold above which wealth tax liabilities become positive. We refer to this group as the "2010 wealthy" or the "2010 treatment group." Note that the extrapolation is only done for individuals filing wealth taxes in 2007, as for the rest of filers we have no wealth information. However, given the large change in the exemption threshold for filing wealth taxes (i.e., from 108,182.18 Euro in 2007 to 700,000 Euro in 2011), we believe this approach allows us to focus on a sample of individuals that are reasonably expected to be paying wealth taxes and thus affected by interjurisdictional tax differentials. The advantage of this approach is that we design our treatment based on the immediate year prior to the reintroduction of the wealth tax, but with the limitation of using extrapolated rather than observed wealth tax data.[11] Furthermore, this approach also excludes individuals that might be forward looking and who expect their wealth to increase dramatically in the coming years.

[11] The results are robust to defining the sample if the individual has more than 700,000 Euro of wealth in the administrative records from 2007.

Our second alternative approach defines the treatment sample on the basis of the 2007 administrative records. We classify an individual as treated by the decentralization if they filed wealth taxes under the centralized regime in 2007. We refer to this group as the "2007 filers" or the "2007 treatment group." Because of the increase in the wealth tax filing threshold in 2011 relative to 2007, this sample allows for the possibility to be forward looking and anticipate wealth taxes applying in a future year due to growth in the individual's asset portfolio. Moreover, this sample also includes some individuals that likely do not need to file wealth taxes under the new regime with the higher threshold.

For defining the comparison group, our preferred specification includes anyone who reports positive dividends on their personal income tax form in at least one year over the period 2008-2010, but did not file wealth taxes in 2007.[12] Spain introduced in 2007 an exemption of up to 1,500 Euro on dividends, so that this group only includes individuals that have more than 1500 Euro of dividend income. We refer to this group as "high-dividend non-filers".[13] This is our preferred group because they have a significant amount of savings, but not enough so that they would move in response to expected wealth increases that require them to pay taxes. Again, we use their fiscal residence reported on their personal income tax return to calculate the share of high-dividend non-filers in each region by year.

As an second approach, we use all personal income tax filers that were not wealth tax filers in 2007 as a comparison group. We call this the "non-filer comparison group". Finally, for the case of the 2010 treatment group, we can also use the number of 2007 wealth tax filers that have a level of wealth that is significantly below the 700,000 Euro threshold as a third comparison group. To do this, we rely on the extrapolated wealth and assign individuals to the comparison group if their wealth is between 108,000 and 300,000 Euro.[14] While more similar on the basis of wealth than our high-dividend non-filers, some of these individuals may expect their wealth to grow and may be partially treated due to the reform, especially given their familiarity with filing wealth taxes. We call this group the "$< 300,000$ comparison group".

[12] Because dividends are volatile, perhaps for reasons unrelated to the taxpayer wealth status, we prefer to define this group based on having more than 1,500 Euro of dividends in any year when the wealth tax was suppressed rather in all years.

[13] Here being a non-filer refers to year 2007. While it is unlikely anyone in this group could become a filer in subsequent years, it not entirely impossible as individuals might receive a large bequest or purchase a large amount of assets after winning the lottery.

[14] As in Akcigit, Baslandze, and Stantcheva, 2016, although individuals with wealth very close to the threshold are more likely to follow a similar trend to the treatment, this group is also likely to be affected by the reform and would bias the results. For this reason, we look at lower wealth individuals and document that they also follow similar trends.

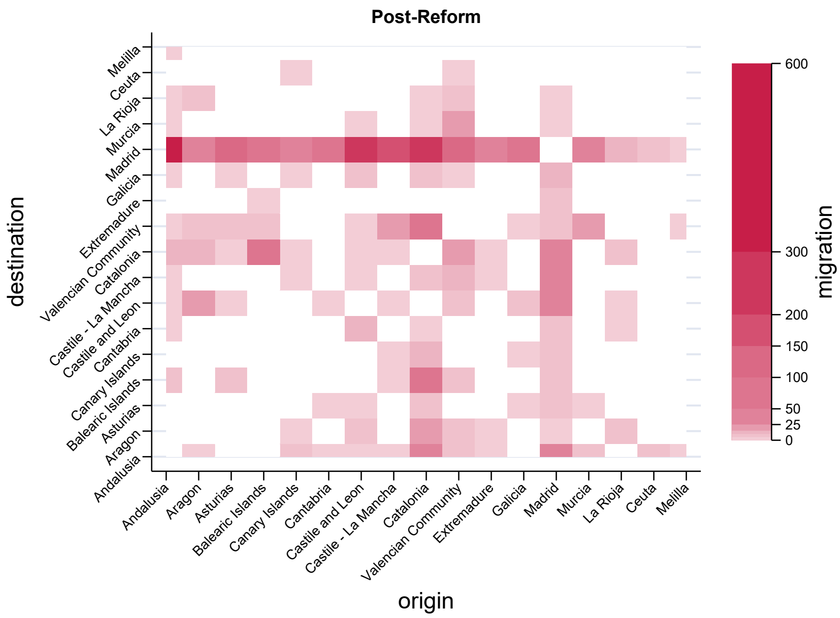
3.4 Descriptive Evidence

SUMMARY STATISTICS, 2010

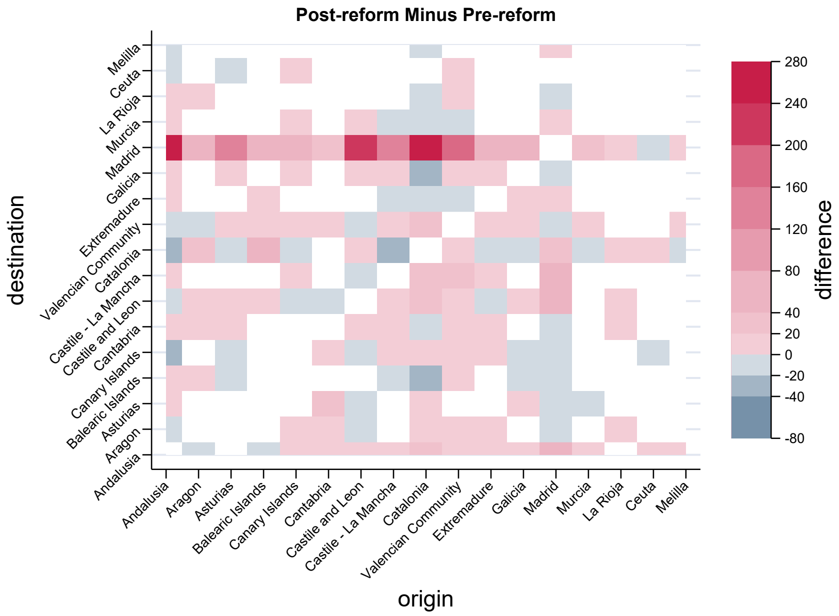
Variables	# obs	Mean	sd	Min	Max
		Panel A: All filers in 2010			
PIT tax base (labor)	375,170	111.7	299.6	-1,122	21,722
PIT tax base (capital)	375,170	71.32	682.5	0	110,409
Debt	375,170	179.6	1,365	0	203,162
Wealth tax base	375,170	2,355	5,972	700.0	313,634
Age	375,170	64.77	12.05	11	106
Gender	375,170	0.441	0.497	0	1
		Panel B: Filers residing outside Madrid			
PIT tax base (labor)	294,463	97.69	221.9	-1,020	14,002
PIT tax base (capital)	294,463	59.37	219.3	0	8,164
Debt	294,463	158.2	748.8	0	30,799
Wealth tax base	294,463	2,141	5,375	700.0	313,634
Age	294,463	65.16	11.97	11	104
Gender	294,463	0.442	0.497	0	1
		Panel C: Filers residing in Madrid			
PIT tax base (labor)	80,707	162.9	484.0	-1,122	21,722
PIT tax base (capital)	80,707	114.9	1,410	0	110,409
Debt	80,707	257.4	2,570	0	203,162
Wealth tax base	80,707	3,136	7,719	700.1	310,083
Age	80,707	63.37	12.23	17	106
Gender	80,707	0.437	0.496	0	1
		Panel D: Filers which moved to any region other than Madrid			
PIT tax base (labor)	1,094	125.9	264.2	-261.9	1,637
PIT tax base (capital)	1,094	93.56	357.6	0	2,982
Debt	1,094	339.0	1,409	0	10,113
Wealth tax base	1,094	2,203	2,434	704.0	12,654
Age	1,094	63.04	12.66	34	97
Gender	1,094	0.376	0.485	0	1
		Panel E: Filers which moved to Madrid			
PIT tax base (labor)	880	90.43	121.0	-22.49	585.9
PIT tax base (capital)	880	85.78	171.3	0	901.6
Debt	880	217.3	622.6	0	4,510
Wealth tax base	880	4,080	6,255	705.5	38,252
Age	880	65.22	13.17	36	91
Gender	880	0.463	0.499	0	1

Table 3.1: Summary Statistics, 2010 (2010 Wealthy Treatment Sample)

Notes: This table presents summary statistics for our preferred treatment sample (i.e., "2010 wealthy", those who have wealth above 700,000 Euro in 2010) in pre-reform year 2010. Note that all figures are calculated using weights to match the total number of wealth tax filers in every region and year. All monetary values are in thousands of Euro.



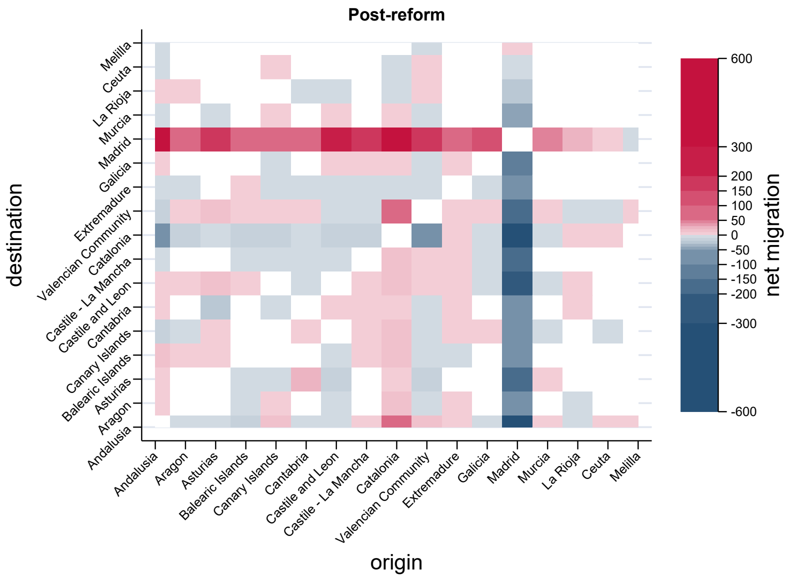
(a) Post-Reform



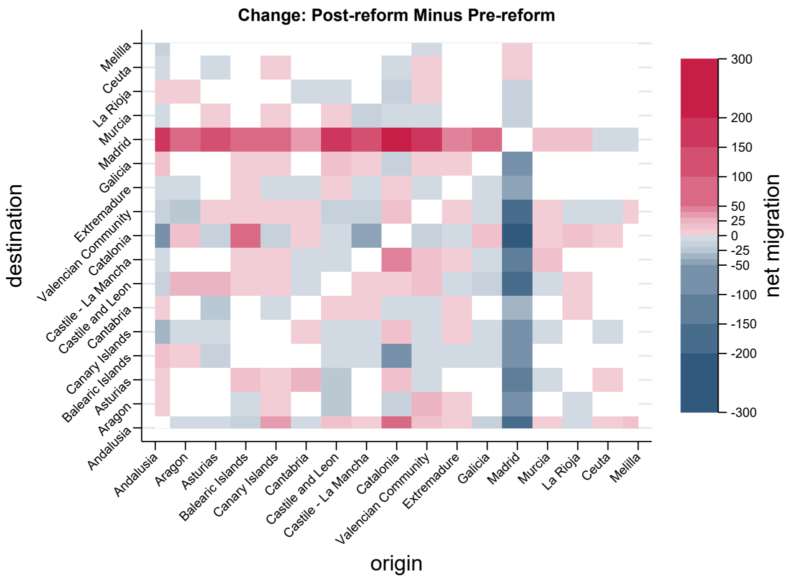
(b) Change: Post-reform Minus Pre-reform

Figure 3.3: Transition Matrix: Flows by Region Pairs

Notes: This figure shows transition matrices with the flows of regions by paris. Panel (a) shows the (annual average) number of wealth tax filers moving from each origin region to each destination region following the wealth tax decentralization. Panel (b) shows the change in the (annual average) of wealth tax filers in the five years following decentralization relative to the (annual average) of wealth tax filers in the years prior to decentralization (i.e., when the wealth tax was suppressed).



(a) Post-Reform



(b) Change: Post-reform Minus Pre-reform

Figure 3.4: Net Migration Patterns

Notes: This figure depicts net migration patterns for the years following decentralization (2011-2015). Panel (a) shows the (annual average) net migration of wealth tax filers to a destination region following the wealth tax decentralization. Panel (b) shows the change in the (annual average) net migration of wealth tax filers to a destination region in the five years following decentralization relative to the (annual average) net migration of wealth tax filers in the years prior to decentralization (when the wealth tax was abolished, 2008-2010). Values in red indicate a net in-migration from the origin region while negative numbers indicate a net out-migration to the origin region. Folding the graph along the 45 degree line would yield the same cell values in absolute value, but with opposite signs.

Before proceeding, it is useful to present some descriptive statistics concerning the sample of wealth tax filers. Table 3.1 shows the summary statistics for our preferred treatment sample (i.e., "2010 wealthy", those who have wealth above 700,000 Euro in 2010) in pre-reform year 2010. The purpose of this exercise is to show that the pre-decentralization characteristics of wealthy individuals are similar in Madrid in comparison to other regions: in this way, we can make some inference about why Madrid may have set a lower wealth tax. Looking at the first three panels that focus on the full 2010 wealthy group, it is clear that wealthy individuals in Madrid are similar to those in other regions on the basis of demographic characteristics, but Madrid wealth tax filers have higher average wealth and income levels. Such an indication may lead to a political economy story: a higher concentration of wealth and income may be attributed to more political influence (Saez and Zucman, 2019b), which may translate to the zero tax rate adopted by the region. Comparing the last two panels, movers to Madrid versus movers to any other region are similar on demographic characteristics, but movers to Madrid have higher wealth and income levels. This is consistent with these individuals having the largest benefit of avoiding taxes.

As initial visual evidence, we also construct heat maps showing the migration flows of the 2010 wealthy treatment group between regions (Figure 3.3). Figure 3.3 (a) shows the (annual average) transition matrix to each destination region from a given origin region for the years following decentralization. Immediately noticeable is the intense migration to the destination of Madrid. Madrid is a relatively large region, so that its migration numbers are expected to be larger. However, even other large regions like Catalonia and Andalusia do not stand out like Madrid. To provide further illustrative evidence, Figure 3.3 (b) depicts the change in the annual migration numbers between each pair. We construt this figure by calculating the annual average migration flows separately for the years prior to and after decentralization. We then difference this data such that dark red cells see large increases in migration following the decentralization of the wealth tax, while blue pairs see declines to that destination. Madrid stands out again: the annual migration flow to Madrid increases from almost every origin region. This provides initial descriptive evidence of our key result: wealth tax differentials induce strong migration to low-tax regions.

Nonetheless, what matters is the change in net migration (i.e., inflows net of outflows) and this is hard to see on Figure 3.3. Thus, as further visual evidence, Figure 3.4 depicts heat maps with the net migration flows. Figure 3.4 (a) shows the net migration patters of wealth tax filers to a given destination from a given origin region. The way to read the heat map is straightforward, pick a destination row. If the cell is dark red, then net migration (in-flow from the "origin" region minus out-flow to the "origin" region) is stronger towards that "destination" region. If the cell is blue, the opposite is true. Figure 3.4 (b) shows the change in net migration as the difference of annual net migration in the pre- and post- reform period. Madrid is the strongest net recipient of wealth tax filers and its migration patterns increase dramatically relative to the period without a wealth tax. Almost every other region is losing high-wealth taxpayers to Madrid.

3.5 Aggregate Analysis

We start by showing the effect of Madrid's status as a tax haven using aggregated data that we construct from the administrative wealth and personal income tax return data. We show that the share of wealthy individuals and the share of wealth in Madrid increases dramatically relative to other regions following decentralization. This pattern holds true even after comparing the 2010 wealthy and 2007 filers samples to other high-wealth individuals that are not above the wealth tax exemption threshold. We focus on the stock of wealth and the stock of wealthy people because estimates of the elasticity of the stock are critical for estimating the effects of wealth taxation on tax revenue and wealth inequality. Using data from both periods, when the wealth tax was abolished (2008-2010) and when it was decentralized to the regions (2011-2015), we implement a difference-in-differences design that compares Madrid to other regions relative to the diifferences in the stocks prior to the reform.

In all regressions presented in this section, we focus on a balanced sample of individuals to construct our aggregate statistics, or in other words, we use individuals that appear in the personal income tax data for all years from 2008 to 2015. In this way, we focus on a sample of individuals that do not die or lose contact with the tax administration in this period.[15] Presumably, reasons for not making contact with the *income* tax authority are uncorrelated with wealth tax rates. For this reason, results using an unbalanced sample of individuals yield nearly identical results. Second, we need to define a "wealthy" individual that might be affected by the decentralization of wealth taxes along with appropriate comparison groups. We do this following the procedure detailed in section 3.3.3.

We then total the number of individuals and sum the total amount of wealth in

[15] Because the sample of individuals is balanced, regressions using the share of individuals in a region and the number of individuals in a region are identical. Results using an unbalanced sample are similar.

each region, year and treatment-comparison group. To calculate these totals of high wealth individuals in each region, we re-weight the data as discussed in section 3.3. After reweighting the data, we tally the total number of wealthy individuals. We also use this reweighted data to construct totals for the comparison groups. To calculate the share of wealth in each region, we take two approaches. First, we hold wealth fixed at its 2010 level, but we track where each individual reports her fiscal residence using information from the personal income tax record. Then, we annually calculate the share of "wealthy" individuals and the share of top wealth in each region. In a second approach, we again allow for interstate migration but use instead time-varying measures of wealth based on out extrapolation method to construct the share of wealth in each region.

To implement the initial empirical design, let r index the region and t index time. Then, the treatment status M_r is equal to one for the region of Madrid, which sets no wealth tax rate, and is equal to zero for all other regions. In this way, we compare the relative evolution of the share of wealthy individuals (or wealth), $N_{r,t}$, in Madrid to all regions other than Madrid. We estimate:

$$\begin{aligned} \ln N_{r,t} = M_r \cdot \left[\sum_{y=-3}^{-2} \theta_y \cdot \mathbf{1}(y = t - 2011) + \sum_{y=0}^{4} \beta_y \cdot \mathbf{1}(y = t - 2011) \right] + \\ X_{r,t}\alpha + \zeta_r + \zeta_t + \nu_{r,t}. \end{aligned} \tag{3.1}$$

The indicators $\mathbf{1}(y = t - 2011)$ are dummies for each event year y prior to or after the reform. We omit the year immediately prior to the reform. As in a generalized difference-in-differences model, the θ_y represent the evolution of wealthy individuals in Madrid *relative* to other regions in the years prior to 2010 and β_y represent their evolution following the reform. We include a vector of various controls, $X_{r,t}$, that include public spending on various programs, regional demographic, amenity and economic controls.[16] Finally, ζ_r and ζ_t are region and year fixed effects.

As supporting evidence of the identifying assumption in the dif-in-dif design, θ_y should be close to zero, while a positive treatment effect for Madrid would indicate $\beta_y > 0$ for wealth tax filers. Because the regressions involve the stock of individuals, rather than a flow, we expect the coefficients to increase gradually rather than jump on impact. An useful point to make is that the event study specification above

[16]These time-varying regional covariates include unemployment, GDP per capita, long term unemployment, R&D spending, material dependence, high school and tertiary education, gender, the median age, fraction senior, the fertility and mortality rate, heating and cooling degree days, and public spending on the most important government services. We show results are robust to the exclusion of controls.

captures the relative difference in the population of Madrid to the other regions, compared to that relative difference in the year prior to decentralization. This means that the coefficients should be interpreted as the evolution of Madrid's population compared to other regions. Because we have data on 16 regions other than Madrid, the decline in the *average* alternative region or to any *one* other region must be small. Thus, to a first order, we do not need to worry that Madrid's increase is offset by the same decrease elsewhere. If sixteen regions is not sufficiently large, our estimates will slightly overestimate the effect of Madrid. Thus, we will refer in our results to the relative difference, whereby we mean Madrid compared to the other alternative regions on average.

As an alternative expression, we exploit the stock of the treatment and comparison group in each region year in a triple difference design. Let $f = T, C$ index the treatment and comparison groups defined in section 3.3.3, respectively. We can then define an indicator variable W_f that equals one for the wealthy and zero for the non-wealthy. We estimate:

$$\begin{gathered}\ln N_{r,f,t} = W_f \cdot M_r \cdot \left[\sum_{y=-3}^{-2} \theta_y \cdot \mathbf{1}(y = t - 2011) + \right. \\ \left. \sum_{y=0}^{4} \beta_y \cdot \mathbf{1}(y = t - 2011) \right] + Z_{r,f,t}\delta + X_{r,t}\alpha + \zeta_f + \zeta_r + \zeta_t + \nu_{r,f,t}\end{gathered} \tag{3.2}$$

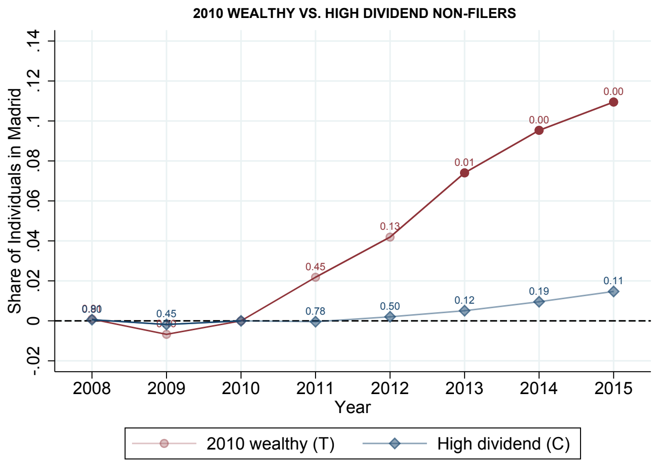
where $Z_{r,f,t}$ is a vector that includes all interactions of W_f, M_r, and post-event dummies and ζ_f are wealth group fixed effects. All other variables are defined as previously stated. To gain intuition, consider a simpler specification that interacts $W_f M_r$ with a simple indicator P_t for all time periods post-decentralization. Of course, the difference-in-difference-in-differences (DDD) coefficient on $W_f M_r P_t$ can be expressed as the differences in sample averages $\left[(\overline{N}_{m,T,a} - \overline{N}_{m,T,b}) - (\overline{N}_{m,C,a} - \overline{N}_{m,C,b})\right] - \left[(\overline{N}_{o,T,a} - \overline{N}_{o,T,b}) - (\overline{N}_{o,C,a} - \overline{N}_{o,C,b})\right]$ where $r = m, o$ indicates the region of Madrid and other regions, $f = T, C$ indicates treatment and comparison groups, and $t = a, b$ stands for after and before the reform, respectively. Then, the DDD removes any common changes in Madrid that also affect the comparison group. This controls for shocks to the wealthy that have nothing to do with the decentralization and, unlike the simple differences-in-differences, for changes in the population stocks of all people living in Madrid that are perhaps due to other state policies, economic conditions, or amenities that may have made Madrid a more attractive place for high wealth individuals more generally.

Given most tax policies are set by the regions, we cluster the standard errors at the regional level to allow for an arbitrary correlation within region over time. However, Spain is a small country, it consists of seventeen regions for which we have data, which implies we have a small number of clusters. It is well known that a small number of clusters can lead to incorrect inference (Cameron, Gelbach, and Miller, 2008; Cameron and Miller, 2015). The implication is that the variance matrix estimate will be downward-biased and confidence intervals will be too narrow. We follow Cameron and Miller, 2015 and implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, in order to present more accurate p-values. In all subsequent results in this section, we will discuss p-values rather than standard errors or confidence intervals.

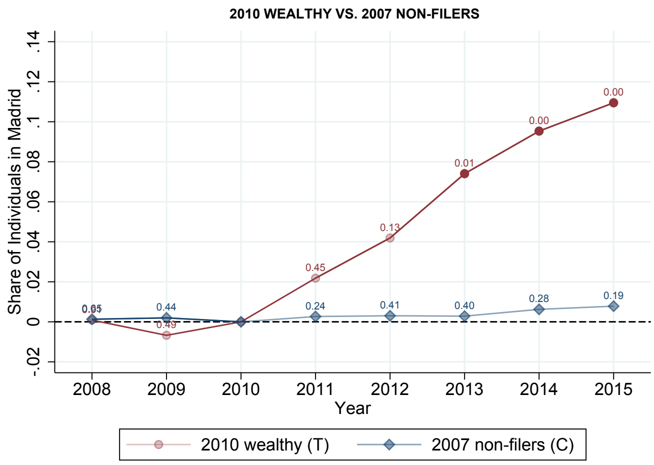
3.5.1 Results

Figure 3.5 shows the results for the (log) share of the 2010 wealthy and Figure 3.6 shows the results for the (log) share of wealth for this group in each region.[17] We discuss each figure in turn. Figure 3.5 (a) presents the estimated coefficients θ_y and β_y from estimation of (3.1), separately estimated for the treatment and comparison groups. This figure uses our preferred comparison group: high-dividend non-filers. On the graph, we show p-values from the wild cluster bootstrap. Plotting the high-dividend comparison groups allows the reader to see the triple difference visually. For the 2010 wealthy, we find insignificant pre-trends in the relative attractiveness of Madrid to other regions. However, following decentralization, the number of filers located in Madrid increases slightly, and then takes off at an initially increasingly rate of growth. Although the relative stock of wealthy individuals in Madrid rises by 4% by two years after the reform, this result is not statistically significant. This is consistent for two reasons: first, although migration flows may jump on impact, the stock is a slower moving variable and for this reason, it is not expected to jump immediately; second, the first two years of decentralization were characterized by a large amount of uncertainty and the retroactive application of the tax in the first year, may have hindered tax avoidance via migration. However, by three and four years after decentralization, the relative stock of wealthy is statistically different and by five years after the reform, Madrid's relative population of wealthy individuals increases by 11%.

[17]Figure B4 and B5 are similar and show the results using 2007 wealth tax filers. As expected, because this latter group includes many people not subject to the reinstated wealth tax, the coefficient estimates are smaller.



(a) 2010 Wealthy vs. High dividend non-filers



(b) 2010 Wealthy vs. 2007 non-filers

Figure 3.5: Event Study of the Share of Individuals in Madrid, 2010 Wealthy

Notes: This figure shows the coefficients from regression equation (3.1) estimated separately for treatment and comparison groups. In panel (a), the series in red (circles) shows results for the specification where N_{rt} is the share of individuals in Madrid among the 2010 wealthy treatment group while the series in blue (diamonds) shows the results where N_{rt} is the share of individuals in Madrid among the High dividend comparison group. The 2010 wealthy treatment group is composed of those individuals with wealth greater than 700,000 Euro in 2010. The High dividend comparison group is composed by individuals that received greater than 1,500 Euro of dividends in at least one year over the period 2008-2010. If the increase in migration to Madrid is due to the wealth tax only, we would expect an increase in the red series, but not the blue series. In panel (b), the comparison group are all 2007 non-filers. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values above the series on the graphs. Statistically significant coefficients are in dark colors and the numbers on the graph are the p-values.

One concern with this design is that there may be unobservable factors that are making Madrid a relatively more attractive region over this time-period. Using the sample of high-dividend individuals that did not file wealth taxes in 2007, we see that this is likely not the case. Although the comparison group shows a minor upward trend following the reform, this increase is statistically insignificant and will only result in slightly smaller DDD estimates. This result is robust to using other definitions of the comparison group, such as 2007 non-filers (Figure 3.5 (b)).

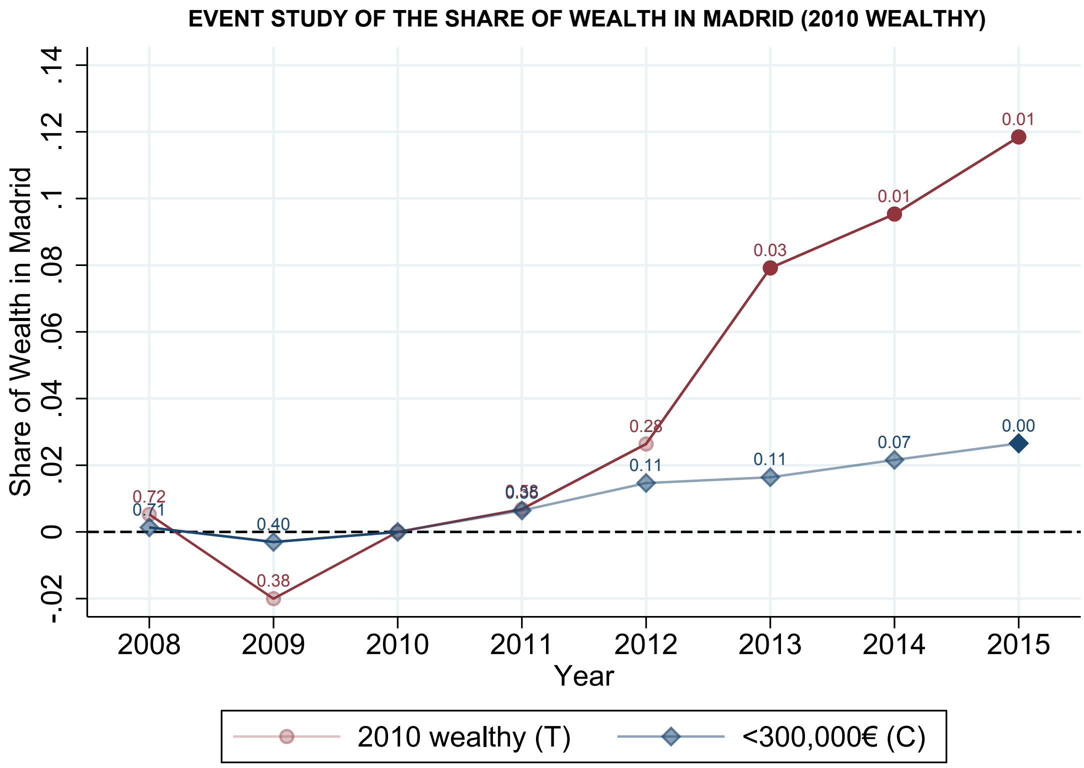


Figure 3.6: Event Study of the Share of Wealth in Madrid (2007 filers)

Notes: This figure shows the coefficients from regression equation (3.1) estimated separately for the treatment and comparison group. The series shows results for the specification where N_{rt} is the share of wealth in Madrid. The series in red (circles) shows results for the specification where N_{rt} is the share of wealth in Madrid among the 2010 wealthy treatment group while the series in blue (diamonds) shows the results where N_{rt} is the share of wealth in Madrid among 2007 wealth tax filers with less than 300,000 Euro. Because wealth is only observed for 2007 wealth tax filers, the only available comparison group is 2007 wealth tax filers that have sufficiently low wealth that they are not expected to file after 2010. If the increase in migration to Madrid is due to the wealth tax only, we would expect an increase in the red series, however, the blue series might increase if these filers expect to pay wealth taxes in the future. The 2010 wealthy treatment group is composed of those individuals with wealth greater than 700,000 Euro in 2010. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values above the series on the graphs. Statistically significant coefficients are in dark colors and the numbers on the graph are the p-values.

Figure 3.6 shows the coefficients from a regression with the (log) share of wealth as the dependent variable. Note that because wealth is only observed for filers, we cannot (in the absence of imputing wealth) estimate specifications for the two comparison groups used in the prior figure. Thus, we use 2007 wealth tax filers with <300,000 wealth as a comparison group, as defined in section 3.3.3. To construct this figure, we hold wealth fixed at its 2010 level but allow it to move with the taxpayer. The design shows a similar pattern to the number of individuals: insignificant pre-trends, a slight rise in the first couple of years, followed by accelerations of that trend. By five years after the reform, relative wealth in Madrid increases by 12%. We discuss the tax revenue implications of this in Section 7 of this paper.

EFFECT OF MADRID'S TAX HAVEN STATUS: EVIDENCE FROM THE EVENT STUDY

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Wealthy Filers			Total Wealth		
	Panel A: Average Effect					
Madrid x Post	0.098	0.082	0.048	0.130	0.101	0.043
Uncorrected SEs	(0.007)	(0.008)	(0.016)	(0.015)	(0.014)	(0.021)
Bootstrap p-values	0.054*	0.000***	0.018**	0.194	0.010**	0.110
	Panel B: Cumulative Effect					
Madrid x 2015	0.132	0.121	0.109	0.166	0.138	0.118
Uncorrected SEs	(0.008)	(0.011)	(0.012)	(0.016)	(0.020)	(0.018)
Bootstrap p-values	0.006***	0.000***	0.002***	0.148	0.004***	0.008***
Observations	136	136	136	136	136	136
Spending Controls	no	yes	yes	no	yes	yes
Economic Controls	no	no	yes	no	no	yes
Amenity Controls	no	no	yes	no	no	yes
Demographic Controls	no	no	yes	no	no	yes

Table 3.2: Effect of Madrid's Tax Haven Status: Evidence from the Event Study

Notes: This table summarizes the regression results from the event-study using regression equation (3.1). The top panel presents coefficients from a simplified version of (3.1) that only uses Madrid $\times$ Post rather than the event study specification. The second panel shows the coefficient on the final treatment by event year dummy from regression equation (3.1). The first three columns show results for the specification where N_{rt} is the share of individuals while final three columns show the results where N_{rt} is the share of wealth. The share of wealth is calculated by holding wealth constant at its 2010 level for each taxpayer, but allowing the taxpayer to move regions. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

In Table 3.2, we next present a simple dif-in-dif that uses Madrid × Post rather than the generalized (dynamic) dif-in-dif design above. This simpler specification identifies an average effect across all post-reform periods, which given the dynamic effects noted above, will understate the cumulative effect. For this reason, in panel B of the table, we also present the cumulative effect given by the coefficient on the interaction with the Madrid dummy and the year dummy for 2015 from estimation of equation (3.1). Overall, the results are consistent with the graphs presented above, and the Madrid × Post interaction yields estimates that are about half as large as the cumulative effect. Furthermore, as noted previously, the economic and demographic controls help eliminate a slight linear trend and thus reduce the effects slightly relative to a specification without controls.[18] Results using the stock of wealth are similar. Table B1 shows the results are robust to using the 2007 treatment sample. Coefficients are smaller because some individuals in this group have wealth too low to be influenced by the 2010 reform.

The DDD results are presented in Table 3.3. Consistent with the event study figures above, estimating (3.5) using the comparison group of high-dividend individuals or 2007 non-filers only lowers the effects by a small amount. This is reassuring as it says the results are driven by the wealth tax reform rather than common shocks or other policy changes making Madrid a more attractive place.

As we have argued in the introduction, the presence of an internal tax haven creates important incentives for tax avoidance and evasion. Given we believe that migration to Madrid is critical due to its zero tax status, the prior approach using Madrid as a treatment indicator is most justified. However, other tax differentials between regions may matter and we can more adequately model the precise tax differential between Madrid and other regions. Thus, to obtain an elasticity, we estimate

$$\ln(N_{r,t}) = \epsilon \cdot \ln(1 - \tau_{r,t}) + \zeta_r + \zeta_t + X_{r,t}\alpha + \nu_{r,t}, \tag{3.3}$$

with $N_{r,t}$ as share of wealth or wealth tax filers living in region r in year t, $1 - \tau_{rt}$ as the population weighted net-of-tax rate, and all other variables remains the

[18] In the absence of covariates, the pre-period initially shows (very minor) linear trends in the treatment region relative to the comparison regions. However, including covariates appears to address this issue of Madrid becoming slightly more popular than other regions in the pre-period. Alternatively, we could use (only) the pre-period data to estimate a linear pre-trend specific to the treatment and comparison group. We could then subtract this fitted trend from all data points. As noted in Goodman-Bacon, 2017, this does not change the estimated trend breaks, but simply changes the orientation of the event study coefficients. Results are similar to specifications including covariates and for this reason we only present those results rather than the ones adjusted for trends (Jakobsen et al., 2018).

same.[19] Because the net-of-tax rate is close to 1, the coefficient ϵ can be interpreted as a classical elasticity or alternatively, ϵ is (approximately) the semi-elasticity corresponding to a one percentage point change in the net-of-tax rate.[20] In addition, we can augment the design by including region-time data for both the treatment group and control group. To do so, we add all appropriate interactions with W_f and estimate the coefficient on $W_f \cdot \ln(1 - \tau_{rtf})$, where W_f is an indicator that takes on one for the treatment group and zero for the comparison group.

EFFECT OF MADRID'S TAX HAVEN STATUS: EVIDENCE FROM A DDD

	(1)	(2)	(3)	(4)	(5)	(6)
	Comparison: High Dividends			Comparison: All Non-filers		
	Panel A: Average Effect					
Madrid x Post x W_f	0.090	0.074	0.060	0.096	0.080	0.062
Uncorrected SEs	(0.008)	(0.008)	(0.012)	(0.008)	(0.008)	(0.012)
Bootstrap p-values	0.114	0.000***	0.000***	0.074*	0.000***	0.000***
	Panel B: Cumulative Effect					
Madrid x 2015 x W_f	0.119	0.104	0.100	0.127	0.115	0.107
Uncorrected SEs	(0.008)	(0.011)	(0.009)	(0.008)	(0.012)	(0.009)
Bootstrap p-values	0.068*	0.002***	0.000***	0.028**	0.004***	0.004***
Observations	272	272	272	272	272	272
Spending Controls	no	yes	yes	no	yes	yes
Economic Controls	no	no	yes	no	no	yes
Amenity Controls	no	no	yes	no	no	yes
Demographic Controls	no	no	yes	no	no	yes

Table 3.3: Effect of Madrid's Tax Haven Status: Evidence from a DDD

Notes: The top panel presents coefficients from a simplified version of 3.5 that only uses Madrid × Post × Filer rather than the event study specification. The second panel shows the coefficient on the final treatment by event year dummy from regression equation (3.1). In all specifications, N_{rt} is the share of wealth tax filers. The first three columns use individuals that received greater than 1,500 Euro of dividends as the comparison group wile the last three columns use all non-filers as the comparison group. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

As migration is an extensive margin response, the decision to move to Madrid is

[19]Note that consistent with the public finance literature, we use the net-of-tax rate or the "keep rate". Given and increase in the tax rate will lower the keep rate, we expect ϵ to be positive.

[20]Recall that wealth tax rates are small so that a 1% average tax rate corresponds to a net-of-tax rate of 99%. Then, a one percent change in this net-of-tax rate corresponds to a $0.99 \approx 1$ percentage point change in the average tax rate.

based off of the average tax rate. For this reason, the average tax rate would be the preferred metric in this estimation equation.[21] To calculate the average tax rates, we first simulate the average tax rate for every wealth tax filer in every region and year, using their time-varying wealth as discussed in section 3.3.2. As we are using aggregate data in this ection, we then construct the mean ATR as a weighted average across all individuals. We weight by the amount of wealth in 2010 following Smith, Yagan, et al., 2019. Thus, all average tax rates in this section can be interpreted as wealth-weighted (or Euro-weighted) average tax rates.

Before proceeding, we visually present the results of this regression. Figure 3.7 shows the results (without IV) using the wealth weighted average tax rate. To construct the figure, we residualize the dependent and independent variable on the region fixed effects, year fixed effects, and covariates and plot the residuals. The slope of the line of best fit corresponds to the estimated elasticity from a two-way fixed effect panel data regression. As can be seen, there is a positive relationship with the net-of-tax rate and the stock for filers, but for non-filers there is an insignificant and small relationship with the net-of tax rate. Figure B7 shows a similar relationship for the stock of wealth.

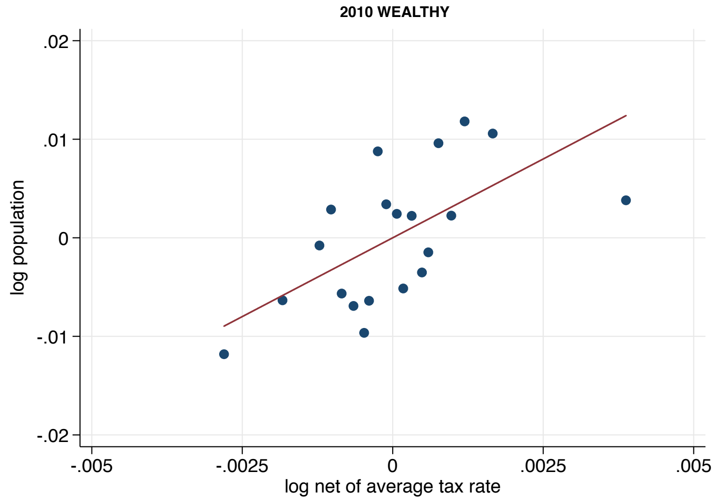
To address measurement error concerns and possible endogeneity resulting from taxable wealth changing over time, we instrument for $\ln(1-\tau_{r,t})$. Given our preferred net of tax rates use time-varying taxable wealth to construct the wealth-weighted average, we also hold wealth constant at its 2010 level, simulate tax rates and construct the wealth rated average in every year. Then, we can also instrument for $\ln(1-\tau_{rt})$ with the net of average tax rate that is calculated holding wealth fixed over time. This latter tax rate uses only statutory variation in the ATR to identify the effects and removes any changes due to the changing composition of wealth. As an alternative, we also follow Henrik Jacobsen Kleven and Schultz, 2014 and instrument with the "binary Madrid $\times$ Post variable. The use of these two instruments provides local average treatment effects (LATE) for two different sub-populations that provides us with some intuition of the mechanisms. Recall that average treatment effects are only available under constant treatment effect assumptions. Without these, we identify average effects for sub-populations that are induced by the instrument to change the endogenous variable (tax rates). In the case of the Madrid $\times$ Post, the instrument only induces a change in the taxes

[21] At the same time, the average tax rate may be less salient because of the complex scheme of exemptions and caps on tax liability. While the top net-of-marginal tax rate is not the theoretically justified metric, for very high wealth individuals the marginal tax rate well approximates the average tax rate and, moreover, even for lower wealth individuals, it is highly salient to taxpayers.

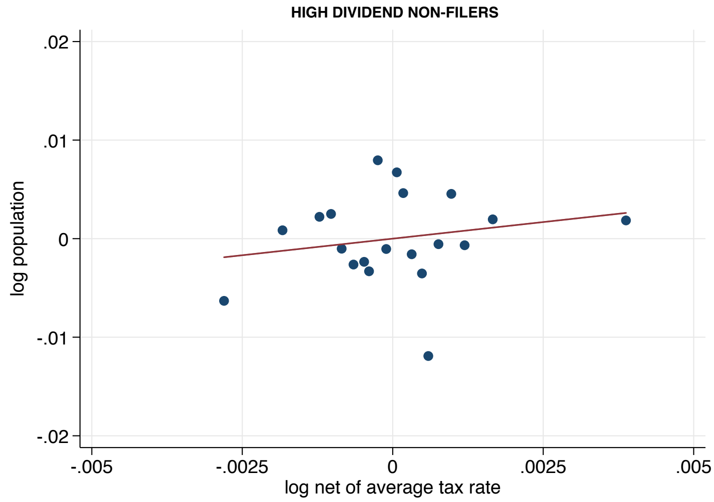
of Madrid versus all other regions and does not induce any variation across other regions. In this way, we can think of the LATE interpretation as identifying the effect of Madrid's adoption of a wealth tax. When we use the fixed ATR instrument, matters are more complex because both the endogenous variable and instrument are continuous, but we can use the compiler notion to think about the subpopulation for which we identify an effect. In this case, a change in the instrument induces a change in the tax rates of all regions. Thus, the elasticity using this instrument is with respect to all tax differentials within Spain. Given both subpopulations are useful, we present both sets of results.

Table 3.4 presents the elasticity estimates for the number of filers and the amount of wealth in the region. Again, we bootstrap the p-values to account for the small number of clusters. Model (1) is estimated using OLS, while models (2) and (3) present IV estimates, respectively, using the simulated net-of-tax rate for a fixed level of wealth and the Madrid $\times$ Post interaction. With respect to the number of filers, the first instrument yields an estimate of 3.8. This suggests that a one percent increase in the net-of-tax rate, which corresponds to an (approximately) 1 percentage point decline in the average tax rate increases the percent of filers in the region by approximately 4%. Given the wealth weighted average tax rate across regions is approximately 0.9 percent, this is similar – albeit slightly smaller – to our prior estimates from the event study design. Moreover, we estimate a similar but more precise elasticity for the stock of wealth, which again, is consistent although slightly smaller than our prior estimates. Table B3 shows the results are robust to using the 2007 treatment group. When using this group, we gain precision on the wealth elasticities.

Overall, we conclude that taxing wealth according the residence principle results in taxpayer "mobility" to untaxed regions. Whether this is tax evasion or avoidance remains to be seen. Madrid, with its zero tax rate, plays a critical role.



(a) 2010 wealthy



(b) High dividend non-filers

Figure 3.7: Elasticity of Number of Individuals

Notes: This figure depicts the elasticity fot the number of individuals for our preferred treatment and comparison groups. In particular, panels (a) and (b) show a visualization of the regression of the (log) share of the 2010 wealthy and High-dividend non-filers, respectively, in a given region year on the (log) wealth weighted net-of-average tax rate. All regressions include state and year fixed effects, and the same controls as in the regressions. To construct this figure, we regress the dependent variable on the fixed effects and controls and obtain the residuals. We do the same for the independent variable. We then bin the residuals and plot a line of best-fit-through the data. The slope of this line is the coefficient from the standard panel data regression. In panel (a), we use the stock of stock of 2010 wealthy, that is those individuals with wealth greater than 700,000 Euro in 2010. In panel (b), we use the stock of High dividend non-filers as a placebo test, that is those individuals not filing wealth taxes but with dividends greater than 1,500 Euro in at least one year between 2008-2010.

ELASTICITIES OF THE STOCKS WITH RESPECT TO THE NET-OF-TAX RATE

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Wealthy Filers			Total Wealth		
	Panel A: Panel Data with Only Filers					
$ln(1-atr_{rt})$	3.968	3.796	5.785	3.284	2.982	4.159
Uncorrected SEs	(0.763)	(0.743)	(1.393)	(1.120)	(1.138)	(2.378)
Bootstrap p-values	0.006***	0.006***	0.016**	0.032**	0.062*	0.238
Observations	136	136	136	136	136	136
F-stat	-	>1000	60	-	>1000	60
	Panel B: Panel Data with Filers and Non-filers					
$W_f \times ln(1-atr_{rtf})$	5.147	4.877	7.981	-	-	-
Uncorrected SEs	(1.104)	(1.073)	(1.168)	-	-	-
Bootstrap p-values	0.006***	0.006***	0.000***	-	-	-
Observations	272	272	272			
F-Stat	-	>1000	56			
Controls	yes	yes	yes	yes	yes	yes
OLS	yes	no	no	no	no	no
Simulated IV with Fixed Wealth	no	yes	no	no	no	no
Madrid x Post IV	no	no	yes	no	no	no

Table 3.4: Elasticities of the Stocks with Respect to the Net-of-Tax Rate

Notes: This table presents results on the elasticities of the stocks with respect to the net-of-tax rate. The top panel shows coefficients from estimation of 3.3. The second panel shows the coefficient where this equation is augmented to include data on high dividend non-filers (individuals that received more than 1,500 Euro of dividends in at least one year over 2008-2010). For the first three columns, N_{rt} is the share of 2010 wealthy filers; in the second panel N_{rtf} is the share of 2010 wealthy filers and High dividend non-filers. For the last three columns N_{rt} is the share of wealth; because we do not have wealth data for individuals that do not file wealth taxes, the second panel cannot be estimated. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

3.6 Individual Choice Model

Although the aggregate analysis is appealing for its simplicity, we now turn to an individual level analysis where we can control for individual-specific factors that may influence the probability of moving. The results presented in this section are estimated by directly using the tax micro-data at the tax-payer level. In terms of our treatment group, we focus on the 2010 wealthy sample in the main text, but we show that the results are robust to the use of the 2007 filers sample in the appendix. As we will exploit a location choice model rather than a panel data model, we include all individuals that relocated across regions between period t and $t-1$. In particular, this implies that we focus on movers (or fraudulent movers) that changed the region of their fiscal residence between 2007-08 to 2014-15. We do not include individuals that moved within a given region. We denote the seventeen regions in Spain by j. Although most people move once, some individuals in the sample change their fiscal residence multiple times. For our purpose, a "move" (we refer to this as a *case*) is an individual time-specific event which is indexed by (i,t) and the choice set for each move is indexed by j. If an individual moves more than once, each move represents a case observation in our data.

We elect to focus on movers rather than on stayers in the individual choice model. As we have already shown the evolution of the stock of taxpayers, this section is aimed at answering the question: conditional on changing fiscal residency, how do taxes influence the chosen location? Furthermore, given movers are only a fraction of the stock, we reduce endogeneity concerns *if* governments set tax rates based on the stock of the wealthy rather than the number of movers (Schmidheiny, 2006; Brülhart, Bucovetsky, and Schmidheiny, 2015). In the Spanish setting, it is likely that Madrid set a zero tax rate based on political economy motives based on pre-existing political influences. Of course, as in Schmidheiny, 2006, focusing on individuals that move introduces a potential selection bias if unobservable factors that explain the decision to move are correlated with unobservable explanations of an individual's preference for a given region.

The dependent variable $d_{i,j,t}$ is coded one for the chosen region of residence in year t and zero for all other regions that are not selected. In its simplest form, we estimate the following linear probability model:

$$d_{i,j,t} = \beta M_j \times Post_t + M_j + \zeta_j \mathbf{x}_{i,t} + \gamma \mathbf{z}_{i,j,t} + \iota_j + \alpha_{i,t} + \varepsilon_{i,j,t}. \tag{3.4}$$

Notice that each case (move) appears seventeen times – the number of alternative regions – in the data-set. In this specification, β measures the effect of the zero-tax regime of Madrid from 2011 onward. The dummy M_j equals 1 for Madrid and zero for the other regions. $Post_t$ is one for the years following decentralization and zero otherwise. Our model contains fixed effects at the case level denoted $\alpha_{i,t}$. The inclusion of $\alpha_{i,t}$ is crucial because it forces identification of our parameter of interest based on within-case variation across alternative regions for a specific tax-payer which moved in a given year. Thus, identification follows from the fact that Madrid has a tax differential with all other choice regions for each move. Although our dependent variable is binary, we elect to utilize a linear probability model rather than a conditional logit model. This choice is based on our desire, in this specification and in subsequent specifications, to include many binary covariates for which logit models are ill-suited. Thus, the $\alpha_{i,t}$ also force the predicted probabilities over all regions to add up to one for an individual moving in a given year.[22] For this reason, an increase in the predicted probability of one region must necessarily decrease the probability of choosing any other region.

The specification allows to include an alternative fixed effect ι_j. This fixed effect controls for all time-constant characteristics of a specific destination which could be chosen by the mover. Note that the Madrid dummyM_j is one of those fixed effects. Such a specification requires omitting a given region and a given year, which consistent with the aggregate analysis is the year immediately prior to the reform. This more general specification reveals the pattern of in-migration for each of the regions relative to the baseline (omitted) region and year immediately prior to the reform.

Starting from this simple specification, with only case fixed effects, we sequentially add the further controls listed in equation (3.4). First, we interact region dummies with characteristics of the taxpayer $\mathbf{x}_{i,t}$, including gender, age, and labor income.[23] This allows us to estimate a region-specific return, ζ_j, for each covariate. These controls flexibly allow for wealth accumulation to differ across regions between men and women, and more critically, based on the age of the individual. We also allow for gender-specific age coefficients in some specifications. Second, we control for labor income in logs and allow it to have a region-specific influence on the probability of moving to a region. In particular, as noted previously, the personal (labor) income tax also varies across regions and may influence the probability of moving to a given

[22]For a proof, see Agrawal and Foremny, 2019.

[23]Note that all variables are individual specific, but do not vary across alternatives. The interaction of characteristics with alternative-region-dummies allows for a different coefficient for each potential region of choice for each covariate.

region.[24] Finally, moving costs between regions also matter. To capture them, we include the log of distance between the region of prior residence and each of the alternative regions. As the origin region cannot be chosen, we also include a dummy variable for it.

Given the specification of equation (3.4), it results in a standard differences-in-differences interpretation, embedded in a location choice model. The parameter β represents the effect of Madrid's tax system relative to other regions on the location choice probabilities. The specification can be generalized by including a set of alternative-fixed effects ι_j and interacting them with annual year fixed effects in a generalized difference-in-differences design. A convenient feature of this specification is to integrate an event-study approach into the location-choice environment by replacing the *Post* dummy with year-indicators, which allows us to test for pre-trends and to possibly estimate dynamic treatment effects.[25]

All of these additions imply that we estimate:

$$\begin{aligned} d_{i,t,j} = \iota_{j \neq \hat{j}} \cdot \left[\sum_{y=-3}^{-2} \theta_{y,j} \cdot \mathbf{1}(y = t - 2011) + \sum_{y=0}^{4} \beta_{y,j} \cdot \mathbf{1}(y = t - 2011) \right] + \\ \iota_j + \alpha_{i,t} + \zeta_j \mathbf{x}_{i,t} + \gamma \mathbf{z}_{i,j,t} + \varepsilon_{i,t,j} \end{aligned} \tag{3.5}$$

where y indexes "event time" as in the aggregate model and $\hat{j}$ is the omitted region or omitted regions. As discussed above, $\zeta_j \mathbf{x}_{i,t}$ are individual characteristics interacted with region fixed effects and $\mathbf{z}_{i,j,t}$ are individual characteristics specific to a particular region such as distance between regions. Note that the event study coefficients appear for every region-year other than the omitted categories. Coefficients $\beta_{y,j}$ for $j = Madrid$ show how the probability of choosing Madrid among all the alternatives evolves after the reform relative to a baseline region and the year just before the reform. The coefficients θ_y for $j = Madrid$ show that same relative evolution, but for a period where taxes do not differ. Of course, the specification is even more flexible because it allows us to estimate the effect of (possibly) smaller tax differentials between all of the other individual regions and the omitted region. The results are not sensitive to the choice of the omitted region.

We complement these results with estimations based on a net-of-tax variable instead of region-dummies. For each individual i, we simulate the tax burden, average-,

[24] However, as shown in Figure B1, only 20% of wealth tax filers have labor income sufficiently high enough for the personal income tax to have a non-trivial effect on the fiscal residence.

[25] This specification is the linear equivalent to an alternative-specific conditional logit (McFadden's choice) model with time fixed effects.

and marginal-tax-rates in the year they move for all alternative regions j. We then estimate the location choice model using the net-of-tax variables as the main independent variables of interest.

$$d_{i,tj} = \beta \cdot ln(1 - \tau_{i,t,j}) + \alpha_{i,t} + \rho_{j,t} + \zeta_j \mathbf{x}_{i,t} + \gamma \mathbf{z}_{i,tj} + \varepsilon_{i,t,j}. \tag{3.6}$$

In this specification, the coefficient on the (log) net-of-tax rate represents the change in the probability of moving to a region for a one-percent change in the net of tax rate. As tax rates are small, this is approximately equivalent to a one percentage point change in the tax rate. This specification comes with an added advantage: because the tax system is progressive, we have variation of tax rates within a region-year across individuals. For this reason, we can include region by year fixed effects. The inclusion of region by year effects accounts for other contemporaneous policy choices that a region may make, including changes in public services that are constant across all high wealth taxpayers. Although high wealth taxpayers are unlikely to benefit much from changes in public services, as these individuals are net payers into the system, these region-year fixed effects, $\rho_{j,t}$, also account for any unobserved time-varying economic shocks or amenities that influence the relative attractiveness of a given region. However, inclusion of these $\rho_{j,t}$ comes with a cost. If as our aggregate analysis suggests and Madrid's status as a tax haven plays a special role, then some of this will be absorbed in the region-year fixed effects and may result in us underestimating the true effect. For this reason, we also present results excluding region-year fixed effects.

As in the aggregate analysis, we use different measures for τ throughout the analysis and verify robustness of the various measures. In all specifications, the simulated net-of-tax rate is *person*-year-region specific. We also estimate the effect of average and marginal tax rates using an instrumental variable approach. As discussed previously, we use tax rates based on the 2010 tax base, which we keep constant, as an instrument.

All models cluster standard errors at the origin-tax-bracket level. This treatment of standard errors follows previous studies (Akcigit, Baslandze, and Stantcheva, 2016; Henrik Jacobsen Kleven, Landais, and Saez, 2013), which cluster at the origin-skill level. In our setting, the wealth tax brackets form the partitions analogous to the skill partitions in the income tax literature.[26]

[26] The significance of the results is robust to different ways of treating the standard errors.

3.6.1 Results

We begin our analysis with the simplest model according to equation (3.4). Table 3.5 shows the results. We add different sets of controls subsequently.

INDIVIDUAL CHOICE MODEL

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\mathbf{1}\{\text{Madrid}\}_j \times Post_t$	0.255***	0.252***	0.242***	0.241***	0.250***	0.245***	0.246***	0.236***	0.236***
	(0.028)	(0.028)	(0.029)	(0.029)	(0.028)	(0.029)	(0.028)	(0.029)	(0.029)
R^2	0.317	0.323	0.339	0.344	0.332	0.333	0.332	0.348	0.348
# taxpayers	1,826	1,826	1,826	1,826	1,826	1,826	1,826	1,826	1,826
# obs	31,042	31,042	31,042	31,042	31,042	31,042	31,042	31,042	31,042
origin dummy	no	yes	yes	yes	yes	yes	yes	yes	yes
distance	no	yes	yes	yes	yes	yes	yes	yes	yes
age x region	no	no	yes	yes	no	yes	no	yes	yes
age squared x region	no	no	no	yes	no	yes	no	yes	yes
gender x region	no	no	no	no	yes	yes	no	yes	yes
labor income x region	no	no	no	no	no	no	yes	yes	yes
j-fixed effects	no	no	no	no	no	no	no	no	yes

Table 3.5: Individual Choice Model

This table presents the results from the individual choice model. Standard errors clustered at the origin-tax-bracket level, *** p<0.01, ** p<0.05, * p<0.

We estimate the model for the sample of movers between 2008 and 2015, which had previously submitted a wealth tax declaration in 2007 and have wealth in 2010 above the 700,000 Euro threshold.[27] Across all specifications, the difference-in-differences estimates indicate that the probability that such a person changed their fiscal residence to Madrid from any other region in Spain increased after decentralization by about 24 percentage points. To benchmark this number, note that conditional on moving, the baseline probability of moving to Madrid in the pre-reform period was 37.5%. Thus, our model suggests that following decentralization, the probability increased to 61.5%. This represents an extremely large increase, but it is consistent with the raw data.[28] Critical to identification, coefficients - and standard errors - are stable across specifications. Adding fixed effects for potential choices other

[27] Appendix B4 shows results for the 2007 wealth tax filer group. Note that this specification does not rely on any extrapolated data, as we don't require 2010 wealth to be above the threshold. Results, also smaller in magnitude, remain qualitatively the same. The fact that the coefficients are very similar suggests that some of the "lower" wealth individuals may have also responded to the wealth tax decentralization, in anticipation of higher wealth in the future.

[28] In the pre-period, 7,041 high-wealth individuals moved; of this 2967 (42%) were to Madrid. In the post-reform period, 12,821 wealth tax filers moved; of this, 1116 (66%) were to Madrid.

than Madrid in the last model does not change the estimated coefficient. This demonstrates Madrid's unique role as an internal tax haven. Given the dummy variable approach, this effect represents the effect of the mean tax rate differential with Madrid on location choice. As a benchmark, if we regress $ln(1 - atr_{i,t,j})$ on the same covariates in Model (9), the coefficient on $\mathbf{1}\{\text{Madrid}\}_j \times Post_t$ implies an approximately 0.45 percentage point differential in taxes between Madrid and alternative regions.

Figure 3.8 shows the annual estimates from equation (3.6) where instead of interacting the event year dummies with region specific indicators, $\iota_{j \neq \hat{j}}$ as noted in that equation, we interact them with the Madrid dummy M_j. In this way the interpretation of the coefficients is the relative evolution of the the flow of movers towards Madrid relative to all other regions. The figure shows the results with and without controls. Again, results are almost identical to the prior table. Most reassuring and valuable from an identification standpoint is that we find no relative differences prior to the reform. The two coefficients of 2008 and 2009 can be interpreted as placebo treatments, as no tax differential exists in this period and validates our approach. The increase in the probability of changing the fiscal residence to Madrid happens on impact in 2011 but at a lower magnitude, and doubles in 2012 and 2013 relative to the first year following decentralization. This increase over time is likely a result of the uncertainty resulting from the late passage of the wealth tax decentralization. The flow towards Madrid starts to decrease in 2014, as the largest part of affected individuals might have moved. This indicates that most moves happened during the first years after the re-introduction of the wealth tax and a convergence towards a new equilibrium.[29]

While the prior results focus on the special role of Madrid via its status as a tax haven, as shown in Figure 3.2, smaller tax differentials exist between other regions. These inter-jurisdictional tax differentials may potentially lead to wealth tax filers changing their fiscal residence between regions. To investigate this, we estimate equation (3.6) omitting a single region, Castile-La Mancha, which borders Madrid and set a higher tax rate than Madrid, but a lower tax rate than most other regions.[30] While in Figure 3.8, we plotted only the event study coefficients for Madrid, in Figure 3.9, we present the event study coefficients for all of the other sixteen regions. In this way, the figure shows the relative evolution of the population of every region in

[29]One might be concerned that the results are sensitive to the use of the Madrid dummy relative to all other regions. In an exercise similar to a jackknife procedure, Figure B8 in the Appendix estimates equation (3.6) sixteen times for each possibly omitted region. It shows that results are not sensitive to the omitted region or to grouping all regions into a single counterfactual category.

[30]Again, we have performed a jackknife like procedure and we can show that the results are insensitive to the choice of the omitted region.

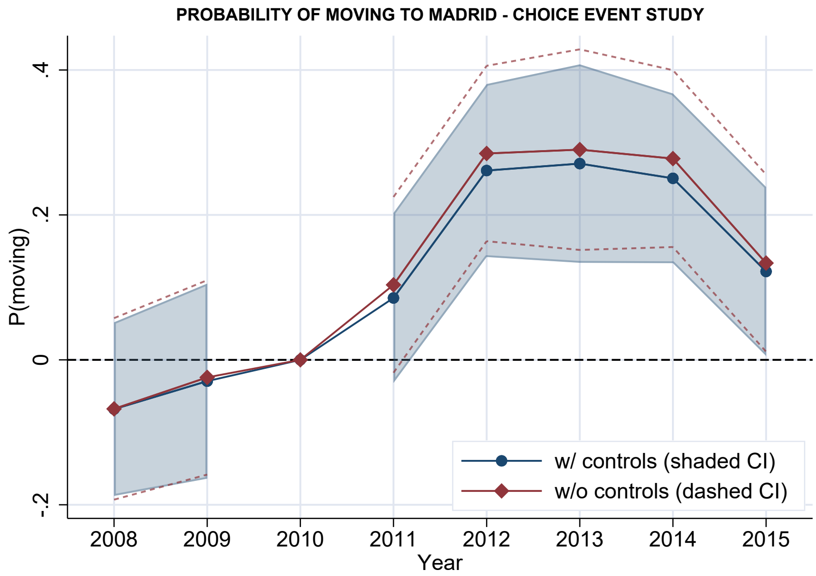


Figure 3.8: Probability of Moving to Madrid (Choice-Event-Study)

Notes: Notes: This figure shows the event study of the probability of moving to Madrid relative to all other regions and the year prior to the reform. Standard errors are clustered at the origin-bracket level and are used to construct 95% confidence bands.

Spain relative to Castile-La Mancha. If small tax differentials matter, we should see decreases in the probability of relocation for all regions with higher tax rates than Castile-La Mancha and increases in the probability for all regions with lower tax rates. Although the probability of moving to Madrid relative to Castile-La Mancha increases following decentralization, the figure indicates that the relative probability of moving to any other region remains almost unchanged following decentralization. Indeed, repeating this exercise omitting a different region each time yields similar results, suggesting for almost all region pairs, the only place where wealth taxes matter are for those pairs of regions involving Madrid. The implication of this is stark: inter-jurisdictional wealth tax differentials, when small, appear not to matter in the location choice decisions. However, the decision of fiscal residency is intensely affected by the presence of a zero tax haven that facilitates dramatic tax avoidance and evasion.

As a next step, we aim at exploiting directly the *person-specific* tax rates from our tax calculator (denoted by $\tau_{i,t,j}$) across regions. Given the presence of $\alpha_{i,t}$ fixed effects, we exploit the wealth tax differential across regions for a given tax payer which relocated. Given different individuals have different amounts of taxable wealth, we exploit variation created by the progressive wealth tax system. We start by estimating a model where $\tau_{i,t,j}$ is based on the (person-specific) marginal wealth

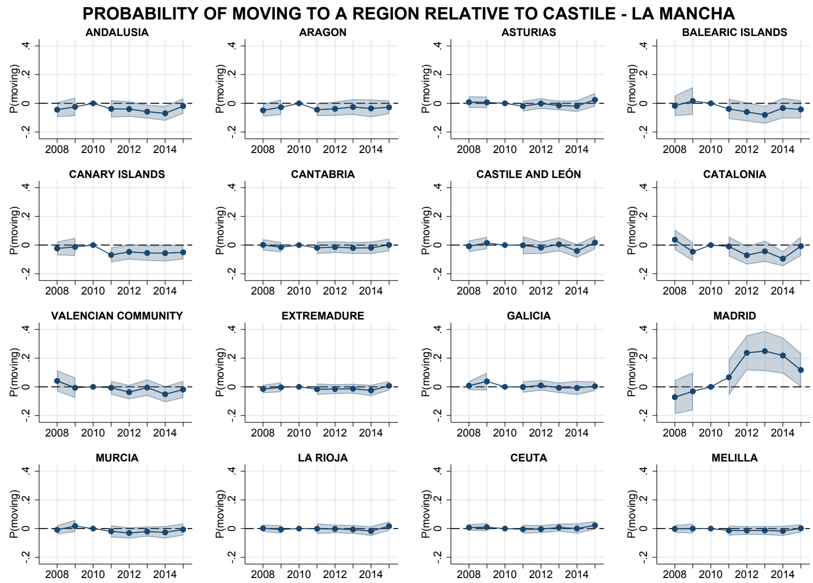


Figure 3.9: Probability of Moving to a Region Relative to Castile-La Mancha

Notes: This figure shows an event study similar to Figure 3.8. To construct this figure, we re-estimate equation (3.6) only once using Castile-La Mancha as $\hat{j}$. This single regression yields a coefficient for every year-region, which we plot in this figure.

tax rate an individual would face in each alternative region j. We then turn to specifications using the (preferred) average tax rate.

Table 3.6 presents results including the same controls as in the full specification before. Odd columns present the specification using the full set of controls in column (9) of Table 3.5. Given variation of marginal tax rates within regions across the wealth distribution, we can additionally include a dummy variable for each alternative j in each year t.[31] Even columns present results with these alternative region-year fixed effects that account for other regional policies or shocks that affect all wealth tax-filers. In the first case, a one-percent increase in the net-of-marginal-tax-rate would increase the probability of moving to Madrid by 7.9 percentage points, which decreases to 4.7 percentage points in the latter case. Models (3) and (4) repeat that exercise for the person-specific net of average-tax-rate. Given that for many taxpayers average tax rates are substantially smaller than the marginal tax rates, estimated coefficients increase as expected. The last two models (5) and (6) repeat the estimations but instrument the net-of-average and marginal tax rate with tax rates simulated on the 2010 tax base. The IV produces slightly larger estimates compared to the previous columns. Including alternative-by-year fixed effects estimates an increase in the

[31] Note that this was not possible before because the dummy approach did not provide variation with alternatives across tax-payers.

probability of moving to Madrid of 5.3 percentage points for a one-percent increase in the net-of-marginal tax rate and 7.2 percentage points as a reaction to a 1% increase in the net-of-average tax rate differential between regions.

INDIVIDUAL CHOICE MODEL (TAX DIFFERENTIAL)

	(1)	(2)	(3)	(4)	(5)	
$ln(1 - mtr)$	7.885***	4.737**			5.319***	
	(1.393)	(1.861)			(1.945)	
$ln(1 - atr)$			11.616***	6.597**		7.167***
			(2.361)	(2.659)		(2.639)
# taxpayers	1,826	1,826	1,826	1,826	1,826	1,826
# observations	50,966	50,966	50,966	50,966	50,966	50,966
first stage					0.960***	0.981***
					(0.007)	(0.004)
F-stat					17637.74	68029
mean MTR	0.935%	0.935%			0.935%	
mean ATR			0.442%	0.442%		0.442%
full controls (last column of Table 3.5)	yes	yes	yes	yes	yes	yes
alternative by by year FE	no	yes	no	yes	yes	yes

Table 3.6: Individual Choice Model (Tax Differential)

This table presents the results of the individual choice model based on movers with a tax base above 700.000 Euro in 2010. Standard errors clustered at the origin-tax-bracket level, *** p<0.01, ** p<0.05, * p<0.1.

Overall, these responses are relatively large. Comparing them to the individual income tax literature on migration is difficult. Here average tax rates are as a share of wealth, while in the personal income tax case they are a share of income. However, a raw comparison of the effect of regional personal income taxes and wealth taxes in Spain, suggests the wealth tax responses are approximately eight to twelve times as large as the migration responses to personal income tax differentials. In order to gain some intuition, assume a (reasonable) rate of return to capital of 5% and suppose an average (wealth) tax rate differential of 0.5 percentage points. Following Kopczuk, 2019, suppose that an individual with wealth ω this year and a rate of return r can either be taxed next year on the accumulated stock $(1 + r)\omega$ or on the return $r\omega$. Then, a wealth tax rate of τ will raise an equivalent amount of revenues as a capital income tax rate of T where the relationship is given by

$$T = \frac{(1+r)\tau}{r}. \tag{3.7}$$

Then, at that initial tax rate, a 0.5% wealth tax corresponds to 10.5% $\left[= (1+0.05)\cdot 0.005/0.05\right]$ tax on capital income.[32] Then, consider our estimates which correspond to a one percent change in the net-of-tax rate, which correspond to a one percentage point change in the average tax rate on wealth. Such a change represents a 31.5% $\left[= (1+0.05)\cdot 0.0125/0.05\right]$ tax on capital income, which corresponds to a 21 percentage point change. In Spain, labor and capital income are taxed on different schedules and our estimates of income tax migration are based on labor income. Thus, assume a (realistic) baseline tax on capital income of 20%. Then, the net-of-tax income tax rate would need to go from 0.80 to 0.59, which represents a 26% change in the net-of-tax rate. A one percent increase in the net-of-wealth tax rate should have an effect that is 26 times larger than a 1 percent change in the net-of capital income tax rate. While we don't have estimates for capital income taxes in Spain, the estimates for labor income the wealth tax elasticities are, in our preferred specification, approximately 5 times larger. However, for such a comparison, one must assume avoiding capital income taxes is as hard as avoiding labor income taxes by migrating.[33] Moreover, the conclusion assumes that the expected costs of avoiding or evading income taxes are the same as for wealth taxes; this is likely not the case as the tax authority may have different information or incentives.

3.6.2 Heterogeneity

To analyze heterogeneous responses by various types of taxpayers we use personal characteristics of movers and also classify them across different indicators of their financial situation before 2010. To measure the financial situation of an individual, we differentiate between individuals who filed non-incorporated business income, dividend income, effective rents, and imputed rents from owner occupied housing in any year between 2008 and 2010 in the income tax declaration. Reporting income in one of those categories implies that they were owners of the corresponding assets.

