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Potentiality of reverse mortgages to supplement pension: the case of Chile

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Economic Analysis



Potentiality of reverse mortgages to supplement pension: the case of Chile

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Abstract

Reverse mortgages have been established as an alternative for generating liquid flows of income during retirement in some developed countries. Given that the risks associated with lower income during old age are usually covered by a wide range of sources of funding, this paper analyses the potentiality of reverse mortgages as alternative income during old age. This work focuses on the case of Chile, based on information extracted from national surveys that map out the behaviour of representative individuals divided into income quintiles. The changes from 2010 to 2050 are observed on the basis of reasonable assumptions. The pension replacement rates have been found to have increased by nearly 30 points as a result of incorporating life annuities derived from property assets. This result supports the concept of not just fixing policies aimed at improving formal pension schemes, but facilitating private financial mechanisms that generate other suitable forms of income during old age derived from other assets.

Keywords: reverse mortgage, private pensions, pension funds, defined contribution.

JEL: G23, J32, G22, D14, G21.

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1. General issues

Increased life expectancy and better quality of life amongst the elderly has posed the question of how to fund the cost of living during old age. Traditionally, the savings that fund this cost have come from state institutions or have been regulated by the State. Reforms over the last decades have added private pension systems as a form of generating these savings. Nevertheless, the majority of current systems face a number of problems rendering them inefficient when it comes to providing sufficient income for an increasingly protracted retirement period. This doesn't account for other structural or institutional problems that impede the possibility of generating savings within countries, such as problems faced by some emerging economies concerning poverty or less formal systems.

In light of these challenges, there is a school of thought that advocates the possibility of funding old age in a broader sense. In other words, the available funds for old age would not just come from a retirement pension, but from other types of savings or wealth that would traditionally have been inherited by the next generation. Specifically, the most common and larger assets are property assets, including of course the place of residence.

In general, the vast majority of the population in emerging countries are homeowners, but because they are not a member of a pension scheme, they will not receive regular income upon retirement. There is therefore a paradox in which a percentage of the population is rich in terms of its wealth upon retirement but poor in terms of cash flow. Although this is a problem, it also presents an opportunity.

These types of property savings are subject to certain preliminary considerations before they can be considered available upon retirement:

- It is a highly illiquid asset, which, depending on the period in question, can be more or less difficult to dispose of.
- The property itself provides its owners with somewhere to live and, therefore, in the event of a sale, the former owners must find somewhere else to live, along with the cost that this entails.
- Culturally, parents typically choose to leave the family home to the children.

Nevertheless, it has been interesting to see that a number of financial innovations such as reverse mortgages have enabled the development of structures that attempt to provide solutions to the issues outlined above. For example, significant growth in this market has been witnessed in the United States and the United Kingdom with relative success during the last few years.

Reverse mortgages are non-refundable loans, granted until the owner dies, whereby the property is held as a guarantee. There are three different ways of borrowing the capital: a single lump sum, a line of credit or periodic instalments during a limited period of time or over a lifetime. The capital lent depends on the borrower's age, the interest rates and the forecast property prices.

The reverse mortgage is an interesting alternative for people who are about to retire for several reasons. Firstly, different studies have highlighted the difficulties of savings put into a pension scheme (whether public or private) to preserve a level of income similar to that received while working. Difficulties originating from the arena of economic policy limit the possibility of making parametric adjustments that allow for this saving; secondly, increased life expectancy are becoming higher and higher, leading to adjustments in pension benefits for future generations. Thirdly, particularly in developing countries, there is a substantial percentage of people of working-age that simply do not have any pension scheme, meaning that they depend on handouts from third parties, especially their children or other relatives, to keep them. Nevertheless, no matter what the case, it is possible that this retired person holds an asset that can help diversify their sources of liquid income and simultaneously reduce the negative effects on the accumulated wealth of their relatives.

The foregoing shows the need to conduct a study to observe the development potential of reverse mortgages in emerging economies. Given the availability of information, this study will focus on the case of Chile. On the one hand, this country has quite a consolidated pension system, based on the reforms of 1981 that incorporated an obligatory individual savings system. However, it also poses significant challenges when securing funds that give its retired citizens a reasonable pension.

The study is structured as follows: Section two reviews the experiences of developing reverse mortgages in mature markets such as the United States and the United Kingdom, along with some initial experiences as in Spain for example.

2. Some international experiences of the reverse mortgage

The reverse mortgage is a non-refundable loan taken out until the property owner dies, with said property held as security (See Taffin, 2004). According to Sánchez et al (2007), the capital lent is available in three different forms: a single lump sum, a line of credit, or via periodic instalments during a specific period of time or over a lifetime. The capital lent depends on the borrower's age, the interest rates and the forecast property prices. These types of assets have been developed primarily in the United States and the United Kingdom.

