

The Importance of Housing for the Elderly in Spain.



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Abstract

Contrary to the standard life-cycle model, it has been observed that individuals not only do not reduce their level of savings during retirement but also reduce their consumption. In this paper, we review the most important aspects of the use of housing in the saving behaviour of households and as an option to complement the retirement period. Spain is one of the countries where homeownership is most important, so throughout the paper we will analyze the main socio-demographic factors that affect homeownership for the elder Spanish population. Moreover, at the beginning of the century, Spain, like the rest of the world, experienced a speculative attack on the real estate market that could have had an effect on the homeownership behaviour of retirees . To analyze this, we will carry out a comparative study between the homeownership rate before and after the crisis.

Keywords: Homeownership rate, Retirement, Housing, Savings, House equity.

JEL codes: C12, C83, E20, E21, P14

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1.Introduction

The life-cycle model without uncertainty and bequest motive predicts that families accumulate wealth over the course of their lives and decumulate this wealth when they reach retirement so that when they die they have spent all their savings. Nevertheless, several authors have observed that many people die with a significant amount of savings (Davies, 1981 and palumbo, 1999 among others) so that this dissaving in the retirement period is much slower than predicted by the life cycle model, giving rise to the term known as the Retirement Saving Puzzle (RSP).

Saving behaviour differs between individuals and between countries. In Spain, as in many other countries, most of the savings that families obtain throughout their lives are invested in the form of an illiquid asset such as housing. This is why housing plays an important role in retirement savings models, with studies conducted by Nakajima and Telyukova (2011 and 2020) standing out. In addition, due to the socio-demographic changes we are experiencing social security pension payments may be reduced, making housing a more interesting financial instrument to complement retirement. In these models, where housing is introduced as a separate asset to explain the savings of retirees, it has been observed that the saving behaviour of those who are homeowners differs from those who are not.

The saving behaviour of Spanish households is mainly through the purchase of a house, and the homeownership rate in Spain is very high (over 80%). Moreover, this homeownership is high among the most adult people and close to or above 90% for retirees. At the beginning of the 21st century, there was a worldwide housing bubble that caused housing prices to rise significantly. As demonstrated in the Nakajima and Telyukova (2011) models, house price increases have had an effect on the homeownership rate and the house equity of retirees.

The aim of this paper is to see how socio-demographic factors affect the rate of home ownership of Spanish families for age groups in or close to retirement (65 and over), and to analyze whether the latest crisis has had an effect on the homeownership rate of Spanish retirees. To do this we use the data provided by the Spanish Household

Financial Survey for 2005 and 2014. Through a proportion test we carry out a comparative study to analyze whether there is a significant difference between the homeownership rate of the elder age groups between 2005, before the housing crisis, and 2014, after the crisis. Moreover, through a logit model where the dependent variable is the probability of being a homeowner we can determine whether socio-demographic factors such as age, gender or income have a different impact on homeownership in those years.

The results obtained show how the homeownership rate of the population in retirement for the year before the crisis, 2005, does not differ significantly from the rates for the same population group after the crisis, 2014. In addition, the only variables that have a significant impact on the probability of being a homeowner are the fact of belonging to a low income percentile, age of the head of the household and their age squared and the dummy variables that indicate the marital status of the head of the household. In order to see if the effect of these variables is different between the two samples, we have added interaction terms for the 2014 sample in order to check if there is a difference between the coefficients of the independent variables for both years. As main results, we obtained that a dummy indicating that the household belongs to a high income percentile and a dummy equal to one if the individual is single have a significantly different effect in 2014 than in 2005. The rest of the variables with interaction terms are not significant so their effect is the same for both years.

The rest of the paper is organized as follows. In Section 2 we conduct a review of the literature related to retirement saving and dissaving, housing as an option to supplement retirement consumption, and housing in retirement saving models. In section 3 we describe the current Spanish situation with interesting data, show different types of house equity withdrawal and briefly describe the deregulation of the housing market during the years before the bubble burst. In section 4 we describe the data, describing the variables that we later use to perform the econometric analysis and providing some relevant data extracted from the Spanish Household Financial Survey of 2005 and 2014 years. In section 5 we carry out the comparative study and the logit models. Finally, in section 6 we make a brief conclusion of the work.

2. Literature Review

Saving and dissaving in retirement.

Many households do not save enough to face retirement. Indeed, almost all studies show that, contrary to the life cycle model, people continue to save during retirement and consumption decreases as people approach retirement. Some authors have tried to explain why the elderly decumulate wealth more slowly than predicted in the life cycle model. According to the life-cycle model, households should accumulate wealth when income is higher than consumption and draw down their assets when income is lower than consumption (Modigliani and Brumberg, 1954). However, according to Davies (1981), the empirical evidence shows that the levels of dissaving by the elderly deviates from the predictions of the life-cycle model without bequest motive. Davies (1981) said that, without considering pensions, lifetime uncertainty will have a large impact on the decline in the level of consumption at all ages, but especially in the middle age. Even when pensions are taken into account the results show how the lower level of consumption is affected by lifetime uncertainty. To measure the impact that life uncertainty has on consumption, Davies measures the difference between what an individual would consume with certainty and uncertainty during different ages. The result shows that considering both pensions and not considering them, there is a negative impact on the level of consumption under the uncertainty that increases proportionally with age and, moreover, the magnitude of this impact is sufficient to take into account the lifetime uncertainty in the lack of decumulation of the elderly without considering a bequest motive.

Another reason why the elderly do not dissave enough during retirement, affecting their levels of consumption, is the role of uncertain medical expenditures (Palumbo, 1999). Palumbo (1999), considering the impact of uncertainty of future medical expenses by elderly households on their current consumption levels, made a structural model of household consumption decisions. The life cycle model does not consider precautionary motives for households such as expenses in the residence for the elderly and future out-of-pocket medical expenses which affect the pension income of the elderly. The consumption model proposed by Palumbo differs from the standard life cycle model because of the out-of-pocket medical expenses and because the date of death is not known exactly. Using data of elderly retirees in the PSID, Palumbo

concludes that within the precautionary savings of American elderlies, uncertain out-of-pocket medical expenses play an important role.

In the basic life-cycle model, households have to deplete completely their wealth at the time of death. Nevertheless, with a bequest motive, people tend to gather positive wealth before the time of death in order to transfer capital to the next generation. As Bernheim, Shleifer and Summers (1986) wrote: "intergenerational transfers play an important role in aggregate capital accumulation"(pp.152). De Nardi, French and Jones (2016) argued that individuals are inclined to increase their saving rate with the purpose of increasing bequest. Leaving a bequest to family members could mean an increase in the utility generated in individuals. Gale and Scholz (1994) said that the number of expected wealth transfers reaches 51% of net wealth accumulation. This is due to the unintended bequest that even a perfectly rational life cycle saver leaves when dying earlier than expected.

The rise of longevity along with lower fertility rates is the result of an older population that may have consequences for household welfare and the welfare of the elderly in particular. There was a perception that households were not saving enough during their life-cycle to maintain the levels of consumption through retirement (Bank et al, 1998). Older people build up their wealth at retirement through public transfers such as pensions and health benefits (Patxot et al, 2011). However, with the demographic changes, older households have to find a source of income other than public pensions in order to support consumption during the last years of life.

Housing choices in retirement.

Accumulated wealth in housing is considered one of the main sources for supplementing retirement. Many authors have built models that explain how elderly behave with their homeownership when faced with unexpected shocks. Modigliani and Brumberg (1954) pointed out that although the ownership of a house can be used for different services, it also could be used to complete the consumption during retirement, to bequeath or to earn funds in case of emergency. As well, Venti and Wise (1990) argued that housing equity is mainly the most important source to accumulate wealth for elderly people. There are many studies in the previous literature which explain the role that house equity withdrawal plays in the elderly population to complement the consumption in retirement due to socio-demographic changes.

The study by Venti and Wise (1990) shows that the majority of the older population is not willing to move out of their house and, therefore, to complement consumption by housing equity and even those who are ready to move out of their house might not want to use home equity withdrawal. What is more, the people who are most likely to decrease their home equity when they move out of their house are those who have higher home equity relative to other wealth and, conversely, those who increase their home equity when they move out are those with less home equity compared to other wealth. In addition, the utility generated by using the withdrawal of housing equity and transforming it into other assets that supplement non-housing consumption is less than the transaction costs related to the reduction of housing equity. Feinstein and McFadden (1989) also analyze relocation decisions and consumption levels that are highly correlated with demographic changes, such as the arrival of retirement or changes in family composition, and they also concluded that, if there are no unexpected shocks to family members, home equity is not expected to reduce it.

In the Venti and Wise (2004) study, they analysed the impact of unexpected family shocks in the home equity as they get older, considering the use of this home equity to fund consumption during retirement. In their former studies, they found that without changes in family composition, there is no reason for households to move out of their house. Besides, unless there will be unexpected shocks in the family, even those who move out, they are unlikely to reduce home equity. The use of home equity is important in understanding whether it should be treated as a financial asset that complements consumption in retirement or if, on the other hand, retirees do not reduce home equity as they get older, consumption will be made by means of social security payments and financial wealth accumulated so far. Changes in home equity take place when families move to a different size home or when homeownership is disrupted.

They found that normal people are not tempted to stop being homeowners. This can only happen if there are unexpected shocks, such as the death of a family member or entry into a nursing home. In addition, those who end up selling their house buy another one, which indicates that on average house equity is more likely to increase. Another of the experiments they carried out compared, after discounting the mortgage of the house, the sale price of the previous house and the value of the new house. They also concluded that on average people do not reduce home equity but increase it.

Unlike the study by Venti and Wise (2004), Sinai and Souleles (2007), without considering the mobility of homeowners, analyze the use of home equity during

retirement. Using the Survey of Consumer Finances (SCF) over the period 1983 to 2004, they found a meaningful rise in the net worth of retirees at the same time housing prices were growing. Nonetheless, house equity did not grow in the same way as net wealth. Younger retirees took advantage of the rising value of homes to increase their housing debt. Moreover, they investigated the fraction of their housing equity that retirees could withdraw using a reverse mortgage and they found that among elderlies, especially younger elderlies, there is a fraction of house equity which is not available to complement consumption. This is because the amount of home equity available for non-housing consumption increases with age.

A vast majority of the population becomes homeowner in their middle age so that when they become retirees they will accumulate wealth in the form of housing. In the literature, there are some studies that examined the role of ageing in housing choices such as Sheiner and Weil (1992) and Chiuri and Jappelli (2008). The former found a decline in the average homeownership rate and housing wealth in relation to ageing, even taking into account cohort effects. These results differ between women who have an important decrease in homeownership as they get older and widowed women, whose homeownership rate is lower and remains constant with age. In fact, widowhood, which grows up with age, is one of the reasons why homeownership rates decline with age in women. Nevertheless, household housing wealth levels remain high despite this.

