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REVERSE MORTGAGE: OVERVIEW, POTENTIAL FOR PORTUGAL AND IMPACT OF COVID-19 CRISIS

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ABSTRACT

This paper examines the Reverse Mortgage (RM) market development. It discusses potential market failures, such as adverse selection, and possible solutions. It is debated whether RM would thrive in Portugal by establishing a parallelism with Spain, and performing an empirical evaluation of borrowers' potential demand, via survey. The COVID-19 impact in the U.S. is studied, focusing on the aggregate demand drivers (interest rates, economic state, and disbursed amount). The results suggest that the RM market is resilient, flexible, and a good solution to liquidity issues. It does not seem, however, to be viable in most countries due to regulatory matters and borrowers' financial illiteracy.

KEYWORDS: Reverse Mortgage; HECM; COVID-19; Portugal; Pension; Biden; Libor; Aging societies

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1. OVERVIEW (HISTORY)

World population is aging, which directly reflects on how different countries deal with the foreseeable collapse of pension systems. Most of the government pensions, like the Social Security of the U.S. are characterized as a defined benefit system, which guarantees a retirement benefit dependent on the contributions done during the citizens' work life work life rather than on investment returns. With the decline of public pension systems, many employer-sponsored retirement plans shifted from a defined benefit to a defined contribution system, raising the uncertainty of the pension income due to investment risk, which is arguably an incentive for the citizens to become homeowners, ensuring this way, a place to live. Accordingly, different studies conclude that Reverse Mortgages (RM) are welfare-enhancing for elderly American homeowners (Venti & Wise, 1991; Merrill, Finkel, & Kutty, 1994; Mayer & Simons, 1994).

The idea of a contract providing a loan with the home's equity as collateral, emerged in 1961 as an act of kindness to a widow. Henceforth, this concept generated curiosity, becoming an official state-provided financial tool in 1988, when Pres. Ronald Reagan signed the RM bill into law approving the Federal Housing Administration (FHA) insurance of the so-called Home Equity Conversion Mortgage (HECM). Since then, the RM contract has developed (e.g., an additional offer of differentiated products, and regulation improvement), reaching the current point of a safe financial tool both for lenders and borrowers.

The U.S. was the first country to recognize and provide state-runed RM, being the oldest and still largest market in the world. Moreover, it is where there are less informational constraints, allowing a stronger analysis. Therefore, the following RM assessment will be focused mostly on the U.S. market, more specifically, the one provided by FHA: HECM.

RM can be seen as a supplement to either private or public pension income; an insurance against financial shocks coming, for instance, from health risk; and a tool to achieve a welfare-maximizing smooth consumption curve. But what are indeed RM and how do they function?

RM are a type of loan which allows homeowners to convert some of their home's equity into cash, without moving or selling their homes. This financial instrument is targeted to elders who have already reached the retirement age (Americans must be at least 62 years old); own their home outright or have a very low outstanding mortgage debt; and have the house which will serve as collateral, registered as primary residence. This product is mainly beneficial to "house rich, cash poor" individuals who found themselves in a liquidity need situation, having a lot of borrowing constraints due to their lack of certain, significant income flow. Thus, one can infer that RM are more valuable to the more elderly and consequently to women due to their higher life expectancy.

RM are nonrecourse loans meaning debtors are not liable to repay more than the house value – they must repay just the minimum amount between the loan balance and the house price.

Since the outstanding loan balance is only repaid once at termination, the usual assessment of whether borrowers can pay debts is not required. The single asset worth considering is the house value pledged as collateral, which may be a concern due to the house market volatility and its risks thus, RM is a provider for insurance against a decline in housing prices, albeit at a cost, because the terms established in the beginning of the contract relative to the size of the loan are constant.

1.1. Estimation of the RM loan size:

The Principal Limit, defined as the maximum amount which an RM borrower can receive from the loan, is a function of the Principal Limit Factor (dependent on the age of the youngest borrower (positive relation), and the expected average mortgage interest rate (negative relation)) and the Maximum Claim Amount (MCA – higher value between the house market price and the limit established by the FHA which, for contracts signed since January 1st, 2020 is $765,600).

The Principal Limit is then discounted by the accounted Loan Costs which encompasses a panoply of different costs according to the National Reserve Mortgage Lenders Association:

- **Origination Fee:** lender's operating expenses. Capped at $6,000 [max (*$2,500; 2% of the first $200,000 of the house's value + 1% of the remaining over the $200,000*)].

- **Mortgage Insurance Premium (MIP):** insurance provided by FHA to protect both the lender and the borrower in case one of them fails to meet their obligations: FHA assumes responsibilities for the loan if the lender is unable to meet obligations; and cover the possible losses for the borrower in the house sale if the amount obtained is not enough to pay back the outstanding debt (agreeing with the nonrecourse feature of RM). The cost structure encompasses: an upfront fee, a flat 2% premium of the MCA; and an ongoing fee, with a current rate at 0.5% of the outstanding loan balance, however it is not paid directly by the borrower, but instead accrued annually and paid when the loan is due, along with all the other debt.

- **Appraisal Fee:** Evaluate the home's market value, checking if all regulation is met. Averaging $450 for the first examination and $125 for the second one, if applicable.

- **Closing Costs:** *Credit report fee* (~$20 - $50); *Flood certification fee* (~$20); *Settlement fee* (~$150 to $800); *Document preparation fee* (~$75 to $150); *Recording fee* (~$50 - $500); *Courier fee* (< $50); *Title insurance; Pest Inspection* (< $100); and *Survey* (< $250).

- **Servicing Fee & Set-Aside:** the so-called Life Expectancy Set-Aside (LESA) covers the lender's administrative fees, and the borrower's expenses required over the life of the loan (property taxes and insurance), in the case of being considered unable to pay them, if the credit score is below a determined threshold. This fee can be included into the interest rate of the loan, or it can be defined as a fixed monthly amount. In the last case, a portion of the loan proceeds will be set-aside (not collected) to pay this fee at termination. This set-aside amount is calculated according to the borrower's age and life-expectancy, considering the monthly fee is capped at $35.

- **Interest:** charged only over the withdrawals. As the RM has no payments until the due date, the interest is accrued, at a compounded rate, until the repayment time comes. The rate applied can be fixed or variable. The latter is tied to an index, 30-day LIBOR (London Interbank Offered Rate) or 1-year CMT (Constant Maturity Treasury) and its margin is fixed at the beginning of the loan accordingly to the yield requirements in financial markets.

1.2. Disbursement Options:

In 2013, due to the relatively high loan defaults of borrowers making huge withdrawals of funds in the first year, it was imposed a limit on what could be disbursed on the first 12 months of the contract: either 60% of the Principal Limit or 10% plus mandatory obligations. In RM, the funds can be withdrawn in several ways to accommodate the different needs of each borrower:

- **Single-disbursement lump-sum:** only payment plan available for fixed rate mortgages consisting in a single payment at the closing of the contract. Capped at the disbursement limit.

- **Line of Credit:** unscheduled disbursements, when and in the wanted amount until the loan line runs out. This plan has a unique advantage of rising over time by the interest rate.

- **Tenure** ("life" annuity)**:** constant monthly payments until termination. This plan is the perfect complement to the pension income and can also be argued as being more beneficial to women due to their higher life expectancy. Additionally, the borrower can choose a modified tenure, consisting in a combination of a credit line and scheduled monthly disbursements.

- **Term** ("fixed period" annuity)**:** constant monthly payments for a determined period. Additionally, there is the choice of a modified term, a combination of line of credit and term plan.

1.3. Maturity Events & Payment of the Outstanding Loan Balance:

According to the regulation, RM is due when the last borrower leaves the home, with death of the last living borrower (decisions pass to heirs); change of the primary residence (not living in the pledged house for more than 1 year – e.g., moving to a nursing home); or sale of the house.

At contract termination, the outstanding loan balance must be repaid, either by the borrower or by his/her heirs, having three options: settle the mortgage with their own funds, keeping the house; sell the house and use the proceeds to settle; or relinquish the house to the bank.

1.4. Types of Home Equity Conversion Mortgage (HECM):

HECM is the FHA provided loan, allowing elders to access part of their home's equity to spend on whatever they need. The HECM Traditional is the one usually described as RM.

Besides this usual option, there is also the HECM for Purchase launched in 2009, allowing elders to purchase a new, more adequate home. The borrower must do an initial investment with their own funds (a down payment of about 30% to 50% of the home's purchase price).