Figure 3.10 shows the results. We do not observe substantial heterogeneity of the effect across different groups, which is explained by the fact that high wealth movers

[32] Note that this is sensitive to the assumed rate of return.

[33] This is not necessarily the case because a person with no labor income, but high capital income may expect the probability of being caught to be lower than a person with labor income as the tax authority may use location of work to document fiscal residence.

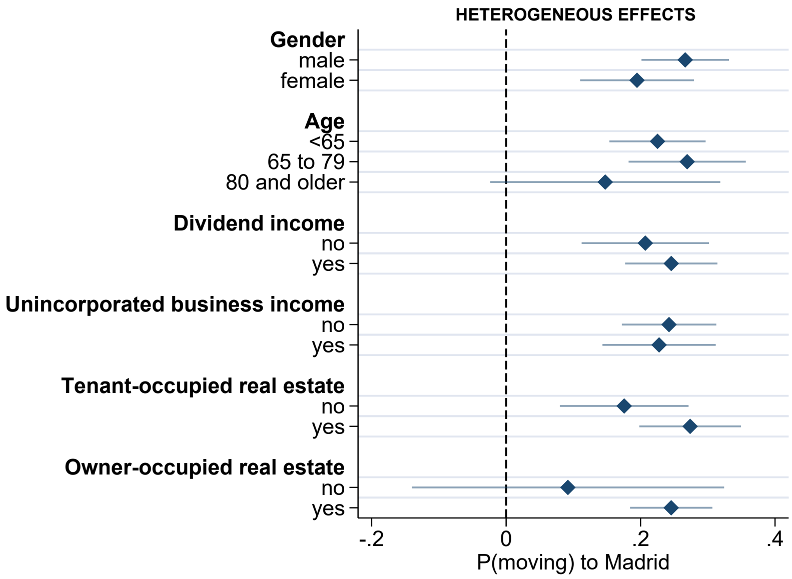


Figure 3.10: Heterogeneous Effects

Notes: This figure shows the estimated coefficients from model 3.6 with an indicator variable for the respective category. Estimates based on movers with a tax base above 700,000 Euro in 2010. All other specifications remain unchanged. 95% confidence intervals around point estimates.

individuals are relatively homogeneous. Results suggest that gender does not matter for the magnitude of coefficients. Age does not appear to be significant across the three groups we analyze here.[34]

Furthermore, we provide estimates based on the composition of asset portfolios. There is no significant difference between dividend and business owners. Movers with real estate are slightly more responsive. However, most individuals in the sample own some rel estate. In particular the result for owner occupied real estate is driven by the fact that 88% of our sample declare income from that asset type.

Figure 3.11 shows results by region of origin. In all regions except from La Rioja the probability to move to Madrid is positive, which shows taxpayers in all regions are attracted by the zero tax rate in Madrid and that the effect is not only coming from one region. However, the values are quite different across regions. The probability to move to Madrid is highest in Castile and León, Asturias and Galicia and lowest in Extremadure, Cantabria and Ceuta.

[34]The fact that the effect does not increase in age (the point estimate for individuals above 80 is even lower compared to younger individuals) reassures that moves are not motivated by other tax instruments, such as inheritance taxes. Only 9% of movers are 80 or older in this sample.

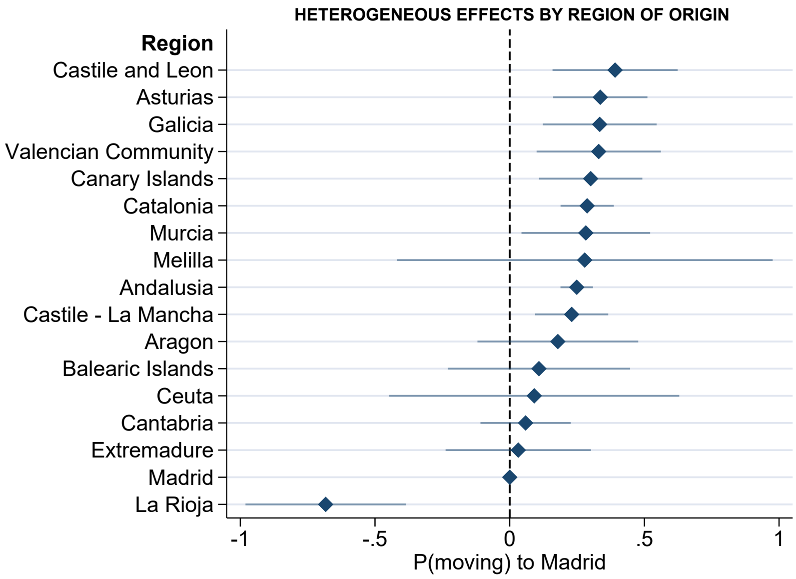


Figure 3.11: Heterogeneous Effects: Region of Origin

Notes: This figure shows the estimated coefficients from model 3.6 with an indicator variable for the respective category. Estimates based on movers with a tax base above 700.000 Euro in 2010. All other specifications remain unchanged. 95% confidence intervals around point estimates.

3.7 Implications for Revenue and Wealth Inequality

In this section, we analyze how Spain's decentralization affected each region's tax revenue as well as wealth concentration. This is relevant from the policy standpoint as wealth taxes might be introduced as a means of raising tax revenue to fund public services, but possibly also to limit the growth in wealth inequality and in political concentration. This is the first study to study the implications of migration responses for both regional wealth tax revenues and regional wealth concentration. Moreover, the construction of regional inequality measures contributes to the literature.

3.7.1 Revenue Analysis

The documented migration responses after the decentralization of the wealth tax might have important consequences for tax revenue (Saez and Zucman, 2019a). We analyze how this reform affects revenue by means of counterfactual simulations. To do this, we simulate the evolution of revenue absent mobility using our wealth tax simulator by holding the distribution of wealth tax filers in each region at their pre-reform levels. Note that this is a partial equilibrium analysis that abstracts from spillovers from the presence of top wealth holders to the wealth of, and thus revenues from, lower taxpayers; it ignores any other revenue effects obtained through other taxing instruments; and it assumes no tax competition between the different governments and the national government. Moreover, except from mobility, this analysis also abstracts from any other behavioral response to changes in the wealth tax (e.g., underreporting, saving, etc.). In this way, we identify the direct effect of mobility on wealth tax revenue.

Figure 3.12 reports the ratio of wealth tax revenue absent mobility to the actual revenue with mobility across Spanish regions. Our results reveal that, conditional on implementing a decentralized system, Spain foregoes on average 4% of total wealth tax revenue over the period 2011-2015 due to mobility; this arises as the tax base shifts from high-tax to low-tax regions. However, the revenue effects are quite different across regions. Whereas Castile-La Mancha, Castile and León and Andalusia lose on average 86%, 20% and 16% of their revenue due to mobility, respectively, Catalonia and Balearic Islands stay revenue neutral. Note that the revenue effects are largest in the two Castiles and Andalusia is consistent with our previous analyses, since these regions have a large number of movers to Madrid. Moreover, these regions have many provinces that are within a short distance to Madrid.Moreover, the smaller communities of La Rioja and Melilla have even increases in its revenue with mobility, meaning they have more wealth taxpayers than in 2011.

We also simulate the revenue effects of having a centralized wealth tax system with the same default statutory national wealth tax schedule across all regions. With a centralized wealth tax system, tax-induced mobility disappears so that we hold the distribution of wealth tax filers in each region at their pre-reform levels. Figure 3.13 shows that Spain foregoes on average 60% of total wealth tax revenue after decentralization. Note that this number is much larger than the previous reported 4% when we compare revenue effects under the decentralized system without and with mobility. The reason is that in this comparison most of the revenue differences come from the fact that Madrid does not earn any revenue under the decentralized system over the whole period 2011-2015. Foregone revenue is much higher in 2011 than in 2012-2015, because in 2011 Balearic Islands and Valencian Community also implemented a zero wealth tax rate.

Finally, we compare the distribution of wealth tax revenue across Spanish regions under the current benchmark with mobility, the current tax system absent mobility and under the centralized scenario without mobility (Figure 3.14). Catalonia is

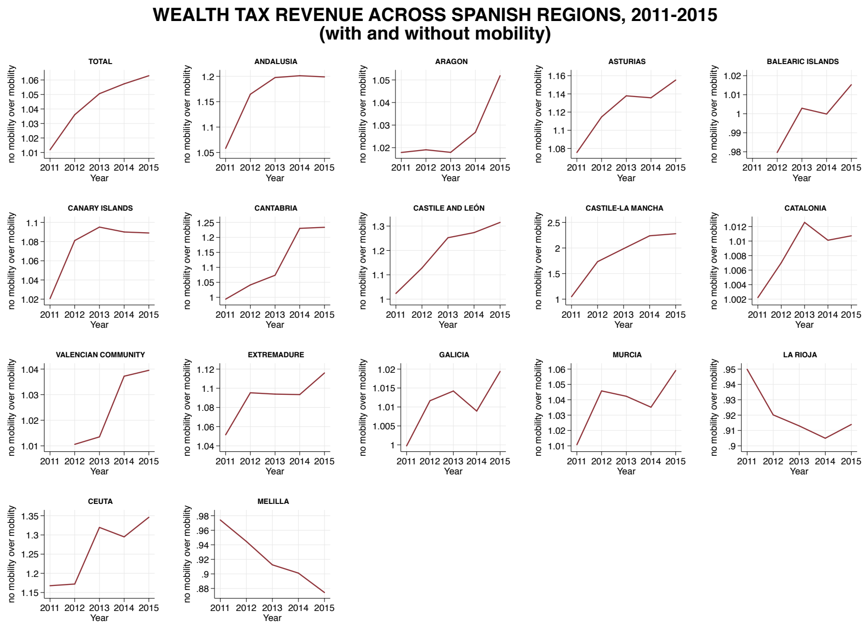


Figure 3.12: Wealth tax revenue across Spanish regions, 2011-2015

Notes: This figure depicts the evolution of wealth tax revenue under the decentralized scenario absent mobility over the current wealth tax revenue with mobility across Spanish regions over the period 2011-2015. The decentralized scenario absent mobility has been carried holding the distribution of wealth tax filers in each region at their pre-reform levels and using our wealth tax simulator.

the region collecting the largest share of revenue under the benchmark and the no mobility scenarios (approx. 50%), followed by Valencian Community (12%) and Andalusia (9%). With a centralized wealth tax schedule, Madrid would collect the highest share of wealth tax revenue (37%). Note that these are shares and hence, we cannot

3.7.2 Wealth Inequality Analysis

The documented migration responses after the decentralization of the wealth tax might lead not only to a large drop in wealth tax revenue for high-tax regions and consequently in national revenue (as documented in the previous subsection), but also to an exacerbation of regional wealth disparities.

To analyze whether Spain's decentralization contributed to increasing regional wealth inequalities, we construct new top national and regional wealth distribution series using the personal income and wealth tax panel over the period 2003-2015. For estimating national shares of wealth, we have to divide the wealth amounts accruing

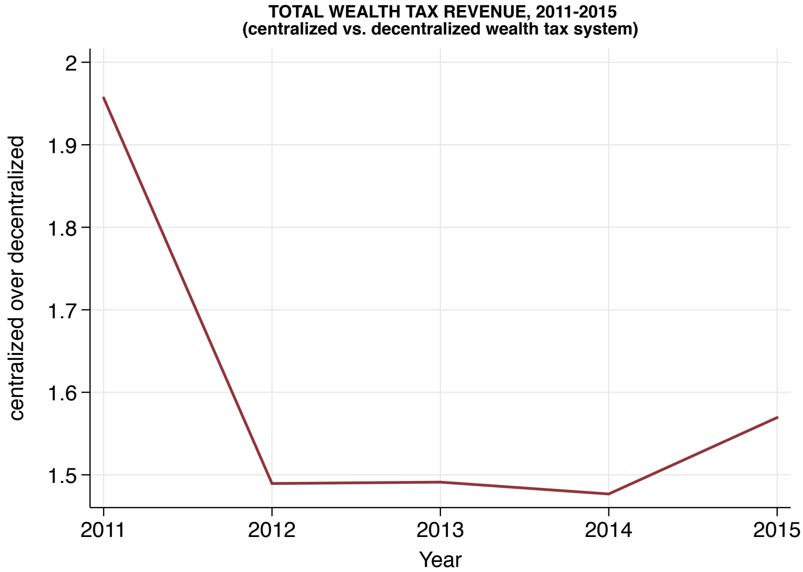


Figure 3.13: Total wealth tax revenue, 2011-2015 (centralized vs. decentralized wealth tax system)

Notes: This figure depicts the evolution of wealth tax revenue under the centralized scenario over the wealth tax revenue under the decentralized scenario absent mobility over the period 2011-2015. Under both scenarios the simulations have been carried holding the distribution of wealth tax filers in each region at their pre-reform levels and using our wealth tax simulator. The centralized scenario assumes all regions apply the same default statutory national wealth tax schedule.

to each fractile by an estimate of total personal wealth defined ideally as total personal wealth reported on wealth tax returns had everybody been required to file a wealth tax return. As only a fraction of individuals file a wealth tax return, this total wealth denominator cannot be estimated using wealth tax statistics and needs to be estimated using other sources. As for the extrapolation, we rely on the non-financial accounts reconstructed by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and financial accounts from the Bank of Spain. Artola Blanco, Bauluz, and Martínez-Toledano, 2020 only reconstruct urban and rural real estate and business assets. Hence, for other non-financial assets such as consumer durables (e.g., cars, boats, etc.) and collectibles (e.g., jewelry, antiques, etc.), we rely on the reported totals in the five waves (2002, 2005, 2008, 2011, 2014) of the Spanish Survey of Household Finances (SHF) elaborated by Bank of Spain. Wealth tax information excludes Navarre and Basque Country because they do not belong to the Common Fiscal Regime. To take this fact into account, we correct our estimate of total personal wealth assuming that total wealth in those regions is roughly proportional to GDP. Combined these two regions represent about 6-7% and 8% of Spain in terms of population and gross domestic product, respectively (Martínez-Toledano, 2020).

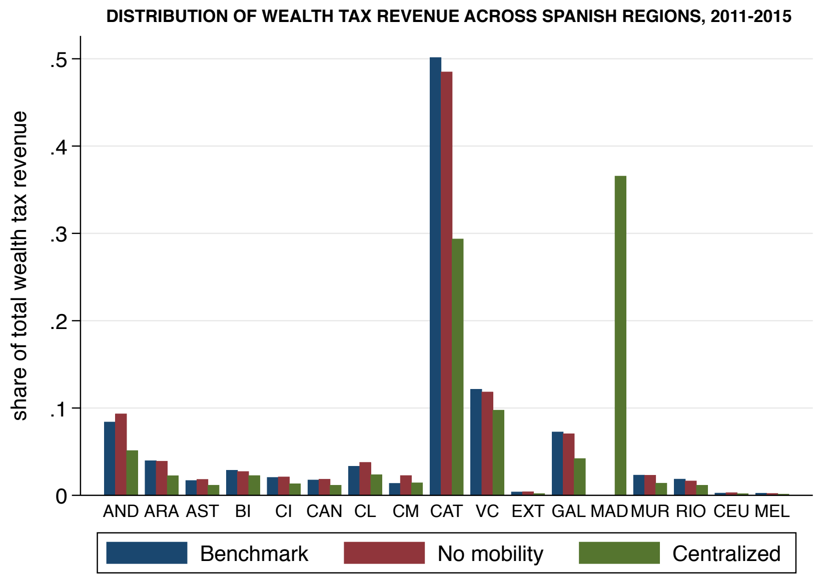


Figure 3.14: Distribution of wealth tax revenue across Spanish regions, 2011-2015

Notes: This figure shows the average distribution of wealth tax revenue across Spanish regions over the period 2011-2015 under the current benchmark with mobility, absent mobility and under the centralized scenario without mobility. The revenue analysis for the no mobility and centralized scenarios has been carried holding the distribution of wealth tax filers in each region at their pre-reform levels and using our wealth tax simulator. The centralized scenario assumes all regions apply the same default statutory national wealth tax schedule.

Hence, our series are consistent with national accounts aggregates.

The numerator, that is, total reported wealth in tax files, needs to be adjusted to reflect market prices and be consistent with the denominator. Financial assets are reported at market values, so only real assets need to be adjusted. Real estate wealth is not taxed according to its market value but according to its tax-assessed value. Market prices are about three times as high as tax-assessed values on average. We apply as a correction factor to each individual's annual reported real estate wealth the ratio of aggregate real estate wealth at market prices estimated by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 over aggregate tax-assessed real estate wealth reported by the Spanish Cadastre. Moreover, other real assets such as consumer durables, antiques and business assets tend to be underestimated in wealth tax records, as contrary to most financial assets, they are self-reported. We adjust them using the reported shares of these assets among the top 1% richest individuals in the SHF.[35] Whenever a taxpayer's share out of total taxable assets lies below the average share observed in the survey, we assign the survey share.

[35]Note that these assets are also self-reported in the SHF. However, we expect the reported values to be more accurate as the incentives to underreport are not as evident as when filing taxes.

Our top groups are defined relative to the total number of adults (aged 20 and above) from the Spanish Census. The progressive wealth tax has high exemption levels and less than the top 5 per cent of wealthiest adult individuals filed wealth tax returns until 2007 and less than 1% after 2011. Thus, we limit our analysis of wealth concentration to the top 1 per cent and above. Note that taxable wealth from 2008 to 2015 is based on the extrapolation method described in 3.3.1.

The new series show an increase in wealth concentration since 2007 and are similar both in level and trend to Martínez-Toledano, 2020 wealth distribution series using the mixed-capitalization method (Figure B9). Our top wealth shares are slightly lower in level, most likely because we do not account for pension funds (more prevalent at the top of the wealth distribution), as they are exempted in wealth tax records. We are not the first to construct national wealth shares with Spanish wealth tax records, as Alvaredo and Saez, 2009 already built distribution series with wealth tax tabulations over the period 1982-2005. Our estimated series are broadly similar, but we extend them until 2015. The differences mainly come from our refined wealth denominator including the new non-financial series from Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and the SHF, and the additional adjustment of reported real assets. Overall, the consistency of our series with existing methods and sources suggests that the extrapolation method we use captures very well the recent evolution of wealth concentration in Spain.

We then proceed to decompose the wealth shares at the regional level. To our knowledge, this is the first regional within-country wealth inequality analysis consistent with national accounts. Understanding wealth inequality across regions is quite relevant as it can help to better understand regional disparities and think of policies to improve convergence within countries. This analysis is of particular interest in this paper as the tax-induced migration responses might exacerbate regional wealth disparities. The Spanish setting is quite unique when it comes to do a regional inequality analysis as the tax panel we use is representative at the regional level and includes the region of residence. Hence, for the numerator we can simply decompose the national total by region. For the denominator, we decompose the national total used by Martínez-Toledano, 2020 that also relies of representative tax records and covers the full distribution.

Figure 3.15 depicts the evolution of regional top 1% wealth shares in Spain over the period 2003-2015. There are significant differences in both level and trend in wealth concentration across Spanish regions. Madrid is the region with the highest wealth concentration throughout the whole period followed by Catalonia, Valencian Community and La Rioja. Extremadure is the region with the lowest wealth concentration throughout the whole period, followed by the two Castiles and Asturias. The differences in regional wealth disparities at the top have been exacerbated since the onset of the financial crisis, as wealth concentration has increased in regions with high levels of wealth concentration and decreased or stagnated in regions with low levels of wealth concentration. There is very little evidence about regional wealth disparities within countries but these patterns are consistent with the fact that income inequality is higher within large cities (e.g., Madrid) and that the spatial concentration of income inequality has risen since the financial crisis (OECD, 2015; OECD, 2018).

Once we have the national and regional wealth distribution series, we can use them to run counterfactual simulations and analyze how migration shapes wealth inequality. To do this, we simulate the evolution of wealth inequality absent mobility by holding the distribution of wealth tax filers in each region at their pre-reform levels. To ensure consistency with the numerator, we also fix the distribution of the total adult population and total wealth in each region at their pre-reform levels. Finally, we correct each individual's wealth for the difference in tax liability between the benchmark scenario with mobility and the counterfactual scenario absent mobility using our wealth tax simulator. Note that as in the previous subsection, this is a partial equilibrium analysis that abstracts from spillovers from the presence of top wealth holders to the wealth of lower taxpayers. Moreover, except from mobility, this analysis also abstracts from any other behavioral response to changes in the wealth tax.

Figure 3.16 compares the evolution of top 1% wealth concentration in Madrid versus the rest of Spain under the benchmark scenario with mobility and the counterfactual scenario absent mobility. As expected, the migration of wealth taxpayers to Madrid has led to a rise in wealth concentration in the region and a drop in wealth concentration in the rest of regions. In particular, between 2010 and 2015 the top 1% wealth share growth in Madrid (16%) was almost double the growth absent mobility (8.7%). The differences between the benchmark and the counterfactual series only appear in 2012, as the reintroduction of the wealth tax was meant to be transitory and consequently, migration responses low. These findings are in line with the empirical results from the aggregate analysis. Figure B10 compares the evolution of top 1% wealth shares and its counterfactuals absent mobility in Spain and across all Spanish regions. In line with the revenue analysis, most of the drop in wealth concentration comes from the migration out of the two Castiles. Nonetheless, migration does not lead to any significant change in top wealth concentration at the national level.

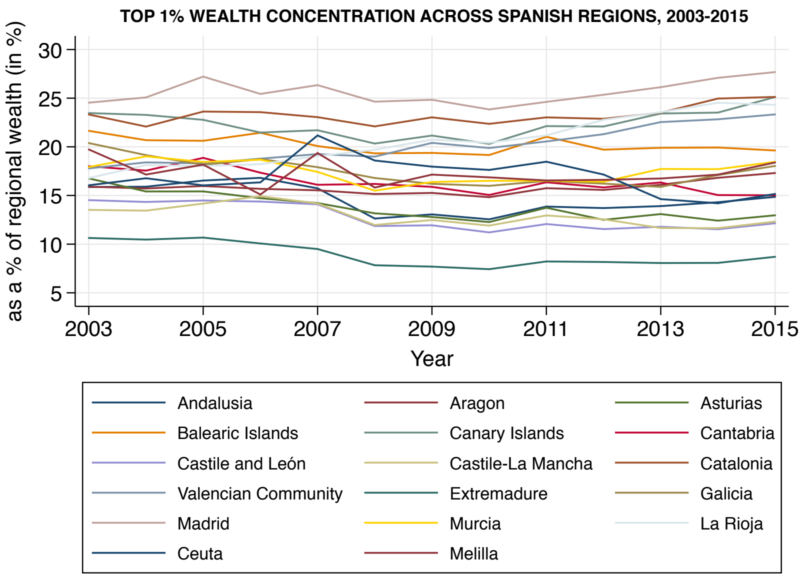


Figure 3.15: Top 1% wealth concentration across Spanish regions, 2003-2015

Notes: This figure depicts top 1% wealth shares across Spanish regions over the period 2003-2015. Our series are consistent with national accounts and have been constructed using as denominator the aggregate non-financial aggregates reconstructed by Artola Blanco, Bauluz, and Martínez-Toledano, 2020and the financial aggregates as reported by the Bank of Spain. Artola Blanco, Bauluz, and Martínez-Toledano, 2020only reconstruct urban, rural estate and business assets. Thus, for other non-financial assets such as consumer durables (e.g., cars, boats, etc.) and collectibles (e.g., jewelry, antiques, etc.), we rely on the reported totals in the five waves (2002, 2005, 2008, 2011, 2014) of the Spanish Survey of Household Finances (SHF) elaborated by Bank of Spain. We then calculate the regional denominator by decomposing the wealth denominator of Martínez-Toledano, 2020across regions and calculating the share that accounts for each region. Wealth tax information excludes the regions of Navarre and Basque Country because they do not belong to the Common Fiscal Regime. We follow Alvaredo and Saez, 2009and Martínez-Toledano, 2020and correct our denominator assuming that total wealth in those regions is roughly proportional to GDP. Combined, they represent about 6-7% and 8% of Spanish population and gross domestic product over our period of analysis. For the numerator, we use total reported wealth in tax files and adjust real assets to reflect market prices and actual totals. Real estate wealth is commonly taxed according to its tax-assessed value and market prices are about three times as high as tax-assessed values on average. We correct each individual's annual reported real estate wealth using the ratio of aggregate real estate wealth at market prices elaborated by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and aggregate tax-assessed real estate wealth reported by the Spanish Cadastre. We finally adjust consumer durables, antiques and business assets that tend to be underestimated, as they are self-reported. We do so by using the reported shares of these assets among the top 1% richest individuals in the SHF. Note that 2008-2015 taxable wealth is based on our extrapolation method. Wealth groups are defined relative to the total number of adults in each region (aged 20 and above from the Spanish Census.

3.8 Concluding comments

In the presence of *paraísos fiscales*, wealthy individuals have a high propensity to avoid or evade wealth taxes by changing the region of residence. Thus, decentralized

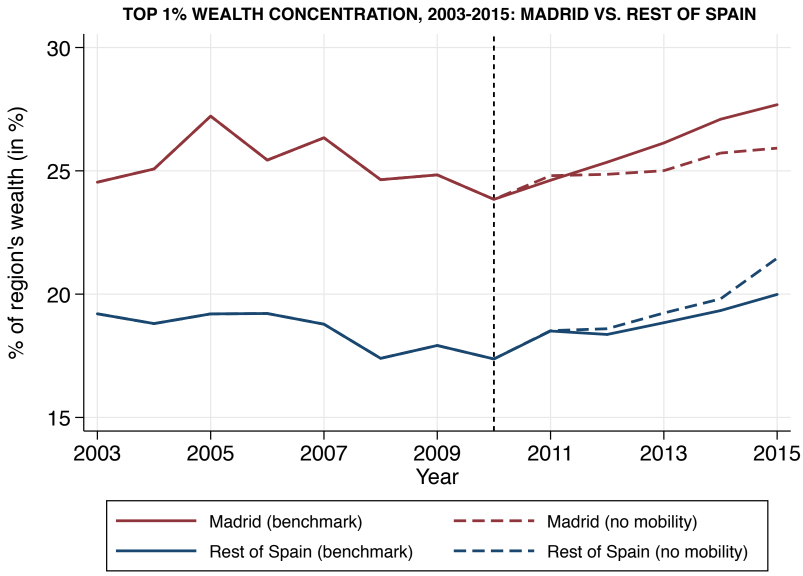


Figure 3.16: Top 1% Wealth Concentration, 2003-2015: Madrid vs. Rest of Spain

Notes: This figure compares the evolution of top 1% wealth concentration in Madrid versus the rest of regions in Spain under the benchmark scenario with mobility and the couterfactual scenario absent mobility. The counterfactual wealth shares have been calculated holding the distribution of wealth tax filers in each region at their pre-reform levels. To ensure consistency with the numerator, the distribution of total adult population and total wealth in each region is fixed at their pre-reform levels. We also correct each individual's wealth for the difference in tax liability between the benchmark scenario with mobility and the counterfactual scenario absent mobility using our wealth tax simulator.

wealth taxes may be ineffective at achieving their ultimate goals of raising revenue and reducing wealth inequality. The role of internal wealth tax havens, such as Madrid, play an important role in allowing the wealthy to reduce taxes paid even without offshoring wealth. We show that following decentralization, the stock of individuals reporting that they reside in a tax haven increases by 11%. Moreover, conditional on moving the probability of changing one's fiscal domicile to a tax haven rises by 24 percentage points. Finally, we show using a novel regional analysis of wealth inequality that migration of the wealthy doubles the increase in wealth concentration in zero-tax regions and erodes national tax revenues on average by 4%.

These responses are most likely due to avoidance or evasion and are likely a function of the design of the wealth tax and the enforcement of it. First, the decentralized wealth tax maximizes the potential for inter-jurisdictional migration given that mobility costs within a country are lower than mobility costs across countries. Second, enforcement is partially a choice of the central government and the regional authorities. The central government could tighten reporting requirements necessary to document a change of residence, but given the sixteen remaining regions have not forced Madrid to levy a minimum tax rate suggest that political economy factors may be preventing what is traditionally regarded as a possibly welfare improving reform (Kanbur and Keen, 1993).

Finally, conditional on decentralizing, the choice of a purely resident-based wealth tax amplifies mobility. Our paper stands in contrast to the standard view that source-based taxes on capital are most inefficient by showing that people may be more mobile than *certain* types of capital.[36] If a goal of the wealth tax is to reduced the concentration of wealth inequality, then a decentralized residence-based wealth tax concentrates more high-wealth taxpayers in Madrid. Under the current law, wealth taxes are paid to the region of residence regardless of where the wealth is located. Instead, if the source-principle prevailed, wealth would be allocated to the region where the wealth is located. Thus, if offshoring were not possible, for example, because all wealth were held in (relatively) immobile capital or land, then based on our results, the source-principle would dampen competition relative to the residence-based system. Such a view, although resting on the strong assumption of some wealth being immobile, would challenge the conventional wisdom that tax competition is usually stronger under the source-principle. Of course, much of the wealth owned by top taxpayers is highly mobile capital that can easily be offshored. In this setting, the tax system could tax property and land under the source-principle and could tax mobile capital under the residence principle. Regardless of the source or residence principle, the incentive to offshore remains, but the source principle would dampen tax competition because some wealth is relatively more immobile than the fiscal residence of the taxpayer.

Given the effectiveness of wealth taxes depends critically on the enforcement policies, our results also raise interesting political economy concerns. As most regions set relatively similar wealth tax schedules, Madrid appears to be the only region to deviate from what looks like an optimal equilibrium policy for many other jurisdictions. But then why do other regions tolerate Madrid's deviation? In addition to ramping up enforcement, the other regions could presumably form a centralized coalition that passes a "minimum" tax rate that all regions must set; indeed, it is well known that passage of minimum tax rates can raise revenue in all countries (Kanbur and Keen, 1993). Nevertheless, despite reducing the harmful effects of tax competition, there may still be a conflict of interest between the countries in the precise choice of the minimum tax rate. The failure to adopt such a minimum, along with the failure

[36] See Mongrain and J. D. Wilson, 2018 or Wildasin, 2011.

to optimally design enforcement mechanisms, suggests that reinstatement of the Spanish wealth tax was not a consensus decision across regions and the decision to set artificially low tax rates is a strategy to undermine its overall effectiveness or to reap economic or revenue gains by attracting mobile households.

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General Conclusion

This thesis takes an empirical approach to study new topics related to the dynamics of wealth accumulation, wealth inequality and wealth taxation, using the Spanish context as a laboratory. The three chapters contribute to the literature on macroeconomics, inequality and taxation in several ways. The first two chapters present new long-run aggregate and distribution wealth series for Spain. The first chapter highlights, by means of the Spanish aggregate wealth series, the importance of land, housing capital gains and international capital flows as key elements of wealth accumulation. The second chapter uses the Spanish wealth distribution series to study the dynamics of wealth inequality during house price cycles and presents novel evidence on how changes in the composition of saving shape the wealth distribution over the business cycle. Finally, the third chapter provides the first causal analysis on the impact of wealth taxes on migration and regional wealth inequalities.

There are several takeaways from this research. First, despite some improvements in the availability of wealth data in recent years, in many cases it is still incomplete and of poor quality, obliging researchers—including myself—to rely on strong assumptions. To better understand the economic, social and political importance of wealth, there is need to collect more and better data on assets and liabilities and make them available to researchers. At the same time, having a good track of wealth within and across countries could be useful to fight tax evasion. Second, when studying the dynamics of aggregate wealth and its distribution there is a lot to learn from carrying detailed country by country analyses. This thesis entirely focuses on the Spanish case, but the results presented and methods used are useful to better understand other contexts. Third, for understanding the determinants of wealth dynamics the gains from taking a historical perspective are quite noticeable, as the accumulation processes of wealth are slow and the drivers of the dynamics confounded by specific episodes. Fourth, for a long time research on macroeconomics and research on inequality have grown apart. Many of the empirical results presented here could be useful to enrich macroeconomic theories of wealth inequality and taxation over the business cycle.

This thesis has made progress in understanding the dynamics of wealth accumulation and wealth inequality and how they interact with taxes. Yet, there is still a lot to be done. We still know very little about how wealth is distributed in the developing world, across gender, generations and within countries. Filling these gaps could be very useful to make improvements in the design of redistributive policies and make economic growth more inclusive. Moreover, different economic shocks might have completely different effects on the dynamics of wealth and its distribution. This research has put the focus on house price fluctuations, but we still know very little about other type of shocks, such as those coming from a pandemic, like the one we are currently phasing. I hope the series and results presented in this thesis will open new avenues for future theoretical and empirical research on the determinants of wealth accumulation and wealth inequalities.

"It is wrong to see today's high inequality as the product of forces over which we have no control."—Anthony B. Atkinson

Appendix A

Appendix to "Wealth in Spain, 1900-2017: A Country of Two Lands"

A.1 Introduction

The main challenge of this research has been to build a consistent wealth series for Spain that will cover the lack of an official national balance sheet for the present and the past. This appendix is dedicated to present the key concepts, methods and sources employed.

A.1.1 Concepts

National income and wealth are two concepts extensively developed in the international accounting systems (SNA 2008 and ESA 2010). Wealth is calculated by providing, for a particular point in time, a balance sheet that records the value of assets economically owned and liabilities owed by an institutional unit or group of units. To carry this analysis, the system of national accounts divides the economy into five resident sectors—households, non-profit institutions serving households (NPISH), financial corporations, non-financial corporations and the general government—, and a sixth sector which corresponds to the rest of the world. For a given resident sector (i.e., personal, corporate, or government sectors), wealth (or net worth) is the sum of non-financial assets plus financial assets, less liabilities: $W_i = A_i^{NF} + A_i^F - L_i$.

At the country level, we follow the two definitions of national wealth used by Piketty and Zucman, 2014. The first one, called the book value of wealth, basically follows the SNA standards by computing, for each resident sector i, their non-financial assets (A_i^{NF}), and adding the net foreign wealth (NFW).[1] Grouping households and non-profit institutions into the personal sector and financial and non-financial corporations into the corporate sector, book-value of national wealth (W_N^B) can be expressed as follows: $W_N^B = A_P^{NF} + A_C^{NF} + A_G^{NF} + NFW$. The other definition of national wealth, named market value of wealth (W_N^M), is the sum of personal wealth (W_P) and public sector wealth (W_G): $W_N^M = W_P + W_G$.

The link between these two definitions can be traced to the corporate sector. To see this, start with a closed economy, where financial assets cancel out with liabilities, and national wealth equals the national stock of non-financial assets. Given that in an open economy net foreign wealth equals the sum of financial assets A_i^F minus liabilities L_i of resident sectors: $NFW = A_P^F - L_P + A_C^F - L_C + A_G^F - L_G$, then the book-value of national wealth equals the market-value definition plus the wealth of the corporate sector: $W_N^B = W_N^M + W_C$.

Hence, both definitions of national wealth are equal when the residual wealth of the corporate sector (W_C) is zero or, equivalently, when the famous Tobin's q formula equals 1 (Tobin, 1969). In this paper, we develop national wealth series based on these two definitions and provide also an estimate of the residual corporate wealth for the most recent period.

A.1.2 Asset classification

The other major recommendation of the SNA/ESA involves creating a balance sheet that separates between non-financial assets, financial assets and liabilities. In this paper, we have followed the proposed guidelines, although, given the lack of detailed sources, some necessary adjustments have been made. At a country level, we separate between produced and non-produced assets. In the first, we include dwellings, other buildings, infrastructures, machinery, and transport equipment. In the second, we separate between agricultural land, land underlying buildings, and mineral reserves. Valuables (i.e., art, antiques, jewelry, etc.) are excluded due to insufficient data. Also, neither human capital nor consumer durables are part of the wealth definition used in this paper. By doing so, we follow SNA/ESA guidelines which do not consider

[1] In the SNA, the rest of the world sector only holds financial positions, with non-financial assets holdings being accounted as financial. In ESA 2010, non-financial assets of non-residents are classified in AF.519.

human capital an economic asset and classify investment in durables as current consumption. Overall, the book value definition of national wealth is based on the sum of these non-financial assets plus the net foreign asset position.

Wealth of the major institutional sectors has also been detailed into separate balance sheets by distinguish between non-financial assets, financial assets and liabilities. In the personal sector, we group households and non-profit institutions serving households.[2] Household non-financial assets are presented following a simplified structure around three categories (i.e., housing, agricultural land and unincorporated business capital), while financial assets and liabilities are classified by sticking to SNA/ESA principles.

In the general government (or simply, the public sector) we include the central government, the state government ("Autonomous Communities" in Spain), the local government as well as social security funds. Public non-financial assets have been divided between produced ones (i.e., the capital stock of buildings, infrastructure, etc.) and non-produced one (basically, forest land and land underlying buildings). Then, for the historical period, we proxy financial assets by the value of state-owned equity holdings (e.g., the public railway company *RENFE*) plus financial assets owned by social security funds. Finally, the liabilities include the market-value of public debt and the technical reserves of the funded pension system.

The other institutional sectors cannot be analysed in such detail. The available data makes possible to calculate Spain's net foreign wealth, although it is only feasible to differentiate between assets and liabilities from 1971 onwards. Information on selected corporate assets and liabilities are used as an auxiliary source in this paper, but we can only present a complete balance sheet for both non-financial and financial institutions in the most recent period.

A.1.3 Time coverage

This paper reconstructs the balance sheet for the Spanish national economy and for the selected institutional sectors (i.e., personal, government and foreign sectors) since 1900. Our results start at the beginning of the twentieth century, since it is only at this period when it is possible to obtain the basic sources to compute wealth aggregates. Some very conjectural estimates could be made for the preceding century, but we have preferred to provide only results based on homogeneous series. It is

[2] For the sake of brevity, in what follows, we refer to households in a broad sense that includes non-profit institutions serving households.

also worth pointing that we do not provide any figures for the Civil War and the following year (1936-1940), given that most statistics do not include references for this period. Besides, the whole concept of wealth seems difficult to assess at that time. On the one hand, most household assets (i.e., land, dwellings and financial securities) lacked any organized markets, as the stock market was closed and very few real estate transactions were carried, and so imputing representative prices seems almost impossible. Besides, with two competing forces fighting over Spain, each with different government structures, debts and currencies, establishing the size of the public sector is not as straightforward as in other periods of history.

Another important point that should be kept in mind refers to the period of observation of our wealth variables. Generally-speaking, non-financial assets are measured as mid-year averages in the original sources, while financial claims are valued at the end of the year. To provide a convergence between both, we make a mid-year average of financial assets and liabilities by making a simple mean between the values of year t and $t-1$.

A.2 Domestic assets

A.2.1 Produced assets

Our estimate of produced assets covers the ESA-2010 category of fixed assets (AN.11)—which includes dwellings, other buildings and structures, machinery and equipment, weapons systems, cultivated biological resources, and intellectual property products—and inventories (AN.12). Valuables (AN.13) are not considered in our book-value estimate of national wealth. This omission is not a major problem, as data from other countries show that this asset represents a very small share of national wealth.[3]

Ideally, fixed assets and inventories should be measured through the census-like approach, which multiplies the observed quantities of each asset type by their corresponding market prices. In practice, however, direct observation of most assets may be difficult, especially for the corporate and the general government sectors. Due to this reason, the SNA 2008 recommends its measurement using the perpetual inventory method (PIM). The basic principle of this method is that asset values can be estimated by cumulating historical flows of investment, corrected for depreciation, and adjusted at current market prices. More concretely, to obtain the capital stock in

[3]Since 2002, the Survey of Household Finances of the Bank of Spain covers valuables owned by individuals. Results point to a very low share (c. 1%) in total household wealth.

year $t+1$ (C_{t+1}) from an initial value of the capital stock in year t (C_t), the PIM adds the investment flow in year $t+1$ (I_{t+1}) and detracts the depreciation of existing capital in year $t+1$. If we name δ the depreciation rate of existing capital, the accumulation method can be expressed in the following form: $C_{t+1} = C_t + I_{t+1} - \delta \cdot (C_t + \frac{I_{t+1}}{2})$.

Hence, for implementing this method, three elements are crucial: an initial estimate of the value of an asset type, high-quality series of investment flows and prices, plus depreciation rates over time.

Unfortunately, the SNA 2008 does not provide strict guidance to national statisticians on which specific procedure to follow when implementing the PIM, something which may obstruct the international comparison of produced assets. Depreciation rates depend on the age efficiency and the retirement profiles of assets, and different assumptions about them will imply different depreciation patterns. Nevertheless, the SNA 2008 refers to the OECD manual (OECD, 2009), which explores in greater detail the practical implementation of the PIM, and gives some particular recommendations. Importantly, the OECD advises to use geometrical patterns of depreciation because they tend to be empirically supported, conceptually correct and easy to implement (OECD, 2009, p. 12). Given that the use of initial levels of produced assets and the quality of investment series are an empirical matter (and not a conceptual one), the advice to use geometric patterns indeed points towards homogenizing the international implementation of the PIM.

In this paper, we implement the perpetual inventory method for the period 1850-2017 using data on investment flows from Prados de la Escosura, 2017 and investment prices from Prados de la Escosura, 2016b for four groups of fixed assets (i.e., dwellings, other constructions, machinery and equipment, and transport equipment) plus inventories.[4] However, we only provide results from 1900 onwards for two reasons: first, it is since 1900 when we can also estimate the stock of non-produced assets; and second, any mismeasurement of the initial stock of produced assets at 1850 will have a negligible impact on the PIM estimates from 1900 onwards.

We are not the first study using this type of approach to reconstruct produced assets in Spain and we have benefited greatly from previous analyses. Most notably, Prados de la Escosura and Rosés, 2010 estimate the stock of produced assets for the same four asset categories for the period 1850-2000, while Mas, Perez, and Uriel, 2000 and the group of researchers at the IVIE (*Instituto Valenciano de Investigaciones Económicas*) institute (Pérez, 2005; Mas, Pérez, and Uriel, 2011; Mas, Pérez, and Uriel, 2015)

[4]Machinery and equipment is a broad concept that includes agriculture and other assets, plus intellectual property since 1995.

decompose this stock into 17 different categories from 1964 onwards. However, we decide to compute our own estimate to incorporate the latest recommendations from the OECD (OECD, 2009) on the use of geometric patterns of depreciation, and, also, to include the recently available data on Spain's historical national accounts from Prados de la Escosura, 2017.

Regarding the geometric pattern of depreciation, we stick to the double-declining balance method from the OECD (OECD, 2009, p. 52), where the depreciation rate of an asset i takes the following form: $\delta_i = \frac{2}{T_i}$, with T_i being the average service life of asset type i. This depreciation pattern coincides with the one adopted by the IVIE institute since 2011 but differs from Prados de la Escosura and Rosés, 2010 approach, who use the modified geometric pattern as an in-between approach of the arithmetic and the geometric patterns (Prados de la Escosura and Rosés, 2010, p. 145).

To choose the service life (T_i) for each of the four groups of assets, we take the values from Prados de la Escosura and Rosés, 2010 (Table 1). In line with them, we also divide the asset lives into three broad periods (1850-1919, 1920-1959 and 1960-2000), to capture the diverse evolution of assets lives over time (i.e., certain asset types depreciate much faster nowadays than in the 19th century). However, we make a further correction. For the three asset types which service lives change over time (only "Dwellings" have a constant service life of 70 years over the period 1850-2000), we do not assume that service lives are constant over the mentioned periods and, then, suddenly change from one period to the next one. Doing this would affect the estimate of produced assets by the PIM, as in the years when a new period is introduced there is a sudden increase in the amount of capital depreciated due to lower service lives in the most recent period. Instead, we set the average service live of an asset type at the middle of the mentioned periods, and link the three periods using linear interpolation, therefore smoothing the evolution of service lives over time. Given that the middle year of the period 1960-2000 is 1979, we add an extra benchmark year in 2007. For this year, we use the service lives profile for "Machinery and equipment" and "Transport and equipment" used by Denmark in its national accounts (Görzig, 2007, table 6), and keep constant the service life profile of "Other constructions". We use the Danish service life profile as it is in line with the one used in this study. In the robustness checks section, we compare the evolution of produced assets using constant versus varying service lives, as well as different depreciation patterns.

One important difference in this paper with respect to Mas, Perez, and Uriel, 2015 relates to the use of the historical series of investment flows to implement the PIM. In this study, we employ the reconstruction of Spain's national accounts from Prados de la Escosura, 2017 for the period 1850-2017, who revises and updates his previous series of GDP (1850-2000) with a new interpolation method to splice historical national accounts. This method is designed to overcome the problems of the conventional retropolation approach, which overstates the level of investment and of other components of GDP in the past, and underestimates their growth over time (Prados de la Escosura, 2016a), especially when official national accounts started to produce estimates for countries that had not completed their structural transformation towards modern, service-oriented economies. Applying the perpetual inventory method with retropolated investment series—as it is the case in the IVIE institute— inflates artificially the initial stocks of fixed assets, and shows lower growth rates (i.e., a flatter posterior development).

We use the same values than Prados de la Escosura and Rosés, 2010 for the initial value of the stock of produced assets in 1850, with a stock of fixed asset equivalent to 86% of national income. In their paper, Prados de la Escosura and Rosés choose this value by applying a steady-state formula, where fixed assets equal the value of investment over the sum of capital depreciation rates and GDP growth rates around 1850 which, then, they multiply by two. This value may contain an important degree of uncertainty. However, this choice has little incidence on the performance of the PIM after some decades, as Prados de la Escosura and Rosés, 2010 (figure 1) show: by 1890, any assumption about the initial stock of fixed assets in 1850 has almost no impact on the PIM estimate. Hence, by presenting our results from 1900, we avoid any mismeasurement in our PIM series derived from the choice of an initial stock of fixed assets.

A final adjustment has to be made on our PIM series to account for war destructions during the Civil War period (1936-1939). We take the percentage of capital destroyed from Prados de la Escosura and Rosés, 2010 (p. 144): Transport equipment (40%), machinery and equipment (13%), buildings (4%) and infrastructures (6%). Given that we do not distinguish between buildings and infrastructures but between dwellings and other buildings, we assume 4% destruction for dwellings and 5% for other buildings (average of 4 and 6%).

A.2.1.1 Housing

In this paper, we estimate the value of housing from two perspectives. First, we estimate the total market value of the housing stock using the census approach, which captures both the value of the structure (produced element) and the land underlying (non-produced element). Second, we estimate the value of the structure by estimating the value of dwellings following the PIM previously discussed. As a specific consideration to the housing sector, we assume that the asset life of dwellings is 70 years (as in Prados de la Escosura and Rosés, 2010), and that, following the double-declining balance method, the annual depreciation rate is 2.9% (i.e., two divided by seventy). One additional element has to be considered when applying the PIM to housing investment data, as these data include commissions from existing home sales. In the United States, the Bureau of Economic Analysis quantifies the impact from including commissions in the value of the replacement cost of dwellings in 8.5% (Davis and Heathcote, 2007). In Spain, we are not able to quantify the value of these commissions, so we do not correct our series. Nonetheless, the lack of this correction does not affect the level nor the trend of housing wealth over our period of analysis.

Our initial point is to estimate the total market value of the housing stock, including both the structure and the land underlying. We use the best available sources and methods depending on the quality and availability over time, keeping in mind that recent estimates (1975-2017) are of better quality than the historical estimates (1900-1974). However, we want to emphasize that in a long-run estimate, it is more important to estimate correctly the value of the housing stock for the most recent period, not only because more refined data is available, but also because it anchors wealth levels. In fact, no matter which other source and/or methods we use, we find that the main findings presented in this paper, most importantly, a high wealth-to-income ratio mostly driven by housing, remains as the most important conclusion (see below).

Housing wealth during the period of 1900 to 1954 is calculated by multiplying, at a provincial level, the number of dwellings by the average prices recorded by property registrars. The number of houses can be obtained from the decennial censuses and interpolating for the years in between. From 1900 to 1930, figures are derived from the oldest and simplest survey, the Nomenclátor, which recorded the total number of buildings at a local level, differentiating both between dwellings and other types of constructions.[5] After the Civil War, the information is of higher quality, as the

[5]Dirección General de Estadística, 1924; Dirección General del Instituto Geográfico, Catastral y

government started in 1950 to carry a modern housing census on decennial intervals.[6] The only adjustment relates to the destructions caused by the Civil War. We assume that from 1931 to 1935 the building activity continued at the same rate as in the preceding decade, and afterwards 5% of the housing stock was destroyed between 1936 and 1939. The resulting trend is very similar to the 250,000 housing units that contemporaries estimated that were destroyed during the Civil War (Tafunell, 2005b, p. 463).

From 1900 to 1954 housing prices have been derived from the Registrars' Yearbook (Ministerio de Gracia y Justicia, 1910-2015). This source has already been used by Carmona, Lampe, and Rosés, 2014 to construct a hedonic index of housing prices. Our computations are slightly different in two aspects. First, in this paper we are only interested in market prices, and so we exclude post-mortem transmissions and other special transactions. Secondly, given that there is hardly any difference between the evolution of their hedonic price index and real prices, we simply opt to compute housing prices by making a simple average in each province. Nonetheless, it should be noted that the original source is plagued by small typographical errors that most times do not alter results. The only exception occurs in 1910 and 1927, when results seem highly implausible and thus we opt to interpolate linearly with the nearest two years. Finally, housing wealth has been calculated by multiplying the number of units by the average price at a provincial level.

Although property registrars' have continued to publish the same statistics until the present, the legal changes that occurred in Spain from 1950s onwards makes highly advisable to use alternative sources. Until that moment the real estate market had been dominated by a system of vertical property (i.e., the building and the underlying land could only have one owner), but since the 1950s there was a transition to a system of horizontal property and ownership became gradually extended. Unfortunately, property registrars did not change their data format, and therefore it is not possible to distinguish buildings and single apartments in transactions.

As an alternative, we have assumed that since 1954 and until 1975 the change in housing wealth (i.e., dwellings multiplied by nominal prices) followed the same trends than housing rents recorded in the national accounts (García, 1969; Instituto Nacional de Estadística, 1971; Instituto Nacional de Estadística, 1982). We have compared our estimate with the one provided by Universidad de Deusto (Donges,

de Estadística, 1933.

[6] Instituto Nacional de Estadística, 2011; Instituto Nacional de Estadística, 2001; Instituto Nacional de Estadística, 1995; Instituto Nacional de Estadística, 1986; Instituto Nacional de Estadística, 1976; Instituto Nacional de Estadística, 1962; Instituto Nacional de Estadística, 1953.

1968) for 1965, and the results are broadly in range.

For the most recent era (1975-2017), we provide a more accurate estimate of housing wealth using new statistics. Presently, there are two main sources on the market value of housing: the Indicadores del Mercado de Vivienda of the Bank of Spain (1987-2015) and the BBVA Foundation report of Albert and Uriel, 2012. Both sources follow a similar methodology by multiplying the total constructed area by the average price.[7] These two metrics are expressed in square meters. Surface area is computed in both studies using the census of dwellings, and both obtain almost identical results.[8] For constructing our series of housing wealth, we use the Bank of Spain's series, since it covers a longer period (1987-2015) than the work of Albert and Uriel, 2012.[9]

For calculating the average price per square meter, both studies use the series of average prices elaborated by the Ministry of Public Works based on property appraisals. To avoid biases due to the composition of dwellings appraised changing over time, the Ministry of Public Works stratifies the property appraisals into small subgroups by location and other common characteristics and assigns different weights to each of the subgroups to arrive to the national average. Hence, we do believe that this series is quite representative of the evolution of average housing prices in Spain, since it relies on administrative data and has been built under the best possible practices. However, whereas the Bank of Spain uses the average price of free housing, Albert and Uriel, 2012 use both the average price of free and social housing. As this latter method is more accurate, we use the data provided by Albert and Uriel, 2012 for constructing our series of housing wealth. However, the shortcoming of using this latest one is that it does not cover the period after 2010. Thus, for the period 2011-2015, we directly use the series of average price of free housing of the Ministry of Public Works, and adjust for social housing by multiplying prices by the price ratio between free and social housing over the average free housing price in 2010.

Until now we have explained how we construct our series of housing stock for the period 1990-2015. We complete the series backwards to 1975 using the nominal house price index (1975-2015) used in Mack, Martínez-García, et al., 2011. These authors provide two versions of a housing price index. From 1986 to 1994 they use the price

[7]For years 2016-2017 we do not have the total constructed area in m2, we extrapolate forwards the 2015 estimate using population growth rates.

[8]In order to know the exact methodology followed to construct this series see the definitions' appendix of Indicadores del Mercado de Vivienda and Albert, Benages, et al., 2009 for the series included in the 2012 report of Fundación BBVA.

[9]We thank Jorge Martínez Pages for sharing the series on the total constructed area, since it is not directly available in Indicadores del Mercado de la Vivienda.

series produced by the Ministry of Housing (1986-1994) on the average price on all dwellings types (new and existing), and from 1995 onwards the already mentioned series of the Ministry of Public Works. For the period 1986-2015, the two series are virtually identical, but for from 1975 to 1986 they show considerable differences. The first annual house price series was the one produced by Tecnigrama, which measures average prices for all dwelling types located in Madrid. The second series is the one constructed by Taltavull and Juárez, 2015, based on mortgage loan data from the National Statistics Institute (INE). Although in theory this latter one should be more accurate, the truth is that it shows an implausible fall of more than 50% in housing prices in the early 1980s. For this reason, we use the data series derived from Tecnigrama, since we believe that it better captures the trend in Spanish housing prices between 1975 and 1985.

One final adjustment needs to be done to link the 1975-1986 series with the 1986-2015 data. First, we divide the housing wealth series that has already been obtained by the stock of dwellings in 1990, the reference year of the census. Secondly, we extend the results backwards in time based on the growth rate in the volume of dwellings, according to other census data (1970 and 1980). Finally, we obtain the value of the housing stock by multiplying the estimated volume of dwellings by the nominal house price index in each year.

A.2.1.2 Other produced assets

Besides dwellings, we estimate the PIM to estimate the value of three other fixed assets (other constructions, machinery and equipment, and transport equipment) plus inventories. The correspondence between these categories and the ESA 2010's decomposition of fixed assets (AN.11) is as follows: "Other constructions" is equivalent to "Other buildings and structures" (AN.112); "Machinery and equipment" incorporates the equally named category in ESA 2010 (AN.113) as well as "Weapons and systems" (AN.114) and "Cultivated biological resources" (AN.115). In addition, from 1995, "Machinery and equipment" includes "Intellectual property products" (AN.117). Finally, as a separate category, we present estimates of "Transport equipment", which correspond to the equally named group of assets (AN.1131) in ESA 2010.

To implement the PIM on these three asset categories we follow the procedure explained before, using the asset lives of Prados de la Escosura and Rosés (Prados de la Escosura and Rosés, 2010, p. 145) and applying the double-declining balance method of depreciation. Furthermore, we decompose the category “Other constructions” into non-residential buildings and structures. To do this, we use information on non-residential buildings from the latest IVIE study of Spain’s produced assets (Mas, Perez, Uriel, et al., 2015), where “Other constructions” (category 1.2) are decomposed between economic structures (categories 1.2.1 to 1.2.6) and other types of constructions (category 1.2.7), the latter capturing non-residential buildings. During the years for which the IVIE carries this analysis (1964-2013), the share of non-residential buildings on “Other constructions” was relatively stable, ranging from 66% in 1964 to 71% in 2013. For this period, we use IVIE’s share of non-residential buildings and we apply it to our estimate of “Other constructions”. Then, to extend this decomposition backwards to 1900, we assume that the share of non-residential buildings was constant at 65%. For the year 2014, we assume that this share was equal to the last year in IVIE’s data: 2013. Although this is the best approximation we could came up with to decompose “Other constructions” between structures and non-residential buildings, these values should be viewed as a rough approximation, particularly during the period 1900-1963. If better data become available in the future, our figures would be revised accordingly.

A.2.2 Non-produced assets

Non-produced assets, as defined by ESA 2010, can be divided into three broad categories: Natural resources (AN.21), contracts, leases and licences (AN.22) and purchases less sales of goodwill and marketing assets (AN.23). In this study, we estimate the value of natural resources (AN.21) but, due to lack of information, we do not cover the latter two categories. Nevertheless, the value of these two categories in other countries is very small (e.g., in France, they represent between 4% and 6% of the total value of non-produced assets over the period 1978-2014). Hence, by assessing the value of natural resources, we are already capturing almost all non-produced assets.

A.2.2.1 Agricultural, pastoral and forest land

The valuation of agricultural land involves the use of various sources of diverse quality. For the first period, that starts at the beginning of the 20th century and lasts until the outbreak of the Civil War, we start by gathering estimates on the surface of arable, pastoral and forest land by crop type (Grupo de Estudios de Historia Rural, 1983). The original series only provides surfaces in hectares for some specific benchmark years (1900, 1910, 1922 and 1931), from which we construct an annual estimate by making a linear interpolation for the years in between. The challenge then lies in linking these data with a reliable series of land prices, a fact that has always been problematic in Spanish history given the late development of its fiscal cadastre. As an alternative, we use the land prices per hectare and crop published by Bringas, 2000, who carried an extensive survey on property auctions for a period ranging from the early 19th century until 1935 using also benchmark years (1905, 1915, 1920, 1925, 1931 and 1935). Information is available on five types of land (i.e., dryland cereals, irrigated cereals, vineyards, olives groves, and pastoral and forest land) and takes into account regional differences by gathering information on 20 provinces. From his data, we thus construct an approximate land price index by interpolating the values in between. Thereafter, we relate both magnitudes (i.e., arable land by crop and average price per hectare and crop) to estimate the total value of agricultural land.

After the Civil War the quality of statistics declines substantially. High inflation, the development of a black market of foodstuffs and the lack of any rigorous fiscal control makes more difficult the assessment of agricultural land prices. Later, the situation improves, and by 1963 the research team of the University of Deusto made a detailed estimate of Spain's land prices using the first results provided by the agrarian census carried by the government the year before.[10] This impressive work was later replicated by the Ministry of Agriculture in 1970, 1972, 1974 and 1976 (Ministerio de Agricultura, Pesca y Alimentación, 1984a). As for the most recent period, the available data are far less problematic. The Ministry of Agriculture published a first preliminary survey on land prices for years 1979-1983 (Pousa and Sánchez, 1986), which thereafter has been upgraded and made permanent (Bosque, 1984). Our calculations for the 1960s and 1970s take these estimates and interpolate for the years in between. Since the 1979 until the present day we multiply the weighted average price per hectare by the utilized agricultural area.

Linking the 1935 and 1963 estimates is more problematic. As a solution we considered that land surface stayed unchanged and that the evolution of prices per hectare followed the patterns of the indemnity paid by the public National Institute of Colonization to private landowners through this period (Gómez, 1979). Some caution should be taken when using this land price index. While historians (Barciela

[10]Although the wealth estimate of Universidad de Deusto was referred to 1965, their series on agricultural wealth was done for the year 1963 (Donges, 1968, p. 190). When upgrading their estimates, the authors assumed that land prices remained constant in value, something implausible at a time of relative high inflation (c. 10% per annum). For this reason, we use their data as referring to 1963.

and Mangas, 1990) agree that public indemnities were generous (i.e., near market conditions), it is also true that the available data do not take into account differences between regions or crop types. Besides, the land price index shows some very questionable results in its first two years (1942 and 1943), pointing to decline in nominal prices in a context of high inflation. Given that these figures are very difficult to justify, we have opted to make our last direct estimate in 1944, when agricultural land amounts to 212% of national income, and extrapolated this ratio for the preceding three years (1941-1943).

A.2.2.2 Mineral and energy reserves

Historically, the importance of subsoil assets in Spain has been very limited compared to other countries. Oil and natural gas reserves have been almost inexistent (Ballestero et al., 2003; J. L. Díaz, 2014) and only mining and quarry have had some minor contribution to Spain's total production. Overall, the value added from these industries has been below 2% of Spain's total GDP during the 20th century.

Spain lacks good direct sources to compute subsoil assets both for the present and the past. The Spanish Ministry of Industry has been publishing for long comprehensive data on mining production and employment. The Spanish Mining and Geology Institute also provides an annual survey on the industry, but their figures on mineral reserves are of very low quality: most information is taken from old surveys made in the mid-1980s, while in other cases they rely on private estimates made by corporations for specific mining sites.

In this paper we have calculated subsoil assets through a net price method as proposed by Statistics Canada (Ministry of Industry, Ottawa, 2006), in which the annual resource rent of extractive industries is capitalized by the depletion ratio. The resource rent has been obtained by deducting from gross value added the value of labour inputs (i.e., compensation of employees), depreciation of produced assets (machinery) and the imputed return on the capital stock. Figures on the gross value added are derived for the historical period from Prados de la Escosura, 2017 for the historical period and from national accounts from 1958 onwards. Labour inputs have been calculated for the first half of the 20th century using census data and information on miners' wages (Ministerio de Trabajo, Comercio e Industria, 1927).

The major challenge was to impute a depletion ratio, given the absence on data on Spanish mineral reserves both for the past or the present. However, as a starting point we calculate the stock of reserves at the start of the 1900 of the two most important minerals (i.e., coal and pyrites) by accumulating the psychical output as recorded by Tafunell, 2005b. This procedure provided a first upper-bound estimate, in which the depletion ratio amounted to annual production divided by the adjusted mineral reserves. However, in this scenario it is assumed that all resources were known and available to be exploited in the beginning of the 20th century. Since this was clearly not the case, we provide a second estimate in which the extraction rate was capped at 2% for the first half of the century. In this way, we assume that contemporaries did not had the technology nor the knowledge to exploit more than fifty years of mineral reserves. Overall, any inaccuracy should have an almost negligible effect on our national wealth series.

A.2.2.3 Land underlying buildings

Finally, we need to account for the value of land underlying buildings. This part of the analysis is of special importance given the increasing role of land under constructions in advanced economies, as recently shown for the housing sector by Knoll, Schularick, and Steger, 2017. For dwellings, this procedure is simple, we apply the residual approach suggested by Eurostat and the OECD (European Union, 2015, p. 78-80), which consists of detracting the perpetual inventory method estimate of the value of dwellings from our census-like estimate of housing. In this manner, we obtain a decomposition of housing between land and structure for the period 1900-2017. We are the first study which decomposes housing wealth in Spain into land and structure using the residual approach for a period over a century, but we have benefited from the study of Albert, Benages, et al., 2009 and Albert and Uriel, 2012, who apply this same method for the 1990-2010 period.

Incorporating the value of land underlying non-residential buildings is a more complex exercise given the absence of census-like estimates for these assets. We start by dividing our estimate of “Other constructions” between economic structures (i.e., roads, ports, bridges, etc.) and buildings, using the decomposition of this same category in Mas, Perez, Uriel, et al., 2015 for the period 1964 2017. Over these years, this decomposition is relatively stable—around 65-70% corresponds to economic structures—so that we assume a constant share over the previous period too. To account for land underlying non-residential buildings, we use the valuation of residential and non-residential buildings in the most recent years from the Spanish cadastre (2006-2017), which already subsumes the value of both land underlying buildings and its structure. Interestingly, over these years the relative value of non-residential buildings on total buildings was relatively constant at around 45%. As in other countries, cadastral sources do not capture accurately the market valuation of buildings, but we use it to compare the relative value of housing versus non-residential buildings. By doing so, we account for the share of land in residential buildings with respect to non-residential ones. To extend this relation backwards we use as a reference the evolution of land in the case of housing.

Overall, the most conflicting estimates of non-financial assets are subsoil assets and land underlying non-residential buildings, which together represent between 4% and 16% of the total value of non-financial assets over the period 1901-2017. In our opinion, the general trend of these two assets is correctly captured by our estimates while any imprecision in their level is not having a decisive effect in our total estimate of non-financial assets. Nevertheless, we admit that this procedure is subject to improvement and if better data become available we will update our series.

A.3 Personal wealth

A.3.1 Non-financial assets

The modern SNA distinguishes a broad range of non-financial assets. However, given the lack of homogeneous sources, we group household assets into three main categories: housing, agricultural land and unincorporated business capital.

A.3.1.1 Housing

To be consistent with the sectoral division of the SNA/ESA, we adjust housing wealth by excluding dwellings that do not belong to the personal sector. Given the lack of data on housing ownership trends, it has been assumed that during the period of 1900-1975 all houses were held by individuals. This fact is in accordance with the anecdotal evidence that exists for some cities (Chumillas, 2002), and also with the results of the 1970 census, which pointed out that 95% of dwellings were owned by households.

We then use the census of dwellings to measure household ownership on a decennial basis and interpolate for the years in between. Holdings by corporations and the general government are stated in these statistics. Unfortunately, information on houses owned by non-residents is scarcer, although the anecdotal evidences points that they might have a significant part in coastal and touristic areas. As a first approach, we use the statistics on housing transactions of the Ministry of Public Works for the period of 2006-2015. This data set reports the transactions in which non-residents were involved (c. 1% of the total), from which we compute a three-year moving average. This share is directly deducted from the housing wealth for the latest decade, and for the years prior to 2006 we apply the average ratio of the period 2006-2015. We are aware that the Bank of Spain is currently making an important effort to make a more consistent estimate on housing assets held by non-residents. Once these estimates are available, we will update our series.

It must be emphasized that even though in this paper personal wealth includes both households and non-profit institutions, our series of housing wealth only report in a consistent manner the dwellings owned by households. The reason has mostly to do with the lack of information, as the 1991 census was the only that reported separately the dwellings owned by non-profit institutions. Since in that year the share owned by this sector amounted to only 0.1% of the total housing stock, we believe that it makes very little difference between including or excluding dwellings owned by non-profit institutions.

A.3.1.2 Agricultural land

Using the value of agricultural land, we calculate the ownership of different institutional sectors through history. Households have been the main owners of agricultural land in Spain, although the government and corporations have owned an increasing share. For the period prior to the Civil War, there are some estimates on the area covered by public forests (Estudios de Historia Rural, 1991), from which we prefer to use a constant value of 6.5 million of hectares (around 14% of total land), which is then multiplied by the average price of forest land (Bringas, 2000). As we explain later, during Francoism there was a sustained increase in the land in the hands of public institutions, until it reached 25% of the total in the 1972 census. Public ownership of agricultural land has remained almost unchanged until now.

Data on corporate ownership of agricultural land is far scarcer. Before the Civil War there is no systematic information on ownership patterns, so we rely on the results of the special survey carried in 1932 by the Second Republic (Registro de la Propiedad Expropiable) to carry the agrarian reform. Results gathered by researchers show different regional patterns, but overall it is safe to say that around 1% of total land was in the hands of corporations.[11] We apply this same ratio for the years from 1905

[11] Mata et al., 1985; Muñoz, Serrano, and Roldán, 1980; Romero, 1982.

to 1941, which then gradually increases up to 4% in 1972 and then, following the results of the most recent agrarian census, up to 8% by the turn of the century.

A.3.1.3 Unincorporated business capital

The unincorporated sector includes all productive assets held directly by individuals (i.e., farmers, merchants, industrialists, entrepreneurs, etc.), as sole proprietorships and partnerships. For practical reasons, during the period of 1905 to 1980 assets employed in the agricultural sector with respect to the rest of the economy are calculated separately.

Farm capital

In the modern system of national accounts, farm capital basically includes livestock (i.e., animal resources yielding repeat products), other buildings, machinery and equipment. Prior to 1964, the first asset class has been calculated drawing on the census compiled and reviewed by the GEHR (1991) that classifies livestock species (i.e., horses, cattle, sheep, etc.). Each kind are then related to the average price reported in two benchmark years (1910 and 1919) by Cascón, 1934 and Ceballos, 1921, and later with the estimate for 1963 of the Universidad de Deusto. Given that we have still not found more systematic price series of livestock for other periods, we have opted to make a provisional estimate that relates the value of livestock to agricultural land (i.e. 10% in 1919) and extend the results for the missing years.

The estimate on farm fixed assets follows a similar reasoning, except that data is of inferior qualit Cascón, 1934 provides a full balance sheet for various farms in 1910, which points that farm machinery amounted to 27 pesetas per hectare on average (or 1.7% the value of agricultural land). For the early 1930s, Carrión, 1932 gives a more rough estimate of 50 pesetas per hectare (c. 2% the value of agricultural land), while the researchers of the Universidad de Deusto provide for 1963 a detailed assessment of Spanish farm capital that amounts to 2.5% of agricultural land. These three estimates are in accordance with the prevailing idea that Spanish agricultural became increasingly mechanized.

Reconstructing farm capital (including both livestock and machinery) from 1964 until 1980 is easier, given that Mas, Perez, Uriel, et al., 2015 provide a detailed estimate of the capital stock that quantifies the value of non-financial produced assets in the primary sector. Interestingly, their results are very similar to the ones provided by the Universidad de Deusto and the Ministry of Agriculture for some years (1965, 1967, 1969, 1970, 1972 and 1976).

Farm capital is then divided by institutional sectors. The basic assumption is that ownership trends follow the same evolution as with agricultural land, with households initially holding 85% of farm capital in 1905 and then progressively been reduced up to 50% in the present day.

Non-farm capital

To estimate non-farm business assets, it is not feasible to conduct a similar approach given the lack of the most basic accounting information until the recent period. As an alternative, non-farm asset is calculated from 1900 to 1980 by first drawing the mixed income of sole proprietorships and partnerships and then capitalizing income from capital by the corresponding rate of return. Estimates for the later period (1981-2015) are more straightforward, as they have been computed by extending the results from the Survey of Household Finances.

During the period of 1900 to 1980 capital income of non-farm entrepreneurs has been estimated differently in two sub-periods. From 1900 to 1954, the basic data source is provided by the industrial tax (*Contribución industrial, de comercio y profesiones*). This tax consisted on a fixed rate that was levied on non-farm economic activities according to some basic indicators (type of industry, location, number of employees, etc.). The tax was imposed to all partnerships and sole propietorships, but corporations were exempted and thereby assigned to a new tax (*Contribución de Utilidades*). The evaluation of this industrial tax was crude and simple, but it has been used by historians to analyse the industrialization process and regional inequality in Spain (Betrán, 1999).

These statistics include the number of taxpayers and the tax paid, classified both by region and economic sector (Ministerio de Hacienda, 1900; Dirección General de Contribuciones y Régimen de Empresas, 1956; Instituto de Estudios Fiscales, 1990). To calculate capital income it has been assumed that the tax amounted, on average, to a rate that fluctuated between 3 to 7% of earnings during this period. The imputed rate has been set at a slightly lower bound than the one imposed to the smallest joint-stock corporations and in accordance with changes in tax legislation.[12] Income of non-farm entrepreneurs for the period of 1954 to 1980 have been derived from Spanish national accounts (García, 1969; Instituto Nacional de Estadística, 1971; Instituto Nacional de Estadística, 1982).

[12] The imputed tax rate varies across time. It stands at 5% from 1900 to 1919, rises to 6% with the fiscal reform of 1920 and then to 7% with the second reform of 1932. After the Civil War, the imputed tax rate is of 6%, which thereafter decreases to 4% in 1946 and 3% by 1950. The details to make such assumptions have been derived from Dirección General de Contribuciones y Régimen de Empresas, 1956 (2-3).

Finally, capital income has been capitalized by the return on equity of non-financial companies, as stated by Tafunell, 2000, plus a premium to take into account the illiquidity of these assets. This kind of information is very scarce in history, but for the years 1928-1933, tax statistics record the equity and profits of unlimited partnerships, and thereby it is possible to compare their returns (a ROE of 12%) versus that of joint-stock companies (a ROE of 8%). For the rest of the historical period (i.e., 1900-1980), we have assumed that this 4% premium remained in place.