Chiuri and Jappelli (2008), using data from 15 OECD countries, discovered that, taking into account cohort effects, there is a decline in the homeownership rates after age 60 in most countries. Once these cohort effects are taken into account, the decline in the homeownership rate occurs after age 70, until the decline becomes one percentage point per year after age 75. However, they also suggested that the variation among countries in the decline in homeownership rates might be attributable to market regulation indicators that have a direct effect on the home equity withdrawal for the elderly population.

Finally, in relation to Spain, according to Elvira et al, (2005), Spanish households have a close relationship with homeownership. Moreover, a large fraction of the Spanish population over 55 years old would not change their house, and those who have a preference for changing their house is due to a dependency motive. They also point out that people over 55 are very appreciative of leaving bequests. In the same case, Costa-Font et al, (2006) said that the Spanish population prefers to age in their houses

alone or with medical assistance in case of dependency. Therefore, they could complement public pensions with different housing wealth instruments, such as a reverse mortgage. Last but not least, Luengo-Prado and Sevilla (2012) wrote that, unlike other countries such as the United Kingdom or the United States, a large proportion of Spanish household do not see their income reduced during retirement.

Housing in retirement saving models.

Most of the works have concluded that people are not motivated to tap their home equity as they age. Housing as an asset apart from other assets can be important in explaining saving behaviour in the last phase of the life cycle. Households can make their house liquid in two ways: by selling it outright or by house equity debts. Nakajima and Telyukova (2011) were among the first to consider homeownership and the use of home equity in retirement. In this study, from a homeownership rate perspective and the use of home equity withdrawal, they examine the consequences of a more liberalized financial market and the impact of a possible future price decline. Through the use of The Health and Retirement Study and by building cohorts as well as profiles, the model is carried out so that retirees can choose between owning or renting, and those who choose to own can decide to sell their home and thus use the home equity. They can also decide whether to consume or save on financial assets or borrow against the home. The model also takes into account uncertainty motives where retirees have to face precautionary expenditures such as medical expenses or the price of housing as well as other precautionary shocks such as widowhood or changes in family composition. Social security provides them with their only source of income.

In a first experiment, which is divided into the first period where there is a speculative attack on the housing prices and a later period where housing prices decrease, they studied the effect that housing prices have in homeownership rates. As a conclusion, they get that an increase in housing prices, just as in the last real estate bubble, moderates homeownership rates. This is due to the rises of housing prices, and therefore, retirees will be more tempted to sell their home. This also causes retirees to borrow against their home equity. In the second post-crisis period, as prices fall down, the rate of homeownership increases and home equity borrowing decreases. A second experiment questions what would happen to a decrease in the "cost of home equity borrowing" in homeownership rates and home equity debts. They concluded that a decrease in the "cost of home equity borrowing" will lead to an increase in the debt on home equity for retirees. Hence, the homeownership rate increases as the cost of

borrowing against home equity debt is lower. Finally, the study shows if the housing can be considered to explain the Retirement Saving Puzzle. In relation to the housing boom, data are misleading where the higher value of the house makes the value of the total assets of the retirees shoot up. They also argued that although the cost of home equity withdrawal affects the behaviour of retirees when they borrow against home equity, there is no change in the portfolio assets held by retirees.

In the study carried out by Nakajima and Telyukova (2020), using data from the Health and Retirement Study (HRS) from the period 1996 to 2006, they showed that the saving behaviour is different between retirees who own a home and retirees who are renters, and those who are renters show faster dissaving than those who own a house, who are more inclined to accumulate wealth at this point in life. Hence, homeownership rates play an important role in saving decisions for retirees, which suggest housing could be of great importance in explaining RSP. To do this, they build a structural model of household saving decisions during the retirement period. This model considers both financial assets and housing, with the latter also providing utility. The difference with other previous works is that it takes into account the housing separately to explain the Retirement Saving Puzzle, apart from other motives such as a bequest or medical expenses, which also have an important role in this model.

In this model, households can be both single and couple, but that does not mean they could not become widowers. Each household begins in the position of owner or renter and during each period the household can decide whether to consume or accumulate financial savings. In relation to housing, the retirees have to decide to move out of the house or stay in it. They can also borrow against home equity. Due to the real estate bubble during the period 1996-2006, the aggregate price of housing is increasing. In addition to changes in family composition the model also takes into account other idiosyncratic shocks such as lifetime uncertainty and uncertain medical expenditures among others. Households can earn income from social security insurance plans for elderly.

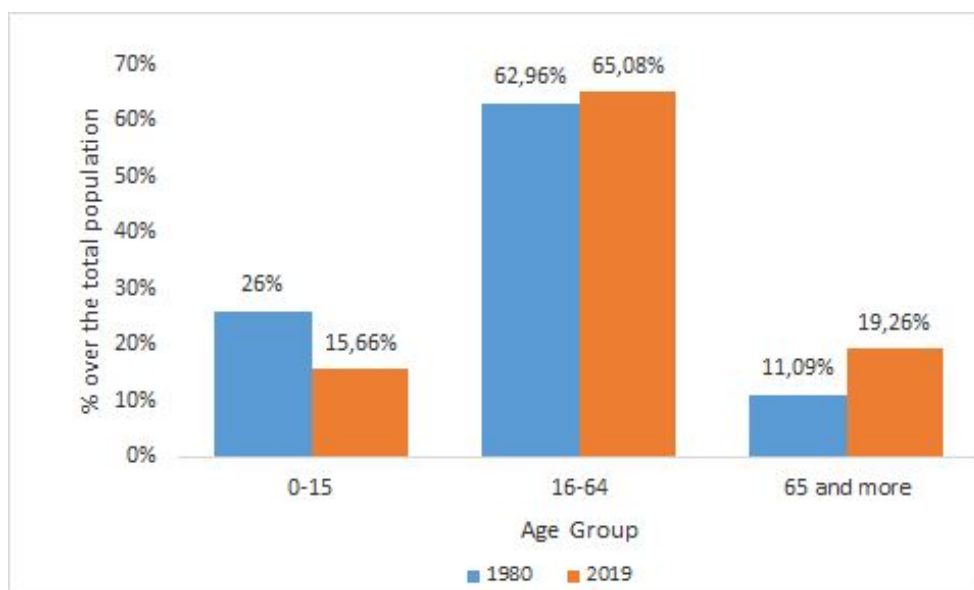
As conclusions, once the benchmark model is estimated, it considers five mechanisms that are a bequest motive, medical expenses, collateral constraint, extra utility in homeownership rates and the increasing of the housing prices during the housing bubble. These mechanisms are compared separately with the benchmark model. The most important results are that without taking into account the bequest motive, the rate of homeownership and the net wealth of retirees show a faster decline than the

benchmark model. A similar result occurs when the extra utility of the homeownership rate is not taken into account. They conclude that once housing has been considered separately, the Retirement Saving Puzzle conclusions change.

3. The current Spanish situation.

According to Perez (2001), Spain is one of the latest countries to undergo a demographic transition compared with other European countries. The Spanish population is ageing and, like in other parts of the world, this is due to both a decrease in the younger population and an increase in the older population . Graph 3.1 represents a comparison between years 1980 and 2019 of the evolution of the population structure by large age groups in Spain. As the graph shows, during all these years there has been a shift in the population pyramid due to a demographic transition in which the first age group has been considerably reduced, leading to an increase in the elderly population. Moreover, the ageing rate in 2019 in Spain was 122.88. This rate means the number of people aged 65 and over for every 100 people under 15. This number is significantly high compared to the 44 people over 65 for every 100 under 15 in 1981 (Perez,2001).

Graph 3.1 Comparison of the population by group ages in Spain.



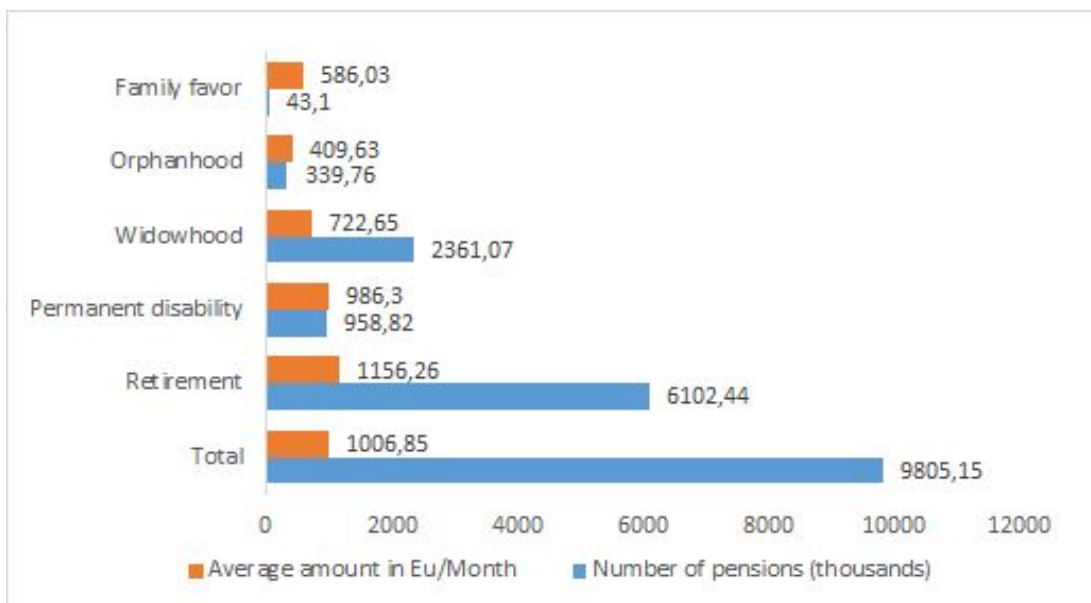
Source: Own elaboration from Instituto Nacional de Estadística (INE)

Nowadays, the fertility rate in Spain is one of the lowest in all European countries with 1.49 births per woman. Moreover, in 2018 life expectancy in Spain was 83.5 years,

placing itself among the first countries of the world. A decrease in the number of tax contributors due to a delay in the incorporation of the labour market, combined with the other reasons above, implies an increase in the retired population relative to the working-age population, which probably will lead to a reduction of public pensions in Spain in the medium run.

With the arrival of baby boomers in retirement, social security payments will be lower than expected. According to the report of Centro de Investigaciones Sociológicas (CIS), 11.8% of Spanish society considers pensions within three of the main problems of the Spanish society today (Barómetro CIS, January of 2020). As argued by Conde-Ruiz (2017), the public pensions system works in such a way that workers, in some way, have to devote a fraction of their salary to pay current retirees who are entitled to a pension. Furthermore, the more you contribute to the pension system, the more pension payments you will receive in the future. With the reform that took place in 2013, the Spanish pension system was adjusted to increase its sustainability, with the amount of payments each retired person will receive varying according to years of contribution and life expectancy. Graph 3.2 displays the number of pensioners who are at the charge of social security, as well as the average amount expressed in euros.