Lastly, also introduced in 2009, came the HECM for Refinance, allowing the borrower to refinance the previously issued HECM. The advantage of acquiring this loan depends on the potential change of interest rates; Principal Limit Factors; and/or appraised home's value.

1.5. Reverse Mortgages Over the World:

Due to the escalating issue of aging population, several international policy makers are trying to come up with innovative ways of approaching pension systems, to accommodate both the question of demand for long-term investment options and housing shortages (Sing & Stewart, 2018). Following this, the RM's markets in different cultures are characterized:

- **United Kingdom:** Since the introduction of RM in the UK, a variety of ups and downs in this market was witnessed, worsen by the 1980s and 1990s mis-selling scandals, when there was an "earlier mini-boom in the UK equity release", practicing high costs and not implementing the nonrecourse feature – borrowers usually ended up passing debt to heirs (Jenkins, 2017).

Research carried out by Royal London shows that 89% of Britons aged 45 to 64 (“the children”), want their parents to spend their money in retirement, and only 45% of those aged 65 to 85 (“the parents”) think they would leave cash as heritage. This, allied with a raise of health expenses, made elder Britons more prone to the “equity release market” – UK’s RM.

From 2015 onward, the equity release market became even more attractive to consumers due to a panoply of new features. Those included higher principal limits; a lower interest rate; a retrench of the previously implemented protection; the option to move home and get cashback; the analysis of each contract by an independent financial adviser, along with a heavy regulation, assuring a safe market; and the entrance of recognized banks and insurance companies as lenders, bringing a healthy advantageous competition for consumers. (Male & Dunn, 2018).

As a recent well-developed market in the UK, RM still have room to grow. In fact, the Q1 2020 was the Q1 with the major number of contracts since 1991, and with a property wealth increase of 14% relative to the previous year (inf. provided by the Equity Release Council).

- **Australia:** RM were first implemented in the 1990s based on the U.S.’s and UK’s products, however the legislation for lenders was only implemented in 2009 with the *National Consumer Credit Protection Act 2009*. “Since then, the exposure to RM almost doubled, even have suffered the impact of the global financial crisis, from $1.3 billion in March 2008 to $2.5 billion by December 2017.” (Knaack; Miller & Stewart, 2020). Getting an RM in Australia comes with a great disadvantage: the borrower is excluded from the application to the state social programs.

- **Europe:** According to an industry study, 75% of the 2009 European RM market’s transactions took place in the UK (European Mortgage Federation, 2009) thus, one can conclude that the other countries have not yet developed a significant RM market. It can be verified that some countries have not even proceeded with the crucial legal aspects to accommodate this new product, and others have the legal and regulatory framework covered but the market does not react as expected, the case in France, Germany, Sweden, Finland, Spain, and Hungary. The combination of low homeownership and low home appreciation rates with the unwillingness of Europeans to take loans pledging their own home, can be the major cause of the RM failure in Europe.

- **Asia:** The concept of "family" plays a big role in the Asian culture, consequently, one may say they are prone to leave an inheritance. Attesting this reasoning, an empirical study by Yoo & Koo (2008), showed that, in a sample of 290 Koreans aged between 25 and 35, only 37% of the children would support their parents' decision to contract an RM due, perhaps, to their economic situation (78% could not afford to buy their own house and 55% still live with their parents).

Although Hong Kong SAR has a suitable environment for the RM market with high property prices, an aging population, an attractive regulatory framework, and several lending institutions, this market did not flourish. In fact, in the beginning of this year, there were only about 3,300 RM endorsements, in a country where approximately 1.25 M households own their home.

On the other side, Singapore has a huge percentage of homeowners with liquidity issues (around 90% homeownership rate – SDOS, 2019), due to their hybrid pension system which sets aside a good portion of their retirement reserves with the goal of purchasing a home (Sing & Stewart, 2018). One may say a good solution would be the implementation of RM however, after 2009 the RM market was discontinued due to lack of demand. (Fong & Mitchell, 2020).

Summing up, although some Asian countries provide borrowers the possibility of acquiring an RM, one may say that cultural constraints end up impeding the potential growth of this loan.

2. Market Failures in Reverse Mortgages

2.1. Market Failures on the Supply Side:

- **Cross-Over Risk & High Insurance Premium:** Although the nonrecourse feature is currently applicable in all the U.S.'s RM contracts, the housing equity falling below the outstanding loan balance is still considered a risk, the *Cross-Over Risk*. Neither the lender nor the borrower must be concerned with this possibility due to the borrower's obligation of getting an FHA insurance. The risk definition shows its dependence on other more usual ones: interest rate risk – due to its direct relation with the outstanding loan debt; longevity risk (risk of a person outliving their retirement savings) – due to the positive relation of the outstanding debt with time in the cases where the borrower chooses periodic payments rather than a lump-sum withdrawal; and property valuation and maintenance risk – directly affecting the property's market price.

As the *Cross-Over Risk* constitutes a serious problem for RM insurers, Wang, Huang, and Miao designed a crossover bond, a possible solution to offset this issue. Theoretically, the insurance premium structure must equal the structure of the expected claim losses, meaning the PV of all the expected losses must equal to the PV of the premium charges. The problem arises when the actual losses out stand the expected ones, making the insurer incur in an unexpected loss. The crossover bond created is like a Treasury bond, paying a coupon at each payment date plus the principal at maturity, however, the coupon component is contemporaneously dependent on the relative value of the actual versus the expected loss. The coupon rate paid to a crossover bond investor is higher than the one paid to a treasury bond investor when the actual losses incurred by the insurer do not reach the expected level, and vice-versa (Wang, Huang & Miao, 2011). The creation of a crossover bond transfers the unexpected loss to the bond investors eliminating the cross-over risk from the RM insurer which can be said to increase the desire to supply this product.

Associated with this failure, the imperfection of the actuarial models used to calculate the insurance premium is also a great dilemma for the RM supply side. The high value provided by the miscalculation of this premium is carried by the borrower, leading most of them to give up on getting this type of loans due to the implicit high costs.

- **Adverse Selection & Lack of Risk Pooling Mechanisms for Lenders:** The concept of adverse selection appears when there is asymmetrical information among parties before the signature of a contract, which may lead to an inadequate selection of the available options. In RM, the borrowers are the ones who usually have more potentially harmful information for others.

The life expectancy, for example, may affect both the lender and the borrower if seen from different perspectives. On one hand, borrowers with a higher expected life (longevity risk), pay less interest over the outstanding loan either by enjoying their houses for an extended period without paying the interest corresponding to that increased time, being outside the lender's rights to evict them (Davidoff & Welke, 2004); or by making a higher lump-sum withdrawal calculated according to the life expectancy (paying less accrued interest). On the other hand, it can be observed that RM are often signed for medical emergencies, which is usually sign of a reduced life expectancy, leading to a higher factor for the calculation of the Initial Principal Limit (IPL).

To tackle this issue, the borrower must go through a tough assessment covering his credit score, criminal record, house preservation, health condition, among other subjects that may be a potential source of asymmetric information from the borrower to the lender. Furthermore, the lenders must pass a panoply of criteria to be approved as an FHA certified lender.

The borrowers' problems related to adverse selection are challenged by the consumer protection association. However, the asymmetric information problem is aggravated for lenders due to lack of risk pooling mechanisms, which can reduce the economic viability for suppliers.

- **Moral Hazard & Costly Regulation:** One may say that the moral hazard concept is intrinsically linked with the morality one, due to the probability of one party breaching the terms of the contract when there is no direct consequence for him/her but there is a cost to the other one.

On one hand, moral hazard may be defined as the risk of one party going against the contract principles after the contract signature, in a hopeless attempt to achieve more profits than initially predicted. On the other hand, moral hazard may be in place, when one party enters the contract not being completely faithful to the actual situation (e.g., true value of their assets or credit capacity).

In the specific case of RM, the homeowners' incentive to preserve their homes and pay the property taxes decreases over time. Due to the nonrecourse feature of RM, the lack of maintenance would be borne by the insurer. Additionally, the heirs have no incentive to incur in repair costs to maximize the sale's price because they will not carry out the debt, which may increase corruption in the private housing sales market. In case of moral hazard behavior by the borrower's side, the lender commonly foreclosures the contract even bearing the high transaction costs (Caplin, 2002). The solution found to partially combat this issue is to require a credit assessment of the borrower, which if below a determined threshold, the borrower should make a LESA. However, one may say that the cost of implementing the necessary regulations to tackle the moral hazard issue is in itself a huge market barrier for the application of RM in some countries.