From 1981 to 2015 two basic sources have been used to calculate unincorporated business assets: the Survey of Household Finances (SHF, Banco de España 2002-2014) and Central Balance Sheet Data Office of non-financial corporations (Banco de España 1982-2014). For years 2002 to 2014 information on household wealth is clearly more abundant and of higher quality due to the availability of SHF micro-data. The SHF reports the value of unincorporated business assets declared by households for some specific benchmark years (2002, 2005, 2008, 2011 and 2014). However, since household surveys tend to underestimate the market value of virtually all asset classes (e.g., financial claims, housing, etc.) due to under-coverage of the wealthiest sectors or misreporting (Hurst, Li, and Pugsley, 2014; Vermeulen, 2016), the declared values on unincorporated business have been upgraded. The share of unincorporated business assets (excluding agricultural land) over housing, as computed from SHF micro-data, has been multiplied by the aggregate value of dwellings held by households, as calculated by other sources (see next section). The rationale behind this process is that the bulk of unincorporated assets are invested in commercial property (i.e., office buildings, businesses premises, undeveloped land, etc.) and, thus, the degree of underreporting should be similar as with dwellings. Overall, the resulting figures are on average 23% higher than the raw data reported in SHF micro-data. The ratios provided in the SHF surveys have been interpolated for the years in between (i.e., 2003-2004; 2006-2007, etc.) and multiplied by the value of household dwellings.

The major challenge involves extrapolating these results backwards for years 1981-2001. The basic assumption taken is that unincorporated business assets followed the same trends as non-financial assets of non-financial companies, the latter being reported by the Central Balance Sheet Data Office of the Bank of Spain (more information in the section on corporate wealth in this appendix).

A.3.1.4 Consumer durables: one final remark

As pointed previously, following SNA guidelines, we exclude consumer durables from our wealth estimates. Although we could always compute these goods as a memo item, any estimates for Spain would be purely conjectural given the lack of good data sources. In the long run, the only reliable estimates refer to the annual consumption of consumer durables, as computed in national accounts. However, data is not separated between different goods (i.e. automobiles, television sets, radios, etc.), and so it is impossible to compute depreciation rates in a consistent manner. The landmark study of the Universidad de Deusto provided an estimate on household consumer durables and valuables (e.g., art, jewellery, etc.) for the year 1965. However, their assumptions are extremely doubtful, as, for example, including a single and low depreciation rate (6.5%). Goldsmith, 1970 expressed serious concerns on the validity of this exercise.

A.3.2 Financial assets

Sources on financial assets and liabilities are in general much more detailed. Since December 1980 until the present we use the Financial Accounts of the Spanish Economy published by the Bank of Spain. There are two set of statistics: one based on ESA 95 (1980-1994), and another constructed with ESA 2010 (1995-2017). From 1970 to 1979 data is quite similar, albeit of inferior quality (Banco de España, 1986). The main difference lies in the fact that the statistics published at the time were only a first estimate that, to our knowledge, have never been updated or revised. The most important drawback is that the balance sheet for non-financial corporations and households were consolidated into one group, but also it seems evident that the equity holdings of the public sector were being considerably underestimated. For these reasons, we have adjusted this dataset with the available data.

In contrast, for the period 1900 to 1969 we had to construct new estimates. This process basically involves taking the aggregate volume of each asset type, and them computing households' share by deducting the holdings of other institutional sectors (mostly corporations or the public sector). Besides using previous research carried by historians, our main sources are financial yearbooks and the published balance sheets of banking and insurance companies.

A.3.2.1 Currency and deposits

Our basic reference is the work of Martín Aceña (Martín, 1985; Martín, 1988), who presents Spanish money aggregates differentiating between currency, bank accounts, bank deposits and savings banks deposits for the period between 1900-1962. Later, for 1963 to 1969 we use the official data published by the Bank of Spain to extend his series. Both datasets have been elaborated by including only money held by the public (including households, non-financial corporations and the public sector, but excluding financial institutions). The financial accounts of the 1970s present similar data, but bring together households and non-financial institutions, while those elaborated after 1980 differentiate between both sectors.

Using these results, we calculate for the historical period the share held by households on total money aggregates. For currency, this process is straightforward. Financial accounts presently show that almost all bank notes and coins (around 96%) held outside financial institutions correspond to households, so we extend backwards this ratio considering that it has been constant over time. With bank accounts and bank deposits we follow a similar procedure, using different ratios (50% and 80%). Finally, regarding savings banks' deposits we simply opted to assign all to households, given that these financial institutions were mostly designed to serve low and middle-income families at that time.

A.3.2.2 Debt securities

The stock of debt securities corresponds to the aggregate value of bonds issued by the public sector and corporations. Due to practical reasons, both set of securities are assessed separately.

During the period of 1900-1969, we start with Fernández Acha's series on public debt (Fernández, 1976), who details the debt profile of the central government in terms of maturity (i.e., perpetual, non-perpetual), currency (i.e., national or foreign) and the issuer (i.e., central government, the Treasury or subsidiary institutions). These data are supplemented by our own calculations on the small volume of bonds issued by regional and local governments. For the period of 1901 to 1919,Nuñez and Castellano, 1998 present an estimate on this debt stock using tax statistics. Afterwards, the AFSAE Yearbook and the Anuario Financiero de Bilbao extend the series from 1920 to 1944. From this date and until 1964, García, 1969 provides a more comprehensive estimate on the total liabilities of local authorities, which includes not only securities issued, but also loans provided by the Bank for Local

Government Funding (*Banco de Crédito Local*). Since the debt of this last institution is already computed by Fernández, 1976 in his estimate of central government debt, we exclude it to avoid double counting. Finally, for the last years we interpolate the figures with the relevant figures of the Financial Accounts of the Bank of Spain.

Secondly, we adjust the nominal value of debt to its market price using the average annual prices quoted in the Madrid Stock Exchange. This reassessment has some importance in the years prior to the Civil War, when most public debt securities traded with a significant discount over par value (usually around 70-80%), but has almost no incidence during Franco's era. Treasury debt (*Deuda del Tesoro*)—which includes both short-term securities and non-marketable debt—is priced at its nominal value.

Lastly, to compute households' share we deduct the holdings of the following groups:

- Central Bank: The balance sheet of the Bank of Spain included within its assets some special kinds of Treasury debt and a small portfolio of marketable public debt. Overall, central bank holdings had some importance at the beginning of the 20th century and especially in the aftermath of the Civil War.

- Private Banks: Martín Aceña (Martín, 1985; Martín, 1988) presents the securities portfolio of Spanish private banks from 1900 to 1962 using the official statistics published by the Spanish Banking Council (*Consejo Superior Bancario*). Within these reports, public debt was stated as a separate item of the securities portfolio. However, for the years prior to 1920 this last information is not available, so we use the estimates provided by Martínez, 2005, who basically extends a constant share. For the period from 1963 to 1969 we use the same statistics of the Spanish Banking Council.

- Saving Banks: Titos and Piñar, 1993 present the public debt portfolio of Spanish savings banks from 1941 to 1969. For the years before the Civil War we also use the estimates provided by Martínez, 2005. Furthermore, we include the public debt holdings of the Postal Savings Bank (*Caja Postal de Ahorros*) and the small portfolio of securities held by the public banking sector (*Crédito Oficial*) using the information available on the annual reports of both institutions.

- Insurance companies: In the early 1910s the Spanish Ministry of Finance imposed a severe control on the investments of the technical reserves by private insurance companies. The annual reports of the General Directorate of Insurance (Ministerio de Hacienda, 1955) include a detailed analysis of the sector's balance sheet, from which it is possible to obtain the figures corresponding to public debt securities. Separately, the reports of the Spanish public insurance institutions (the INP and later the Social Security) recorded the volume of public debt held against its technical reserves (Instituto Nacional de Prevision, 1931; Ministerio de Trabajo, 1953; Ministerio de Trabajo y Seguridad Social, 1985)

- Rest of the World: Since 1898, only non-residents that had provided an affidavit could own the external perpetual debt payable in gold currencies. Therefore, for the 20th century this kind of securities and foreign loans are, by definition, in the hands of non-residents. Their share is important until 1916 and afterwards in the late 1960s, but in the years in between Spain had almost no public foreign debt.

Corporate debt has been computed relying on two different sources. From 1902 to 1919 the official tax statistic states the debentures issued by joint-stock corporations (Dirección general de Contribuciones, 1901). This series is far from perfect, as researchers (Tafunell, 2005a) have already pointed that tax authorities did not update with sufficient diligence the volume of corporate securities, so that numbers should be taken as a rough estimate. Since 1921 and until 1969 data has been obtained from financial yearbook calculate (AFSAE, 1916). The advantage of this publication is that, despite not being an official register, it has been regarded as a far more reliable source by historians studying corporate profits and the business cycle in the long term (Carreras and Tafunell, 1993; Tafunell, 1998; Tafunell, 2000).

This latest source is also of great value as it details the debt issued by different corporate sectors (e.g., railways, electricity, banking, etc.), and makes possible to make some minor deductions to avoid double counting errors. In this sense, we deducted the covered bonds (*cédulas hipotecarias*) issued by the official public financial sector, which have already been computed as a special kind of public debt.

Overall, debt was an important source of corporate finance until the Civil War, but afterwards its role declined sharply. This trend is in accordance with the fact that during the first decades of the 20th century more than half of the corporate debt was issued by railway companies, so that the nationalization of this sector in 1941 had a profound impact in the overall volume. The difference between railroad and other corporations issuing debt (mostly utilities) is also of great importance for converting the nominal value of corporate debt into market prices. The railroad sector was more leveraged, and its revenues were severely impacted by the First World War, so that its bonds normally traded with an important discount over par (around 70-80%, but at times even at 50%). In contrast, the creditworthiness of other corporations was far higher, and their bonds traded nearer to their nominal values. To take into account this difference, from 1900 to 1936 we compute separately the market value of railway and other corporations bonds with the series published by Hoyo, 2007. Since the Civil War onwards there is no systematic information on corporate bond prices, but to make them resemble the general trends of the public debt market, we compute them at their nominal value.

Finally, as with public debt, we deduct the holdings of the following groups to obtain household's wealth:

- Private Banks. As pointed previously, the official statistics published by the Spanish Banking Council present the portfolio of private banks, including as a joint item all corporate securities (*Otros valores*). The main problem is thus to differentiate between debt and shares. For the period prior to the Civil War we rely on the detailed composition of the securities portfolio of some banks (e.g., Banco Vizcaya, Santander, Aragón, López Quesada) that was published in the 1924 edition of AFSAE. Per this source, within the corporate securities portfolio there was a separation between debt and stocks around 70/30%. Thereafter we do not have any further direct sources, but to make our series consistent with the evolution of the aggregate volume of corporate debt and the holdings of other financial institutions (as detailed below), we make that the share corresponding to corporate debt in banking balance sheets gradually decreases from 70 to 20%.

- Saving Banks. The series presented by Titos and Piñar, 1993 for years 1941 to 1969 is very similar, except that it does detail the separation between corporate bonds and shares from 1959 onwards, pointing that, on average, private debt securities amount to 80% of the total. Prior to this year we extend backwards this share until 1941. Finally, for the period of 1905-1935 we extrapolate the same results as obtained by Martínez, 2005.

- Insurance companies. The annual reports of the General Directorate of Insurance also include the corporate debt portfolio held by these companies since 1915 until 1969.

- Rest of the World. At the beginning of the 20th century an important part of the Spanish railway debt was listed in foreign stock markets (mostly Paris). However, after the First World War the government promoted the repatriation of funds, so that by the time Franco nationalized these companies, foreign debt holdings had almost disappeared. To take into account the changes of these three decades, we rely on the approximate ownership ratios provided by historians (Cuéllar, 2015; López-Morell, 2005; Tedde, 1980; Tedde, 1978) and the yearbook of the Madrid Stock Exchange (Agentes de Cambio y Bolsa, 1919) on the three most important companies (i.e., Norte, MZA and Andaluces). Since these corporations accounted for c. 75% of the bonds issued by railways, we extrapolate their overall trends to the remaining companies.

From 1970 to 1979 the Financial Accounts of the Bank of Spain present a consolidated statement of household's and non-financial corporations debt holdings, that is, including securities issued by the public sector and financial corporations, but not of non-financial corporations. To recalculate our series, we start from 1980, the first year in which household debt holdings are separately computed and then extend backwards the missing information assuming that it followed a similar path as the consolidated statement.

A.3.2.3 Loans

The economic literature has highlighted that households in developing countries frequently tap informal credit markets to finance their investments. Although scholars have not made a detailed research on the matter, the scarce evidence found for Spain during the first half of the 20th Century points that informal lending provided by rich individuals (*prestamistas o usureros*) also played a significant role (Carmona and Simpson, 2003). The only systematic sources of information that can be found for this period refer to mortgage loans. Since 1900 the Ministry of Finance levied a specific tax on the interests of mortgage loans. Commercial and savings banks were exempted, while the Mortgage Bank (*Banco Hipotecario de España*) only had to pay the tax on its covered bonds (*cédulas hipotecarias*).

For the first three decades of the 20th century, from the total amount of interests paid on mortgage loans, as reported by tax authorities (Dirección general de Contribuciones, 1901), it is possible to deduct the amount corresponding to covered bonds, as reported in the annual statement of the Mortgage Bank and in Lacomba et al. (Ruiz and García, 1990). The resulting series corresponds to the interests paid on loans granted by households to other individuals. Then, it is necessary to capitalize this series to obtain the volume of outstanding loans. The literature points that in Spain during this period interests on informal credits usually stood around 6 to 9% (Carmona and Simpson, 2003, p. 280). As such, we take as a reference the interest on covered bonds (that normally was 5%) and add 2% more to reflect the higher risks and lack of liquidity associated with these investments.

Data is absent for the period after the Civil War, although it is reasonable to assume that informal lending was progressively displaced by the rise of banking institutions. Thus for 1941 we take the volume of outstanding loans that existed in 1935 and draw a process of a gradual disappearance until 1954.

A.3.2.4 Equity and investment fund shares

Equity shares correspond to the aggregate value of stocks issued by corporations and other limited liability companies. Mutual and investment funds are an important part of financial markets nowadays, but they did not exist in Spain until the mid-1960s and can be omitted in the construction of historical estimates. As Hannah, 2015 has recently pointed out, calculating the volume of these assets is especially problematic for various reasons. First, joint-stock companies that provide separate legal personhood and limited responsibility can exist in different forms. Secondly, it is very rare to have an official census on the number and capital of each set of companies, so it is necessary to use unofficial records. Thirdly, the available historical sources normally refer to the aggregate paid-up capital of corporations, that is, the funds originally provided by shareholders. These set of figures then need to be converted to market values. The easiest cases occur with those corporations that are listed in the stock market, given that equity holdings can be recorded at the prevailing prices at one time. Unfortunately—both presently and in the past—most companies are not listed in exchanges, and thus it is necessary to provide some assumptions on the book value reported on corporate balance sheets to estimate market values.

When dealing with this problem, the Bank of Spain had traditionally opted as most historians have done: applying to non-listed firms some observed ratio that exists between the book and market value of companies quoted in the stock market. However, recently it has started to follow a different approach by which the annual profits of non-listed firms in a particular economic sector (i.e., utilities, manufacturing, etc.) are capitalized at a the rate as similar companies listed in exchanges (Banco de España, 2005). Although this approach provides better results, there are no historical sources to carry it. Instead, in this paper the traditional approach of applying a ratio between the paid-up capital and the equity market value is carried. As a starting point, the same sources used for corporate bonds have been drawn to compute the equity value of Spanish corporations [sociedades anónimas]. For the period of 1905 to 1918 the paid-up value of corporations is derived according to the official tax statistic (Dirección general de Contribuciones, 1901), and from 1924 to 1969 from the AFSAE yearbook, as published Tafunell, 2005b. Data for the years in between (1919-1923) has been interpolated due to the inconsistency of both sources.

Then, to convert this series into market prices we use different ratios that can be established between market prices to paid-up capital of companies listed in the Madrid stock exchange. For the period of 1900-1957, we use information on an ongoing project to build a blue-chip index (Artola Blanco, Battilossi, and Houpt, 2018), while for years 1958-1969 it can be derived from the official index of the Madrid bourse (Bolsa de Madrid, n.d.). We have computed the market value of a corporate equities in two different ways. In a first scenario we stick to the procedure of extrapolating the ratio between the market value to paid-up capital of listed firms to all privately-owned corporations. In the other we capitalize the dividends paid by non-listed corporations, as reported in tax statistics, by the dividend yield of quoted corporations. Afterwards, we applied to non-listed companies a 20% discount to consider the illiquidity of these assets. This discount tends to be on the upper side of the available estimates (Amihud, Hameed, et al., 2015), although it is worth pointing that there is probably a limit to this discount, as non-listed firms are owned by investors with longer holding periods (Amihud and Mendelson, 1986). Also, we must highlight that state-owned companies have been left aside in these estimates, as their market value has been derived on a case-by-case basis (as we will detail later).

By comparing both results we eventually chose to combine both systems to avoid distortions. Basically, the valuation carried by applying the ratio of market prices to paid-up capital tends to overestimate equity values in the 1900-1935, due to the distortion introduced by large privately-owned monopolies (mostly notably, the Bank of Spain). Later it is the second method that tends to overshoot, as the stock market tanks in the 1970s and produces extremely high dividend yields. We thus opted to use, respectively, the method that provided the most conservative estimate.

A special set of limited liability companies (*sociedades limitadas*) have also been included, but unlimited partnerships (sociedades colectivas and sociedades comanditarias), a form of business association widely used at the beginning of the century, are excluded as they did not issue shares and therefore computed within the unincorporated sector. Limited liability companies started to exist in 1920 and have had a growing importance in business activities since. However, unlike with corporations, data is of inferior quality as there is only two complete census of these set of companies referring to 1944 and 1949 (Dirección General de Contribución sobre la Renta, 1944). As a complementary source, Tafunell (Tafunell, 2005b, p. 766-770) provides a revised version of the official statistic of the Mercantile Register on the annual number of charterings and paid-up capital for the whole period. This series is completed from 1950 onwards with data on the number and value of capital increases, reductions and corporate dissolutions.

With these different sources a new series on the paid-up capital of limited liability companies is constructed. First, it is assumed that before 1950 net changes in the equity of existing companies (increases, reductions and dissolutions) in relation to newly incorporated companies amounted to the average observed from 1950 to 1969 (34%). Secondly, the flow of new corporate charters and net changes in equity is accumulated from 1920 until 1936. Thirdly, this series is then matched with the 1949 census estimate and accumulate backwards and forwards in time with the more complete data of the Mercantile Register. Finally, given the lack of sources, it is important to point that these set of estimates are not converted into market prices, although the difference should be as large as with corporations, as limited liabilities companies normally held fewer reserves.

From the aggregate volume of equity holdings, it is then necessary to deduct holdings of the following institutional sectors to compute household's share:

- Private Banks. As discussed above, the aggregate balance sheet of the banking sector provides figures on the holdings of corporate securities, from which is necessary to assume the distribution between bonds and shares. The weight of stocks starts at 30% before the Civil War and rises gradually up to 80% by 1969.

- Savings Banks. In the same manner, the available data presents the evolution of stocks held in the balance sheet of savings banks.

- Insurance companies. The annual reports of the General Directorate of Insurance include the shareholdings of these companies since 1915 until 1969.

- Non-financial corporations. Beyond some anecdotal evidence on utilities and industrial companies (Jubany, 1994), there is very little systematic data on inter-corporate stockholdings. The only noticeable exception than could be found comes from the 1955 estimate made by Banco de Bilbao (Banco Bilbao Vizcaya, 1957) on the Spanish national income, which included as an appendix a detailed survey on the balance sheet of a sample of circa 100 non-financial corporations. From these data it is possible to estimate that around 20%

of shareholdings were held by corporations. Later, in 1970, the Financial Accounts of the Bank of Spain point to a share around 20%. To construct a time series, these two points are interpolated and then extended backwards in time assuming a level of 1% in 1914.

- Public sector equity holdings. As we discuss in the section below, the public sector started to build an important number of shareholdings in industrial and service companies from the 1940s onwards. These stakes could be valued either at book value or market value, and so are deducted separately from the overall volume of corporate shares.

- Rest of the World. As Broder, 1976 and Prados de la Escosura, 2010 have pointed, at the beginning of the 20th century foreigners were heavily involved in two economic sectors: railways and mining. Investment in the first kind of business was made through Spanish companies. Information provided by Ortúñez and Vidal, 2002, Tedde, 1980 and Cuéllar, 2015 for the three major railway companies during this period enables to construct the precise share accruing to foreigners, and then assumed a similar weighting for the other railroad companies. Foreign investment in the mining sector was different as it was mostly channelled through foreign-based companies (i.e., Rio Tinto Company, Compagnie Royale Asturienne des Mines, Société Minière et Métallurgique de Peñarroya, etc.). The census developed by tax authorities (Dirección general de Contribuciones, 1901) points that in the 1910s the above mentioned companies usually represented around 20% of the paid-up capital in the mining sector. Thereby this ratio is applied for the whole period of 1900 to 1935. Later, for the 1940s and 50s it is assumed that foreigners were completely absent, as Franco forced the last foreign investors to sell their stakes (Carreras, 2003). Later, as other historians have pointed, the liberalisation of Spanish economy from 1959 onwards enabled a growing flow of foreign investments. It is thus assumed that their share gradually grew from 1% in 1960 to the level pointed in the Financial Accounts of the Bank of Spain in 1970 (4%).

A.3.2.5 Insurance, pension and standardized guarantee schemes

Insurance and pension assets correspond to the value of accumulated reserves against outstanding claims made by households. In practice, these assets are not held directly by households, but rather as technical reserves by private and mutual insurance companies.

For practical reasons, the technical reserves of private companies and public institutions are calculated separately for the period of 1905 to 1969. Data on private sector insurance schemes start in 1915, when the Spanish Ministry of Finance imposed a control on the investments made by insurance companies. Thereafter, official reports state the amount and composition of technical reserves (Ministerio de Hacienda, 1955). Although insurance schemes had already been present in Spain for a long time (Caruana et al., 2014), the value of reserves in 1905 is so low (42 million pesetas, or 0.3% of the Spanish national income) that it is feasible to dismiss its importance prior to then. For the first two decades figures are only available in five-year intervals (1915, 1920, 1925, 1930 and 1935) and thus have been interpolated for the years in between. From 1941 to 1969, the reports appear on a yearly basis. In principle, most technical reserves are constituted to cover life insurance contracts, but some can also refer to the liabilities incurred with households and non-financial companies for other reasons (e.g., fire or vehicle insurances). Since no information is available on the ownership trends by institutional sector, households' share in 1980 (84% of all technical reserves) has been extrapolated backwards in time.

The development of public insurance schemes has undergone through two different phases in history that need to be briefly explained. In 1908 the government created the INP (*Instituto Nacional de Previsión*) as a system that grouped various schemes that covered workers' risks (e.g., disability, sickness, old age, etc.) based on the contributions of employees and employers (Comín, 2010). The most important economic right (pensions) were provided based on accumulated savings and investment returns. Later, in 1962, the government created the modern Social Security as an unfunded, defined-benefit system that included the previous existing schemes of the INP.

Unfortunately, data sources on public technical reserves are quite scarce. During the period of the INP, the government published a complete balance sheet on irregular intervals (1913, 1918, 1923, 1928, 1933-1935, 1940, 1945-1947, 1949-1952) and thus figures have been linearly interpolated for the years in between.[13] Later, during the years of transition to the new Social Security system there is a complete lack of consistent sources. From 1962 onwards, the most comprehensive accounting data was published in Ministerio de Trabajo y Seguridad Social (Ministerio de Trabajo y Seguridad Social, 1985).

From 1970 to 1979 technical reserves are directly derived from the Financial Accounts

[13]The first two reports appeared in the official *Gazeta de Madrid*. Information from 1923 onwards has been derived from Instituto Nacional de Previsión (1931-1945) and Ministerio de Trabajo (Ministerio de Trabajo, 1953).

of the Bank of Spain.

A.3.2.6 Other accounts

The Financial Accounts of the Bank of Spain group in this category some miscellaneous assets: financial derivatives, short-term commercial credit and all other accounts pending payment. As readers may imagine, there are virtually no sources to compute them in a consistent way for the historical period. Nonetheless, their magnitude is relatively small, and their share has been declining since 1980.

A.3.2.7 Offshore wealth

The Spanish financial institutions automatically report to the Spanish Tax Agency the income (i.e., dividends, interest, and capital gains) and wealth (i.e., deposits, stocks, investment funds, life insurance, and pension funds) held by their clients. To compile the Financial Accounts, the Bank of Spain uses very similar sources to record households' assets and liabilities (Banco de España, 2011). Thus, implicitly, these two official statistics fail to include all assets held by individuals in foreign countries and non-reported to national authorities.[14]

Zucman, 2014 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 in 2012 amounted to 80 billion euros, which accounts to 9.4% of household's net financial wealth. Peramo, 2016 has also made a very rough estimate on Spanish offshore assets that arrives to a similar figure. Hence, offshore wealth is not a negligible part of the portfolio of households and must be taken it into account when analyzing the long-run evolution of wealth.

In order to construct our series of offshore wealth we rely on two main data sources: Zucman's (Zucman, 2013; Zucman, 2014) data, which come mainly 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

[14] See Zucman, 2013 for a general explanation on the problems related to recording offshore wealth in Financial Accounts. The only exception occurs with bank accounts held abroad, because the Bank for International Settlements collects data on those assets.

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.

When constructing our series of offshore wealth, we calculate separately reported assets, that is, claims held abroad by Spanish residents and declared to the Spanish tax authorities, from unreported offshore wealth. For the latter, we mainly use Zucman's (Zucman, 2013; Zucman, 2014) statistics on offshore portfolios held in Swiss banks, which have been published for more than two decades by the Swiss National Bank (SNB). Given the outsized role that Switzerland plays in the wealth management industry, we believe that this is the best available source we can use. Nonetheless, we then extrapolate these results for tax havens in the rest of the world.

Our starting point for the reported offshore wealth is the 720 tax-form for years 2012 to 2015. Then, we compare the magnitude of assets declared in Switzerland with our estimate on the total wealth held in this country (both declared and undeclared). The SNB provides on the one hand information on the total amount of fiduciary deposits held in Switzerland by non-residents by country of origin and, on the other hand, the total amount of portfolio assets held by non-residents in Switzerland. We follow the methodology of Zucman (Zucman, 2014; Zucman, 2015) to calculate the total amount of offshore wealth held by Spaniards in Switzerland. Zucman provides the ratio of offshore wealth held by Europeans in Switzerland.[15] With this fraction and the SNB statistics on fiduciary deposits, we can then obtain the share corresponding to Spanish residents.

Secondly, we compare 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. We then extrapolate this series to obtain total reported offshore wealth in other countries (e.g., Luxembourg, the Panama, etc.) using the fraction of reported wealth not held in Switzerland from the 2012 720 tax-form, which is 76%.

Total unreported financial offshore wealth can be then derived by first applying to the latter series the fraction of financial wealth declared in tax havens in order to have an estimate of total reported financial offshore wealth held by Spaniards in tax

[15] See Table S1 in Zucman (Zucman, 2014) Data Appendix and Table A26 in Zucman (Zucman, 2013) Data Appendix. Both series have been elaborated using SNB data.

havens.[16] Finally, using the fraction of unreported financial wealth held by Spaniards in Switzerland we can derive the total amount of unreported offshore wealth.[17]

By adding up the estimations of unreported financial offshore wealth with the reported one, we obtain the final aggregated series. Our results range between 1999 and 2017, since the statistics on total offshore held in Switzerland are only available for this period of time.

As a last step, we extrapolate the series backwards using the total amount of offshore wealth that flourished in the 1991 Spanish tax amnesty (10,367 million euros as reported by the newspaper ABC) and make a linear interpolation for the years in between. We assume that this corresponds to the declared assets, and then add the total amount of offshore non-declared wealth using the average ratio of unreported versus reported offshore wealth from years 1999 until 2017. Finally, we extrapolate the series backwards up to 1900 by using the proportion of European financial wealth held in offshore havens estimated by Zucman, 2014. His data is based on decennial averages, and so we linearly interpolate for the years in between. We believe that our historical series from 1902 until 1991 is quite robust given that our 1991 estimate using the declared wealth from the tax amnesty perfectly matches with the historical series from 1900 until 1990 with this different methodology. Using the 720 tax-form we also provide a decomposition of our series of offshore wealth by asset type. Offshore wealth appears disaggregated into financial and non-financial wealth, and financial assets further is aggregated into deposits, stocks, investment funds and life and other insurance.

2012 offshore declared assets amounted to 194,586 million euros, which represents around 23% of both national income and net personal financial wealth. Our estimate is larger than Zucman's (Zucman, 2013) 8% estimate for the whole world. This discrepancy can be explained as we do include non-financial assets in our estimates (i.e., dwellings in foreign countries), whereas Zucman only considers financial claims. However, in any case, the difference is large enough to claim that offshore wealth is relatively larger in Spain than the world average.[18]

[16]This fraction is calculated based on the information provided in the 720 tax-form and the classification of tax havens by Zucman, 2013.

[17]This fraction is calculated based on the reported financial wealth held in Switzerland in the 720 tax reform and the series of total offshore wealth held by Spaniards in Switzerland using SNB data and the methodology in Zucman (Zucman, 2013; Zucman, 2014).

[18]We are not the first at claiming that offshore wealth is larger in Spain that the world average. As it was mentioned in the beginning, Zucman (Zucman, 2015) estimates that Spanish financial wealth in offshore havens amounted to 80 thousands million euros 2012, which represents more than 9% of total net financial wealth.

Even though our estimates are a step forward the measure of offshore wealth because of the unique information from the 720 tax-form, the available data sources are still quite poor. Further research and data are needed to better understand the levels and trends in offshore wealth across countries and over time.

A.3.3 Liabilities

Households' liabilities are constituted by all credits and loans provided to finance investment and consumption. Their magnitude has been reconstructed from the perspective of institutional lenders (i.e. banks), and added the informal lending provided by other households.

Using the statistics of financial institutions to reconstruct households' liabilities is not without problems. The main issue is that virtually no institution stated in its balance sheet whether credits were provided to households or companies, so that it is necessary to follow a case by case approach:

- The Bank of Spain. Although the main function of the central bank was to act as the lender of last resort, the Bank also operated as a private firm that granted loans to private individuals [cuentas de crédito con garantía personal], mostly entrepreneurs (i.e., merchants, industrialists and tradesmen). Martínez, 2005 reconstructs their volume for the period of 1900 to 1935. After the Civil War, the balance sheet of the Bank of Spain includes these loans as a separate category, but from 1945 onwards it differentiates between loans granted directly to households, from those that had been given through the public sector. Given that these last ones were separately recorded in other official banks (see next section), we exclude them from this category. Results show that personal loans granted by the Bank of Spain had some significance until the First World War.
- Official banking sector. Since the 19th century, the government promoted the creation of official banks to provide loans for some specific sectors. The first and most important was the Spanish Mortgage Bank (*Banco Hipotecario de España*), but in the following years others were also developed, such as the Industrial Bank (*Banco de Crédito Industrial*), the Bank for Local Government Funding (*Banco de Crédito Local*), the Agrarian Bank (*Banco de Crédito Agrícola*), Bank for Maritime and Fishing Activities (*Crédito Marítimo y Pesquero*) and the Construction Bank (*Banco de Crédito a la Construcción*). After the Civil War, these firms were grouped into a single holding (*Crédito Oficial*), although they continued to publish separate balance sheets.

As the reader can imagine, not all of these banks provided loans to the household sector. In the absence of detailed statistics, only the credits provided by the Mortgage, Construction, Agrarian, Maritime and Fishing Banks have been computed. These banks have been selected under the assumption that until the late 1960s the activity in the primary and real estate sectors were dominated by households. Also, it can be argued that public lending would have been carried out to benefit mostly individuals (and not corporations). Besides, the scarce evidence presented by Casares, 1984 on the most important official bank—the Mortgage Bank—confirms that almost of all its debtors were individuals.

- Private banks. Martín Aceña (Martín, 1985; Martín, 1988) uses the statistics of the Spanish Banking Council to reconstruct the balance sheet of the private banking sector from 1900 to 1962. From 1962 to 1969 we extend his series using the same source. The original statistics recorded as a single item all loans provided to the private sector. However, from 1942 onwards, in the AFSAE yearbook, the Spanish Banking Council provided a summary that differentiated between loans provided against collateral (*créditos con garantía*) from personal ones (*créditos personales*). Results show that during the period covered (1942-1969), the share of personal loans was rather stable, averaging around 82%, so we extend the same weighting to the previous years.

- Savings banks. As pointed previously, for the period before the Civil War Martín, 1985 makes an estimate on the accounts and deposits held by savings banks. Also, by using the data of Martínez, 2005, it is possible to estimate the securities portfolio of these institutions. Thus, it can be assumed that the difference between both magnitudes amounted to the loans provided to the private sector. From 1941 onwards the data is of higher quality, as Titos and Piñar, 1993 provide their consolidated balance sheet using official statistics. Finally, to this set of data small number of loans provided the official Postal Savings Banks has been added. Given that for much of their history, savings banks only served middle and low-income individuals, all loans have been classified as liabilities of the household sector.

- Insurance companies. Besides owning a large portfolio of financial securities, insurance companies could also grant mortgage loans. Their magnitude has been traced since 1915 using the official reports of the Spanish Ministry of Finance (Ministerio de Hacienda, 1955). As we have already assumed that mortgages granted by the official banking sector were held by private individuals, we have also computed these loans as a liability of the household sector.

- Informal lending. Loans granted by households have already been estimated as a financial asset of the personal sector from 1900 to 1954. Since these credits constitute a liability of other individuals, they must be included in this study.

  Data on liabilities form 1970-1979 are provided in the Financial Accounts. As with other items of the balance sheet, the information refers to the aggregated loan volume of non-financial corporations and households. Thereby, the both are disentangled by applying the same ratio (38%) that existed in December 1980 according to the later revisions.

A.4 General government wealth

A.4.1 Non-financial produced assets: public capital

The produced non-financial assets include the public capital stock (e.g., infrastructure, public buildings, etc.). The excellent work of Mas, Perez, and Uriel, 2015 provides an annual estimate of the public capital stock during the period 1900-2013 that has been established through the perpetual inventory method. The authors present two series: one of public investment and another on the capital stock provided by private agents but with a strong public service bias (i.e., railways). In this study, we only include the first, given that the second series can be better calculated as part of the financial wealth of the general government.

A.4.2 Non-financial non-produced assets

Non-produced assets of the general government have never been systematically studied, but for a long-term study it is necessary to have at least a basic estimate on both public-owned agricultural land and land underlying public buildings. During the first decades of the twentieth century, around 6.5 million hectares of forest (11-13% of the agricultural area) were owned by public institutions, mostly municipalities. Moreover, since the end of the Civil War, the Francoist regime started a systematic policy of agricultural colonization which involved buying land plots that were afterwards rented to peasants. Nowadays, the agrarian census points that c. 25%% of agricultural land is owned by the general government.

Our calculations public agricultural land are done in the following way. For the first three decades of the twentieth century, we use the various available estimates on public forest area (Estudios de Historia Rural, 1991) to fix a standard surface of 6.5 million hectares. These figures are then multiplied by the average price of forest land of Bringas, 2000. After the Civil War and until the 1972 agrarian census, we use two sources to compute the agrarian surface owned by government institutions. First, the official statistics on forest land point to a sustained growth in public forest, reaching around 9 million hectares by the late 1960s. To this figure, we accumulate the surface of arable land that was purchased by the Institute of National Colonization during this period, according to Bosque, 1984. The value of land is then calculated following the same method that has been explained in the first section.

Finally, the modern agrarian census provides information on the ownership of the general government (Instituto Nacional de Estadística, 1973; Instituto Nacional de Estadística, 1984; Instituto Nacional de Estadística, 1991; Instituto Nacional de Estadística, 1999). This surface is then multiplied by the average land prices, as published by Ministerio de Agricultura, Pesca y Alimentación, 1984b.

In addition, we estimate the value of land underlying public buildings based on our own estimate of land underlying non-residential buildings and on IVIE's study of Spain's stock of produced assets (Mas, Perez, and Uriel, 2015). One advantage of IVIE's study is the decomposition of the "Other constructions" category into economic structures and non-residential buildings, which they further decompose into public and non-public ones. Hence, we use the share of public non-residential buildings in the "Other constructions" category present in IVIE over the period 1964-2013, and we apply this share to our own estimate of "Other constructions". Over this period, this share in IVIE's data is relatively constant, fluctuating in values between 5% and 8%. To extend backwards the value of land underlying non-residential public buildings for the period 1900-1963, we assume that this share was 5% over this period, in line with the values observed in the initial years of IVIE's study.

A.4.3 Financial assets

Until 1970 we approximate the value of financial assets owned by the public sector by computing state-owned equity holdings. Their study must be done following the same caveats as the ones pointed with regard to households' shareholdings. In practical terms, this means that although historians have already analysed the development of state-owned enterprises and written numerous case studies (Carreras and Tafunell, 2000; Comín and Martín, 1991), there is still not a comprehensive census on the number and value of the corporations in which the state held total or partial ownership. This lack of comparable series is by no means an accident, as it simply reflects the fact that, for most part of history, the initiatives of the different Spanish ministries (most importantly, Finance and Industry) were not coordinated, and, in consequence, the state did not have a complete balance sheet of public equity holdings. This situation did not change until the mid-1970s (Dirección General del Patrimonio del Estado, 1977), but truly it was not until the development of the modern financial accounts when it is possible to have a complete picture.

Secondly, defining state-owned enterprises is more challenging than for the private sector. In principle, all joint-stock companies in which the state has total or partial ownership must be counted, but also all quasi-corporations that may not have a separate legal personality, but that do perform market-orientated activities. As we will later show, much of the previous research has neglected these entities, even though they may be as relevant as the traditional state-owned companies.

Thirdly, valuation of state-owned enterprises can also be a tricky issue, and thus we follow a case-by-case approach. In some situations, it is reasonable to assume that public-owned firms operated as private companies, and thus turning from book to market values can be done by using metrics similar to the ones observed in other economic sectors. However, in other important cases, the persistent unprofitability of state-owned enterprises makes it reasonable to assume that the book values reported in balance sheets are the most appropriate measure.[19]

Finally, it should be noted that, unlike with households' investment position, the Financial Accounts of the Bank of Spain for the 1970s are not an accurate source to study the equity holdings of the public sector, as they systematically underestimate the assets of the public sector. For this reason, our historical estimates have been extended until 1979 in a way that can be later matched with the new and revised Financial Accounts of the 1980s.

In this appendix, we start by analysing the classic public state-owned corporations in a way that considers the different economic sectors and the assessment at book or market values. Afterwards, we analyse in a specific manner some particular cases of special enterprises.

The major milestone in the development of state-owned enterprises occurred in 1940, when Franco's government created the National Institute of Industry (*Instituto*

[19]Interestingly, the Bank of Spain currently employs the same method when analyzing companies that are unprofitable on a sustained basis (Banco de España, 2005, p. 23).

Nacional de Industria) as a special company that grouped all public holdings into industrial corporations. The detailed study of Martín and Comín, 1991 presents the basic accounts of the Institute, including a consolidated profit and loss statement and the balance sheet. Given that the Institute was hardly profitable throughout its history, it seems reasonable to compute public equity holdings as the sum of the paid-up capital and reserves. In 1941, another major change occurred, when the government nationalized the railroad companies and unified their business by creating a new public enterprise: RENFE (Comín, Martín, et al., 1998). The annual reports of this corporation also show that it was never profitable, so it is indeed preferable to record the equity (i.e., capital and reserves) as stated in its balance sheet.

Besides these two gigantic companies, the Ministry of Finance also kept an independent control over important shareholdings in service sector corporations. The most important, with their respective dates of creation or nationalization, were *CAMPSA* (1927), *Ferrocarriles del Oeste de España* (1928), Tabacalera (1945), *Telefónica* (1945), *Petroliber* (1961) and *Trasmediterránea* (1977). Virtually, all were only partly state-owned, and their shares continued to be quoted in the stock market. To compute public holdings, we start by making an approximation to the stake held by the state in each enterprise according to different sources.[20] Afterwards, we adjust to market prices using the stock prices of the Madrid Stock Exchange at the end of each year.

Public-owned corporations that operated in the mining and financial sectors need to be analysed in a specific manner. With respect to the first, in Spain, a few mining sites (i.e., Almadén, Arrayanes and Torrevieja) have been under public-ownership during the late modern era. In the twentieth century these mines were usually exploited directly by the state, although they normally lacked the legal status of a modern corporation and therefore did not publish regular accounts. Also, in some particular years, the government opted to make a lease with a private agent in exchange for royalties. To estimate their value, we start by taking the annual dividends and royalties, as reported in the state budget (*Cuentas generales del Estado*), and multiply its decennial averages by the return on equity of the private mining companies (Tafunell, 2000).[21] This figure represents the core value or capital

[20] Information on government ownership has been obtained in the following way: Campsa according to Ballestero et al., 2003; Oeste de España in Colegio de Agentes de Cambio y Bolsa (1919-1942), Tabacalera in Torres, 2000, Telefónica, Petroliber and Trasmediterránea in AFSAE and Dirección General del Patrimonio del Estado (1977).

[21] Instituto de Estudios Fiscales, 1979; Instituto de Estudios Fiscales, 1982; Instituto de Estudios Fiscales, 1989; Instituto de Estudios Fiscales, 1990.

of this publicly owned-business, to which we add the corresponding annual profit to estimate the government's equity. Overall, results show that these mining firms were an important asset of the public sector in some periods.

The Spanish state has also played an important role in the development of the financial sector. Since the nineteenth century the government granted a privileged status to some banking firms, such as the monopoly of issue acquired by the Bank of Spain or the right to issue covered bonds of the Spanish Mortgage Bank. Originally, these enterprises were fully owned by private investors and the government only imposed a special tax on profits. However, in 1962 these set of companies were nationalized. The Bank of Spain retained its special status as a separate corporation, but the others were grouped into a new entity called *Crédito Oficial*. The analysis of this latter group is not particularly difficult, as their equity (capital plus reserves) is stated in the annual reports (Instituto de Crédito a Medio y Largo Plazo, 1963).

However, the valuation of the public stake in the Bank of Spain is a more difficult task. As Piketty and Zucman (Piketty and Zucman, 2014, p. 14) point in their appendix, the ways in which central banks value their assets changes significantly between countries, as some opt to record them at book value, while others reflect variations in market prices. Also, earnings based on seigniorage income can change notably throughout time. In Spain, the modern Financial Accounts compute as part of the Bank of Spain's equity not only the paid-up capital and ordinary reserves, but also the accounting provisions for valuation adjustments. This makes that presently the equity holding in the Bank of Spain is one of the most important shareholdings of the public sector.[22]

For the period of 1962 to 1979, it seems very difficult to apply these same criteria. As an alternative, we have opted to take the annual profits from Ministerio de Hacienda, 1984—which were fully paid as dividends to the state—and capitalize them at the return of equity of the private banking sector, as stated by Tafunell, 2000. Although this method makes the series a bit volatile, the results provide similar valuation figures to the ones used in present day accounting standards.

A.4.4 Liabilities

The last step for estimating the net wealth of the general government is to deduct its liabilities. For the period of 1905 to 1969, we have already stated in the section

[22]For example, in 2014 state-owned equity holdings amounted to 148 billion euros, of which 21% (31 billion euros) corresponded to the value of the Bank of Spain.

dedicated to household fixed income securities the sources used to calculate the debt of the general government. We have also explained the necessary adjustments to convert nominal values into market prices.

However, to follow the SNA and ESA methodology, we have also made one final adjustment to deduct the debt that is not issued by the general government but has an explicit (or implicit) state guaranteed. The rules of the European Union are very clear in this sense. Although state-guaranteed debt can be included when calculating the public debt stock following the Maastricht criteria, "guaranteed debt is recorded solely as the borrowing of the borrower" but "or the government, it is contingent liability which is not recorded in the ESA balance-sheet, but may be shown as memorandum item or a footnote" (European Union, 2016, p. 392).

Fortunately, the original source (Fernández, 1976) is sufficiently detailed to make the necessary changes. As a rule, we compute all debt issued by the government and the Treasury, but we exclude the securities of the Mortgage Bank (*Banco Hipotecario de España*), railway companies (*RENFE and Ferrocarril de Tánger a Fez*), the National Institute of Industry (*Instituto Nacional de Industria*) and other minor entities (Administración del Norte de Marruecos and Asociación de la Prensa de Madrid). Also, regarding foreign loans guaranteed by the government, we have excluded those in which borrowers were companies (*Empresas y organismos con garantías del Estado*) or individuals (particulares).

From 1970 onwards, we include all general government liabilities as stated in the Financial Accounts of the Bank of Spain. These particularities of the SNA rules ought to be considered when comparing these new series with other estimates. For the period of 1905 to 1969 our results are slightly inferior than the public debt stock estimated by Comín and D. Díaz, 2005 and Comín, 2012, due to the reasons above mentioned. Thereafter, government liabilities tend to follow the same trend than public debt, as computed by other sources. However, it should be noted that differences between both magnitudes get bigger throughout time.[23]

A.5 Corporate wealth

In this paper, we approximate corporate wealth from two perspectives. First, for the period 1900-2016, we find corporate wealth indirectly by detracting the market-value

[23] As a point of reference, at the end of 2015, total government liabilities amounted to 139% of GDP, but public debt according to the EU criteria stood at c. 100%.

measure of national wealth from the book-value definition. Second, for the 1996-2016 years, we compute it directly from market-value records of the balance sheet of corporations. In this section, we explain how we dealt with the direct measurement of corporate wealth from balance-sheet data, including a brief discussion of the Tobin's Q concept.

A.5.1 Non-financial assets of non-financial corporations

Since 1982, the Central Balance Sheet Data Office of the Bank of Spain has built a comprehensive sample on the accounting information provided by Spanish non-financial corporations. Measured in terms of gross value added, the sample originally covered around 20-25% of the Spanish corporate sector, but since the mid-1990s it has gradually risen to 45%. From this dataset, the Bank of Spain publishes two different set of results. From 1982 until the present, the Bank summarizes the main balance sheet variables of its sample of corporations. Alternatively, since 1995 onwards the Bank also extrapolates the previous series to reflect the complete universe of Spanish non-financial companies. Both datasets have been reclassified by changing the traditional accounting classification to SNA/ESA standards. This process implies not only changes in nomenclature, but also revaluating some specific assets (i.e., real estate) from book to market values. Furthermore, from the late 1990s onwards, the Bank of Spain also decomposes non-financial assets between non-produced and produced assets. However, the resulting series is highly questionable as the values for non-produced assets are very low, probably because the division between buildings and the land underlying has not been properly calculated. For this reason, only the basic series on corporate non-financial assets has been used in this paper.

One last observation must be done regarding the data provided by the Bank of Spain. Since the dataset of the Central Balance Sheet Data Office is revised in various time intervals, as a rule we took the latest version—normally published up to 6 years later from year t—as the reference value. This means that the series for the most recent years can be subject to small revisions in the future. Also, it should be noted that the values for financial assets and liabilities are slightly different to the ones published in the Financial Accounts of the Bank of Spain. To keep all series consistent, the Financial Accounts figures have been taken as the definitive ones.

A.5.2 Non-financial assets of financial institutions

Spain does not have a complete set of statistical set on the non-financial assets of financial institutions. The Central Balance Sheet Data Office does not include this sector in their surveys and the Financial Accounts of the Bank of Spain does not cover these assets in their definitions. Alternatively, their magnitude can be calculated by drawing on the statistics of monetary institutions (i.e., the Bank of Spain, deposit-taking corporations and money markets funds), insurance companies and pension funds. Implicitly, it has been assumed that other non-monetary financial institutions (such as financial intermediaries, asset managers, etc.) do not own non-financial assets.

Information on these three institutional groups is provided by the Bank of Spain. The aggregated balance sheet of monetary institutions includes as a separate item the value of non-financial assets (e.g., buildings, office equipment, etc.) since 1962. The statistics for insurance companies and pensions funds is slightly different, as it presents in one single item all other assets different from financial investments, loans and cash. By taking this classification, non-financial asset might be slightly overstated, although its overall magnitude relative to other institutional sectors is relatively small. Another problem of the insurance and pensions funds statistics is that they only cover up to 2009, so alternatively it has been assumed that non-financial assets from then onwards follow the trends reported by private insurance companies.

A.5.3 Financial assets and liabilities

Financial assets and liabilities of both non-financial and financial institutions are reported in the Financial Accounts of the Bank of Spain. No further adjustment has been made in this paper.

A.5.4 Tobin Q

As a final step, the Tobin's Q of the Spanish corporate sector (including both non-financial and financial institutions) has been calculated in the following way: $Q = \frac{\text{Market value of equity}}{\text{Corporate net worth}}$. The market value of equity is directly stated in the Financial Accounts of the Bank of Spain and is available from 1981 onwards. The corporate net worth is a broader concept that sums corporate assets minus non-equity liabilities, both measured at market prices following ESA guidelines. Hence, for the period 1995-2014, we can compute corporations' Tobin's Q based on the aggregate balance sheet of the corporate sector. Alternatively, we also compute the Tobin's Q using the indirect measure of corporate wealth obtained from detracting the market-value definition of national wealth from the book-value approach. In this case, we define corporate net worth as the sum of corporations' wealth plus their market-value of equity, and we compute Tobin's Q for a longer period: 1981-2014. For the period in which both measures overlap results show a similar value.

A.6 Foreign wealth

Net Foreign Assets are the assets held by Spanish residents in foreign countries minus the value of assets held by non-residents in Spain. Our estimate covers the full 1850-2014 period and is expressed at market value. To calculate the Net Foreign Assets of Spain we rely on a variety of sources and methods.

For the period 1850-1913 we take the data on Spain's international indebtedness from Prados de la Escosura, 2010.[24] His approach is easy to understand. He assumes that Spain's international indebtedness in 1850 amounted to the foreign liabilities of the public sector, and then accumulates the current account plus the variation in foreign exchange reserves. This method is based on the accounting identity according to which the aggregate of the current account, the financial account plus the variation in reserves equals to zero. The main drawback of this method, however, is that it does not capture changes in the relative price of assets in different countries that could be happening over time. However, as we do not count with specific information on the assets held abroad by country and by type of asset, this seems the best possible method to apply.

Later, for the years 1932 to 1934 the Bank of Spain estimated the level of international indebtedness of Spain and we use estimates without further correction (Banco de España, 1932). However, we discard a previous estimate made by the Bank of Spain for the year 1931, as this calculation has a lower quality than those of the period 1932-1934. To match the 1932-1934 estimates from the Bank of Spain with the series of Prados de la Escosura ending in 1913, we extend Prados de la Escosura's data following the same methodology: we start by accumulating the current account since

[24]International indebtedness is an equivalent to Net Foreign Assets, just expressed with an opposite sign.

1914 correcting for the variation in reserves up to 1931.[25] This procedure leads to an estimate of the net foreign asset position of Spain in 1931 that is -18% the value of the national income of Spain in the same year, versus an estimate of the Bank of Spain for the year 1932 of -4% the national income of Spain in 1932.

This difference could be the result of different factors. First, it could be because of lack of information in the Bank of Spain's estimate for the years 1932-1934 or it could be due to a wrong approximation to Spain's foreign assets in 1850. Most likely, this could be largely the consequence of not being able to account for the variation in the relative price of assets held abroad by Spanish residents and those assets owned by foreigners in Spain. Given that the quality of current account information is slightly better for the period 1850-1913 than for the period 1914-1931, we decided to correct our extension of Prados de la Escosura's series of international indebtedness with a constant capital gain to match the 1913 estimate with that of 1932. The annual capital gain needed to match the 1913 estimate with that of 1932 is an annual revaluation of the net foreign asset position of 0.75% as a proportion of annual national income.

The next period in which net foreign assets have been estimated go from 1935 to 1970. Thereafter, the Financial Accounts of the Bank of Spain enable to calculate directly the net foreign assets of the country. Thus, to match the 1934 estimate with that of 1970, we follow the same procedure of accumulating the current account and correcting by the variation of foreign exchange reserves. Data on the current account balance is provided by Prados de la Escosura, 2016b. Information on the foreign exchange reserves from 1935 to 1948 is presented by Martínez Ruiz, 2003 and for the later period from the annual reports of the Bank of Spain and the Anuario Estadístico de España (Dirección General del Instituto Geográfico y Estadístico, 1858-). The resulting series is corrected in the period 1958-1970, assuming some given capital gains of 1.9% per annum.

Finally, for the period of 1970 to 2014, Spain's net foreign assets are derived by netting the gross foreign assets and gross foreign liabilities from the Financial Accounts.

[25] Data on the current account balance has been kindly provided by Prados de la Escosura, 2016a. Information on gold reserves is stated in Martín, 1985.

A.7 Income and saving

In this paper, we reconstruct both the stock of wealth and the income flows of the Spanish economy. On the flows side, we are mostly interested in three measures: net national income, net national savings and the current account.

Net national income (or simply national income) seems the best measure to measure the resources produced at disposition of a country's population for either consumption or saving. From this metric, we derive net national savings (or just national savings) to evaluate whether the evolution of wealth is driven by a volume effect (through savings) or by a capital-gains effect (through prices). Finally, we reconstruct the current account to estimate the evolution of the Foreign Assets Position in certain periods. To obtain these estimates we use the Spanish historical national accounts of Leandro Prados de la Escosura, who reconstructs the GDP and national income of Spain for the period 1850 to 2015 (Prados de la Escosura, 2017), and the international position from 1850 to 1913 (Prados de la Escosura, 2010).

A.7.1 National income

National income is equivalent to GDP, plus the net primary income with the rest of the world, and minus the consumption of fixed capital. We are interested in this measure as it reflects the income of a country after discounting the income dedicated to repair the depreciation of the existing capital stock, and after accounting for the rents sent abroad and received from abroad. For the period of 1850-2014 we use the data on GDP at market value from Prados de la Escosura (Prados de la Escosura, 2017) most recent update of the Spanish historical accounts, in which he extends his previous work on the Spanish GDP for the period 1850-2000 (Prados de La Escosura, 2003). In addition, these new estimates revise the splicing procedure of the different GDP series produced by the Spanish statistical office since 1958. Consequently, the new series for the 1958-2000 period show some differences relative to the figures for the same period published in his 2003 book.[26]

In addition to GDP, we need data on the net primary income from the rest of the world, which can be decomposed between net foreign labor and capital income, plus net foreign production taxes (net of subsidies). We use the series on net primary income with the rest of the world from Prados de la Escosura, 2017 for the period

[26]For a detailed methodological discussion of this splicing revision, see Prados de la Escosura, 2016a.

1850-2014 and we only correct these data for the Civil War period (1936-1939) when Prados de la Escosura's estimates (which are still work in progress) seem implausibly low. We correct these data using the estimates Martínez Ruiz, 2006, who analyzes the foreign sector of Spain during the Civil War. In particular, Martínez-Ruiz's work collects two important flows of income from Spain to foreign countries over this period: the maintenance cost of foreign troops fighting in Spain (around 277.3 million of current dollars) and the payments made by the Spanish authorities to pay down acquired loans (around 78.5 million dollars).[27] The amount of debt payments is taken form table 4.10 (payments to Italy), table 4.11 (payments to Germany) and from the text in the case of payments to Portugal (which amounted to 5.84 million of dollars). Given that her estimates cover a period of four years, we provide a simple annual average and apply the exchange rate with the US dollar prevailing in each of these four different years. Following this procedure, our annual estimate of net foreign primary income is about -2.9% of Spain's national income, which is of a much larger magnitude than Prados de la Escosura's provisional estimate of about -0.2%.

For the Consumption of Fixed Capital (CFC), we decide not to use the values of Prados de la Escosura, 2017, for two reasons. First, to keep consistency between our estimates of produced assets and the decomposition of national wealth accumulation between savings and capital gains. Importantly, this decomposition relies on using net investment rates by asset type, hence discounting CFC from gross investment. Second, Prados de la Escosura adopts the official data on CFC from INE (Spanish National Statistics Institute) since 1999 onwards, coinciding with the latest official national accounts series. Although this approach seems reasonable to assure convergence between the historical accounts and the most recent official data, it also implies discarding the pattern of depreciation adopted for the period 1850-1998. For these reasons, we prefer to use our series of CFC throughout all sections of this study. As we show in the robustness checks section, our benchmark values of CFC are consistent both with the existing national accounts and with the historical series of Prados de la Escosura, 2017. Therefore, this choice does not affect significantly our results in this study.

Nevertheless, a note of caution is needed before extending our findings to other countries. Although we follow the latest recommendations on the use of the perpetual inventory method (OECD, 2009), these are not yet harmonized at the international level by the SNA, implying that important methodological differences persist in the valuation of fixed assets across countries. In addition, and more importantly, this

[27] The maintenance cost of foreign troops is taken from table 4.3 in Martínez Ruiz, 2006.

study benefits from the outstanding reconstruction of Spain's historical national accounts by Prados de la Escosura, 2017 for 1850-2014. In particular, Prados de la Escosura proposes an interpolation method for splicing historical national accounts to overcome the problems of the conventional retropolation approach, which overstates the level of investment and of other components of GDP in the past, and underestimates their growth over time. Thus, the perpetual inventory method with retropolated investment series employed in studies of most countries artificially inflates the initial stock of fixed assets, showing a flatter later development.

A.7.2 National savings and the current account balance

Net national saving is equal to net domestic saving (i.e., gross capital formation minus the consumption of fixed capital) plus net foreign investment. Foreign investment is equivalent to the current external balance (i.e., the net balance with the rest of the world of exports, primary income, current transfers and capital transfers). The current external balance diverges from the most extended definition of the current account balance in that the former includes net capital transfers from the rest of the world. As briefly introduced at the beginning of this section, the main goal for calculating net national saving is to decompose wealth growth between a savings effect and changes in asset prices. From this perspective, it is more accurate to include in the definition of net savings the current external balance instead of the current account balance because net capital transfers directly affect the property of assets across countries, something we would like to capture.[28]

To compute gross capital formation (i.e., domestic investment) and net exports (i.e., exports minus imports) we need to decompose GDP into its demand side components (private consumption, investment, government spending and net exports). All metrics are derived for the 1850-2014 period from Prados de la Escosura, 2017.

Net current transfers with the rest of the world are also taken directly from the same source for the 1850-2014 period. Net capital transfers with the rest of the world, on the contrary, are only available for the period 1972-2014 from OECD National Accounts Statistics. Although it would be good to count with data covering a longer period, we do not think this should have a relevant effect on the current external balance as capital transfers only became significant after Spain entered the European Union in 1986. Given that the GDP levels in Prados de la Escosura, 2017 and OECD

[28] Capital transfers (ESA 2010, 4.145, 4.146) are defined as transfers of ownership of an asset (other than inventories and cash), or the cancellation of a liability by a creditor, without any counterpart being received in return (European Union, 2013, p. 119).

show some discrepancies for the reasons discussed above, we rescale the net capital transfers in OECD to match the GDP values of Prados de la Escosura. For example, in 1989 the GDP level per OECD statistics stood at 102.7% the level of Prados de la Escosura, 2017. Consequently, we simply make that net capital transfers (as per OECD data) are matched at the same percentage (e.g., 0.3% in 1989), but using Prados de la Escosura's GDP series.

A.7.3 Decomposition of wealth accumulation

In addition to building sectoral balance sheets, we also present a decomposition of the accumulation of wealth between a volume effect (through saving) and a relative price effect (through capital gain/losses). To do this, we follow both the multiplicative and the additive decomposition of wealth accumulation as proposed by Piketty and Zucman (Piketty and Zucman, 2014) in the appendix to their paper. These methods relate the accumulation of national saving to the evolution of national wealth, and finds the capital gain component as a residual.

The multiplicative approach argues that the wealth stock in year $t+1$ depends on three factors: the volume of wealth in t, new accumulated wealth from t to $t+1$ (net of depreciation) and the evolution of the relative price of wealth with respect to income. This can be thought as a two goods model were the price of wealth varies with regard to the price of consumption goods. Leaving aside the capital gains component, the accumulation of wealth can be expressed through the following equation:

$$W_{t+1} = W_t + s_t \cdot Y_t, \tag{A.1}$$

where W_{t+1} represents the value of wealth in year $t+1$, W_t represents de value of wealth in year t, and $s_t\ Y_t$ represents the net-of-depreciation saving flow between years t and $t+1$, that results from the net-of-depreciation saving rate in year t from Y_t, the net national income in year t. Then, to track the evolution of the wealth-to-income ratio (β) we divide the previous equation by Y_{t+1} and we obtain:

$$\beta_{t+1} = \beta_t \cdot \frac{(1+g_{wt})}{(1+g_t)}, \tag{A.2}$$

where $1+g_{wt} = 1+\frac{s_t}{\beta_t}$ and $1+g_t = \frac{Y_{t+1}}{Y_t}$. Hence, in this model movements in the wealth-to-income ratio are positively determined by the volume of saving and negatively determined by the growth rate of income.

Using the result in equation (2), we introduce the relative price effect component

$(1+q_t)$ as follows:

$$\beta_{t+1} = \beta_t \cdot \frac{(1+q_t)\cdot(1+g_{wt})}{1+g_t}, \tag{A.3}$$

Next, we cumulate this equation over n years to get the following multiplicative decomposition of wealth accumulation:

$$\beta_{t+n} = \beta_t \cdot \frac{(1+q)^n \cdot (1+g_{ws})^n}{(1+g)^n}, \tag{A.4}$$

where $(1+g_{ws})^n = (1+g_{wt})\cdot ...\cdot(1+g_{wt+n-1})$ equals the cumulated saving-induced wealth growth rate; $(1+q)^n = (1+q_t)\cdot ...\cdot(1+q_{t+n-1})$ is the cumulated capital-gains-induced wealth growth rate, and $(1+g)^n = (1+g_t)\cdot ...\cdot(1+g_{t+n-1})$ is the cumulated growth rate of national income.

From equation (4), we can decompose the evolution of the wealth-to-income ratios into the previous three components or, alternatively, we could just decompose the accumulation of wealth into a volume effect and a capital gains effect. Given that we count with all the data in equation (4) except the cumulated capital-gains-induced component, we solve for this component as a residual of this equation.

In addition, we carry this decomposition of wealth accumulation for two subcomponents of national wealth: Housing and non-housing wealth. To do this, we start from the definition of national wealth as the sum of domestic non-financial assets plus net foreign wealth: $W_N = A^{NF} + NFW$, which we further decompose into housing and non-housing wealth: $W_N = W^H + W^{NH}$. Housing wealth is the market value of dwellings, while non-housing wealth is the sum of non-housing non-financial assets and net foreign wealth. Similarly, we decompose national saving into domestic investment (net of depreciation) and foreign saving: $S_N = I + S_F$, which then we decompose into housing investment and non-housing national saving: $S_N = I^H + S^{NH}$. As a result, each component of national saving is mapped to its corresponding component in national wealth. We run equation (3) separately for each of these two components of national wealth:

$$\beta_{i,t+1} = \beta_{i,t}\frac{(1+q_{i,t})(1+g_{wi,t})}{1+g_{i,t}}, \tag{A.5}$$

where i stands for housing or non-housing national wealth. Ideally, we would have liked to further decompose non-housing wealth into non-housing non-financial assets and net foreign wealth. However, the multiplicative decomposition of wealth accumulation is based on geometric averages of growth rates, which are only meaningful when wealth stocks take positive values. This is not the case for net foreign wealth in Spain. On the other hand, the additive decomposition between two given years (t and $t+1$) can be specified as follows:

$$W_{t+1} = W_t + S_{t,t+1} + KG_{t,t+1}, \tag{A.6}$$

where W_t and W_{t+1} are national wealth at times t and $t+1$, respectively; $S_{t,t+1}$ is the total savings flow between years t and $t+1$; and $KG_{t,t+1}$ is the total capital gains or losses between years t and $t+1$. To track the evolution of the wealth-to-income ratio (β), we then divide the previous equation by Y_{t+1} and obtain:

$$\beta_{t+1} = \beta_{ini} + \beta_{sav} + \beta_{kg} \tag{A.7}$$

where $\beta_{ini} = \frac{W_t}{Y_{t+1}}$ is the component coming from initial wealth, and $\beta_{sav} = \frac{S_{t,t+1}}{Y_{t+1}}$ and $\beta_{kg} = \frac{KG_{t,t+1}}{Y_{t+1}}$ are the components coming from savings flows and capital gains or losses, respectively.

Furthermore, in line with the multiplicative form, we go one step beyond and carry this decomposition for housing, other types of capital and foreign wealth.[29] We run equation (7) separately for each of these three components of national wealth:

$$\beta_{i,t+1} = \beta_{i,ini} + \beta_{i,sav} + \beta_{i,kg} \tag{A.8}$$

where i stands for housing, other types of capital, or foreign wealth.

The additive decomposition has the advantage of allowing us to disentangle the fraction of savings and capital gains that each component represents in the total, which is very relevant for explaining the accumulation of national wealth in Spain over time.

The decomposition of wealth accumulation (in both the multiplicative and the additive forms) can be calculated directly with the available series on national wealth, income and savings, except for the Civil War period (1936-1939) and the two subsequent years (1940 and 1941), when we lack complete information to compute the wealth stock. To provide an estimate of national wealth in these years, we follow the approach of Piketty and Zucman, 2014 when they estimate the value of wealth in periods with missing data by running equation (2). In addition, they add a fixed

[29] Note that in this case we do not have the limitations mentioned for the multiplicative decomposition and we are able to split non-housing wealth between other types of capital and foreign.

capital gain $(1 + q)$ over the whole period, as in equation (3), which serves to match the initial estimate of the wealth-to-income ratio with the ratio at the end of the given period. From 1935 to 1942 we follow this same approach with two corrections. First, we correct for the destruction of wealth during the Civil war period (1936-1939) based on Prados de la Escosura, 2010, using the same proportions of assets destroyed that we use for the PIM estimates of produced assets. Second, we adjust equation (5) with a fixed annual capital gain, which serves to match the 1935 estimate of wealth-to-income ratios for each subcomponent of national wealth with that of 1942. Specifically, we run accumulation equations separately for housing and non-housing wealth (we do count with foreign wealth data for the period 1935-1942). We then assume a fixed capital gain for each of this two subcomponents. Finally, we obtain the evolution of national wealth for the period 1935-1942 by aggregating the three subcomponents (housing, non-housing and foreign wealth).

A second aspect where our data show some limitations has to do with the estimate of housing and non-housing investment. By definition, gross national saving equals gross investment plus net foreign saving (i.e., current external balance), where gross investment is the sum of gross fixed capital formation and changes in inventories. While we count with data for gross fixed capital formation for housing and non-housing assets, changes in inventories is not decomposed into different assets. Hence, we assume that the proportion of housing and non-housing assets in changes in inventories is proportional to the one observed in gross fixed capital formation. Although we would like to count with more precise estimates of inventories, we do not believe that this assumption has a practical effect on our accumulation equations, as changes in inventories are a small proportion of total gross investment.

A.7.4 Interactions between international capital flows and housing prices

This section explains in detail the sources used to analyse the relationship between foreign capital flows, the growth in household credit and the evolution of the real estate market in Section V. We rely on four main data sources.

First, we use the Financial Accounts of the Bank of Spain to derive the growth in net foreign holdings of debt securities issued by Spanish monetary institutions measured as a share of GDP (ND/GDP), which is our main measure of international capital flows. More precisely, we gather information on the market value of bonds issued by Spanish financial institutions owned by foreigners, and the value of bond issued by foreign institutions and owned by Spanish financial institutions. Finally, we measure the net position by deducting one from the other. We choose net foreign holdings of debt securities issued by monetary institutions as our main measure of international capital flows, since as we have shown in Section V, they were the most important asset through which Spanish banks obtained new funding from abroad. Nonetheless, we also carry the correlations using two other more common measures of capital flows from the Bank of Spain statistics: the current account ($CAdef/GDP$) and the net foreign asset position ($NFAP/GDP$) as a share of GDP.

Table A.1 in the appendix presents the results of the regressions of the growth of housing prices on the growth in our three measures of capital flows and housing prices. As expected, net foreign debt securities explain more of the variation in housing prices, namely, 20%, than the net foreign asset position, which explains 8.5%, and the current account, which explains 6.2% and is not even significant. These findings confirm observations from Obstfeld (2012) and Lane and McQuade (2014) that the current account is not the best indicator of capital flows because it does not take into account changes in values, and hence, it is more relevant to consider other metrics (i.e., net debt inflows excluding equity investment, net foreign assets, etc.) to explain domestic credit growth.

	(1)	(2)	(3)
ΔCAdef/GDP	0.129		
	(1.518)		
ΔNFAP/GDP		0.069**	
		(2.401)	
ΔND/GDP			0.182***
			(2.931)
Constant	-0.004	-0.003	-0.001
	(-0.813)	(-0.637)	(-0.329)
R-squared	0.062	0.085	0.200

Table A.1: Regression of real housing price growth on international capital flows growth, 2002-2017

Notes: This table presents the results from the correlations of the growth in three measures of capital flows (current account (ΔCAdef/GDP), net foreign asset position (ΔNFAP/GDP) and net foreign holdings of debt securities issued by monetary institutions as a share of GDP (ΔND/GDP)) and the growth in real housing prices. All series are published in the Bank of Spain statistics. Observations are available on a quarterly basis and range from the last quarter of 2002 to the last quarter of 2017. Hence, all regressions have 61 observations in total. Newey-West standard errors using four lags are reported in parentheses.

Second, we use the loan margin reported by Spanish banks in the Bank Lending Survey (BLS) compiled by the Bank of Spain, as a measure of credit standards (CS). This margin is specific to loans granted to households for the purchase of dwellings and should be understood as the spread over a relevant market reference rate (e.g., EURIBOR, LIBOR or the interest rate swap of a corresponding maturity for fixed rate loans), depending on the characteristics of the loan. The survey tracks the net percentage of banks that report having increased their margins in the previous quarter. A positive value for this variable therefore indicates a softening of credit conditions, while a negative value indicates an easing. We standardize the credit standards variable by dividing by the standard deviation and subtracting its mean based on data for the full sample.

Third, we use the nominal ten-year rate of the Spanish public debt, from the Bank of Spain statistics, minus the expected inflation rate reported by a panel of experts on the perspectives for the Spanish economic gathered by the think-tank organisation FUNCAS ($rr10yr$), as a measure of real interest rates. The dataset on inflations expectations is published in its journal *Cuadernos de Información Económica*.

Fourth, nominal housing prices are based on property appraisals, and the series is the same as the one used to construct our housing wealth series. We convert the series into constant prices using the inflation rate from the Spanish National Institute of Statistics. Observations are available on a quarterly basis and range from the last quarter of 2002 to the last quarter of 2017.

A.8 Additional robustness checks

In this paper we compare the long-run evolution of national wealth at market-value and at book-value and, in addition, we decompose the accumulation of national wealth between capital gains and savings using the market-value definition of national wealth. In this section, we check the robustness of our results to different specifications. First, we analyze how robust our housing wealth estimates are, comparing them with all other available evidence and sources. Second, we analyze how sensitive the decomposition of the housing stock into a land and a structures component is to assumptions on depreciation rates. Thirdly, we estimate an alternative measure of book-value national wealth using three different patterns of depreciation for produced assets. Fourthly, we test the validity of each estimate of produced assets by comparing the implied values for the Consumption of Fixed Capital. In addition, we compare the decomposition of national wealth accumulation using the market-value approach, as presented in the paper, with the same decomposition using the book-value definition. Finally, we compare our capital gains estimates on national wealth and the increases in real terms of the three most important assets (i.e., housing, equities and agricultural land). Overall, our results are very robust to these different specifications.

A.8.1 Sensitivity of housing wealth series

In this section we present robustness checks on our housing wealth series. Throughout the paper we follow very closely the General Valuation Principles of ESA 2010, which state that asset and liability values recorded should reflect prices observable on the market on the date to which the balance sheet relates. In other words, a price times quantity approach (census method) should be followed, whenever possible. The quantity of houses is easily available and precisely recorded in Spanish housing censuses. Thus, we explore in depth the quality of our house price series. We want to emphasize that in a long-run estimate, it is more important to estimate correctly the value of the housing stock for the most recent period, not only because more refined data is available, but also because it anchors wealth levels. For this reason, we analyse first the most recent decades, then we move to the historical part.