2.1 United States

This product was launched in the United States in 1989 as a pilot scheme consisting of 2,500 reverse mortgages. Growth was sluggish in the first few years, but from 2002 onwards it began to grow more significantly due to the combined effect of favourable interest rates and the increase in house prices (See Sánchez et al, 2007) until it reached its peak of around 120,000 reverse mortgages in 2009.

There are different categories. The differences between each category lie in the manner in which the loan is taken out, where it is offered, its price and who offers it (See Reyes Arzate 2010):

- *Single-use mortgages*: These are offered and backed by some state and local governments, and as a result they are not widely available. The acquisition and management costs of these mortgages are low. It is not required to take out insurance against damages and the applied interest rates are lower, establishing a fixed or simple rate of interest. But the funds for these mortgages can only be used for one purpose, such as paying for the property's repairs or taxes. A lump sum is paid out and no interest is paid provided that the owner lives in the same property. It is recommended that single-use reverse mortgages are combined with another mortgage, such as a standard property mortgage.
- *Property mortgages*: They are the so-called "Jumbo" reverse mortgages that offer customers a higher amount. However they are usually the most expensive. They are offered by any private financial institution authorised by the Federal Housing Administration and the Government backs them, paying off the loan in the case of non-payment. To be able to take one out, candidates must be a homeowner with no debts. The value of the property to be mortgaged may be high.
- *Government-backed mortgages*: They are the only mortgages backed by the U.S. Federal Government, via the Federal Housing Administration (FHA), and are offered nationwide. The amount depends on the property's value and the age of the owner. To be granted one of these mortgages, the owner must permanently reside in the building, which cannot be pre-fabricated and must have 1-4 rooms. The funds may be used freely though a single lump sum, and/or monthly pay-outs during a specified period or over a lifetime. The loan will be repaid upon the death of the owner or the sale of the property, as is the case with other mortgages, but there are other situations where a refund is given, for example: if the pertinent repairs are not made to the property and it is therefore left to deteriorate, a change

of residence, the owner is unable to live in the property for one year due to mental or physical reasons, or non-payment of taxes or insurance with respect to damage. The costs are higher than for other types of mortgages. When the mortgage expires, the borrower or the heirs have the option to refinance the house and keep it, or sell it and keep the remaining equity, or even return the house to the lender. These types of mortgages are offered by banks and mortgage companies.

According to Bishop and Shan (2008), the majority of reverse mortgages (90%) are HECM (Housing Equity Conversion Mortgage), which are a type of government-backed reverse mortgage. They are standardised products that insure the lender should the loan exceed the value of the property when sold, and the borrower in the event that the lender doesn't pay out as agreed. It is the only kind of mortgage that is insured by the Federal Government. It fixes the maximum loan amounts, guarantees that lenders honour their obligations and limits the associated costs. The FHA (Federal Housing Administration) has insurance that guarantees the risk of negative equity, which is financed by the borrowers. FannieMae is the only agency that purchases HECM loans from lenders.

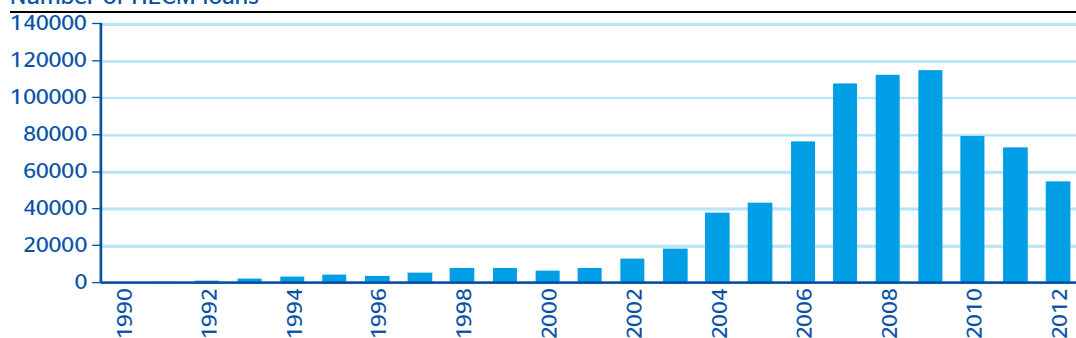
This type of mortgage offers more initial payments, more possibilities in pay-out arrangements, and lower costs when compared with other types of reverse mortgages. According to Del Pozo (2011), the HECM federal program offers more cash and better conditions.