Graph 3.2: Social Security Contribution Pensions in February 2020

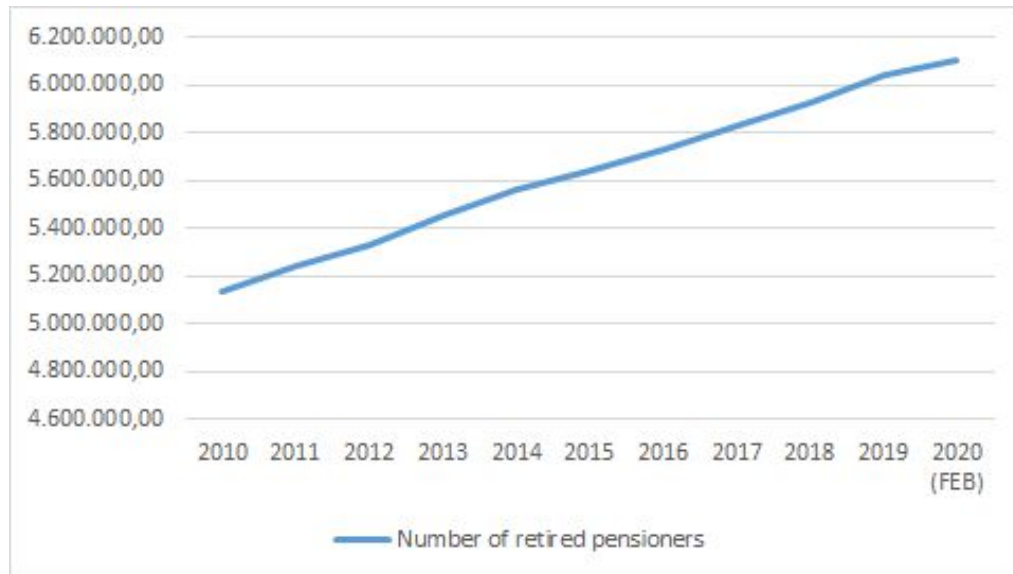


Source: Own elaboration from Ministerio de Trabajo

The number of retirees rises to 6,102,440 people with an average payment of 1.156,26 euros per month. This indicates that retirees are certainly the largest social

group to benefit from social security. It is important to note that, as pointed out by Conde-Ruiz and Gonzalez (2015), the Spanish population will be involved in the ageing of society more intensely than other European countries. This can be explained by the decrease in the mortality among the elderly, which means longer life expectancy, lower fertility rates, a delay in the generation of baby boomers and a process of immigration during the early years of 2000 that led to a rejuvenation of the population.

Graph 3.3: Evolution of the number of retired pensioners for the period 2010 to 2020



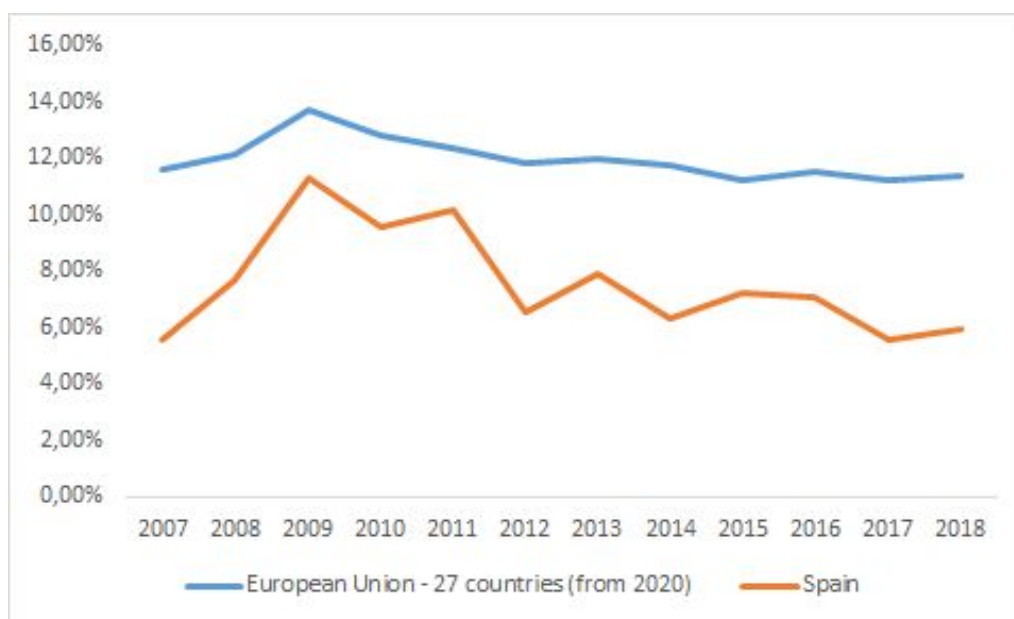
Source: Own elaboration from Ministerio de Trabajo

Graph 3.3 shows that in less than nine years the increase in the number of incorporations of pensioners in the public system is over one million people. Through this graph, you can predict the change in the population pyramid with the increase in the arrival of thousands of baby boomers at retirement age. This leads to finding a possible extra source of income during the retirement period through illiquid assets such as housing.

Despite the concern that public pensions cause to Spanish society, the behaviour of Spanish households does not reflect a situation of uncertainty about the future of the pensions system. Graph 3.4 illustrates the gross household saving rate, which is gross saving divided by gross disposable income. Gross saving is defined as the part of gross disposable income that is not spent as final consumption. There is evidence during the period of recession caused by the last financial crisis: the level of the gross saving rate increased during this period approaching the levels of gross saving rate of

the European Union (27 countries) and then a period of distance begins with a decrease in the gross saving rate of Spanish households.

Graph 3.4: Comparison of the gross saving rate between Spain and the European Union



Source: Own elaboration from Eurostat

It seems that Spanish consumers are reluctant to engage in a precautionary process of accumulating savings with the purpose of finance retirement in case the public pension system would not be enough. However, this lack of saving could be due to the lower gross disposable income of the Spanish society and, therefore, not having sufficient resources for savings. Retirees disposable income is closely related to the pay-as-you-go pensions they receive from social security. Most Spanish households do not have other sources of income such as private pensions because Spanish society is not used to save in this way. In addition, according to the financial survey of Spanish households in 2014, only 13.04% of respondents believed that their future savings would be greater than current ones, while the remaining 86.96% thought that their future savings would be less than or equal to current ones.

The saving method of Spanish households is mainly composed of illiquid assets. According to the Financial Survey of Spanish Households (2014), the percentage of retirees who own a main residence in Spain is 90.4% and 52.9% of retirees claim to own another real estate. The purchase of a house implies the attribute of a quite illiquid asset. Households gather wealth by means of housing and when they reach retirement

they can no easily turn these assets into liquid assets, in fact, it is not common to find a market available to convert real estate savings into cash. Moreover, a large fraction of Spanish households prefer to stay in their main residence rather than move. Another reason people do not make their house liquid is the desire for intergenerational transfers to their relatives (Elvira et al, 2005).

The level of investment in financial assets in Spain is fairly low. Graph 3.5 shows the percentage of real assets as a percentage of total assets and the percentage of financial assets as a percentage of total assets. The real assets are clearly higher than financial assets. Within real assets, in 2014, 57.4% of real assets belong to housing and another 31.6% to other real estates. As for financial assets, in 2014, 18.7% belongs to pension plans and life insurance. Moreover, compared to 2005, in 2014 the percentage of financial assets as a percentage of total assets, has slightly increased, which means that real assets have decreased by a little. However, in 2005 the number of real assets as a percentage of total assets is significantly higher than in 2014.

Graph 3.5: Comparison of the total assets (Financial survey of Spanish Households, 2005 and 2014)

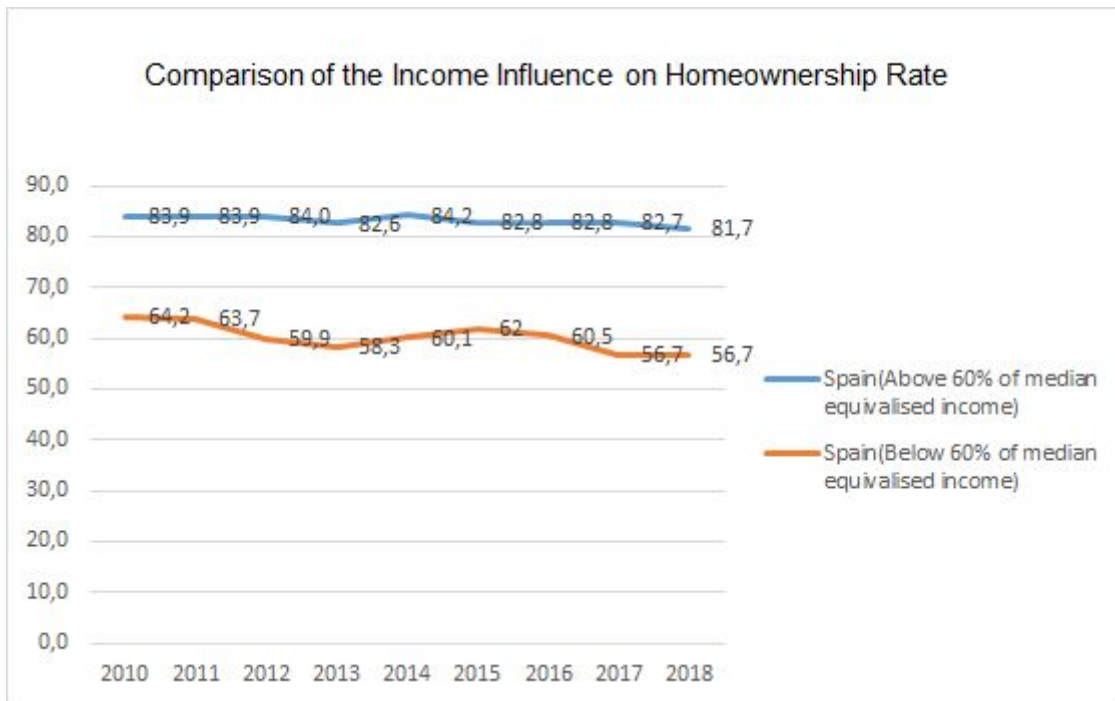


Source: own elaboration from Financial Survey of Spanish Households

Housing is the main investment asset in Spain. A high percentage of the population owns a property, even for low levels of income. As graph 3.6 shows, the percentage of the population who own homes with an income level above 60% of the median is higher than 80% and the percentage of the population who own homes with an income level below 60% of the median is higher than 50%, indicating that more than half of the

population in low-income situations prefers to invest their saving in housing. Even for those households with certain financial difficulties, housing becomes their main asset through their working age and the only asset when they reach retirement and therefore, the study of some financial instruments that help to tap their housing equity becomes quite interesting.

Graph 3.6: Income influence on Homeownership Rate in Spain.



Source: Own elaboration from Eurostat

Equity release schemes

The study by Bravo et al (2019) analyze different ways of home equity withdrawing. In this study, two forms of equity release are considered, staying in the home or through the sale of the home. There are two agents involved in these schemes, the homeowner and the institutions that provide the cash. While in the in situ schemes the homeowner, without moving from the home, borrows from the institution that originates the mortgage loan, in sales models the homeowner sells the home to the institution providing the cash to release the home equity.

