The informal economy and the constraints that it imposes on pension contributions in Latin America

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Abstract

Low contribution levels to pension schemes in Latin America are an enormous obstacle limiting the implementation of a broad-based social security system. Contribution rates measured as a ratio of contributors to the total labour force stand at an average of 40%, or 60% in the best of cases. Although previous studies explain this situation by factors related to growth, economic institutions and market considerations, only a few studies have quantified the specific determinants behind this problem. This study therefore aims to approach the subject by exploring the national household surveys for Brazil, Chile, Colombia, Mexico and Peru. Once the specific question relating to pension contributions has been identified in the surveys, probit models are used to estimate the probability that this event may occur, conditioned by the variables that theory considers to be explanatory. The study finds the enormous relevance of labour markets as a common conditional factor affecting the likelihood to contribute to any pension system in Latin America. Working in the informal economy, being a self-employed worker or working in a micro-enterprise are particularly significant and show the highest coefficients in this geographical region. The high impact of these variables may give clues for economic policy, in its search for eliminating the hurdles in labour market distortions that limit the impact of social security programmes.

1 Introduction

Pension reforms in Latin America have included a series of changes with twin goals: to provide financial stability for their systems and to increase the participation rate, thus allowing for an accumulation of funds that can be used to obtain better pensions (Gill et al. 2004, Holzmann and Hinz 2005, Carranza et al. 2012). Decisions to balance the budget through a redefinition of the parameters of 'pay-as-you-go' (PAYG) systems, and the introduction of partial or complete individual saving schemes under mandatory or voluntary contribution mechanisms, have largely achieved the goal of sustainability. However, the results with respect to participation have been far from generating a system of broad-based coverage.

Worth highlighting is the case of countries that introduced systems of mandatory individual savings under the so-called 'Chilean model' of Pension Fund Administrators (or AFP in Spanish). Except for the case of Chile, where the contribution rate (total of contributors as a proportion of the labour force) is around 60%, in countries such as Colombia, Mexico and Peru the figures do not exceed 40% (Kay and Sinha 2008, Carranza et al. 2012). Brazil, which followed a different path from the Chilean model and based its reforms on parametric adjustments to its public PAYG system, plus the development of voluntary private pension schemes, had a coverage rate in 2010 of around 55% (Bosch et al. 2013, Mesa-Lago 2008). These figures reflect the low participation of extensive sections of the population, which is a critical problem in Latin America. To some extent, this makes obvious the divorce between society and a state that does not have sufficient capacity to implement an inclusive pension system.

The capacity of mandatory pension systems to create incentives for workers to save in these economies is limited by various factors, such as macroeconomic conditions, household income levels, the structure of the labour market and the capacity of the state to enforce the law (Carranza et al. 2012, Tuesta 2011). The analyses of these factors have normally been carried out from a theoretical perspective, but in only very few cases they have been calculated, particularly in Latin America, generally due to the lack of statistical information. However, more national household surveys in the region have recently included more specific questions on the situation of social security in the countries in question. This enables us to explore the copious information, and provides both specific and comparative answers between countries.

The aim of this study will therefore be to quantify the factors that condition the higher or lower probability of individuals deciding to contribute to a formal pension system, whether public or private. It also seeks to draw conclusions for the region as a whole, based on the comparative analysis of statistics from five representative countries: Brazil, Chile, Colombia, Mexico and Peru. It will do so by using the respective national household surveys, from which it will identify those variables that the literature has defined as determinants in pension savings decision-making, and then include them in probabilistic estimates. The contribution of this work could be valuable, as this methodology rarely appears to have been applied simultaneously to various countries in the region as a whole to this problematic, nor has this question been approached from the point of view of trying to understand the problems of pension coverage in Latin America in order to give clues into economic policy decision-making.

Following this introduction, the second section will discuss the main aspects behind the participation in pension schemes highlighted by the economic literature. The third section sets out the characteristics of the data and the methodology used. The fourth section discusses the results. Finally, section five presents the conclusions of this research.

2 The problem of participation in pension systems

Latin America has a low social security coverage rate, particularly in the case of pensions (Rofman et al. 2008). A number of reasons lie behind this. First, there is the problem of the capacity to save, which is closely related to per capita income and poverty (Costa et al. 2011, Francke and Mendoza, 2005, Tuesta 2011). Behind the problem of low income, we find poor economic growth strategies, deficient institutional bases and, from a more social perspective, inadequate policies for dealing with poverty, health, education and gender (Acosta and Ramirez 2004). One particularly serious problem within the institutional area is the significant size of the informal economy, which makes it impossible to make contributions obligatory, simply because the state cannot enforce compliance (Levy 2008, Costa et al. 2011, Tuesta 2011, Carranza et al. 2012).

Coverage rates are particularly low because the pension schemes they correspond to are based on the operation of formal labour markets. In fact, governments have based the operation of their mandatory systems on using employers as contractual agents of the labour force to ensure adequate social security coverage. The problem is that if the companies involved are informal, or if they are formal but have informal relations with their employees, they will not be able to act as the state's partners to enforce compliance with the law by using mandatory mechanisms to ensure that the population has adequate social coverage (Carranza et al. 2012, Saavedra and Torero 2000, Loayza 2008).

Although growth and macroeconomic stability in Latin America are generating conditions for starting to formalise the economy and thus improve coverage, their impact may not be sufficient if progress is not made in the institutional area to boost the function of the state (Lederman et al. 2001). Given the limitations on the state in enforcing the mandatory payment of pension contributions, the decision whether to contribute to the pension system largely falls to individuals.

Given this situation, both studies and policy experience have been moving towards public intervention that creates incentives for saving for old age. This is the basis of the argument that the population requires different tools to raise their awareness of the need to participate in pension schemes. Some studies have tried to capture the factors that lie behind the decisions to contribute to pension systems. One approach is the analysis of policy interventions or incentives to participation. For this kind of analysis, governments generally require experiments or specific surveys to be designed. These can be used to analyse the impact of a certain decision on a representative sample of individuals, establishing control groups against which the effects of the probable measure can be compared. For example, one of the increasingly used incentive mechanisms is government subsidies, whether through tax allowances or direct transfers (Whitehouse 2012, Holzmann et al. 2012). An increasingly popular type of financial incentive is that of 'matching contributions', where the government or employer (through tax incentives) supplements the workers' contributions by adding a fraction of that amount to their pension accounts. Studies in developed countries find positive results for these kinds of mechanisms (Beshears et al. 2010, Duflo et al. 2006, Engelhardt and Kumar 2007, Mills et al. 2008, Choi et al. 2002, Choi et al., 2004, Choi et al. 2006, Mitchell et al. 2007), although the results are not conclusive in all cases. Of particular importance are the cases of New Zealand (Rashbrooke 2012), Germany (Börsch-Supan et al. 2012) and India (Palacios and Sane 2012).