The majority of reverse mortgages are created with the option of a credit facility. The fact that there are federal loans has allowed these types of products to overcome their bad reputation and elevated costs (See Taffin, 2004). The HECM mortgages offer ample protection for homeowners (they cannot be forced to sell the house in order to pay the mortgage) and the lender (the federal government guarantees the mortgage thanks to the mandatory insurance that comes with the operation.) (See Sánchez et al, 2007).

To take out a HECM reverse mortgage, owners must be at least 62 years of age, and the house must be their habitual place of residence. The applicant must also receive independent advice. According to Bedwell (2009), the people taking out HECMs are now younger and have greater purchasing power.

The loan amount is a fixed proportion based on the borrower's age and the estimated value of the property, with a local maximum amount per county.

Figure 1
Number of HECM loans



Source: National Reverse Mortgage Lenders Association (NRMLA), 2012

The growth in the HECM program was slow initially, and annual figures for new loans were always under 8,000 until 2002. Growth has been on the up since then. From 2006 to 2007, the number of approved HECM loans rose from 76,282 to 107,367- an unprecedented increase of 42%. HECMs continued to grow until 2009. From 2009 onwards, there was a considerable drop in the number of HECM loans, since the financial crisis has affected supply. Nevertheless, the product has not disappeared.

2.2 United Kingdom

According to Reyes (2010), reverse mortgages have existed in the United Kingdom since 1965. The last few years have seen steady growth in the number of reverse mortgages taken out. The mortgage consists of a loan granted by a financial institution as a lump sum or regular income, the amount of which depends on the client's age. A fixed interest rate is normally applied or it is subject to a limit. The loan is not redeemed until both spouses die and almost all of the credit agencies guarantee the non-negative equity risk (the obligations acquired must not exceed the property's value) (See Sánchez, 2007). These loans usually have quite costly early cancellation penalties because they are classed as long-term funding (See Taffin, 2004).

In the UK, there are three types of reverse mortgages: interest-only mortgages, shared appreciation plans and capitalised interest loans (the only one currently in practice) Anyone wishing to take out a reverse mortgage must be at least 55-60 years old (See Álvarez (2009 and must own the property, which must have a minimum value (See Taffin, 2004).

- *Interest only mortgage*: these were traditional non-redeemable loans in which interest was repaid periodically. Some of the loan amount was reinvested in financial products that were considered to generate similar income. These products ceased to be attractive when they lost their tax benefits and it appears that they are now obsolete.
- *Shared appreciation plans*: these were interest free loans whereby the credit institutions were able to benefit by taking on a part of the property's appreciation. This product however disappeared due to the scarcity of financial products allocated to hedge the risk of changes in the price.
- *Capitalised interest loans*: the credit institution grants a loan that is paid out over one or several periods or as a regular income. Its amount increases with age and the interest rate is fixed or capped. There is no obligation to pay interest over the life of the loan and they are capitalised on an annual basis.

According to Taffin (2004), the majority of funding institutions are obliged to provide transparent information, assist the borrower independently in all transactions, and to make sure that the debt accumulated by the person never exceeds the value of the property. The heirs are able to choose whether to sell the property and keep the residual value or repay the loan and keep the property. There are penalties to deter early repayment. In the United Kingdom, some 124,842 new loans were issued during the first quarter of 2007.

Table 1
Reverse mortgages in the United Kingdom

Year		Accumulated total	
		Number	Millions of GBP
2003	1 st half	52,658	2,258
	2 nd half	64,127	2,836
2004	1 st half	71,426	3,298
	2 nd half	83,728	3,998
2005	1 st half	93,850	4,612
	2 nd half	105,073	5,307
2006	1 st half	113,645	5,833
	2 nd half	122,087	6,328
2007	1 st quarter	124,842	6,549

Source: Sánchez Álvarez (2007)

2.3 Spain

The arrival of the reverse mortgage on the Spanish market was encouraged by financial institutions who were inspired by those in the United Kingdom or the United States (See Martínez, 2012). Reverse mortgages began to be marketed in Spain in 2006. Spain has different types of reverse mortgages and although the design is similar, no government-backed structure has been developed as in the case of the United States. The reverse mortgage has been designed as a result of a private initiative by the banks, motivated by the growth of the

elderly population. Reverse mortgages have gained a certain level of importance owing to the reforms that were put in place in this area several years ago. Nevertheless, they have been the topic of much controversy in the past because the borrower's heirs were subsequently unable to keep the property or recover it due to the massive debt owed to the lending institution. In order to resolve the problem of the heirs, it was decided to request their authorisation so that when the property owner died, they had the power to decide if they wanted to keep the property and the debt borrowed, or even sell the property to cover the debt and keep any remaining money (See Reyes, 2010).