In the equity release schemes that involve selling the home and moving out, the home equity withdrawal can be carried out by different methods. One of them is because the owners of the house have moved to another house as a rental. A second process consists of moving into a smaller home, called downsizing. The difference between the capital of the old house and the new house is the capital that is released. Another way

is called over-mortgaging, where the owners buy a larger house. In this case, the owner would have to take out a mortgage loan to finance the larger home and therefore release home equity. Other ways are to sell the home because of divorce or to emigrate to another country. Ultimately one way is to sell the house and move into a relative home or a nursing home, so it does not involve buying a new home.

There is also the possibility of selling the house and not moving. One way is to sell the home for less than the market price of the home and stay in it as long as you live. On the other hand, in the in situ method, there are two ways to obtain the capital of the house, staying in the house and not selling it or staying in it and finally selling it to the institution providing the loan in the final years of life or when the contract says so. The way not to sell the house is to refinance the loan among others. Among the ways to stay in your home, the most important is the reverse mortgage.

Currently, in Spain, the use of financial instruments to make your assets more liquid is still not very common, which implies that people facing a possible scenario of lack of savings to tackle retirement could not know how to obtain an extra income. Moreover, with the high level of life expectancy, the elderly become more dependent and are therefore more likely to experience shortage of resources due to increased medical expenses or care needs. This would lead to an increased need to benefit from financial products that reduce the risk of financial resource shortage during the last phase of the life-cycle.

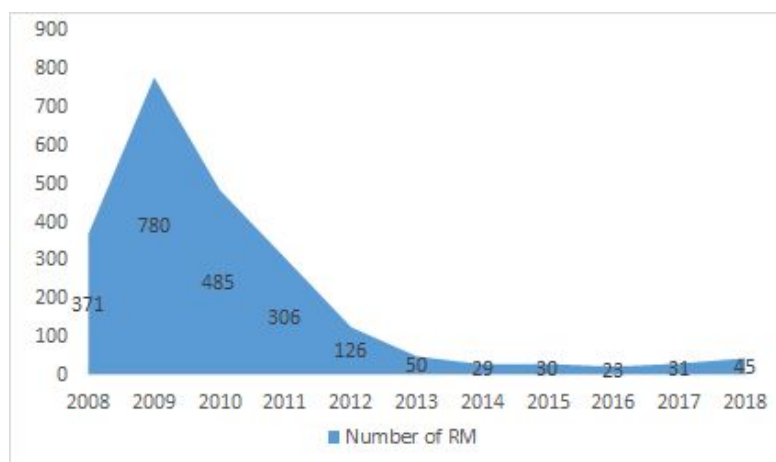
In Spain according to Serrano et al (2019) the main alternatives to release equity include selling or renting a house. Renting is very important in Spain because of the diffusion of this activity through the web pages and because of the importance of tourism in Spain. According to the National Institute of Statistics of Spain (INE), in 2014 the number of houses for renting increased by 51.1% with 2.4 million houses. Another way to find financial means is downsizing. This consists of selling your home first and buying a new smaller home later. However, one drawback is the preference of the elderly to age in their homes. Another important alternative to release equity from housing is a reverse mortgage. As Costa-Font and et al (2006) pointed out, the reverse mortgage works as a loan from a financial institution that allows elderly to accept an amount of money in addition to their pension for a specific period of time, at a fixed interest rate, in exchange for establishing their home as a guarantee and with the consent of the heirs. The extra income depends on the value of the home, the age of the applicant or life-expectancy, and the requirements for receiving the money.

Reverse mortgage owners could keep taking advantage from the mortgage even when they live longer than expected by taking out an annuity.

The maturity of the operation is established at the death of the subscriber, where the heirs have to return the total of the funds plus the interest generated. The heirs have to decide whether to sell the house to meet the debt and interest, pay off the debt and keep the house, or take out a new mortgage to cover the debt. If the situation arose that the borrower died before the maturity date, the relatives could take ownership of the house by paying the debt incurred to date. The biggest disadvantage of this financial instrument is that the person had to decide how many years to apply for the loan and if he miscalculate it could happen that he would either die earlier or run out of money during the last years of his life .

Despite the fact that reverse mortgages are one of the most important financial instruments for releasing home equity, the number of reverse mortgages in Spain is still quite small. As Graph 3. 7 shows, the number of reverse mortgages is not taken into account much when it comes to getting extra income. The peak was reached in 2009, in the midst of the financial crisis, when the highest number of reverse mortgages were taken out. In this period many people have spent most of their savings on speculating on housing and could need liquidity to in many cases pay off debts, while as we move away from the crisis period the number of reverse mortgages is reduced considerably to a minimum of 23.

Graph 3.7: Number of Reverse Mortgages in Spain.



Source: Own elaboration from Consejo General de Notarios.

Private pensions in Spain

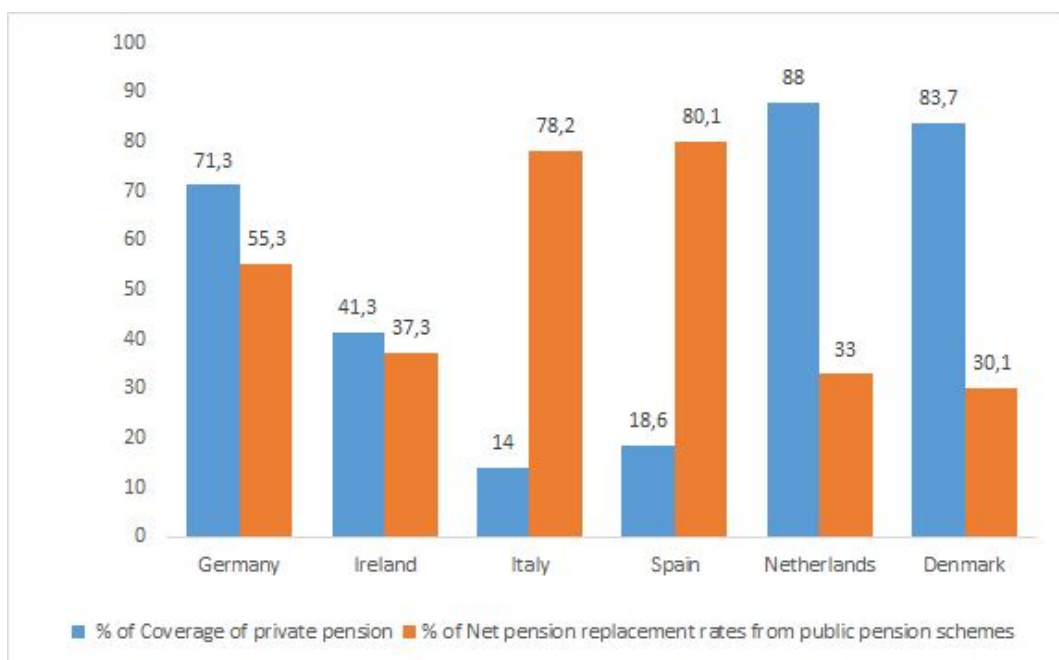
Despite the fact that Spain has a lower gross saving rate than the European Union, those who are more worried about the future of the pensions can begin to save privately. According to a report from OECD (2013), In OCDE countries, 18 of them have some type of mandatory or quasi-mandatory private pension system where its coverage rate is equal to or greater than 70% of the working population. In countries such as Switzerland, Norway, Ireland and Finland occupational pensions are mandatory and their contribution rate is set by governments, with coverage rates covering a large part of the working-age population. Other countries have quasi-mandatory occupational pension systems, where the difference with mandatory ones is that not all sectors are covered by collective agreements. There are also OECD countries that have mandatory personal pensions, such as Denmark or Sweden, where the coverage rate is complete. Moreover, there are voluntary private pension plans where in many countries employees are free to decide whether to join the plans or not. In countries such as the United States, the Czech Republic and New Zealand have a coverage rate of over or close to 50% with the voluntary private pension system, while in other countries with the same system, such as Greece, Portugal and Turkey, the coverage rate is less than 5%.

This may be due to the fact that in these countries they receive high amounts from the public pension system, which makes their private pension coverage rate low. Graph 3.8 illustrates a blue bar that shows the coverage rate of private pension plans for the working-age population (15-64 years). The coverage rate indicates the percentage of the population that has a private pension plan, either in a mandatory or voluntary and occupational or personal system. The orange Bar represents the net replacement of public pensions. The replacement rate is the amount of money that a person will receive when they retire compared to their last salary when they were active.

As the graph illustrates, Spain has a very low percentage of the working population with private pensions compared to other countries. The graph also shows that those countries that have a lower replacement rate in public pensions than other countries have higher participation in private pensions, such as the Netherlands. This fact may indicate that in these countries the pension system is not public, but mandatory or quasi-mandatory, where the majority of the working-age population must hire an occupational pension plan. On the other hand, those countries with high replacement rates of public pensions mean lower levels of participation in private pensions such as

Italy or Spain. The replacement rate in Spain is 80.1% which indicates high payments from Social Security. This means that many Spanish families are satisfied with the money received from the public system and do not take out private pension plans when they are of working age. This makes the saving rates of Spanish Households lower than usual and they reach retirement age with almost all their savings invested in the home. This may be reflected in the high rate of homeownership that individuals reach retirement with. That is why the use of house equity withdrawal as a complement to pensions is one of the most important aspects to be taken into account by the Spanish society.

Graph 3.8: Comparison of private pensions with net pension replacement rate.



Source: Own elaboration from OCDE: pensions at a glance 2013

Housing Market Deregulation.

In most Western countries the mortgage markets have been liberalised over the last 20 years as a result of the globalisation of the financial markets. Among the measures to deregulate housing markets is an increase in the number of financial institutions that allow mortgages to be offered and a reduction in restrictions on the conditions and use of mortgage loans. This has led to an increase in mortgage debt and a significant rise in house prices (Scanlon et al, 2008).

As we know, at the beginning of the 21st century there is a period of speculative attack on the housing market. In Spain, according to Estadística Registral inmobiliaria from Colegio de Registradores (2019), in 2007, characterized by a high speculative period,

the average period of ownership of property subject to transfer (measured in years) was 7 years and 120 days, while by 2019, characterised by more long-term investments, the average period of ownership of the property subject to transfer was 15 years and 101 days, twice as long as in 2007. It is also important to note that during the period between 1997 and 2007, the housing revitalization in Spain has been 191%, and the mortgage interest rates have been reduced from 11% in 1995 to 3.5% between 2003 and 2005 (Arellano and Bentolila, 2009). Moreover, according to the last official population and housing census carried out by the INE in 2011, in Spain, there are currently 3.5 million empty houses, 500.000 more than the census carried out in 2001.