Other studies of incentives have highlighted the role of state intervention such as financial literacy programmes, financial assistance for saving and automatic enrolment (Madrian 2012, Mitchell and Utkus 2004). The definition of financial literacy programmes with respect to their impact on participation in pension schemes covers a broad range of actions, from supplying information (general or detailed) and education and training at different levels and ages. Experience suggests that the strategies and the methods of implementing them are important, as is persistence, given their long-term effects. This provides an explanation for why, despite the consensus regarding the good intentions of these programmes, sometimes

the assessments made of their results have not always been encouraging (Hastings et al. 2012, Roa 2013). With respect to assistance for savings, some works include the effects of reminders for saving (e.g. through a telephone call, e-mail or text message) with positive, though very limited, results on the intention of contributing to pension schemes in the United States (Karlan et al. 2010) and Chile (Kast et al. 2012). Other studies such as Lusardi et al. (2009) and Clark and Schieber (1998) found an extremely positive effect from simplifying the information given to the workers for making decisions on saving for old age. Meanwhile, two interesting studies on emerging countries include the role of savings commitment plans that aim to reduce the temptation to spend (Ashraf et al. 2006, Soman and Cheema 2011), and thus to earmark more funds for saving. Nevertheless, one of the most important findings from the point of view of political interventions in the case of the 401(k) pension scheme in the United States is that of automatic enrollment in voluntary pension systems, which in practice implies a semi-mandatory contribution to pensions, as enrollment is considered as the default option (Madrian 2012, Beshears et al. 2008).

Lack of participation in pension systems may also be categorised as one of the problems of financial inclusion. From this point of view, the subject of limitations to saving for retirement may be associated with the presence of barriers or obstacles that limit the possibility of accessing a retirement plan, if it is of interest to the individual. Thus, the situation may respond to the lack of capacity for saving for old age, the cost of the product (the problem of administrative fees), lack of confidence, paperwork and complications required for saving, and geographical aspects (Allen et al. 2012, Demirgüç-Kunt et al. 2012).

Expanding on the above, one interesting approach is to evaluate the conditioning factors of saving through an assessment of the socioeconomic characteristics of individuals. Thanks to the recent development of national surveys focused on matters relating to social security, quantitative approaches to the problem of coverage are being developed. Along these lines, in Latin America, Chile has been undertaking the most interesting developments with specialised surveys. Notable among these are the studies by Correa (2011) who, working with the Household Financial Survey of 2007, finds that participation in voluntary pension schemes is affected by marginal tax bands, household wealth, knowledge of the pension system and the amount of collateral debt. At the same time, Bravo et al. (2008), using the Social Protection Survey of 2008, includes additional socioeconomic elements such as income levels, the individual's age, and whether the individual has life insurance. Also in the Chilean case, Pizarro and Muñoz (2008) find similarities when using different Household, Financial and Social Protection surveys. Basett et al. (1998) finds for the case of the 401 (k) plans in the United States not only the role of income and age, but the role that having a stable job and higher educational level may have. Similarly, Huberman et al. (2007) uses a private survey to highlight the greater likelihood that women have to save in pension schemes.

Except for the case of Chile, quantitative analysis of the problem of low participation in retirement savings in Latin America has been lacking so far, due to the lack of statistical information available to develop such an analysis. Nevertheless, national household surveys are gradually beginning to include specific questions on the subject of pensions and social security. These statistics allow this study to estimate the factors that affect the probability of contributing to pension schemes in five Latin American countries, taking as a base the relevant aspects that theory points to as interacting on the decisions made by individuals. The results obtained at both the country and comparative levels may help to shed light for policymakers on the lines of action that should be taken in this area.

3 Data and basic characterisation of the individuals

The richest source of information for finding answers to the socioeconomic conditioners that affect the financial decisions of individuals to save in pension schemes are the different national household surveys. This study is focused on the analysis of the cases of five relevant countries in Latin America: Brazil, Colombia, Chile, Mexico and Peru. Depending on the questions available in each of the national surveys, this study will concentrate on identifying the factors affecting the probability of participating in a formal pension system, which may mean a scheme that is public, and offered by the state, or a voluntary or mandatory pension scheme offered by the private sector, but whose operation is regulated by a specific legal framework.

Our study will focus on observing whether workers are contributing to a pension system, according to the answers they give in the surveys for each country. This is a more restrictive definition than coverage. It is different from the broad approach of participation or membership, whose statistics are included if people have contributed at some time in their employment history, which may not give them any rights at the time of retirement. Our definition of pension coverage is contribution, which implies that the person responds in the survey that he or she is currently contributing at that time toward future retirement.

A deep level of statistical data is required to obtain a detailed characterisation of individuals, allowing us to identify their different socioeconomic profiles, which in accordance with the revised theory may condition their active participation in pension systems. Such data can only be found in surveys that have a broad range of questions for a representative set of the population. A survey of these dimensions that is specialised in pensions may be the best means to offer different points of view on the problem of social security at the individual level in a country. However, surveys of this kind are not sufficiently extended in the region to address social security matters.

The only country that has made an important effort in Latin America in the latest decade has been Chile, with the specialised development of Social Protection Surveys (Subsecretaria de Prevision Social, 2013), where as well as obtaining a broad knowledge of the individual's profile, the questions are designed to ascertain all the relevant aspects on pension issues. Given that similar surveys are not available for the entire region, if we want a comparative approach such as in this study, the alternative is to work with national household surveys, which have managed to construct a history of application and use in Latin America. Some questions relating to social security can be identified in these surveys, and these can be the basis for estimating the probability of workers contributing to a pension system, given their characteristics.

Thus, for Brazil, the study uses the National Household Sample Survey-PNAD of 2011 (IBGE 2011), which has been carried out by the Brazilian Geographical and Statistical Institute-IBGE. For Chile, the study uses Survey of National Socioeconomic Characterisation-CASEN (Ministerio de Desarrollo Social de Chile 2011), which is promoted by the Ministry of Social Development. In the case of Peru, the National Household Survey-ENAHO of 2011 (INEI 2012) carried by the National Institute of Statistics and IT-INEI. For Mexico, this study uses the National Household Income and Expenditure Survey-ENIG of 2010, which has been carried out by the National Institute for Statistics and Geography (INEGI 2010). Finally, in the case of Colombia, the data for this research has been extracted from the Large Integrated Household Survey-GEIH of 2011, which is managed by the National Administrative Department of Statistics (DANE 2011).

We have identified the variables that describe the level of participation in the formal pension systems in each of the national surveys of the five countries. As we have explained above, the most precise way of calculating this participation is through current contributions. We have therefore identified the question that indicates whether in the period of the survey the person was actually contributing toward retirement. People

may contribute to a system that is administered by either the state or private-sector companies; they may also either be obliged by law to contribute, or contributions may be voluntary. Given the availability of questions in the surveys, the analysis will focus on the participation in any pension system, without differentiating between its particular characteristics.