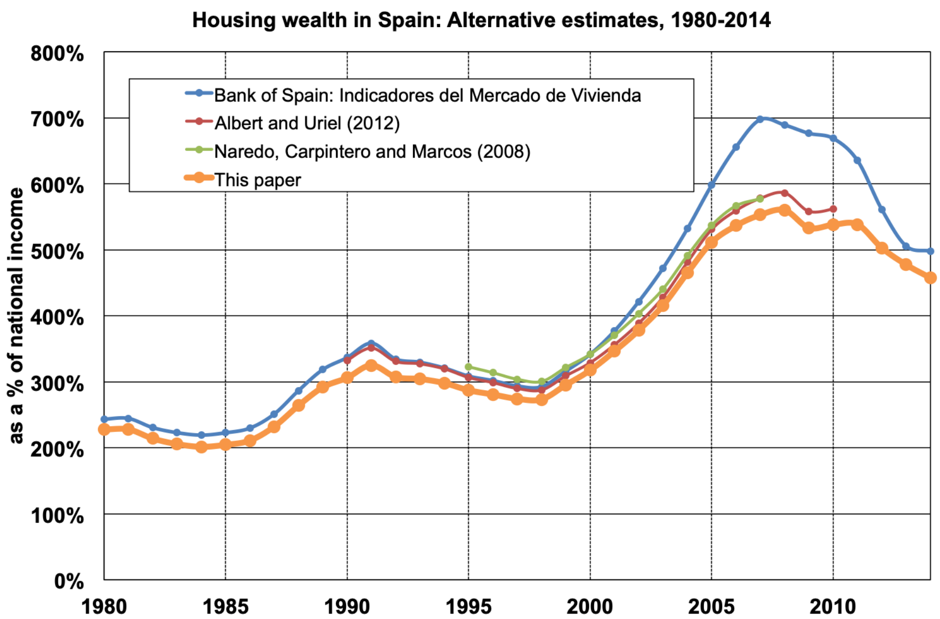


Figure A.1: Housing wealth in Spain: Alternative estimates, 1980-2014

Notes: This figure compares our housing wealth series with the series of Naredo, Carpintero, and Marcos, 2008, Albert and Uriel, 2012 and Bank of Spain.

For the latest period (i.e., since 1980-1990) other researchers and institutions have estimated the market-value of the housing stock in Spain. We compare our series to these alternative estimates in Figure A.1. Overall, our series show similar trends to the ones calculated by Naredo, Carpintero, and Marcos, 2008, Albert and Uriel, 2012 and the Bank of Spain, although our levels are generally lower as we make a more precise use of the available prices on real estate transactions. Clearly, our estimate is the most conservative on the Spanish housing stock.

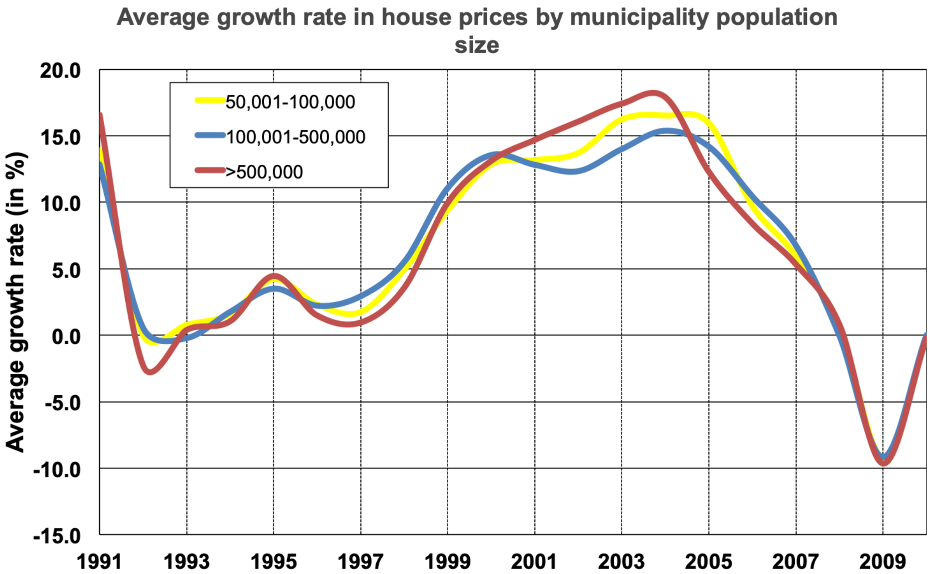


Figure A.2: Average growth rate in house prices by municipality population size

Notes: The data from this figure comes from the Instituto Valenciano de Investigaciones Econonómicas (IVIE).

Focusing on the years around the Spanish housing bubble, one natural question is whether the aggregate dynamics that we find are the consequence of certain regions or cities behaving markedly different from the rest of the country. In Figures A.2 and A.3 we use data from the IVIE institute on the evolution of housing prices by municipality size and by type of geographical region: coastal vs non-coastal regions. The existing evidence shows that the rise in housing prices during the boom happened across the board and was slightly stronger in big cities than in smaller cities and in coastal cities than in the non-coastal cities.

To further prove that our series and results are credible, we have carried some robustness checks using two completely different sources. First, we use the housing price indices in Jordà et al., 2019. Most of the housing price indices they use come from Knoll, Schularick, and Steger, 2017. Even though these indices vary on the method and source by country, they rely on the most reliable source and hence they

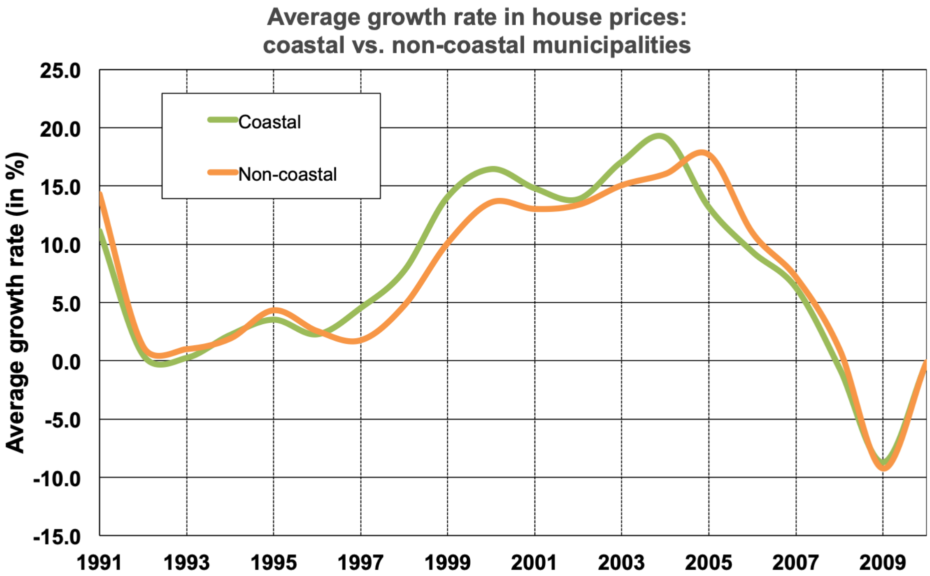


Figure A.3: Average growth rate in house prices: coastal vs. non-coastal municipalities

Notes: The data from this figure comes from the Instituto Valenciano de Investigaciones Econonómicas (IVIE).

constitute a valuable complementary source to test our series. In fact, for the recent period the housing price index for Spain is also based on the series of housing prices from the Ministry of Public Works. Figure A.4 presents the international comparison of housing price indices in Jordà et al., 2019. In line with our main findings and the results in Figure 7 of the paper, the housing price growth in Spain during the 1990s and 2000s has outperformed the trends in all other analyzed countries.

The previous robustness check shows that our series of average housing prices was not overestimating the increase in housing prices over the last three decades. To prove that our series is representative in nominal terms and that the results in Figure 6 of the paper are robust, we will rely on another valuable source: household wealth surveys. Wealth surveys are based on self-reported information and tend to underestimate wealth, but thanks to advanced oversampling and imputation techniques they constitute a very rich source with which we can test our series. We use the two waves of the Household Finance and Consumption Survey (HFCS) elaborated and harmonized across countries by the European Central Bank, the Survey of Consumer Finances (SCF) for the US and the Wealth and Asset Survey (WAS) for the UK. Figure A.5 presents the housing wealth to national income ratios for most of the countries we use in our paper, using as a numerator the survey housing wealth total. In line with Figure 6 in the paper, the values for Spain are larger than

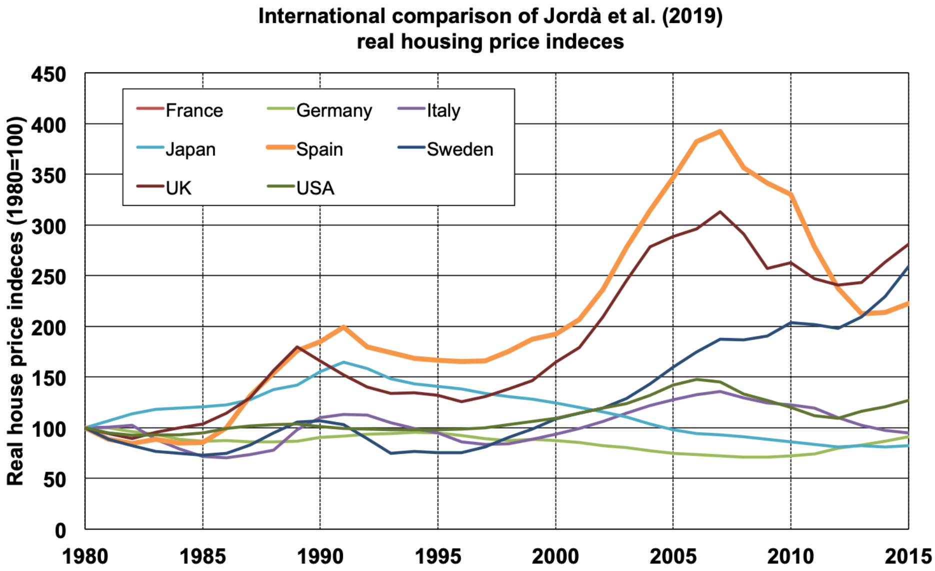


Figure A.4: International comparison of Jordà et al. (2019) real housing price indeces

for the rest and the differences across countries are consistent with our findings. For instance, Italy has a larger housing wealth to national income ratio during this period than the US but lower than Spain, and France has a lower housing wealth to national income ratio than Italy but larger than the US. These tests provide strong evidence supporting the validity and credibility of our results.

For the historical period (1900-1954) there is only one dataset available: the statistics of Property Registrars on market transactions. Prices are expressed on a unit basis (i.e., one house) at a provincial level. We are perfectly aware that with this source we are only considering one basic dimension of housing markets (i.e., regional variations), but not others. Carmona, Lampe, and Rosés, 2014 have built a hedonic price series for 1900-1934 based on this same data that attempts to capture differences in quality and the purchasing power between Spanish regions. They constructed their index based on six large regions (i.e., Mediterranean, Northern Spain, etc.), while we opted to use more disaggregated provincial data. In Figure A.6 of the appendix we have plotted our series versus their alternative series. Results speak by themselves: the trends are very similar from 1904 to 1934.

A.8.2 Housing assets decomposed into land and structures: the residual approach

In this paper we calculate the value of housing land as a residual, by deducting the PIM estimates of residential structures from the market value of the housing stock

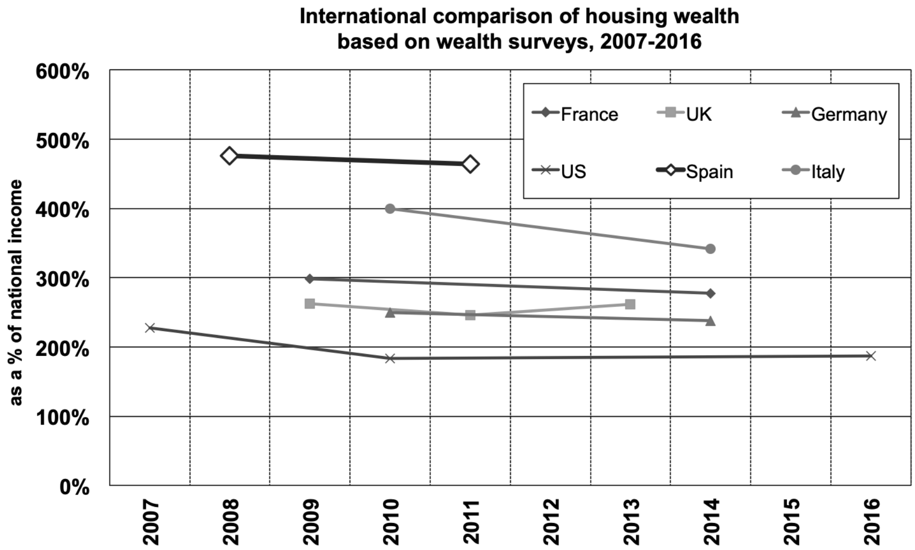


Figure A.5: International comparison of housing wealth based on wealth surveys, 2007-2016

Notes: This table reports the housing wealth to national income ratios for France, Germany, Italy, Spain, UK and US. The housing values for France, Germany, Italy and Spain are calculated using the two waves of the Household Finance and Consumption Survey (HFCS) compiled by the European Central Bank, while for the UK and the US they are based on the Wealth and Assets Survey (WAS) and the Survey of Consumer Finances (SCF), respectively. The national income is based on National Accounts.

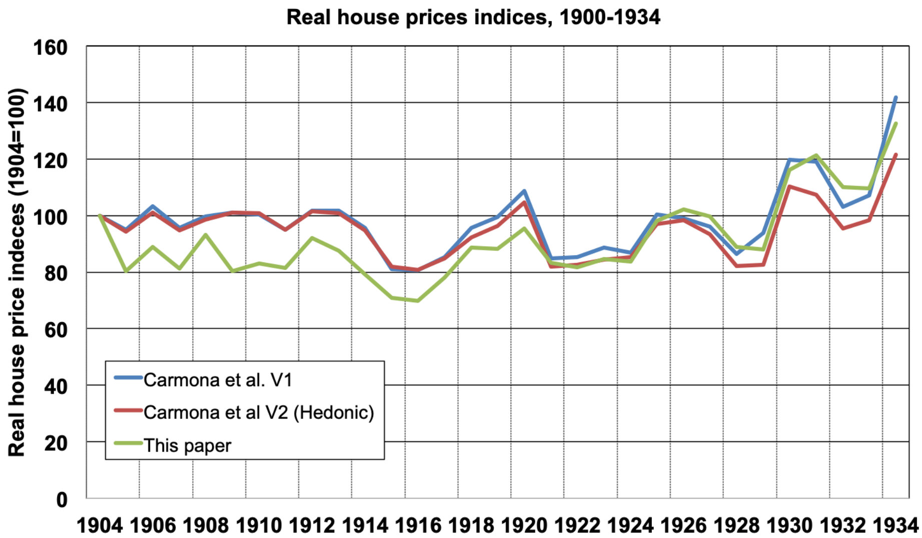


Figure A.6: Real house prices indices, 1900-1934

Notes: This figure compares the evolution of house prices in real terms. We present the data used in our paper with the two alternative indices presented by Carmona, Lampe, and Rosés, 2014.

(European Union, 2015). Estimates of produced assets with the PIM are sensitive to assumptions on depreciation patterns and, therefore, so it is the land residual.[30] We follow the latest recommendations to measure the structure component of housing with the PIM (OECD, 2009) and use geometric depreciation rates. Despite this recommendation, many countries continue to use alternative depreciation patterns, as reported in a survey on national practices made by Eurostat and the OECD (European Union, 2015, p. 10-13): there are 9 countries using geometric patterns versus 23 using alternative procedures (i.e., linear, hyperbolic, log-normal).

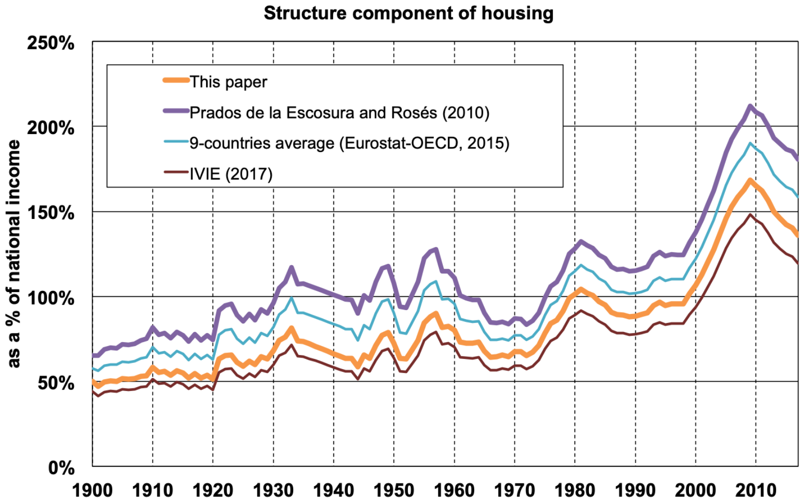
In Spain, there are two well-known studies analysing the evolution of reproducible capital with the PIM, those by Prados de la Escosura and Rosés, 2010 and by Mas Ivars et al. (2017). In both cases, geometric depreciation rates are used, although with different values.[31] In our paper, the annual depreciation rate is 2.9%; in Prados de la Escosura and Rosés, 2010, 1.3%; in Mas Ivars et al. (2017), 3.3%; the average of the 9 countries reported in Eurostat and OECD (2015b), 2.1%. Despite this important divergence between depreciation rates, the truth is that they have only a minor incidence on our main results. This is clearly shown in Figure A.7 (upper and bottom panels) of the appendix, which presents the structure component and the land components of housing, respectively, using these four different depreciation rates. As we explain in the next sub-section, our choice of the exact depreciation rate is made so to be as closer as possible to official values of Consumption of Fixed Capital in the Spanish national accounts.

A.8.3 Alternative measurement of book-value national wealth

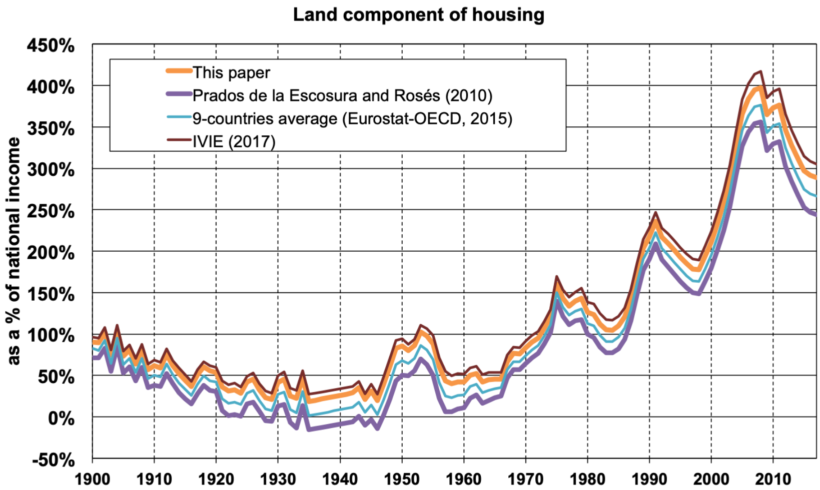
The book-value approach to national wealth sums the stock of non-financial assets (produced and non-produced) and the net foreign wealth. Ideally, the measurement of all types of assets should be based on a census-like approach where prices and quantities are observed at a given point in time, for which a value of assets is reconstructed. While we measure the two most important non-financial assets in Spain—agricultural land and housing—through the census approach, our book-value

[30] In the next sub-section (Alternative measurement of book-value national wealth) we explore two other assumptions that might influence estimates based on the perpetual inventory method: the initial value of the stock of produced assets and the quality of underlying data on investment. As we explain, we do not have reasons to believe these two assumptions are problematic to our estimates of produced assets, including those of housing structures.

[31] Both Prados de la Escosura and Rosés, 2010 and our paper use the same service lives, but we use a double-declining balance method (OECD, 2009, p. 52), while they use a modified geometric depreciation pattern (Prados de la Escosura and Rosés, 2010, p. 145).



(a) Structure component of housing



(b) Land component of housing

Figure A.7: Housing decomposition, 1900-2016

Notes: The upper and bottom panels of this figure depict PIM estimates of housing structures and land (as a % of national income) over the period 1900-2016, respectively, using annual geometric depreciation rates from four different sources: this paper, 2.9%; Prados de la Escosura and Rosés, 2010, 1.3%; Mas Ivars et al. (2017), 3.3%; 9-countries average as reported in Eurostat and OECD (2015b), 2.1%. Data on Spain's housing investment used to compute the PIM is taken from Spain's Historical National Accounts (Prados de la Escosura, 2017).

definition of wealth calculates produced assets with the PIM.[32] This method is sensitive to three aspects: the initial stock of produced assets from which investment flows are added, the depreciation pattern of assets and the quality of the underlying data on flows of investment.

The last of these three elements is difficult to test. However, we rely on Prados de la Escosura, 2017 reconstruction of Spain's historical national accounts, which is regarded as one of the most serious and consistent historical reconstructions in advanced economies. As for the initial value of the stock of produced assets, we calculate our series of produced assets since 1850, but we only present results since 1900 onwards. This way, we avoid any mismeasurement coming from the choice of an initial value. This is shown by Prados de la Escosura and Rosés, 2010, where they compare different choices for the initial stock of produced assets in Spain for the year 1850 and the posterior evolution of PIM estimates. The authors demonstrate that after a period of 40 years (i.e., by 1890), differences in the value of produced assets basically vanish.

The choice of a depreciation pattern is a more delicate aspect. At this respect, the release of the OECD's (OECD, 2009) manual supposed an improvement for the practical implementation of the PIM, as it recommends the use of geometric patterns of depreciation, which we use in this study. We use the double-declining balance method (OECD, 2009, p. 52), which is characterized by fast rates of depreciation in the initial years of an asset life, which reduces the accumulation of investment and the resulting stock of produced assets when compared to other patterns. Therefore, we decide to compare our results with those using a more conservative approach. For this purpose, we take the depreciation rates used in Prados de la Escosura and Rosés, 2010, which correspond to a modified geometric pattern, and which are especially conservative regarding the speed at which assets depreciate. As expected, using the modified geometric depreciation raises the annual stock of produced asset.

As figure A.8 shows, our benchmark value for produced assets is around 70-80% of the alternative stock of produced assets over the period 1900-2017. In both cases, we have smoothed the evolution of service lives across the three different periods (1850-1919, 1920-1959 and 1960-2000) for which Prados de la Escosura and Rosés, 2010 calculate different service lives (see discussion in produced assets

[32] We also measure subsoil assets using a capitalization approach, which is different to the census-like method. However, given the historically low weight of subsoil industries in total GDP in Spain, any mismeasurement of the stock of subsoil assets should have an almost negligible impact on the total value of national wealth (for more details, see mineral and energy reserves section in this appendix).

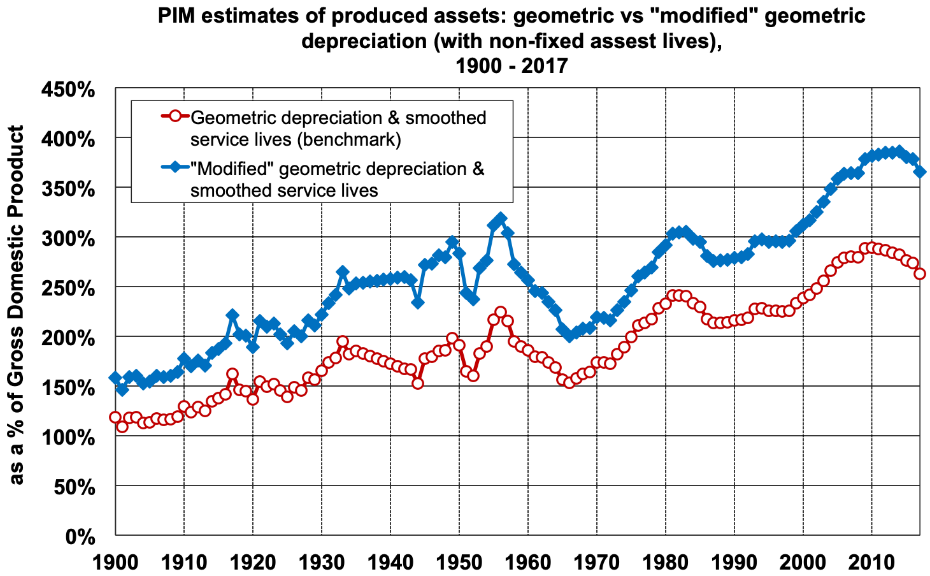


Figure A.8: PIM estimates of produced assets: geometric vs. modified geometric depreciation (with non-fixed assest lives), 1900-2017

Notes: This figure compares the stock of produced assets obtained using the Perpetual Inventory Method with smoothed service lives of assets under two different patterns of depreciation: a) Using a geometric pattern of depreciation (benchmark series in the paper), and b) Using a modified geometric pattern of depreciation. Data are expressed as a percentage of Gross Domestic Product.

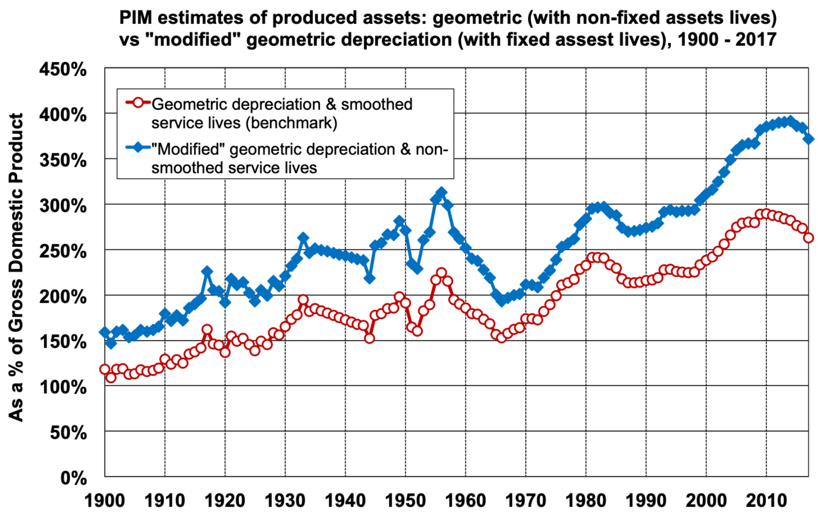


Figure A.9: PIM estimates of produced assets: geometric (with non-fixed assets lives) vs modified geometric depreciation (with fixed assest lives), 1900-2017

Notes: This figure compares the stock of produced assets obtained using the Perpetual Inventory Method under two different scenarios: a) Using a geometric pattern of depreciation together with smooth service lives of assets (benchmark series in the paper), and b) Using a modified geometric pattern of depreciation with non-smoothed service lives of assets. Data are expressed as a percentage of Gross Domestic Product.

section). We do this to avoid sharp breaks in the years in which there exist a change of service-lives period (i.e., between 1959 and 1960), which would imply a sudden and artificial increase in the depreciation of produced assets in these years. Figure A.9, on the contrary, compares our benchmark estimate of produced assets with that of a modified geometric depreciation with non-smoothed service lives while figure A.10 presents the comparison of our benchmark series with those using the same depreciation pattern (geometric) but with non-smoothed service lives. Overall, results for the value of produced assets are very similar when comparing the same depreciation pattern with smoothed and non-smoothed service live. However, there exists a significant difference in the level of produced assets when computed with a geometric depreciation pattern or a modified geometric depreciation approach (i.e., geometric pattern is around 70-80% of the modified pattern, confirming the results of figure A.8).

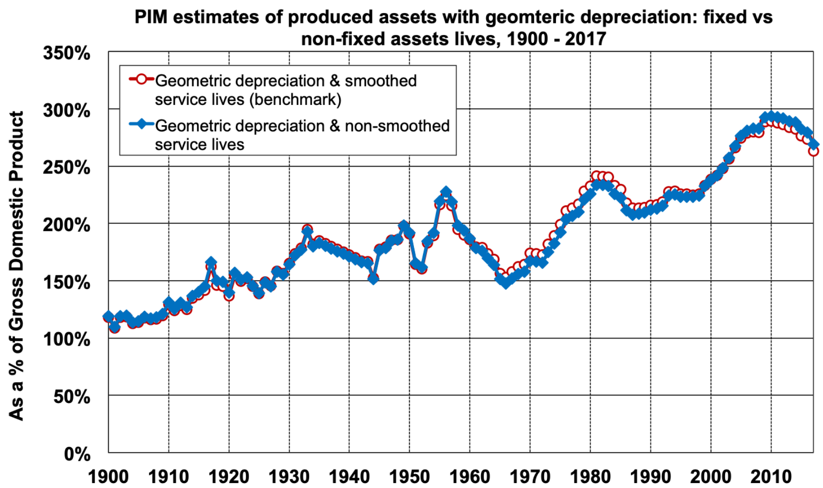


Figure A.10: PIM estimates of produced assets: geometric (with non-fixed assets lives) vs modified geometric depreciation (with fixed assest lives), 1900-2017

Notes: This figure compares the stock of produced assets obtained using the Perpetual Inventory Method with a geometric pattern of depreciation under two different specifications for the service lives of assets: a) Using smoothed service lives (benchmark series in the paper), and b) Using non-smoothed service lives. Data are expressed as a percentage of Gross Domestic Product.

To shed light on which series of produced assets are better to use, we compare the Consumption of Fixed Capital (CFC) obtained with each of the previous approaches. Figure A.11 compares our benchmark series of CFC with those obtained using the modified geometric pattern, as a percentage of GDP. In both specifications, the service lives of assets are smoothed. As expected, our benchmark series using the double-declining geometric approach shows higher levels of depreciation. Figure A.12 compares our benchmark series with those using a modified geometric pattern with non-smoothed services lives while figure A.13 compares our benchmark series with those using the same depreciation approach but with non-smoothed service lives. Results from figure A.12 present very similar values to those in figure A.11, confirming that the main difference when estimating produced assets stems from the depreciation patterns, and not from the smoothing of service lives. However, as shown in figure A.13, when using non-smoothed series, a spike in CFC appears in 1960, coinciding with the year in which there is a change in the profile of service lives. From this perspective, using smoothed lives seems preferable.

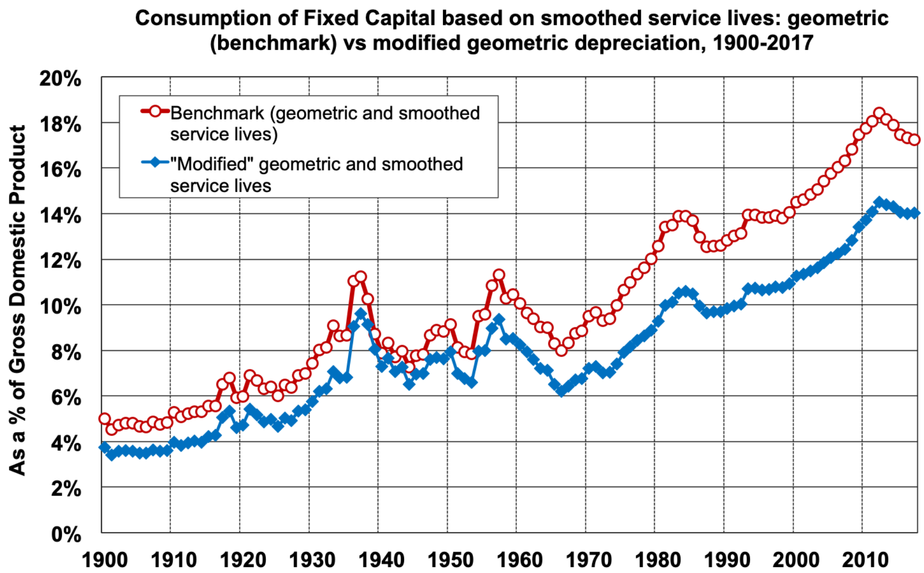


Figure A.11: Consumption of Fixed Capital based on smoothed service lives: geometric (benchmark) vs modified geometric depreciation, 1900-2017

Notes: This figure compares capital depreciation obtained from estimating the stock of produced assets using the Perpetual Inventory Method with smoothed service lives of assets but under two different patterns of depreciation: a) Using a geometric pattern of depreciation (benchmark series in the paper), and b) Using a modified geometric pattern of depreciation. Data are expressed as a percentage of Gross Domestic Product.

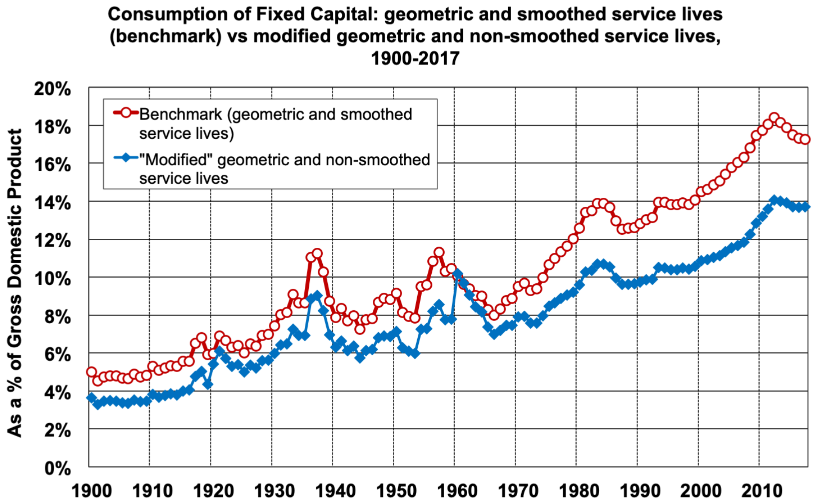


Figure A.12: Consumption of Fixed Capital: geometric and smoothed service lives (benchmark) vs modified geometric and non-smoothed service lives, 1900-2017

Notes: This figure compares capital depreciation obtained from estimating the stock of produced assets using the Perpetual Inventory Method under two different scenarios: a) Using a geometric pattern of depreciation with smoothed service lives of assets (benchmark series in the paper), and b) Using a modified geometric pattern of depreciation with non-smoothed service lives of assets. Data are expressed as a percentage of Gross Domestic Product.

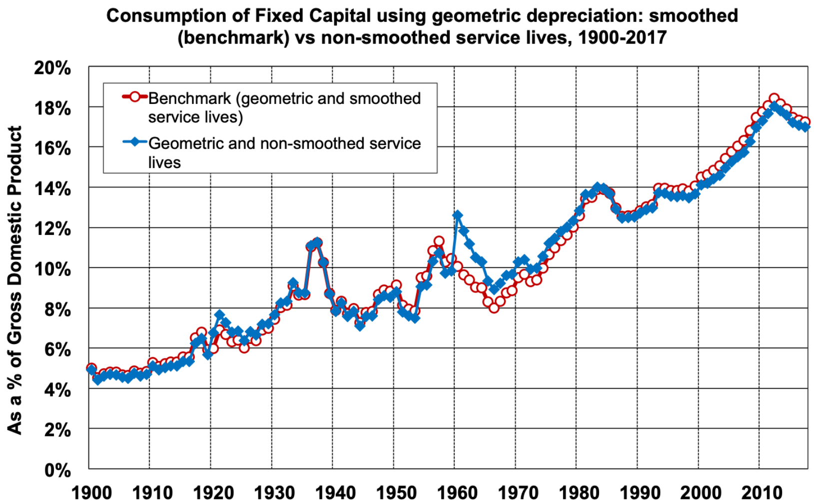


Figure A.13: Consumption of Fixed Capital using geometric depreciation: smoothed (benchmark) vs non-smoothed service lives, 1900-2017

Notes: This figure compares capital depreciation obtained from estimating the stock of produced assets using the Perpetual Inventory Method with a geometric pattern of depreciation under two different specifications for the service lives of assets: a) Using smoothed service lives (benchmark series in the paper), and b) Using non-smoothed service lives. Data are expressed as a percentage of Gross Domestic Product.

In figure A.14, we compare the geometric and the modified geometric results for CFC with those from the Spanish national accounts, since 1970, when the OECD splices the official series form the Spanish National Statistics Institute. In this comparison, the denominator (GDP) is different: the geometric and modified geometric series uses the GDP from Prados de la Escosura, 2017 while the OECD series uses their own GDP obtained when splicing official accounts. This way, all results for CFC are comparable. This figure shows that our benchmark estimates of CFC are very close to those of national accounts, while those obtained using the modified approach are significantly below (between 3 and 4 points of GDP). From this perspective, our benchmark series of produced assets are closer and more compatible with official national accounts than those using the significantly more conservative pattern of depreciation, as it is the case for the modified depreciation one.

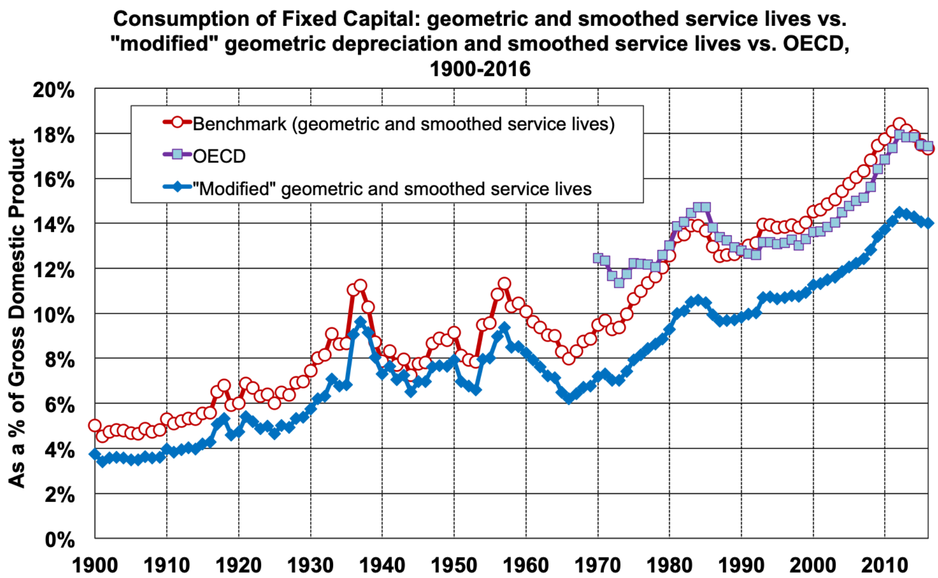


Figure A.14: Consumption of Fixed Capital: geometric and smoothed service lives vs. modified geometric depreciation and smoothed service lives vs. OECD, 1900-2016

Notes: This figure compares our benchmark series of capital depreciation (geometric pattern of depreciation with smoothed service lives) with those obtained with a modified geometric pattern of depreciation and those calculated by the OECD National Accounts Statistics. Data are expressed as a percentage of Gross Domestic Product. To be consistent, OECD's capital depreciation is expressed as a percentage of OECD's GDP (our benchmark series of GDP slightly differ from those at OECD).

As explained in the produced assets section, in this study we prefer not to use the data on CFC in Prados de la Escosura, 2017. The main reason for doing this is that, since 1999, Prados de la Escosura uses directly the data from the last official Spanish national accounts, which start in 1999. While doing this allows Prados de la Escosura full convergence of CFC between his series and those in the official national accounts for the period 1999-2014, it also implies a break with the depreciation pattern followed during the historical period. In figure A.15, we compare our benchmark values for CFC with those of Prados de la Escosura, 2017 and those of the OECD (which, since 1999, correspond with the official national accounts). Overall, the evolution of the three series is very similar, with our series being slightly above the official ones in the most recent years. Yet, it is worth noting that official data during the 1999-2017 period is based on a linear pattern of depreciation, as opposed to the geometric pattern used in this study and advised by the OECD (OECD, 2009).

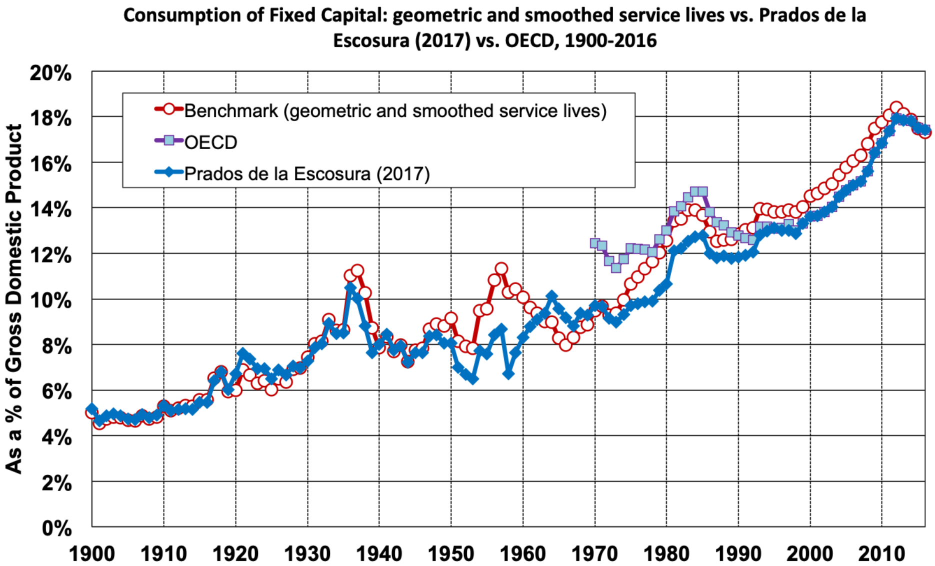


Figure A.15: Consumption of Fixed Capital: geometric and smoothed service lives vs. Prados de la Escosura (2017) vs. OECD, 1900-2016

Notes: This figure compares our benchmark series of capital depreciation with those in Prados de la Escosura, 2017 and those of OECD National Accounts. Data are expressed as a percentage of Gross Domestic Product (our benchmark series and those of Prados de la Escosura, 2017 as percentage of Prados de la Escosura, 2017 GDP, those of OECD as percentage of OECD's GDP).

Overall, this analysis of the different levels of depreciation shows that the real difference when computing CFC stems from the use of different depreciation patterns. In particular, when using our benchmark depreciation pattern, our series are very close to both the values in Prados de la Escosura, 2017 Historical National Accounts and the official Spanish accounts. As shown in the first three figures of this appendix, the pattern of depreciation is what determines the level of the PIM series of produced assets. Hence, from this perspective, using our pattern of depreciation to compute PIM estimates is more adequate when compared with alternative patterns. Nevertheless, in what follows we compute the book-value national wealth, the stock of non-financial assets and the Tobin's Q under the different patterns of depreciation used to estimate produced assets.

Figures A.16, A.17 and A.18 compare our benchmark series of book-value national wealth with the same three alternative scenarios to calculate produced assets: modified geometric depreciation with smoothed service lives, modified geometric depreciation with non-smoothed service lives and geometric depreciation with non-smoothed services lives. In all three cases, the results are very similar to our benchmark series. This seemingly paradox is the result of land underlying buildings, which is obtained as a residual from detracting the replacement cost of dwellings from the total value of housing. Thereafter, the share of land underlying non-residential buildings is imputed from the relation found in the housing sector. Thus, when using the most conservative depreciation pattern, we obtain a higher value of produced assets, which is compensated by lower land underlying buildings (both residential and non-residential).[33] This is shown in figures A.19, A.20 and A.21, which present the decomposition of non-financial assets obtained under these different specifications as compared to our benchmark series. Although the share of produced assets and land underlying buildings varies between the three figures, the dynamics are broadly similar.

Finally, in figures A.22, A.23 and A.24 we present the Tobin's Q obtained using these different approaches to the book-value national wealth and compare them with the Tobin's Q calculated from corporations' balance sheet. As the alternative measures of national wealth based on the PIM show similar levels over the long run, the Tobin's Q estimates under the different specifications offer similar results too.

Overall, this sensitivity analysis confirms the robustness of our book-value measure of national wealth. In addition, these results highlight the importance of computing dwellings at market value (i.e., including land underlying), as this asset not only determines the long-run dynamics of national wealth but also the role played by land underlying buildings in our calculations. Nevertheless, these results also confirm the need to count with better assessments of both produced assets and land underlying buildings. This element has not been sufficiently explored by statistical institutes and researchers, both in the past and in the present.

[33]When using the modified geometric depreciation, we find slightly negative values for land underlying dwellings in the years 1930s and 1940s. This could be the result of dwellings being overestimated by the PIM when using the modified geometric depreciation but also some degree of underestimation in our series of housing wealth over these years. Historically, rent control can also explain the low values of the market-value of housing as compared to the replacement cost of dwellings during this period.

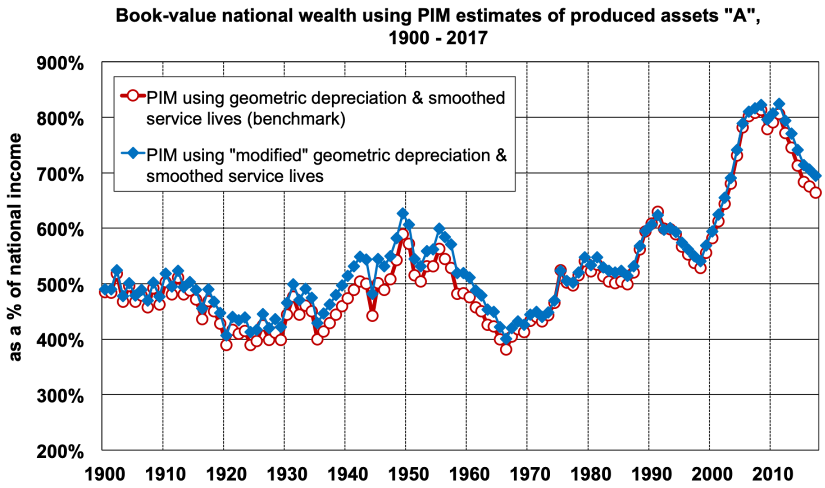


Figure A.16: Book-value national wealth using PIM estimates of produced assets A, 1900-2017

Notes: This figure compares our benchmark series of book-value national wealth with those obtained estimating produced assets under an alternative pattern of depreciation. Our benchmark series uses a geometric pattern while the alternative series uses a modified geometric pattern. Data are expressed as a percentage of Gross Domestic Product.

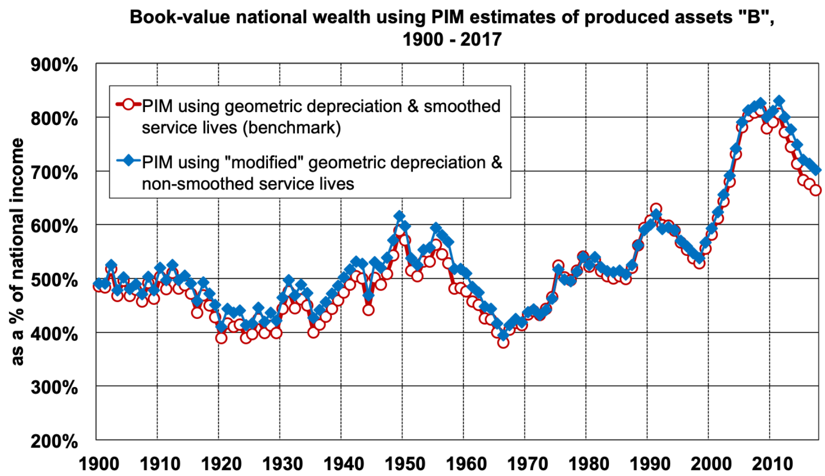


Figure A.17: Book-value national wealth using PIM estimates of produced assets B, 1900-2017

Notes: This figure compares our benchmark series of book-value national wealth with those obtained estimating produced assets under an alternative pattern of depreciation and a different specification for the service lives of assets. Our benchmark series uses a geometric pattern together with smoothed service lives of assets while the alternative series uses a modified geometric pattern with non-smoothed service lives of assets. Data are expressed as a percentage of Gross Domestic Product.

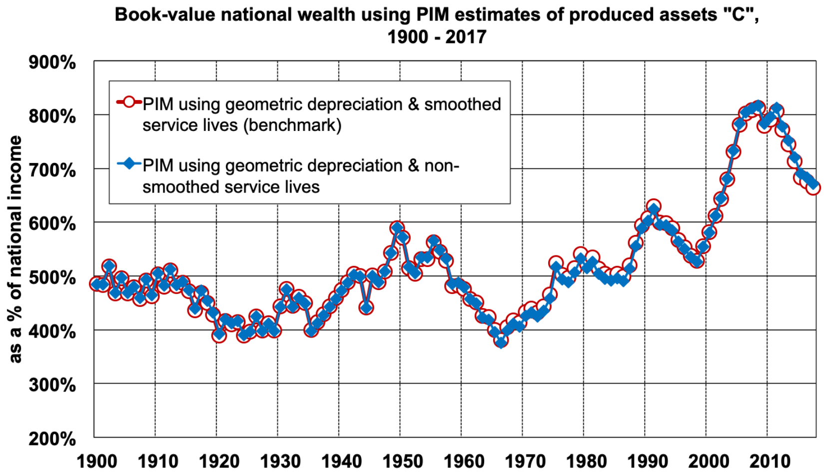


Figure A.18: Book-value national wealth using PIM estimates of produced assets C, 1900-2017

Notes: This figure compares our benchmark series of book-value national wealth with those obtained estimating produced assets with a different specification for the service lives of assets. Our benchmark series uses smoothed service lives of assets while the alternative series uses non-smoothed service lives of assets. Data are expressed as a percentage of Gross Domestic Product.

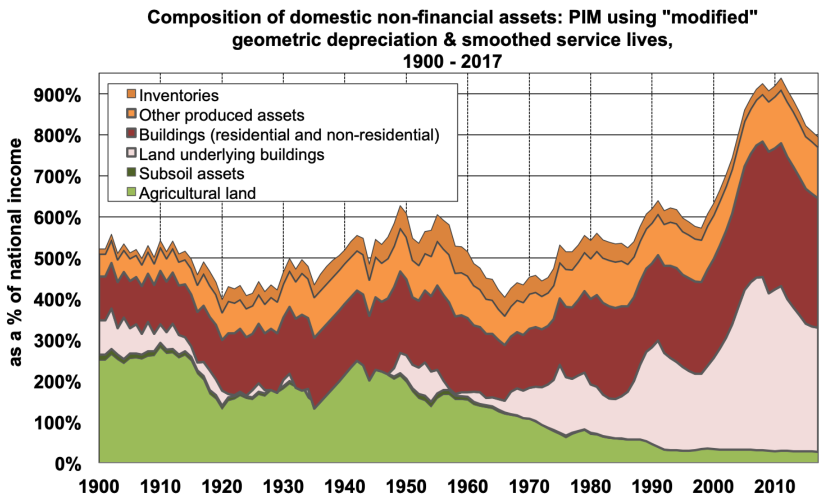


Figure A.19: Composition of domestic non-financial assets: PIM using modified geometric depreciation & smoothed service lives, 1900-2017

Notes: This figure shows the composition of domestic non-financial assets which results from estimating produced assets with an alternative specification to the one used in the paper. In this alternative case, produced assets are obtained using a modified pattern of depreciation while the benchmark series in the paper (Figure 4) uses a geometric pattern. Data are expressed as a percentage of national income.

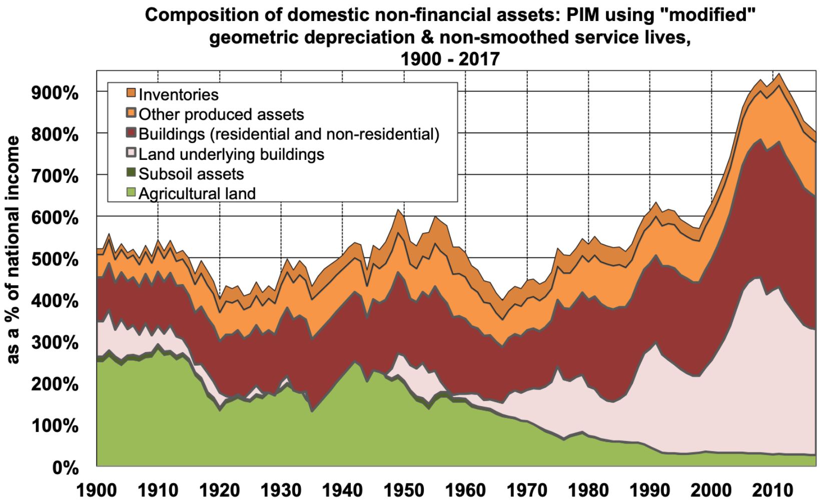


Figure A.20: Composition of domestic non-financial assets: PIM using modified geometric depreciation & non-smoothed service lives, 1900-2017

Notes: This figure shows the composition of domestic non-financial assets which result from estimating produced assets with an alternative specification to the one used in the paper. In this alternative case, produced assets are obtained using a modified pattern of depreciation and non-smoothed service lives of assets. The benchmark series in the paper (Figure 4) uses a geometric pattern with smoothed service lives of assets. Data are expressed as a percentage of national income.

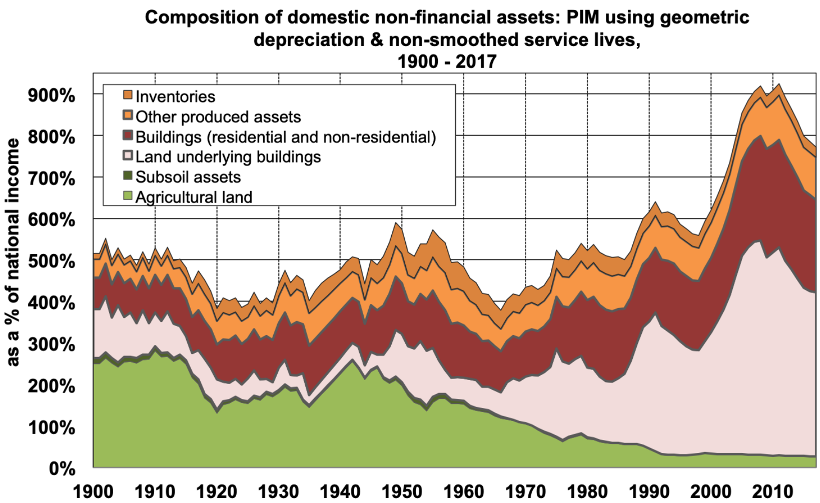


Figure A.21: Composition of domestic non-financial assets: PIM using geometric depreciation & non-smoothed service lives, 1900-2017

Notes: This figure shows the composition of domestic non-financial assets which results from estimating produced assets with an alternative specification to the one used in the paper. In this alternative case, produced assets are obtained using non-smoothed service lives of assets. The benchmark series in the paper (Figure 4) uses smoothed service lives of assets. Data are expressed as a percentage of national income.

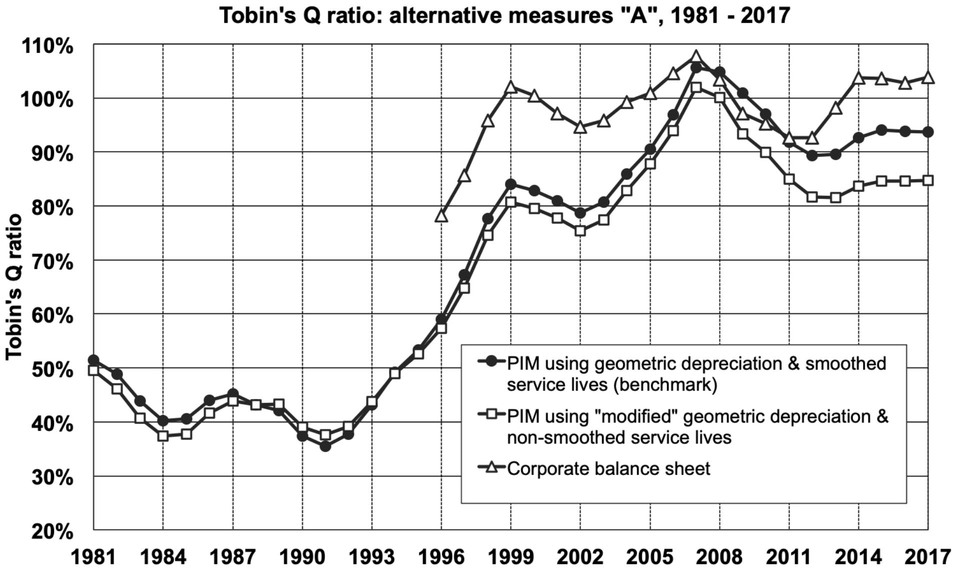


Figure A.22: Tobin's Q ratio: alternative measures A, 1981-2017

Notes: This figure compares our benchmark series of Tobin's Q and the census-like estimate from the Bank of Spain (both series shown in figure EF6 in the excel appendix) with an alternative series of Tobin's Q obtained estimating produced assets using a modified pattern of depreciation and non-smoothed service lives of assets.

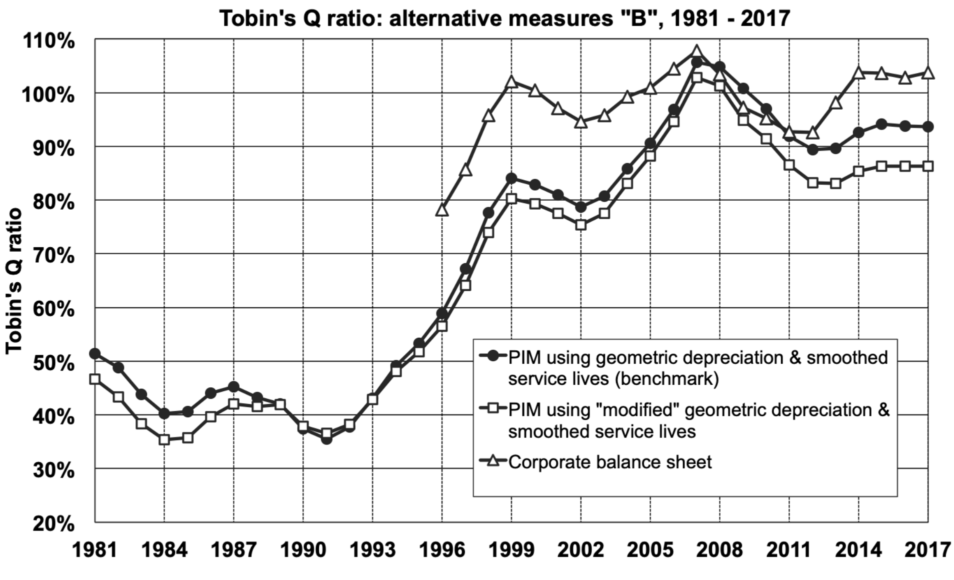


Figure A.23: Tobin's Q ratio: alternative measures B, 1981-2017

Notes: This figure compares our benchmark series of Tobin's Q and the census-like estimate from the Bank of Spain (both series shown in figure EF6 in the excel appendix) with an alternative series of Tobin's Q obtained estimating produced assets using a modified pattern of depreciation.

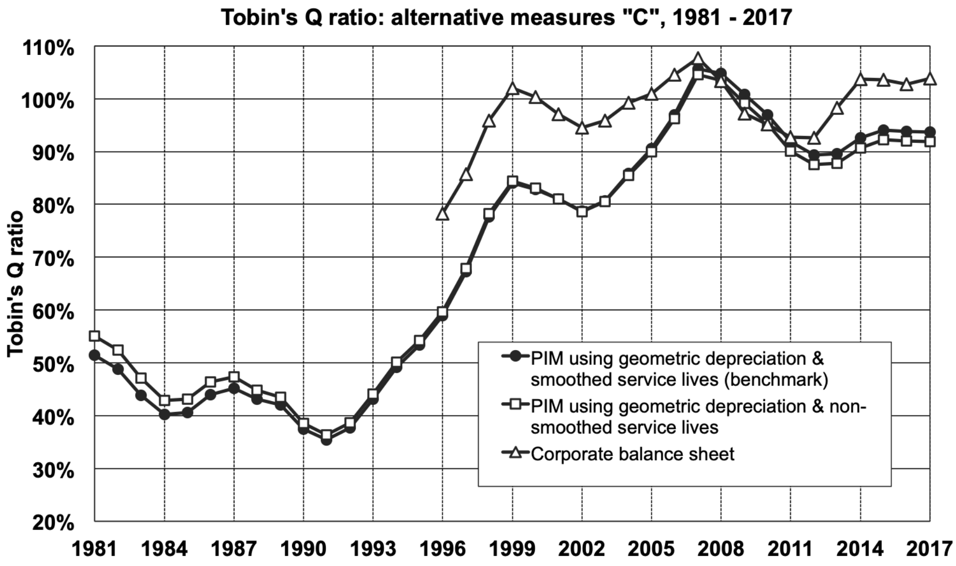


Figure A.24: Tobin's Q ratio: alternative measures C, 1981-2017

Notes: This figure compares our benchmark series of Tobin's Q and the census-like estimate from the Bank of Spain (both series shown in figure EF6 in the excel appendix) with an alternative series of Tobin's Q obtained estimating produced assets using non-smoothed service lives of assets.

A.8.4 The decomposition of national wealth accumulation with the book-value approach and the private wealth sub-component

A second aspect which deserves attention has to do with the decomposition of national wealth accumulation shown in the paper. This decomposition is carried with market-value national wealth series and not with the book-value ones. Therefore, we compute the same decomposition using our benchmark series of book-value national wealth. In addition, we show this decomposition for the alternative book-value definition of national wealth, where we use the modified-geometric pattern of depreciation, which we have shown produces too low values of depreciation (hence, high values of net national saving). In table A.2 and A.3, we reproduce tables 1 and 2 of the paper, using our benchmark book-value national wealth series.[34] Not surprisingly, given the close resemblance between the two measures of national wealth, results obtained with the two measures are almost identical. In addition, table A.4 compares the decomposition of national wealth into a savings and a capital gains component using

[34]Relative to table 1 in the paper, table A.2 does also include a decomposition of national wealth accumulation into housing and non-housing assets, using the multiplicative approach.

the alternative book-value national wealth definition in addition to our benchmark market-value and book-value national wealth series, for the period 1950-2017. In the two benchmark series (i.e., market value and book value), the capital gains component explains between 52 and 54% of the accumulation of national wealth. In the alternative series, capital gains explain a lower share: around 46%. Given the too high net national saving produced by the alternative book-value national wealth series, the share computed with these alternative series should be seen as a lower bound. Overall, these results confirm the important role of capital gains in explaining the accumulation of wealth in Spain since the 1950s, no matter which metric is used in the calculation.

Accumulation of national wealth in
in Spain, 1900-2017 (Multiplicative decomposition)

	Book-value national wealth-income ratios (%)		Decomposition of national wealth growth rate (%)			Decomposition of housing wealth growth rate (%)			Decomposition of non-housing wealth growth rate (%)		
			Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate	Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q	g_w	$g_{ws} = s/\beta$	q	g_w	$g_{ws} = s/\beta$	q
1900-2017	484%	664%	3.0%	1.4%	1.4%	3.7%	1.8%	1.9%	2.4%	1.3%	1.1%
				50	50		49	51		54	46
1900-1950	484%	572%	1.2%	0.8%	0.3%	1.2%	1.0%	0.2%	1.2%	0.7%	0.5%
				72	28		82	18		58	42
1950-2017	572%	664%	4.1%	1.8%	2.2%	5.4%	2.2%	3.1%	3.0%	1.6%	1.4%
				44	56		41	59		53	47
1950-1980	572%	522%	5.3%	2.4%	2.8%	6.9%	3.3%	3.5%	4.4%	2.1%	2.3%
				46	54		48	52		47	53
1980-2017	522%	664%	3.1%	1.3%	1.8%	4.2%	1.3%	2.8%	1.8%	1.1%	0.7%
				43	57		32	68		63	37

Table A.2: Accumulation of book-value national wealth in Spain, 1900-2017 (Multiplicative decomposition)

Notes: This table presents the accumulation of book-value national wealth in Spain for 1900-2017 using the multiplicative decomposition. Results for the market-value definition of national wealth are presented in table 1 in the paper. This table reads as follows: The annual real growth rate of national wealth in Spain was 3% over 1900-2017. This can be decomposed into 1.4% and 1.4% savings-induced and capital gains-induced wealth growth rates, respectively. The table also presents the accumulation of housing and non-housing national wealth (other types of capital and foreign wealth) separately. The small numbers below the savings and capital gains growth rates are the fraction of each in the total growth rate.

Finally, table A.5 compares the decomposition of market-value national wealth with the decomposition of the private wealth component.[35] As figures 1 in the paper

[35] We cannot show the decomposition of public wealth given that in some years, net government

Accumulation of national wealth in Spain, 1900-2017
(Additive decomposition)

	Savings (% total cumulative net savings)			Capital gains (% total capital gains)		
	Housing	Other types of capital	Foreign	Housing	Other types of capital	Foreign
1900-1950	33%	65%	2%	17%	69%	15%
1950-2017	57%	79%	-36%	75%	25%	0%
1950-1980	42%	93%	-35%	52%	24%	23%
1980-2017	63%	73%	-36%	82%	27%	-9%

Table A.3: Accumulation of book-value national wealth in Spain, 1900-2017 (Additive decomposition)

Notes: This table presents the accumulation of book-value national wealth in Spain for 1900-2017 using the additive decomposition. Results for the market-value definition of national wealth are presented in table 2 in the paper. National wealth is decomposed into housing, other types of capital, and foreign wealth. The Table reads as follows: Housing accounts for 33% of total cumulated net savings over 1900-1950.

and EF2 on the excel appendix show, the evolution of national wealth in Spain is mostly shaped by the private component. This table shows the similarity of the decomposition of national wealth and private wealth, confirming the predominate role of private wealth in driving the evolution of Spain's national wealth, both at the aggregate level, and when decomposing the accumulation of wealth into a saving and a capital gains component. This should not be surprising given the predominant role of housing (almost fully owned by households) in driving the dynamics of national wealth in Spain.

A.8.5 Capital gains and asset price changes

Table A.6 compares our capital gains estimates on national wealth and the increases in real terms of the three most important assets (housing, equities and agricultural land). This comparison is carried for the whole period 1900-2017, and for different subsets (1900-1950, 1950-2017, etc). Data on housing and equities was kindly provided by Jordà et al., 2019.

Results show interesting trends that go in line with our results. Overall, housing

wealth takes very low or even negative values, making the computation of geometric average growth rates not possible.

Accumulation of national wealth measures (Multiplicative decomposition), 1950-2017

	National wealth-income ratios (%)		Decomposition of national wealth growth rate (%)		
			Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
Benchmark market value	556%	629%	4.0%	1.9% 48	2.1% 52
Benchmark book value	572%	666%	4.1%	1.9% 46	2.2% 54
Alternative book value	606%	696%	4.1%	2.2% 54	1.8% 46

Table A.4: Accumulation of national wealth: comparison of national wealth measures (Multiplicative decomposition), 1950-2017

Notes: This table presents the accumulation of national wealth in Spain for 1950-2017, for three alternative measures. Computations have been done using national accounts. The Table reads as follows: the real growth rate of market-value national wealth in Spain has been 4% a year on average over 1950-2017. This can be decomposed into a 1.9% savings-induced wealth growth rate and a 2.1% capital gains-induced wealth growth rate.

real prices and capital gains show very similar trends, especially for the 1950-2014 period. In the first half of the 20th century, it is agricultural land prices that mostly resembles the evolution of capital gains. Stock returns are weakly correlated with our capital gains measure, but this fact can be explained due to the underdevelopment of the Spanish stock market. Nonetheless, some caution should be taken when making these comparisons, as Jordà et al., 2019 data on housing prices is based on relatively low-quality sources (i.e., house advertisements on the Barcelona-based newspaper *La Vanguardia*).

A.8.6 Market vs. book-value wealth estimation

Wealth measured through at the market-value and book-value perspective show similar trends in the long run. However, in some periods (e.g., 1900-1913), there are some noticeable differences. This can ultimately be explained due to theoretical reasons (i.e., the Tobin Q can have a value different from 1) or because of measurement problems. To address this last fact, we have carried the following robustness check.

From a methodological viewpoint, our wealth at market value measures the assets

Accumulation of market-value national and private wealth
in Spain, with two ending years: 2010 and 2017 (Multiplicative decomposition)

	Market-value national wealth income ratios		Decomposition of national wealth growth rate (%)			Market-value private wealth income ratios		Decomposition of private wealth growth rate (%)		
			Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate			Real growth rate of national wealth	Savings-induced wealth growth rate	Capital gains-induced wealth growth rate
	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q	β_t	β_{t+n}	g_w	$g_{ws} = s/\beta$	q
1950-2010	556%	774%	4.7%	2.1%	2.6%	506%	703%	4.7%	2.2%	2.5%
				44	56				47	53
1950-2017	556%	629%	4.0%	1.9%	2.1%	506%	619%	4.1%	2.1%	2.0%
				48	52				52	48
1980-2010	460%	774%	4.5%	1.7%	2.8%	402%	703%	4.7%	1.9%	2.7%
				38	62				41	59
1980-2017	460%	629%	3.3%	1.5%	1.8%	402%	619%	3.6%	1.8%	1.7%
				46	54				52	48

Table A.5: Accumulation of market value national and private wealth in Spain, with two ending years: 2010 and 2017 (Multiplicative decomposition)

Notes: This table presents the accumulation of market-value national wealth in Spain for 1900-2017, for the total economy and the private sectors. Computations have been done using national accounts. The Table reads as follows: the real growth rate of market-value national wealth in Spain has been 4.7% a year on average over 1950-2010. This can be decomposed into a 2.1% savings-induced wealth growth rate and a 2.6% capital gains-induced wealth growth rate.

of the personal and government sectors through a census-like method. The assets covered are agricultural land, housing, unincorporated business assets, financial claims, minus liabilities. The book value measures all non-financial assets of the economy and then adjusts for the net foreign asset position. Furthermore, as a general principle, any difference between the two cannot be related to housing or agricultural land, given than these two assets match in a perfect manner in our wealth estimates. The mismatch is therefore due to productive capital. One can then go one step further and explore the differences between the book versus market value estimate of the same assets held by households, the government and corporations. Since we already have estimates for the first two sectors, we only need to calculate the non-financial assets of the corporate sector since 1900 by making the following assumptions.

Computing the assets of the corporate sector since the 1900s following a census-like estimate is unfeasible given the dearth of data. However, one can build an alternative series by exploring the financial records we have gathered. The basic logic is that the financial net-worth position of corporations relative to households, A comparison between estimated and observed real capital gains. Spain, 1980-2017

	Wealth accumulation model (This paper)			Historical asset prices		
	Total wealth	Housing wealth	Non-housing wealth	Housing	Stocks	Agricultural land
	Capital gains-induced wealth growth rate	Capital gains-induced wealth growth rate	Capital gains-induced wealth growth rate			
1900-2017	1.2%	1.9%	0.6%	0.66%	-0.67%	0.87%
1900-1950	0.1%	0.2%	0.2%	-1.56%	-1.48%	0.55%
1950-2017	2.1%	3.1%	0.9%	2.43%	-0.01%	1.11%
1950-1980	2.4%	3.5%	1.5%	2.97%	-3.93%	3.03%
1980-2017	1.8%	2.8%	0.4%	1.91%	3.35%	-0.5%

Table A.6: A comparison between estimated and observed real capital gains. Spain, 1980-2017

Notes: This table compares the real capital gains on national wealth, as computed in this paper (table 1 in the paper and table 2 supplement A in the data appendix), with real price gains on specific data. Historical data on housing and stocks is derived from Jordà et al., 2019, while for agriculture it is derived from the same sources used in this paper.

the government and the rest of the world sector must be equal to its non-financial assets. Figure A.25 shows a simple representation of this idea. This estimate has one important assumption, namely that the Tobin Q is equal to 1. In principle, this might seem as a too strict condition, but the available data shows that a different scenario (i.e., a Tobin Q of 0.5 or 1.2) does not change the basic results. To demonstrate this, figure A.26 includes two series: the proxy of corporate non-financial assets from 1900, and its actual value from 1995 onwards (as recorded by the Bank of Spain's Central Balance Sheet Data Office). Results are similar in price trends and asset levels. In the long run, corporate non-financial assets started in 1900 at c.50% of national income, rose towards 70-80% in the mid-century until attaining 100%-120% by the year 2000.