- **Lack of Competition:** In the U.S., the RM market is already well-developed and regulated. According to Ibis World, in March 2020, the market size was accounted in 7 billion dollars and there were 978 businesses originating, broking and servicing this loan. Outside U.S., RM is still not well-developed nor regulated, aspects which do not attract lenders into the market, leading to a lack of competition increasing the difficulty for this industry to attain a consistent growing path.

2.2. Market Failures on the Demand Side:

- **Opportunity Costs:** Contracting an RM can bring some disadvantages from the borrower's point of view, mainly when thinking about the potential benefits lost (opportunity costs). When the borrower makes the advanced decision of getting an RM, would most likely start to dis-save earlier, resulting in a sizable loss in his saving account. One of the main reasons leading elders into getting an RM, is the high health expenses. However, one good solution usually embraced by seniors to deal with this expense, is selling their house and using the gathered funds to pay for a nursing home, reaching a financial stable life after the move. In most countries where RM were already implemented, their acquirement constitutes a limiting factor for the eligibility for social insurance programs, like the state pension income, known as the *Social Insurance Risk*.

- **Elderly Care:** RM can be seen as a health care insurance tool due to its potential source for funds aimed for that kind of expenses. However, it is a flawed one because it does not take into account the probable need of the borrower to move into a nursing home (>50% in the U.S.) (Hurd, Michaud & Rohwedder, 2013), problem known as *Elderly Care Risk*. One of the circumstances for contract termination is the absence of the last living borrower from the pledge house for 1 year, which happens with the move to an elderly care facility, exactly when health expenses raise.

- **Regulatory Uncertainty, Financial Illiteracy & Low Demand:** Most of the common citizens, mainly the ones at retirement age, do not have the sufficient financial knowledge to perfectly understand RM, making them more susceptible to frauds. The grey spots in the regulation associated with this lack of financial literacy helped the conmen which did not leave a good reputation for RMs, worsened by the well-publicized cases of mis-selling and fraud (1990s).

The lack of regulatory clarity also keeps some potential borrowers away, not giving them enough security to compromise to a financial product such as this one. "RM market is stuck in a vicious cycle of low demand, making it very hard to determine reliable actuarial estimates, in other words, the lack of data coming from the minimal demand, increases the borrowing costs, which in turn, keep the demand low" (Davidoff & Welke, 2004). To tackle this issue, some countries implemented the requirement of the borrower getting counselling from an independent party. The

U.S. pioneered in 1998, when it was determined that potential RM's customers had to be counselled by a HUD-approved third party before signing the contract.

- **Cultural Factors:** Culture is one of the most significant barriers which can hamper this financial deal. The values and beliefs related with family have an important impact on the decision of whether to acquire an RM. It can be verified that the older and more conservative cultures are, with higher standards for family values, the less RM products are well-received (e.g., Asian countries and Spain), when compared with more dynamic and success driven cultures (e.g., the U.S. and the UK). The thought of harming the future generation (no inheritance) is still a big concern and deciding factor to consider in most European countries when talking about RM.

The citizens' perspective of the government policies and actions is also a factor influencing the willingness to acquire an RM. For instance, the trust instilled on the population about the government, private financial institutions, and state regulatory bodies was found to be a great determinant on how potential borrowers would react to this kind of market offer (conclusion taken from the evaluation of the survey to a portion of the Portuguese population, latter cited).

3. PROS AND CONS OF REVERSE MORTGAGE ACROSS CULTURES

From the *Borrower's Point of View*, one may say there are more factors in favor of getting an RM than against it. However, even being only a few cons, some of them can be deal breakers.

The requirement that the youngest couple's member must be at least 62 years old, hamper the ones with a great age gap to apply for this loan as a couple. Even though passing the ownership of the pledged house to the older homeowner is an option, the youngest partner is not being included in the contract, which may cause future problems. Additionally, the huge costs associated with this type of loan may dissuade some potential customers, even though they may be included in the loan balance. Moreover, one must always consider the citizens with a desire to leave the house as an inheritance, and if they are not capable of paying the outstanding debt at termination using other resources, they would have to sell the house to do so. Likewise, if, in life, the borrower is not able to keep up with the property taxes and insurance, or to remain in the pledged house due to long-term care needs, the loan is due and there is a huge possibility of losing the home.

Even though all these factors negatively impact the borrower's decision to get an RM, there are some others that push the decision in the opposite way. The source for a regular non-taxable cash inflow is what attracts more RM customers, which allied with the impossibility of either the debtor or their heirs contracting a huge debt due to its nonrecourse feature, comes as a great advantage when compared with common loans (difficult to attain for elders in retirement age). The additional funds are seen not only as a source of life-quality improvement, but also to escape from unexpected expenses, brought by financial shocks (e.g., disease, catastrophe, or property damage).

The pension systems are collapsing all over the world, and the access to the house's equity comes as an advantage to the elders' suppressing liquidity needs. Accordingly, a series of studies found RM to boost welfare both for Americans and citizens of developing countries where high homeownership rates and limited pension coverage systems are present. Although the literature does not show a clear evidence that RM reduce poverty, it can be beneficial for both low- and high-income households, depending on the environment (more beneficial for low-income citizens in developing countries and for high-income households in advanced economies). (Ong, 2008)

From the *Lender's Point of View*, although there are some disadvantages and risks taken when the regulation is not completely clear, the RM non-interest income is substantial, compensating the disadvantages most of the times. Non-interest income is defined as the income coming mainly from mandatory fees the borrower must pay to the lender when acquiring, in this case, an RM. Additionally, interest rates applied to RM are substantially higher than the ones applied to common loans and compounded. Before the creation of RM, the group of citizens in the retirement age were not eligible to the common loans, therefore, a lender's entrance in this market, allow to access all age groups of potential borrowers, translating obviously in extra revenues.

The greatest challenges for lenders in the RM market occur in developing countries and/or in recent markets. The difficult access to information in developing countries makes it tougher to assess and price longevity risk, and the existing solution for this problem in advanced economies, insurance, is not well applicable due to their low development. Due to this lack of regulation and sense of security for lenders in developing countries, like Singapore and South Africa and although the RM were initially implemented in these countries, later, the creditors left the market, having considered RM economically unviable. (Knaack, Miller & Stewart, 2020)

As there are more potential development benefits for each country applying this product than costs, from the *Government's Point of View*, it can be seen as a good bet. The cons for the government itself if it decides to implement this mortgage, are all associated with the costs incurred in developing the appropriated regulation, which can be expensive, as the one combating the Moral Hazard issue. The creation of specialized state entities to control and supervise the RM market are also found to be essential for a good market performance (as in U.S. and UK), coming with costs.

Policy makers are trying to solve the pension systems' deterioration impact of retirement income: in advanced economies, the risk of inadequate pensions has increased with the shift from a defined benefit to a defined contribution system; in countries emerging now, the increased urbanization and the family's heritage importance, has damaged the elders' financial support. The elders of developing countries face the additional risk of being the transitional generation between a traditional family support system and a modern financial support system including both public and private pension schemes, SS, and long-term health care insurance solutions. Overall, the introduction of RM would take some of the pressure felt on the state pension systems both in advanced and developing countries using the housing equity available, which also comes as a good solution to deal with the housing shortages in many countries, rotating this equity.

4. Viability of Reverse Mortgage in Portugal – an Empirical Analysis

To evaluate the viability of RM in the Portuguese market, it would be beneficial to see the reaction in a country with a similar culture and economy, hence Spanish market will be analyzed.

Spanish RM is called *Hipoteca Inversa* and although being available since 2002, it only began to be commercialized in 2005, and more adequately regulated in 2007 with the creation of state financial institutions to clarify both lenders and potential borrowers. However, currently, there is only one lender providing this type of mortgage in the Spanish market, ironically, a Portuguese bank – BNI Europa. This financial product in Spain has as target group, citizens with fewer assets and low income, over 65 years old or requiring long-term care (extra condition when compared with the U.S.). Additionally, the loan only comes due in case of death of the last living borrower, not entailing the issue of elder care risk, because the borrower can simply move to a nursing home, without having to pay off the outstanding debt. However, there is another risk that is not covered for the borrower in Spain contrarily to what happens in the U.S. – longevity risk – if the borrower lives more than expected, he/she will stop receiving the complementary income.