Individuals wishing to take out the loan usually have to be 70 years old (See Sánchez, 2007). The amount available to borrowers is determined on the basis of their age and the value in the property appraisal. The property must be owned by the borrower. It must be officially valued and it must also be the owner's habitual place of residence. A minimum value for the house is not usually established and the mortgage deed allows the possibility of leasing it or changing residence (if the owner has to move into a residence for the elderly, for example). The debt will only be called in and the guarantee executed when the borrower dies, which is when the accumulated debt in the reverse mortgage may be settled by the heirs by repaying the debt.

The reverse mortgage provides a monthly income (See Quesada, 2011). According to Del Pozo (2011), the reverse mortgage may generally be paid in one of two of the following ways: periodic payments or a lump sum. The applicable interest rate is usually fixed, and at the end of the period during which income is received from the reverse mortgage, the accrued interest is generally the Euribor mortgage interest rate plus a spread of 2% (See Sánchez (2007).

Spain has an important tradition of inheritance, which complicates the implementation of this product. Although the majority of people aged over 65 own their own homes, if the mortgage guarantee ran out, there would be fewer assets to leave to their heirs. Furthermore, property ownership, compared with renting, is a deep-rooted tradition in Spanish society (See Martínez, 2012, Clavijo, B. and Pacheco, M). Another reason for the slow development in Spain is due to the lack of knowledge regarding these types of products. According to Sánchez (2007), over 2,000 reverse mortgages have been marketed in Spain. The client profile is 80 years old, owner of a property valued at approximately €300,000, receiving income over 15 years.

3. Reasons why the inverse mortgage market has not taken off

According to Taffin (2004), people in the majority of countries prefer to own property and government authorities normally offer incentives associated with this option. Ownership brings significant tax benefits given that the income computed is tax free. In Europe people are less likely to get into debt compared to the United States or the United Kingdom. In the United States, mortgage loans are widely encouraged.

A lack of adaptation to this product can still be observed on the part of the legal system (See Kuchciak, 2011), possibly due to the fact that the markets for these types of initiatives are still very small. According to the Consumer Financial Protection Bureau (2012), reverse mortgages are new, complex products that consumers find difficult to understand. Therefore, there are problems surrounding product information and there is little interest at individual level (See Costa-Font et al, 2006). The same source also states that reverse mortgage borrowers are using loans differently than in previous years, increasing consumer risks that still require regulatory attention.

In the United States it has been detected that eligibility to receive state benefits (e.g. the Medicaid medical program or other government assistance), may be affected when taking out a reverse mortgage. This is due to the fact that one mortgage pay-out that is not spent immediately may cause a reduction in the benefits received from the government due to a sudden increase in financial wealth. All income that is not spent immediately is considered an asset by the

government. Not only may it reduce current benefits, it may also make it difficult to obtain future benefits.

From a behavioural theory perspective, the feeling of living in a property that you might lose does not seem to be something that appeals to retired people, according to Quesada (2011). Furthermore, according to Herranz, R. (2006), there is a tendency to associate reverse mortgages with dependence. According to Del Pozo (2011) on the other hand, the property market crisis and the ongoing devaluation in the value of property on the residential market mean that banking institutions do not seem to be interested in marketing the product either at this point. According to Sanders Hammonds (2011), there are property valuation risks. The credit institution may only target the debtor's assets, and cannot alternatively target the assets of the heirs. This may generate significant losses for lenders due to the difficulty in predicting the value of a property given the strong downward trend in the real estate sector.

As a result, it is important to adequately weigh up the opportunities for developing reverse mortgage markets, comparing the huge potential of the assets accumulated by a percentage of the retired group -providing them with the opportunity to improve their cash flow situation during an increasingly protracted retirement period-, with the equally significant limitations for this development due to the structural and cultural environment and the economic situation. In terms of the latter, it is perfectly valid to think about how to develop this market in a context in which the origins of the financial system crisis lie with the volatility arising from the property market (key during a process of creating reverse mortgages). In this sense, beyond the enormous potential of the latter for the retired, they must come up with mechanisms for mitigating this risk, allowing this potential to be truly sustainable.