One can then make one final estimate by comparing unincorporated business assets (excluding agricultural land) and corporate assets (as recorded through this last metric). Results are shown in figure A.27. Again, the general trends are easy to explain. At the beginning of the 20th century, unincorporated businesses constituted the most important actor in the private economy, but as the country modernized and more business turned into corporations, their share experienced a gradual decline. If one then leaves out the differences between legal entities (corporations vs non-

Consolidated balance sheet of the corporate sector

<table>
<tr><th>Assets</th><th>Liabilities</th></tr>
<tr><td rowspan="2">Non financial assets</td><td>Liabilities, assets of the goverment sector</td></tr>
<tr><td rowspan="3">Liabilities, assets of the personal sector</td></tr>
<tr><td>Financial assets, liabilities of the goverment sector</td></tr>
<tr><td>Financial assets, liabilities of the personal sector</td></tr>
<tr><td>Financial assets, liabilities of the rest of the world</td><td>Liabilities, assets of the rest of the world</td></tr>
</table>

Figure A.25: Consolidated balance sheet of the corporate sector

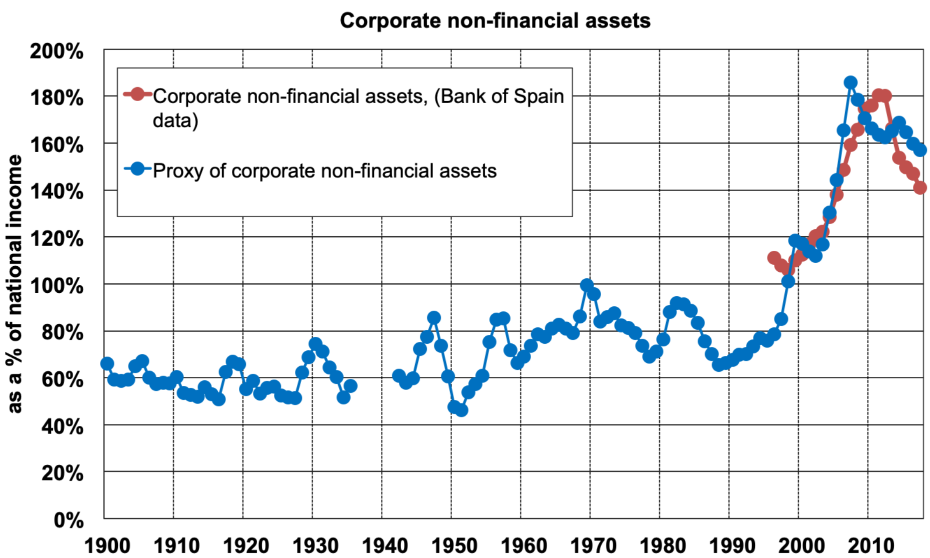


Figure A.26: Corporate non-financial assets

Notes: This figure compares our benchmark series of Tobin's Q and the census-like estimate from the Bank of Spain (both series shown in figure EF6 in the excel appendix) with an alternative series of Tobin's Q obtained estimating produced assets using non-smoothed service lives of assets.

corporations), it is possible to argue that productive assets (i.e., capital excluding housing and agricultural land) have constituted a relatively constant share of around 150-200% of national income.

This is only a rough estimate of the general trends, yet it points to some valid conclusion. Since the difference at the beginning of the 20th century between the

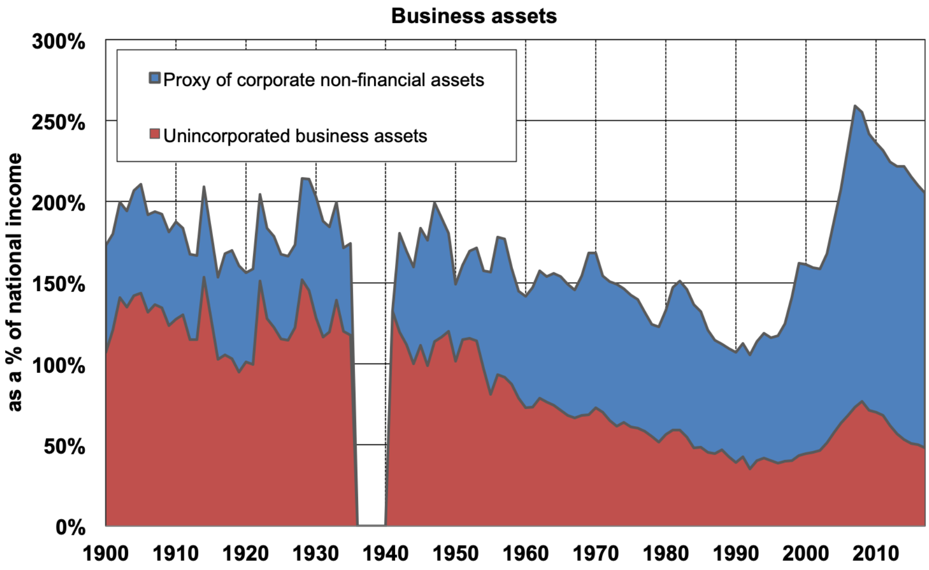


Figure A.27: Business assets

Notes: This figure compares our benchmark series of Tobin's Q and the census-like estimate from the Bank of Spain (both series shown in figure EF6 in the excel appendix) with an alternative series of Tobin's Q obtained estimating produced assets using non-smoothed service lives of assets.

market and book value estimate is roughly of 100% of national income, and considering that non-financial corporate assets are relatively low (at c. 50% of national income), one would then have to assume a really low value for the unincorporated business sector. If the two estimates were forced to converge, one would then have to assume that unincorporated business assets have been hugely overestimated at roughly 130% of national income. This would then imply extremely low levels for this kind of businesses at c.20-30% of national income, which is hard to reconcile with the historical data and present-day estimates for these same sector (c. 50% of national income from 1995 to 2017).

Overall, in spite of some level of uncertainty, our two estimates of national wealth rely on the best data and methods available. As we have explained, discrepancies between the two series do not necessarily reflect the higher quality of one estimate over the other. Conceptual and economic reasons can explain the observed divergence.

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Appendix B

Appendix to "House Price Cycles, Wealth Inequality and Portfolio Reshuffling"

B.1 Imputation methods

B.1.1 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 (Table B6). 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 perentile 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.

B.1.2 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 (Table B9), I can account for them using 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 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, Goupille, and Piketty, 2019a 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[1], 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

[1] 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.

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 affect our results in a significant manner.

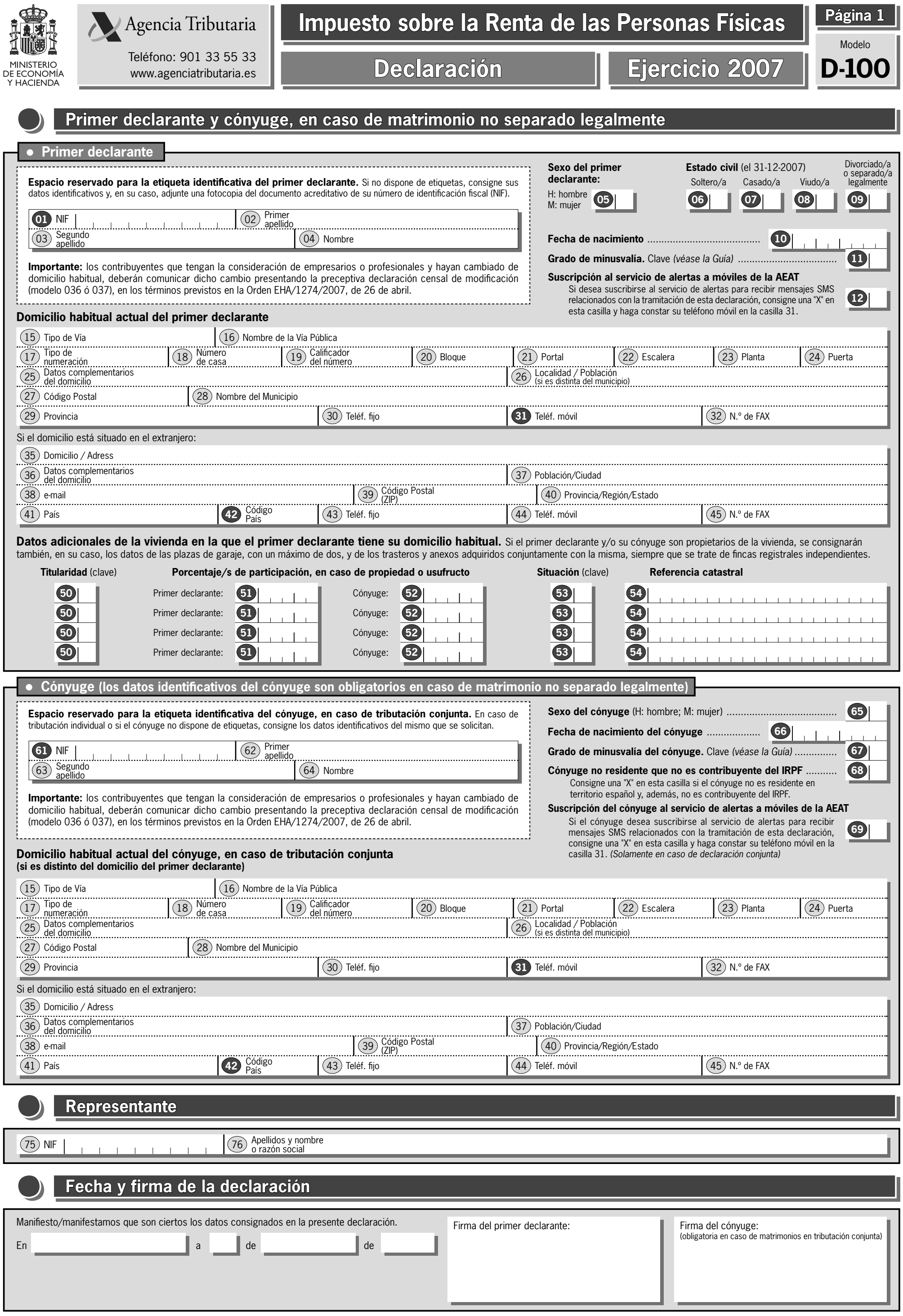
B.2 The Spanish Personal Income Tax and Wealth Tax

B.2.1 A Recount of Personal Income Taxation in Spain

B.2.1.1 Adjustment of the income distribution series for personal income tax reforms

The modern income tax was established in 1979 (Law 44/1978), with three major reforms in 1991, 1998 and 2006. Albi (2006) provides a detailed description of the current system along with all the reforms from 1979 to date. From 1984 to 1987 the top marginal rate was 66%; however the average tax rate could not exceed 46%. In 1988 the tax scale was completely restructured downwards; the top marginal rate decreased from 66% to 56%, but the 46% limit was eliminated (Table A1, column 9). The reform of 1991 did not modify either the tax rates or the main deductions. It updated the legislation in terms of individual and joint filing after the Constitutional Court decided in 1989 that the obligation to file jointly for married couples was thereafter unconstitutional. It also introduced changes in the taxation of capital gains, which we briefly describe below. Since the reform of 1998 (Law 40/1998), the system was not supposed to tax overall but disposable income, after the deduction of a personal and family minimum income threshold (family-related reductions existed before, but they were applied to the amount of the tax and not to the income). For this reason, the joint-filer tax scale disappeared, so that the same scale applies to everybody since that year. The reform also provided a general rate reduction in the marginal rates. The drops ranged from 2% (from 20% to 18% for the bottom bracket) to 8% (from 56% to 48% for the top bracket). It also reduced the number of brackets from eight to six and eliminated the 0% rate for the lowest income.

Concerning capital gains, the following facts are worth mentioning. Between 1978 and 1991, capital gains (excluding gratuitous inter-vivos and mortis causa transfers) were taxed as regular income, according to the tax rate scale. From 1992 to 2005, a distinction was made between short run (or regular, meaning assets held less than one year) capital gains and long run (or irregular) capital gains. Short run capital gains are added to the main income and taxed according to the tax scale. Since 1994, long run capital gains from assets purchased before 1994 were first corrected downwards by a coefficient depending both on the nature of the asset and the number of years the asset had been held up to 1996 (real estate, -5.26% per year; stock: -11.11% per year; -7.14% per year for other assets). Finally, the tax was computed as the maximum of (a) adding 50% of irregular capital gains to the regular income and applying the tax scale to the result; and (b) applying the individual average tax rate to 100% of the irregular gains. Since 1996 the average tax rate affecting irregular capital gains could not exceed 20%. From 1997 to 1998, long run capital gains from assets held between one and two years continued to follow the rules described above. For those held more than two years, a 20% rate was applied only to any amount beyond 200,000 pesetas. Since 1999 only gains for sales of assets held more than two years are considered irregular and consequently taxed in a different way from the rest of income, at a 20% rate (18% for 2002 and 15% since 2003). All capital gains (with the exception of the reductions mentioned above) are reported and thus included in our estimations, irrespective of whether they have been taxed based on the marginal tax scale or the flat tax rate,. We report in appendix Table G the revenue (as a share of GDP) of each tax source in Spain between 1930 and 2005, based on Comín, 1985 and Instituto de Estudios Fiscales (BADESPE).


MINISTERIO DE ECONOMÍA Y HACIENDA

Agencia Tributaria
Teléfono: 901 33 55 33
www.agenciatributaria.es

Impuesto sobre la Renta de las Personas Físicas

Declaración **Ejercicio 2007**

Página 1 Modelo **D-100**

Primer declarante y cónyuge, en caso de matrimonio no separado legalmente

● Primer declarante

Espacio reservado para la etiqueta identificativa del primer declarante. Si no dispone de etiquetas, consigne sus datos identificativos y, en su caso, adjunte una fotocopia del documento acreditativo de su número de identificación fiscal (NIF).

01 NIF | 02 Primer apellido | 03 Segundo apellido | 04 Nombre

Importante: los contribuyentes que tengan la consideración de empresarios o profesionales y hayan cambiado de domicilio habitual, deberán comunicar dicho cambio presentando la preceptiva declaración censal de modificación (modelo 036 ó 037), en los términos previstos en la Orden EHA/1274/2007, de 26 de abril.

Sexo del primer declarante: H: hombre M: mujer 05

Estado civil (el 31-12-2007): Soltero/a 06 | Casado/a 07 | Viudo/a 08 | Divorciado/a o separado/a legalmente 09

Fecha de nacimiento 10

Grado de minusvalía. Clave (*véase la Guía*) 11

Suscripción al servicio de alertas a móviles de la AEAT
Si desea suscribirse al servicio de alertas para recibir mensajes SMS relacionados con la tramitación de esta declaración, consigne una "X" en esta casilla y haga constar su teléfono móvil en la casilla 31. 12

Domicilio habitual actual del primer declarante

15 Tipo de Vía | 16 Nombre de la Vía Pública
17 Tipo de numeración | 18 Número de casa | 19 Calificador del número | 20 Bloque | 21 Portal | 22 Escalera | 23 Planta | 24 Puerta
25 Datos complementarios del domicilio | 26 Localidad / Población (si es distinta del municipio)
27 Código Postal | 28 Nombre del Municipio
29 Provincia | 30 Teléf. fijo | 31 Teléf. móvil | 32 N.º de FAX

Si el domicilio está situado en el extranjero:

35 Domicilio / Adress
36 Datos complementarios del domicilio | 37 Población/Ciudad
38 e-mail | 39 Código Postal (ZIP) | 40 Provincia/Región/Estado
41 País | 42 Código País | 43 Teléf. fijo | 44 Teléf. móvil | 45 N.º de FAX

Datos adicionales de la vivienda en la que el primer declarante tiene su domicilio habitual. Si el primer declarante y/o su cónyuge son propietarios de la vivienda, se consignarán también, en su caso, los datos de las plazas de garaje, con un máximo de dos, y de los trasteros y anexos adquiridos conjuntamente con la misma, siempre que se trate de fincas registrales independientes.

Titularidad (clave)	**Porcentaje/s de participación, en caso de propiedad o usufructo**		**Situación** (clave)	**Referencia catastral**
50	Primer declarante: 51	Cónyuge: 52	53	54
50	Primer declarante: 51	Cónyuge: 52	53	54
50	Primer declarante: 51	Cónyuge: 52	53	54
50	Primer declarante: 51	Cónyuge: 52	53	54

● Cónyuge (los datos identificativos del cónyuge son obligatorios en caso de matrimonio no separado legalmente)

Espacio reservado para la etiqueta identificativa del cónyuge, en caso de tributación conjunta. En caso de tributación individual o si el cónyuge no dispone de etiquetas, consigne los datos identificativos del mismo que se solicitan.

61 NIF | 62 Primer apellido | 63 Segundo apellido | 64 Nombre

Importante: los contribuyentes que tengan la consideración de empresarios o profesionales y hayan cambiado de domicilio habitual, deberán comunicar dicho cambio presentando la preceptiva declaración censal de modificación (modelo 036 ó 037), en los términos previstos en la Orden EHA/1274/2007, de 26 de abril.

Sexo del cónyuge (H: hombre; M: mujer) 65

Fecha de nacimiento del cónyuge 66

Grado de minusvalía del cónyuge. Clave (*véase la Guía*) 67

Cónyuge no residente que no es contribuyente del IRPF 68
Consigne una "X" en esta casilla si el cónyuge no es residente en territorio español y, además, no es contribuyente del IRPF.

Suscripción del cónyuge al servicio de alertas a móviles de la AEAT
Si el cónyuge desea suscribirse al servicio de alertas para recibir mensajes SMS relacionados con la tramitación de esta declaración, consigne una "X" en esta casilla y haga constar su teléfono móvil en la casilla 31. (*Solamente en caso de declaración conjunta*) 69

Domicilio habitual actual del cónyuge, en caso de tributación conjunta
(si es distinto del domicilio del primer declarante)

15 Tipo de Vía | 16 Nombre de la Vía Pública
17 Tipo de numeración | 18 Número de casa | 19 Calificador del número | 20 Bloque | 21 Portal | 22 Escalera | 23 Planta | 24 Puerta
25 Datos complementarios del domicilio | 26 Localidad / Población (si es distinta del municipio)
27 Código Postal | 28 Nombre del Municipio
29 Provincia | 30 Teléf. fijo | 31 Teléf. móvil | 32 N.º de FAX

Si el domicilio está situado en el extranjero:

35 Domicilio / Adress
36 Datos complementarios del domicilio | 37 Población/Ciudad
38 e-mail | 39 Código Postal (ZIP) | 40 Provincia/Región/Estado
41 País | 42 Código País | 43 Teléf. fijo | 44 Teléf. móvil | 45 N.º de FAX

Representante

75 NIF | 76 Apellidos y nombre o razón social

Fecha y firma de la declaración

Manifiesto/manifestamos que son ciertos los datos consignados en la presente declaración.
En ______ a ___ de ______ de ______

Firma del primer declarante:

Firma del cónyuge: (obligatoria en caso de matrimonios en tributación conjunta)

Figure B1: Personal Income Tax Form D-100, 2007

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Página 2**

Situación familiar

● Hijos y descendientes menores de 25 años o discapacitados que conviven con el/los contribuyente/s

	NIF	Primer apellido, segundo apellido y nombre (por este orden)	Fecha de nacimiento	Fecha de adopción o de acogimiento	Minusvalía (clave)	Vinculación (*)	Otras situaciones
1.º	80	81	82	83	84	85	86
2.º	80	81	82	83	84	85	86
3.º	80	81	82	83	84	85	86
4.º	80	81	82	83	84	85	86
5.º	80	81	82	83	84	85	86
6.º	80	81	82	83	84	85	86
7.º	80	81	82	83	84	85	86
8.º	80	81	82	83	84	85	86
9.º	80	81	82	83	84	85	86
10.º	80	81	82	83	84	85	86

(*) No se cumplimentará esta casilla cuando se trate de hijos o descendientes comunes del primer declarante y del cónyuge.

Si alguno de los hijos o descendientes incluidos en la relación anterior hubiera fallecido en el año 2007, indique el número de orden con el que figura relacionado y la fecha de fallecimiento ...

N.º de orden	Fecha de fallecimiento
87	88 2007
87	88 2007

● Ascendientes mayores de 65 años o discapacitados que conviven con el/los contribuyente/s al menos la mitad del período impositivo

NIF	Primer apellido, segundo apellido y nombre (por este orden)	Fecha de nacimiento	Minusvalía (clave)	Vinculación	Convivencia
90	91	92	93	94	95
90	91	92	93	94	95
90	91	92	93	94	95

Devengo

Atención: este apartado únicamente se cumplimentará en las declaraciones individuales de contribuyentes fallecidos en el ejercicio 2007 con anterioridad al día 31 de diciembre.

Fecha de finalización del período impositivo ... 100 Día Mes Año 2007

Opción de tributación

Indique la opción de tributación elegida (marque con una "X" la casilla que proceda) ...
- **Tributación individual** ... 101
- **Tributación conjunta** ... 102

Atención: solamente podrán optar por el régimen de tributación conjunta los contribuyentes integrados en una unidad familiar.

Comunidad o Ciudad autónoma de residencia en el ejercicio 2007

Clave de la Comunidad Autónoma o de la Ciudad con Estatuto de Autonomía en la que tuvo/tuvieron su residencia habitual en 2007 *(véase la Guía)* ... 103

Asignación tributaria a la Iglesia Católica

Si desea que se destine un 0,7 por 100 de la cuota íntegra al sostenimiento económico de la Iglesia Católica, marque con una "X" esta casilla ... 105

Asignación de cantidades a fines sociales

Atención: esta asignación es independiente y compatible con la asignación tributaria a la Iglesia Católica.

Si desea que se destine un 0,7 por 100 de la cuota íntegra a los fines sociales previstos en el Real Decreto 825/1998, de 15 de julio (BOE del 28), marque con una "X" esta casilla *(véase la Guía)* ... 106

Solicitud del borrador de la declaración o de los datos fiscales del ejercicio 2008

Si desea/n que para el próximo ejercicio 2008 la Agencia Tributaria le/s facilite un borrador de la declaración o, en su defecto, los datos fiscales de dicho ejercicio, marque con una "X" esta casilla ... 110

En caso de matrimonio, si desea/n el envío individualizado del borrrador y/o de los datos fiscales del ejercicio 2008, marque con una "X" esta casilla *(véase la Guía)* ... 111

(En este caso, la Agencia Tributaria enviará por separado a cada cónyuge el borrador de su declaración, necesariamente en régimen de tributación individual, y/o los datos fiscales que individualmente le correspondan)

Declaración complementaria

Si esta declaración es complementaria de otra declaración anterior del mismo ejercicio 2007, indíquelo marcando con una "X" esta casilla, salvo que proceda marcar la casilla 123 ... 120

Si la declaración complementaria está motivada por haber percibido atrasos de rendimientos del trabajo después de la presentación de la declaración anterior del ejercicio 2007 o si se trata de una declaración complementaria presentada en cumplimiento de lo dispuesto en el artículo 14.3 de la Ley del Impuesto, marque con una "X" esta casilla además de marcar la casilla 120 ... 121

Si la declaración complementaria está motivada por haberse producido, después de la presentación de la declaración anterior del ejercicio 2007, alguno de los supuestos especiales que se señalan en la Guía de la declaración, marque con una "X" esta casilla además de marcar la casilla 120 ... 122

Si de la declaración complementaria resulta una cantidad a devolver inferior a la solicitada en la declaración anterior y dicha devolución no hubiera sido todavía efectuada por la Agencia Tributaria, indíquelo marcando con una "X" esta casilla. (En este supuesto, no marque ninguna de las casillas 120 a 122 anteriores) ... 123

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Página 3**

A Rendimientos del trabajo

Retribuciones dinerarias (incluidas las pensiones compensatorias y las anualidades por alimentos no exentas). Importe íntegro				001
	Valoración	Ingresos a cuenta	Ingresos a cuenta repercutidos	Importe íntegro (002 + 003 – 004)
Retribuciones en especie (excepto contribuciones empresariales a Planes de Pensiones y a Mutualidades de Previsión Social)	002	003	004	005
Contribuciones empresariales a planes de pensiones, planes de previsión social empresarial y mutualidades de previsión social. Importes imputados al contribuyente				006
Aportaciones al patrimonio protegido de las personas con discapacidad del que es titular el contribuyente. Importe computable				007
Reducciones (artículo 18, apartados 2 y 3, y disposiciones transitorias 11.ª y 12.ª de la Ley del Impuesto). Importe *(véase la Guía)*			008	
Total ingresos íntegros computables (001 + 005 + 006 + 007 – 008)				009
Cotizaciones a la Seguridad Social o a mutualidades generales obligatorias de funcionarios, detracciones por derechos pasivos y cotizaciones a los colegios de huérfanos o entidades similares			010	
Cuotas satisfechas a sindicatos			011	
Cuotas satisfechas a colegios profesionales (si la colegiación es obligatoria y con un máximo de 500 euros anuales)			012	
Gastos de defensa jurídica derivados directamente de litigios con el empleador (máximo: 300 euros anuales)			013	
Total gastos deducibles (010 + 011 + 012 + 013)				014
Rendimiento neto (009 – 014)				015
Reducción de rendimientos acogidos al régimen especial "Copa América 2007" (artículo 13 del Real Decreto 2146/2004). *Véase la Guía*			016	
Reducción por obtención de rendimientos del trabajo (artículo 20 de la Ley del Impuesto):				
Cuantía aplicable con carácter general *(véase la Guía)*			017	
Incremento para trabajadores activos mayores de 65 años que continúen o prolonguen la actividad laboral *(véase la Guía)*			018	
Incremento para contribuyentes desempleados que acepten un puesto de trabajo que exija el traslado de su residencia a un nuevo municipio *(véase la Guía)*			019	
Reducción adicional para trabajadores activos que sean personas con discapacidad *(véase la Guía)*			020	
Rendimiento neto reducido (015 – 016 – 017 – 018 – 019 – 020)				021

B Rendimientos del capital mobiliario

● Rendimientos del capital mobiliario a integrar en la base imponible del ahorro

Intereses de cuentas, depósitos y activos financieros en general (*)		022
Intereses de activos financieros con derecho a la bonificación prevista en la disposición transitoria 11.ª de la Ley del Impuesto sobre Sociedades (*)		023
Dividendos y demás rendimientos por la participación en fondos propios de entidades *(véase la Guía)*		024
Rendimientos procedentes de la transmisión o amortización de Letras del Tesoro		025
Rendimientos procedentes de la transmisión, amortización o reembolso de otros activos financieros (*)		026
Rendimientos procedentes de contratos de seguro de vida o invalidez y de operaciones de capitalización		027
Rendimientos procedentes de rentas que tengan por causa la imposición de capitales y otros rendimientos del capital mobiliario a integrar en la base imponible del ahorro		028
(*) *Salvo que procedan de entidades vinculadas con el contribuyente, en cuyo caso formarán parte de la base imponible general.*		
Total ingresos íntegros (022 + 023 + 024 + 025 + 026 + 027 + 028)		029
Gastos fiscalmente deducibles: gastos de administración y depósito de valores negociables, exclusivamente		030
Rendimiento neto (029 – 030)		031
Reducción aplicable a rendimientos derivados de determinados contratos de seguro (disposición transitoria 4.ª de la Ley del Impuesto). *Véase la Guía*	032	
Rendimiento neto reducido (031 – 032)		035

● Rendimientos del capital mobiliario a integrar en la base imponible general

Rendimientos procedentes del arrendamiento de bienes muebles, negocios o minas o de subarrendamientos		040
Rendimientos procedentes de la prestación de asistecia técnica, salvo en el ámbito de una actividad económica		041
Rendimientos procedentes de la propiedad intelectual cuando el contribuyente no sea el autor		042
Rendimientos procedentes de la propiedad industrial que no se encuentre afecta a una actividad económica		043
Otros rendimientos del capital mobiliario a integrar en la base imponible general		044
Total ingresos íntegros (040 + 041 + 042 + 043 + 044)		045
Gastos fiscalmente deducibles *(exclusivamente los que se indican en la Guía de la declaración)*		046
Rendimiento neto (045 – 046)		047
Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular (artículo 26.2 de la Ley del Impuesto)	048	
Rendimiento neto reducido (047 – 048)		050

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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C Bienes inmuebles no afectos a actividades económicas, excluida la vivienda habitual e inmuebles asimilados

Si procediera relacionar más de tres inmuebles en este apartado, indique el número de hojas adicionales que se adjuntan ....

• Bienes inmuebles a disposición de sus titulares y bienes inmuebles arrendados o cedidos a terceros

Inmueble 1

Contribuyente titular	Titularidad (%)	Naturaleza: clave (*)	Uso o destino: clave (*)	Situación: clave (*)	Referencia catastral
060	061	062	063	064	065

(*) Véase la Guía.

Inmuebles a disposición de sus propietarios o usufructuarios: Parte del inmueble que está a disposición (%): 066 Período computable (número de días): 067 **Renta inmobiliaria imputada** *(véase la Guía)* 068

Inmuebles arrendados o cedidos a terceros y constitución o cesión de derechos o facultades de uso o disfrute sobre los mismos:

Ingresos íntegros computables 069

Gastos deducibles: Intereses de los capitales invertidos en la adquisición o mejora y gastos de reparación y conservación: { Importe que se aplica en esta declaración (como máximo, el importe de la casilla 069) ..... 070 / Pendiente de deducir en los 4 años siguientes 071

Otros gastos fiscalmente deducibles 072

Rendimiento neto (069 – 070 – 072) 073

Reducción por arrendamiento de inmuebles destinados a vivienda (artículo 23.2 de la Ley del Impuesto). Importe *(véase la Guía)* 074

Reducción por rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular (artículo 23.3 de la Ley del Impuesto). Importe *(véase la Guía)* 075

Rendimiento mínimo computable en caso de parentesco (artículo 24 de la Ley del Impuesto). *Véase la Guía* 076

Rendimiento neto reducido del capital inmobiliario: la cantidad mayor de (073 – 074 – 075) y 076 077

Inmueble 2

Contribuyente titular	Titularidad (%)	Naturaleza: clave (*)	Uso o destino: clave (*)	Situación: clave (*)	Referencia catastral
060	061	062	063	064	065

(*) Véase la Guía.

Inmuebles a disposición de sus propietarios o usufructuarios: Parte del inmueble que está a disposición (%): 066 Período computable (número de días): 067 **Renta inmobiliaria imputada** *(véase la Guía)* 068

Inmuebles arrendados o cedidos a terceros y constitución o cesión de derechos o facultades de uso o disfrute sobre los mismos:

Ingresos íntegros computables 069

Gastos deducibles: Intereses de los capitales invertidos en la adquisición o mejora y gastos de reparación y conservación: { Importe que se aplica en esta declaración (como máximo, el importe de la casilla 069) ..... 070 / Pendiente de deducir en los 4 años siguientes 071

Otros gastos fiscalmente deducibles 072

Rendimiento neto (069 – 070 – 072) 073

Reducción por arrendamiento de inmuebles destinados a vivienda (artículo 23.2 de la Ley del Impuesto). Importe *(véase la Guía)* 074

Reducción por rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular (artículo 23.3 de la Ley del Impuesto). Importe *(véase la Guía)* 075

Rendimiento mínimo computable en caso de parentesco (artículo 24 de la Ley del Impuesto). *Véase la Guía* 076

Rendimiento neto reducido del capital inmobiliario: la cantidad mayor de (073 – 074 – 075) y 076 077

Inmueble 3

Contribuyente titular	Titularidad (%)	Naturaleza: clave (*)	Uso o destino: clave (*)	Situación: clave (*)	Referencia catastral
060	061	062	063	064	065

(*) Véase la Guía.

Inmuebles a disposición de sus propietarios o usufructuarios: Parte del inmueble que está a disposición (%): 066 Período computable (número de días): 067 **Renta inmobiliaria imputada** *(véase la Guía)* 068

Inmuebles arrendados o cedidos a terceros y constitución o cesión de derechos o facultades de uso o disfrute sobre los mismos:

Ingresos íntegros computables 069

Gastos deducibles: Intereses de los capitales invertidos en la adquisición o mejora y gastos de reparación y conservación: { Importe que se aplica en esta declaración (como máximo, el importe de la casilla 069) ..... 070 / Pendiente de deducir en los 4 años siguientes 071

Otros gastos fiscalmente deducibles 072

Rendimiento neto (069 – 070 – 072) 073

Reducción por arrendamiento de inmuebles destinados a vivienda (artículo 23.2 de la Ley del Impuesto). Importe *(véase la Guía)* 074

Reducción por rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular (artículo 23.3 de la Ley del Impuesto). Importe *(véase la Guía)* 075

Rendimiento mínimo computable en caso de parentesco (artículo 24 de la Ley del Impuesto). *Véase la Guía* 076

Rendimiento neto reducido del capital inmobiliario: la cantidad mayor de (073 – 074 – 075) y 076 077

• Rentas totales derivadas de los bienes inmuebles no afectos a actividades económicas

Suma de rentas inmobiliarias imputadas derivadas de los inmuebles a disposición de sus propietarios o usufructuarios (suma de las casillas 068) 080

Suma de rendimientos netos reducidos del capital inmobiliario derivados de los inmuebles arrendados o cedidos a terceros (suma de las casillas 077) 085

D Bienes inmuebles urbanos afectos a actividades económicas

Si procediera relacionar más de cinco inmuebles en este apartado, indique el número de hojas adicionales que se adjuntan ....

	Contribuyente titular	Titularidad (%)	Situación *(véase la Guía)*	Referencia catastral
Inmueble 1	090	091	092	093
Inmueble 2	090	091	092	093
Inmueble 3	090	091	092	093
Inmueble 4	090	091	092	093
Inmueble 5	090	091	092	093

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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E1 **Rendimientos de actividades económicas en estimación directa**

Si el número de actividades económicas previsto en esta hoja resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

● Actividades económicas realizadas y rendimientos obtenidos

	Actividad 1.ª	Actividad 2.ª	Actividad 3.ª
Actividades realizadas			
Contribuyente que realiza la/s actividad/es	100	100	100
Tipo de actividad/es realizada/s: clave indicativa (*véase la Guía*)	101	101	101
Grupo o epígrafe IAE (de la actividad principal en caso de realizar varias actividades del mismo tipo)	102	102	102
Modalidad aplicable del método de estimación directa	Normal 103 / Simplificada 104	Normal 103 / Simplificada 104	Normal 103 / Simplificada 104
Si para la imputación temporal de los rendimientos opta por la aplicación del criterio de cobros y pagos, consigne una "X" (*Véase la Guía*)	105	105	105
Atención: *la opción se referirá necesariamente a todas las actividades del mismo titular.*			
Ingresos íntegros			
Ingresos de explotación	106	106	106
Otros ingresos (incluidas subvenciones y otras transferencias)	107	107	107
Autoconsumo de bienes y servicios	108	108	108
Total ingresos computables (106 + 107 + 108)	109	109	109
Gastos fiscalmente deducibles			
Consumos de explotación	110	110	110
Sueldos y salarios	111	111	111
Seguridad Social a cargo de la empresa (incluidas las cotizaciones del titular)	112	112	112
Otros gastos de personal	113	113	113
Arrendamientos y cánones	114	114	114
Reparaciones y conservación	115	115	115
Servicios de profesionales independientes	116	116	116
Suministros	117	117	117
Otros servicios exteriores	118	118	118
Tributos fiscalmente deducibles	119	119	119
Gastos financieros	120	120	120
Amortizaciones: dotaciones del ejercicio fiscalmente deducibles	121	121	121
Incentivos al mecenazgo. Convenios de colaboración en actividades de interés general	122	122	122
Incentivos al mecenazgo. Gastos en actividades de interés general	123	123	123
Otros gastos fiscalmente deducibles (excepto provisiones)	124	124	124
Suma (110 a 124)	125	125	125
Actividades en estimación directa (modalidad normal):			
Provisiones: dotaciones del ejercicio fiscalmente deducibles	126	126	126
Total gastos deducibles (125 + 126)	127	127	127
Actividades en estimación directa (modalidad simplificada):			
Diferencia (109 – 125)	128	128	128
Provisiones deducibles y gastos de difícil justificación (*véase la Guía*)	129	129	129
Total gastos deducibles (125 + 129)	130	130	130
Rendimiento neto y rendimiento neto total			
Rendimiento neto (109 – 127 o 109 – 130)	131	131	131
Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular (artículo 32.1 de la Ley del Impuesto). *Véase la Guía*	132	132	132
Diferencia (131 – 132)	133	133	133
Rendimientos acogidos al régimen especial "Copa América 2007" Reducción (artículo 13 del Real Decreto 2146/2004)	134	134	134
Rendimiento neto reducido (133 – 134)	135	135	135

● Rendimiento neto reducido total de las actividades económicas en estimación directa

Suma de rendimientos netos reducidos (suma de las casillas 135)	136
Reducción por el ejercicio de determinadas actividades económicas (artículo 32.2 de la Ley del Impuesto y artículo 26 del Reglamento). *Véase la Guía*	137
Rendimiento neto reducido total (136 – 137)	140

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Página 6**

E2 Rendimientos de actividades económicas (excepto agrícolas, ganaderas y forestales) en estimación objetiva

Si el número de actividades económicas previsto en esta hoja resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

● Actividades económicas realizadas y rendimientos obtenidos

Actividad 1.ª

Contribuyente titular de la actividad 150

Clasificación IAE (grupo o epígrafe) 151

MÓDULOS

	Definición	N.º de unidades	Rendimiento por módulo antes de amortización
1			
2			
3			
4			
5			
6			
7			

Rendimiento neto previo (suma) 152

Minoraciones: *(véase la Guía)*

Minoración por incentivos al empleo 153

Minoración por incentivos a la inversión 154

Rendimiento neto minorado (152 – 153 – 154) 155

Índices correctores *(véase la Guía)*

1. Índice corrector especial 156
2. Índice corrector para empresas de pequeña dimensión 157
3. Índice corrector de temporada 158
4. Índice corrector de exceso 159
5. Índice corrector por inicio de nueva actividad 160

Rendimiento neto de módulos 161

Gastos extraordinarios por circunstancias excepcionales 162
(véase la Guía)

Otras percepciones empresariales 163
(véase la Guía)

Rendimiento neto de la actividad (161 – 162 + 163).... 164

Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular 165
(artículo 32.1 de la Ley del Impuesto)

Rendimiento neto reducido (164 – 165) 168

Actividad 2.ª

Contribuyente titular de la actividad 150

Clasificación IAE (grupo o epígrafe) 151

MÓDULOS

	Definición	N.º de unidades	Rendimiento por módulo antes de amortización
1			
2			
3			
4			
5			
6			
7			

Rendimiento neto previo (suma) 152

Minoraciones: *(véase la Guía)*

Minoración por incentivos al empleo 153

Minoración por incentivos a la inversión 154

Rendimiento neto minorado (152 – 153 – 154) 155

Índices correctores *(véase la Guía)*

1. Índice corrector especial 156
2. Índice corrector para empresas de pequeña dimensión 157
3. Índice corrector de temporada 158
4. Índice corrector de exceso 159
5. Índice corrector por inicio de nueva actividad 160

Rendimiento neto de módulos 161

Gastos extraordinarios por circunstancias excepcionales 162
(véase la Guía)

Otras percepciones empresariales 163
(véase la Guía)

Rendimiento neto de la actividad (161 – 162 + 163).... 164

Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular 165
(artículo 32.1 de la Ley del Impuesto)

Rendimiento neto reducido (164 – 165) 168

● Rendimiento neto reducido total de las actividades económicas (excepto agrícolas, ganaderas y forestales) en estimación objetiva

Rendimiento neto reducido total (suma de las casillas 168) 170

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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E3 Rendimientos de actividades agrícolas, ganaderas y forestales en estimación objetiva

Si el número de actividades económicas previsto en esta hoja resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

● Actividades agrícolas, ganaderas y forestales realizadas y rendimientos obtenidos

Actividad 1.ª

Contribuyente titular de la actividad 171

Actividad realizada. Clave (*véase la Guía*) 172

Si para la imputación temporal opta por el criterio de cobros y pagos, consigne una "X" (*véase la Guía*) 173

Atención: *la opción se referirá necesariamente a todas las actividades del mismo titular.*

PRODUCTOS	Ingresos íntegros	Índice	Rendimiento base producto
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
Total ingresos 174			

Rendimiento neto previo (suma de rendimientos base) 175

Amortización del inmovilizado material e inmaterial 178

Rendimiento neto minorado (175 – 178) 179

Índices correctores (*véase la Guía*)

1. Por utilización de medios de producción ajenos en actividades agrícolas 180
2. Por utilización de personal asalariado 181
3. Por cultivos realizados en tierras arrendadas 182
4. Por piensos adquiridos a terceros en más del 50 por 100 183
5. Por actividades de agricultura ecológica 184
6. Por ser empresa cuyo rdto. neto minorado no supera 9.447,91 euros 185
7. Índice corrector en determinadas actividades forestales 186

Rendimiento neto de módulos 187

Reducción agricultores jóvenes (*véase la Guía*) 190
(disposición adicional sexta de la Ley del Impuesto)

Gastos extraordinarios por circunstancias excepcionales 191
(*Véase la Guía*)

Rendimiento neto de la actividad (187 – 190 – 191)....... 192

Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular 193
(artículo 32.1 de la Ley del Impuesto)

Rendimiento neto reducido (192 – 193) 194

Actividad 2.ª

Contribuyente titular de la actividad 171

Actividad realizada. Clave (*véase la Guía*) 172

Si para la imputación temporal opta por el criterio de cobros y pagos, consigne una "X" (*véase la Guía*) 173

Atención: *la opción se referirá necesariamente a todas las actividades del mismo titular.*

PRODUCTOS	Ingresos íntegros	Índice	Rendimiento base producto
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
Total ingresos 174			

Rendimiento neto previo (suma de rendimientos base) 175

Amortización del inmovilizado material e inmaterial 178

Rendimiento neto minorado (175 – 178) 179

Índices correctores (*véase la Guía*)

1. Por utilización de medios de producción ajenos en actividades agrícolas 180
2. Por utilización de personal asalariado 181
3. Por cultivos realizados en tierras arrendadas 182
4. Por piensos adquiridos a terceros en más del 50 por 100 183
5. Por actividades de agricultura ecológica 184
6. Por ser empresa cuyo rdto. neto minorado no supera 9.447,91 euros 185
7. Índice corrector en determinadas actividades forestales 186

Rendimiento neto de módulos 187

Reducción agricultores jóvenes (*véase la Guía*) 190
(disposición adicional sexta de la Ley del Impuesto)

Gastos extraordinarios por circunstancias excepcionales 191
(*Véase la Guía*)

Rendimiento neto de la actividad (187 – 190 – 191)....... 192

Reducciones de rendimientos generados en más de 2 años u obtenidos de forma notoriamente irregular 193
(artículo 32.1 de la Ley del Impuesto)

Rendimiento neto reducido (192 – 193) 194

● Rendimiento neto reducido total de las actividades agrícolas, ganaderas y forestales en estimación objetiva

Rendimiento neto reducido total (suma de las casillas 194) 195

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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F **Regímenes especiales** (salvo los regímenes especiales de imputación de rentas inmobiliarias y para trabajadores desplazados)

● Régimen de atribución de rentas: rendimientos del capital y de actividades económicas y ganancias y pérdidas patrimoniales

Entidades y contribuyentes partícipes:	Entidad 1.ª	Entidad 2.ª	Entidad 3.ª	
Contribuyente que es socio, comunero o partícipe de la entidad	200	200	200	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....
NIF de la entidad en régimen de atribución de rentas	201	201	201	
Porcentaje de participación del contribuyente en la entidad	202 %	202 %	202 %	
Rendimientos del capital mobiliario:				
Rendimientos a integrar en la base imponible general:				
Rendimiento neto atribuido por la entidad	203	203	203	
Reducciones y minoraciones aplicables (*véase la Guía*)	204	204	204	Total
Rendimiento neto computable (203 – 204)	205	205	205	220
Rendimientos a integrar en la base imponible del ahorro:				Total
Rendimiento neto atribuido por la entidad. Importe computable	206	206	206	221
Rendimientos del capital inmobiliario:				
Rendimiento neto atribuido por la entidad	209	209	209	
Reducciones y minoraciones aplicables (*véase la Guía*)	210	210	210	Total
Rendimiento neto computable (209 – 210)	211	211	211	222
Rendimientos de actividades económicas:				
Rendimiento neto atribuido por la entidad	212	212	212	
Reducciones y minoraciones aplicables (*véase la Guía*)	213	213	213	Total
Rendimiento neto computable (212 – 213)	214	214	214	223
Ganancias y pérdidas patrimoniales imputables a 2007:				
No derivadas de la transmisión de elementos patrimoniales:				Total
Ganancias patrimoniales atribuidas por la entidad	215	215	215	224
Pérdidas patrimoniales atribuidas por la entidad	216	216	216	225
Derivadas de la transmisión de elementos patrimoniales:				Total
Ganancias patrimoniales atribuidas por la entidad	217	217	217	226
Pérdidas patrimoniales atribuidas por la entidad	218	218	218	227
Retenciones e ingresos a cuenta:				Total
Retenciones e ingresos a cuenta atribuidos	219	219	219	746

● Imputaciones de agrupaciones de interés económico y uniones temporales de empresas (arts. 48 a 52 del texto refundido de la LIS)

	Entidad 1.ª	Entidad 2.ª	Entidad 3.ª	
Contribuyente a quien corresponden las imputaciones	230	230	230	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....
Nº de identificación fiscal (NIF) de la entidad	231	231	231	
Criterio de imputación temporal. Clave (*véase la Guía*)	232	232	232	
Imputaciones de bases imponibles y deducciones:				Total
Base imponible imputada	233	233	233	245
Deducciones por inversión empresarial (bases imputadas)	234	234	234	
Deducciones por creación de empleo (importe deducible imputado)	235	235	235	
Deducción por rentas obtenidas en Ceuta o Melilla (base imputada)	236	236	236	
Deducción por doble imposición internacional (base imputada)	237	237	237	
Imputaciones de retenciones e ingresos a cuenta:				Total
Retenciones e ingresos a cuenta imputados	239	239	239	747

● Imputaciones de rentas en el régimen de transparencia fiscal internacional (art.º 91 de la Ley del Impuesto)

	Entidad 1.ª	Entidad 2.ª	Entidad 3.ª	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....
Contribuyente que debe efectuar la imputación	250	250	250	
Denominación de la entidad no residente participada	251	251	251	
Criterio de imputación temporal. Clave (*véase la Guía*)	252	252	252	Total
Importe de la imputación	253	253	253	255

● Imputación de rentas por la cesión de derechos de imagen (art.º 92 de la Ley del Impuesto)

Contribuyente que debe efectuar la imputación como consecuencia de la cesión del derecho de imagen	260
Persona o entidad primera cesionaria de los derechos de imagen: NIF (si es residente en territorio español) o denominación	261
Persona o entidad con la que el contribuyente mantiene la relación laboral: NIF (si es residente en territorio español) o denominación	262
Cantidad a imputar	265

● Imputación de rentas por la participación en Instituciones de Inversión Colectiva constituidas en paraísos fiscales (art.º 95 de la Ley del Impuesto)

	Institución Inv. Colectiva 1.ª	Institución Inv. Colectiva 2.ª	Institución Inv. Colectiva 3.ª	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....
Contribuyente que debe efectuar la imputación	270	270	270	
Denominación de la Institución de Inversión Colectiva	271	271	271	Total
Importe de la imputación	272	272	272	275

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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G1 Ganancias y pérdidas patrimoniales que no derivan de la transmisión de elementos patrimoniales

• Premios obtenidos por la participación en juegos, concursos, rifas o combinaciones aleatorias

	Valoración	Ingresos a cuenta	Ingresos a cuenta repercutidos	Importe computable (301 + 302 – 303)
Premios en metálico. Importe total				300
Premios en especie	301	302	303	304

• Otras ganancias y pérdidas patrimoniales que no derivan de la transmisión de elementos patrimoniales

Subvenciones o ayudas destinadas a la adquisición o rehabilitación de la vivienda habitual o a la reparación de defectos estructurales en la misma. Importe imputable a 2007	310
Ganancias patrimoniales obtenidas por los vecinos en 2007 como consecuencia de aprovechamientos forestales en montes públicos	311
Otras ganancias patrimoniales imputables a 2007, no derivadas de la transmisión de elementos patrimoniales	312
Pérdidas patrimoniales imputables a 2007, no derivadas de la transmisión de elementos patrimoniales	313

G2 Ganancias y pérdidas patrimoniales derivadas de la transmisión de elementos patrimoniales

• Ganancias y pérdidas patrimoniales sometidas a retención o ingreso a cuenta derivadas de transmisiones o reembolsos de acciones o participaciones de instituciones de inversión colectiva (sociedades y fondos de Inversión)

Acciones o participaciones transmitidas y titulares:	Sociedad / Fondo 1	Sociedad / Fondo 2	Sociedad / Fondo 3	Totales
Contribuyente titular de las acciones o participaciones	320	320	320	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan
NIF de la sociedad o fondo de Inversión	321	321	321	
Resultados netos:				
Positivos: Ganancias patrimoniales netas	322	322	322	329
Negativos: Pérdidas patrimoniales netas	323	323	323	330

• Ganancias y pérdidas patrimoniales derivadas de transmisiones de acciones o participaciones negociadas en mercados oficiales

Acciones o participaciones transmitidas y titulares:	Entidad emisora 1	Entidad emisora 2	Entidad emisora 3	Totales
Contribuyente titular de los valores transmitidos	340	340	340	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan
Denominación de los valores transmitidos (entidad emisora)	341	341	341	
Importe global de las transmisiones efectuadas en 2007	342	342	342	
Valor de adquisición global de los valores transmitidos	343	343	343	
Resultados:				
Ganancias patrimoniales. Importe obtenido	344	344	344	
Ganancias patrimoniales. Importe reducido	345	345	345	349
Pérdidas patrimoniales. Importe obtenido	346	346	346	
Pérdidas patrimoniales. Importe imputable a 2007	347	347	347	350

• Ganancias y pérdidas patrimoniales derivadas de transmisiones de otros elementos patrimoniales

Titularidad y datos del elemento patrimonial transmitido:	Elemento patrimonial 1	Elemento patrimonial 2	Totales
Contribuyente titular del elemento patrimonial transmitido	360	360	Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan
Tipo de elemento patrimonial. Clave (*véase la Guía*)	361	361	
En caso de inmuebles: Situación. Clave (*véase la Guía*)	362	362	
Referencia catastral	363	363	
Fechas y valores de transmisión y de adquisición:			
Fecha de transmisión (día, mes y año)	364	364	
Fecha de adquisición (día, mes y año)	365	365	
Valor de transmisión	366	366	
Valor de adquisición (actualizado en caso de inmuebles)	367	367	
Si la diferencia [366] – [367] es negativa:			
Pérdida patrimonial obtenida: diferencia (366 – 367) negativa	368	368	
Pérdida patrimonial imputable a 2007	369	369	383
Si la diferencia [366] – [367] es positiva:			
Ganancia patrimonial obtenida: diferencia (366 – 367) positiva	370	370	
Elementos no afectos a actividades económicas:			
Parte de la ganancia patrimonial susceptible de reducción	371	371	
N.º de años de permanencia hasta el 31-12-1994, en su caso	372	372	
Reducción aplicable (disp. transitoria 9.ª de la Ley del Impuesto)	373	373	
Ganancia patrimonial reducida (370 – 373)	374	374	
Ganancia exenta por reinversión (sólo vivienda habitual)	375	375	
Ganancia patrimonial reducida no exenta (374 – 375)	376	376	
Ganancia patrimonial reducida no exenta imputable a 2007	377	377	384
Elementos afectos a actividades económicas:			
Reducción (licencia municipal autotaxis en estimación objetiva)	378	378	
Ganancia patrimonial reducida (370 – 378)	379	379	
Ganancia patrimonial reducida imputable a 2007	380	380	385

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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G2 Ganancias y pérdidas patrimoniales derivadas de la transmisión de elementos patrimoniales (continuación)

● Imputación a 2007 de ganancias y pérdidas patrimoniales derivadas de transmisiones efectuadas en ejercicios anteriores

Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan .... ☐

Imputación de ganancias patrimoniales:	Ganancia patrimonial 1	Ganancia patrimonial 2	Ganancia patrimonial 3	Total
Contribuyente a quien corresponde la imputación	390	390	390	
Importe de la ganancia patrimonial que procede imputar a 2007	391	391	391	395

Imputación de pérdidas patrimoniales:	Pérdida patrimonial 1	Pérdida patrimonial 2	Pérdida patrimonial 3	Total
Contribuyente a quien corresponde la imputación	400	400	400	
Importe de la pérdida patrimonial que procede imputar a 2007	401	401	401	405

● Imputación a 2007 de ganancias patrimoniales acogidas a diferimiento por reinversión (derivadas de elementos afectos a actividades económicas)

Si las columnas previstas en este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan .... ☐

Imputación de ganancias patrimoniales:	Ganancia patrimonial 1	Ganancia patrimonial 2	Ganancia patrimonial 3	Total
Contribuyente a quien corresponde la imputación diferida	410	410	410	
Importe de la ganancia patrimonial que procede imputar a 2007	411	411	411	415
Método de integración. Clave *(véase la Guía)*	412	412	412	

G3 Exención por reinversión de la ganancia patrimonial obtenida en 2007 por la transmisión de la vivienda habitual

Importe obtenido por la transmisión de la vivienda habitual que es susceptible de reinversión a efectos de la exención *(véase la Guía)*............	420
Ganancia patrimonial obtenida como consecuencia de la transmisión de la vivienda habitual	421
Importe reinvertido hasta el 31-12-2007 en la adquisición de una nueva vivienda habitual	422
Importe que el contribuyente se compromete a reinvertir, en los dos años siguientes a la transmisión, en la adquisición de una nueva vivienda habitual	423
Ganancia patrimonial exenta por reinversión	424

G4 Opción por el régimen especial de fusiones, escisiones y canje de valores de entidades no residentes en España

Cumplimentarán este apartado los contribuyentes que, siendo socios de entidades no residentes en España, se hayan visto afectados en 2007 por operaciones de fusión, escisión o canje de valores realizadas por dichas entidades y que, deseando optar por el régimen especial previsto en el Capítulo VIII del Título VII del texto refundido de la Ley del Impuesto sobre Sociedades, deban hacerlo en la forma establecida en el artículo 43 del Reglamento de dicho Impuesto.

Contribuyente que opta:	430	N.º de operaciones:	431
Contribuyente que opta:	432	N.º de operaciones:	433

G5 Integración y compensación de las ganancias y pérdidas patrimoniales imputables a 2007

Ganancias y pérdidas patrimoniales a integrar en la base imponible general:

Suma de ganancias patrimoniales (224 + 300 + 304 + 310 + 311 + 312 + 415) ..	440	
Suma de pérdidas patrimoniales (225 + 313)	441	
Saldo neto de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible general .... Si la diferencia (440 – 441) es positiva		450
Si la diferencia (440 – 441) es negativa	442	

Ganancias y pérdidas patrimoniales a integrar en la base imponible del ahorro:

Suma de ganancias patrimoniales (226 + 329 + 349 + 384 + 385 + 395)	443	
Suma de pérdidas patrimoniales (227 + 330 + 350 + 383 + 405)	444	
Saldo neto de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible del ahorro .... Si la diferencia (443 – 444) es positiva		457
Si la diferencia (443 – 444) es negativa	445	

H Base imponible general y base imponible del ahorro

Base imponible general:

Saldo neto positivo de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible general	450
Saldos netos negativos de ganancias y pérdidas patrimoniales de 2003 a 2006 a integrar en la parte general de la renta del período impositivo (como máximo, el importe de la casilla 450)	451
Saldo neto de los rendimientos a integrar en la base imponible general y de las imputaciones de renta .... (021 + 050 + 080 + 085 + 140 + 170 + 195 + 220 + 222 + 223 + 245 + 255 + 265 + 275)	452

Compensaciones (si la casilla 452 es positiva y con el límite conjunto del 25 por 100 de su importe):

Resto de los saldos netos negativos de ganancias y pérdidas patrimoniales de 2003 a 2006 a integrar en la parte general de la renta del período impositivo	453
Saldo neto negativo de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible general	454
Base imponible general (450 – 451 + 452 – 453 – 454)	455
Saldo neto negativo de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible general: importe pendiente de compensar en los 4 ejercicios siguientes (442 – 454)	456

Base imponible del ahorro:

Saldo neto positivo de las ganancias y pérdidas patrimoniales imputables a 2007 a integrar en la base imponible del ahorro	457

Compensación (si la casilla 457 es positiva y hasta el máximo de su importe):

Saldos netos negativos de ganancias y pérdidas patrimoniales de 2003 a 2006 a integrar en la parte especial de la renta del período impositivo	458
Saldo de los rendimientos del capital mobiliario a integrar en la base imponible del ahorro (suma de las casillas 035 y 221 de las páginas 3 y 8 de la declaración) .... Si el saldo es negativo ...	459
Si el saldo es positivo	460
Base imponible del ahorro (457 – 458 + 460)	465

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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I Reducciones de la base imponible

• Reducción por tributación conjunta

Reducción para unidades familiares que opten por la tributación conjunta. Importe *(véase la Guía)* 470

• Reducciones por aportaciones y contribuciones a sistemas de previsión social

Régimen general

Contribuyente que realiza, o a quien se imputan, las aportaciones y contribuciones	480	480	
Excesos pendientes de reducir de aportaciones y contribuciones de los ejercicios 2002 a 2006	481	481	
Aportaciones y contribuciones del ejercicio 2007. *Cuantía máxima: véase la Guía*	482	482	**Total con derecho a reducción**
Importes con derecho a reducción (481 + 482). *Límite máximo y condiciones: véase la Guía*	483	483	500

Aportaciones a sistemas de previsión social de los que es partícipe, mutualista o titular el cónyuge del contribuyente

Total con derecho a reducción *Límite máximo y condiciones: véase la Guía* 505

• Reducciones por aportaciones y contribuciones a sistemas de previsión social constituidos a favor de personas con discapacidad

Contribuyente que realiza las aportaciones con derecho a reducción	510	510
N.º de identificación fiscal (NIF) de la persona con discapacidad partícipe, mutualista o asegurada	511	511
Excesos pendientes de reducir de aportaciones y contribuciones de los ejercicios 2003 a 2006	512	512
Aportaciones realizadas en 2007 por la propia persona con discapacidad (*)	513	513
Aportaciones realizadas en 2007 por parientes o tutores de la persona con discapacidad (*)	514	514

Si las dos columnas de este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....

(*) *Cuantía máxima: véase la Guía.*

Total con derecho a reducción. *Límite máximo y condiciones: véase la Guía* 530

• Reducciones por aportaciones a patrimonios protegidos de personas con discapacidad

Contribuyente que realiza las aportaciones con derecho a reducción	540	540
N.º de identificación fiscal (NIF) de la persona con discapacidad titular del patrimonio protegido	541	541
Excesos pendientes de reducir de aportaciones realizadas en los ejercicios 2004 a 2006	542	542
Aportaciones realizadas en 2007 al patrimonio protegido de la persona con discapacidad	543	543

Si las dos columnas de este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....

Total con derecho a reducción. *Límite máximo y condiciones: véase la Guía* 560

• Reducciones por pensiones compensatorias a favor del cónyuge y anualidades por alimentos, excepto en favor de los hijos

Contribuyente que abona las pensiones o anualidades	570	570
N.º de identificación fiscal (NIF) de la persona que recibe cada pensión o anualidad	571	571
Importe de la pensión o anualidad satisfecha en 2007 por decisión judicial	572	572

Si las dos columnas de este apartado fuesen insuficientes, indique el número de hojas adicionales que se adjuntan ....

Total con derecho a reducción 585

• Reducciones por aportaciones a la mutualidad de previsión social de deportistas profesionales

Contribuyente que realiza las aportaciones con derecho a reducción	590	590
Aportaciones realizadas en 2007 con derecho a reducción. *Cuantía máxima: véase la Guía*	591	591

Total con derecho a reducción. *Límite máximo y condiciones: véase la Guía* 600

J Base liquidable general y base liquidable del ahorro

• Determinación de la base liquidable general

Base imponible general (traslade el importe de esta misma casilla de la página 10 de la declaración) 455

Reducciones de la base imponible general (si la casilla 455 es positiva y hasta el límite máximo de su importe):

Por tributación conjunta. Importe de la casilla 470 que se aplica	610
Por aportaciones y contribuciones a sistemas de previsión social (régimen general). Importe de la casilla 500 que se aplica	611
Por aportaciones a sistemas de previsión social de los que es partícipe, mutualista o titular el cónyuge. Importe de la casilla 505 que se aplica	612
Por aportaciones y contribuciones a sistemas de previsión social constituidos a favor de personas con discapacidad. Importe de la casilla 530 que se aplica	613
Por aportaciones a patrimonios protegidos de personas con discapacidad. Importe de la casilla 560 que se aplica	614
Por pensiones compensatorias y anualidades por alimentos. Importe de la casilla 585 que se aplica	615
Por aportaciones a la mutualidad de previsión social de deportistas profesionales. Importe de la casilla 600 que se aplica	616
Cuotas de afiliación y demás aportaciones a los partidos políticos realizadas por afiliados, adheridos y simpatizantes (máx. con derecho a reducción: 600 euros)	617

Base liquidable general (455 – 610 – 611 – 612 – 613 – 614 – 615 – 616 – 617) 618

Compensación (si la casilla 618 es positiva y hasta el límite máximo de su importe): Bases liquidables generales negativas de 2003 a 2006 619

Base liquidable general sometida a gravamen (618 – 619) 620

• Determinación de la base liquidable del ahorro

Base imponible del ahorro (traslade el importe de esta misma casilla de la página 10 de la declaración) 465

Remanente de determinadas reducciones no aplicadas anteriormente (si la casilla 465 es positiva y hasta el límite máximo de su importe):

Reducción por tributación conjunta. Remanente de la casilla 470 que se aplica	621
Reducción por pensiones compensatorias y anualidades por alimentos. Remanente de la casilla 585 que se aplica	622
Cuotas de afiliación y demás aportaciones a los partidos políticos realizadas por afiliados, adheridos y simpatizantes. Importe no aplicado en la casilla 617	623

Base liquidable del ahorro (465 – 621 – 622 – 623) 630

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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K Reducciones de la base imponible no aplicadas en 2007 que podrán aplicarse en ejercicios siguientes

● Exceso no reducido de las aportaciones y contribuciones a sistemas de previsión social (régimen general)

Cumplimentarán este apartado los contribuyentes que, por insuficiencia de base imponible o por exceder del límite porcentual previsto en el artículo 52.1.a) de la Ley del Impuesto, no hubieran podido reducir en esta declaración la totalidad de las aportaciones y contribuciones del ejercicio 2007 que figuran en las casillas **482** de la página 11 de la declaración.

Contribuyente con derecho a reducción	640	640
Aportaciones y contribuciones de 2007 no aplicadas cuyo importe se solicita poder reducir en los 5 ejercicios siguientes *(véase la Guía)*	641	641

● Exceso no reducido de las aportaciones y contribuciones a sistemas de previsión social constituidos a favor de personas con discapacidad

Cumplimentarán este apartado los contribuyentes que, por insuficiencia de base imponible, no hubieran podido reducir en esta declaración la totalidad de las aportaciones y contribuciones del ejercicio 2007 que figuran en las casillas **513** ó **514** de la página 11 de la declaración.

Contribuyente con derecho a reducción	650	650
Aportaciones y contribuciones de 2007 no aplicadas cuyo importe se solicita poder reducir en los 5 ejercicios siguientes *(véase la Guía)*	651	651

● Exceso no reducido de las aportaciones a patrimonios protegidos de personas con discapacidad

Cumplimentarán este apartado los contribuyentes que, por exceder de los límites máximos establecidos o por insuficiencia de base imponible, no hubieran podido reducir en esta declaración la totalidad de las aportaciones y contribuciones del ejercicio 2007 que figuran en las casillas **543** de la página 11 de la declaración.

Contribuyente con derecho a reducción	660	660
Aportaciones de 2007 no aplicadas cuyo importe podrá reducirse en los 4 ejercicios siguientes *(véase la Guía)*	661	661

● Exceso no reducido de las aportaciones a la mutualidad de previsión social de deportistas profesionales

Cumplimentarán este apartado los contribuyentes que, por insuficiencia de base imponible o por exceder del límite previsto en el apartado Uno.5.a) de la disposición adicional undécima de la Ley del Impuesto, no hubieran podido reducir en esta declaración la totalidad de las aportaciones del ejercicio 2007 que figuran en las casillas **591** de la página 11 de la declaración.

Contribuyente con derecho a reducción	670	670
Aportaciones y contribuciones de 2007 no aplicadas cuyo importe se solicita poder reducir en los 5 ejercicios siguientes *(véase la Guía)*	671	671

L Adecuación del impuesto a las circunstancias personales y familiares: mínimo personal y familiar

Mínimo del contribuyente. Importe *(véase la Guía)*	680	Mínimo por ascendientes. Importe *(véase la Guía)*	682
Mínimo por descendientes. Importe *(véase la Guía)*	681	Mínimo por discapacidad. Importe *(véase la Guía)*	683

Mínimo personal y familiar (680 + 681 + 682 + 683) 684

Importe del mínimo personal y familiar que forma parte de la base liquidable general: la menor de las cantidades consignadas en las casillas 620 y 684 685
(Si la casilla 620 es negativa o igual a cero, consigne el número cero en la casilla 685)

Importe del mínimo personal y familiar que forma parte de la base liquidable del ahorro: la menor de la diferencia (684 – 685) y la casilla 630 686

M Cálculo del impuesto y resultado de la declaración

● Datos adicionales: rentas exentas con progresividad y anualidades por alimentos satisfechas a los hijos por decisión judicial

Atención: si cumplimenta alguna de estas casillas, la determinación de los importes a que se refieren las casillas **689**, **690**, **691** y **692** se realizará según las indicaciones específicas que figuran en la Guía de la declaración.

Importe de las rentas obtenidas que están exentas del IRPF, excepto para determinar el tipo de gravamen aplicable a las demás rentas *(véase la Guía)* 687

Importe de las anualidades por alimentos en favor de los hijos satisfechas por decisión judicial 688

● Determinación de los gravámenes estatal y autonómico

	Parte estatal	Parte autonómica
Gravamen de la base liquidable general:		
Aplicación de las escalas del Impuesto al importe de la casilla 620 . Importes resultantes *(véase la Guía)*	689	690
Aplicación de las escalas del Impuesto al importe de la casilla 685 . Importes resultantes *(véase la Guía)*	691	692
Cuotas correspondientes a la base liquidable general (693 = 689 – 691 ; 694 = 690 – 692)	693	694
Tipos medios de gravamen (TME = 693 x 100 ÷ 620 ; TMA = 694 x 100 ÷ 620)	TME	TMA
Gravamen de la base liquidable del ahorro:		
Base liquidable del ahorro sometida a gravamen (630 – 686) 695		
Cuotas correspondientes a la base liquidable del ahorro *(véase la Guía)* (Importes resultantes de la aplicación de los tipos de gravamen del ahorro al importe de la casilla 695).	696	697
Cuotas íntegras (698 = 693 + 696 ; 699 = 694 + 697)	698	699
Deducciones generales:		
Por inversión en vivienda habitual (traslade los importes de estas mismas casillas del anexo A)	700	701
Por inversiones o gastos de interés cultural (traslade los importes de estas mismas casillas del anexo A)	702	703
Por donativos (traslade los importes de estas mismas casillas del anexo A)	704	705
Deducciones en actividades económicas:		
Por incentivos y estímulos a la inversión empresarial (traslade los importes de estas mismas casillas del anexo C)	706	707
Por dotaciones a la Reserva para Inversiones en Canarias (Ley 19/1994) *(véase la Guía)*	708	709
Por rendimientos derivados de la venta de bienes corporales producidos en Canarias (Ley 19/1994) *(véase la Guía)*	710	711
Por rentas obtenidas en Ceuta o Melilla (traslade los importes de estas mismas casillas del anexo A)	712	713
Por cantidades depositadas en cuentas ahorro-empresa (traslade los importes de estas mismas casillas del anexo A)	714	715
Deducciones autonómicas (traslade el importe de esta misma casilla del anexo B.1, B.2 o B.3, según corresponda)		716
Cuota líquida estatal (698 – 700 – 702 – 704 – 706 – 708 – 710 – 712 – 714)	720	
Cuota líquida autonómica (699 – 701 – 703 – 705 – 707 – 709 – 711 – 713 – 715 – 716)		721

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

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M Cálculo del impuesto y resultado de la declaración (continuación)

• Determinación de los gravámenes estatal y autonómico (continuación)

Incremento de las cuotas líquidas por pérdida del derecho a determinadas deducciones de ejercicios anteriores:

		Parte estatal	Parte autonómica
Deducciones de 1996 y ejercicios anteriores:	Importe de las deducciones a las que se ha perdido el derecho en 2007	722	
	Intereses de demora correspondientes a las deducciones anteriores	723	
Deducciones generales de 1997 a 2006:	Importe de las deducciones a las que se ha perdido el derecho en 2007. Parte estatal	724	
	Intereses de demora correspondientes a las deducciones anteriores	725	
	Importe de las deducciones a las que se ha perdido el derecho en 2007. Parte autonómica		726
	Intereses de demora correspondientes a las deducciones anteriores		727
Deducciones autonómicas de 1998 a 2006:	Importe de las deducciones autonómicas a las que se ha perdido el derecho en 2007		728
	Intereses de demora correspondientes a las deducciones anteriores		729
Cuotas líquidas incrementadas (730 = 720 + 722 + 723 + 724 + 725 ; 731 = 721 + 726 + 727 + 728 + 729)		730	731

• Cuota resultante de la autoliquidación

Cuota líquida incrementada total (730 + 731)	732
Deducciones por doble imposición de dividendos pendientes de aplicar, procedentes de los ejercicios 2003 a 2006. Importe que se aplica	733
Deducción por doble imposición internacional, por razón de las rentas obtenidas y gravadas en el extranjero	734
Deducción por doble imposición internacional en los supuestos de aplicación del régimen de transparencia fiscal internacional	735
Deducción por doble imposición en los supuestos de aplicación del régimen de imputación de rentas derivadas de la cesión de derechos de imagen	736
Compensaciones fiscales:	
Por deducción en adquisición de vivienda habitual, para viviendas adquiridas antes del 20-01-2006 *(véase la Guía)*	737
Por percepción de determinados rendimientos del capital mobiliario con período de generación superior a dos años *(véase la Guía)*	738
Retenciones deducibles correspondientes a rendimientos bonificados (disposición transitoria 11.ª del texto refundido de la Ley del Impuesto sobre Sociedades)	
Importe de las retenciones no practicadas efectivamente que, no obstante, tienen la consideración de deducibles de la cuota	739
Cuota resultante de la autoliquidación (732 – 733 – 734 – 735 – 736 – 737 – 738 – 739)	741

• Retenciones y demás pagos a cuenta

Por rendimientos del trabajo	742	Ingresos a cuenta del artículo 92.8 de la Ley del Impuesto	748
Por rendimientos del capital mobiliario	743	Por ganancias patrimoniales, incluidos premios	749
Por arrendamientos de inmuebles urbanos	744	Pagos fraccionados ingresados (actividades económicas)	750
Por rendimientos de actividades económicas (*)	745	Bonificaciones programa PREVER (art. 3 de la Ley 39/1997)	751
Atribuidos por entidades en régimen de atribución de rentas	746	Cuotas del Impuesto sobre la Renta de no Residentes (**)	752
Imputados por agrupaciones de interés económico y UTE's	747	Retenciones art. 11 de la Directiva 2003/48/CE, del Consejo	753

(*) *Salvo las retenciones e ingresos a cuenta por arrendamientos de inmuebles urbanos, que se incluirán en la casilla anterior.*

(**) *Contribuyentes que hayan adquirido la condición de tales por cambio de residencia a territorio español.*

Total pagos a cuenta (suma de las casillas 742 a 753) — 754

• Cuota diferencial y resultado de la declaración

Cuota diferencial (741 – 754)		755
Deducción por maternidad	Importe de la deducción *(véase la Guía)*	756
	Importe del abono anticipado de la deducción correspondiente a 2007	757
Deducción por nacimiento o adopción	Importe de la deducción *(véase la Guía)*	758
	Importe del abono anticipado de la deducción	759
Resultado de la declaración (755 – 756 + 757 – 758 + 759)		760

N Regularización mediante declaración complementaria (sólo en caso de declaración complementaria del ejercicio 2007)

Resultados a ingresar de anteriores autoliquidaciones o liquidaciones administrativas correspondientes al ejercicio 2007	761
Devoluciones acordadas por la Administración como consecuencia de la tramitación de anteriores autoliquidaciones correspondientes al ejercicio 2007	762
Resultado de la declaración complementaria (760 – 761 + 762)	765

O Solicitud de suspensión del ingreso de un cónyuge / Renuncia del otro cónyuge al cobro de la devolución

Si el resultado de esta declaración es positivo (a ingresar). Cumplimentarán estas casillas los contribuyentes casados y no separados legalmente que tributen individualmente y que, al amparo de lo previsto en el artículo 97.6 de la Ley del Impuesto, deseen solicitar la suspensión del ingreso de la cantidad resultante de su declaración en el importe que se indica en la casilla **768**, por cumplir las condiciones establecidas en dicho artículo y, en particular, por haber renunciado su cónyuge al cobro efectivo de la devolución resultante de su declaración en un importe igual al del ingreso cuya suspensión se solicita.