Portugal is like Spain in a panoply of characteristics: low appreciation of the respective house markets, mainly after the 2008 financial crisis; socioeconomic and cultural factors; and aged population with high homeownership rates at retirement. All these factors combined with Portuguese elders being the ones provided with the lowest pensions in all Europe, should translate in a good environment to RM implementation.

However, in Spain, this product is not thriving at all. In 2018, for instance, there were only

45 RM endorsements. One may point out some possible causes for this failure in Spain: the fact that the contract only comes due with the death of the last living borrower gives fewer opportunities for the lenders to get the debt paid, and although the interest is higher than in ordinary loans (5%), the waiting associated with longevity, interest, and house market risks, makes it unappealing to lenders; one of the settlement options for heirs is to deliver the house to the lender, however, banks are already piled up with real estate in their balance sheets, which also diminishes the willingness to supply this product; the lack of supply takes on an obvious consequence, the ignorance of Spanish citizens regarding this product (an inquiry made to Spanish inhabitants in 2019, showed that only 12% of homeowners above the age of 65 knew about RM).

Theoretically, Portugal has almost perfect conditions to prosper in this market, benefiting even from the "errors" of Spain entering the market with a steeper learning curve, providing a potential improvement in the life of the ones in retirement, since this country is among the ones with the worst expectations about the evolution of life quality in retirement age. For most Portuguese people, it is certain that pension income is insufficient to at least maintain the quality of life previously enjoyed. Moreover, the Portuguese population foresees continue working after retirement to acquire an extra income. All these factors contribute to a good prospective of the possible RM market. However, there are circumstances making the regulators stand back, as the cultural tendency to support their children more than in other European countries, mostly due to the struggle young generations face with employment

4.1. Survey Analysis – an Empirical Approach:

To better evaluate the potential willingness of Portuguese citizens to acquire an RM in a foreseeable future, a survey was conducted to a random group of Portuguese people above the age of 50 [APPENDIX 1], reaching a viable number of 153 observations. The sample attained is considered to be suitably distributed in terms of education (half has a superior education), a bit skewed in terms of age (around 71% is aged less than 60 years old) and in terms of savings rate (about 71% puts aside up until 20% of their income). The age skewness is considered not to negatively influence the results' viability because, after the age of 50, there is only a small occurrence probability of drastic events changing people's ideas, beliefs or living conditions.

To evaluate the results' viability, one should look upon the margin of error (e) which is determined by the following equality, applicable for large populations: $n = \frac{z^2 * p * (1-p)}{e^2}$, where the n determines the size of the sample (in this case 153), z is the z-score correspondent to the confidence level (p) of the normal distribution (used due to the LLN). The confidence level (p) is the percentage revealing how confident the researcher is that the entire target group would select an answer within the confidence interval and should be chosen according to three important factors: the sample size, the frequency of response and the population size. A 90% confidence level was chosen, due to the sample size not being big enough to eliminate some tendencies and able to be fully representative of the entire population in some levels like the *Age* and *Savings rate*. Therefore, there is a margin of error of 3.1%, which is acceptable, meaning the results reached with the sample only differ in around 3 percentage points from the real population.

In the survey applied, the following personal characteristics were described: educational level; gender; age; predictability of being a debtor at retirement age, with the pledge asset being the primary house; having a foreseeable low pension income forbidding the same life quality as before; savings rate relative to income; and homeownership. From all of these, the only factor that proved to have an obvious impact on whether the individual would contract an RM, is the possession of outstanding debt at retirement age: 58% of debtholders said they would contract an RM if available, however only 42% of the ones free of debt would do the same. [APPENDIX 2].

Contrary to what one may have thought, even though 71% of the respondents think they would have a low pension income, this feature does not show an obvious impact on the decision.

Regarding their opinion of RM fitness for the Portuguese market, although 54% of the respondents would not get an RM, 31% of them still think it would be good for the country's market, and considering the ones who would get it, only 13% think it is not a good deal for the overall population. Thus, there are more citizens thinking the product would be beneficial for the overall economy however, not all of them would contract one. What could be the reasons?

This survey covered the reasons why citizens would or would not incur in an RM [APPENDIX 3]. The causes leading for a positive response are: 61% of respondents would use the extra income as a complement for the pension income; 45% of debtholders would use the funds to pay the outstanding debt, and only 34% of the overall would use the funds to get rid of the debt; only 28% would spend the money in travels; and 66% would spend the extra capital to pay for health/caring expenses. When asked what other reasons would make them acquire an RM, some have said would use the funds to invest, help their heirs (which fits with the theory aforementioned that Portugal is a country particularly worried about the next generation), improve their life quality (properly related with the fact that Portugal is one of the countries in the world where entering the retirement age is a synonym of entering into a worse life), and use the funds for a rainy day.

Variable	Obs
Yinvestment	3
Yhelpheirs	6
Ylifequality	7
Yrainyday	7

Table 1. Reasons leading to a potential RM endorsement: *number of answers given in an open question where "Yinvestment" stands for investment; "Yhelpheirs" for the desire of helping their children/others in the foreseeable future; "Ylifequality" for the desire of improving their retirement life quality; and "Yrainyday" for the possibility of an unexpected expense.*

There are different possible reasons making individuals not willing to get into an RM: 82% of the respondents express the desire of leaving the house to the heirs without future concerns; only 52% would not enter in one because of its newness in Portugal; and 64% points out the wariness about potential scams. A great portion affirm not trusting either the product, or the financial institutions providing it (e.g., banks); others simply dislike contracting debt; the concern about their heirs and losing the house is again pointed out; and one of the final big reasons related with their disinterest is considering that they have enough liquidity to live in the desired lifestyle.

Variable	Obs
Nlackoftrust	7
Ndislikedebt	6
Nenoughliq~y	12
Nheirsconc~n	3
Nlosehome	2

Table 2. Reasons not to incur in a potential RM endorsement: *number of answers given in an open question where "Nlackoftrust" stands for the expressed lack of trust either in banking institutions or in the product itself; "Ndislikedebt" for the simple dislike that certain Portuguese citizens have in contracting debt, not being comfortable with such a commitment; "Nenoughliquidity" for the consideration of having enough liquidity to live the retirement life as desired; "Nheirsconcern" for the unwillingness of leaving any kind of possible concern for the heirs; and "Nlosehome" for the apprehension of losing their home either while living in it or when it is left as inheritance.*

Overall, Portuguese citizens are found to be more concerned about their heirs and possible essential expenses rather than about more superficial or dispensable questions such as investment and travelling. All in all, one may say that the application of RM would be beneficial to the Portuguese market if correctly applicable, considering the needs and particularities of this culture, combined with a good in place regulation protecting all the parties involved.

5. Impact of the Current Socio-Economic Crisis due to Covid-19 in the U.S. Market

The pandemic impact has been felt in most businesses, and it is considered a true socio-economic international crisis. Although this was first seen as a health crisis, the consequent indirect costs were much higher than the illness and mortality direct losses (*Noy et al., 2020)*. Meaning, the health and economic impact are not directly related when evaluating countries individually. In developing countries, even the slight health shock would harm the economy due to their weak resilience and intrinsic socio-economic conditions. Differently, in advanced countries, the crisis is triggered by the downfall of international trade and the break of the global value chain. In this thesis, the impact in the most developed RM market is studied (U.S.). Even though Pres. Trump has signed into law a set of provisions offering fast and direct economic assistance (the CARES – Coronavirus Aid, Relief, and Economic Security – Act), there will be an obvious impact on RM.

The main RM's impacts of COVID-19 were felt on: *Interest Rates*, with the biggest one-time cut ever (0.5%) by the Fed, in March, as an attempt to avoid an even bigger crisis, seen as a benefit for potential and current RM borrowers as a low interest rate environment translates into higher loan proceeds; *Loan Closings & Document Signing* have suffered some alterations although not becoming an issue; *Appraisal Activity*, the pandemic brought a highly recommended social distancing, changing the appraisal activity to "exterior-only" and "desktop-only"; *Payment, Foreclosures & Evictions* were delayed to provide a temporary relief for all parties involved; and *Regulatory Easement*, where some requirements and verifications were relaxed (e.g. employment reverification delay, verbal requests over the phone, document's delivery extra time, …).