Although the above may make the characterisation of the situations less detailed, analysing the data of the overall contribution to the pension system as a whole also provides us with very valuable information for this research. First of all, although the surveys do not allow us to differentiate in all the countries whether the contribution is to a mandatory or a voluntary system[2], this seems to be less relevant for the study because of the low penetration of voluntary schemes in the countries under analysis. Second, given this, the data allow us to focus on conditions that promote pension savings, without it being particularly important what the type of pension product is; and third, the descriptive statistics shown below confirm that the contribution level in the pension system is fairly low, despite it being mostly mandatory.

Although this study is not going to discuss the particular institutional aspects of the pension systems in each country, it is important to point out that a common factor was that they have all been reformed using the common goal of greater fiscal sustainability (Gill et al. 2004, Tuesta 2011). Thus, examining the different references in the literature (Gill et al. 2004, Hinz and Holzmann 2005, Tuesta 2011, Carranza et al. 2012) within the spectrum of pension systems, we can locate one end the system in Chile, which after the reform in the 1980s was no longer a PAYG scheme and became, in essence, a private savings scheme using the model of pension fund administrators (AFP), with some solidarity components which were introduced in subsequent reforms. At the other end of the spectrum in Latin America is Brazil, which essentially maintains a PAYG scheme with successive parametric adjustments to make it more sustainable, and which introduced incentives for the creation of voluntary pension schemes. Half-way between these two extremes are the cases of Colombia, Peru and Mexico. Colombia and Peru have incorporated the AFP model, although in competition with a PAYG scheme, where the worker has the possibility of choosing either or both. In Mexico, although new enrollments to the old PAYG scheme were closed and a system along the lines of AFPs was introduced (called the Retirement Fund Administrator - AFORE), those who had been contributing before 1995 had the opportunity to choose the benefits of the PAYG scheme if they thought they were better for them at the moment of retirement, even though they had begun to save in a capitalisation scheme.

Based on information from Latin American household surveys, the series of figures below illustrate the contribution situation in Latin American pension systems according to different characterisations of individuals. Each of the figures presents the contribution rate to pension systems with respect to the total occupied population. This rate is important because it is not a measure of coverage applied to the whole economically active population (EAP), but rather to the ability to contribute to a pension system if the person is actively employed in the labour market. Thus, *Figure 1* indicates that the highest contribution rate is in Chile, where more than 80% of the employed population contributes to a pension scheme. This rate, which is the highest in the region, contrasts with the contribution rates of the rest. In Mexico, the rate is slightly higher than 50%; in Brazil it is 40%; in Colombia 30%, and in Peru it is slightly under 20%. To put it more clearly, although a significant fraction of the population generates income from work, they are not contributing to any pension scheme, according to the answers in the survey.

From the contribution rate in the five countries according to income quintiles (*Figure 2*), it is worth noting in the case of Chile that the contribution does not vary with respect to the average in the case of the lower-income quintiles. However, in the rest of the countries the lowest quintiles, particularly 2 and 3, are fairly far removed from the average. The case of Peru is particularly striking, as the contribution rate there is fairly weak and even in the highest income quintile it barely rises above 30%. One would have expected *a priori*

2: The survey of Brazil used for this study, enables us to differentiate between mandatory and voluntary pension schemes. We will discuss this issue later in the document.

that it is precisely this group that was in the best position to save. *Figure 3* highlights the role that education may play in contribution rates. The contribution rates out of all the working population are higher in groups with secondary-level education or higher, once more highlighting the low contribution levels of the most educated population in the case of Peru, and the limited level of contribution of the population groups with only a primary or lower level of education, contrasting with what is observed in the other countries.

The form in which individuals are inserted in the labour market is particularly relevant for their contribution rates to pension systems. Based on specific questions in the country surveys, we define both formal and informal workers, who are different according to their contractual conditions and/or their relationship of formality with respect to the state. Thus, *Figure 4* shows the high contribution rate in the formal group, in particular in the case of Chile and Colombia, with 90% of contributors in this group. The rest of the countries also show higher contribution rates in the formal group compared with the informal, as is to be expected. In addition, reviewing the group of informal workers in each country reveals a greater effectiveness in the case of Chile, with 70% of its working population contributing. At the other end is the situation in Peru, where the level of contributors among the informal group is practically non-existent.

Figure 1
**Pension contribution ratio
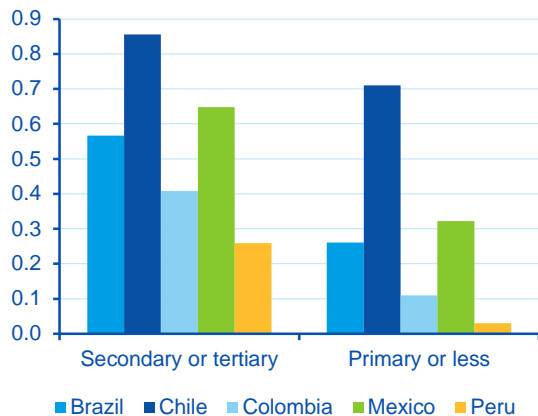(contributors as a % of employed population)**
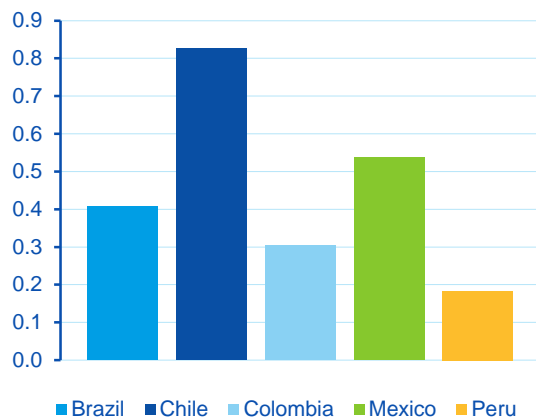
Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

Figure 2
**Pension contributions - income quintile
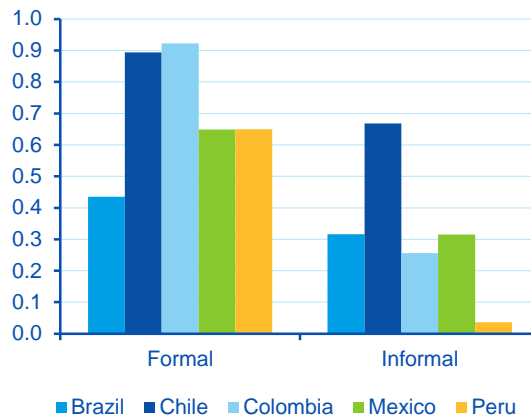(contributors as a % of employed population)**
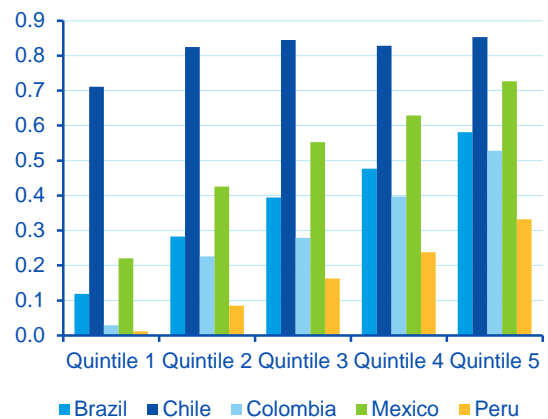
Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