Importe del resultado a ingresar de su declaración (casilla 760) cuya suspensión se solicita *(véase la Guía)*	768
Resto a ingresar del resultado de su declaración: diferencia (760 – 768) positiva o igual a cero	770

Si el resultado de esta declaración es negativo (a devolver). Cumplimentarán estas casillas los contribuyentes casados y no separados legalmente que tributen individualmente y que, al amparo de lo previsto en el artículo 97.6 de la Ley del Impuesto, deseen renunciar al cobro efectivo de la devolución resultante de su declaración en el importe que se indica en la casilla **769**, aceptando expresamente que dicha cantidad sea aplicada al pago del importe del resultado positivo de la declaración de su cónyuge cuya suspensión ha sido solicitada por éste.

Importe del resultado a devolver de su declaración (casilla 760) a cuyo cobro efectivo se renuncia *(véase la Guía)*	769
Resto del resultado de su declaración cuya devolución se solicita: diferencia (760 – 769) negativa o igual a cero. Si es negativa, consígnela con signo menos	770

Con independencia de que renuncie al cobro efectivo de la totalidad del resultado negativo de su declaración, sírvase consignar los datos de la cuenta en la que desearía recibir la devolución a la que eventualmente pudiera tener derecho como consecuencia de las posteriores comprobaciones realizadas por la Administración tributaria.

771 — Entidad | Oficina | DC | Número de cuenta

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Anexo A**

Deducción por inversión en vivienda habitual

• Adquisición, construcción, rehabilitación o ampliación de la vivienda habitual y cuentas vivienda. Inversión máxima deducible: 9.015 euros

	Inversión con derecho a deducción (*)		Parte estatal	Parte autonómica
Adquisición de la vivienda habitual	A	**Importe de la deducción** ... *(véase la Guía)*	780	781
Construcción, rehabilitación o ampliación de la vivienda habitual	B	**Importe de la deducción** ... *(véase la Guía)*	782	783
Cantidades depositadas en cuentas vivienda para la primera adquisición o rehabilitación de vivienda habitual	C (Importe con derecho a deducción (*))	**Importe de la deducción** ... *(véase la Guía)*	784	785

(*) *Los importes consignados en estas casillas tienen como límite máximo conjunto la cantidad de 9.015 euros.*

Identificación de cuentas vivienda:
Datos obligatorios para todos los contribuyentes que practiquen deducción por cantidades depositadas en cuentas vivienda.
Cada contribuyente sólo puede ser titular de una cuenta vivienda.

	Titular de la cuenta	Fecha de apertura	Entidad	Oficina	DC	Número de cuenta
Cuenta 1						
Cuenta 2						

• Obras e instalaciones de adecuación de la vivienda habitual de personas con discapacidad. Inversión máxima deducible: 12.020 euros

			Parte estatal	Parte autonómica
Cantidades satisfechas con derecho a deducción .... *(límite máximo: 12.020 euros)*	D	**Importe de la deducción** ... *(véase la Guía)*	786	787

• Importe total de la deducción por inversión en vivienda habitual

Deducción por inversión en vivienda habitual ....
- **Parte estatal** (780 + 782 + 784 + 786).............................. 700
- **Parte autonómica** (781 + 783 + 785 + 787)...................... 701

• Deducción por inversión en vivienda habitual: datos adicionales

En su caso, pagos efectuados al promotor o constructor de la vivienda habitual o de las obras e instalaciones de adecuación de la misma: Importe de los pagos realizados en el ejercicio al promotor o al constructor: 790 NIF del promotor o constructor: 791

En caso de deducción por adquisición de la vivienda habitual: Fecha de adquisición de la vivienda por la que se practica la deducción 792

Si la adquisición de la vivienda se financió, total o parcialmente, mediante un único préstamo hipotecario, consigne el número de identificación de dicho préstamo y la parte del mismo efectivamente destinada a la adquisición de la vivienda habitual. En caso de cambio de préstamo, consigne los datos del vigente a 31-12-2007.

Número de identificación del préstamo hipotecario .... 793 Porcentaje del importe total del préstamo hipotecario que se ha destinado efectivamente a la adquisición de la vivienda: 794

Deducción por inversiones o gastos de interés cultural

	Importes con derecho a deducción (*)	Porcentaje de deducción	Importe de la deducción
Inversiones y gastos para la protección y difusión del Patrimonio Histórico Español y de las ciudades, conjuntos y bienes situados en España declarados Patrimonio Mundial por la UNESCO	E	15 por 100	795

(*) Límite máximo: el 10 por 100 de la suma de las casillas **618** y **630** de la página 11 de la declaración.

Deducción por inversiones y gastos de interés cultural ....
- **Parte estatal:** el 67 por 100 de 795 702
- **Parte autonómica:** el 33 por 100 de 795 703

Deducciones por donativos

	Importe con derecho a deducción	Porcentaje de deducción	Importe de la deducción
Donativos con límite del 15% de la base liquidable *(véase la Guía)*	F (*)	30 por 100	796
Donativos con límite del 10% de la base liquidable *(véase la Guía)*	G (**)	10 ó 25 por 100 *(véase la Guía)*	797

(*) Límite máximo: el 15 por 100 de la suma de las casillas **618** y **630** de la página 11 de la declaración.

(**) Límite máximo: el 10 por 100 de la suma de las casillas **618** y **630** de la página 11 de la declaración, menos el importe consignado en la casilla **F**.

Deducciones por donativos ....
- **Parte estatal:** el 67 por 100 de la suma (796 + 797) 704
- **Parte autonómica:** el 33 por 100 de la suma (796 + 797) 705

Deducción por rentas obtenidas en Ceuta o Melilla

Importe total de la deducción por razón de las rentas obtenidas en Ceuta o en Melilla *(véase la Guía)* 798

Deducción por rentas obtenidas en Ceuta o Melilla ....
- **Parte estatal:** el 67 por 100 de 798 712
- **Parte autonómica:** el 33 por 100 de 798 713

Deducción por cantidades depositadas en cuentas ahorro-empresa

	Base de la deducción	Porcentaje de deducción	Importe de la deducción
Cantidades depositadas en el ejercicio con derecho a deducción *(véase la Guía)* .... *(límite máximo: 9.000 euros)*	H	15 por 100	799

Deducción por cantidades depositadas en cuentas ahorro-empresa ....
- **Parte estatal:** el 67 por 100 de 799 714
- **Parte autonómica:** el 33 por 100 de 799 715

Identificación de cuentas ahorro-empresa:
Datos obligatorios para todos los contribuyentes que practiquen esta deducción.
Cada contribuyente sólo puede ser titular de una cuenta ahorro-empresa.

	Titular de la cuenta	Fecha de apertura	Entidad	Oficina	DC	Número de cuenta
Cuenta 1						
Cuenta 2						

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Anexo B.1**

Deducciones autonómicas (aplicables únicamente por los residentes en 2007 en las Comunidades Autónomas que se indican)

● Comunidad Autónoma de Andalucía

Para los beneficiarios de las ayudas familiares	800
Para los beneficiarios de las ayudas a viviendas protegidas	801
Por inversión en vivienda habitual que tenga la consideración de protegida y por las personas jóvenes	802
Por cantidades invertidas en el alquiler de vivienda habitual ... NIF del arrendador: 920 ... Importe de la deducción	803
Para el fomento del autoempleo de los jóvenes emprendedores	804
Para el fomento del autoempleo de las mujeres emprendedoras	805
Por adopción de hijos en el ámbito internacional	806
Para contribuyentes con discapacidad	807
Para padre o madre de familia monoparental y, en su caso, con ascendientes mayores de 75 años	808
Por asistencia a personas con discapacidad	809
Total deducciones autonómicas (suma de las casillas 800 a 809)	716

● Comunidad Autónoma de Aragón

Por nacimiento o adopción del tercer hijo o sucesivos o del segundo hijo, si éste es discapacitado	810
Por adopción internacional de niños	812
Por el cuidado de personas dependientes	813
Por donaciones con finalidad ecológica	814
Total deducciones autonómicas (suma de las casillas 810 a 814)	716

● Comunidad Autónoma del Principado de Asturias

Por acogimiento no remunerado de mayores de 65 años	815
Por adquisición o adecuación de vivienda habitual para contribuyentes discapacitados	816
Por adquisición o adecuación de vivienda habitual para contribuyentes con los que convivan sus cónyuges, ascendientes o descendientes discapacitados	817
Por inversión en vivienda habitual que tenga la consideración de protegida	818
Por el arrendamiento de vivienda habitual ... NIF del arrendador: 920 ... Importe de la deducción	819
Para el fomento del autoempleo de las mujeres y los jóvenes emprendedores	820
Para el fomento del autoempleo	821
Por donación de fincas rústicas a favor del Principado de Asturias	822
Total deducciones autonómicas (suma de las casillas 815 a 822)	716

● Comunidad Autónoma de las Illes Balears

Por gastos de adquisición de libros de texto	823
Para contribuyentes de edad igual o superior a 65 años	824
Por adquisición o rehabilitación de vivienda habitual por jóvenes	825
Por el arrendamiento de vivienda habitual por jóvenes ... NIF del arrendador: 920 ... Importe de la deducción	826
Para los declarantes con minusvalía física o psíquica o con descendientes con esa condición	827
Para los declarantes que sean titulares de fincas o terrenos incluidos en áreas de suelo rústico protegido	828
Por adopción de hijos	829
Total deducciones autonómicas (suma de las casillas 823 a 829)	716

● Comunidad Autónoma de Canarias

Por donaciones con finalidad ecológica	830
Por donaciones para la rehabilitación o conservación del patrimonio histórico de Canarias	831
Por cantidades destinadas por sus titulares a la restauración, rehabilitación o reparación de bienes inmuebles declarados de Interés Cultural	832
Por gastos de estudios	833
Por trasladar la residencia habitual a otra isla del Archipiélago para realizar una actividad laboral por cuenta ajena o una actividad económica	834
Por donaciones en metálico a descendientes menores de 35 años para la adquisición o rehabilitación de su primera vivienda habitual	835
Por nacimiento o adopción de hijos	836
Por contribuyentes minusválidos y mayores de 65 años	837
Por gastos de guardería	838
Por familia numerosa	839
Por inversión en vivienda habitual: a) Con carácter general: adquisición o rehabilitación de la vivienda habitual	922
b) Obras de adecuación de la vivienda habitual por personas con discapacidad	923
Por alquiler de vivienda habitual ... NIF del arrendador: 920 ... Importe de la deducción	840
Total deducciones autonómicas (suma de las casillas 830 a 840)	716

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Anexo B.2**

Deducciones autonómicas (aplicables únicamente por los residentes en 2007 en las Comunidades Autónomas que se indican)

● Comunidad Autónoma de Cantabria

Por arrendamiento de vivienda habitual por jóvenes, mayores y discapacitados .... NIF del arrendador: 920 Importe de la deducción	841	
Por cuidado de familiares	842	
Por adquisición o rehabilitación de segunda vivienda en municipios con problemas de despoblación	843	
Por donativos a fundaciones	844	
Por acogimiento familiar de menores	845	
Total deducciones autonómicas (suma de las casillas 841 a 845)	716	

● Comunidad Autónoma de Castilla-La Mancha

Por nacimiento o adopción de hijos	846	
Por discapacidad del contribuyente	847	
Por discapacidad de ascendientes o descendientes	848	
Para contribuyentes mayores de 75 años	849	
Por el cuidado de ascendientes mayores de 75 años	850	
Por cantidades donadas al Fondo Castellano-Manchego de Cooperación	851	
Total deducciones autonómicas (suma de las casillas 846 a 851)	716	

● Comunidad de Castilla y León

Por familia numerosa	852	
Por nacimiento o adopción de hijos	853	
Por adopción internacional	854	
Por cuidado de hijos menores	855	
Para contribuyentes de 65 años o más afectados por minusvalía	856	
Por adquisición de viviendas por jóvenes en núcleos rurales	857	
Por cantidades donadas para la recuperación del patrimonio histórico, cultural y natural	858	
Por cantidades invertidas en la recuperación del patrimonio histórico, cultural y natural	859	
Por alquiler de vivienda habitual para jóvenes .... NIF del arrendador: 920 Importe de la deducción	860	
Para el fomento del autoempleo de las mujeres y los jóvenes	861	
Total deducciones autonómicas (suma de las casillas 852 a 861)	716	

● Comunidad Autónoma de Cataluña

Por nacimiento o adopción de hijos	862	
Por donaciones a determinadas entidades	863	
Por alquiler de la vivienda habitual .... NIF del arrendador: 920 Importe de la deducción	864	
Por el pago de intereses de préstamos al estudio universitario de tercer ciclo	865	
Por la donación de cantidades a descendientes para la adquisición de su primera vivienda habitual	866	
Para los contribuyentes que queden viudos	867	
Total deducciones autonómicas (suma de las casillas 862 a 867)	716	

● Comunidad Autónoma de Extremadura

Por adquisición de vivienda habitual para jóvenes y para víctimas del terrorismo	868	
Por trabajo dependiente	869	
Por donaciones de bienes integrantes del Patrimonio Histórico y Cultural Extremeño	870	
Por cantidades destinadas por sus titulares a la conservación, reparación, restauración, difusión y exposición de bienes del Patrimonio Histórico y Cultural Extremeño	871	
Por alquiler de vivienda habitual para jóvenes, familias numerosas y minusválidos ..... NIF del arrendador: 920 Importe de la deducción	872	
Por cuidado de familiares discapacitados	873	
Por acogimiento de menores	874	
Total deducciones autonómicas (suma de las casillas 868 a 874)	716	

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Anexo B.3**

Deducciones autonómicas (aplicables únicamente por los residentes en 2007 en las Comunidades Autónomas que se indican)

• Comunidad Autónoma de Galicia

Por nacimiento o adopción de hijos	875
Por familia numerosa	876
Por cuidado de hijos menores	877
Por contribuyentes minusválidos de edad igual o superior a 65 años que precisen ayuda de terceras personas	878
Por gastos dirigidos al uso de nuevas tecnologías en los hogares gallegos	879
Por alquiler de la vivienda habitual ... NIF del arrendador: 920 ... Importe de la deducción	880
Para el fomento del autoempleo de los hombres menores de 35 años y las mujeres, cualquiera que sea su edad	881
Total deducciones autonómicas (suma de las casillas 875 a 881)	716

• Comunidad de Madrid

Por nacimiento o adopción de hijos	882
Por adopción internacional de niños	883
Por acogimiento familiar de menores	884
Por acogimiento no remunerado de mayores de 65 años y/o discapacitados	885
Por arrendamiento de vivienda habitual por menores de 35 años ... NIF del arrendador: 920 ... Importe de la deducción	886
Por donativos a fundaciones	887
Para compensar la carga tributaria de determinadas ayudas	888
Total deducciones autonómicas (suma de las casillas 882 a 888)	716

• Comunidad Autónoma de la Región de Murcia

Por inversión en vivienda habitual por jóvenes menores de 35 años	889
Por donativos para la protección del patrimonio histórico de la Región de Murcia	890
Por gastos de guardería para hijos menores de tres años	891
Por inversión en instalaciones de recursos energéticos renovables	892
Por inversiones en dispositivos domésticos de ahorro de agua	893
Total deducciones autonómicas (suma de las casillas 889 a 893)	716

• Comunidad Autónoma de La Rioja

Por el nacimiento o adopción del segundo o ulterior hijo	894
Por inversión en la adquisición o rehabilitación de vivienda habitual para jóvenes	895
Por adquisición o rehabilitación de segunda vivienda en el medio rural	896
Por inversión no empresarial en la adquisición de ordenadores personales	897
Total deducciones autonómicas (suma de las casillas 894 a 897)	716

• Comunitat Valenciana

Por el nacimiento o adopción de hijos	898
Por nacimiento o adopción múltiples	899
Por nacimiento o adopción de hijos discapacitados	900
Por familia numerosa	901
Por la custodia en guarderías y centros de primer ciclo de educación infantil de hijos menores de tres años	902
Por conciliación del trabajo con la vida familiar	903
Por contribuyentes discapacitados de edad igual o superior a 65 años	904
Por ascendientes mayores de 75 años o mayores de 65 años que sean discapacitados	905
Por la realización por uno de los cónyuges de labores no remuneradas en el hogar	906
Por adquisición de su primera vivienda habitual por contribuyentes de edad igual o inferior a 35 años	907
Por adquisición de vivienda habitual por discapacitados	908
Por cantidades destinadas a la adquisición o rehabilitación de vivienda habitual, procedentes de ayudas públicas	909
Por arrendamiento de la vivienda habitual ... NIF del arrendador: 920 ... Importe de la deducción	910
Por arrendamiento de una vivienda por actividades en distinto municipio ... NIF del arrendador: 921 ... Importe de la deducción	911
Por cantidades destinadas a inversiones para el aprovechamiento de fuentes de energía renovables en la vivienda habitual	912
Por donaciones con finalidad ecológica	913
Por donaciones de bienes integrantes del Patrimonio Cultural Valenciano	914
Por cantidades donadas para la conservación, reparación y restauración de bienes integrantes del Patrimonio Cultural Valenciano	915
Por cantidades destinadas por sus titulares a la conservación, reparación y restauración de bienes integrantes del Patrimonio Cultural Valenciano	916
Por donaciones destinadas al fomento de la lengua valenciana	917
Total deducciones autonómicas (suma de las casillas 898 a 917)	716

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

Ejercicio 2007 | Primer declarante | NIF | Apellidos y nombre | **Anexo C**

Deducciones por incentivos y estímulos a la inversión empresarial

● Régimen general de la Ley del I. sobre Sociedades y regímenes especiales de apoyo a acontecimientos de excepcional interés público

Deducciones de ejercicios anteriores (saldos pendientes de aplicar)	Límite	Saldo anterior	Aplicado en esta declaración	Pendiente de aplicación
Deducciones acogidas al régimen general de la Ley del Impuesto sobre Sociedades	35% (*)		940	
Regímenes especiales de apoyo a acontecimientos de excepcional interés público			941	
Deducciones del ejercicio 2007				
Régimen general de la Ley del Impuesto sobre Sociedades (LIS):		Deducción 2007	Aplicado en esta declaración	Pendiente de aplicación
Actividades de investigación y desarrollo e innovación tecnológica (art.º 35 de la LIS)			942	
Fomento de las tecnologías de la información y de la comunicación (art.º 36 de la LIS)			943	
Actividades de exportación (art.º 37 de la LIS)			944	
Inversiones o gastos a que se refiere el artículo 38 de la LIS			945	
Inversiones medioambientales (art.º 39 de la LIS)			946	
Gastos de formación profesional (art.º 40 de la LIS)			947	
Creación de empleo para trabajadores minusválidos (art.º 41 de la LIS)			948	
Contribuciones empresariales y aportaciones a que se refiere el artículo 43 de la LIS			949	
Regímenes especiales de apoyo a acontecimientos de excepcional interés público:				
Régimen especial "Copa América 2007"			950	
Régimen especial "Pekín 2008"			951	
Régimen especial "Año Lebaniego 2006"			952	
Régimen especial "Expo Zaragoza 2008"			953	
Régimen especial "Alicante 2008. Vuelta al Mundo a Vela"			954	
Régimen especial "Barcelona World Race"			955	
Régimen especial "Año Jubilar Guadalupense 2007"			956	

(*) Cumpliéndose las condiciones establecidas en el artículo 44.1, último párrafo, de la Ley del Impuesto sobre Sociedades, este límite se eleva al 50 por 100 para las deducciones del régimen general.

● Régimen especial para inversiones en Canarias (art.º 94 de la Ley 20/1991)

Deducciones de ejercicios anteriores (saldos pendientes de aplicar)	Límite	Saldo anterior	Aplicado en esta declaración	Pendiente de aplicación
Inversiones en la adquisición de activos fijos	50/70%		960	
Restantes modalidades	70% (*)		961	
Deducciones del ejercicio 2007				
Modalidades de la Ley del Impuesto sobre Sociedades (LIS):		Deducción 2007	Aplicado en esta declaración	Pendiente de aplicación
Actividades de investigación y desarrollo e innovación tecnológica (art.º 35 de la LIS)			962	
Fomento de las tecnologías de la información y de la comunicación (art.º 36 de la LIS)			963	
Actividades de exportación (art.º 37 de la LIS)			964	
Inversiones o gastos a que se refiere el artículo 38 de la LIS			965	
Inversiones medioambientales (art.º 39 de la LIS)			966	
Gastos de formación profesional (art.º 40 de la LIS)			967	
Creación de empleo para trabajadores minusválidos (art.º 41 de la LIS)			968	
Contribuciones empresariales y aportaciones a que se refiere el artículo 43 de la LIS			969	
Inversiones en la adquisición de activos fijos	50%		970	

(*) Cumpliéndose las condiciones establecidas en el artículo 44.1, último párrafo, de la Ley del Impuesto sobre Sociedades, este límite se eleva al 90 por 100.

● Importe aplicado en esta declaración en concepto de deducciones por incentivos y estímulos a la inversión empresarial

Importe total de las deducciones por incentivos y estímulos a la inversión empresarial que se aplican en esta declaración (suma de las casillas 940 a 970) 975

Deducciones por incentivos y estímulos a la inversión empresarial ....
- **Parte estatal:** el 67 por 100 de 975 706
- **Parte autonómica:** el 33 por 100 de 975 707

Reserva para Inversiones en Canarias (Ley 19/1994). Dotaciones, materializaciones e inversiones anticipadas

● Reserva para inversiones en Canarias de 2003 a 2006. Importe de las dotaciones y de las materializaciones efectuadas en 2007

	Importe de las dotaciones	Materializaciones en 2007	Clave (*)	Pendiente de materializar
Reserva para Inversiones en Canarias 2003		980	981	
Reserva para Inversiones en Canarias 2004		982	983	
Reserva para Inversiones en Canarias 2005		984	985	
Reserva para Inversiones en Canarias 2006		986	987	

(*) Se consignará la clave numérica que proceda de las que se indican en la Guía de la declaración.

● Reserva para inversiones en Canarias de 2007. Importe de la dotación y de las materializaciones e inversiones anticipadas efectuadas en 2007

	Importe de la dotación	Detalle de las inversiones según el artículo 27.4 de la Ley 19/1994: Inversiones previstas en las letras A, B y D (1.º) del art.º 27.4	Inversiones previstas en las letras C y D (2.º a 6.º) del art.º 27.4	Pendiente de materializar
RIC 2007. Dotación y materializaciones efectuadas en 2007	990	991	992	993
Inversiones anticipadas de futuras dotaciones a la RIC, efectuadas en 2007		994	995	

Figure B1: Personal Income Tax Form D-100, 2007 (cont.)

B.2.2 A Recount of Wealth Taxation in Spain

The Spanish wealth tax was adopted in 1978 (Law 50/1977) aimed at complementing the personal income tax (Law 44/1977), but with an extraordinary and censal character. As it is common for standard wealth taxes, it was a progressive annual tax on the sum of all individual wealth components net of debts. Wealth must be recorded as of December 31st of every year. The tax was filed jointly in the case of marriage, the joint assets had to be declared by the one administering them under a regime of community property or declared by the man (unless disabled) under a regime of separation of ownership. The only exempted assets were historical and artistic monuments as well as some artworks of particular cultural importance. It was not until 1978 (RD 1382/1978) when it was clearly specified when these monuments and artworks could be exempted.

All regions were obliged to implement this tax, including Basque Country and Navarre, which have never been part of the Common Fiscal Regime (*Régimen Fiscal Común*) and manage their taxes independently. Both residents (under *personal obligation*) and non-residents (under *real obligation*) were obliged to file if they had a positive net taxable base. Initially, its main purpose was not to raise revenue, since the tax had a high exemption threshold (4,000,000 pesetas or 24,040.5 euros for non-married residents and 6,000,000 pesetas or 36,060.7 euros for married residents), other large exemptions (500,000 pesetas or 3,000.06 euros for each child under 25 and 1,000,000 pesetas or 6,000.12 euros for every disabled child) and the maximum tax rate was 2%. In 1979 a cap was introduced on the personal income and wealth tax liability payed (RD 2615/1979). In particular, the sum of the personal income and wealth tax liability could not be larger than 55% of the personal income tax base. If the sum was larger, the wealth tax liability was reduced up until satisfying the limit, so that some filers ended up paying no wealth tax. For the calculation of the limit, the wealth tax liability only included assets whose generated income was subject to the personal income tax.

The first important reform was introduced in 1982 (Royal Decree Law 23/1982 and Law 5/1983). The exemption threshold was increased up to 6,000,000 pesetas or 36.060,73 euros for non-married residents, 9,000,000 pesetas or 54,091.09 euros for married residents, 750,000 pesetas or 4,507.59 euros for each child under 25 subject to a personal income tax relief and 1,500,000 pesetas or 9,015.18 euros for every disabled child subject to a personal income tax relief. The 74/1980 Law allowed to report the value of non-listed shares as the capitalized profits (dividends and reserves) generated in the last three years at the rate of 8%. The 9/1983 Law raised the limit of the sum of the personal income and wealth tax liability from 55% to 65%. In 1988 the exemptions were further increased (Royal-Decree Law 6/1988). The exemption threshold was raised up to 9,000,000 pesetas or 54,091.09 euros for non-married residents, 18,000,000 pesetas or 108,182.18 euros for married residents, 1,500,000 pesetas or 9,015.18 for each child under 25 subject to a personal income tax relief and 3,000,000 pesetas or 18,030.36 euros for every disabled child subject to a personal income tax relief.

In 1989, another reform was introduced which allowed individual filing among married couples. Each member of a married couple had to declare half of their joint assets under a regime of community property or the legal ownership share of each asset under a regime of separation of ownership (Law 20/1989). Nonetheless, in cases in which the couple was filing the personal income tax jointly, the Ministry could ask filers to also file the wealth tax jointly. The exemptions for having children under 25 or disabled children subject to a personal income tax relief were reduced for parents living together (750,000 pesetas or 4,507.59 for each child under 25 and 1,500,000 pesetas or 9,015.18 euros for every disabled child). The Law 20/1989 also specified that in case married couples were filing jointly the personal income tax, the limit to the personal income and wealth tax liability had to be calculated by adding up both the personal income and wealth tax liabilities of each member of the couple. The wealth tax liability reduction was then split proportionally to the wealth tax liability of each member of the couple. All these changes in the law were in place until the new wealth tax law was introduced in 1991 (Law 19/1991).

With the new 1991 law (still in place at present), the wealth tax ceased to have the initial transitory and extraordinary character, asset valuation rules were improved and many changes were introduced to the former wealth tax system (Law 19/1991). Collectibles and consumer durables (excluding mainly vehicles, boats, planes, jewelry and antiques) started to be exempted, as well as pension and property rights in the author's ownership. In addition, all individuals filing under *personal obligation* and having gross wealth over 100,000,000 pesetas (601,012.1 euros) were obliged to file even though their taxable base was below the new minimum exempted of 15,000,0000 pesetas or 90,151.82 euros. Filers under *real obligation* were obliged to file whatever net wealth they had, as it was stated in the 1977 law. The exemptions for having children under 25 or disabled children disappeared from the wealth tax and the maximum tax rate was raised up to 2.5%. A reduction of 50% of the wealth tax liability was introduced on the reported assets located in Ceuta or Melilla. Finally, the 1991 law also modified the personal income and wealth tax liability cap by raising the limit of the sum of the personal income and wealth tax liability from 65% to

70% of the personal income tax base and introducing a reduction limit of 80% of the wealth tax liability.

The first important reform after the new 1991 law was the introduction of the exemption on business assets and company shares (except from shares in property investment companies) in 1993 (Law 22/1993, RD 2481/1994). For the assets to qualify as business assets, the activity had to be the taxpayer's main source of income (at least 50% of its total taxable income) and be carried out by the taxpayer on his own account and on a habitual basis. For company shares to be exempted, the ownership share had to be at least 20% of the capital of the entity and the individual had to lead it receiving at least 50% of their total business and labor income from this company. In 1995 the minimum exempted was increased up to 17,000,000 pesetas (102,172.1 euros) and the brackets were slightly increased (Law 41/1994). Moreover, for company shares to be exempted, the ownership share condition for the taxpayer was modified to be at least 15% of the capital of the company. The brackets were further increased in 1995 (Law 12/1995).

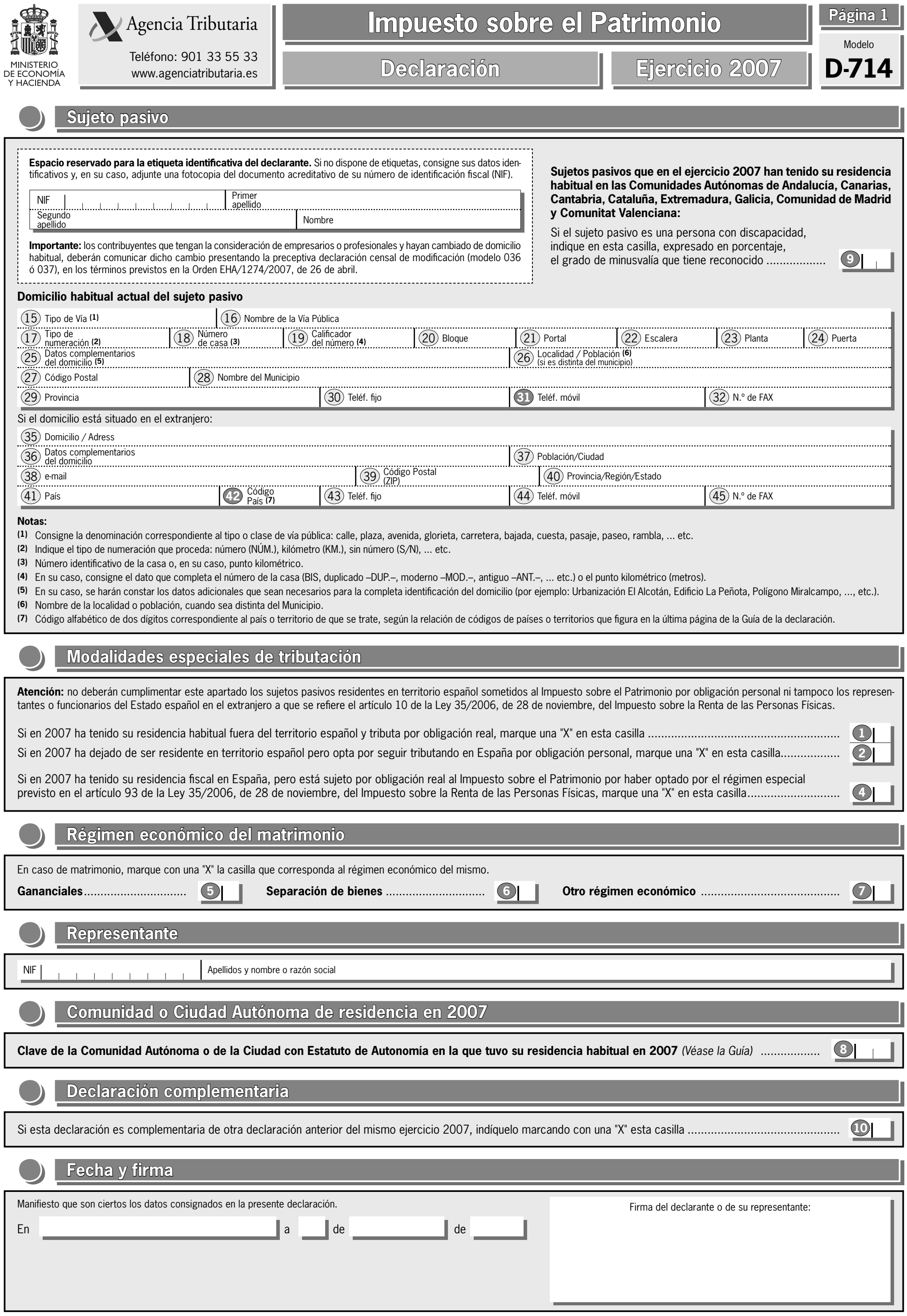
Since 1996 the rights to modify the minimum exempted and the tax rates were ceded to the regions under the condition of keeping the same minimum bracket and marginal tax rate than the national one (Law 14/1996). In 1997 the exemption on business assets was modified for married couples. All assets belonging to both members of the couple and used for the business activity could be exempted under the same old conditions. For company shares, the ownership share condition was modified to be at least 15% of the capital of the company for the individual or 20% together with a family member. In 1998 the exemption threshold was increased up to 17,300,000 pesetas (103,975.1 euros), the brackets were slightly raised and the valuation rules for undertakings for collective investment in transferable securities (*Instituciones de inversión colectiva)*) were modified (Law 49/1998). In 1999, the exemption threshold was further raised up to 18,000,000 pesetas (108,182.2 euros) and the brackets were also slightly increased (Law 54/1999).

The first important reform in the wealth tax of the 2000s was the introduction of an exemption in primary residence of 25,000,000 pesetas or 150,253.03 euros in 2000 (Royal Decree Law 3/2000). In 2001, the regions were ceded the right to change or include deductions in the wealth tax and the condition of keeping the same minimum bracket and minimum marginal tax rate than the national one was suppressed (Law 21/2001). Nonetheless, all regions kept the national wealth tax schedule (0.2-2.5%) during the late 1990's and beginning of the 2000's (only a few regions changed the minimum exempted and Cantabria changed the wealth tax schedule in 2006). In

2002, the personal income and wealth tax liability cap was reduced from 70 to 60% of the personal income tax base (Law 46/2002), the ownership share condition for the exemption of company shares was modified to be at least 5% of the capital of the company for the individual (Law 51/2002) and the reduction on the wealth tax liabilities for assets located in Ceuta or Melilla was raised up to 75% (Law 53/2002). In 2003, the exemption of company shares was also extended to those owning them under life usufruct (Law 62/2003).

In 2008, the wealth tax was suppressed (Law 4/2008) and reintroduced with a temporal character with the aim of reducing public deficit for years 2011 and 2012 (Royal Decree Law 13/2011). With the reintroduction some of the main features of the wealth tax system were modified. The exemption on primary residence was raised up to 300,000 euros, all individuals under *personal obligation* having gross wealth over 2,000,000 euros were obliged to file and the new minimum exempted was raised up to 700,000 euros. Hence, since 2011 the number of wealth taxpayers was considerably reduced (from 981,498—2.7% of the adult population +20—in 2007 to 130,216—0.3% of the adult population +20—in 2011). With Law 16/2012 the wealth tax was extended until 2013 and with Laws 22/2013, 36/2014, 48/2015, 6/2018 and RD-Law 3/2016, the wealth tax was extended for an indefinite number of years, so that it is still currently in place.

After the reintroduction in 2011, the differences in the wealth tax schedule across regions have become significant. For instance, Madrid decided to keep the suppression of the wealth tax after 2011, contrary to regions such as Catalonia and Extremadura who have raised the top marginal tax rates (up to 2.75% and 3.75%, respectively) above the national tax rate (2.5%).


MINISTERIO DE ECONOMÍA Y HACIENDA

Agencia Tributaria
Teléfono: 901 33 55 33
www.agenciatributaria.es

Impuesto sobre el Patrimonio

Declaración — **Ejercicio 2007**

Página 1 — Modelo **D-714**

Sujeto pasivo

Espacio reservado para la etiqueta identificativa del declarante. Si no dispone de etiquetas, consigne sus datos identificativos y, en su caso, adjunte una fotocopia del documento acreditativo de su número de identificación fiscal (NIF).

NIF | Primer apellido | Segundo apellido | Nombre

Importante: los contribuyentes que tengan la consideración de empresarios o profesionales y hayan cambiado de domicilio habitual, deberán comunicar dicho cambio presentando la preceptiva declaración censal de modificación (modelo 036 ó 037), en los términos previstos en la Orden EHA/1274/2007, de 26 de abril.

Sujetos pasivos que en el ejercicio 2007 han tenido su residencia habitual en las Comunidades Autónomas de Andalucía, Canarias, Cantabria, Cataluña, Extremadura, Galicia, Comunidad de Madrid y Comunitat Valenciana:

Si el sujeto pasivo es una persona con discapacidad, indique en esta casilla, expresado en porcentaje, el grado de minusvalía que tiene reconocido 9

Domicilio habitual actual del sujeto pasivo

15 Tipo de Vía (1) | 16 Nombre de la Vía Pública
17 Tipo de numeración (2) | 18 Número de casa (3) | 19 Calificador del número (4) | 20 Bloque | 21 Portal | 22 Escalera | 23 Planta | 24 Puerta
25 Datos complementarios del domicilio (5) | 26 Localidad / Población (6) (si es distinta del municipio)
27 Código Postal | 28 Nombre del Municipio
29 Provincia | 30 Teléf. fijo | 31 Teléf. móvil | 32 N.º de FAX

Si el domicilio está situado en el extranjero:

35 Domicilio / Adress
36 Datos complementarios del domicilio | 37 Población/Ciudad
38 e-mail | 39 Código Postal (ZIP) | 40 Provincia/Región/Estado
41 País | 42 Código País (7) | 43 Teléf. fijo | 44 Teléf. móvil | 45 N.º de FAX

Notas:
(1) Consigne la denominación correspondiente al tipo o clase de vía pública: calle, plaza, avenida, glorieta, carretera, bajada, cuesta, pasaje, paseo, rambla, ... etc.
(2) Indique el tipo de numeración que proceda: número (NÚM.), kilómetro (KM.), sin número (S/N), ... etc.
(3) Número identificativo de la casa o, en su caso, punto kilométrico.
(4) En su caso, consigne el dato que completa el número de la casa (BIS, duplicado –DUP.–, moderno –MOD.–, antiguo –ANT.–, ... etc.) o el punto kilométrico (metros).
(5) En su caso, se harán constar los datos adicionales que sean necesarios para la completa identificación del domicilio (por ejemplo: Urbanización El Alcotán, Edificio La Peñota, Polígono Miralcampo, ..., etc.).
(6) Nombre de la localidad o población, cuando sea distinta del Municipio.
(7) Código alfabético de dos dígitos correspondiente al país o territorio de que se trate, según la relación de códigos de países o territorios que figura en la última página de la Guía de la declaración.

Modalidades especiales de tributación

Atención: no deberán cumplimentar este apartado los sujetos pasivos residentes en territorio español sometidos al Impuesto sobre el Patrimonio por obligación personal ni tampoco los representantes o funcionarios del Estado español en el extranjero a que se refiere el artículo 10 de la Ley 35/2006, de 28 de noviembre, del Impuesto sobre la Renta de las Personas Físicas.

Si en 2007 ha tenido su residencia habitual fuera del territorio español y tributa por obligación real, marque una "X" en esta casilla 1

Si en 2007 ha dejado de ser residente en territorio español pero opta por seguir tributando en España por obligación personal, marque una "X" en esta casilla................. 2

Si en 2007 ha tenido su residencia fiscal en España, pero está sujeto por obligación real al Impuesto sobre el Patrimonio por haber optado por el régimen especial previsto en el artículo 93 de la Ley 35/2006, de 28 de noviembre, del Impuesto sobre la Renta de las Personas Físicas, marque una "X" en esta casilla.......................... 4

Régimen económico del matrimonio

En caso de matrimonio, marque con una "X" la casilla que corresponda al régimen económico del mismo.

Gananciales.............................. 5 **Separación de bienes** .... 6 **Otro régimen económico** 7

Representante

NIF | Apellidos y nombre o razón social

Comunidad o Ciudad Autónoma de residencia en 2007

Clave de la Comunidad Autónoma o de la Ciudad con Estatuto de Autonomía en la que tuvo su residencia habitual en 2007 *(Véase la Guía)* 8

Declaración complementaria

Si esta declaración es complementaria de otra declaración anterior del mismo ejercicio 2007, indíquelo marcando con una "X" esta casilla 10

Fecha y firma

Manifiesto que son ciertos los datos consignados en la presente declaración.

En ______ a ___ de ______ de ____

Firma del declarante o de su representante:

Figure B2: Wealth Tax Form D-714, 2007

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | **Página 2**

1 Bienes y derechos

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan .... ☐

A. Bienes inmuebles de naturaleza urbana

A1. Vivienda habitual (incluidos, en su caso, los derechos reales de uso y disfrute sobre la misma de los que sea titular el sujeto pasivo)

Clave (*)	Referencia catastral	Situación (vía pública, número, municipio y provincia)	Valoración (euros)

(*) Se utilizarán las siguientes claves:
P: Pleno dominio.
U: Usufructo y demás derechos reales de uso y disfrute.

Valor total de la vivienda habitual susceptible de exención 60
Valor exento (máximo: 150.253,03 euros) 61
Valor no exento (diferencia 60 – 61 positiva o cero) 62

A2. Otros inmuebles urbanos

Clave (*)	Tipo (**)	Referencia catastral	Situación del inmueble (vía pública, número, municipio y provincia)	Valoración (euros)

Total 63

Total bienes inmuebles de naturaleza urbana (62 + 63) 01

(*) Se utilizarán las siguientes claves: **P**: Pleno dominio; **N**: Nuda Propiedad; **M**: Multipropiedad, propiedad a tiempo parcial o fórmulas similares, con titularidad parcial del bien.
(**) Para indicar el tipo de inmueble se utilizarán las siguientes letras: **V**: Viviendas; **L**: Locales; **O**: Otros inmuebles urbanos.

B. Bienes inmuebles de naturaleza rústica

Clave (*)	Referencia catastral	Situación del inmueble (municipio y provincia)	Valoración (euros)

Total 02

(*) Se utilizarán las siguientes claves: **P**: Pleno dominio; **N**: Nuda Propiedad; **M**: Multipropiedad, propiedad a tiempo parcial o fórmulas similares, con titularidad parcial del bien.

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 3

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

C. Bienes y derechos no exentos afectos a actividades empresariales y profesionales

C_1. Bienes y derechos no exentos afectos a actividades empresariales y profesionales (excepto inmuebles)

Epígrafe IAE	Domicilio de la actividad	Descripción del bien o derecho	Valoración (euros)
		Total .... (a)	

C_2. Bienes inmuebles no exentos afectos a actividades empresariales y profesionales

Epígrafe IAE	Clave (*)	Referencia catastral	Situación (vía pública, número, municipio y provincia)	Valoración (euros)
			Total .... (b)	

Total bienes y derechos no exentos afectos a actividades empresariales y profesionales ((a)+(b)) 03

(*) Se utilizarán las siguientes claves: **U**: Inmueble urbano; **R**: Inmueble rústico.

D. Bienes y derechos exentos afectos a actividades empresariales y profesionales

Epígrafe IAE	Clave (*)	Referencia catastral (en caso de inmuebles)	Descripción de los bienes y derechos y de las deudas derivadas de la actividad	Valoración (euros)
			Total (neto de deudas) 04	

(*) Tratándose de bienes inmuebles, se utilizarán las siguientes claves: **U**: Inmueble urbano; **R**: Inmueble rústico.

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 4

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

E. Depósitos en cuenta corriente o de ahorro, a la vista o a plazo, cuentas financieras y otros tipos de imposiciones en cuenta

Entidad de depósito	Número de cuenta o depósito	Valor (euros)
	Total 05	

F. Valores representativos de la cesión a terceros de capitales propios

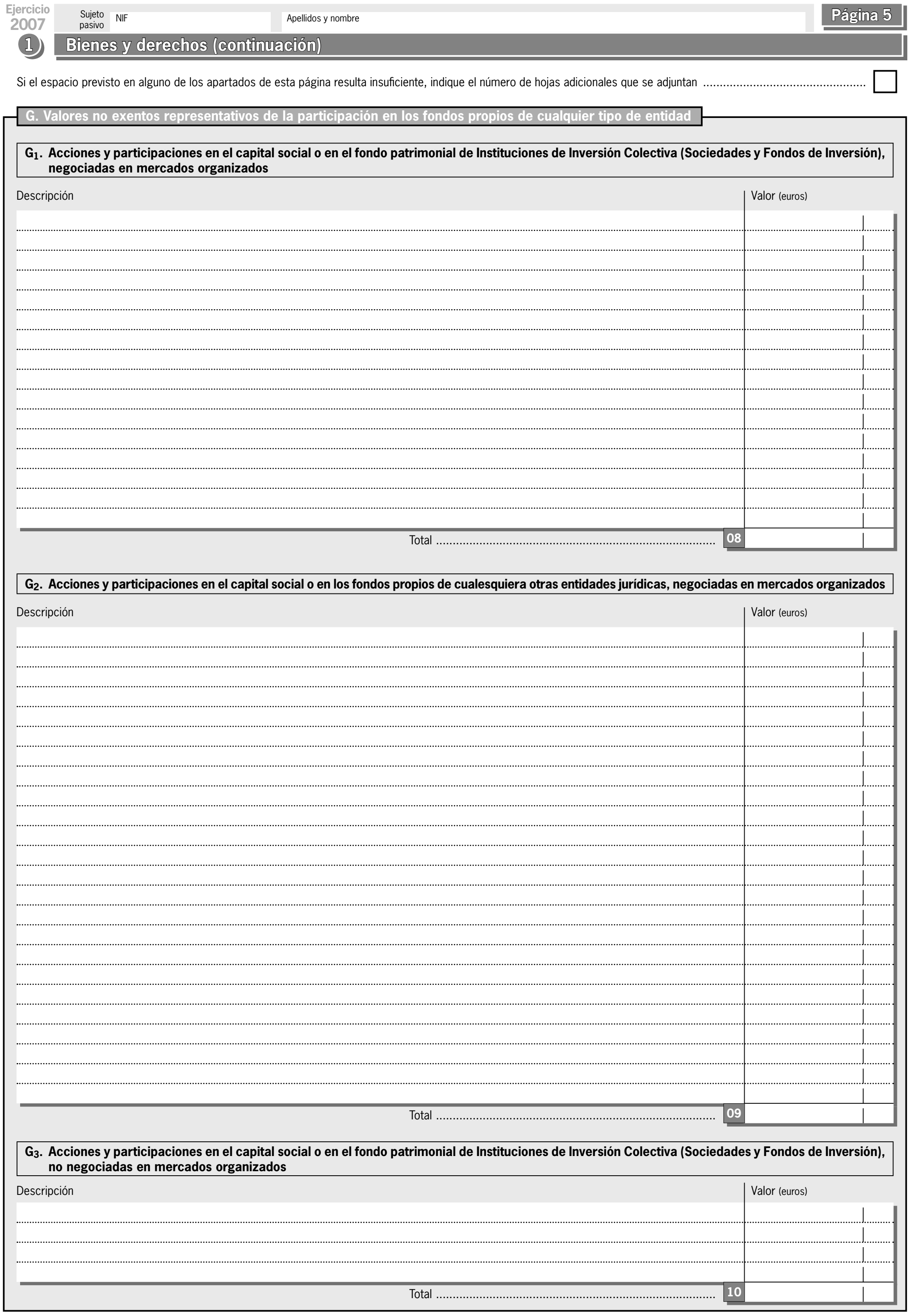
F_1. Deuda pública, obligaciones, bonos y demás valores equivalentes, negociados en mercados organizados

Descripción	Valor (euros)
Total 06	

F_2. Obligaciones, bonos, certificados de depósito, pagarés y demás valores equivalentes, no negociados en mercados organizados

Descripción	Valor (euros)
Total 07	

Figure B2: Wealth Tax Form D-714, 2007 (cont.)



Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 5

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

G. Valores no exentos representativos de la participación en los fondos propios de cualquier tipo de entidad

G_1. Acciones y participaciones en el capital social o en el fondo patrimonial de Instituciones de Inversión Colectiva (Sociedades y Fondos de Inversión), negociadas en mercados organizados

Descripción	Valor (euros)
Total 08	

G_2. Acciones y participaciones en el capital social o en los fondos propios de cualesquiera otras entidades jurídicas, negociadas en mercados organizados

Descripción	Valor (euros)
Total 09	

G_3. Acciones y participaciones en el capital social o en el fondo patrimonial de Instituciones de Inversión Colectiva (Sociedades y Fondos de Inversión), no negociadas en mercados organizados

Descripción	Valor (euros)
Total 10	

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 6

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

G. Valores no exentos representativos de la participación en los fondos propios de cualquier tipo de entidad (continuación)

G_4. Acciones y participaciones en el capital social o en los fondos propios de cualesquiera otras entidades jurídicas, no negociadas en mercados organizados, incluidas las participaciones en el capital social de Cooperativas

Descripción	Valor (euros)
Total 11	

H. Valores exentos representativos de la participación en los fondos propios de entidades jurídicas

H_1. Acciones y participaciones exentas en el capital social o en los fondos propios de entidades jurídicas, negociadas en mercados organizados

Descripción	Valor (euros)
Total (neto de deudas) 12	

H_2. Acciones y participaciones exentas en el capital social o en los fondos propios de entidades jurídicas, no negociadas en mercados organizados, incluidas las participaciones exentas en el capital social de Cooperativas

Descripción	Valor (euros)
Total (neto de deudas) 13	

I. Seguros de vida

Entidad aseguradora	Valor (euros)
Total 14	

J. Rentas temporales y vitalicias

Persona o entidad pagadora	Clave (*)	Importe anualidad (euros)	Valor (euros)
Total 15			

(*) Se utilizarán las siguientes claves: **T**: Renta temporal; **V**: Renta vitalicia.

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 7

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ....

K. Vehículos, joyas, pieles de carácter suntuario, embarcaciones y aeronaves

Descripción	Valor (euros)
Total 16	

L. Objetos de arte y antigüedades

Descripción	Valor (euros)
Total 17	

M. Derechos reales de uso y disfrute (excluidos los que, en su caso, recaigan sobre la vivienda habitual del sujeto pasivo)

Clave (*)	Referencia catastral (en caso de derechos reales sobre inmuebles)	Descripción / Situación del bien	Valor del bien (euros)	Valor del derecho (euros)
			Total 18	

(*) Se utilizarán las siguientes claves: **U**: Usufructo; **D**: Derechos de aprovechamiento por turno de bienes inmuebles; y **O**: Otros derechos reales de uso y disfrute.

N. Concesiones administrativas

Descripción	Valor (euros)
Total 19	

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 8

1 Bienes y derechos (continuación)

Si el espacio previsto en alguno de los apartados de esta página resulta insuficiente, indique el número de hojas adicionales que se adjuntan ☐

O. Derechos derivados de la propiedad intelectual o industrial

Descripción	Valor (euros)
Total 20	

P. Opciones contractuales

Descripción	Valor (euros)
Total 21	

Q. Demás bienes y derechos de contenido económico

Descripción	Valor (euros)
Total 22	

2 Deudas deducibles

Descripción	Valor (euros)
Total 24	

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | **Página 9**

3 Resumen del patrimonio neto: base liquidable

Bienes y derechos no exentos

A. Bienes inmuebles de naturaleza urbana	01
B. Bienes inmuebles de naturaleza rústica	02
C. Bienes y derechos no exentos afectos a actividades empresariales y profesionales	03
E. Depósitos en cuenta corriente o de ahorro, a la vista o a plazo, cuentas financieras y otros tipos de imposiciones en cuenta	05
F. Valores representativos de la cesión a terceros de capitales propios.	
F_1. Deuda pública, obligaciones, bonos y demás valores equivalentes, negociados en mercados organizados	06
F_2. Obligaciones, bonos, certificados de depósito, pagarés y demás valores equivalentes, no negociados en mercados organizados	07
G. Valores no exentos representativos de la participación en los fondos propios de cualquier tipo de entidad.	
G_1. Acciones y participaciones en el capital social o en el fondo patrimonial de Instituciones de Inversión Colectiva (Sociedades y Fondos de Inversión), negociadas en mercados organizados	08
G_2. Acciones y participaciones en el capital social o en los fondos propios de cualesquiera otras entidades jurídicas, negociadas en mercados organizados	09
G_3. Acciones y participaciones en el capital social o en el fondo patrimonial de Instituciones de Inversión Colectiva (Sociedades y Fondos de Inversión), no negociadas en mercados organizados	10
G_4. Acciones y participaciones en el capital social o en los fondos propios de cualesquiera otras entidades jurídicas, no negociadas en mercados organizados, incluidas las participaciones en el capital social de Cooperativas	11
I. Seguros de vida	14
J. Rentas temporales y vitalicias	15
K. Vehículos, joyas, pieles de carácter suntuario, embarcaciones y aeronaves	16
L. Objetos de arte y antigüedades	17
M. Derechos reales de uso y disfrute (excluidos los que, en su caso, recaigan sobre la vivienda habitual del sujeto pasivo)	18
N. Concesiones administrativas	19
O. Derechos derivados de la propiedad intelectual o industrial	20
P. Opciones contractuales	21
Q. Demás bienes y derechos de contenido económico	22
Total bienes y derechos no exentos (01 + 02 + 03 + 05 + 06 + 07 + 08 + 09 + 10 + 11 + 14 + 15 + 16 + 17 + 18 + 19 + 20 + 21 + 22)	23

Deudas deducibles

Total deudas deducibles	24

Base imponible y base liquidable

Base imponible (23 – 24)	25
Reducción para sujetos pasivos por obligación personal *(véase la Guía)*	26
Base liquidable (25 – 26)	27

4 Resumen de los bienes y derechos exentos

A. Bienes inmuebles de naturaleza urbana:	
A_1. Vivienda habitual: valor total susceptible de exención	60
A_2. Vivienda habitual: valor exento	61
D. Bienes y derechos exentos afectos a actividades empresariales y profesionales	04
H. Valores exentos representativos de la participación en los fondos propios de entidades jurídicas:	
H_1. Acciones y participaciones exentas en el capital social o en los fondos propios de entidades jurídicas, negociadas en mercados organizados	12
H_2. Acciones y participaciones exentas en el capital social o en los fondos propios de entidades jurídicas, no negociadas en mercados organizados, incluidas las participaciones exentas en el capital social de Cooperativas	13

5 Patrimonio exento con progresividad (solamente sujetos pasivos por obligación personal de contribuir)

En su caso, se consignará en esta casilla la valoración de los bienes y derechos situados o que deban cumplirse o ejercitarse en un Estado con el que España tenga suscrito un Convenio bilateral para evitar la doble imposición en materia de impuestos sobre el patrimonio, en virtud del cual dichos bienes y derechos estén exentos del Impuesto sobre el Patrimonio español, pero deban ser tenidos en cuenta para calcular el impuesto correspondiente a los restantes elementos patrimoniales del sujeto pasivo.

Bienes y derechos exentos, excepto para determinar el tipo de gravamen aplicable al resto del patrimonio	28

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

Ejercicio 2007 | Sujeto pasivo | NIF | Apellidos y nombre | Página 10

6 Liquidación

Cuota íntegra

Cuota íntegra (cuota resultante de aplicar la escala del Impuesto a la base liquidable consignada en la casilla 27) 29

Atención: *si ha cumplimentado la casilla 28, la determinación de la cuota íntegra se efectuará siguiendo las indicaciones específicas que figuran en la Guía de la declaración.*

Límite de la cuota íntegra (únicamente para sujetos pasivos por obligación personal)

Suma de las bases imponibles del Impuesto sobre la Renta de las Personas Físicas (suma de las casillas 455 y 465 de la declaración del IRPF) 30

Dividendos y participaciones en beneficios a que se refiere el apartado 6.a) de la disposición transitoria vigésima segunda del texto refundido de la Ley del Impuesto sobre Sociedades, obtenidos en el ejercicio y no integrados en la declaración del IRPF *(véase la Guía)* 31

Parte de la base imponible del ahorro del IRPF constituida por el saldo positivo de las ganancias y pérdidas patrimoniales obtenidas por transmisiones de elementos patrimoniales adquiridos con más de un año de antelación a la fecha de la transmisión *(véase la Guía)* 32

Límite conjunto de cuotas del Impuesto sobre el Patrimonio y del IRPF: 60% de (30 + 31 − 32) 33

Cuotas íntegras del IRPF (suma de las casillas 698 y 699 de la declaración del IRPF) 34

Parte de las cuotas íntegras del IRPF correspondiente al saldo positivo de las ganancias y pérdidas patrimoniales obtenidas por transmisiones de elementos patrimoniales adquiridos con más de un año de antelación a la fecha de la transmisión *(véase la Guía)* 35

Parte de la cuota íntegra del Impuesto sobre el Patrimonio susceptible de limitación *(véase la Guía)* 36

Suma de cuotas a efectos del límite conjunto (34 − 35 + 36) 37

- Si la casilla 33 es mayor o igual que la casilla 37, traslade el importe de la casilla 29 a la casilla 40.
- Si la casilla 33 es menor que la casilla 37, la reducción es igual a la menor de las dos cantidades siguientes:

a) Exceso (37 − 33) 38

b) 80 por 100 de la cuota íntegra del Impuesto sobre el Patrimonio (80% de la casilla 29) 39

Total cuota íntegra

Total cuota íntegra (casilla 29 menos la cantidad menor de las consignadas en las casillas 38 y 39) 40

Deducción por impuestos satisfechos en el extranjero

Tipo medio efectivo de gravamen: TM = 40 ÷ 27 x 100 .... TM

Impuestos efectivamente satisfechos en el extranjero .... a

Parte de la base liquidable gravada en el extranjero .... b

Importe de la deducción *(véase la Guía)* 41

Bonificación de la cuota en Ceuta y Melilla

Valor neto de los bienes y derechos en Ceuta y Melilla 42

Parte de la cuota que proporcionalmente corresponde a dichos bienes y derechos (42 ÷ 25 x 40) 43

Bonificación: 75 por 100 de la casilla 43 (máximo: 75 por 100 de la casilla 40) 44

Cuota minorada

Cuota minorada (40 − 41 − 44) 45

Bonificaciones autonómicas

Comunidad Autónoma de Cataluña: bonificación de los patrimonios protegidos de las personas con discapacidad

Valor neto de los bienes y derechos con derecho a bonificación *(véase la Guía)* 46

Parte de la cuota minorada que proporcionalmente corresponde a dichos bienes y derechos (46 ÷ 25 x 45) 47

Bonificación: 99 por 100 de la casilla 47 (máximo: 99 por 100 de la casilla 45) 48

Comunitat Valenciana: bonificación en favor de miembros de entidades relacionadas con la celebración de la "Copa América 2007"

Valor neto de los bienes y derechos con derecho a bonificación *(véase la Guía)* 49

Parte de la cuota minorada que proporcionalmente corresponde a dichos bienes y derechos (49 ÷ 25 x 45) 50

Bonificación: 99,99 por 100 de la casilla 50 (máximo: 99,99 por 100 de la casilla 45) 51

Cuota a ingresar

Cuota a ingresar (45 − 48 − 51) 52

Figure B2: Wealth Tax Form D-714, 2007 (cont.)

B.3 Accounting for Offshore Wealth

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, Johannesen, and Zucman, 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.[2]

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 mutual fund shares held by Spanish persons through offshore financial institutions in tax havens[3]. 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 Blanco, Bauluz, and Martínez-Toledano, 2020. They rely

[2]Self-employees might also evade taxes and indeed Torregrosa, 2015 finds widespread tax evasion among them in the Spanish context. However, Alstadsæter, Johannesen, and Zucman, 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.

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

on two main data sources: Zucman, 2013; 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 Blanco, Bauluz, and Martínez-Toledano, 2020 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 Blanco, Bauluz, and Martínez-Toledano, 2020 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 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.[4]

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.[5]

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

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

[5]For a more detailed explanation of how the series of unreported and reported offshore assets are constructed, read the appendix of Artola Blanco, Bauluz, and Martínez-Toledano, 2020.

by carrying more audits, introducing the 720 tax-form and implementing a tax amnesty in 2012 (Figure B17, panel a). Unreported offshore wealth amounted to 158,915 million euros in 2012, which represents 9% of household financial wealth.[6] 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 B17, 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, Johannesen, and Zucman, 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 wealtholders.

Including offshore assets increases the top 1% wealth share on average from 22.7% to 25.7% over the period 1984-2015 (Figure B16). 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, Johannesen, and Zucman, 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.

[6] 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 Blanco, Bauluz, and Martínez-Toledano, 2020 use administrative data on reported wealth held by Spanish residents abroad.

B.4 Robustness Checks on the Distribution Series

B.4.1 Comparison with Other Sources

B.4.1.1 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, specially for the top 0.1% and 0.01% (Figure B18). 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, specially 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 methods which might explain these differences. First, Alvaredo and Saez, 2009 use financial wealth from both households and non-profit institutions serving households in their wealth denominator, rather than only financial household wealth. Second, they exclude pensions 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 B10). 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 Blanco, Bauluz, and Martínez-Toledano, 2020 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.

B.4.1.2 The Survey of Household Finances

The Survey of Household Finances provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top, as it was already pointed out in section 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. Even though trends are the same, levels are still quite different across the two methods (Figure B19a). 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 B19b). Figure B19d shows that results are also quite similar when looking at the very top of the distribution (top 1% and 0.1%).

In general, it is a challenge for wealth surveys to accurately capture wealthy individuals because of limited sample size and low response rates at the very top. Thus, as it is the case with income, wealth shares tend to be lower using survey data instead of tax data. This is the case in the US, as documented by Saez and Zucman, 2016. Nonetheless, this does not seem to be the case in Spain, since after adjusting for population and wealth totals results are almost the same. This is also the case even looking at very top groups (Figure B19d). The similarities across the two sources and methodologies also exist even when looking at the composition of wealth shares (Figure B20). Hence, the Spanish SHF is extremely useful not only to analyze the bottom and middle of the distribution, which as it has already be mentioned it is not entirely possible using only tax data, but also to understand the wealth inequality dynamics 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.

B.4.2 Testing the Mixed Capitalization-Survey Method

The wealth distribution series are obtained using a mixed capitalization-survey method and thus, assuming that within a given asset class, everybody has the same capitalization factor. Computing wealth shares by capitalizing income consists of allocating the wealth for each asset recorded in the Non-financial and Financial Accounts to each group of the distribution based on how the income for this asset is distributed. Hence, this method does not require to know the exact rate of return for each asset type, as long as the distribution of each capital income category is similar to the distribution of its corresponding wealth category. A new wave of papers have documented that returns are positively correlated with wealth and that wealth inequality series estimated using the capitalization method can be sensitive to the assumptions on the rates of return (Fagereng et al., 2019, Smith, Zidar, and Zwick, 2019). In this section, I carry different tests and show that the mixed capitalization-survey method is robust to the assumption of constant asset-specific rates of return in the Spanish context.

Figures B19b and B19d are already a test for the well-behaved wealth inequality trends using the mixed capitalization-survey method. As another robustness check, I use the SHF and compare the wealth shares using direct reported wealth, with the shares calculated by capitalizing the income from the survey. These wealth shares include the same assets as the benchmark capitalized shares in this paper, except for owner-occupied housing, life insurance, pension and investment funds. The reason is that the SHF does not include the income generated by these assets in any of the four waves. Results using direct and capitalized wealth shares are very similar (Figure B21). All these robustness checks suggest that the capitalization method derives robust wealth distribution series in the Spanish context.

B.5 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, Martínez-García, et al., 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, M. Bordo and Landon-Lane, 2014, Bracke, 2013, Igan and Loungani, 2012, Claessens, Kose, and M. E. Terrones, 2012, Kose, Claessens, and M. E. Terrones, 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.[7]

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, Claessens, and M. E. Terrones, 2011, T. F. Helbling, 2005 and T. Helbling and M. 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 M. D. Bordo and Jeanne, 2002 and International Monetary Fund, 2009 in which turning 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.[8] 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.

[7]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.

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

B.6 Wealth Distribution in Spain by Age

The high level of dissagregation of the wealth distribution series allows me to analyze the wealth inequality dynamics by age.[9] I find that average wealth is always very small at age 20 (less than 20% of average adult wealth), then rises sharply with age until age 60-70 reaching 150-170% of average adult wealth, and moderately decreases at ages above 60-70 (Figure B22a). Contrary to the pure life-cycle model with no bequest (the standard Modigliani triangle), average wealth does not seem to sharply decline at high ages and it remains at very high levels, which means that old-age individuals die with substantial wealth and transmit it to their offspring. This age-wealth profile has changed over the 2002-2015 period. Old individuals (+60) are better-off in 2015 than in 2007 and even more so than in 2002. Furthermore, the age at which individuals reach the maximum average wealth relative to total wealth has increased with the passing of time. In 2002 the maximum average wealth was reached at age 63, in 2007 at age 67 and in 2015 at age 75. In contrast, the young (20-39) are worse-off in 2015 than in 2007 and even more so than in 2002. Hence, the old have benefited from the economic crisis at the expense of the worsening-off of the young. This is consistent with the large increase in youth unemployment (Scarpetta, Sonnet, and Manfredi, 2010), the difficult access to housing for young individuals after the burst of the housing crisis, and at the same time the stability in Social Security pension payments.

When decomposing the wealth distribution series by age, I find that wealth inequality is more pronounced for the young (20-39) than for the old (+60) and middle-old (40-59), for which wealth inequality is slightly lower than for the population taken as a whole (Figure B22b). Wealth concentration among the young has significantly increased during the housing bust. This is consistent with large differences in saving rates and bequests received between the young-rich and the young-poor.

B.7 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

[9] I only carry the analysis for the period 1999-2015, since the old personal income tax panel (1984-1998) does not include any information about age.

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.[10] 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 tax data), wealth shares are almost identical (Figure B23).

My first exercise is to follow Kuhn, Schularick, and Steins, 2018 and explore wealth mobility across the three groups in the analysis: bottom 50%, middle 40% and top 10%. Table B15 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).[11] 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.

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 saving rates. Figure B24 in the appendix 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 B24a shows that capital gains are larger for the middle and bottom of the distribution during the boom and they converge during the bust. Figure B24b documents that saving rates are larger for the top than for the middle and the bottom. Figures B24c and B24d also shows 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.

[10]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.

[11] 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.

B.8 Alternative Explanations to Saving Responses

B.8.1 Risk aversion

Heterogeneity in saving responses can also happen due to differences in attitudes towards risk along the wealth distribution. It is widely accepted that Pratt, 1964 and Arrow, 1970 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 evidence for Spain goes in the same direction. Table B16 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 did not invest as much as top wealth holders in risky financial assets (i.e., stocks), but not why only top wealth holders sold housing and why only housing for investment purposes.

B.8.2 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 the housing bust. There is evidence of a positive empirical link between financial knowledge and wealth holdings (Behrman et al., 2012) and, in particular, stock holdings (Van Rooij, Lusardi, and Alessie, 2011). 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 B17).[12]

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

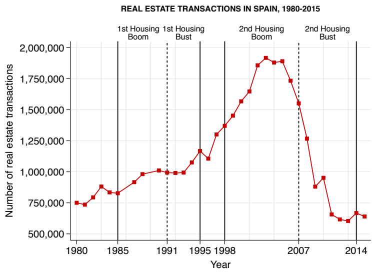
[12]Ideally, one should looked at the relationship between financial knowledge and wealth (not income), but the SFC does not ask about the amount of households' wealth holdings. Nonetheless, income and wealth are highly correlated, so that one can already learn about the gradient for wealth by looking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

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 diversification. In Spain, the probability of getting financial advice is also higher among top income holders (Table B17). 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 only top wealth holders sold housing and why only housing for investment purposes.

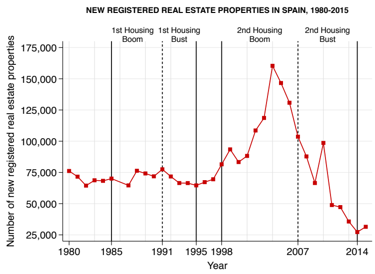
B.8.3 Expectations on House Prices

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. Top wealth holders might have dissaved more if they had more pessimistic expectations about the future evolution of house prices. 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.

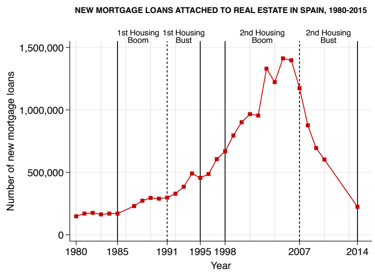
B.9 Appendix Figures and Tables



(a) Number of Real Estate Transactions



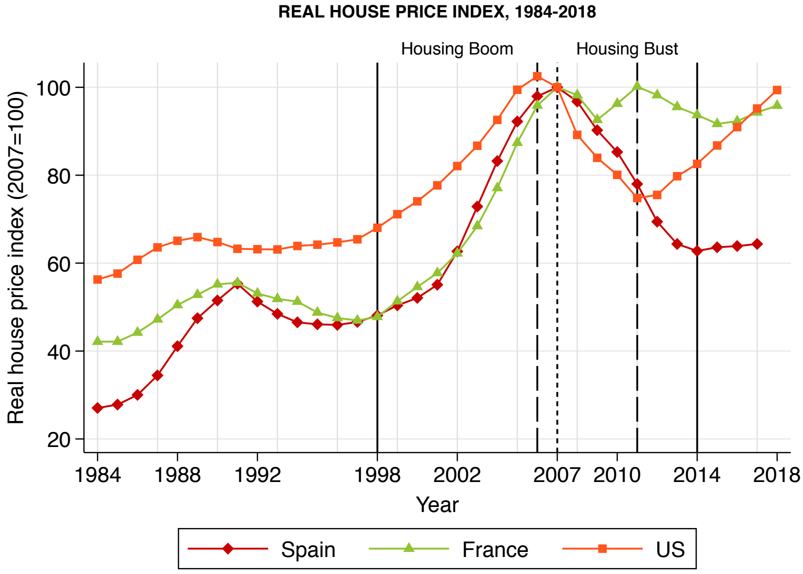
(b) Number of New Registered Real Estate Properties



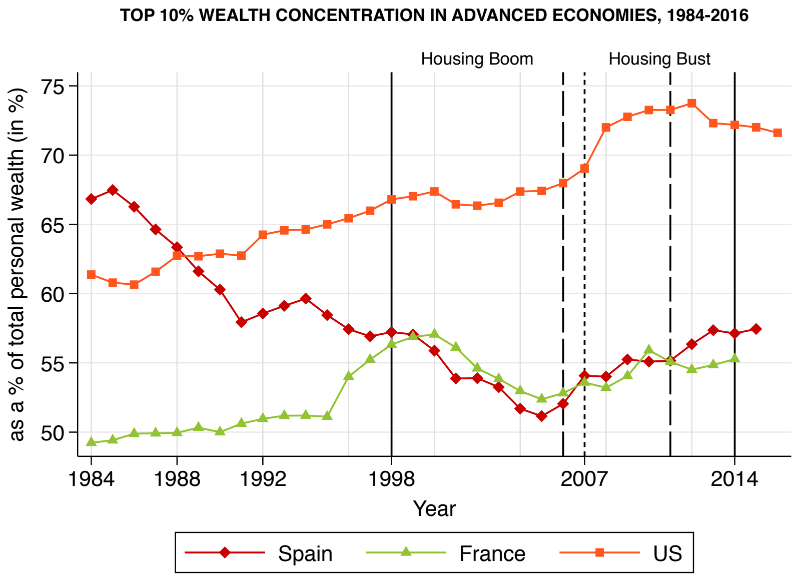
(c) Number of New Mortgage Loans attached to Real Estate

Figure B3: 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.