The evolution of house prices in Spain has been fairly volatile. Graph 3.10 shows the year-on-year variation in the price of housing in Spain according to the IME index from Tinsa for each first quarter of 2002 until 2020. From the graph, it can be seen how there has been a fall in housing prices when the housing bubble burst, from an inter-annual variation of 11.5% in 2007 to an inter-annual variation in 2008 and 2009 of 1% and -9.6% respectively.

Graph 3.9: Year-on-Year change in housing prices in Spain.



Source: Own elaboration from tinsa

4. Data description

Housing is the main asset in which Spanish households invest throughout their lives. In this section, we will be able to observe the homeownership rate of Spanish households for the years 2005 and 2014. To do this we will use the Financial Survey of Spanish households carried out by the Bank of Spain. This survey, whose main objective is to provide detailed information on the income, assets, expenses and debts of Spanish households, has been carried out since 2002 and in it, we can obtain information on the financial situation of Spanish households.

In order to ensure the representativeness of the study, the sample, selected at random, contains observations from all economic strata and has the collaboration of the Instituto Nacional de Estadística (INE) for its elaboration. Given that since the second edition (the first was in 2002) of the EFF a portion of the households that collaborated in previous editions are interviewed, the combination of the samples from the different editions allows for the observation of a subset of households at various points in time and, in some cases, over a period of almost ten years. In particular, the EFF sample of the bank of Spain is a rotating panel design. Rotating panel designs are used to reduce variations in level or change estimators and often to reduce survey costs associated with introducing a new unit into the sample. We have decided to use the years 2005 and 2014 because the first represents a period prior to the world financial crisis with a booming Spanish real estate market, and the second a period after the last world financial crisis, where the world economy was still recovering from the negative effects of this crisis. In the 2005 survey, there are 5962 participants while in the 2014 survey the sample is slightly larger with 6120 participants.

Using the Stata software, we will carry out an analysis of the distribution of the Spanish population by tenure status for the years 2005 and 2014. By focusing on the homeownership rate, we will be able to make a comparative study of the differences in this homeownership rate and see if there is empirical evidence that this rate differs statistically for the oldest age groups between the years 2005 and 2014. We can also see how the ownership rate differs according to the annual income of the household in the year preceding the survey (2004 for EFF 2005 and 2013 for EFF2014), the age group and marital status of the head of the household. To do the analysis, we will divide the sample into 13 age groups. The first age group will correspond to (household

heads) individuals between 18 and 29 years old, and the rest of the groups will correspond to 5-year-intervals groups from 30 to 89 years old (30 to 34, 35 to 39, etc.).

Regarding the household annual income, we will divide it into percentiles, from lower to higher annual income. Using the Stata command to calculate the income percentile for each of the surveys, table 4.1 shows the results of the income distribution according to the percentiles calculated for each of the samples. Finally, the homeownership rate of Spanish families in relation to the family size, marital status and gender of the head of household will be described. We will take into account whether the head of the family is single, married, common law partner, divorced, divorcee or widowed.

Table 4.1 : Income distribution by percentiles.

Income percentile	2005	2014
First percentile	0 to 7.220 €	0 to 9.508,5 €
Second percentile	7.220 to 11.800 €	9.508,5 to 14.040 €
Third percentile	11.800 to 15.600 €	14.040 to 18.642 €
Fourth Percentile	15.600 to 20.160 €	18.642 to 24.000 €
Fifth percentile	20.160 to 25.100 €	24.000 to 30.622 €
Sixth percentile	25.100 to 31.700 €	30.622 to 38.000 €
Seventh percentile	31.700 to 40.804,5 €	38.000 to 49.000 €
Eighth percentile	40.804,5 to 57.000 €	49.000 to 65.680,5 €
Nine percentile	57.000 to 95.015,18 €	65.680,5 to 99.500 €
Tenth percentile	Above 95.015,18 €	Above 99.500 €

Source:own elaboration.

Table 4.2: Comparison of the Homeownership rate by age groups.

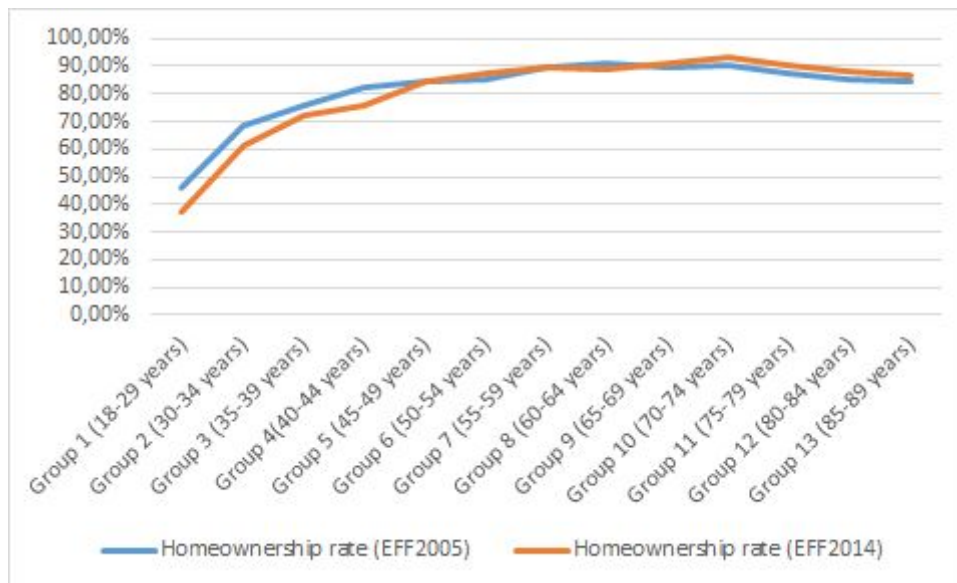
Household Type	Homeownership rate (EFF2005)	Homeownership rate (EFF2014)
All Households	84.00 %	85,46%
Age group		
Group 1 (18-29 years)	45,76%	37,27%
Group 2 (30-34 years)	68,30%	61,02%
Group 3 (35-39 years)	75,53%	72,00%
Group 4(40-44 years)	82,04%	75,93%
Group 5 (45-49 years)	84.42%	84,86%
Group 6 (50-54 years)	85.01%	87,16%
Group 7 (55-59 years)	89,85%	89,62%
Group 8 (60-64 years)	91,28%	89,04%
Group 9 (65-69 years)	89.39 %	90,73%
Group 10 (70-74 years)	90.66 %	93,06%
Group 11 (75-79 years)	87,53%	90,68%
Group 12 (80-84 years)	84,95%	88,03%
Group 13 (85-89 years)	84,29%	86,34%

Source: Own elaboration.

Table 4.2 shows a comparison of the homeownership rate by age group between the year before the housing bubble burst, 2005, and the year 2014, after the crisis. As data to emphasize we can see that the homeownership rate in 2014 is very similar than in 2005 and that the homeownership rate during the retirement period is a little higher in 2014 than in 2005, with a rate for the years between 70 and 74 of 93.06% for 2014 versus 90.66% for 2005. This may be due to the fact that in 2005 house prices were higher, so, as the study by Nakajima and Telyokova (2011) says, this meant that homeownership rates are moderated so that by 2014, when house prices are lower, homeownership rates increase.¹

In relation to the literature, both Sheiner and Weil (1992) and Chiuri and Jappelli (2008) show a slight decrease in the homeownership rate as age increases. However, these results are more important depending on whether you are a woman and in a situation of widowhood. Moreover, these results also vary from country to country. As we can see in our results, graph 4.1 shows how the homeownership rate increases until it reaches more or less the stage of retirement where it suffers a slight decrease. This is true for both 2005 and 2014.

Graph 4.1: Comparison of the Homeownership rate by age groups.



Source: Own elaboration.

According to the Financial Survey of Spanish households, the situation of widowhood in Spain in 2005 was 12.01% for individuals between 60 and 65 years old, 32.51% for individuals between 75 and 79 years old and 57.85% for individuals between 85 and 89

¹ In the following section, I will provide the results of a proportion test to determine whether the observed differences are significant.

years old, while by 2014 the data is very similar with 31.84% of individuals between 75 and 79 years old in a situation of widowhood and more than 62% of individuals between 80 and 84 years old and between 85 and 89 years old in the same situation. Furthermore, in Spain in 2005, 25.53% of women were widowed, while only 4.63% of men were in this situation and the same by 2014 with 26.27% of women widowed and only 5.53% of men widowed, so that widowhood affects more women than men.

Table 4.2 shows a description of the homeownership rate depending on marital status, gender and family size for the years 2005 and 2014. As we can see the lowest homeownership rate according to marital status is divorced with a rate of 62.03% and 74.85% for the years 2005 and 2014 respectively. We can also see how the homeownership rate for those married is quite high with a rate above 90% by 2014. The homeownership rate of widowed individuals, although lower than that of married individuals, is also significantly high. Later we can also see how for both years the homeownership rate is higher for men than for women, with a rate of 88.08% for men during 2014 and a rate for women of 81.47%. Finally, we describe the homeownership rate depending on the size of the family, where the most remarkable thing is that families with one person have a lower rate than those with more than one and the rate is high up to a family size of 5 people and then up or equal to 6 the rate drops.

Table 4.3: Homeownership rate by socio-demographic factors

Household type	Homeownership rate (EFF2005)	Homeownership rate (EFF2014)
All Households	84.00 %	85,46%
Marital Status		
Single	69.95 %	71,41%
Married	88.89 %	90,59%
Common law partner	68,25%	68,15%
Divorced	62,03%	74,85%
Divorcee	70,45%	79,25%
Widowhood	85.44 %	84,20%
Gender		
Man	86.66 %	88.08 %
Woman	80.20 %	81,47%
Family size		
1 person	71,28%	78,27%
2 to 3 people	86.71%	87,86%
4 to 5 people	86,97%	87,01%
6 or more	73.17 %	65.52 %

Source: Own elaboration.

Another piece of information provided by the financial survey of Spanish households is how the homeownership rate varies with the level of annual income. For this purpose, we have divided the sample into percentiles depending on the income level received by each household. As described in Table 4.3, the homeownership rate is quite high for income levels that are in the middle to upper percentiles with rates ranging from almost 85% to over 93%. On the other hand, we can also observe how the homeownership rate is relatively high for the lower-income percentiles, with rates close to 70% for the lower percentile and with a rate close to or above 75% for those in the second income percentile, for both 2005 and 2014. These data show that housing is highly regarded among Spanish households even for those with lower income levels where they have little margin for savings, and therefore are very likely to invest their entire savings in housing.

The survey allows us also to compute what percentage of the families in a property regime situation obtained ownership of the dwelling by purchase (and own construction for the 2014 survey), by inheritance or by gift. Through Stata, we obtained as for the year 2005, 85.68% of the individuals in the situation of homeownership obtained that property through the purchase of the house, while the remaining 14.32% obtained it through inheritance or gift. The same occurs for the year 2014, where 85.26% of individuals acquire ownership through purchasing of the house, while the rest of individuals are homeowners by bequest motive or gift.