The number of endorsements after March actually raised when compared to the same period in 2019. This can be explained by the diminished interest rates and regulatory easement felt in this period; the increased demand for urgent liquidity due to unexpected health expenses; the fast and severe decline in many retirement portfolios; the appreciation of house market values; and the high uncertainty felt over future taxes, due to the future need of the government to acquire more revenue to tap into the huge expenses made to control the ongoing crisis.

All in all, although the pandemic has led to several changes in the RM market, the number of complaints made to the Consumer Financial Protection Bureau (CFPB) slowed down, which shows a huge adaptability of the market itself. One may reflect upon the possibility if a similar crisis, like other diseases or a natural disaster, would impact RM demand, the way COVID-19 is. However, the pandemic is not only a health problem, but also the source of a several socio-economic problems, which only a global crisis could have created. Thus, only an occurrence with similar global consequences would build the perfect storm, impacting the RM aggregate demand, which would not be the case with a natural disaster, usually concentrated in one geographical area.

5.1. A Time Series Analysis on the Impact of Covid-19 over RM in the US market:

Firstly, an inference on which factors better determined the path of HECM's endorsements was performed, the dependent variable, using a time-series approach with data from October 2012 until December 2019, right before the coronavirus outbreak. [APPENDIX 4]

The explanatory variables initially thought to be significant were interest rate; personal savings rate; consumer price index; homeownership rate; home price index; PPP (purchasing power parity) adjusted GDP; bank prime loan rate; real estate loans; total social security retirement insurance applications; average of the RM's initial principal limit; average of the RM's maximum claim amount; and the average fixed and variable interest rates applied in the RM's contracts. After testing, correcting, and adjusting the regression for all the time series assumptions (Linearity in Parameters; No Perfect Collinearity; Zero Conditional Mean; Homoskedasticity; No Serial Correlation; and Normality), the following final inference regression was reached:

endorsements	Coef.	Newey-West Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdp	-9.433681	3.09259	-3.05	0.003	-15.58363	-3.283727
positive	0	(omitted)				
lbplrate_vinterestRM	-1099.456	401.3858	-2.74	0.008	-1897.655	-301.256
ipl	.0285222	.0082427	3.46	0.001	.0121307	.0449136
_cons	3630.3	1232.365	2.95	0.004	1179.607	6080.993

Table 3. Determinants of RM endorsements in the U.S.: *Time-series regression inferring the factors that better determine the RM endorsements path from October 2012 until December 2019. "gdp" being the PPP-Adjusted GDP; "positive" being the number of positive Covid-19 cases in U.S. (variable valuable for further analysis); "lbplrate_vinterestRM" being the logarithm of the interaction between the bank prime loan rate and the variable interest rate applied to RM's contracts; and "ipl" being the Initial Principal Limit.*

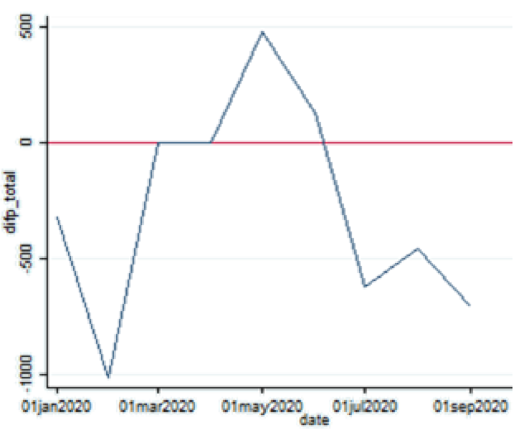
The inverse relation between the PPP-Adjusted GDP and the number of RM endorsements emphasizes the theory that RM are still considered a product of last resort, more used in a troubled environment. Considering that the monthly contracts' average is 4,154, and that the PPP-Adjusted GDP has a standard deviation of 60 points, the fact that this beta is -9.4 means that a one-point increase in the index will decrease the number of endorsements by 9, on average, *ceteris paribus*.

The positive relation between the IPL and the dependent variable is also converging with the theory behind RM demand increase with available disbursements. This variable was studied in dollar units having a monthly average of $175,161, so a beta of 0.0285 which means that with a

10,000 dollar increase of IPL, endorsements would increase by 285, on average, *ceteris paribus*.

The explanatory variable named *lbplrate_vinterestRM* is the logarithm of the interaction between the bank prime loan rate and the variable interest rate applied to RM's contracts. This interaction was made due to the more significant believed joint effect. The negative relation of this variable with the number of endorsements is also theoretical accurate (a low interest rate environment increases the RM demand, similarly to the present), being the beta -1,099.5, which means that a percentage point decrease in both bank prime loan rate and variable interest rate would imply an increase of 2,000 in the monthly number of contracts, on average, *ceteris paribus*.

Secondly, a month-by-month forecast until September was performed, evaluating the COVID-19 crisis impact in the more accurate and contemporaneous way possible, assuming the events and decisions taken about one month to reflect into actual and potential borrowers' choices.



Graph 1. COVID-19 possible impact in RM aggregate demand: *month-by-month difference between the real number of RM endorsements and the predicted value using the previous month data.*

The following graph shows the differences between the real number of RM endorsements and the predicted value using previous data (explanatory variables one month lagged). As the difference for March and April is zero, the inference regression is considered accurate enough. In the graph's negative zone, the forecast model applied is said to overestimate the true results, which have happened during the pandemic, just after July. After this month, the uncertainty about future expenses started to diminish, which combined with a higher sense of a new normality decreased RM demand. Although much higher than in the previous year, the demand was no longer as high as in the beginning of the pandemic chaos.

One may conclude, that passing through the first impact of this crisis, the citizens will have a decreasing willingness to contract an RM, although higher than in other periods of time before the pandemic, due the continued high expenses. Yet, with time passing by, the low interest and tax rates will foreseeably increase for their standard values, and the incentives will therefore diminish.

6. Impact Some Other Events at the End of 2020 May Have Over RM

6.1. Joe Biden as President – Democrats in the White House:

The collapse of the American Social Security trust fund is predicted for 2035, and the Biden administration wants to delay it, proposing a tax for wealthy Americans. Some of Biden's proposals reflect a desire to protect the citizens impacted by the coronavirus outbreak, mainly the low-income families (e.g., expanding the Community Reinvestment Act). However, his stated goal of "exclusionary zoning", allowing only single-family construction in specific areas, may go on the other way, due to its foreseeable positive impact on single houses' price, increasing RM demand, going against its initial goal of helping the unwealthy retirees getting extra income.

The intent to provide in-home care options for Medicare and Medicaid beneficiaries, is another proposal which seems to increase RM demand, due to the diminished probability of reaching one of the maturity events (moving to a nursing home). Moreover, the new administration is also expected to be more aggressive for CFPB, which has not grown in Trump's administration.

6.2. Change of LIBOR as the Reference Rate:

Investigations covering the period between 2003 and 2012, determined that LIBOR was vulnerable to manipulative actions, therefore, regulators all over the world started advising financial institutions to change their reference rate from LIBOR, if possible until December 2021. As the RM market is already making the change to Constant Maturity Treasury (CMT) since September, the November decline in HECM endorsements may be partially explained by this transition. Although the CMT has not been used as a reference rate for HECM contracts since 2007/2008, which may cause some backlogs in the RM endorsement process, it continues to be a good choice to substitute LIBOR in the short-term, as most experienced professionals, are already familiarized with it. For the long-term, specialists do not consider holding to CMT would make RM a more mainstream solution. To offer borrowers some peace of mind, a lifetime cap of 5% over the initial rate was implemented, along with the transition to the CMT which, in the current low interest rate environment is not significant but would be important if doubt about rates appear.

6.3. Increase of the Lending Limit from $765,600 to $822,375 at 2021:

The increase in the lending limit is considered by most professionals a positive development for the RM business, predicted to raise the demand for this loan. However, the FHA Commissioner Dana Wade, has been criticizing this measure arguing that the subsequent increases of the lending limit, makes RM move away from its initial mission.