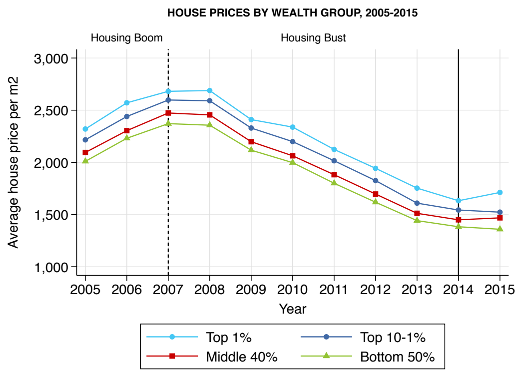
(a) Real House Price Index, 1984-2018



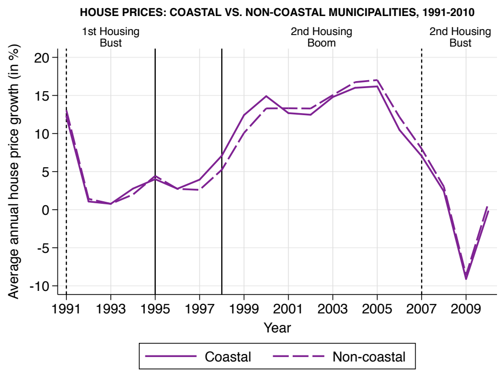
(b) Top 10% Wealth Concentration, 1984-2016

Figure B4: International comparison of real house prices and top wealth shares

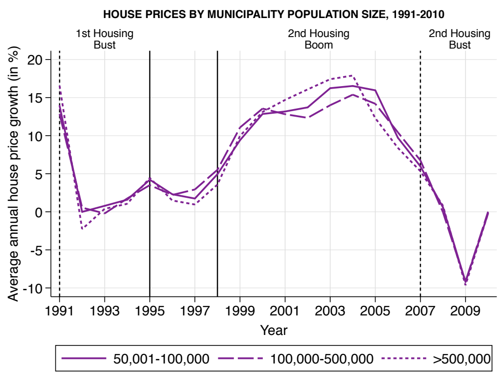
Notes: Panel a in the figure depicts the real house price index in Spain, France and the US over the period 1984-2018. The base year is set to 2007. The real house price series are the ones published by the OECD, except from Spain which is the series constructed by Mack, Martínez-García, et al., 2011. 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, Goupille, and Piketty, 2019b and for the US by Saez and Zucman, 2016. 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).



(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 B5: 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 distribution of house prices is calculated by assigning to each individual in the wealth distribution the average house price in the municipality in which they report having their primary residence. The series of house prices used is elaborated by the Ministry of Public Works and it is based on property appraisals. Despite the large volatility in house prices during this period of of time, differences in house prices are on average very modest. 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 evolution has been quite similar in all type of municipalities. The series in the last two panels has been elaborated by the *Instituto Valenciano de Investigaciones Económicas.*

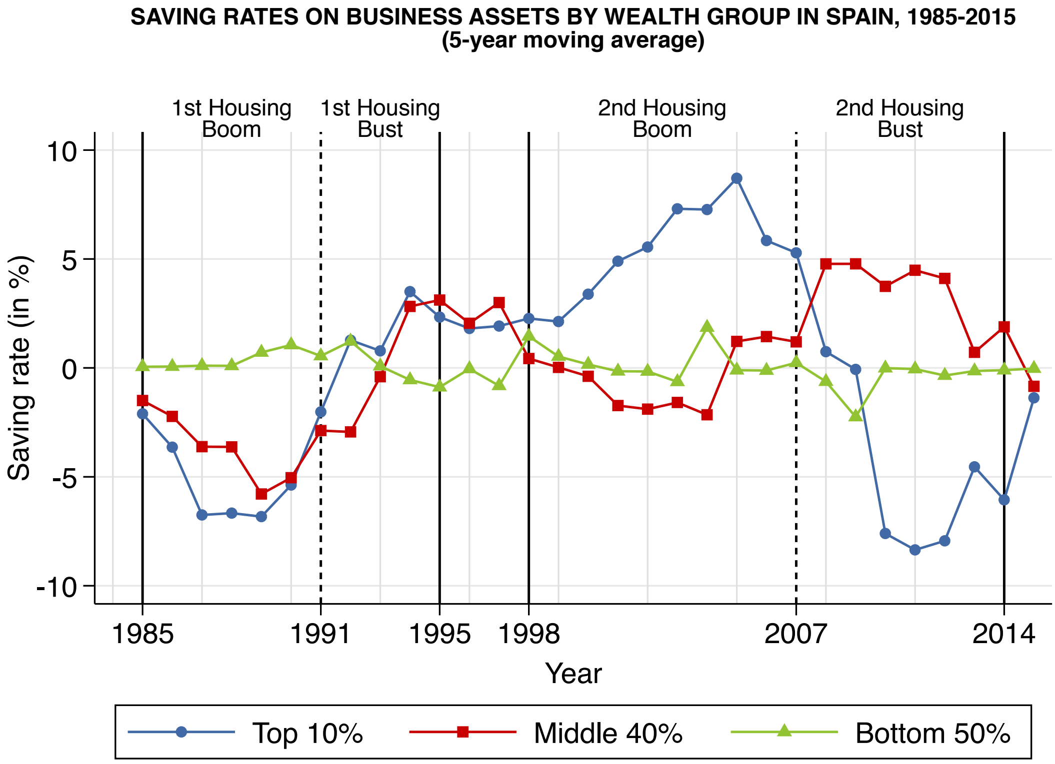
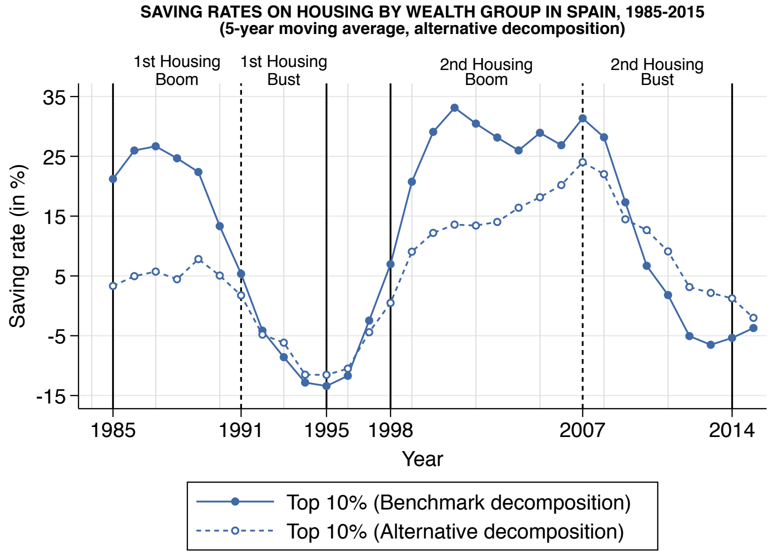
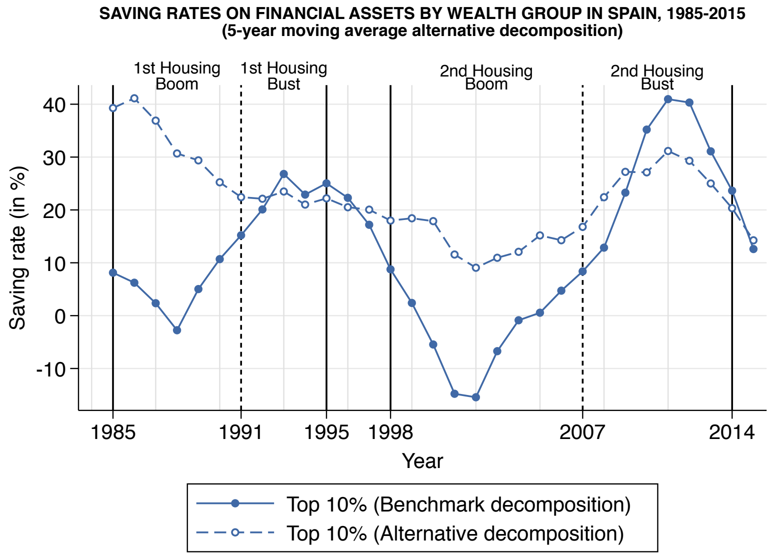


Figure B6: Saving rate on unincorporated business assets by wealth group in Spain, 1985-2015

Notes: This figure plots the synthetic saving rates on unincorporated business assets for the top 10%, middle 40%, and bottom 50%, respectively, using a five year moving average from 1985 up to to 2015. Synthetic saving rate $s^g_{A,t}$ for wealth group g in year t is defined so that $W^g_{A,t+1} = (1+q^g_t)[W^g_{A,t} + s^g_{A,t}(Y^g_{L_t} + r^g_t W^g_{H,t})]$, where $W^g_{A,t}$ stands for the average value of asset A (i.e. unincorporated business assets) of wealth group g at time t, $s^g_{A,t}$ the synthetic saving rate on asset A of wealth group g at time t and the rest of variables are the same as in Figure B4. For each wealth group, the sum of these this saving rate each year, together with the saving rate on net housing and financial assets is equal to the total annual saving rate by wealth group. 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.



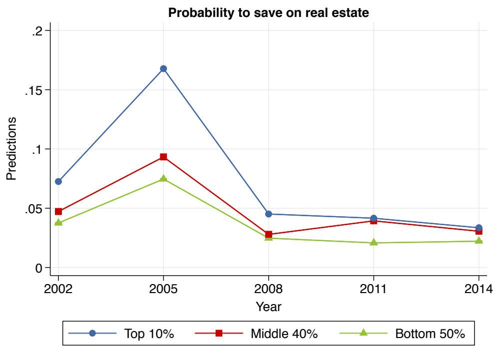
(a) Saving rate on housing for the top 10% wealth group



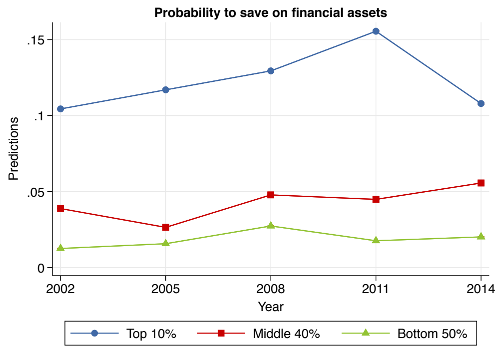
(b) Saving rate on financial assets for the top 10% wealth group

Figure B7: Alternative asset-specific decomposition using group-and-asset specific rates of capital gain for Spain, 1984-2015

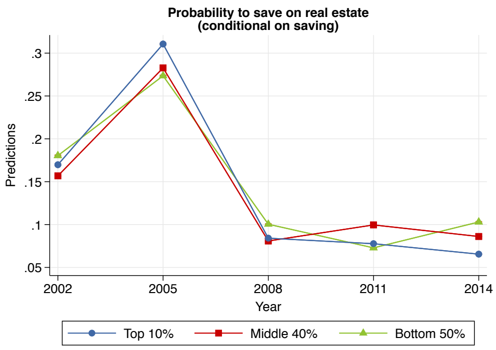
Notes: This figure compares the saving rates on housing (panel a) and financial assets (panel b) for the top 10% wealth group in Spain using the benchmark asset-specific decomposition of wealth accumulation with group-specific rates of capital gain, with the saving rates of an alternative asset-specific 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 levels differ, but dynamics are similar over the business cycle. The only exception are fluctuations of the saving rate on financial assets during the first housing boom. The rates on capital gain on financial assets were significantly low but increasing during the mid-1980s (Figure B25) and consequently, by construction, the saving rates with the alternative decomposition declining. 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.



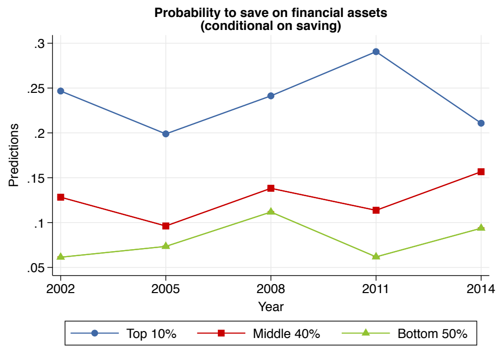
(a) Probability to save on real estate



(b) Probability to save on financial assets



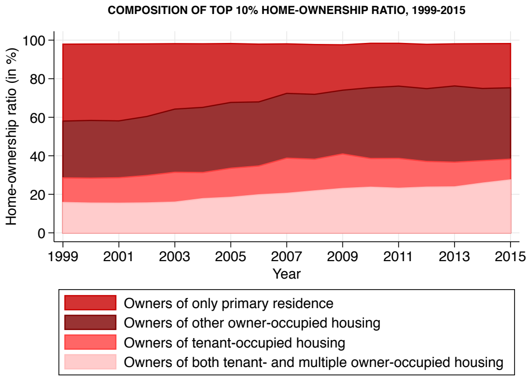
(c) Probability to save on real estate (conditional on saving)



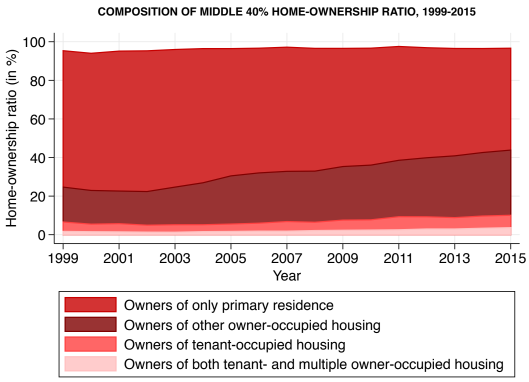
(d) Probability to save on financial assets (conditional on saving)

Figure B8: Attitudes towards saving, 2002-2014

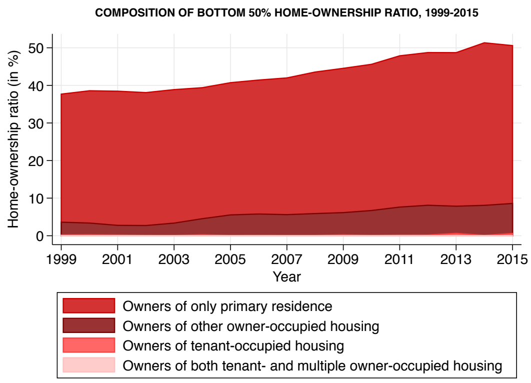
Notes: The figure depicts the probability to save on real estate (panel a) and on financial assets (panel b) over the period 2002-2014. Panels c and d show the same probabilities conditional on being a saver. These results are obtained after carrying logit regressions with the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). 95% confidence intervals are reported.



(a) Composition of top 10% home-ownership ratio



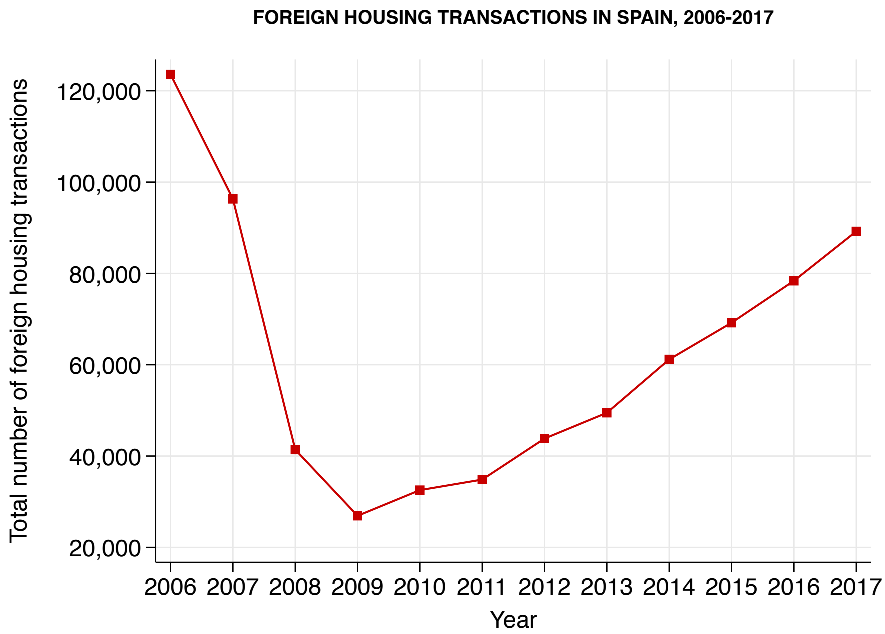
(b) Composition of middle 40% home-ownership ratio



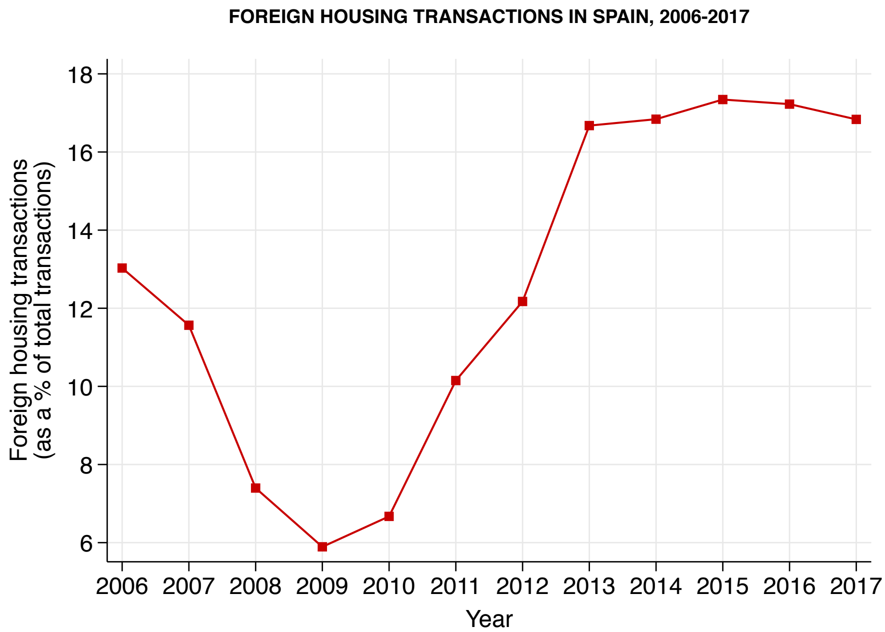
(c) Composition of bottom 50% home-ownership ratio

Figure B9: 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.



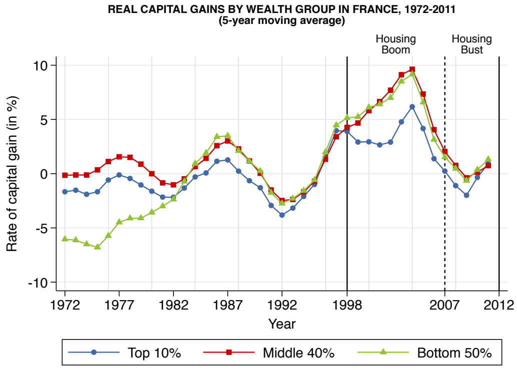
(a) Total number of foreign housing transactions



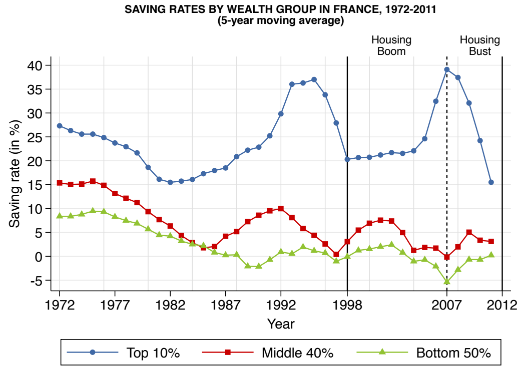
(b) Foreign housing transactions (as a % of total transactions)

Figure B10: Foreign housing transactions in Spain, 2006-2017

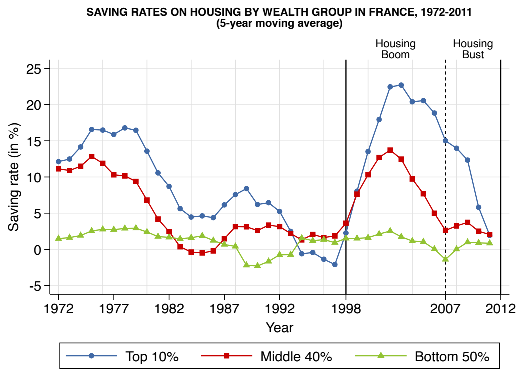
Notes: This figure depicts the evolution of foreign housing transactions in Spain over the period 2006-2017. Panel a shows the evolution of the total number of foreign transactions and panel b the same evolution but as a share of total transactions. Foreigners include both residents and non-residents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



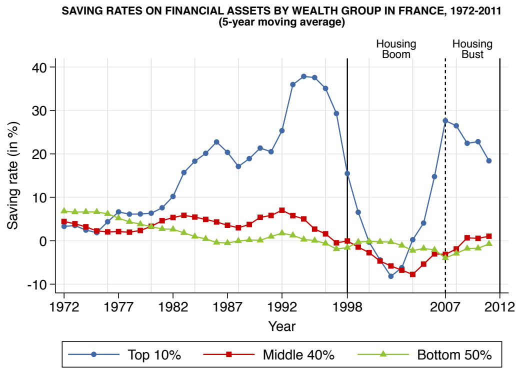
(a) Real capital gains by wealth group



(b) Saving rates by wealth group



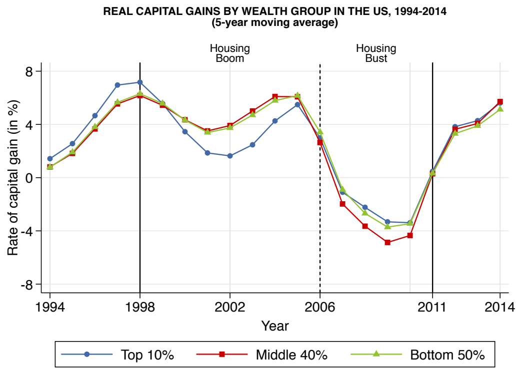
(c) Saving rates on housing by wealth group



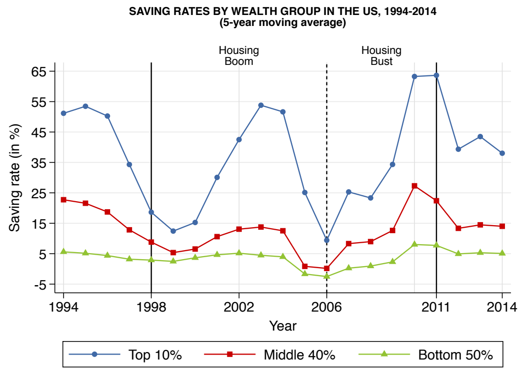
(d) Saving rates on fin. assets by wealth group

Figure B11: Real capital gains and saving rates by wealth group in France, 1972-2011

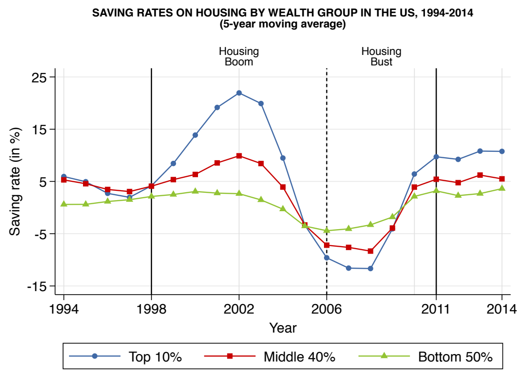
Notes: The figure depicts the distribution of real capital gains (panel a), synthetic saving rates (panel b), synthetic saving rates on housing (panel c) and synthetic saving rates on financial assets (panel d) among the top 10%, middle 40% and bottom 50% wealth groups using a five year moving average over the period 1972-2011 in France. These calculations have been derived using the wealth distribution series of Garbinti, Goupille, and Piketty, 2019b.



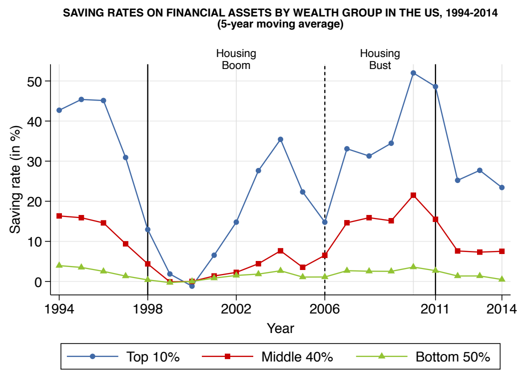
(a) Real capital gains by wealth group



(b) Saving rates by wealth group



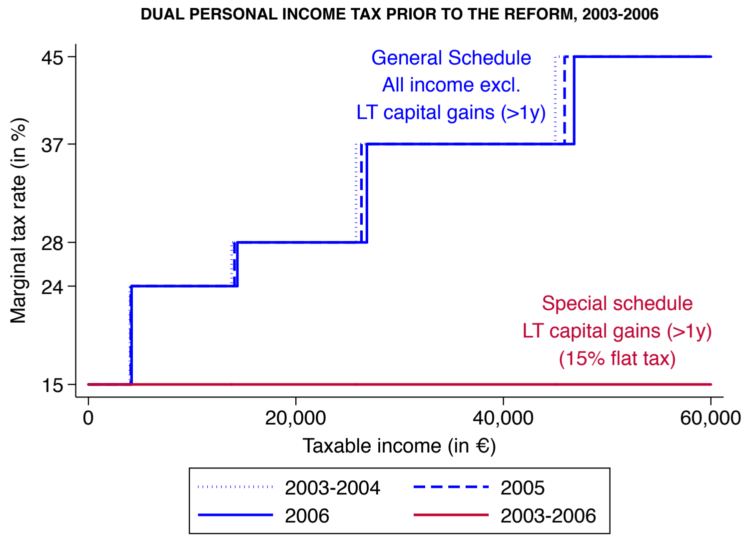
(c) Saving rates on housing by wealth group



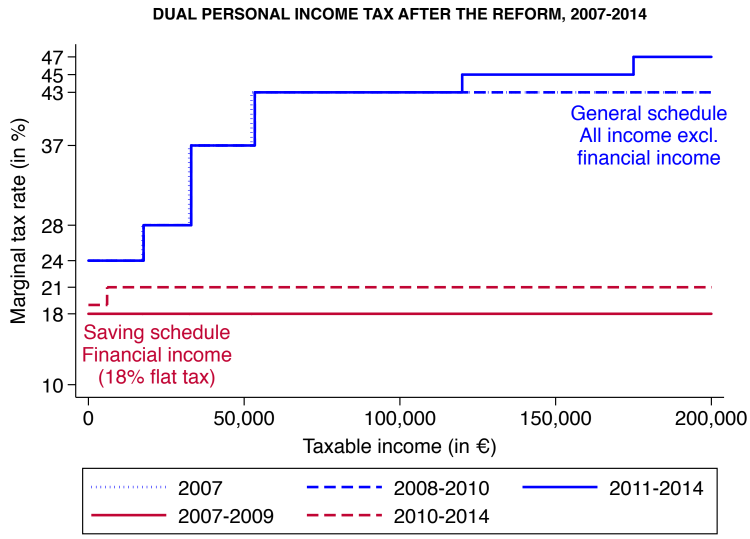
(d) Saving rates on fin. assets by wealth group

Figure B12: 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.



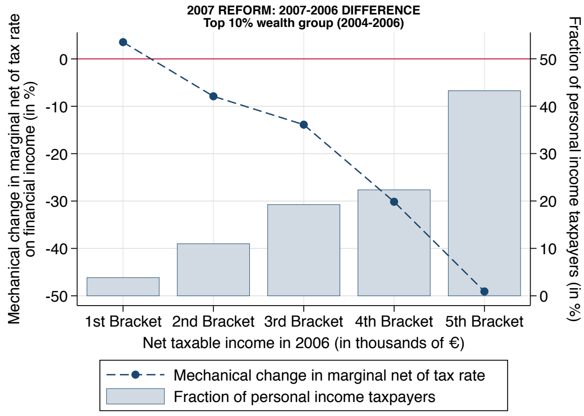
(a) Dual Personal Income Tax Schedule before the reform, 2003-2006



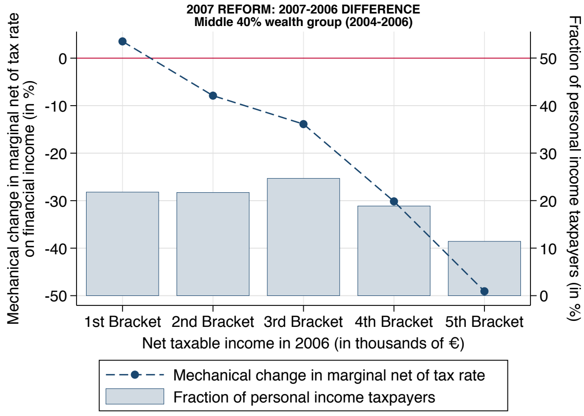
(b) Dual Personal Income Tax Schedule after the reform, 2007-2014

Figure B13: Dual personal income tax schedule before and after the reform in Spain, 2003-2014

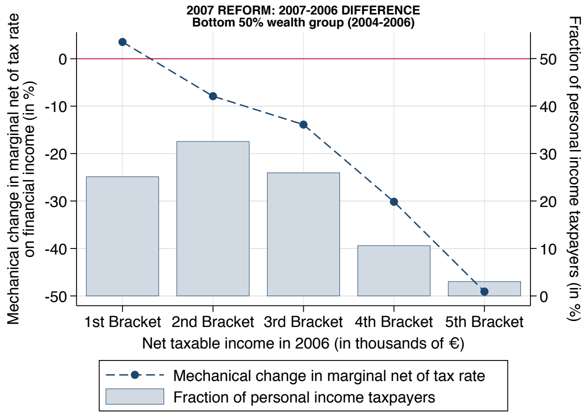
Notes: This figure presents the dual personal income tax schedule before and after the reform in Spain. Panel a depicts the dual personal income tax schedule over the period 2003-2006, the years prior to the reform. All income components were subject to the general progressive tax schedule (upper panel), except from long-term capital gains (those generated over more than one year), which were subject under a special schedule to a 15% flat tax. Panel b presents the dual personal income tax schedule in Spain over the period 2007-2014, the years after the reform. The general tax schedule was slightly modified and all income components were subject to it, except from financial income (interest, dividends and capital gains), which was subject under a new saving schedule to a 18% flat tax over the period 2007-2009. The saving schedule was slightly modified over the period 2010-2014 with a tax rate of 19% for the first 6,000 euros of reported financial income and a 21% rate for financial income above 6,000 euros.



(a) Top 10% wealth group



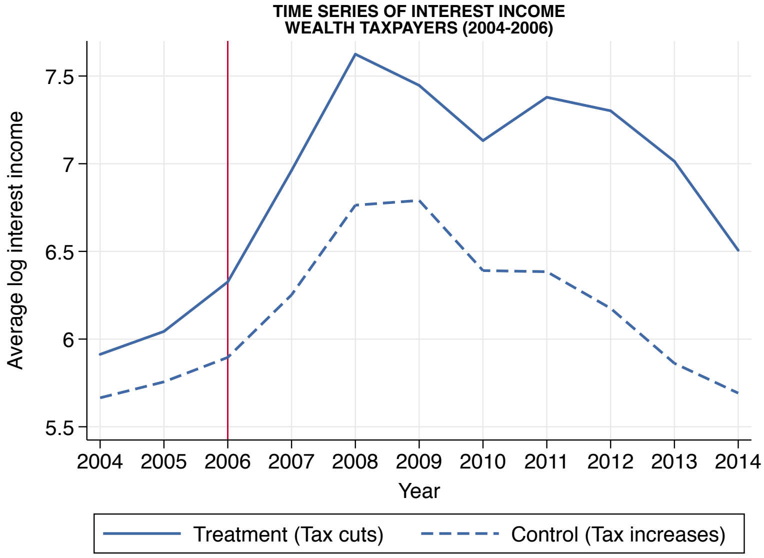
(b) Middle 40% wealth group



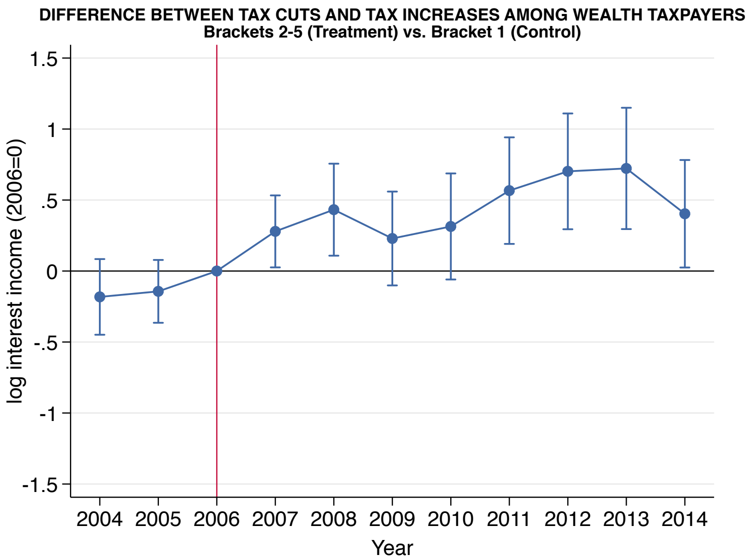
(c) Bottom 50% wealth group

Figure B14: Mechanical changes in marginal net of tax rates on financial income by wealth group

Notes: This figure depicts the mechanical changes in marginal net of tax rates (dashed lines) due to the 2007 reform among personal income taxpayers within the top 10% wealth group (upper panel) middle 40% wealth group (middle panel) and bottom 50% wealth group. Each panel shows the 2007-2006 differences in percent. The figure also shows the size of each group as a share of all taxpayers (bars).



(a) Time Series of Interest Income among Wealth Taxpayers, 2004-2014



(b) Differences-in-Differences Results

Figure B15: Effects of the 2007 personal income tax reform among wealth taxpayers

Notes: The figure shows the evolution of log reported interest income for groups that were affected differently by the 2007 reform. The figure is based on a balanced panel of wealth taxpayers who are observed throughout the period 2004-2014. The vertical line at 2006 denotes the last pre-reform year. The treatment-control definition is based on the reform-induced tax variation (2004-2006) for the different groups shown in Figure 2.11b, with treatments being an aggregation of groups who experience an increase in the marginal net-of-tax rate due to the reform (2nd-5th bracket) and the control being the group who experiences a decline in the marginal net-of-tax rate (1st bracket). Panel a compares the evolution of log reported interest income in the two comparison groups and panel b shows using a DD event-study the differences between these two series normalized to zero in the pre-reform year 2006. 95% confidence intervals are based on standard errors clustered at the individual level.

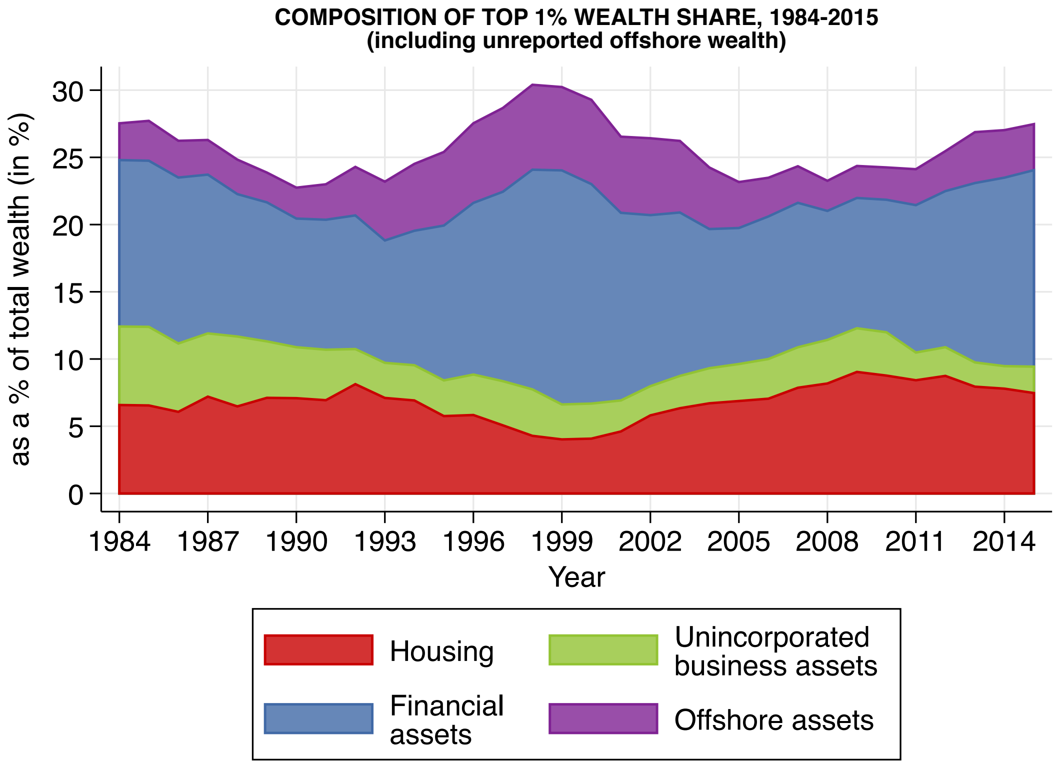
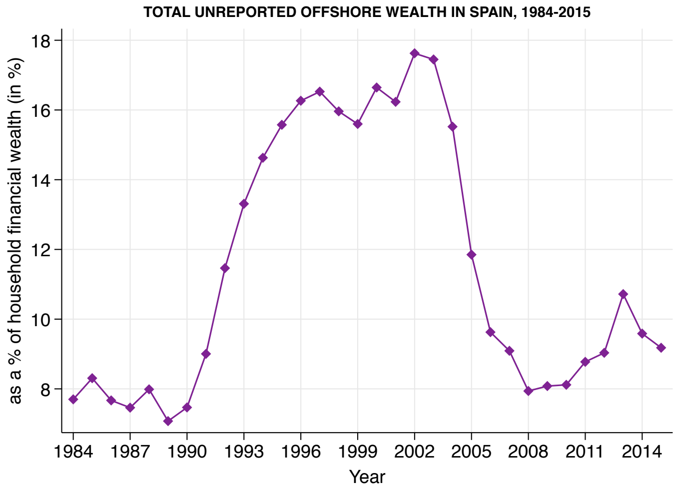
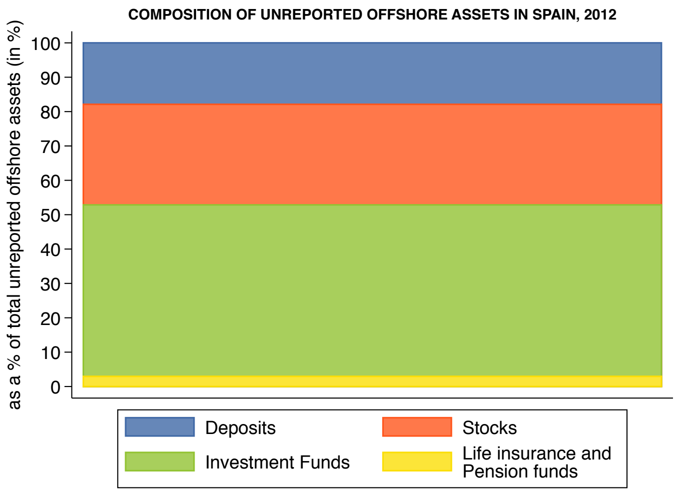


Figure B16: Composition of top 1% wealth share including unreported offshore wealth in Spain, 1984-2015

Notes: The figure depicts the composition of the top 1% wealth share in Spain including unreported offshore assets both in the numerator and in the denominator. The series of unreported offshore assets used is the one displayed in Figure B17a). Following Alstadsæter, Johannesen, and Zucman, 2019, unreported offshore assets are assigned proportionally to the top 1%.



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



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

Figure B17: 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. This is the series used in order to correct the wealth distribution series for unreported offshore assets. The series comes from Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and has been estimated using Zucman, 2013; Zucman, 2014, whose data mainly come from the Swiss National Bank (SNB) statistics, and the unique information provided by the 720 tax-form. Since 2012, Spanish residents holding more than 50,000 euros abroad are obliged to file this form specifying the type of asset (stocks, investment funds, deposits, etc.), value, and country of location. The panel (b) figure displays the composition of unreported offshore assets in Spain using the information provided in the 2012 720 tax-form. For a more detailed explanation of how the series of unreported offshore assets are constructed, read the appendix of Artola Blanco, Bauluz, and Martínez-Toledano, 2020.

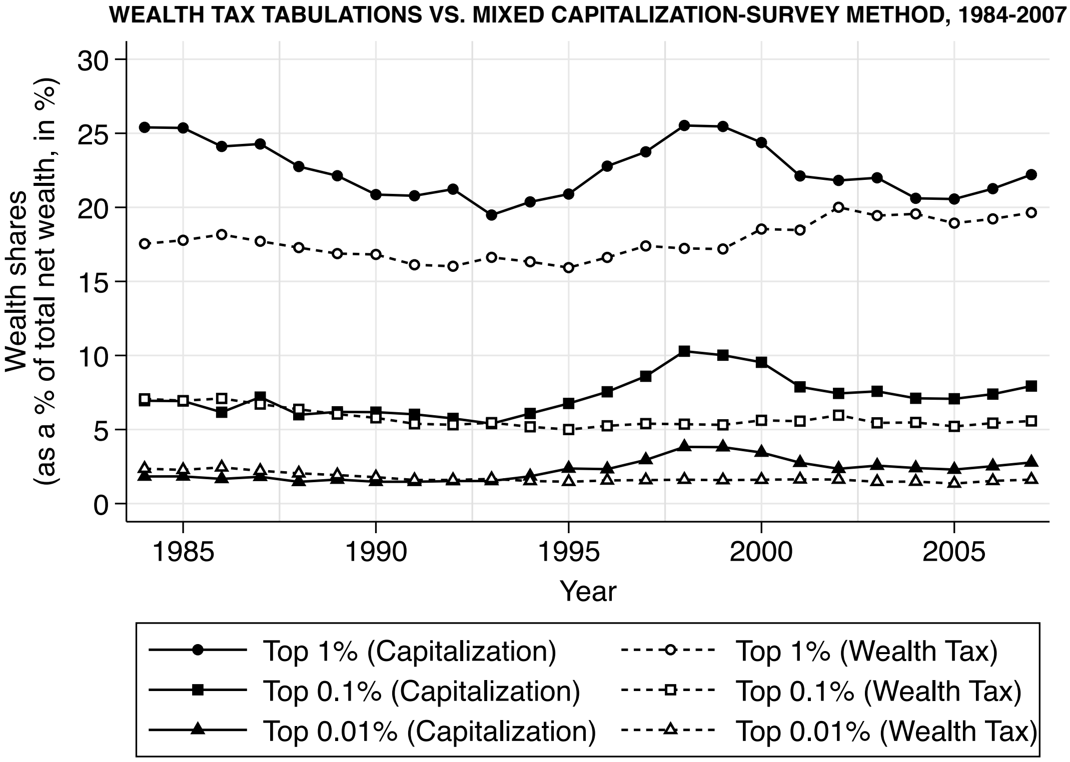
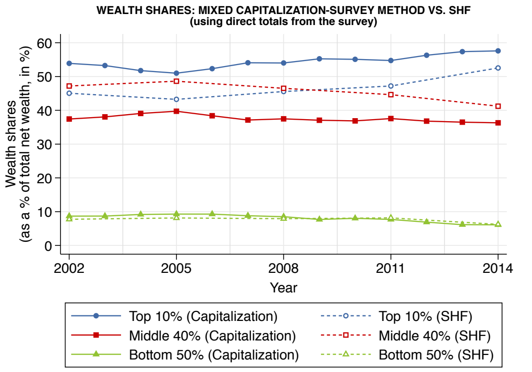
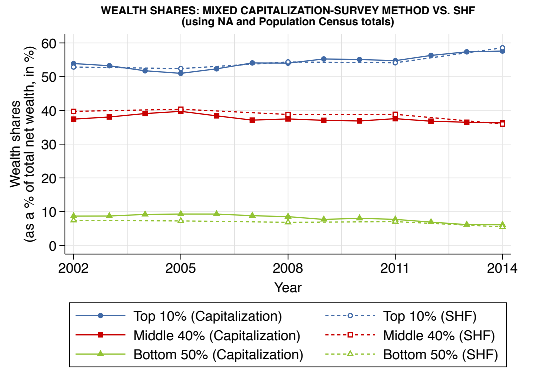


Figure B18: Wealth tax tabulations vs. Mixed capitalization-survey method in Spain, 1984-2007

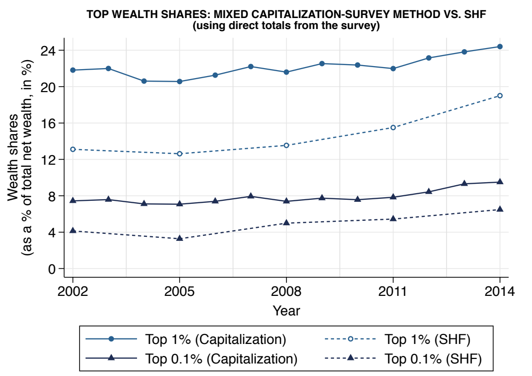
Notes: The figure compares the top 1%, 0.1% and 0.01% wealth shares in Spain using wealth tax tabulations and the capitalization method. The wealth shares using wealth tax tabulations are extracted from Alvaredo and Saez, 2009. They use wealth tax returns and the Pareto interpolation method. There are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



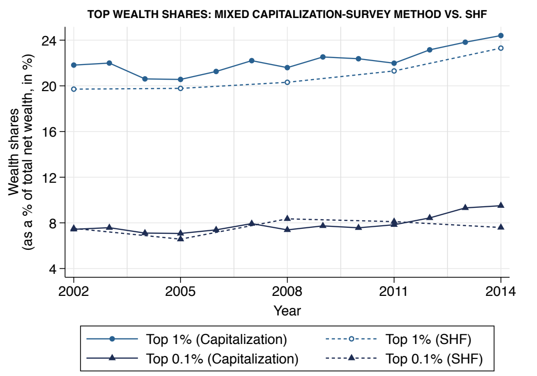
(a) SHF wealth shares using direct totals from the survey



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



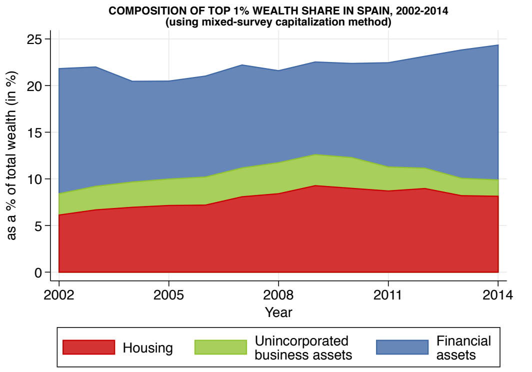
(c) SHF top wealth shares using direct totals from the survey



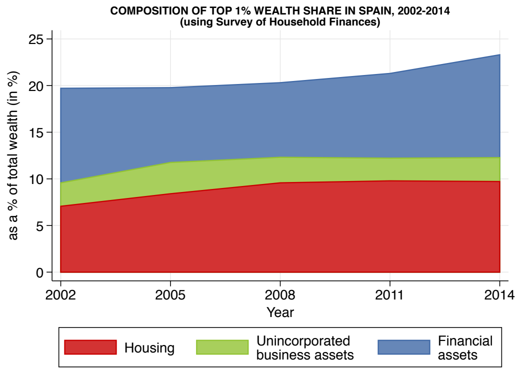
(d) SHF top wealth shares using the Census of Population and NA totals

Figure B19: Wealth shares: Mixed capitalization-survey method vs. SHF in Spain, 2002-2014

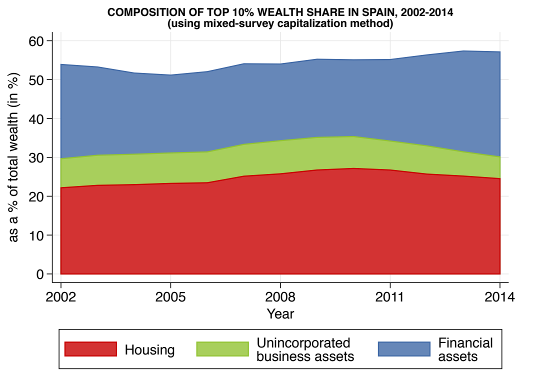
Notes: The figure compares the top 10%, middle 40%, bottom 50%, top 1% and top 0.1% wealth shares in Spain using the capitalization method and the Survey of Household Finances. In panels a and c the SHF wealth shares are calculated using the direct totals of the SHF, whereas in panel b and d the SHF wealth shares are calculated using the Census of Population and NA totals, that is, the same totals as the ones used in the mixed capitalization-survey technique. This is done by proportionally rescaling the wealth shares to arrive to the Census of Population and NA totals. Note that contrary to the capitalized wealth shares, the SHF includes the regions of País Vasco and Navarra. In all panels, the wealth shares with the survey data have been constructed using the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). In order to ensure consistency across methods, households in the survey are split into individuals and wealth is assigned proportionally to all members of the household, except from children, who are only given proportionally wealth held in bank accounts. Moreover, the population considered excludes individuals aged less than 20.



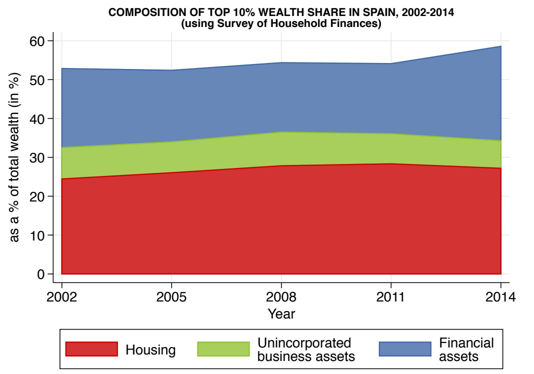
(a) Composition of top 1% wealth share (using mixed survey-capitalization method)



(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 B20: 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. Net housing includes owner- and tenant-occupied housing net of mortgage debt, the latter approximated by total household liabilities. Unincorporated business assets include the total value of the business of sole proprietorships. Financial assets cover equities, investment funds, fixed income assets (mainly bonds), saving and current deposits, currency, life insurance reserves and pension funds, excluding Social Security. The SHF wealth shares are calculated using the Census of Population and NA totals, that is, the same totals as the ones used in the mixed capitalization-survey technique. This is done by proportionally rescaling the wealth shares to arrive to the Census of Population and NA totals. Note that contrary to the capitalized wealth shares, the SHF includes the regions of País Vasco and Navarra. In all panels, the wealth shares with the survey data have been constructed using the five waves of the Survey of Household Finances from the Bank of Spain (2002, 2005, 2008, 2011 and 2014). In order to ensure consistency across methods, households in the survey are split into individuals and wealth is assigned proportionally to all members of the household, except from children, who are only given proportionally wealth held in bank accounts. Moreover, the population considered excludes individuals aged less than 20. The level and composition of wealth shares is very similar across the two sources.

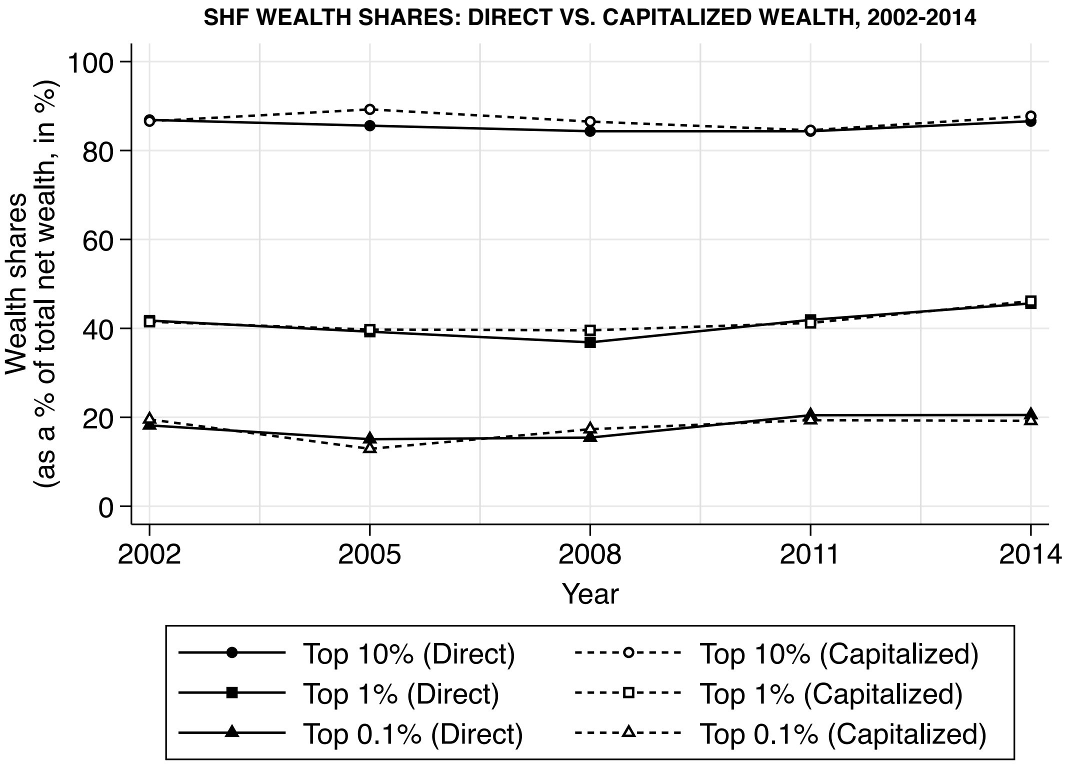
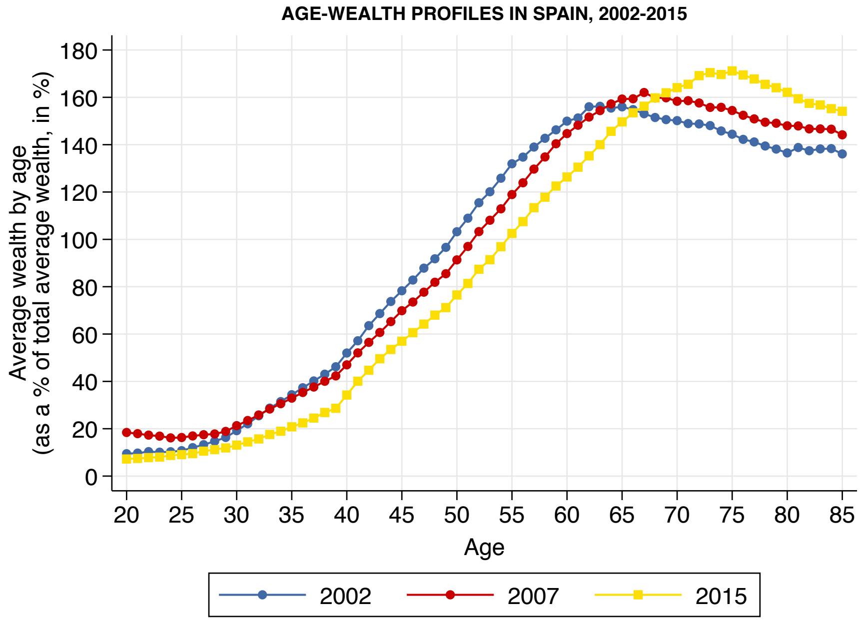
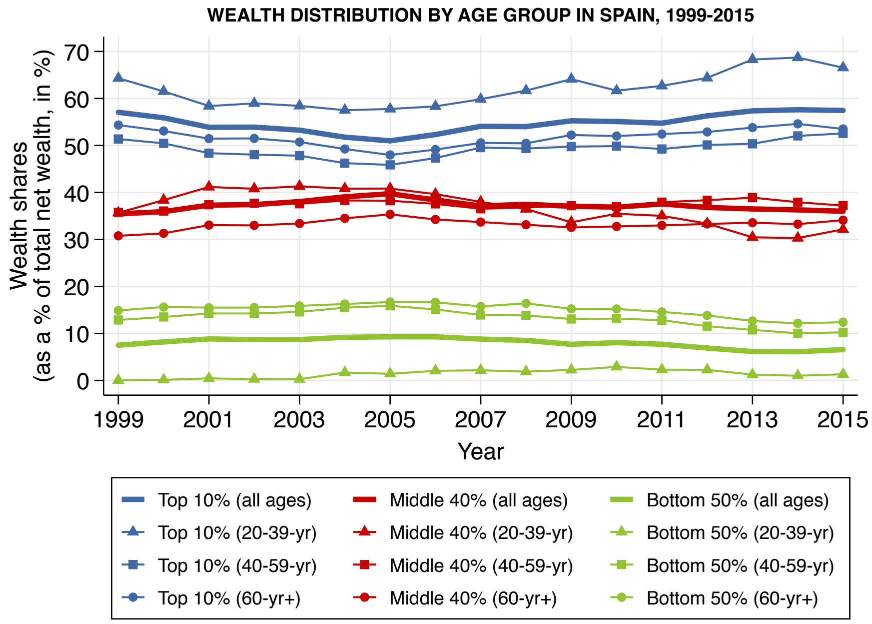


Figure B21: SHF wealth shares: Direct vs. Capitalized wealth in Spain, 2002-2014

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.



(a) Age-wealth profiles in Spain, 2002-2015



(b) Wealth distribution by age group, 1999-2015

Figure B22: Wealth distribution by age, 1999-2015

Notes: The figure in panel a displays age-wealth profiles as a % of average wealth for years 2002, 2007 and 2015 in Spain. The figure in panel b depicts the breakdown of the wealth distribution in Spain over the period 1999-2015 into three age groups: the young (20-39), the middle-old (40-59) and the old (+60). Both figures have been elaborated based on the benchmark series using the mixed capitalization-survey method. Results are only available from 1999 onwards, since there is no information available on age in the micro-files for previous years.

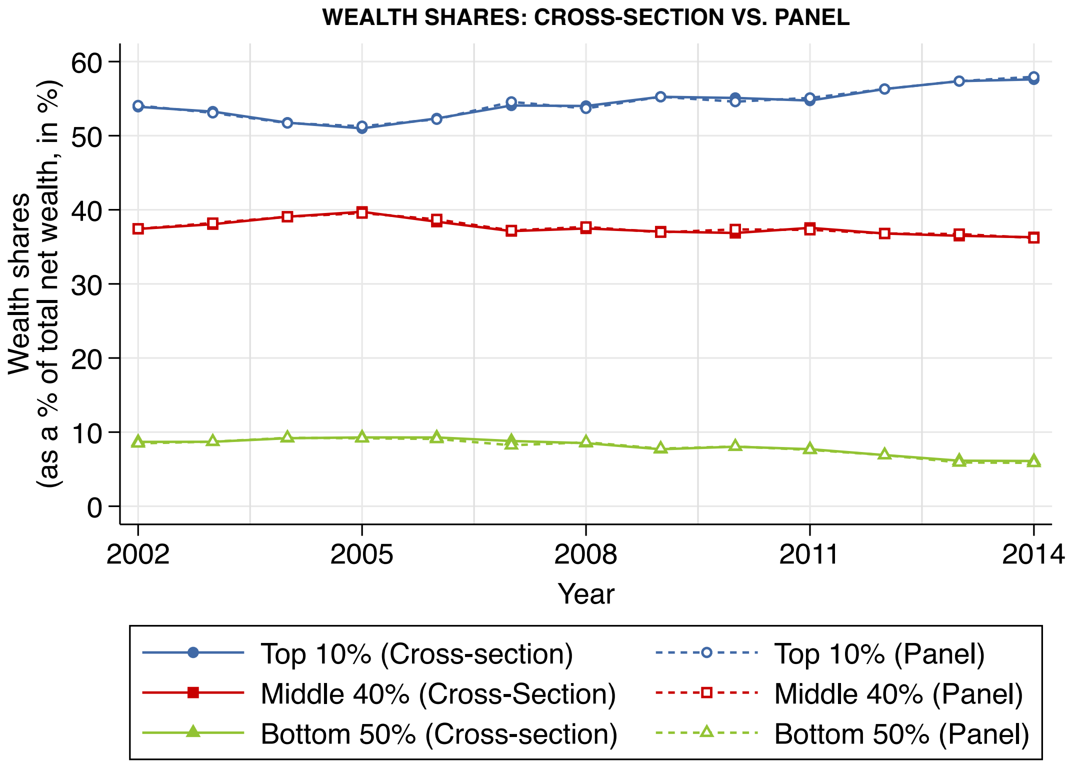
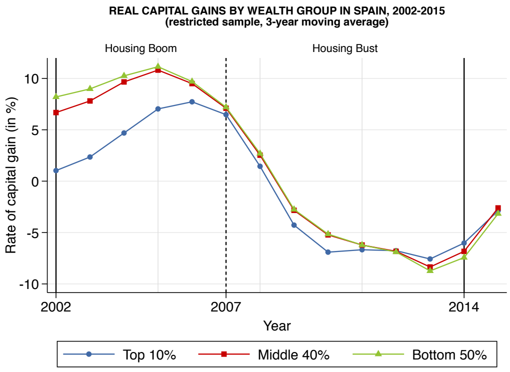
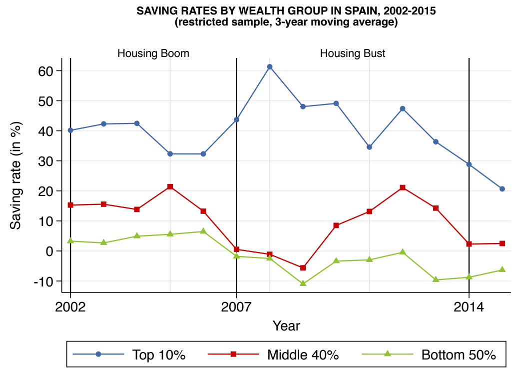


Figure B23: Wealth shares: Cross-section vs. Panel

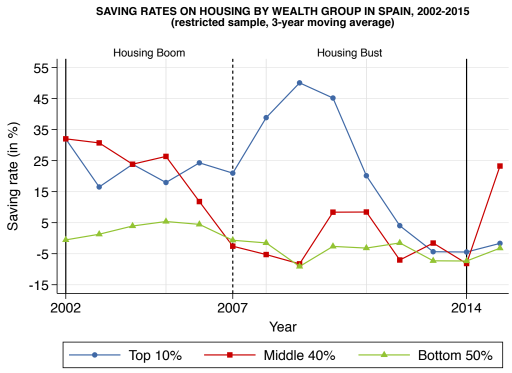
Notes: The figure compares the benchmark wealth distribution series using cross-sectional income tax samples with the wealth distribution series using a the personal income tax panel. All series have been constructed using the mixed capitalization-survey method. Both data sources have been elaborated 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.



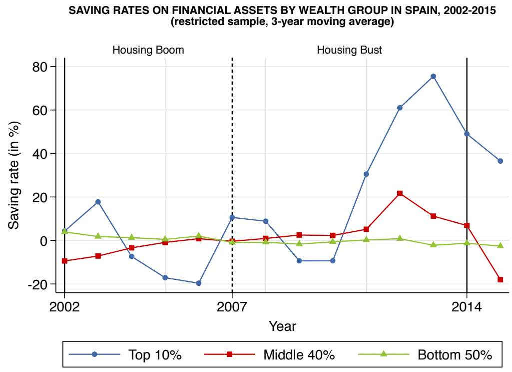
(a) Real capital gains by wealth group



(b) Saving rates by wealth group



(c) Saving rates on housing by wealth group



(d) Saving rates on financial assets by wealth group

Figure B24: 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. The aim with new calculation is analyze the evolution of real capital gains and saving rates by wealth group in the absence of wealth mobility.

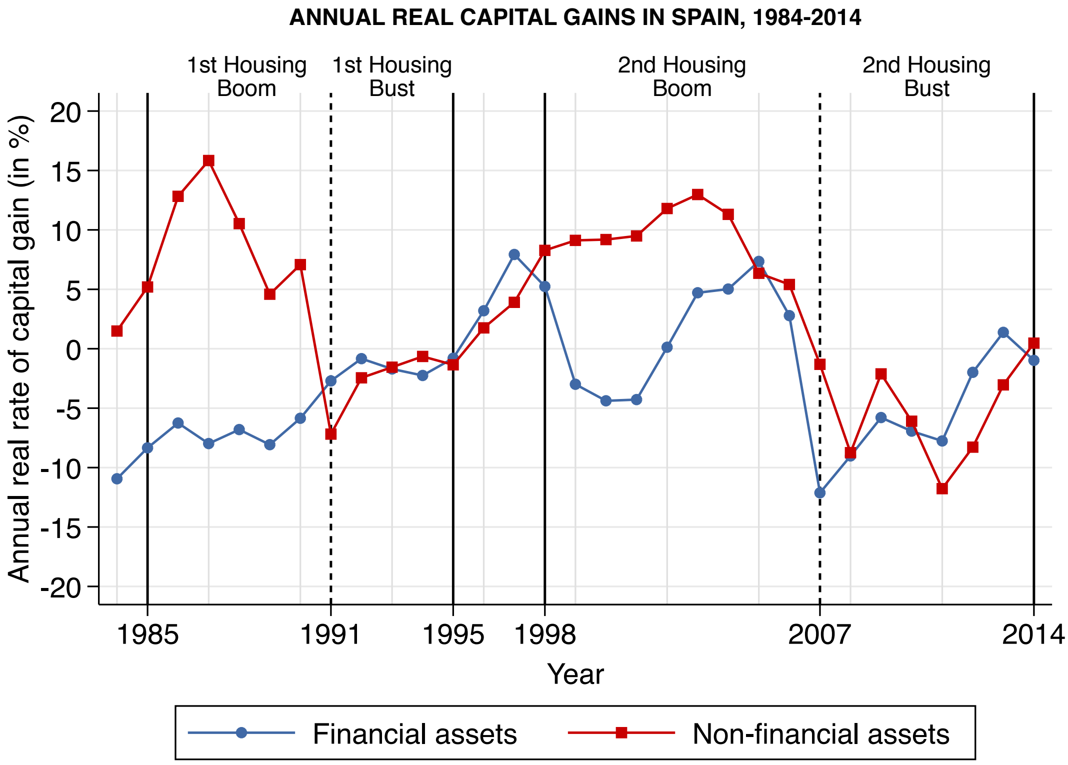


Figure B25: Annual real capital gains in Spain, 1984-2014

Notes: This figure shows the evolution of real capital gains on financial and non-financial assets in Spain over the period 1984-2015. These series are constructed using the Financial Accounts of the Bank of Spain and the information on non-financial assets from Artola Blanco, Bauluz, and Martínez-Toledano, 2020. 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.

HOUSEHOLDS (HH) AND NON-PROFIT INSTITUTIONS SERVING HOUSEHOLDS (NPISH) NET WEALTH, 1995-2017

Year	HH	NPISH	HH + NPISH	NPISH/ (HH + NPISH)
1995	440,246€	7,264€	447,509€	1.6%
1996	482,216€	7,018€	489,233€	1.4%
1997	553,869€	7,613€	561,482€	1.4%
1998	654,137€	8,493€	662,630€	1.3%
1999	698,695€	10,371€	709,067€	1.5%
2000	667,385€	10,644€	678,029€	1.6%
2001	681,287€	11,710€	692,998€	1.7%
2002	641,063€	12,663€	653,726€	1.9%
2003	725,743€	13,705€	739,449€	1.9%
2004	776,002€	13,568€	789,570€	1.7%
2005	851,742€	15,346€	867,089€	1.8%
2006	975,711€	17,824€	993,535€	1.8%
2007	927,851€	19,231€	947,081€	2.0%
2008	703,406€	18,544€	721,950€	2.6%
2009	767,973€	17,136€	785,108€	2.2%
2010	771,583€	15,474€	787,057€	2.0%
2011	842,345€	14,917€	857,262€	1.7%
2012	873,475€	14,098€	887,573€	1.6%
2013	1,073,297€	17,099€	1,090,396€	1.6%
2014	1,153,927€	36,624€	1,190,551€	3.1%
2015	1,243,615€	37,232€	1,280,846€	2.9%
2016	1,289,526€	36,483€	1,326,010€	2.8%
2017	1,338,376€	39,954€	1,378,330€	2.9%

Table B1: Households (HH) and non-profit institutions serving households (NPISH) net wealth, 1995-2017

Notes: This table reports total household (HH) and non-profit institutions serving households (NPISH) net wealth over the period 1995-2017. These series are part of the Financial Accounts (ESA 2010) constructed by the Bank of Spain. Values are reported in millions of current euros and correspond to the wealth as of December of each year. The last column shows the NPISH net wealth as a share of total HH and NPISH net wealth.

COMPOSITION OF HOUSEHOLD DEBT, 2002-2014

Year	Primary residence	Other real estate properties	Other
2002	56%	24%	20%
2005	57%	24%	19%
2008	59%	25%	16%
2011	63%	24%	13%
2014	69%	19%	12%

Table B2: Composition of household debt, 2002-2014

Notes: This table reports the composition of household debt among total Spanish households over the period 2002-2014. These figures are part of the set of tables published by the Bank of Spain for each wave of the Survey of Household Finances (*Encuesta Financiera de las Familias*). All figures are presented in percentages.

COLLECTIBLES AND CONSUMER DURABLES, 2002-2014

Year	Collectibles	Consumer durables	Collectibles (as a % of net household wealth)	Consumer durables (as a % of net household wealth)
2002	12.5€	277.9€	0.5%	11.5%
2005	22.1€	381.1€	0.5%	9.0%
2008	24.9€	468.1€	0.5%	9.1%
2011	46.1€	501.1€	0.9%	9.6%
2014	40.7€	450.0€	0.8%	9.2%

Table B3: Collectibles and consumer durables, 2002-2014

Notes: This table reports the value of collectibles and consumer durables (both in current billion euros and a as a share of net household wealth) for Spanish households using the five waves of the Survey of Household Finances (*Encuesta Financiera de las Familias*). Net household wealth includes collectibles and consumer durables.

POPULATION IN BASQUE COUNTRY AND NAVARRE, 1984-2017

Year	Basque C.	Navarre	Spain	Share of Basque C. and Navarre
1984	1,469,524	359,267	25,870,425	7.1%
1985	1,487,232	363,769	26,218,074	7.1%
1986	1,503,271	368,043	26,544,445	7.0%
1987	1,519,163	372,389	26,882,512	7.0%
1988	1,533,784	376,706	27,202,969	7.0%
1989	1,547,408	380,890	27,504,179	7.0%
1990	1,560,837	385,100	27,807,783	7.0%
1991	1,575,548	389,597	28,146,601	7.0%
1992	1,594,355	395,383	28,572,172	7.0%
1993	1,612,639	401,358	29,006,070	6.9%
1994	1,630,726	407,413	29,445,282	6.9%
1995	1,648,294	413,780	29,892,316	6.9%
1996	1,665,345	420,225	30,338,367	6.9%
1997	1,681,104	426,477	30,773,981	6.8%
1998	1,695,367	432,563	31,198,456	6.8%
1999	1,706,891	437,976	31,588,436	6.8%
2000	1,716,100	443,010	31,961,787	6.8%
2001	1,724,472	448,252	32,324,508	6.7%
2002	1,734,582	455,529	32,996,147	6.6%
2003	1,745,690	463,057	33,701,837	6.6%
2004	1,756,053	468,854	34,311,863	6.5%
2005	1,767,124	475,169	35,029,779	6.4%
2006	1,777,139	481,599	35,611,758	6.3%
2007	1,789,102	491,297	36,326,756	6.3%
2008	1,798,919	500,006	36,911,054	6.2%
2009	1,803,560	505,345	37,198,908	6.2%
2010	1,802,573	508,307	37,352,340	6.2%
2011	1,799,876	510,305	37,483,204	6.2%
2012	1,791,677	509,824	37,501,510	6.1%
2013	1,780,653	507,282	37,370,637	6.1%
2014	1,771,742	505,633	37,259,529	6.1%
2015	1,765,572	505,253	37,213,754	6.1%
2016	1,764,085	506,298	37,242,125	6.1%
2017	1,764,019	508,302	37,313,732	6.1%

Table B4: Population in Basque Country and Navarre, 1984-2017

Notes: This table reports adult population (+20) in Basque Country, Navarre and Spain as a whole over the period 1984-2017. These series are part of the Population Census constructed by the Spanish National Statistics Institute (INE). Population numbers are reported as of July of the corresponding year. The last column shows the population of Basque Country and Navarre as a share of total population in Spain.