Figure 3
**Pension contribution ratio - education level
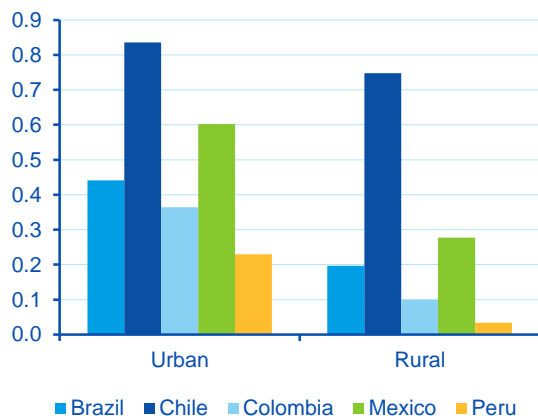(contributors as a % of employed population)**

Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

Figure 4
**Pension contribution - informal workers
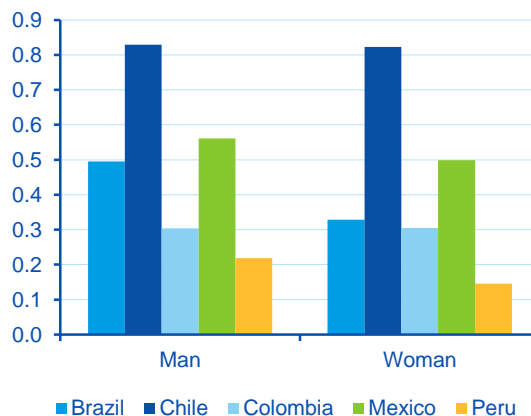(contributors as a % of employed population)**

Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

Figure 5
**Pension contribution - rural and urban area
(contributors as a % of total population)**

Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

Figure 6
**Pension contribution by gender
(contributors as a % of total population)**

Source: National Statistics Institutes of Brazil, Chile, Colombia, Mexico and Peru (see references)

At the same time, urban and rural conditions tend to affect the way in which people comply with the social security regulations, due to difficulty of access and/or control by the state. *Figure 5* highlights the higher contribution rates in all the countries among groups in urban areas compared with rural areas; although even more clearly, it highlights the high contribution rate among the rural population of Chile compared with the rest of Latin America. *Figure 6* includes the gender elements that may affect the contribution rate to pension systems. In all cases it can be seen that women have lower contribution rates than men, although in the cases of Chile and Mexico the differences are less marked.

As discussed in our review of the literature, these and other socioeconomic characterisations of the individual may condition the probability of contributing to a pension system. Finding these possibilities and comparing their results in Latin America may be very relevant for detecting their relative significance and, based on that, for providing economic policymakers with information that will allow them to set out priorities for action to improve the viability of contribution levels to pension systems. These results will be calculated based on a probit model with a standard replication process for each of the countries, given the availability of questions in the surveys.

4 Methodology

We assume an empirical, discrete model based on a utility function that describes the eagerness of an individual to participate in a given pension system. This utility function is determined by specific individual characteristics, according to the revised literature.

Following Ziegler (2010), Christiadi and Cushing (2007) and Hausman and Wise (1976), the hypothetical utility of the potential pension participant i (i = 1,…,N) can be defined as:

$$U_i = \beta'x_{ij} + \varepsilon_{ij}$$

Because we do not know the real individual's utility derived from the participation in a pension system, we assume that the contribution decision is a reflex of this utility function. In this case, there are j specific individual characteristics affecting the final decision to contribute or not to the pension system. The unknown parameter vectors are β. The values of the latent variables cannot be observed and depend on the stochastic components ε_{ij}, which summarise all unobserved factors that influence the final decision.

This approach is flexible enough to comprise a multitude of discrete choice models. In this case, it has considered the use of a probit model, based on the assumption that the ε_{ij} are jointly normally distributed.

Probit models are widely used for econometric analysis (Greene 2011). They are binary classification models where the dependent variable is dichotomous. These models are estimated by maximum likelihood and quantify the probability of whether or not an individual with certain characteristics pertains to the study target group. In this case, the question is whether or not they save in a pension system.

The aim of the empirical specification is to model contribution to or affiliation with the pension system by people over the age of 18y_{ai}. The variable to be explained is a binary response that takes the value 1 if the person contributes to a retirement scheme and 0 if not.

The proposed model suggests that the decision to make pension savings depends on a latent variable y^* which is determined by a set of exogenous variables, included in the vector x', so that:

$$y_{ai}^* = x_i'\beta_j + u_i$$

$$y_{ai} = 1 \ si \ y_{ai}^* > 0 \ ; \ y_{ai} = 0 \ si \ y_{ai}^* \leq 0$$

Where the subscript i represents individuals y, vector β represents the parameters of the model and u is a normal distribution error term of average 0 and variance 1.

A critical threshold y_i is assumed, based on which, if y_i^* is over y_i then an individual saves for retirement. This threshold y_i^*, similarly to y_i, is not observable; however, if it is assumed that it is distributed normally with the same average and variance, it is possible to estimate the regression parameters and thus obtain information on y_i.

$$P_i = P \ y_i = 1|x' \ = P \ y_i \leq y_i^* \ = P \ Z_i \leq \beta x_i' \ = F(\beta x_i')$$

Where Z is a standard normal variable, $Z \sim N \ 0, \sigma^2$ and $F = \ \frac{1}{2\pi} \ \int_{-\infty}^{\beta x_i'} e^{-Z^2/2} \, dz,$ is the cumulative normal distribution function.

The model is estimated for maximum likelihood as a series of probit models for the individuals. The marginal effects on the latent variable are calculated according to the different coefficients estimated in the models. The interpretation of these marginal effects is similar to that obtained in the linear regression models, so the coefficients represent the change in the probability of saving for retirement when a variable x_j belonging to the vector of exogenous variables x' changes, maintaining the other factors fixed, given that $E \ y^* \ x' \ = x'\beta$.

These estimates have been carried out using the information in the household surveys for Latin America, in particular the representative cases of Brazil, Chile, Colombia, Mexico and Peru. The model can be used to discover the probability of contributing to a pension system. Therefore, the dependent variable is a dichotomous type that reflects whether or not the person contributes to a pension system. This is determined by a common question asked in the five surveys, which will allow us to establish comparisons of the results obtained in each case.