7. CONCLUSION

Reverse Mortgage, for its demonstrated resilience and adaptability to different market circumstances, could potentially solve the elder's liquidity issues brought by the pension systems collapse. However, this market seems to be viable only in economies where there is a huge government dedication to the product, not only in the creation of a detailed regulatory framework, but also in designing it appealing for lenders. One may see them as the major players, which could both ignore this option, or insert it in the market, publicizing it and expanding the financial literacy of borrowers. Supported by the survey's results and learning from the Spanish case, one may say that, depending on the state's approach to this product, it can thrive if it decides to incentivize lenders and cover borrowers' risks, considering the demonstrated interest in contracting an RM, sometimes only disregarded by the individuals for regulatory and ignorance questions.

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APPENDIX

APPENDIX 1

SURVEY APPLIED TO A TOTAL OF 153 PORTUGUESE CITIZENS IN SEPTEMBER, OCTOBER, AND NOVEMBER OF 2020

Reverse Mortgage

This survey is carried out in the scope of the Final Work Project for the MSc in Finance of Nova School of Business and Economics, with the goal of study "Reverse Mortgage", a financial product still not available for Portuguese citizens.

The survey is completely anonymous, being the answers only used for statistical purposes. Its filling should not take more than 5 minutes of your time.

Thank you in advance for your cooperation!

Gender: ☐ Female ☐ Male ☐ Other

Age: ___

Educational Level: ☐ 4th year ☐ 6th year ☐ 9th year ☐ 12th year
☐ Bachelor ☐ Post Graduate ☐ Master ☐ PhD

Nationality: __________________

Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widower ☐ Nonmarital Partnership

Do you own the house you live in? ☐ Yes ☐ No

From the age of 66, do you expect to be paying any loan in which the guarantee is your residence? ☐ Yes ☐ No

On average, which is the percentage of your income saved? ____

Do you consider that your future pension income will be insufficient to maintain the lifestyle level you currently have? □ Yes □ No

In video format:
https://www.youtube.com/watch?v=vxt43e71t3M&list=PLS-tqQmfqcA-uWLsfJtC2kOQ2NoInVHKa&index=2

[The following description is just the video in text format]

Imagine that when reaching retirement age (66 years), there was a financial product that would give you the possibility to transform about 50% of the value of the house you live in into liquidity (a value which could be spent as you wish) remaining as the owner and living in it. This liquidity can take the form of a single initial payment, monthly income, or credit line (withdraw money when needed). Meaning, taking a loan based on the value of your residence, not making any payment until the loan matures, which only happens when you die, change your address, or sell your home. At this point, you have the possibility, transferred to your heirs in the event of death, to pay off the debt. This debt is consisted by: all the withdrawals you decide to make; the interest over them; the home insurance; the entire amount withdrawn for the payment of loans with the pledge house as a guarantee; and all the fees and costs on the mortgage. To pay off the debt, you can do it with your funds, sell the house, paying off the debt, and keeping the remainder, or renounce the house to the bank.

Do you consider that the mentioned product, Reverse Mortgage, would be a good bet for the Portuguese market?

Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

Did you already know about the existence of this product? □ Yes □ No

If given the chance, would you do a Reverse Mortgage?

□ Not Likely □ Unlikely □ Likely □ Most Likely

Which would be the reasons influencing you to purchase a Reverse Mortgage?

- Working as a pension income complement:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Use the funds to pay the outstanding debt:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Use the funds to travel:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Use the funds to medical / caring expenses:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Which other reason would you have to acquire a Reverse Mortgage?

  ____

Which would be the reasons influencing you NOT to purchase a Reverse Mortgage?

- Desire to leave the housing heritage as an inheritance to the heirs at no additional cost:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Do not feel comfortable with the fact that this is a new product in the Portuguese market:

  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Concern about possible scams:

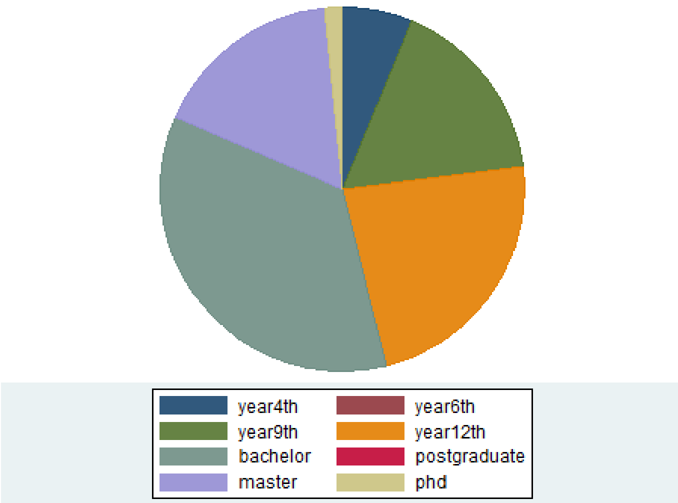
  Not Likely 1 – 2 – 3 – 4 – 5 – 6 Most Likely

- Which other reason would you have NOT to acquire a Reverse Mortgage?

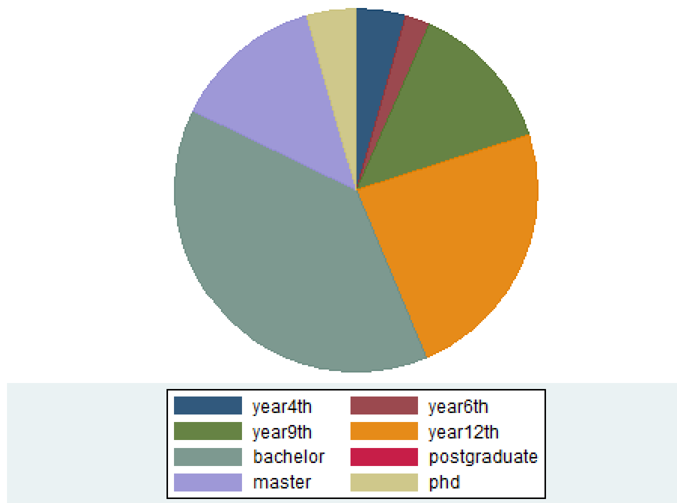
  ____

Appendix 2

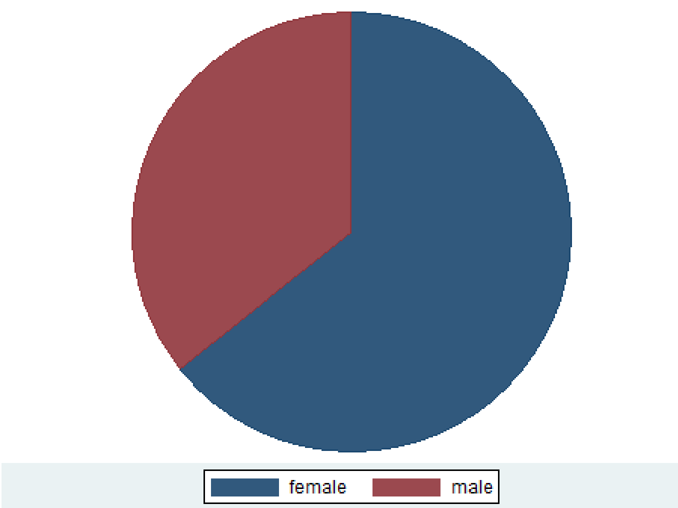
Key results of the survey applied – Impact of personal characteristics on the willingness to contract a Reverse Mortgage contract if possible



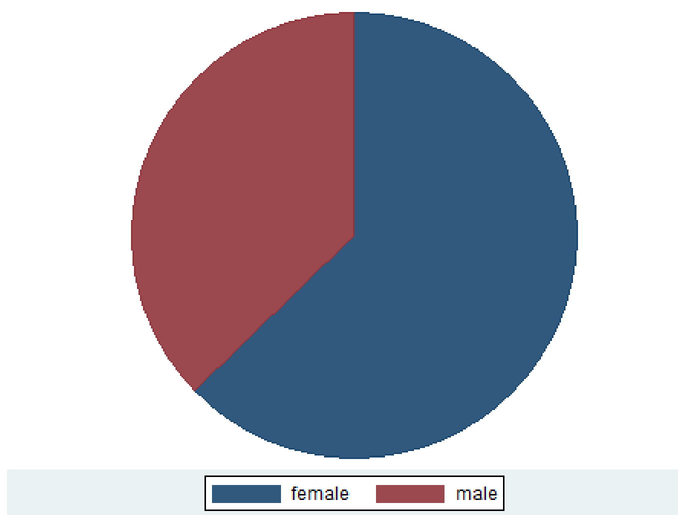
Graph 3.Portuguese willing to contract a RM per Educational Level