Table 4.4: Description of the homeownership rate by income level

	Homeownership rate (EFF2005)	Homeownership rate (EFF2014)
All Households	84.00 %	85,46%
Income percentile		
First percentile	69,30%	67,97%
Second percentile	78,69%	73,98%
Third percentile	80,68%	80,26%
Fourth Percentile	82,72%	83,13%
Fifth percentile	80,87%	87,87%
Sixth percentile	84,42%	88,82%
Seventh percentile	85,91%	90,10%
Eighth percentile	92,28%	93,57%
Nine percentile	91,44%	94,61%
Tenth percentile	93,63%	93,95%

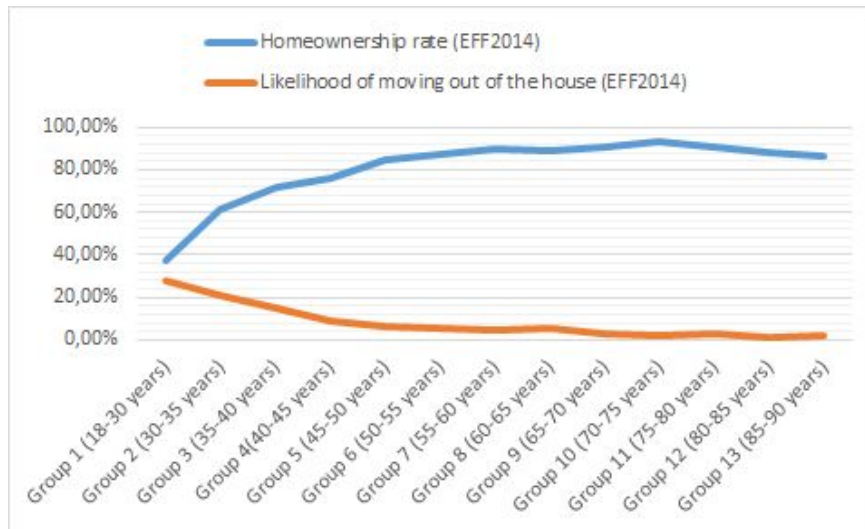
Source: Own elaboration.

Another type of information that we can obtain is to see what percentage of the purchase of the house was financed with loans. For the year 2005, we obtained that 62.76% of the people who bought the house financed it with loans (mortgage) and that 39.54% of those who financed the purchase with loans were still paying the mortgage when the survey took place. Something similar occurs for the year 2014, where 67.53% of individuals who obtained homeownership by purchasing a home financed it with loans, and of those, only 40.12% were still paying the mortgage.

Finally, it is important to note that in 2014 only 5.92% of families were planning to move out of the house in the next few years. Similarly, for the year 2005, this data is slightly altered with 7.48% of those surveyed expecting to move out of the house in the next few years. Graphs 4.2 and 4.3 show the relationship between homeownership and the probability of moving out of the house for each age group. We can observe how for the first age groups (younger) the rate of homeownership is lower, so the probability of moving is high. This may be because the ownership status of many of these individuals is rental, so the likelihood of moving out is higher.

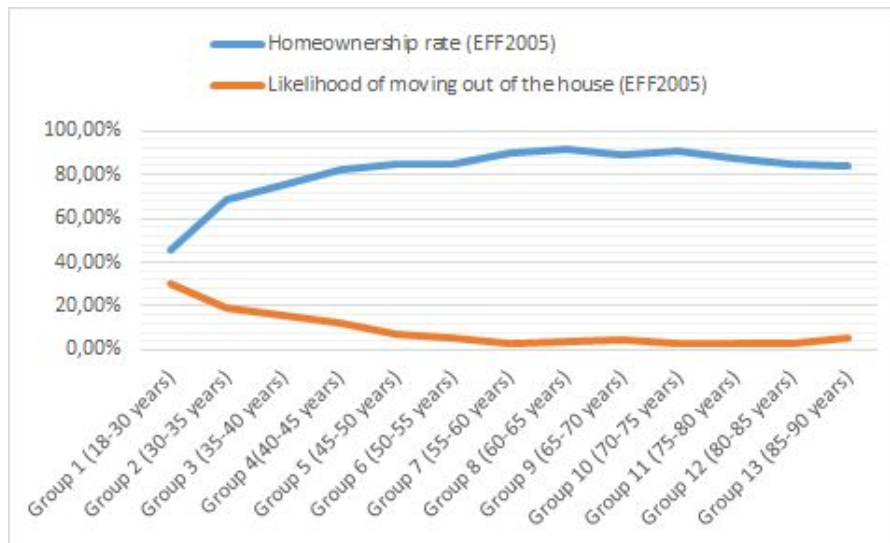
Therefore we observe for both years that as the homeownership rate increases the likelihood of moving out of the house is significantly lower. This is usually for the middle age groups where they have settled families and where the main regime is that of ownership. Other aspects to highlight are that for the year 2005, the probability of moving out of the house in the last years of life (group 13, 85-89 years old) increases to 5.79% compared to 1.86% that took place for the year 2014, which may indicate that elderlies, in particular the older elderlies, took more into account in 2005 moving out to another smaller house and thus release their house equity to complement the pension (Probably due that it was more attractive to sell because of the high house prices).

Graph 4.2: Likelihood of moving out of the house 2014



Source: Own elaboration.

Graph 4.3: Likelihood of moving out of the house 2005



Source: Own elaboration

5. Empirical Analysis.

In order to carry out a comparative study of the homeownership rate for the population in retirement, we used the Financial Survey of Spanish households during 2005 and 2014. What we will try to find out is whether there is sufficient empirical evidence to determine whether the homeownership rates of retirees in the pre-crisis period (2005), where Spain was experiencing a high speculative attack on the market and where the value of housing was experiencing large year-on-year appreciations, differs significantly from the homeownership rate of retirees for a post-crisis period (2014).

Subsequently, with the aim of investigating how socio-demographic factors affect the variation of the homeownership rate in the older population, we will construct a Logit model based on the Financial Survey of Spanish households, in which the dependent variable will be a dummy variable equal to one if the family is a homeowner and 0 if not.

To carry out the comparative study of the homeownership rates of retirees between 2005 and 2014, we used the proportion test. The Proportion Test performs tests for equality of proportions using large sample statistics. That is to say, it allows us to test if the difference between two percentages, as the homeownership rate, are statistically significant. For this purpose, as we have divided the sample by age groups, we will only use the age groups that interest us, which are those individuals over 65 years of age, the age at which the Spanish population is in a situation, or is close, to retirement.

In the study by Nakajima and Telyukova (2011), they study the importance of homeownership rate in saving models for retirees. They describe the impact of a more liberalized financial market and home price changes on the homeownership rate. They noted that in the period of the housing bubble when house prices were very high, the homeownership rate is more moderate than at a time when house prices are decreasing, where the homeownership rate increases. The objective in our study is to see if the homeownership rate of the population over 65 years old in 2005 (when house prices were higher) differs from the homeownership rate of the population over 65 years old in 2014 (when house prices relaxed and were still low compared to the levels before the bubble burst).

To do this, we carried out a proportion test comparing the homeownership rate of the 2005 sample with that of 2014 for each age group up to 65 years. Under the null

hypothesis, the difference in rates between what obtained in 2005 and what obtained in 2014 is not significant. This means that there is not enough empirical evidence to determine that the 2005 homeownership differs from that of 2014. The alternative hypothesis is therefore that the rate differs significantly between the two samples. Where $\text{prop}(0)$ means the homeownership rate from 2005 sample and $\text{prop}(1)$ the homeownership rate from 2014 sample:

$$\text{diff} = \text{prop}(0) - \text{prop}(1)$$

$$H_0: \text{diff} = 0$$

$$H_a: \text{diff} \neq 0$$

Once we have carried out all the contrasts for individuals in a retirement situation corresponding to the age groups over 65, we show the main results in table 5. 1.

Table 5.1: Proportion test of the Homeownership rate.

Diff between samples	Mean	Std. Err.	z	P-value
Group 9 (65 to 69 years)	-0,0133912	0,016123	-0,83	0,4051
Group 10 (70 to 74 years)	-0,0239669	0,0147336	-1,62	0.105
Group 11 (75 to 79 years)	-0,0314499	0,0215956	-1,49	0.1369
Group 12 (80 to 84 years)	-0,0307948	0,0247874	-1,27	0,2051
Group 13 (85 to 89 years)	-0,0203788	0,04274	-0.48	0.6309

Source: Own elaboration.

We can see how for group 9, which is the most recent age group in the retirement period, under the null hypothesis, where the difference in the homeownership rate of individuals aged 65 to 69 in the 2005 sample and the homeownership rate of individuals aged 65 to 69 in the 2014 sample is equal to 0, we obtain a p-value of 0.4051. The p-value means the probability of rejecting the null hypothesis when it is true. That is, it is the smallest possible level of significance such that, from that value onwards we reject the null hypothesis (H_0), and for smaller values, we do not reject the null hypothesis. As the p-value is too high we can not reject the null hypothesis at any level of significance so we will conclude that for the group of 65 to 69 years old there is not enough empirical evidence to state that the difference between the homeownership rate of 2005 and that of 2014 is statistically significant.

The p-values for the other age groups are also higher than 10% (significance level) so we cannot reject the null hypothesis that the homeownership rates of the age groups

ten to thirteen differ, so there is not enough empirical evidence to conclude that the difference between the rates is statistically significant.

In conclusion, the homeownership rates for individuals between 65 and 89 years old do not differ significantly between the two samples, which may indicate that the homeownership behaviour of these groups of retirees before the crisis, 2005, does not differ from the homeownership behaviour of the group of retirees after the crisis, 2014. While table 4.1 shows for these age groups that the homeownership rate in 2005 differs slightly from 2014, this little difference is not significant, as we have just seen.²

In recent years, Spain, like the other countries, has undergone a demographic transition that has changed households' saving decisions. Now, in order to analyze how the socio-demographic factors influence the homeownership rate in 2005 and in 2014, using the Financial Survey of Spanish households, we have constructed a non-linear binary response logit model where the dependent variable is the probability of being a homeowner. The logit regression model will be used whenever the dependent variable is binary. In our case, the dependent variable is homeownership which takes the value 1 if the individual is a homeowner and 0 otherwise.