With the aim of demonstrating the robustness of the models and identifying the most relevant explanatory variables to understand the decision to contribute for retirement in each country, three groups of explanatory variables have been included: first, personal characteristics (age, marital status, education, type of household, income, expenditure, zone of residence); second, labour market variables (sector, type of company, labour relationship, type of contract, formality); and finally, the complete model contains the two first groups of variables and also includes the geographical or regional dimension.

5 What conditions the probability of contributing to a pension system?

A review of the literature showed us that there are different approaches to the problem of low participation levels in pension systems. First, there are macroeconomic aspects that condition the growth of a country, income capacity and institutional aspects that make savings possible. Other aspects of a microeconomic nature, though they do not refute the above, focus the problems on the marginal improvements of greater or lesser participation in retirement savings, given a particular macroeconomic situation. From this perspective, the analysis focuses on socioeconomic conditioners that allow a person to save for a pension in Latin America.

Given this point of view, the studies give particular relevance to the role that the capacity to generate income may play, thus generating a surplus for savings. Specific conditions such as gender, age, education or geographical area, which may affect consumption and savings over time (in a long-term product such as pensions), have also been taken into account. One element that at times is left out of political discussions but that may have an enormous impact on the success of a pension system is the labour-market condition. In this case, aspects related to the type of employment contract a worker has, or subjects related to the situation of informality in the firm's operation, may be relevant.

These elements are considered in the probit model that we will discuss below, taking as a dependent variable the option that an individual has whether or not to contribute to pension systems, and as explanatory variables a set of socioeconomic characteristics grouped into personal aspects, an individual's employment situation and geographical area. First, we will carry out an analysis of the econometric results of each of the countries, and then provide a comparative analysis for Latin America.

As mentioned before, we will analyse the data of the overall contribution to the pension system without differentiating whether the contribution is to a mandatory or a voluntary system. It was seen that the low penetration of voluntary schemes in the countries under analysis and the fairly low pension participation - despite it being mostly mandatory - makes this differentiation less relevant.

5.1. Results of the model by country

Brazil

The model for Brazil (*Table 1*) shows the relevance of personal variables in explaining the probability of contributing to the pension system, measured by an adjusted R^2 of 20% that increases to 32% when employment variables are added.

Low educational and income levels are the factors that have the greatest negative influence on the probability of saving for retirement. Thus, in comparison with people with a higher education, those with only primary or lower have 27.5% less probability of contributing, while in people with secondary education the probability falls by 12.9%. On the income side, people who form part of the three poorest quintiles are less likely to contribute to the pension system, with the probability down 25% in the case of quintile 1, 13% down for quintile 2 and 5.6% down for quintile 3.

Other personal variables that reduce the probability of contributing to the pension system are: being a woman, at 14.7% less probability compared with men; living in a rural zone, at 5% less than in an urban one; belonging to an ethnic group, at 4% less than for individuals not belonging to one; living in households with someone who is retired, at 6.5% less compared with those who do not; and age, where as the age rises there is 0.04% less probability of contributing. It is worth pointing out that these two latter results are different

from those found in other countries, and may be related to the Brazilian policy, which apparently leans more toward solidarity, guaranteeing welfare retirement pensions to elderly adults who have not been able to accumulate savings for their retirement. According to Bertranou and Grafe (2007), in Brazil as adults approach retirement age their jobs become more precarious, so contributions to the pension system are reduced[3]. Given this solidarity, Brazil is the Latin American country with the highest coverage rate for elderly adults (87% in 2002) receiving some kind of benefit.

The personal characteristics that increase the probability of contributing to the pension system are: being married, 5.6% more probable compared with single people; and living in households with underage children, 1.2% more probable than for people who live without people under the age of 18.

It is interesting to point out that all the labour market variables included in the model are statistically significant at 99%, and all reduce the probability of saving in the pension system. Taking dependent employees as a parameter for comparison, independent workers have 24.9% less probability of making contributions, unpaid workers 47.5% and informal workers 49.2% less probability.

By economic sectors, compared with workers in the manufacturing sector, employees in the primary sector (66.6% less), retail trade (10.8% less) and services (9.6% less) all have a lower probability of contributing toward retirement. The result in the primary sector is particularly worth examining, as it is the most negative coefficient in the model and is not comparable with any of the other four countries. However, the data could be overestimated, given that the pension system in the rural Brazilian sector, where agricultural activity is concentrated, is different and does not oblige workers to make contributions from income, while it does receive major financial assistance (Bertranou and Grafe 2007).

Table 1
Probit estimates for the determinants of pension contribution in Brazil

	Contributes to federal, municipal or state social security institution or private funds?					
	Model 1		Model 2		Model 3	
Woman	-.1977109	***	-.1444574	***	-.1469201	***
Age	-.0044626	***	-.0003962	**	-.0004117	**
Rural	-.1183976	***	-.0632394	***	-.0503351	***
Married or with partner	.0647444	***	.0611959	***	.0565172	***
Size of household	.0018043	*	.0024525	*	.0030423	**
Primary education	-.2792839	***	-.264799	***	-.2747477	***
Secondary education	-.1254795	***	-.1259371	***	-.1289511	***
Belongs to ethnic group	-.0411065	**	-.0632347	**	-.0402469	
Household with minor(s)	.0668472	***	.0144115	***	.0127978	**
Household with pensioner(s)	-.1854143	***	-.0625944	***	-.0646418	***
Spending on housing	-2.20e-06		1.23e-06		-.0000112	
Income quintile 1	-.3776296	***	-.3010419	***	-.2498967	***
Income quintile 2	-.2436504	***	-.1649502	***	-.1299526	***
Income quintile 3	-.1303452	***	-.0745007	***	-.0564379	***
Income quintile 4	-.0178017	***	.0074504		.0098407	*
Independent worker			-.2569914	***	-.2496237	***
Unpaid worker			-.4760402	***	-.4749466	***
Informal worker			-.4968831	***	-.4917129	***
Primary sector			-.67049	***	-.6663555	***
Retail sector			-.1185654	***	-.1080489	***
Service sector			-.1041168	***	-.0962311	***
Lives in northern region					-.1688405	***
Lives in north-east region					-.1139732	***
Lives in southern region					.0248047	***
Lives in central region					-.0806546	***
Number of observations	197589		118880		118880	
Joint significance test	Wald chi2(15)=35638.94 Prob > chi2=0,0000		Wald chi2(21)=29928.59 Prob > chi2=0,0000		Wald chi2(25) =30534.21 Prob > chi2=0,0000	
R2	Pseudo R2=0.2024		Pseudo R2=0.3247		Pseudo R2=0.3328	

Source: Author's calculations

3: One hypothesis suggested in Bertranou and Grafe (2007) for this situation is the obsolescence of human capital, the impossibility of receiving welfare pensions when contributing to the pension system, or the preference for the more flexible jobs that are usually available in the informal sector.