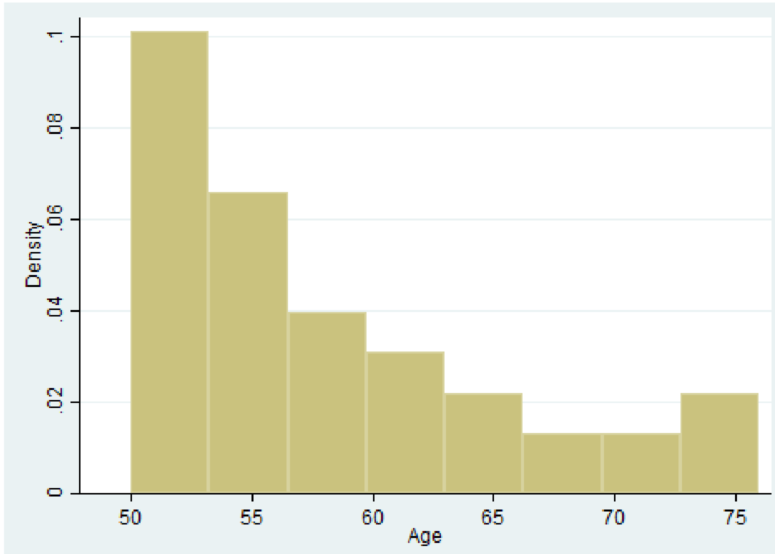
Graph 2. Distribution of Educational Level in the studied sample



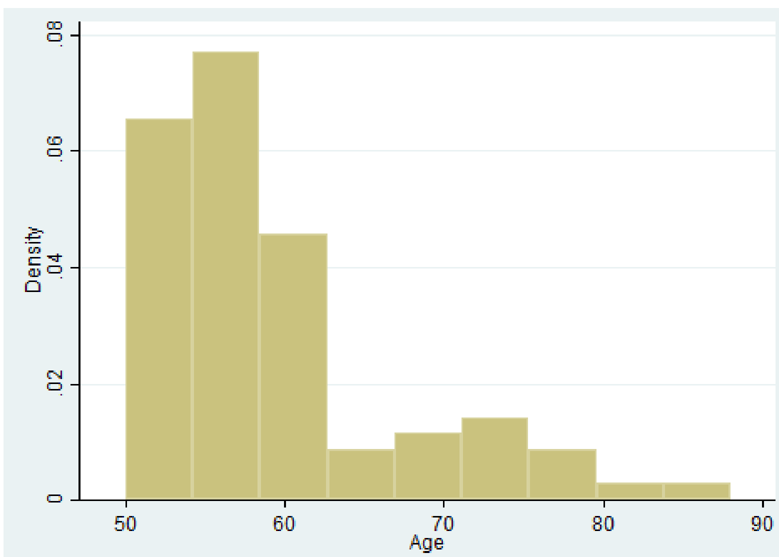
Graph 3. Portuguese willing to contract an RM per Gender



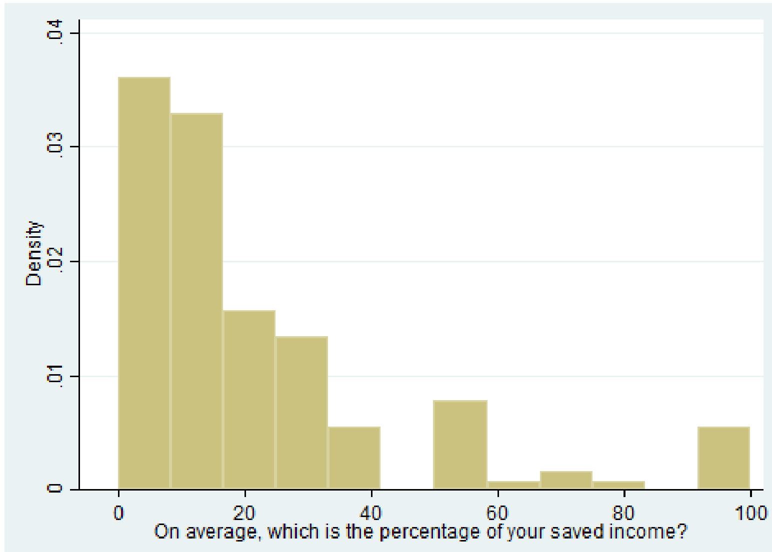
Graph 4. Distribution of Gender in the studied sample



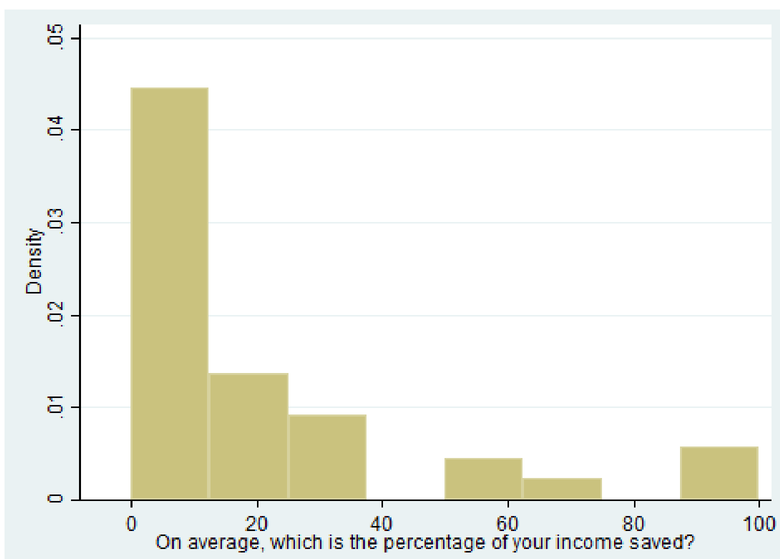
Graph 5. Portuguese willing to contract an RM by age



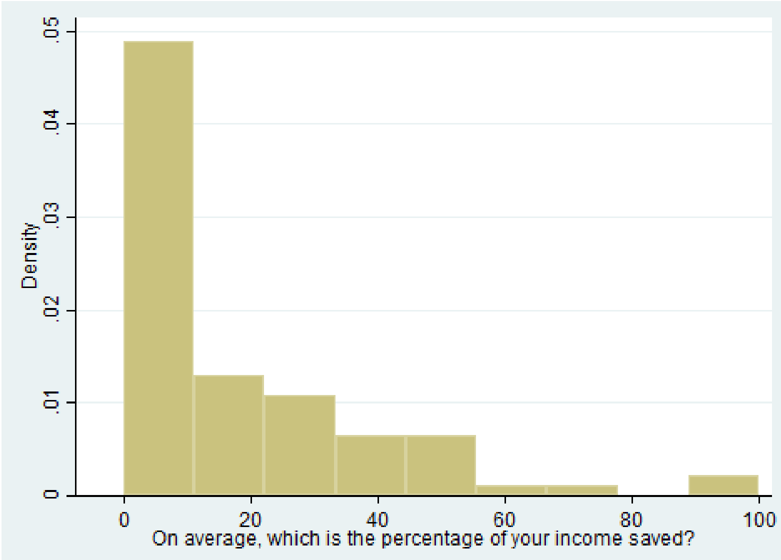
Graph 6. Portuguese unwilling to contract an RM by age



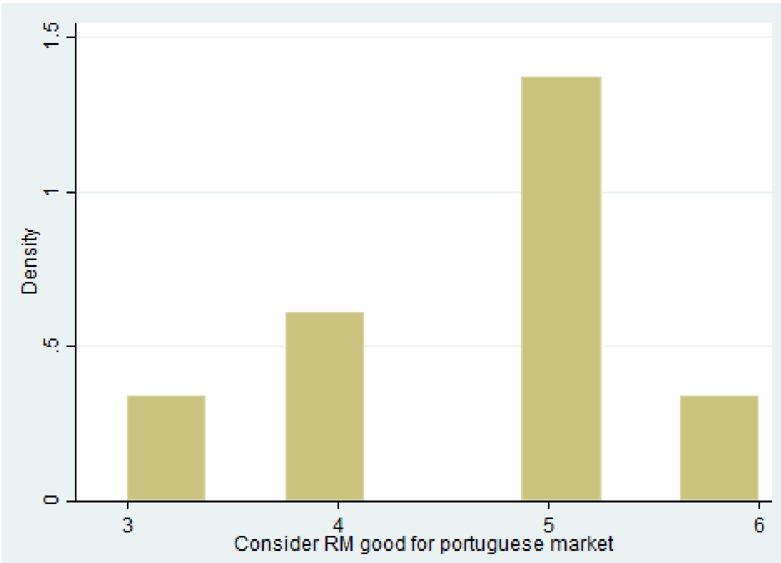
Graph 7. Distribution of savings rate of the studied sample