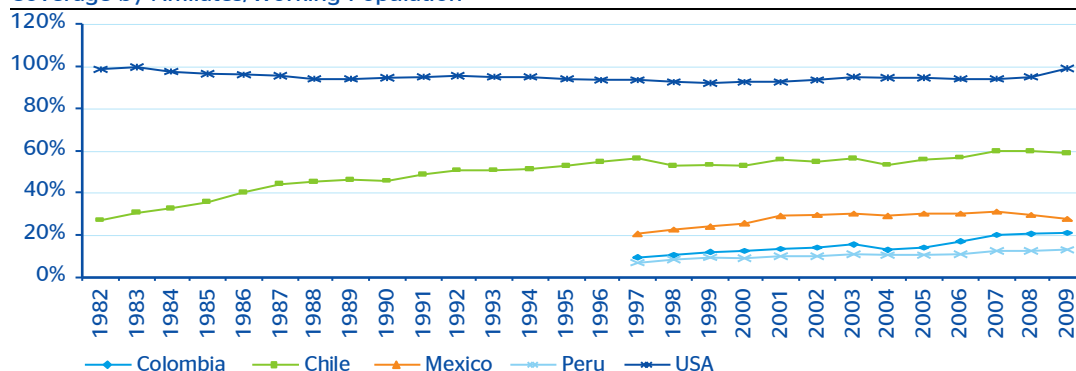
4. The case of Chile

In 1980, Law 3500 led to the structural reform of the Chilean pensions system. The old defined benefit distribution scheme that was managed by different Savings Banks, and was mandatory for skilled and unskilled workers employed by others, gave rise to a capital funded system with individual defined contribution accounts, obligatory for workers employed by others, and managed by Private Pension Fund Administrators, regulated and supervised by the State.

The new Chilean system has since become an example to other countries in the region and the world, mainly because it brought financial sustainability to the system and greater transparency in the relationship between contributions and benefits. Nevertheless, some authors (Uthoff, 2001 and Bernstein et al, 2005) showed that some challenges persisted, which might require subsequent reforms, fundamentally in terms of the level of participation in the system.

The coverage rate, understood to be the number of contributors with respect to the working population, grew tremendously in Chile up until the end of the 90s, reaching over 55%. Nevertheless, this growth rate slowed considerably during the following decade. This reveals that the problem is still lies dormant even today, leaving important groups outside the appropriate forecast mechanism, particularly the self-employed, young adults and women.

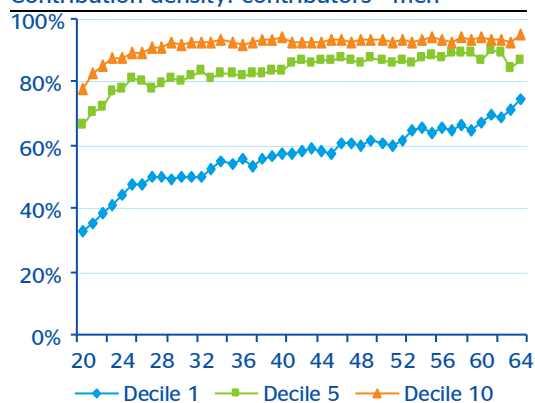
Figure 2
Coverage by Affiliates/Working Population



Source: BBVA Research and FIAP (International Federation of Pension Fund Administrators).

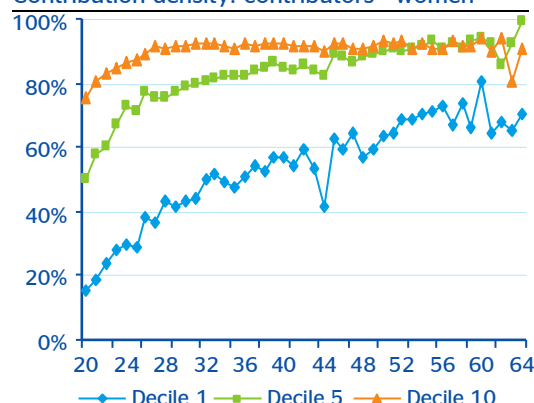
For affiliates who are eligible for a pension, the system's initially considered target replacement rates of 76% would be at risk due to the problem of low contribution densities within several groups (see Figures 3 and 4). This is largely due to a labour market that limits the possibility of specific groups of the working population from being able to maintain a sufficient level of stability in order to consistently contribute to their retirement account. Even though this is not the most dramatic case within the region, in Chile some workers lose their salaried status, particularly during times of economic crisis, and become self-employed and no longer make pension contributions. Likewise, other cases show that when these workers lose their job in the latter years of their working life, they resort to early retirement. Ultimately, all this reduces the possibility of saving more and thus obtain more adequate pensions.