In a country the size of Brazil, geography is important. Depending on the geographical division used, residents of the northern, central and north-east regions have 16.8%, 8% and 11.4% less probability of making contributions, taking the south-east region as a reference. Rio de Janeiro and São Paolo are located in the south-east, where most of the manufacturing sector and 42% of the population are concentrated. Using the same parameter for comparison, people who live in the south of the country have 2.5% greater probability of contributing to the system. Examining the reasons that favour contribution in the southern region is beyond the scope of this study, but it should be pointed out that this region has consolidated an industrial park, the population is concentrated in the urban area and a significant proportion are European immigrants or their descendants.

Chile

Personal characteristics are statistically significant in explaining the decision to contribute to the Chilean pension system. In a country with a high contribution level, income is a limiting variable for individuals to contribute to the pension system. That is why belonging to the poorest quintile of the population reduces the probability of contribution by 14%, compared with the richest quintile. As income levels increase, the probability of contributing is greater. This can be seen with the reduction of negative coefficients in the model (*Table 2*).

Other personal variables that reduce the probability of contributing to the pension system by between 1% and 2% are: living in a rural zone, being a woman, having only primary education or less, being married, and belonging to an ethnic group. These coefficients are calculated in comparison with residents in the urban sector, who are single men who do not belong to any ethnic group and who have higher education. An interesting result in the case of Chile is the negative effect of spending on education, although the coefficient is very small (-0.00001%). This would be a reflection of the relative importance that the population gives to private education in this country as a mechanism for economic transition[4].

Labour market variables increase the explanatory power of the model (adjusted R^2 increases from 14.2% to 47.8%). Thus, being bound by a formal contract increases the probability of contributing to the system of retirement savings by 54% compared with workers without a contract. This would be related to labour law, which requires employers to discount and pay the contributions corresponding to their workers into the pension system (Law 3500 of 1980 and its amendments or subsequent implementing regulations). Despite it being mandatory for self-employed workers to make contributions, being independent reduces the probability of them doing so by 3.4%; while the fact of being an employer increases the probability by 2.4%. At the same time, family workers have 25% less probability of making contributions compared with dependent workers.

4: According to the OECD (2011), while in OECD countries private finance of education represents 17.4% on average, in Chile spending by families at all educational levels amounts to 40% of the funding of the educational system. In Mexico this figure stands at 19.5%.

Table 2
Probit estimates for the determinants of pension contribution in Chile

	Has contributed to the pension scheme in the reference year (2011)?					
	Model 1		Model 2		Model 3	
Rural	-0.04257	***	-0.01535	**	-0.01526	**
Woman	-0.22660	***	-0.02315	***	-0.02305	***
Age	-0.00652	***	0.00028		0.00028	
Belongs to ethnic group	-0.03107	**	-0.02104	**	-0.01945	*
Married or with partner	-0.02700	***	-0.01298	*	-0.01284	*
Primary education	-0.09229	***	-0.02442	**	-0.02457	**
Secondary education	-0.03956	***	-0.01055		-0.01056	
Size of household	0.00903	***	0.00195		0.00200	
Household with minor(s)	0.00249	***	0.00087		0.00086	
Household with pensioner(s)	-0.09992	***	-0.01299		-0.01311	
Household receives public transfers	0.01329		-0.02390	***	-0.02355	***
Income quintile 1	-0.28281	***	-0.14960	***	-0.14992	***
Income quintile 2	-0.11428	***	-0.08048	***	-0.08040	***
Income quintile 3	-0.04555	**	-0.06730	***	-0.06695	***
Income quintile 4	-0.05825	***	-0.06797	***	-0.06761	***
Spending on housing	0.0000002	***	0.00000		0.00000	
Spending on education	-0.0000002	***	-0.00001%	**	-0.0000001	**
Bank user	0.13647	***	-0.00361		-0.00343	
Employer			0.02331	*	0.02381	*
Independent worker			-0.03409	**	-0.03408	**
Family worker			-0.25426	***	-0.25465	***
With formal contract			0.53945	***	0.53957	***
Informal worker			-0.01856	*	-0.01873	*
Retail sector			-0.00239		-0.00206	
Service sector			-0.01148		-0.01128	
Primary sector			-0.00561		-0.00498	
Micro-enterprise			-0.02551	***	-0.02538	***
Small company			0.00306		0.00292	
Lives in poorest region					0.00089	
Lives in region with average poverty level					-0.01017	
Number of observations	53142		33492		33492	
Joint significance test	Wald chi2(18)=2512,91		Wald chi2(28)=3907,66		Wald chi2(30)=3913,02	
	Prob > chi2=0,0000		Prob > chi2=0,0000		Prob > chi2=0,0000	
R2	Pseudo R2=0,1425		Pseudo R2=0,4789		Pseudo R2=0,4791	

Source: Author's calculations

With respect to the informality variable, in the case of Chile it only reduces the probability of making contributions by 1.8%. This result may be explained because Chile is one of the Latin American countries with the lowest levels of this indicator. Some estimates put the Chilean working population not in the formal economy at 30%; this figure is lower than Brazil (38%), Mexico (54%), Colombia (56.8%) and Peru (68.8%)[5].

Finally, the size of the company to which the individual is linked has an influence on the probability of the individual making contributions: workers in micro-enterprises have 2.5% less probability of contributing towards their retirement compared with employees in medium-sized or large companies. The variables of geographical location are not significant in Chile. This may be related to its size (only 17 million people), ease of communications and the policy of decentralisation and integration between regions.

5: CEPAL and OIT (2013).

Colombia

The model for Colombia provides the highest level of explanatory power. With the three groups of variables considered, we achieve an adjusted R^2 of 66%, but it is the employment variables that increase this value most (see *Table 3*). Individually, the variables that are relevant in the model, except for the 'spending on housing' variable, are statistically significant to 99%.

The individual characteristics that lower the probability of saving for retirement are: being a woman (6.5% less probable than men) and only having primary education or lower (13.6% less probability than people with higher education). Other common variables that also reduce the probability of making contributions similar to the rest of the countries covered by this study are: living in a rural area (6.5% less probability in comparison with the urban population); having secondary-level education (7.8% less probability than people with higher education); and the size of the household, where with more people in the household the probability of contributing to the pension system reduces by 1.5%. Income is also a major barrier for contributing to the pension system. Compared with the richest population quintile, people in the first three quintiles have less probability of contributing to the pension system (the probability is 13% lower in quintile 1 and 2% lower in quintiles 2 and 3).

With respect to other factors, being married increases the probability of contributing by 5.6%; individuals who live in households with minors increase the probability by 1.5%; while increased age raises the probability by 0.4%. Other variables positively affecting contribution to the pension system are banking use (8.6% more probable compared with those excluded from the banking system); and facility of response to exogenous shocks (such as loss of employment), at 1.8% more probable.