GDP IN BASQUE COUNTRY AND NAVARRE, 1984-2016

Year	Basque C.	Navarre	Spain	Share of Basque C. and Navarre
1984	10,711,713 €	2,548,105 €	159,107,276 €	8.3%
1985	11,889,708 €	2,784,453 €	185,562,266 €	7.9%
1986	13,416,706 €	3,174,468 €	207,859,033 €	8.0%
1987	14,320,808 €	3,700,167 €	230,913,179 €	7.8%
1988	15,573,600 €	3,996,202 €	256,013,669 €	7.6%
1989	17,622,997 €	4,652,669 €	287,944,680 €	7.7%
1990	19,320,165 €	4,984,211 €	322,168,878 €	7.5%
1991	21,008,180 €	5,460,622 €	354,233,905 €	7.5%
1992	22,191,176 €	5,842,006 €	382,953,981 €	7.3%
1993	22,802,495 €	5,930,733 €	395,249,891 €	7.3%
1994	24,133,280 €	6,301,245 €	423,161,918 €	7.2%
1995	28,171,465 €	7,606,052 €	459,337,000 €	7.8%
1996	29,564,913 €	8,145,548 €	487,992,000 €	7.7%
1997	31,495,610 €	8,756,985 €	518,049,000 €	7.8%
1998	34,032,038 €	9,318,953 €	554,042,000 €	7.8%
1999	36,801,733 €	9,976,810 €	594,316,000 €	7.9%
2000	40,711,377 €	11,157,493 €	646,250,000 €	8.0%
2001	43,591,343 €	11,906,276 €	699,528,000 €	7.9%
2002	46,167,184 €	12,741,253 €	749,288,000 €	7.9%
2003	48,879,847 €	13,586,433 €	803,472,000 €	7.8%
2004	52,130,831 €	14,514,312 €	861,420,000 €	7.7%
2005	56,211,666 €	15,635,137 €	930,566,000 €	7.7%
2006	60,937,706 €	16,816,112 €	1,007,974,000 €	7.7%
2007	65,091,957 €	17,958,589 €	1,080,807,000 €	7.7%
2008	67,698,141 €	18,738,715 €	1,116,225,000 €	7.7%
2009	64,935,346 €	18,204,976 €	1,079,052,000 €	7.7%
2010	65,680,491 €	18,256,818 €	1,080,935,000 €	7.8%
2011	65,176,367 €	18,220,597 €	1,070,449,000 €	7.8%
2012	63,818,464 €	17,573,037 €	1,039,815,000 €	7.8%
2013	62,647,749 €	17,480,886 €	1,025,693,000 €	7.8%
2014	63,895,891 €	17,836,047 €	1,037,820,000 €	7.9%
2015	66,482,288 €	18,564,204 €	1,079,998,000 €	7.9%
2016	68,817,210 €	19,152,416 €	1,118,522,000€	7.9%

Table B5: GDP in Basque Country and Navarre, 1984-2016

Notes: This table reports GDP in Basque Country, Navarre and Spain as a whole over the period 1984-2016. These series are part of the National Accounts (ESA 2010, 1995 and 1986) constructed by the Spanish National Statistics Institute (INE). Values are reported in thousands of current euros. The last column shows the GDP of Basque Country and Navarre as a share of total GDP in Spain.

PERSONAL INCOME TAX FILERS, 1999-2015

Year	Filers	Total adult population	Share of filers
1999	18,521,709	29,443,569	62.9%
2000	19,246,192	29,802,677	64.6%
2001	19,757,147	30,151,784	65.5%
2002	19,914,191	30,806,036	64.6%
2003	20,371,413	31,493,090	64.7%
2004	20,853,041	32,086,956	65.0%
2005	21,364,900	32,787,486	65.2%
2006	21,949,869	33,353,020	65.8%
2007	22,659,298	34,046,357	66.6%
2008	23,231,888	34,612,129	67.1%
2009	23,099,973	34,890,003	66.2%
2010	22,921,340	35,041,460	65.4%
2011	23,067,189	35,173,023	65.6%
2012	22,946,558	35,200,009	65.2%
2013	22,735,378	35,082,702	64.8%
2014	22,835,510	34,982,154	65.3%
2015	22,882,152	34,942,929	65.5%

Table B6: Personal income tax filers, 1999-2015

Notes: This table reports the number of total personal income tax filers (adults +20) in Spain over the period 1999-2015. These series are constructed using personal income tax samples elaborated by the Spanish Institute of Fiscal Studies in collaboration with the Spanish Tax Agency. They exclude the regions of Basque Country and Navarre since they do not belong to the Common Fiscal Regime. Married couples filing jointly are split into two. The last column corresponds to the share of adult filers out of the total adult population (excluding Basque Country and Navarre). The series of total adult population excluding Basque Country and Navarre has been elaborated using the Population Census from the Spanish National Statistics Institute (INE).

HOUSING WEALTH IN BASQUE COUNTRY AND NAVARRE, 1991-2003

Year	Basque C.	Navarre	Spain	Share of Basque C. and Navarre
1991	80,254 €	15,326 €	1,434,772 €	6.7%
1992	89,112 €	17,891 €	1,494,667 €	7.2%
1993	91,363 €	19,387 €	1,495,370 €	7.4%
1994	86,893 €	17,954 €	1,485,696 €	7.1%
1995	96,844 €	19,560 €	1,552,800 €	7.5%
1996	99,357 €	20,096 €	1,590,087 €	7.5%
1997	103,350 €	21,925 €	1,624,967 €	7.7%
1998	108,096 €	25,188 €	1,704,580 €	7.8%
1999	120,912 €	28,795 €	1,936,482 €	7.7%
2000	146,528 €	33,025 €	2,254,074 €	8.0%
2001	183,971 €	39,081 €	2,637,006 €	8.5%
2002	206,595 €	47,051 €	3,130,569 €	8.1%
2003	233,529 €	53,448 €	3,715,702 €	7.7%

Table B7: Housing wealth in Basque Country and Navarre, 1991-2003

Notes: This table reports housing wealth in Basque Country, Navarre and Spain as a whole over the period 1991-2003. These series are included in Caixa Catalunya, 2004 and were elaborated with data from the Ministry of Public Works. Values are reported in million of current euros. The last column shows the housing wealth of Basque Country and Navarre as a share of total housing wealth in Spain.

HOME-OWNERSHIP RATIOS (PRIMARY RESIDENCES) IN SPAIN, 1970-2011

Year	Owner-occupied housing	Tenant-occupied housing	Other
1970	63.4%	30.1%	6.5%
1981	73.1%	20.8%	6.1%
1991	78.3%	15.2%	6.5%
2001	82.2%	11.4%	6.5%
2011	78.9%	13.5%	7.6%

Table B8: Home ownership-ratios (primary residences) in Spain, 1970-2011

Notes: This table reports the home-ownership ratios for primary residences in Spain over the period 1970-2011. These data come from the housing statistics collected by the Bank of Spain (*Indicadores del Mercado de la Vivienda*). They build the home-ownership ratio using the Census of dwellings of the Spanish Statistics Institute (INE), which is elaborated on a decennial basis. The category "other" mainly refers to dwellings whose owner has transferred the use to another person.

IMPUTED NET HOUSEHOLD WEALTH, 1984-2015

Year	Primary residence	Investment funds	Pension funds	Life insurance	Total imputed wealth
1984		0.1%	0.2%	0.3%	0.6%
1985		0.1%	0.3%	0.4%	0.7%
1986		0.2%	0.4%	0.4%	1.0%
1987		0.3%	0.5%	0.5%	1.3%
1988		0.3%	0.7%	0.7%	1.7%
1989		0.4%	0.9%	0.8%	2.1%
1990		0.4%	1.1%	0.9%	2.4%
1991		0.9%	1.2%	0.9%	3.1%
1992		1.8%	1.4%	1.1%	4.4%
1993		2.9%	1.5%	1.3%	5.7%
1994		3.5%	1.5%	1.6%	6.6%
1995		3.5%	1.4%	2.0%	6.9%
1996		4.4%	1.6%	2.2%	8.1%
1997		6.0%	1.7%	2.5%	10.2%
1998		7.3%	1.8%	2.6%	11.7%
1999	35.7%	7.0%	1.9%	2.8%	47.4%
2000	38.4%	5.7%	2.1%	2.8%	49.1%
2001	40.6%	4.6%	2.3%	2.7%	50.3%
2002	41.1%	4.0%	2.4%	2.5%	50.0%
2003	41.9%	3.7%	2.5%	2.2%	50.3%
2004	42.6%	3.6%	2.3%	2.1%	50.6%
2005	42.7%	3.6%	2.2%	2.0%	50.5%
2006	41.1%	3.5%	2.2%	1.9%	48.7%
2007	38.5%	3.2%	2.1%	1.8%	45.7%
2008	39.5%	2.7%	2.1%	1.9%	46.1%
2009	36.3%	2.5%	2.3%	2.1%	43.2%
2010	36.6%	2.3%	2.3%	2.2%	43.4%
2011	36.3%	2.1%	2.3%	2.2%	43.0%
2012	33.8%	2.1%	2.5%	2.5%	40.9%
2013	31.9%	2.7%	2.7%	2.7%	40.0%
2014	30.8%	3.6%	2.9%	2.9%	40.2%
2015	30.7%	4.3%	2.9%	3.0%	40.9%

Table B9: Imputed net household wealth, 1984-2015

Notes: This table reports the share of assets out of total net household wealth that are not subject to the personal income tax and thus need to be imputed using survey data over the period 1984-2015. The most important asset is primary residence, which accounts for around 30-40% of total net household wealth. Imputed rents on primary residence were subject to the personal income tax before 1999, so that one needs to impute primary residence only after 1999. This table has been elaborated using the Financial Accounts from the Bank of Spain and the series of housing wealth of Artola Blanco, Bauluz, and Martínez-Toledano, 2020.

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 B10: Comparison of wealth aggregates in Spain, 2005

Notes: This table compares the wealth totals used for the capitalization technique with the ones used in **alvaredo2009income2** and the SHF. The wealth totals of the capitalization technique are very similar to the ones used in **alvaredo2009income2** but much larger than the ones of the SHF. This difference is mainly due to financial assets. Values are reported in current billion euros.

PRIMARY RESIDENCE, 2002-2014

	Wealth group			P-value		
	T10%	**M40%**	**B50%**			
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
% Own						
2002	0.96	0.98	0.64	0.093	0.000	0.000
2005	0.98	0.98	0.63	0.787	0.000	0.000
2008	0.97	0.97	0.67	0.815	0.000	0.000
2011	0.97	0.96	0.68	0.124	0.000	0.000
2014	0.96	0.97	0.64	0.246	0.000	0.000
Average value						
2002	255,827	128,856	62,292	0.000	0.000	0.000
2005	403,348	226,788	112,327	0.000	0.000	0.000
2008	448,211	231,283	123,859	0.000	0.000	0.000
2011	394,980	201,920	113,096	0.000	0.000	0.000
2014	353,785	172,941	97,706	0.000	0.000	0.000
Average size/m2						
2002	155	108	96	0.000	0.000	0.000
2005	163	106	97	0.000	0.000	0.000
2008	175	114	98	0.000	0.000	0.000
2011	171	119	98	0.000	0.000	0.000
2014	162	122	99	0.000	0.000	0.000
% Own mortgage						
2002	0.17	0.23	0.21	0.003	0.056	0.221
2005	0.20	0.27	0.26	0.000	0.001	0.566
2008	0.19	0.25	0.28	0.000	0.000	0.016
2011	0.12	0.23	0.32	0.000	0.000	0.000
2014	0.14	0.24	0.35	0.000	0.000	0.000
Avreage int. rate						
2002	5.37	5.48	5.54	0.758	0.654	0.884
2005	3.58	3.66	3.86	0.524	0.118	0.037
2008	3.84	2.43	3.10	0.455	0.637	0.006
2011	2.68	3.44	3.41	0.000	0.001	0.799
2014	1.72	2.03	2.52	0.077	0.001	0.000
% Movers						
2002	0.042	0.034	0.021	0.319	0.004	0.013
2005	0.058	0.051	0.028	0.419	0.000	0.000
2008	0.032	0.037	0.028	0.544	0.509	0.090
2011	0.023	0.033	0.027	0.149	0.621	0.248
2014	0.020	0.038	0.030	0.012	0.142	0.194

Table B11: Primary residence by wealth group in Spain, 2002-2014

Notes: This table provides information on the ownership and characteristics (value, size, mortgage, interest rate) of primary residence by wealth group over the period 2002-2014 in Spain. It also reports the reported probability to change in the next two years of primary residence. These calculations are with the the five waves of the Spanish Survey of Household Finances (SHF) constructed by Bank of Spain. The sample size is 5,141 in 2002, 5,950 in 2005, 6,194 in 2008, 6,103 in 2011 and 6,116 in 2014.

OTHER REAL ESTATE PROPERTIES, 2002-2014

	Wealth group			P-value		
	T10%	**M40%**	**B50%**			
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
% Own other prop.						
2002	0.76	0.39	0.12	0.000	0.000	0.000
2005	0.83	0.40	0.18	0.000	0.000	0.000
2008	0.83	0.48	0.17	0.000	0.000	0.000
2011	0.90	0.50	0.21	0.000	0.000	0.000
2014	0.89	0.56	0.17	0.000	0.000	0.000
% Own owner-occ.						
2002	0.41	0.17	0.04	0.000	0.000	0.000
2005	0.45	0.17	0.04	0.000	0.000	0.000
2008	0.47	0.20	0.05	0.000	0.000	0.000
2011	0.53	0.24	0.06	0.000	0.000	0.000
2014	0.55	0.32	0.07	0.000	0.000	0.000
% Own tenant-occ.						
2002	0.19	0.04	0.00	0.000	0.000	0.000
2005	0.22	0.04	0.01	0.000	0.000	0.000
2008	0.25	0.05	0.01	0.000	0.000	0.000
2011	0.27	0.07	0.02	0.000	0.000	0.000
2014	0.34	0.09	0.03	0.000	0.000	0.000
# Other prop.						
2002	2.65	1.05	0.29	0.000	0.000	0.000
2005	3.14	1.14	0.48	0.000	0.000	0.000
2008	3.19	1.34	0.41	0.000	0.000	0.000
2011	3.65	1.47	0.48	0.000	0.000	0.000
2014	3.76	1.67	0.42	0.000	0.000	0.000
# Owner-occ.						
2002	1.29	1.05	1.01	0.000	0.000	0.109
2005	1.20	1.10	1.04	0.000	0.000	0.031
2008	1.37	1.17	1.19	0.000	0.000	0.600
2011	1.40	1.17	1.04	0.000	0.000	0.001
2014	1.42	1.21	1.07	0.000	0.000	0.001
# Tenant-occ.						
2002	1.55	1.24	1.00	0.000	0.000	0.131
2005	1.50	1.16	1.19	0.000	0.000	0.813
2008	1.54	1.14	1.37	0.000	0.026	0.010
2011	1.51	1.11	1.05	0.000	0.000	0.216
2014	1.48	1.16	1.10	0.000	0.000	0.379

Table B12: Other real estate properties by wealth group in Spain, 2002-2014

Notes: This table reports summary statistics on the ownership and number of real estate properties owned (excluding primary residence) by wealth group over the period 2002-2014 in Spain. These calculations are with the the five waves of the Spanish Survey of Household Finances (SHF) constructed by Bank of Spain. The sample size is 5,141 in 2002, 5,950 in 2005, 6,194 in 2008, 6,103 in 2011 and 6,116 in 2014.

OTHER REAL ESTATE PROPERTIES, 2002-2014 (cont.)

	Wealth group			P-value		
	T10%	**M40%**	**B50%**			
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
Value other prop.						
2002	100,912	35,870	14,975	0.000	0.000	0.000
2005	155,379	57,106	25,805	0.000	0.000	0.000
2008	173,276	65,660	31,798	0.000	0.000	0.000
2011	180,328	59,565	30,245	0.000	0.000	0.000
2014	190,108	51,395	29,111	0.000	0.000	0.000
Value owner-occ.						
2002	131,311	75,075	30,819	0.000	0.000	0.000
2005	215,988	120,572	49,427	0.000	0.000	0.000
2008	240,924	120,786	54,571	0.000	0.000	0.000
2011	233,972	108,572	59,011	0.000	0.000	0.000
2014	238,600	78,178	44,994	0.000	0.000	0.000
Value tenant-occ.						
2002	152,695	78,518	42,459	0.000	0.000	0.012
2005	245,275	100,516	102,753	0.000	0.000	0.880
2008	246,511	127,985	148,279	0.000	0.006	0.309
2011	259,752	138,967	105,476	0.000	0.000	0.051
2014	242,798	157,830	82,492	0.001	0.000	0.216
Value rent other prop.						
2002	1,163	544	606	0.000	0.121	0.606
2005	861	583	797	0.000	0.491	0.076
2008	1,133	735	872	0.000	0.125	0.303
2011	1,040	761	676	0.001	0.004	0.281
2014	1,085	643	678	0.000	0.000	0.674
Interest rate on debt						
2002	5.37	5.48	5.54	0.758	0.654	0.884
2005	3.38	3.55	4.13	0.177	0.002	0.007
2008	5.10	4.93	5.30	0.459	0.358	0.098
2011	3.12	3.33	3.40	0.409	0.255	0.741
2014	2.01	2.48	3.32	0.030	0.000	0.000

Table B12: Other real estate properties by wealth group in Spain, 2002-2014 (cont.)

Notes: This table reports summary statistics on the characteristics (value, mortgage, interest rate, etc.) of real estate properties owned (excluding primary residence) by wealth group over the period 2002-2014 in Spain. These calculations are with the the five waves of the Spanish Survey of Household Finances (SHF) constructed by Bank of Spain. The sample size is 5,141 in 2002, 5,950 in 2005, 6,194 in 2008, 6,103 in 2011 and 6,116 in 2014.

DIFFERENCES-IN-DIFFERENCES RESULTS
(using different treatment windows)

	T1 (2004-2005)		T2 (2005-2006)	
	(1)	(2)	(3)	(4)
Post	0.732***	0.732***	0.709***	0.707***
	(7.22)	(6.87)	(6.69)	(6.37)
Treat	0.396***		0.256**	
	(3.31)		(2.14)	
Post·Treat	0.345***	0.348***	0.334***	0.339***
	(3.37)	(3.24)	(3.13)	(3.03)
Indiv. FE		X		X
N	262,065	262,065	300,186	300,186

Table B13: Differences-in-differences results (using different treatment windows)

Notes: The table presents the results from the differences-in-differences estimation for groups that were differently affected by the 2007 reform. The figure is based on a balanced panel of wealth taxpayers who are observed throughout the period 2004-2014. The treatment-control definition is based on the reform-induced tax variation (2004-2006) shown in Figure 2.11b, with treatment (T) being an aggregation of groups who experience an increase in the marginal net-of-tax rate due to the reform (2nd-5th bracket) and the control being the group who experiences a decline in the marginal net-of-tax rate (1st bracket). In columns 1 and 2, the treatment (T1) is defined based on years 2004-2005 and in columns 3 and 4 the treatment (T2) is defined based on years 2005-2006. Results are in line with the benchmark estimates for which the treatment window 2004-2006 is used 2.13. 95% confidence intervals are based on standard errors clustered at the individual level.

DIFFERENCES-IN-DIFFERENCES RESULTS
(positive interest income prior to the reform)

	(1)	(2)
Post	0.853***	0.672***
	(5.90)	(4.43)
Treat	0.378**	
	(2.31)	
Post·Treat	0.348**	0.445***
	(2.40)	(2.92)
Indiv. FE		X
N	241,829	241,829

Table B14: Differences-in-differences results (positive interest income prior to the reform)

Notes: The table presents the results from the differences-in-differences estimation for groups that were differently affected by the 2007 reform. The figure is based on a balanced panel of wealth taxpayers who are observed throughout the period 2004-2014. The treatment-control definition is based on the reform-induced tax variation (2004-2006) shown in Figure 2.11b, with treatment being an aggregation of groups who experience an increase in the marginal net-of-tax rate due to the reform (2nd-5th bracket) and the control being the group who experiences a decline in the marginal net-of-tax rate (1st bracket). The sample is restricted to those wealth taxpayers that reported positive interest over the pre-reform period 2004-2006. Results are in line with the benchmark estimates (2.13). 95% confidence intervals are based on standard errors clustered at the individual level.

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 B15: 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.

ATTITUDES TOWARDS RISK, 2002-2014

		Fraction of risk averse			Difference		
		T10%	**M40%**	**B50%**			
Year	**N**	(1)	(2)	(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 B16: 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.

FINANCIAL INFORMATION BY INCOME GROUP, 2016

	Income group			Difference		
	T10%	**M40%**	**B50%**			
	(1)	(2)	(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 B17: 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.

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Appendix C

Appendix to “Paraísos Fiscales, Wealth Taxation and Mobility”

C.1 Appendix

C.1.1 Institutions Appendix

The Spanish wealth tax was adopted in 1978 (Law 50/1977) aimed at complementing the personal income tax (Law 44/1977), but with an extraordinary and censal character. As it is common for standard wealth taxes, it is a progressive annual tax on the sum of all individual wealth components net of debts. Wealth must be recorded as of December 31st of every year. The tax was filed jointly in the case of marriage. The joint assets had to be declared by the one administering them under a regime of community property or declared by the man (unless disabled) under a regime of separation of ownership. The only exempted assets were historical and artistic monuments, as well as some artworks of particular cultural importance. It was not until 1978 (RD 1382/1978) when it was clearly specified when these monuments and artworks could be exempted.

The wealth tax was centrally administered and all regions were obliged to implement this tax, including Basque Country and Navarre, which have never been part of the Common Fiscal Regime (*Régimen Fiscal Común*) and manage their taxes independently. Both residents (under personal obligation) and non-residents (under real obligation) are obliged to file if they had a positive net taxable base. The wealth tax is residence-based and non-residents only have to file the assets held in Spanish territory. Individuals are resident in Spain for tax purposes if they spend more than 183 days in Spain during a calendar year or if they have Spain as their main base or centre of activities or economic interests. It is presumed, unless proven otherwise, that a taxpayer's habitual place of residence is Spain when, on the basis of the foregoing criteria, the spouse (not legally separated) and underage dependent children permanently reside in Spain.

Initially, its main purpose was not to raise revenue, since the tax had a high exemption threshold (4,000,000 pesetas or 24,040.5 Euro for non-married residents and 6,000,000 pesetas or 36,060.7 Euro for married residents), other large exemptions (500,000 pesetas or 3,000.06 Euro for each child under 25 and 1,000,000 pesetas or 6,000.12 Euro for every disabled child) and the maximum tax rate was 2%. In 1979 a cap was introduced on the personal income and wealth tax liability payed (RD 2615/1979). In particular, the sum of the personal income and wealth tax liability could not be larger than 55% of the personal income tax base. If the sum was larger, the wealth tax liability was reduced up until satisfying the limit, so that some filers ended up paying no wealth tax. For the calculation of the limit, the wealth tax liability only included assets whose generated income was subject to the personal income tax.

The first important reform was introduced in 1982 (Royal Decree Law 23/1982 and Law 5/1983). The exemption threshold was increased up to 6,000,000 pesetas or 36.060,73 Euro for non-married residents, 9,000,000 pesetas or 54,091.09 Euro for married residents, 750,000 pesetas or 4,507.59 Euro for each child under 25 subject to a personal income tax relief and 1,500,000 pesetas or 9,015.18 Euro for every disabled child subject to a personal income tax relief. The 74/1980 Law allowed to report the value of non-listed shares as the capitalized profits (dividends and reserves) generated in the last three years at the rate of 8%. The 9/1983 Law raised the limit of the sum of the personal income and wealth tax liability from 55% to 65%. In 1988 the exemptions were further increased (Royal-Decree Law 6/1988). The exemption threshold was raised up to 9,000,000 pesetas or 54,091.09 Euro for non-married residents, 18,000,000 pesetas or 108,182.18 Euro for married residents, 1,500,000 pesetas or 9,015.18 for each child under 25 subject to a personal income tax relief and 3,000,000 pesetas or 18,030.36 Euro for every disabled child subject to a personal income tax relief.

In 1989, another reform was introduced which allowed individual filing among married couples. Each member of a married couple had to declare half of their joint assets under a regime of community property or the legal ownership share of each asset under a regime of separation of ownership (Law 20/1989). Nonetheless, in cases in which the couple was filing the personal income tax jointly, the Ministry could ask filers to also file the wealth tax jointly. The exemptions for having children under 25 or disabled children subject to a personal income tax relief were reduced for parents living together (750,000 pesetas or 4,507.59 for each child under 25 and 1,500,000 pesetas or 9,015.18 Euro for every disabled child). The Law 20/1989 also specified that in case married couples were filing jointly the personal income tax, the limit to the personal income and wealth tax liability had to be calculated by adding up both the personal income and wealth tax liabilities of each member of the couple. The wealth tax liability reduction was then split proportionally to the wealth tax liability of each member of the couple. All these changes in the law were in place until the new wealth tax law was introduced in 1991 (Law 19/1991).

With the new 1991 law (still in place at present), the wealth tax ceased to have the initial transitory and extraordinary character, asset valuation rules were improved and many changes were introduced to the former wealth tax system (Law 19/1991). Collectibles and consumer durables (excluding mainly vehicles, boats, planes, jewelry and antiques) started to be exempted, as well as pension and property rights in the authors ownership. In addition, all individuals filing under personal obligation and having gross wealth over 100,000,000 pesetas (601,012.1 Euro) were obliged to file even though their taxable base was below the new minimum exempted of 15,000,0000 pesetas or 90,151.82 Euro. Filers under real obligation were obliged to file whatever net wealth they had, as it was stated in the 1977 law. The exemptions for having children under 25 or disabled children disappeared from the wealth tax and the maximum tax rate was raised up to 2.5%. A reduction of 50% of the wealth tax liability was introduced on the reported assets located in Ceuta or Melilla. Finally, the 1991 law also modified the personal income and wealth tax liability cap by raising the limit of the sum of the personal income and wealth tax liability from 65% to 70% of the personal income tax base and introducing a reduction limit of 80% of the wealth tax liability.

The first important reform after the new 1991 law was the introduction of the exemption on business assets and company shares (except from shares in property investment companies) in 1993 (Law 22/1993, RD 2481/1994). For the assets to qualify as business assets, the activity had to be the taxpayers main source of income (at least 50% of its total taxable income) and be carried out by the taxpayer on his own account and on a habitual basis. For company shares to be exempted, the ownership share had to be at least 20% of the capital of the entity and the individual had to lead it receiving at least 50% of their total business and labor income from this company. In 1995 the minimum exempted was increased up to 17,000,000 pesetas (102,172.1 Euro) and the brackets were slightly increased (Law 41/1994). Moreover, for company shares to be exempted, the ownership share condition for the taxpayer was modified to be at least 15% of the capital of the company. The brackets were further increased in 1995 (Law 12/1995).

Since 1996 the rights to modify the minimum exempted and the tax rates were ceded to the regions under the condition of keeping the same minimum bracket and marginal tax rate than the national one (Law 14/1996). In 1997 the exemption on business assets was modified for married couples. All assets belonging to both members of the couple and used for the business activity could be exempted under the same old conditions. For company shares, the ownership share condition was modified to be at least 15% of the capital of the company for the individual or 20% together with a family member. In 1998 the exemption threshold was increased up to 17,300,000 pesetas (103,975.1 Euro), the brackets were slightly raised and the valuation rules for undertakings for collective investment in transferable securities (*Instituciones de inversion colectiva*) were modified (Law 49/1998). In 1999, the exemption threshold was further raised up to 18,000,000 pesetas (108,182.2 Euro) and the brackets were also slightly increased (Law 54/1999).

The first important reform in the wealth tax of the 2000s was the introduction of an exemption in primary residence of 25,000,000 pesetas or 150,253.03 Euro in 2000 (Royal Decree Law 3/2000). For a property to be qualified as primary residence, the wealth taxpayer needs to have lived continuously there over at least three years or in case not, the taxpayer could benefit from the exemption in case of death, marriage, divorce, first job, job transfer or any other analogous circumstance (Law 40/1998, Law 35/2006). Wealth taxpayers are obliged to report their primary residence and any other urban real estate property using the highest of the following three values: the assessed value, the purchasing value or any other administrative value (e.g. value reported in estate taxes). According to the Spanish Tax Agency of Fiscal Administration, most wealth taxpayers report assessed values since this is the value the Tax Agency has and can be directly filled in the tax form without having to self-report it.

In 2001, the regions were ceded the right to change or include deductions in the wealth tax and the condition of keeping the same minimum bracket and minimum marginal tax rate than the national one was suppressed (Law 21/2001). Nonetheless, all regions kept the national wealth tax schedule (0.2-2.5%) during the late 1990s and beginning of the 2000s (only a few regions changed the minimum exempted and Cantabria changed the wealth tax schedule in 2006). In 2002, the personal income and wealth tax liability cap was reduced from 70 to 60% of the personal income tax base (Law 46/2002), the ownership share condition for the exemption of company shares was modified to be at least 5% of the capital of the company for the individual (Law 51/2002) and the reduction on the wealth tax liabilities for assets located in Ceuta or Melilla was raised up to 75% (Law 53/2002). In 2003, the exemption of company shares was also extended to those owning them under life usufruct (Law 62/2003).

In 2008, the wealth tax was suppressed (Law 4/2008) and reintroduced with a temporal character with the aim of reducing public deficit for years 2011 and 2012 (Royal Decree Law 13/2011). Even though the central government had approved its reintroduction, regional governments had the legislative power to implement it or not and regional differences in the wealth tax schedule became significant. For instance, Madrid decided to keep the suppression of the wealth tax after 2011, contrary to regions such as Catalonia and Extremadura who have raised the top marginal tax rates (up to 2.75% and 3.75%, respectively) above the national tax rate (2.5%). With the reintroduction some of the main features of the wealth tax system were modified. The exemption on primary residence was raised up to 300,000 Euro, all individuals under personal obligation having gross wealth over 2,000,000 Euro were obliged to file and the new minimum exempted was raised up to 700,000 Euro. Hence, since 2011 the number of wealth taxpayers was considerably reduced (from 981,498—2.7% of the adult population +20—in 2007 to 130,216—0.3% of the adult population +20—in 2011). With Law 16/2012 the wealth tax was extended until 2013 and with Laws 22/2013, 36/2014, 48/2015, 6/2018 and RD-Law 3/2016, the wealth tax was extended for an indefinite number of years, so that it is still currently in place. Note that after the decentralization, the regions of Basque Country and Navarre kept having a wealth tax similar to the default schedule proposed by the central government.

Wealth tax filers are required to annually self-report end-of-year taxable financial assets (e.g. cash, bank deposits, stocks, bonds, financial assets held abroad, etc.), taxable non-financial assets (e.g. real estate, land, consumer durables, non-corporate business assets, non-financial assets held abroad), and taxable debt (e.g. mortgages, inter-personal debts). They are also obliged to report non-taxable business assets and stocks and the full value of their primary residence.

While income is largely covered by third-party reporting in Spain, there is only partial third-party reporting of wealth, namely dwellings (whenever they have an assessed value) and financial assets and liabilities held in bank accounts (checking accounts, deposits, mortgage debt). All the rest of wealth categories, such as consumer durables, business assets, unlisted stocks, inter-personal debts, etc. have virtually no third-party reporting. Despite technological improvements in third-party reporting in recent years, enforcement capacity in the case of wealth taxes is still limited, mainly because of no third-party reporting wealth categories and because available resources and tax technology are not enough to systematically cross-check all items reported in the wealth tax return using third-party reported information. Audits can be made by central or regional tax authorities. The central authority makes wealth tax audits whenever the reported information in the personal income tax form does not match with what is reported in the wealth tax form. The central authority also shares information with regional authorities for auditing purposes. However, verifying the primary address comes with substantial difficulty to both tax authorities. They tend to make the audits based on utility bills, bank transaction information and other expenses. The incentives to audit are higher for regional than central authorities since all wealth tax revenue goes to the regional authority. The number of wealth tax audits made by regional governments has increased since the reintroduction of the wealth tax in 2011 (from less than 1% of total files until 2007 to 2-3% in 2013-1014), but they are still very low. Partial self-reporting coupled with imperfect enforcement capacity offers scope for tax evasion and avoidance.

C.1.2 Data Appendix

This online appendix presents additional robustness checks. Every figure or table is discussed in the text. Please see the text for detailed descriptions.

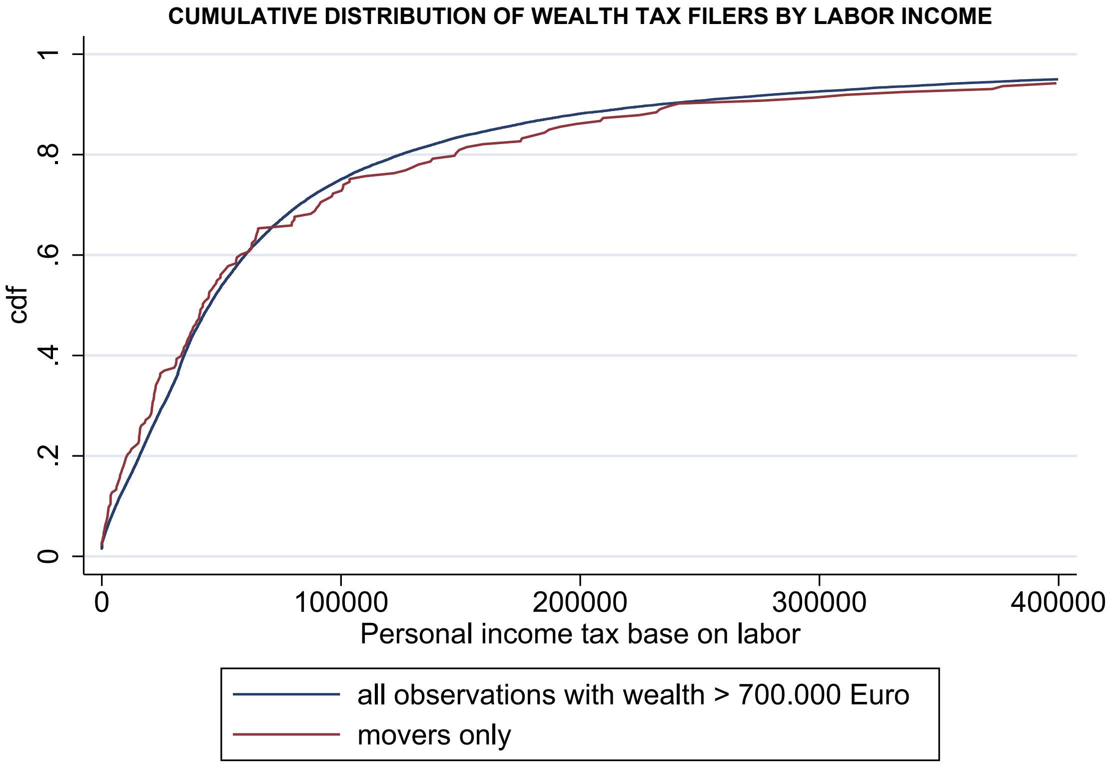


Figure B1: Cumulative Distribution of Wealth Tax Filers by Labor Income

Notes: This figure shows the cumulative distribution of taxable labor income for the 2010 wealthy treatment group (i.e., wealthy individuals with taxable wealth above 700,000 Euro in 2010) and for the movers within this treatment group. This figure can be constructed by linking the personal income and wealth tax panel.

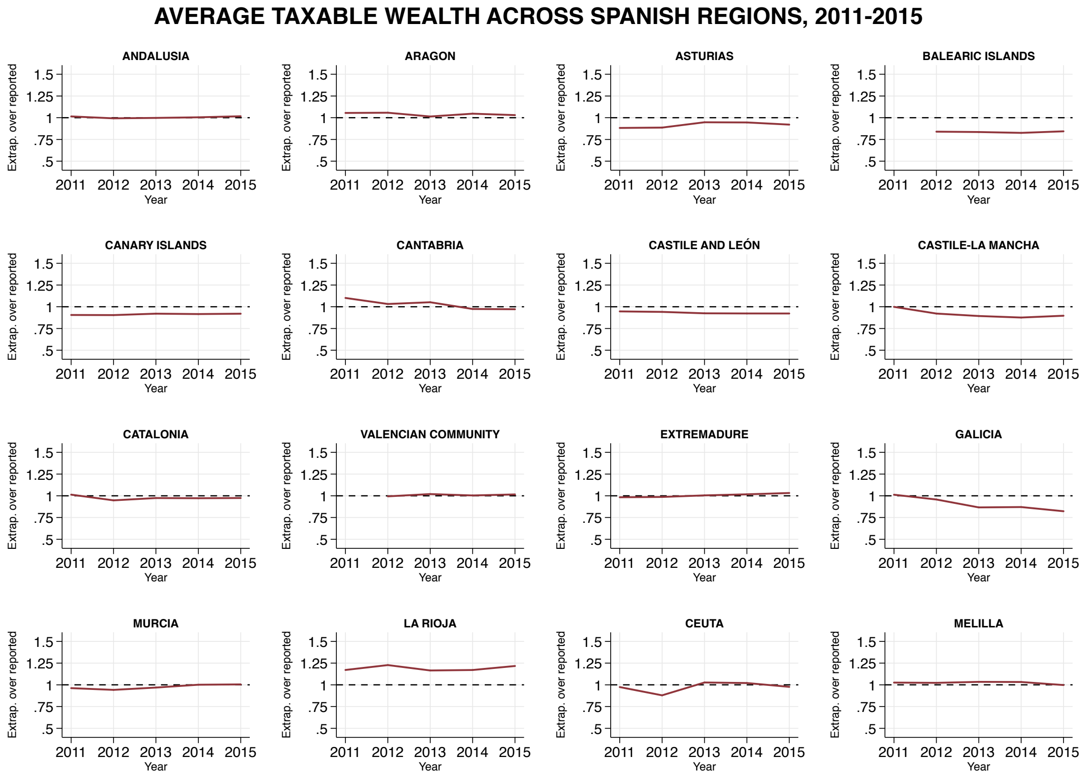


Figure B2: Average taxable wealth across Spanish regions, 2011-2015

Notes: This figure compares extrapolated versus actual reported average wealth across Spanish regions over the period 2011-2015. Reported average wealth figures across regions have been calculated after digitizing the official wealth tax statistics published by the Spanish Tax Agency. Note that the region of Madrid is missing, since it has a 0% wealth tax rate over the whole period 2011-2015.

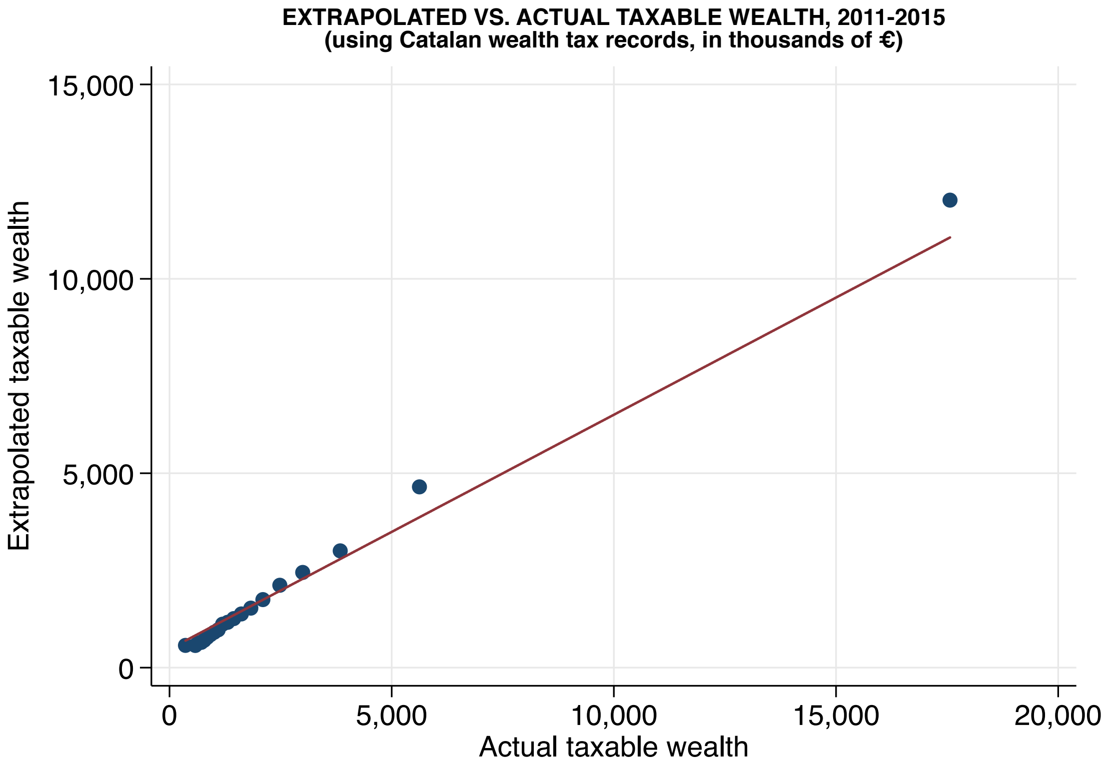


Figure B3: Extrapolated vs. Actual taxable wealth, 2011-2015 (using Catalan wealth tax records)

Notes: This figure compares extrapolated versus actual individual reported wealth levels for Catalonia's wealth taxpayers pooling years 2011-2015. The Catalan wealth tax records have been kindly shared by the Catalan Tax Agency. The comparison is made for the subsample of Catalan wealth taxpayers we are able to match across the two data sources (approx. 40% of our sample).

AGGREGATE MODEL: EFFECT OF MADRID (All 2007 Wealth Tax Filers)

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of Wealthy Filers			Total Wealth		
	Panel A: Average Effect					
Madrid x Post	0.060	0.051	0.033	0.115	0.091	0.044
Uncorrected SEs	(0.004)	(0.005)	(0.010)	(0.011)	(0.012)	(0.019)
Bootstrap p-values	0.028*	0.000***	0.022*	0.162	0.008***	0.064*
	Panel B: Cumulative Effect					
Madrid x 2015	0.083	0.078	0.071	0.146	0.125	0.111
Uncorrected SEs	(0.004)	(0.007)	(0.008)	(0.012)	(0.016)	(0.015)
Bootstrap p-values	0.002***	0.000***	0.008***	0.116	0.002***	0.006***
Observations	136	136	136	136	136	136
Spending Controls	no	yes	yes	no	yes	yes
Economic Controls	no	no	yes	no	no	yes
Amenity Controls	no	no	yes	no	no	yes
Demographic Controls	no	no	yes	no	no	yes

Table B1: Aggregate Model: Effect of Madrid (All 2007 Wealth Tax Filers)

Notes: The only difference with Table 3.2 is that in this table a wealth filer is defined as anyone who filed wealth taxes in 2007. The top panel presents coefficients from a simplified version of (3.1) that only uses Madrid × Post rather than the event study specification. The second panel shows the coefficient on the final treatment by event year dummy from regression equation (3.1). The first three columns show results for the specification where N_{rt} is the share of wealth tax filers while final three columns show the results where N_{rt} is the share of wealth. The share of wealth is calculated by holding wealth constant at its 2010 level for each taxpayer, but allowing the taxpayer to move regions. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

AGGREGATE MODEL: EFFECT OF MADRID ON WEALTH (Using Time-varying Wealth)

	(1)	(2)	(3)	(4)	(5)	(6)
	2010 Filers, > 700,000 Euro			2007 Filers		
	Panel A: Average Effect					
Madrid x Post	0.153	0.112	0.034	0.060	0.051	0.033
Uncorrected SEs	(0.019)	(0.017)	(0.025)	(0.004)	(0.005)	(0.010)
Bootstrap p-values	0.264	0.016**	0.242	0.028	0.000	0.022**
	Panel B: Cumulative Effect					
Madrid x 2015	0.210	0.162	0.138	0.083	0.078	0.071
Uncorrected SEs	(0.023)	(0.026)	(0.021)	(0.004)	(0.007)	(0.008)
Bootstrap p-values	0.218	0.058*	0.006***	0.002***	0.000***	0.008***
Observations	136	136	136	136	136	136
Spending Controls	no	yes	yes	no	yes	yes
Economic Controls	no	no	yes	no	no	yes
Amenity Controls	no	no	yes	no	no	yes

Table B2: Aggregate Model: Effect of Madrid on Wealth (Using Time-varying Wealth)

Notes: The results in this table are analogous to the last three columns in 3.2 and table B1 except the share of wealth is calculated allowing wealth to vary overtime. The top panel presents coefficients from a simplified version of (3.1) that only uses Madrid × Post rather than the event study specification. The second panel shows the coefficient on the final treatment by event year dummy from regression equation (3.1). The first three columns show results for the specification using individuals with wealth greater than 700,000 Euro while the final three columns use individuals that paid wealth taxes in 2007 to calculate regional wealth shares. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

AGGREGATE MODEL: ELASTICITIES FOR 2007 WEALTH TAX FILERS

	(1)	(2)	(3)	(4)	(5)	(6)
		Number of Filers			Total Wealth	
		Panel A: Panel Data with Only Filers				
$ln(1-atr_{rt})$	3.393	3.240	5.298	2.684	2.583	3.965
Uncorrected SEs	(0.762)	(0.738)	(0.751)	(0.526)	(0.512)	(0.855)
Bootstrap p-values	0.008***	0.010***	0.000***	0.008***	0.010***	0.000***
Observations	136	136	136	136	136	136
F-stat	-	>1000	60	-	>1000	60
		Panel B: Panel Data with Filers and Nonfilers				
$W_f \times ln(1-atr_{rtf})$	3.302	3.144	5.064	-	-	-
Uncorrected SEs	(0.691)	(0.670)	(0.752)	-	-	-
Bootstrap p-values	0.004***	0.004***	0.006***	-	-	-
Observations	272	272	272			
F-Stat	-	>1000	56			
Controls	yes	yes	yes	yes	yes	yes
OLS	yes	no	no	no	no	no
Simulated IV with Fixed Wealth	no	yes	no	no	no	no
Madrid x Post IV	no	no	yes	no	no	no

Table B3: Aggregate Model: Elasticities for 2007 Wealth Tax Filers

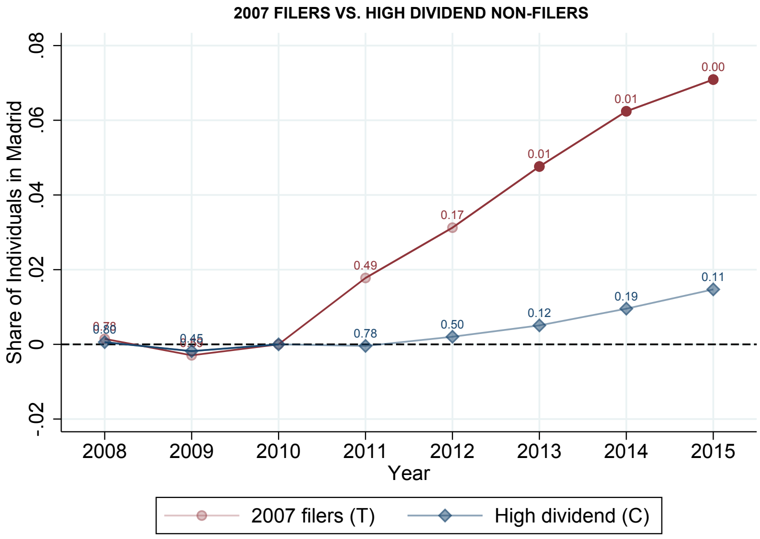
Notes: The top panel presents coefficients from estimation of 3.3. The second panel shows the coefficient where this equation is augmented to include data on non-filers (individuals that received greater than 1,500 Euro of dividends) as well. The only difference from the table in the text is that the treatment group is 2007 wealth tax filers. For the first three columns, N_{rt} is the share of wealth tax filers; in the second panel N_{rtf} is the share of wealth tax filers and non-filers. For the last three columns N_{rt} is the share of wealth; because we do not have wealth data for individuals that do not file wealth taxes, the second panel cannot be estimated. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values, *** p<0.01, ** p<0.05, * p<0.1.

INDIVIDUAL CHOICE MODEL (All 2007 Wealth Tax Filers)

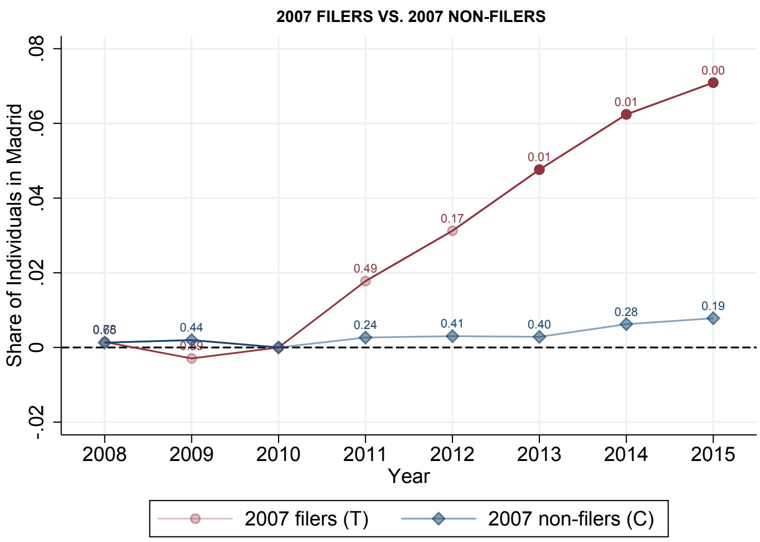
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\mathbf{1}\{\text{Madrid}\}_j \times Post_t$	0.238***	0.234***	0.220***	0.219***	0.233***	0.227***	0.231***	0.219***	0.219***
	(0.025)	(0.024)	(0.025)	(0.025)	(0.024)	(0.025)	(0.024)	(0.025)	(0.025)
R^2	0.231	0.239	0.259	0.265	0.249	0.250	0.250	0.267	0.268
# taxpayers	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251	3,251
# obs	55,267	55,267	55,267	55,267	55,267	55,267	55,267	55,267	55,267
origin dummy	no	yes	yes	yes	yes	yes	yes	yes	yes
distance	no	yes	yes	yes	yes	yes	yes	yes	yes
age x region	no	no	yes	yes	no	yes	no	yes	yes
age squared x region	no	no	no	yes	no	yes	no	yes	yes
gender x region	no	no	no	no	yes	yes	no	yes	yes
labor income x region	no	no	no	no	no	no	yes	yes	yes
j-fixed effects	no	no	no	no	no	no	no	no	yes

Table B4: Individual Choice Model (All 2007 Wealth Tax Filers)

Notes: This table presents the results from the individual choice model regressions for the sample of wealth tax filers in 2007. Standard errors clustered at the origin-tax-bracket level, ***, p<0.01, ** p<0.05, * p<0.1.



(a) 2007 filers vs. High dividend non-filers



(b) 2007 filers vs. 2007 non-filers

Figure B4: Event Study of the Share of Individuals in Madrid

Notes: This figure shows the coefficients from regression equation (3.1) estimated separately for the treatment and comparison group. The only difference from the figures in the main text is that a wealth tax filer is defined as any person that filed wealth taxes in 2007. The series in red (circles) shows results for the specification where N_{rt} is the share of wealth tax filers while the series in blue (diamonds) shows the results where N_{rt} is the share of non-filers as measured by individuals that received greater than 1,500 Euro of dividends in at least one year over the period 2011-2015 (panel (a)) and individuals that filed personal income taxes but no wealth taxes in 2007 (panel (b)). If the increase in migration to Madrid is due to the wealth tax only, we would expect an increase in the red series, but not the blue series. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values above the series on the graphs. Statistically significant coefficients are in dark colors and the numbers on the graph are the p-values.

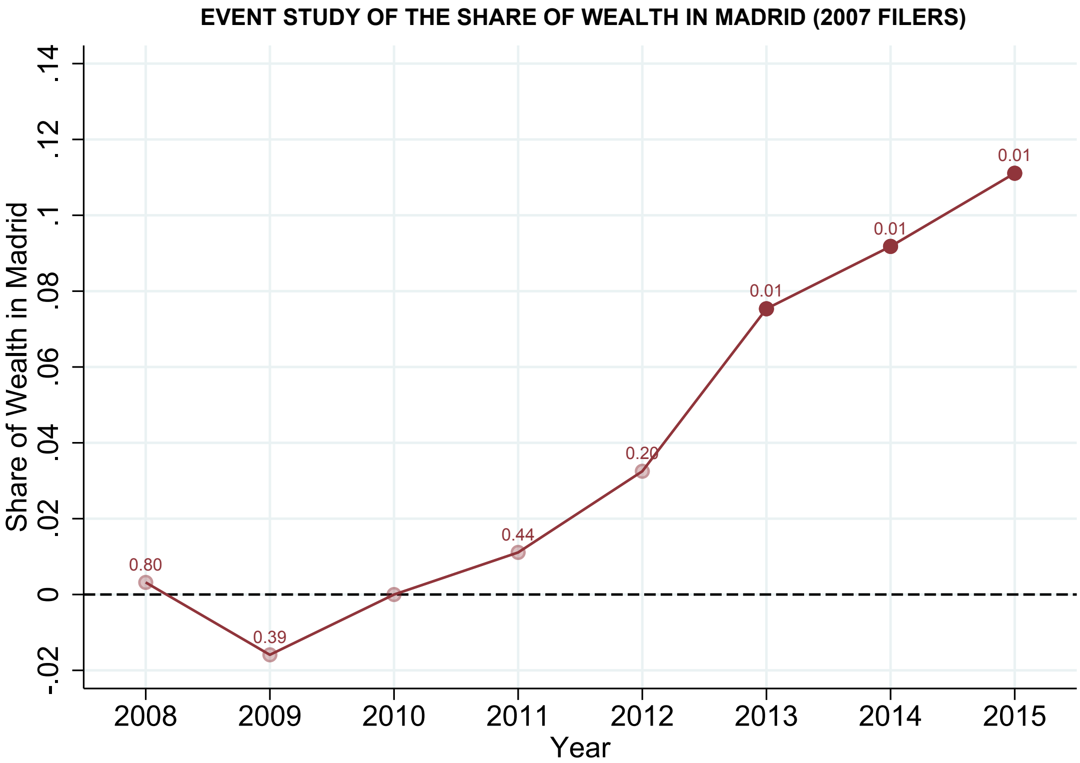
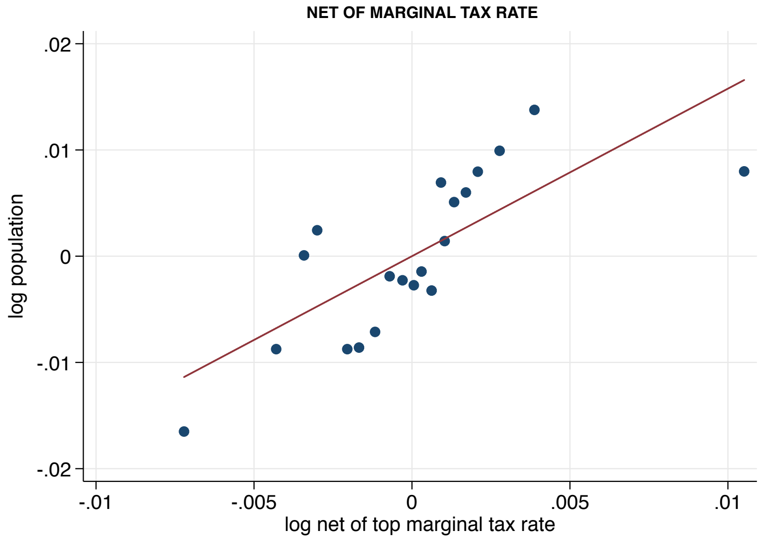
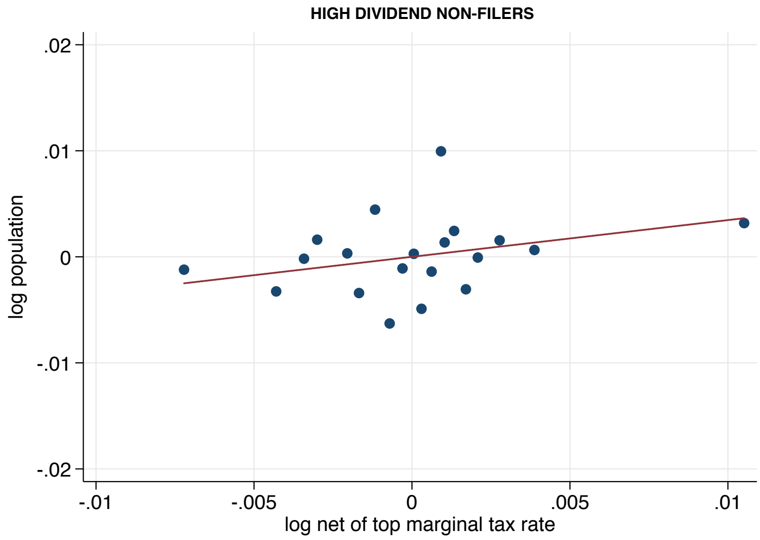


Figure B5: Event Study of the Share of Wealth in Madrid

Notes: The figure shows the coefficients from regression equation (3.1) estimated for the treatment group. The only difference from the figures in the main text is that a wealth tax filer is defined as any person that filed wealth taxes in 2007. The series shows results for the specification where N_{rt} is the share of wealth in a given region. Because wealth is only observed for filers, and here we use all 2007 filers, we have no filers as a control group. All regressions are weighted to match 2010 taxpayers' totals in each region. We cluster standard errors at the regional level. Because we have a small number of clusters, we implement the percentile-t wild cluster bootstrap, imposing the null hypothesis, and report p-values above the series on the graphs. Statistically significant coefficients are in dark colors and the numbers on the graph are the p-values.



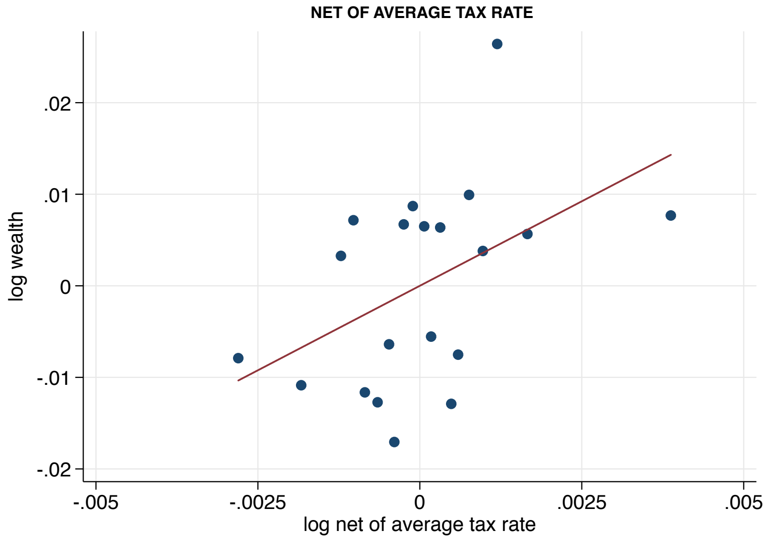
(a) Net of marginal tax rate



(b) High dividend non-filers

Figure B6: Elasticity of Number of Individuals (Top Marginal Rates)

Notes: This figure shows a visualization of the regression of the (log) share of the 2010 wealthy (panel (a)) and the High dividend non-filers group (panel (b)), respectively, in a given region year on the (log) net-of-marginal-tax rate. All regressions include state and year fixed effects, and the same controls as in the regressions. To construct this figure, we regress the dependent variable on the fixed effects and controls and obtain the residuals. We do the same for the independent variable. We then bin the residuals and plot a line of best-fit-through the data. The slope of this line is the coefficient from the standard panel data regression. In panel (a), we use the stock of wealth tax filers as defined as individuals with wealth greater than 700,000 Euro, while in panel (b) we use the stock of non-filers as a placebo test, as defined as individuals not filing wealth taxes but with dividends greater than 1,500 Euro. The top marginal tax rate acts as a salient signal of tax liabilities.



(a) With respect to ATR

(b) With respect to MTR

Figure B7: Elasticity of Stock of Wealth

Notes: This figure shows a visualization of the regression of the (log) share of wealth in a given region year on the (log) wealth weighted net-of-average or net-of-marginal-tax rate. All regressions include state and year fixed effects, and the same controls as in the regressions. To construct this figure, we regress the dependent variable on the fixed effects and controls and obtain the residuals. We do the same for the independent variable. We then bin the residuals and plot a line of best-fit-through the data. The slope of this line is the coefficient from the standard panel data regression.

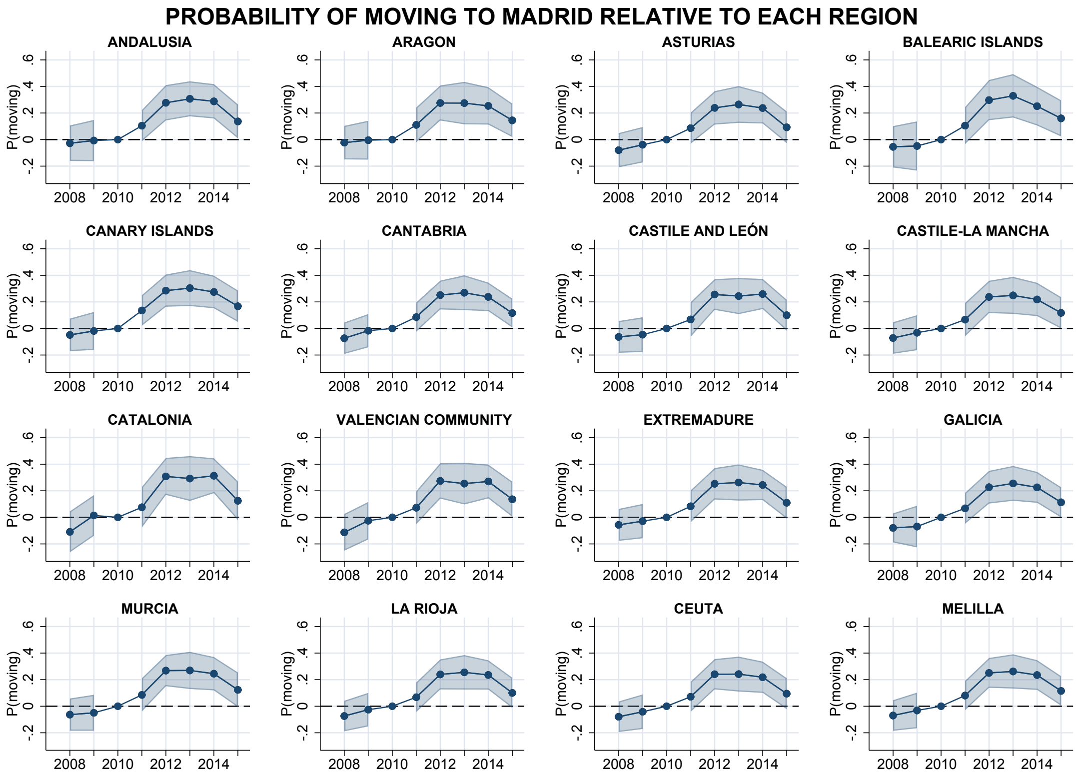


Figure B8: Probability of Moving to Madrid Relative to Each Region

Notes: This figure shows an event study similar to figure 3.8. To construct this figure, we re-estimate equation 3.6 sixteen times. Each time we omit a different region $\hat{j}$.

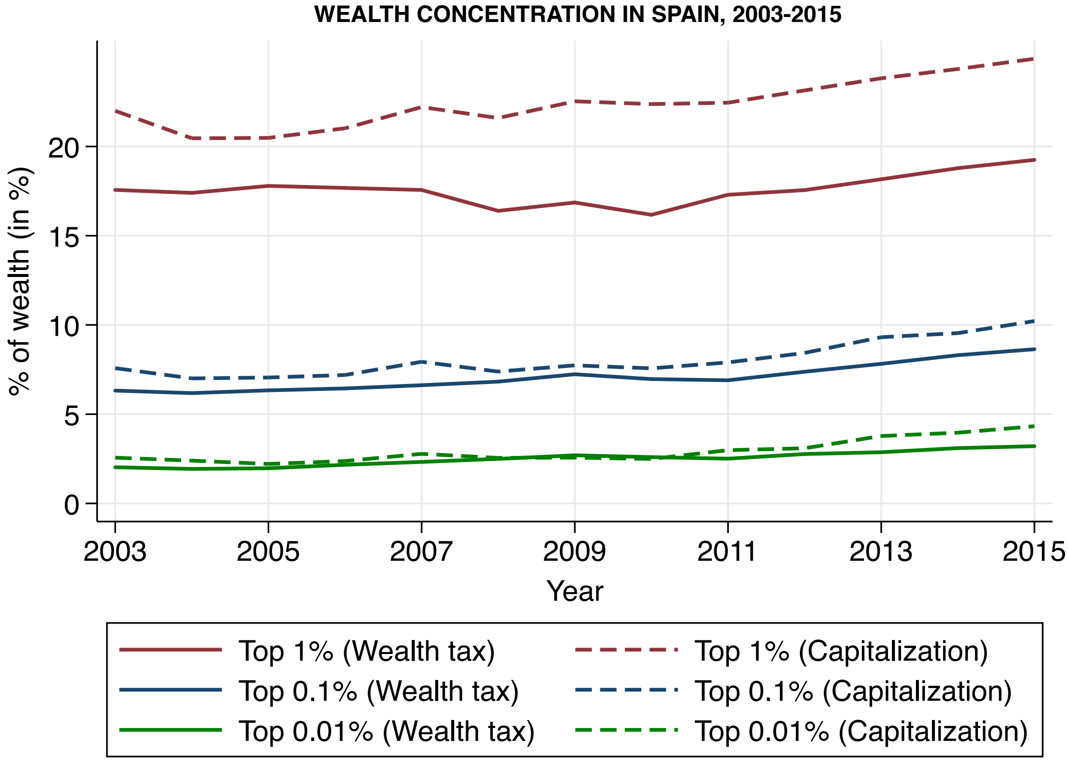


Figure B9: Wealth Concentration in Spain, 2003-2015

Notes: This figure compares our top wealth distribution series using wealth tax records (solid lines) with Martínez-Toledano, 2020 series (dashed lines) using the mixed-survey capitalization method over the period 2003-2015. Our series are consistent with national accounts and have been constructed using as denominator the non-financial aggregates reconstructed by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and the financial aggregates as reported by the Bank of Spain. Artola Blanco, Bauluz, and Martínez-Toledano, 2020 only reconstruct urban, rural estate and business assets. Thus, for other non-financial assets such as consumer durables (e.g., cars, boats, etc.) and collectibles (e.g., jewelry, antiques, etc.), we rely on the reported totals in the five waves (2002, 2005, 2008, 2011, 2014) of the Spanish Survey of Household Finances (SHF) elaborated by Bank of Spain. Wealth tax information excludes the regions of Navarre and Basque Country because they do not belong to the Common Fiscal Regime. We follow Alvaredo and Saez, 2009 and Martínez-Toledano, 2020 and correct our denominator assuming that total wealth in those regions is roughly proportional to GDP. Combined, they represent about 6-7% and 8% of Spanish population and gross domestic product over our period of analysis. For the numerator, we use total reported wealth in tax files and adjust real assets to reflect market prices and actual totals. Real estate wealth is commonly taxed according to its tax-assessed value and market prices are about three times as high as tax-assessed values on average. We correct each individual's annual reported real estate wealth using the ratio of aggregate real estate wealth at market prices elaborated by Artola Blanco, Bauluz, and Martínez-Toledano, 2020 and aggregate tax-assessed real estate wealth reported by the Spanish Cadastre. We finally adjust consumer durables, antiques and business assets that tend to be underestimated, as they are self-reported. We do so by using the reported shares of these assets among the top 1% richest indiiduals in the SHF. Note that 2008-2015 taxable wealth is based on our extrapolation method. Wealth groups are defined relative to the total number of adults (aged 20 and above from the Spanish Census).

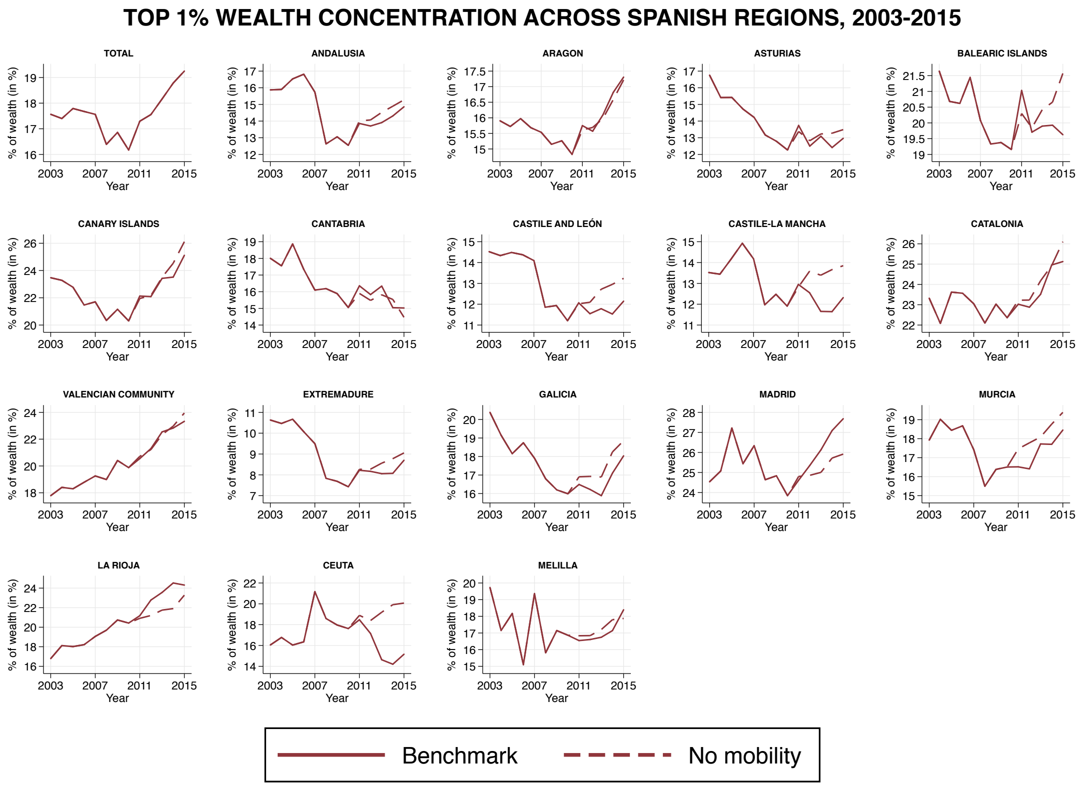


Figure B10: Top 1% Wealth Concentration across Spanish regions, 2003-2015 (with and without mobility)

Notes: This figure compares the evolution of top 1% wealth concentration in Spain and across Spanish regions under the benchmark scenario with mobility and the couterfactual scenario absent mobility. The counterfactual wealth shares have been calculated holding the distribution of wealth tax filers in each region at their pre-reform levels. To ensure consistency with the numerator, the distribution of total adult population and total wealth in each region is fixed at their pre-reform levels. We also correct each individual's wealth for the difference in tax liability between the benchmark scenario with mobility and the counterfactual scenario absent mobility using our wealth tax simulator.

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