Figure 3
Contribution density: contributors - men



Source: BBVA Research

Figure 4
Contribution density: contributors - women



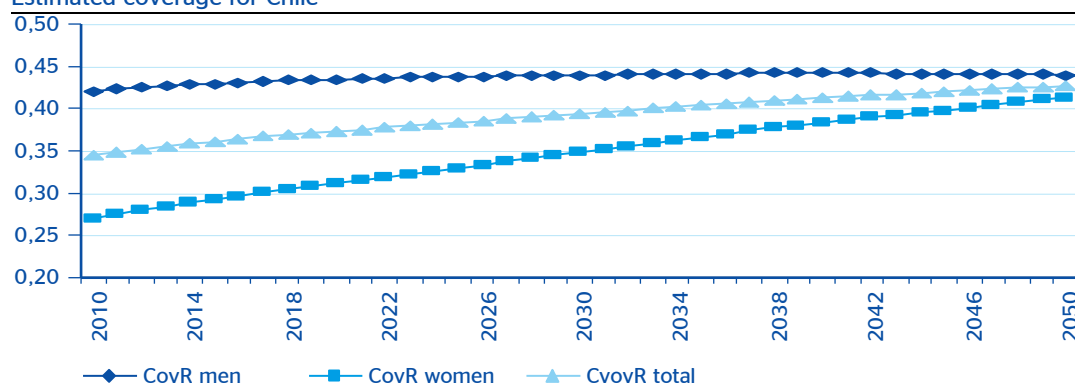
Source: BBVA Research

The coverage forecast using the MAPP2 model by BBVA Research in the base scenario (in other words, assuming agents repeat their current behaviour in the future under consistent legislation), would allow us to observe an upward trend in the coverage rate of contributing affiliates in the future, but on a moderate basis (See Figure 5). This is due to improvements in the level of studies across the general population, most notably women. Nevertheless, this improvement is not enough and there is no doubt that this circumstance will lead to significant socio-economic problems in the future. Bernstein *et al* (2005) through the construction of eight gender-separated profiles and four profiles based on income levels², observed that in 2025 under a base scenario, approximately 50% of individuals would not be eligible for the minimum pension, although they might have access to other types of personal savings. On the

2: The information used is administrative data taken from the "Pension Records of Active, Retired and Deceased Affiliates" which includes the work records of 24,000 affiliates that belong to the Superintendencia

other hand, only 5% of pensioners would be eligible for the minimum pension. The rest would have self-financed pensions that are higher in value than the minimum pension. This result is congruent with that obtained in Favre et al (2006).

Figure 5
Estimated coverage for Chile



Source: BBVA Research

Given this situation, the possibility of capitalising on another type of highly illiquid saving, such as reverse mortgages, may prove to be of interest. According to EPS (Social Protection Survey), 81% of homes in which the head of the household is aged between 60 and 65 are owned outright. This percentage is slightly higher for those people that are part of a pension scheme (82.51%). These figures show that most Chileans prefer to put their savings into property.

Table 2
Detail of savings for Chilean population aged 60-65

	Men			Women		
	Financial Savings	Real Estate	Pension Savings	Financial Savings	Real Estate	Pension Savings
Total	4.52%	33.37%	62.11%	3.87%	52.78%	43.35%
Affiliates	4.30%	35.33%	60.37%	4.49%	38.63%	56.88%
Non-affiliates	2.27%	97.73%	0.00%	0.59%	99.41%	0.00%
Affiliates with own home	4.5%	30.5%	65.0%	5.52%	21.22%	73.27%
Non-affiliates with own home	2.26%	97.74%	0.00%	0.92%	99.08%	0.00%

Note: The value of the property assets declared has been halved in the case of homes in which both man and wife are still alive.
Source: BBVA Research and EPS Chile

It should be clarified that the financial savings of the retired population is only about 4% of total savings, whereas those invested in real estate (highly illiquid) represents 33% for men and 52% for women. This difference between each gender is mainly due to the higher salaries accumulated in pension funds by men, as a result of higher salaries and greater contribution density. Likewise, for citizens who are not affiliated with any pension fund, real estate represents 97% and 99% of the savings for men and women respectively, showing the huge dependence by these types of people on highly illiquid savings upon retirement.

4.1. Reverse mortgages in Chile

In 2003, CIEDESS (Social Security Research, Study and Development Company) proposed a reverse mortgage scheme in Chile. According to Reyes (2010), the specific characteristics of a reverse mortgage in Chile are:

- Purchase-sale agreement with usufruct: The real estate company purchases the property from the owner, who will be more than 60- 65 years old, allowing him and his spouse to continue living there until they die. The property then becomes the property of the real estate company. If the insured party dies earlier than expected, the remaining balance is passed on to the heirs, who may purchase the property, along with the corresponding interest for the amount already given to the owner. If the insured party dies later than

expected, he will continue to receive the amount agreed since it is part of a contractual agreement.

- Leasing or mutual agreement: The real estate company pays out funds that are equivalent to the estimated present value of the property's future sales price, less interest expected to be incurred on the loan. The agreement contains a clause that caps the debt if the property is not worth the amount agreed at the beginning of the agreement, so that it is not possible to inherit any debt.
- Deposit agreement: the difference between the loan amount and the amount paid out to the borrower is obtained, and is deposited into a fund from which the interest incurred will be paid. This acts as a guarantee to cover interest derived from entering into a lease agreement, so it is not necessary for the beneficiaries to pay a dividend. Furthermore, the beneficiaries may leave it as inheritance if the usufruct ends before the life time estimated at the start of the operation and there is still a balance in the secured deposit.