It is worth noting that the labour market variables, such as informality, are the most negative factors affecting pension saving. Being in the informal sector reduces the probability of contributing to the system by 20.7%, with respect to formal workers. This result reflects the importance that informality has in Colombia where, according to the ILO[6], between 57% and 70% of people work in the informal sector. This idea is reinforced by seeing that those who are in vulnerable jobs, self- employed (-12.1%) and unpaid family workers (-14.8%) are also less likely to save for their retirement.

6: According to the Davalos (2013) who cites data of International Labor Organization-ILO, informality in Colombia in 2010 was nearly 70%, while the report by CEPAL and OIT (2013) indicates that urban informality in Colombia stands at 56.8%. DANE (2013) suggests informal employment stands at 49.5%.

Table 3
Probit estimates for the determinants of pension contribution in Colombia

	Has contributed to the pension scheme in the reference year (2011)?					
	Model 1		Model 2		Model 3	
Woman	-.0725382	***	-.0642511	***	-.0645414	***
Rural	-.1080207	***	-.0508095	***	-.0475322	***
Age	.0007015	***	.0039166	***	.0039262	***
Size of household	-.0264152	***	-.0191687	***	-.0152874	***
Married or with partner	.0569933	***	.0539163	***	.0564244	***
Household with minor(s)	.0214324	***	.0168131	***	.014621	***
Primary education	-.3234188	***	-.1329078	***	-.1355141	***
Secondary education	-.2259994	***	-.0788681	***	-.0778521	***
Income quintile 1	-.2637717	***	-.1430441	***	-.1292858	***
Income quintile 2	-.0634356	***	-.0352833	***	-.0220524	***
Income quintile 3	-.0464352	***	-.0377754	***	-.0294098	***
Income quintile 4	.01978	***	-.0016174		.0027492	
Household with pensioner(s)	.0010726		.0034068		-.0037661	
Spending on housing	3.12e-08	***	2.82e-08	***	1.54e-08	
Household receives remittances	-.0457492	***	-.0063311		-.0113148	
Ease of response to shocks	.0433061	***	.0158344	***	.0182796	***
Bank user	.0044164		.1008256	***	.0864614	***
With formal contract			.5806614	***	.5774664	***
Domestic employee or day worker			-.0025779		.0007749	
Independent worker			-.1330025	***	-.1208708	***
Primary sector			-.0257559	***	-.022434	***
Retail sector			-.0087448		-.0032782	
Service sector			.0028286		.0090023	
Informal worker			-.1570865	***	-.2071322	***
Family worker			-.1536112	***	-.1480287	***
Micro-enterprise			-.2621656	***	-.2637815	***
Small company			-.0912806	***	-.0902069	***
Lives in Atlantic region					-.1137441	***
Lives in Pacific region					-.0327507	***
Lives in Oriental region					-.0278123	***
Lives in Central region					.017963	***
Number of observations	311042.00		310645		310645	
Joint significance test	Wald chi2(17) =23997,83		Wald chi2(27)=47087.41		Wald chi2(34)=45377.91	
	Prob > chi2=0,0000		Prob > chi2=0.0000		Prob > chi2=0.0000	
R2	Pseudo R2=0,2339		Pseudo R2=0.6531		Pseudo R2=0.6580	

Source: Author's calculations

Along the same lines as the above, workers in the primary sector and those employed by micro-enterprises and small companies are also less likely to contribute to the pension system. In the case of micro-enterprises, the probability falls by 2.2% compared with workers in the manufacturing sector. By size of companies, the coefficient for micro-enterprises (-26.4%) is the most negative, as it is in all the countries studied. The figures are very important, taking into account that these types of enterprises employ[7] 51% of the working population in Colombia.

In terms of geographical location, in Colombia, residents in the Atlantic, Pacific and Oriental regions are less likely to contribute to pension schemes, compared with those living in Bogota D.C. The coefficients for the Atlantic and Pacific regions are the most negative, at -11.4% and -3.3%, which is reasonable taking into

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7: DNP(2005)

account that these two regions have the highest poverty levels[8]. In contrast, residents in the Central region have a 1.8% greater probability of contributing to the system, which is in line with the fact that the departments with the lowest poverty levels, most economic activity and equality are concentrated in this region.

Mexico

The estimations for Mexico (*Table 4*) show that the personal characteristics that most negatively impact the probability of saving for retirement are: being a woman (-13.7%) compared with men; having only primary education (-17.8%); and having a low income. In Mexico, as in the other countries studied here, being in the poorest quintile is a limiting factor that reduces the probability of making pension contributions by 15.9%. At the same time, while increasing the income quintile reduces the estimated coefficient, it continues to be negative (-7% for quintile 2 and -2.8% for quintile 3). These results are based on a comparison with the richest income quintile.

Living in the rural sector rather than in an urban environment also leads to a lower probability of saving through the pension system, with a fall of 5%. The probabilities are also reduced if the individual belongs to an ethnic group (-3%); if the size of the household is bigger (-2.3%); if he or she receives remittances (-0.001%); or is a beneficiary of public transfers (-0.002%). Although the coefficient for remittances is small, it is worth pointing out that in Mexico remittances are the main source of income[9] for many households, and amounted to 2% of GDP in 2010; those who depend on them may not have sufficient money to save for their own retirement, or may see them as a source of income for retirement.

The personal variables that increase the probability of making contributions to the pension system are: being married (5.47%); living in households with underage (3.25%); using banks (2.28%); and the possibility of responding more easily to external shocks such as losing a job (1.68%). Being older also implies a 0.55% greater probability of saving for retirement. One interesting variable that is only significant and positive in Mexico is living in households that already include one retired person. In this case, the probability of making pension contributions increases by 14.69%. This result may indicate greater incentives to contribute when some family member already benefits from retirement.

8: According to DANE (2012) all the departments in the Atlantic region have a poverty level above the national average and three out of five departments with the highest poverty level belong to this region. The Pacific region has two of the poorest departments in Colombia: Chocó and Cauca.
9: According to the Bank of Mexico (2009), 86.4% of remittances are used to maintain the family.