The independent variables that we use for the model will be:

- The age of the household's head and their age squared;
- Two dummy variables in relation to the annual income of the family: one called "low income", that takes value 1 if the family belongs to the first or second income percentile,(low purchasing power), 0 otherwise. Another dummy is called "high income", and takes the value 1 if the family belongs to of the last two upper income percentiles (higher purchasing power). Thus, individuals in the middle income percentiles constitute the base group in the regression;
- A dummy variable for the family size that is equal to 1 if the family is greater than or equal to 5 persons (large families) and 0 if it is less than 5;
- A dummy variable for gender that takes the value 1 if the individual is a man

² The differences in homeownership behavior observed for the fourth age group (40-44 years), in contrast, result to be significant at 5% significance level and this is the only age group whose homeownership rates differ significantly between the two samples

and 0 if it is a woman;

- A dummy variable for health status that takes the value 1 if the individual is in bad or very bad health status and 0 for good, very good and acceptable health status;
- Five dummy variables that indicate the marital status of the individual: one for widowhood, that takes the value 1 if the person is widowed and 0 otherwise, another variable that takes the value 1 if the person is in the situation of common law partner and 0 otherwise, another variable dummy called single that takes the value 1 if the individual is single and 0 otherwise, a variable that takes the value 1 if the individual is divorced and 0 otherwise and finally a variable that takes the value 1 if the individual is divorcee and 0 otherwise. In order not to fall into the error of perfect collinearity, we have excluded from the regression the married variable, which will be the base variable.
- A dummy variable representing the sample which takes the value 1 for the 2014 sample and 0 for the 2005 sample.

$$P(y_i = 1 | x_i) = G(\beta_0 + \beta_1 age + \beta_2 age^2 + \beta_3 low\ income + \beta_4 high\ income + \beta_5 Familysize + \beta_6 Gender + \beta_7 Healthstatus + \beta_8 Widowhood + \beta_9 common\ law\ partner + \beta_{10} Single + \beta_{11} divorced + \beta_{12} divorcee + \beta_{13} Sample_{14})$$

Where G is a cumulative logistic function, y_i represents the dependent variable that takes the value 1 if the individual is a homeowner and x_i represents the independent variables. Because our interest is in the older population, we will only take into account individuals over 65 years old (approximate age of retirement in Spain). Once we enter the data into Stata, we get the results described in table 5.2.

Observing the results, we can see how we obtain that Prob>chi2=0.0000. This expression tests whether the combined effect of all the variables in the model is different from zero. If it is less than 0.05 the model is good, so in our case, as it is equal to 0.000 it is. The number of observations in the sample is 4.751, which coincides with the number of interviewees over 65 years old for both samples. The explanation of Pseudo R2 approaches that of traditional R2 and indicates that approximately 3,97% of the variation in the dependent variable can be explained by the variation in the

independent variables of the model.

In table 5.2 we can see the values of the coefficients of the independent variables. The logit coefficient is not read as the ordinary least-squares coefficient since its estimation is by maximum likelihood. In the estimation by maximum likelihood, the value that makes the maximum probability of obtaining the observed sample is taken as the parameter estimate. The logit model is interpreted in terms of the probability that the event under study will occur (the individual is a homeowner). These coefficients only tell us the relationship that the dependent variable has with the independent variable, since, as it is not a linear regression model, the value of the parameter does not coincide with the magnitude of the variation in the probability.

Table 5.2: Logit model.

2005&2014 Sample		Dependent variable HW			Log likelihood= -1528,8461
Independent variable	Coef	Odds Ratio	Std.Err.	Z	P-value
Age	0,3418514	1,407551	0,2032409	2,37	0,018(**)
Age^2	-0,0023233	0,9976794	0,0009424	-2,46	0,014(**)
Low income	-0,4914985	0,611709	0,0661271	-4,55	0,000(***)
High income	0,2444784	1,276955	0,2849863	1,1	0,273
Family size	-0,2609518	0,7703181	0,2789194	-0,72	0,471
Gender	0,00673	1,006753	0,1168223	0,06	0,954
Health status	-0,1006442	0,9042547	0,1180273	-0,77	0,441
Widowhood	-0,535819	0,5851898	0,0777651	-4,03	0,000(***)
Common Law partner	-1,0444413	0,3518984	0,1767707	-2,08	0,038(**)
Divorced	-1,526786	0,2172328	0,0598298	-5,54	0,000(***)
Divorcee	-0,616384	0,5398932	0,1906064	-1,75	0,081(*)
Single	-0,5955979	0,5512329	0,0952181	-3,45	0,001(***)
Sample_14	0,1586159	1,171888	0,1151733	1,61	0,107
Cons	-9,954032	0,0000475	0,000261	-1,82	0,069(*)
Num of obs = 4.751					
Prob > chi2 = 0,0000					
Pseudo R2 = 0,0397					

Source: Own elaboration.

Looking at the p-values, we can say whether each coefficient is significantly different from zero, that is, whether the independent variables are significant. These values must be less than 0.01 to be significant at 1% (corresponds to three *), less than 0.05 to be significant at 5% (corresponds to two *) and less than 0.1 to be significant at 10% (corresponds to one *). In our model, the coefficients in front of the variables low income, which means people with the lowest income levels (in the first and second

percentiles), widowhood, divorced and single are significant at 1% i. e. these coefficients are significant at 99% confidence. On the other hand, age of the head of the household, age squared and common law partner variables are significant at 95% confidence, and finally the variable divorcee, is significant at 90% confidence, while all other variables are not significant. Another way to see if they are significant is to check the value of Z. Higher values of Z mean greater relevance of the variables.

The relationship that the significant independent variables have with the dependent variable is positive for the age variable and a negative relationship for the rest of the variables, since their coefficients are all negative. For instance, the coefficient of age of the household head variable tells us that age has a positive relationship with the probability that the individual will be a homeowner, that is, if the individual increases by one year of age, the probability of being a homeowner will be higher. Since the coefficient in front of age squared is negative, though, this increase in probability is decreasing with age. On the other hand, the coefficient of the low income variable tells us that there is a negative relationship between belonging to one of the lowest two income percentiles and being a homeowner. Last, not being married (being single, divorced, a widow, etc.) also decreases the probability of owning a house in old age.

We can also see in table 5. 2 the odds ratio. The odds ratio measures the number of times the event is more likely to occur than not. When the odds ratio is greater than 1 the odds of the dependent variable increases and when the odds ratio is less than 1 the odds of the dependent variable decreases. The variable age of the head of household has an odds ratio of 1.407551. This means that if the individual's age increases by one year, the probability of owning a home increases by 1.407551 (by about 40%), *ceteris paribus*. As for the widowhood variable whose odds ratio is 0.5851898, if this variable takes the value 1, which indicates that the individual is a widower, the probability of the individual owning a home versus not owning a home is almost half that if the individual (head of household) is in the married marital status, which is the base variable, *ceteris paribus*. The same interpretation is given for the odds ratio of low income variable, which is 0.611709, it tells us that, if the individual (over 65 years) is in the first or second lowest percentile of annual income, the probability of him/her being a homeowner versus not being one decreases by about 30%, with respect to the base variable, *ceteris paribus*.

Odds ratios close to or equal to 1 are not very useful as they tell us that there is almost no relationship between the dependent and independent variables. For example, the odds ratio of the variable age squared, is 0.9976794 the relationship between this variable and the dependent is very small.

In addition, the variable `sample_14` shows the difference in the probability of homeownership between the two years, once taken into account the value of all other independent variables. The coefficient in front of this variable, however, is not significantly different from zero. We can also make a logit model by adding temporary binary variables that interact with the independent variables. This allows us to analyze whether the effect of that variable has changed over time. For example, the variable `age_14` is the variable age multiplied by the dummy sample, which takes the value 1 if it is for individuals interviewed in 2014 and 0 for those in the 2005 sample. Therefore, the coefficient that accompanies this interaction indicates the difference between the coefficient of sample 0 (2005) and the coefficient of sample 1 (2014), and its p-value indicates whether this difference is significant.

In the regression, we add to all the independent variables a time interaction term and add them as new independent variables. In this regression, we also add the sample variable, whose coefficient indicates whether there exists a difference in the probability of being a homeowner between the two years, once we take into consideration the value of all other independent variables. The regression with the different interaction terms as new independent variables is shown below to see if the effect of those variables differ significantly between 2005 and 2014.

$$\begin{aligned}
 P(y_i = 1 | x_i) = G & (\beta_0 + \beta_1 age + \beta_2 age^2 + \beta_3 age * sample_{14} + \beta_4 age^2 * sample_{14} \\
 & \beta_5 lowincome + \beta_6 lowincome * sample_{14} + \beta_7 highincome + \beta_8 highincome * sample_{14} + \\
 & \beta_9 Familysize + \beta_{10} Familysize * sample_{14} + \beta_{11} Gender + \beta_{12} Gende * sample_{14} + \\
 & \beta_{13} Healthstatus + \beta_{14} Healthstatus * sample_{14} + \beta_{15} Widowhood + \beta_{16} widowhood * sample_{14} + \\
 & \beta_{17} Common Law Partner + \beta_{18} common Law Partner * sample_{14} + \beta_{19} divorced + \\
 & \beta_{20} divorced * sample_{14} + \beta_{21} divorcee + \beta_{22} divorcee * sample_{14} + \beta_{23} Single + \\
 & \beta_{25} Single * sample_{14} + \beta_{20} Sample_{14})
 \end{aligned}$$

Table 5.3 shows the main results obtained. We can see how the age coefficient is positive, indicating a positive relationship with the probability of owning a home, but is not significantly different from zero anymore. In contrast, in the low income variable we still obtain a significant negative relationship between individuals with the lowest

income levels and the probability of owning a home. Observing the p-values of the independent variables with interaction terms, we can see how these p-values are very high in most variables, which means that these variables are not significant, and the effect of these variables in 2014 on the probability of being a homeowner is the same as in 2005.

However, in the variable `highincome_14`, we obtain a p-value of 0.087 so this variable is significant at 10%. This means that the effect of having a high purchasing power (the two highest income percentiles) in 2014 on the probability of being a homeowner is significantly higher (given that the coefficient is positive) than being one in 2005, even if the level of significance is not very high. In addition, the variable `single_14` is also significant by 1%, so the effect of this variable in 2014 on the dependent variable is significantly different from the effect in 2005. Indeed, in 2005 being single decreases the probability of being a homeowner (because the coefficient of single variable is negative), however the coefficient for 2014 is positive, which counteracts the negative effect of being single in 2005.

The meaning of the odds ratio is the same as in the previous regression: those close to 1 are not useful, those greater than 1 represent that the odds of the dependent variable increases and those with an odds ratio less than 1 represent that the odds of the dependent variable decreases. We can see for instance how the odd-ratio of the low income variable is 0.5394, this means that if the individual belongs to the lowest income percentiles, the probability of being a homeowner is almost half (by about 50%), compared to the base variable, *ceteris paribus*.

Table 5.3: logit model with time interaction term.