According to Almarza, the reverse mortgage could be a very positive instrument in Chile. What would be wrong would be to focus attention on the high-income segment of society, which is very small and saturated with financial products. The market would be initially developed by focusing on the low-income segment of society, where there are great opportunities to be found since there are many families who own a house outright, the value of which has increased over time. These houses represent an asset against which money could be lent.

This makes sense, taking into account that people within the poor, lower income segment will not even reach the minimum pension, meaning the State will have to supplement pensions. Around 75-80% of the population face problems funding themselves, due to the fact that there are no sources of funding. Funding this group may have a significant social and even political impact, and may represent an opportunity for business.

From a supplementary perspective, different financial opportunities of a social nature with an impact on development could also be found, based on reverse mortgage schemes. For example, based on the argument that providing children with an education is a better asset than owning a home, one could come up with a financial instrument that finances children's education using homes that are owned outright by the parents as security. They may repay the loans later with less effort, on the understanding that greater human capital will give them more future income.

We must seek to connect social opportunities with the capital market. Greater business opportunities are there to address the needs of the more poor and middle class sectors.

4.2 Simulation of a case of reverse mortgages

In order to measure the importance of reverse mortgages as a possible additional means to pension savings for retirement in Chile, we will present a set of simulations based on an individual representative of the system. The assumptions made are given in the table below:

Table 3
Assumptions for estimated life annuity

Gender (M/F)	Male	Fund return	5.00%
Starting age	25 years	Interest on life annuity	3.60%
Retirement age	65 years	Costs of life annuity	1.25%
Age difference - spouse	3 years	Pay rise	1.0%
Savings contribution	0.1	Number of payments	12
Frequency of contribution	12	Revision for spouse	42%
Contribution density	0.8		
Commission without cash flow	1.54%		

Source: BBVA Research

Specifically, we will assume that we are dealing with a male subject who starts working in a salaried position at the age of 25 and retires at 65. We will assume that this individual is married and his wife is three years younger than him. Based on the Chilean Social Protection Survey, we can construct five levels of income corresponding to income distributed on the basis of quintiles. The remaining parameters used are those that currently exist, such as a contribution rate of 10% and a 1.54% management commission for the PFA. The contribution density will be 80%. This level is somewhat high with respect to the system average, but it allows us to show the potential of the reverse mortgage as a provider of supplementary savings, even in cases where it is not required as much.

The return on accumulated balances is fixed at an annual gross rate of 5%. The discount interest rate for the life annuity would remain at 3.6% and the costs associated with this income would be 1.25%. In terms of salary, we would see a real annual growth rate of 1% across the entire projected lifetime of our individual in this example.

The aim of this experiment is to calculate the replacement rate that our representative individual would receive with a life annuity that is only calculated based on the balance accumulated in the PFA and compare it with the amount obtained if a reverse mortgage were also to be taken out. This exercise is calculated twice- once for people who will retire in 2010 at the age of 65 and again for people who will retire at the same age in 2050. This time difference makes it possible to measure the impact that the longevity risk could have through the increase in life expectancy.

4.3. Reverse mortgages in Chile 2010

If assumptions included in the life-cycle projected for the cohort retiring at the age of 65 in 2010 were met, the final monthly salary (12 payments) for the first income distribution quintile would be US\$235, whereas in the third quintile it would be US\$1472. The accumulated balances for each type of individual would oscillate between US\$21,579 (for quintile 1) and US\$139,972 in quintile 5. Due to the fact that the contribution densities and pay rises are the same for each type of individual, the replacement rate of the life annuity for each individual, which could contract with the balance, would be approximately 50% in all cases.

Table 4
Pensions in 2010

	Total pension	Salary	Replacement rate	Starting salary	Salary growth rate	Accumulated capital
Quintile 1	119	235	50.4%	158	1%	21,579
Quintile 2	173	344	50.4%	233	1%	31,785
Quintile 3	225	419	53.7%	304	1%	41,408
Quintile 4	294	587	50.1%	398	1%	54,239
Quintile 5	761	1,472	51.7%	1,027	1%	139,972

Source: BBVA Research

According to the EPS, the property value for the same people upon retirement would fluctuate between US\$24,684 in the lowest quintile and US\$78,322 in the highest quintile (see table 5). If the individual could capitalise this value and purchase a life annuity, which would supplement the amount received by the pension system, the replacement rate would increase up to 93% in the first quintile of the distribution and 73% in the highest quintile. This would show that the effect of the reverse mortgage may be very important as a supplement to the normal pension but the effect would be more notable within the poorer bands of the population.