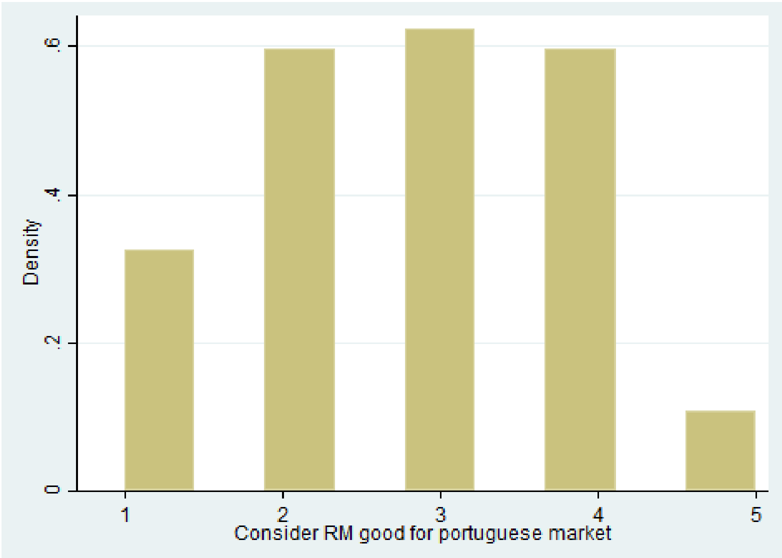
Graph 8. Portuguese willing to contract an RM distributed by savings rate



Graph 9. Portuguese unwilling to contract an RM distributed by savings rate



Graph 10. Portuguese willing to contract an RM considering whether RM would be a good bet for the Portuguese market: *where 1 is "Not Likely" and 6 is "Most Likely"*



Graph 11. Portuguese unwilling to contract an RM considering whether RM would be a good bet for the Portuguese market: *where 1 is "Not Likely" and 6 is "Most Likely"*

wouldo	Freq.	Percent	Cum.
0	13	41.94	41.94
1	18	58.06	100.00
Total	31	100.00	

Table 4. Willingness of Portuguese citizens who predict having outstanding debt at retirement age *(0 being unwilling and 1 willing to contract an RM)*

wouldo	Freq.	Percent	Cum.
0	70	57.38	57.38
1	52	42.62	100.00
Total	122	100.00	

Table 5. Willingness of Portuguese citizens who predict being free of debt at retirement age *(0 being unwilling and 1 willing to contract an RM)*

wouldo	Freq.	Percent	Cum.
0	60	55.05	55.05
1	49	44.95	100.00
Total	109	100.00	

Table 6. Willingness of Portuguese citizens who believe will have an insufficient pension income *(0 being unwilling and 1 willing to contract an RM)*

wouldo	Freq.	Percent	Cum.
0	23	52.27	52.27
1	21	47.73	100.00
Total	44	100.00	

Table 7. Willingness of Portuguese citizens who believe will have a sufficient pension income *(0 being unwilling and 1 willing to contract an RM)*

Owner of the house	Freq.	Percent	Cum.
0	18	11.76	11.76
1	135	88.24	100.00
Total	153	100.00	

Table 8. Homeownership rate in the studied sample *(1 being the homeownership rate)*

Owner of the house	Freq.	Percent	Cum.
0	11	15.71	15.71
1	59	84.29	100.00
Total	70	100.00	

Table 9. Homeownership rate of Portuguese citizens willing to contract a RM

APPENDIX 3

KEY RESULTS OF THE SURVEY APPLIED – REASONS WHY PORTUGUESE CITIZENS WOULD OR WOULD NOT INCUR IN A REVERSE MORTGAGE IF AVAILABLE

Working as a pension income complement:	Freq.	Percent	Cum.
1	18	11.76	11.76
2	20	13.07	24.84
3	22	14.38	39.22
4	42	27.45	66.67
5	33	21.57	88.24
6	18	11.76	100.00
Total	153	100.00	

Table 7. Reason why Portuguese citizens would incur in an RM: Working as a pension income complement [1: Not Likely; 6: Most Likely]

Use the funds to pay the outstanding debt:	Freq.	Percent	Cum.
1	46	30.07	30.07
2	33	21.57	51.63
3	22	14.38	66.01
4	34	22.22	88.24
5	12	7.84	96.08
6	6	3.92	100.00
Total	153	100.00	

Table 8. Reason why Portuguese citizens would incur in an RM: Use the funds to pay the outstanding debt [1: Not Likely; 6: Most Likely]

Use the funds to pay the outstanding debt:	Freq.	Percent	Cum.
1	7	22.58	22.58
2	5	16.13	38.71
3	5	16.13	54.84
4	10	32.26	87.10
6	4	12.90	100.00
Total	31	100.00	

Table 9. Reason why Portuguese citizens would incur in an RM: Debtholders using the funds to pay the outstanding debt [1: Not Likely; 6: Most Likely]

Use the funds to travel:	Freq.	Percent	Cum.
1	62	40.52	40.52
2	18	11.76	52.29
3	30	19.61	71.90
4	21	13.73	85.62
5	16	10.46	96.08
6	6	3.92	100.00
Total	153	100.00	

Table 10. Reason why Portuguese citizens would incur in an RM: Use the funds to travel [1: Not Likely; 6: Most Likely]

Use the funds to medical / caring expenses:	Freq.	Percent	Cum.
1	17	11.11	11.11
2	17	11.11	22.22
3	17	11.11	33.33
4	47	30.72	64.05
5	31	20.26	84.31
6	24	15.69	100.00
Total	153	100.00	

Table 11. Reason why Portuguese citizens would incur in an RM: Use the funds to medical / caring expenses [1: Not Likely; 6: Most Likely]

Desire to leave the housing heritage as an inheritance to the heirs at no additi	Freq.	Percent	Cum.
1	8	5.23	5.23
2	7	4.58	9.80
3	13	8.50	18.30
4	19	12.42	30.72
5	34	22.22	52.94
6	72	47.06	100.00
Total	153	100.00	

Table12. Reason why Portuguese citizens would NOT incur in an RM: Desire to leave the housing heritage as an inheritance at no additional cost [1: Not Likely; 6: Most Likely]

Do not feel comfortable with the fact that this is a new product in the Portugue	Freq.	Percent	Cum.
1	18	11.76	11.76
2	21	13.73	25.49
3	35	22.88	48.37
4	37	24.18	72.55
5	24	15.69	88.24
6	18	11.76	100.00
Total	153	100.00	

Table13. Reason why Portuguese citizens would NOT incur in an RM: Do not feel comfortable with the fact this is a new product in the Portuguese market [1: Not Likely; 6: Most Likely]

Concern about possible scams:	Freq.	Percent	Cum.
1	16	10.46	10.46
2	18	11.76	22.22
3	21	13.73	35.95
4	25	16.34	52.29
5	35	22.88	75.16
6	38	24.84	100.00
Total	153	100.00	

Table14. Reason why Portuguese citizens would NOT incur in an RM: Concern about possible scams [1: Not Likely; 6: Most Likely]

APPENDIX 4

TIME-SERIES REGRESSION INFERRING WHICH FACTORS BETTER DETERMINE THE PATH OF REVERSE MORTGAGE ENDORSEMENTS ALONG TIME

```
Regression with Newey-West standard errors          Number of obs     =         88
maximum lag: 6                                      F(  3,         84) =      47.51
                                                    Prob > F          =     0.0000
```

endorsements	Coef.	Newey-West Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdp	-9.433681	3.09259	-3.05	0.003	-15.58363	-3.283727
positive	0	(omitted)				
lbplrate_vinterestRM	-1099.456	401.3858	-2.74	0.008	-1897.655	-301.256
ipl	.0285222	.0082427	3.46	0.001	.0121307	.0449136
_cons	3630.3	1232.365	2.95	0.004	1179.607	6080.993