Dependent variable HW					Log likelihood=-1526,5663
Independent variable	Coef	Odds Ratio	Std.Err.	Z	P-value
Age	0,2304173	1,259125	0,2250241	1,29	0,197
Age_14	0,4993334	1,647623	0,5575289	1,48	0,140
Age^2	-1,60E-03	0,9983965	0,0011541	-1,39	0,165
Age^2_14	-0,003282	0,9967234	0,0022239	-1,47	0,141
Low income	-0,61718114	0,5394628	0,0794123	-4,19	0,000(***)
Low income_14	0,2579106	1,294223	0,285145	1,17	0,242
High income	-0,1621611	0,8503042	0,2647382	-0,52	0,602
High income_14	0,7703397	2,1605	0,9714156	1,71	0,087(*)
Family size	-0,299528	0,741168	0,3613762	-0,61	0,539
Family size_14	0,0288558	1,029276	0,749024	0,04	0,968
Gender	-0,0167554	0,9833842	0,1604943	-0,1	0,918
Gender_14	0,0720767	1,074738	0,2506175	0,31	0,757
Health status	-0,1278244	0,8800079	0,1536419	-0,73	0,464
Health status_14	0,0321038	1,032625	0,2724296	0,12	0,903
Widowhood	-0,4347048	0,6474558	0,1226198	-2,3	0,022(**)
Widowhood_14	-0,1836133	0,832256	0,2224854	-0,69	0,492
Common Law partner	-1,105215	0,3311398	0,2700786	-1,36	0,175
Common Law partner_14	0,547374	1,056263	1,09726	0,05	0,958
Divorced	-1,781252	0,1684271	0,0719343	-4,17	0,000(***)
Divorced_14	0,4389063	1,55101	0,8731855	0,78	0,436
Divorcee	-0,7818832	0,4575436	0,296707	-1,21	0,228
Divorcee_14	0,2554996	1,291106	0,9999074	0,33	0,741
Single	-1,027071	0,3580541	0,782354	-4,7	0,000(***)
Single_14	1,123433	3,075395	1,157369	2,99	0,003(***)
Sample_14	-18,92265	6,05E-09	7,72E-08	-1,48	0,138
Cons	-5,554433	0,0038703	0,0265413	-0,81	0,418

Num of obs = 4.751	
Prob > chi2 = 0,0000	
Pseudo R2 = 0,0461	

Source: Own elaboration

6. Conclusion

Spain is one of the countries with the lowest level of savings in the entire European Union. Moreover, its coverage rate of private pensions is very low, indicating that Spaniards do not think about saving for retirement. On the other hand, as we have seen, their homeownership rates are very high even for the most advanced age and where most of their savings are invested. This means that in the face of possible inefficiency in the public pension system, housing is the main asset to complement retirement.

In addition, homeownership seems to affect the saving behaviour of families at retirement (Nakajima and Telyukova, 2020). This makes studying the evolution of the homeownership rate even more interesting. The aim of this paper is to analyze the socio-demographic factors affecting the homeownership rate of the older population group for the years 2005 and 2014 and to see if this rate, due to the financial crisis that had a major effect on the real estate market, differs between the two samples. To do this we use the information provided by the Bank of Spain through the Financial Survey of Spanish households during 2005 and 2014.

In order to analyze whether the cyclical nature of the housing market has an effect on the homeownership rate of the elderly, we carry out a comparative study of the homeownership rate for the older population for the year 2005, when the price of housing was high, and the homeownership rate for the year 2014 when the price of housing remains at levels much lower than before the crisis. As a more significant result, we obtain by means of the proportion test that for the homeownership rates of both years for the most advanced age groups there is not enough empirical evidence to affirm that these rates differ significantly. This may be due to the fact that in Spain the bequest motive and the attachment to one's own home are very strong, so even if house prices were high in 2005, there is no further decumulation of these assets and therefore many elderly prefer to age in their own home and do not end up selling it to release house equity and complement consumption.

On the other hand, in order to see how socio-demographic factors affect the homeownership rate of Spanish households for age groups in or close to retirement (65 and over) for 2005 and 2014, through a logit model (where the dependent variable is the probability of being a homeowner) we can determine whether socio-demographic factors such as age, gender or income have an impact on homeownership in those

years. As main results we obtain that the variable that indicate the level of income, low income, age of the head of the household and their age squared and all dummy variables that indicate the marital status of the head of the household, as significant variables.

We then add an interaction term to all variables to see if the effect of those variables on the probability of being a homeowner is different in 2005 than in 2014, and by looking at the p-value see if this effect is significant. To do this, we introduce the dummy variable sample that it takes the value 1 for the 2014 sample and 0 for the 2005 sample. As main results, we obtained that the variables high income and single with the interaction term are significant, so the effect of these variables in 2014 is statistically different from the effect in 2005. The rest of the socio-demographic variables have a high p-value, so the effect of these variables on the probability of owning a home is the same for both years.

Finally, with regard to the limitations of empirical work, the EFF2005 and EFF2014 surveys have the characteristic of an over-representation of households with a high level of wealth in the sample. In order to obtain appropriate results, it would have been appropriate to take into account the weight attributed to each individual in the sample. However, in order to simplify the work, these weights have not been taken into account. In addition, in the proportion test we have not taken into account that the individuals could be the same for both samples and therefore the samples were not completely independent. For further research, it would be interesting to take into account the weights and other limitations in order to make a better research study and be able to compare it with countries like the United States where there is a great variety of empirical studies related to housing and the homeownership rate in retirement.

7. References.

Arellano, M. y Bentolila, S. (2009): “La burbuja inmobiliaria: causas y responsables”, en A. Cabrales, J. Dolado, F. Felgueroso y P. Vázquez (coord.), *La crisis de la Economía Española. Lecciones y propuestas*, FEDEA, libro electrónico.

Bank of Spain. “The Spanish Survey of Households Finances (EFF).” Accessed 15 March 2020. Available in: <https://www.bde.es/bde/en/>

Banks, J., Blundell, R., & Tanner, S. (1998). “Is There a Retirement-Savings Puzzle?” *The American Economic Review*, 88(4), pp. 769-788. Accessed March 3, 2020. www.jstor.org/stable/117005.

Bernheim, B. D., Shleifer, A., & Summers, L. H. (1986). “The Strategic Bequest Motive. *Journal of Labor Economics*”. 4(3, Part 2), pp. 151–182. doi:10.1086/298126

Bravo, J. M., Ayuso, M. & Holzmann, R. (2019). “Making Use of Home Equity: The Potential of Housing Wealth to Enhance Retirement Security”. IZA Discussion Paper No. 12656. Available at SSRN: <https://ssrn.com/abstract=3468604>

Chiuri, M. C., & Jappelli, T. (2008). “Do the elderly reduce housing equity? An international comparison”. *Journal of Population Economics*, 23(2), pp. 643–663. doi:10.1007/s00148-008-0217-4

Colegio de Registradores: Estadística Registral inmobiliaria (2019). Accessed 25 April 2020. Available in: <https://www.registradores.org/>

Conde-Ruiz, J. I. (2017). “Medidas para restaurar (o no) la sostenibilidad financiera de las pensiones”. FEDEA, No. 2017-04.

Conde-Ruiz, J. I. & González, C. (2015). “Challenges for Spanish Pensions in the early 21st Century”. CESifo DICE Report 2/2015 (June).

Consejo General del Notariado. Accessed 25 May 2020. Available in: <https://www.notariado.org/portal/consejo-general-del-notariado>

Costa-Font, J., Gil J. & Mascarilla, O. (2006). Preferencias de la población ante la financiación de la dependencia: La hipoteca inversa en España. *Fundación de Estudios de Economía Aplicada*. Diciembre, 2006.

Davies, J. B. (1981). "Uncertain Lifetime, Consumption, and Dissaving in Retirement". *Journal of Political Economy*, 89(3), pp. 561–577. doi:10.1086/260986

De Nardi, M., French, E., & Jones, J. B. (2016). "Savings After Retirement: A Survey". *Annual Review of Economics*, 8(1), pp. 177–204. doi:10.1146/annurev-economics-080315-015127

Elvira, D., Rodríguez, p. & Tomás, Z. (2005). "Dónde y cómo prefieren vivir los mayores de hoy y mañana en España". Barcelona: Edad y Vida, 116 p. Fuente: EDDDES (1999).

Eurostat: Database. Accessed 02 May 2020. Available in: <https://ec.europa.eu/eurostat>

Feinstein, J. S., & McFadden, D.. 1989. The dynamics of housing demand by the elderly: Wealth, cash flow, and demographic effects. *In The economics of aging*, ed. David A. Wise, pp. 55–86. Chicago: University of Chicago Press

Gale, W. G., & Scholz, J. K. (1994). "Intergenerational Transfers and the Accumulation of Wealth". *Journal of Economic Perspectives*, 8(4), pp.145–160. doi:10.1257/jep.8.4.145

Instituto Nacional de Estadística. Accessed 30 March 2020. Available in: <https://www.ine.es/>

Luengo-Prado, M. J., & Sevilla, A. (2012). "Time to Cook: Expenditure at Retirement in Spain". *The Economic Journal*, 123(569), pp.764–789. doi:10.1111/j.1468-0297.2012.02546.x

Ministerio de Trabajo. Accessed 02 May 2020. Available in: <http://www.mitramiss.gob.es/>

Modigliani, F and Brumberg, R. (1954). "Utility Analysis and the Consumption Function: An Interpretation of Cross Section Data." *Post Keynesian Economics*.

Nakajima, M & Telyukova, I.A. (2011). "Home Equity Withdrawal in Retirement".FRB of Philadelphia Working Paper No. 11-15. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.1803451>

Nakajima, M & Telyukova, I.A. (2020). "Home Equity in Retirement". *International Economic Review*, 61(2), pp. 573-616. <http://dx.doi.org/10.21799/frbp.wp.2019.50>

OECD (2013): Pensions at a Glance 2013

Palumbo, M. G. (1999). "Uncertain Medical Expenses and Precautionary Saving Near the End of the Life Cycle". *Review of Economic Studies*, 66(2), pp. 395–421. doi:10.1111/1467-937x.00092

Patxot, C., Rentería, E., Sánchez-Romero, M., & Souto, g. (2011). How Intergenerational Transfers Finance the Lifecycle Deficits in Spain. In: Lee, R. & Maison. A. (eds). *Population Aging and the Generational Economy: A Global Perspective*. pp. 241-255.

Perez, J. (2001). "Envejecimiento y esperanza de vida en salud". *Papers de Demografia*, No 174. Bellaterra, Spain: Centre d'Estudis Demogràfics.

Scanlon, K., Lunde, J., & Whitehead, C. (2008). "Mortgage Product Innovation in Advanced Economies: More Choice, More Risk". *European Journal of Housing Policy*, 8(2), pp. 109–131. doi:10.1080/14616710802037359

Serrano, P., Lafuente, J.A. & Ramallo, J.M. (2019). "Alternativas a la insuficiencia de las pensiones: instrumentos para dotar de liquidez a los activos inmobiliarios." Instituto Santalucía.

Sheiner, L., & Weil, D. (1992). "The Housing Wealth of the Aged". *NBER WORKING PAPER SERIES*. doi:10.3386/w4115

Sinai, T., & Souleles, N. (2007). "Net Worth and Housing Equity in Retirement". *NBER WORKING PAPER SERIES*. doi:10.3386/w13693

Tinsa (2020). "El precio de la vivienda en España" Accessed 15 April 2020. Available in: <https://www.tinsa.es/precio-vivienda/>

Venti, S. & Wise, D. (1990). " But They Don't Want to Reduce Housing Equity" *National Bureau of Economic Research*, pp. 13-32.

Venti, S. & Wise, D. (2004), "Aging and Housing Equity: Another Look". *National Bureau of Economic Research*. <https://www.nber.org/chapters/c10342>