Table 5
Pensions that incorporate reverse mortgages in 2010

	Total pension	Salary	Replacement rate	Starting salary	Salary growth rate	Human capital	Calculable property value	Total accumulated capital
Quintile 1	218	235	93%	158	1%	21,579	24,684	46,263
Quintile 2	321	344	93%	233	1%	31,785	36,387	68,172
Quintile 3	375	419	89%	304	1%	41,408	36,667	78,076
Quintile 4	466	587	79%	398	1%	54,239	41,894	96,133
Quintile 5	1,080	1,472	73%	1,027	1%	139,972	78,322	218,294

Source: BBVA Research

4.4. Reverse mortgages in Chile in 2050

Repeating the same exercise but for the cohort that will retire at 65 in 2050, and applying the same assumptions adopted for 2010, we can observe that the life annuities that an individual could purchase would reach a replacement rate of 47%, (between three and six points less than those observed in 2010. The decrease is due to the application of the mortality table corresponding to this individual, which includes the increase in life expectancy³.

3: See Alonso et al (2012)

Table 6
Pensions in 2050

	Total pension	Salary	Replacement rate	Starting salary	Salary growth rate	Accumulated capital
Quintile 1	164	348	47.2%	236	1%	32,128
Quintile 2	242	512	47.2%	347	1%	47,324
Quintile 3	315	667	47.2%	452	1%	61,652
Quintile 4	413	874	47.2%	593	1%	80,755
Quintile 5	1,065	2,255		1,530	1%	208,399

Source: BBVA Research

Taking out a reverse mortgage (Table 7) would mean an increase of 67%-88% in the replacement rate for this individual, depending on the respective income range. Once again, the poor sector of the population would see an improvement in their financial situation.

Table 7
Pensions that incorporate reverse mortgages in 2050

	Total pension	Salary	Replacement rate	Starting salary	Salary growth rate	Accumulated capital	Calculable property value	Total accumulated capital
Quintile 1	305	348	88%	236	1%	32,128	36,751	68,879
Quintile 2	449	512	88%	347	1%	47,324	54,175	101,499
Quintile 3	524	667	79%	452	1%	61,652	54,593	116,244
Quintile 4	652	874	75%	593	1%	80,755	62,375	143,129
Quintile 5	1,512	2,255	67%	1,530	1%	208,399	116,611	325,010

Source: BBVA Research

The incorporation of real estate assets via a life annuity generator scheme for the retired sector of the population has the potential to significantly increase pension replacement rates. In general terms, the results propose an extensive reflection on the financial risks associated with retirement, along with the possibility of a wide range of sources of income in order to support this inactivity. Accordingly, the role of the state must not only focus on the design of pension systems as such, but also to create financial structures that facilitate the conversion of highly illiquid assets to a flow of liquid income that would be increasingly necessary in scenario in which life expectancy will continue to rise.

5. Conclusions

This study provides a wider range of possibilities for developing reverse mortgage schemes in emerging economies, using Chile as a case study, given the availability of information for developing an estimation methodology. The results show that reverse mortgages may be something that, in part, compensate for the risks associated with longevity that may be seen in Chile over the coming decades.

More specifically, the pension system replacement rates for different quintiles would decrease by an average of 51% in 2010 to 47% in 2050, primarily due to the effects of the increased life expectancy. This scenario of inadequate pensions would be improved with the incorporation of income from life annuities based on real estate assets held in different quintiles. Pensions would therefore stand at 80-90% on average for the various quintiles in 2010 and 2050.

Although the potential of reverse mortgage schemes is interesting with respect to the problem faced as a result of the risks associated with old age in coming years, it is also true that there are different elements to take into account that in some way limit their launch on to the market. On the one hand, people must change their mind set and consider their home as a saving that can be made available if required. Likewise, people still know relatively little about reverse and there is generally not much competition to supply them. Also, real estate companies and financial institutions and insurance companies are not prepared to manage large property holdings, which would require reorganisation and the establishment of new companies specialised in this sector. Last but not least are the implications associated with a financial crisis and volatilities that are commonly observed on real estate markets. The latter involves risks for both creditors and debtors and, therefore, strategies are required to mitigate these risks as is adequate regulation.

Having said this, reverse mortgages have the potential to significantly increase pension replacement rates. In general terms, the results propose an extensive reflection on the financial risks associated with retirement, along with the possibility of a wide range of sources of income in order to support this inactivity. Therefore, governments must not only focus on the design of pension systems as such, but also to create financial structures that facilitate the conversion of highly illiquid assets to a flow of liquid income that would be increasingly necessary in a scenario in which life expectancy is expected to continue rising.

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