Table 4
Probit estimates for the determinants of pension contribution in Mexico

	Contribution to mandatory pensions and/or voluntary AFORE					
	Model 1		**Model 2**		**Model 3**	
Rural	-0.13994	***	-0.11099	***	-0.05045	***
Woman	-0.20753	***	-0.13703	***	-0.13733	***
Age	0.00297	***	0.00612	***	0.00585	***
Primary education	-0.28343	***	-0.18370	***	-0.18288	***
Secondary education	-0.07725	***	-0.02792	**	-0.03217	**
Belongs to ethnic group	-0.05999	***	-0.05042	***	-0.03014	***
Married or with partner	0.05552	***	0.05336	***	0.05475	***
Size of household	-0.03325	***	-0.02594	***	-0.02280	***
Household with minor(s)	0.04080	***	0.03413	***	0.03241	***
Household with pensioner(s)	0.14818	***	0.15333	***	0.14694	***
Household receives remittances	-0.00001	***	-0.00001	***	-0.00001	***
Household receives public transfers	-0.00004	***	-0.00003	***	-0.00002	***
Income quintile 1	-0.30226	***	-0.21274	***	-0.15944	***
Income quintile 2	-0.17896	***	-0.09511	***	-0.07068	***
Income quintile 3	-0.09969	***	-0.03975	**	-0.02822	*
Income quintile 4	-0.05296	***	-0.01800		-0.01138	
Spending on housing	0.00000	**	0.00000		0.00000	
Health expenses	0.00000	**	0.00000		0.00000	
Spending on education	0.00000		0.00000		0.00000	
Bank user	-0.11496	***	0.02922	**	0.02276	*
Ease of response to shocks	0.03742	***	0.01645	**	0.01680	**
Independent worker			-0.19722	***	-0.19064	***
Works in family enterprise			0.00437		-0.02892	
Works in NGO			-0.05352		-0.06440	
Works in private enterprise			0.15523	***	0.11694	***
With formal contract			0.32118	***	0.32062	***
Informal worker			-0.22390	***	-0.23423	***
Retail sector			-0.04870	***	-0.05394	***
Service sector			-0.02793	*	-0.03598	**
Primary sector			-0.03841	**	-0.02202	
Micro-enterprise			-0.12311	***	-0.11168	***
Small company			-0.05120	***	-0.04269	**
Lives in town with high level of marginalisation					-0.26982	***
Lives in town with level rate of marginalisation					-0.13978	***
Number of observations	62136		37782		37782	
Joint significance test	Wald chi2(21)=6913,37 Prob > chi2=0,0000		Wald chi2(32)=6205,36 Prob > chi2=0,0000		Wald chi2(34)=6534,05 Prob > chi2=0,0000	
R2	Pseudo R2=0,1957		Pseudo R2=0,3498		Pseudo R2=0,3619	

Source: Author's calculations.

By introducing the labour market variables, it is possible to obtain a more explanatory model (adjusted R^2 increases from 19.5% to 35%). The significant variables reveal that precarious employment has the greatest negative effect on the probability of saving for retirement, so that informal workers reduce this probability by 23.6% compared to workers in the formal sector; self-employed workers by 19.6% compared with dependent workers, and employees of micro-companies or small companies by -11.1% and -4.3% respectively, compared with workers in medium-sized and large companies. In addition, workers in the retail (-5.4%) and services (-3.6%) sectors are also less likely to contribute to the retirement system, compared with employees in the manufacturing industry. Mexicans with a formal employment contract and those who work in private-sector companies are more likely to contribute to the pension system, compared with their peers without a

contract. In the former case, the probability is 32% greater, while in the latter it increases by 11.7% for employees of private-sector companies compared with employees in public-sector companies.

The regional factor in Mexico has been calculated using the CONAPO municipal marginalisation indicator[10]. This indicator classifies municipalities in Mexico as having high, medium or low levels of marginalisation. For this exercise, the high and medium-level marginalisation municipalities are compared with those with low levels of marginalisation. As was to be expected, living in municipalities with a higher level of marginalisation reduced the probability of saving for retirement by 26.98%, while living in zones with a medium level of marginalisation reduced it by 14%, compared with people who live in municipalities with a low level of marginalisation.

Peru

In the case of Peru, age, living with a partner and being in a household with children under the age of 18 increased the probability of paying into a pension scheme by 0.1%, 2% and 1% respectively (see *Table 5*). In contrast, being a woman (-2.7%), living in a larger household (-0.5%) and having a lower income cut the probability of saving. As in the rest of the countries, an individual's income level can be a major barrier to making contributions to the pension system. Compared with the richest quintile, the poorest quintile has 5.9% less probability of making pension contributions; this figure falls to -3.4% for quintile 2 and -2.2% for quintile 3.

In Peru, having only primary education or less reduces the probability of making contributions by 7.5%, and those who have secondary education have 3% less probability of saving for retirement compared with individuals who have higher education. In addition, individuals who use banks have 5.2% more probability of saving for retirement compared with those who have no relationship with financial institutions. Unlike other countries studied, living in a rural area does not have any significant effect.

10: This index is calculated by the National Population Council, using a variety of dimensions: educational level; characteristics of the home; availability of basic services; overcrowding; earth floors; small, dispersed and isolated municipalities; and low monetary income.

Table 5
Probit estimates for the determinants of pension contribution in Peru

	Has contributed to the pension scheme in the reference year (2011)					
	Model 1		Model 2		Model 3	
Rural	-0.03715	***	-0.00348		0.00210	
Woman	-0.06233	***	-0.02689	***	-0.02682	***
Age	0.00077	***	0.00141	***	0.00139	***
Married or with partner	0.02895	***	0.02127	***	0.02155	***
Primary education	-0.16273	***	-0.07531	***	-0.07497	***
Secondary education	-0.09275	***	-0.02894	***	-0.02959	***
Size of household	-0.01104	***	-0.00550	***	-0.00543	***
Household with minor(s)	0.00685		0.00979	**	0.00978	**
Household receives public transfers	0.00000	*	0.00000		0.00000	
Receives remittances	0.00000	***	0.00000		0.00000	
Income quintile 1	-0.11589	***	-0.06103	***	-0.05857	***
Income quintile 2	-0.07775	***	-0.03479	***	-0.03434	***
Income quintile 3	-0.05180	***	-0.02177	***	-0.02172	***
Income quintile 4	-0.02821	***	-0.00960	**	-0.01003	**
Spending on housing	0.00000		0.00001		0.00001	
Health expenses	0.00000		0.00000	**	0.00000	**
Spending on education	-0.00001	*	-0.00001		0.00000	
Household with pensioner(s)	0.01184		0.00678		0.00552	
Bank user	0.07550	***	0.05246	***	0.05211	***
Independent worker			-0.07223	***	-0.07089	***
Family worker			-0.04702	***	-0.04527	***
contract			0.19415	***	0.19306	***
Informal worker			-0.13640	***	-0.13624	***
Primary sector			-0.02187	***	-0.02324	***
Service sector			-0.00686		-0.00598	
Retail sector			0.00664		0.00714	
Micro-enterprise			-0.01790	***	-0.01708	***
Small company			-0.01496	***	-0.01519	***
Lives in Costa region					0.01412	***
Lives in Sierra region					-0.00911	**
Lives in Selva region					-0.01144	**
Number of observations	61898		50721		50721	
Joint significance test	Wald chi2(19)=4,510.70		Wald chi2(28) =8,371.71		Wald chi2(31) =8,361.47	
	Prob > chi2=0.0000		Prob > chi2=0.0000		Prob > chi2=0.0000	
R2	Pseudo R2=0.2110		Pseudo R2=0.5123		Pseudo R2=0.5134	

Source: Author's calculations

The introduction of employment variables increases the explanatory power of the model (adjusted R^2 increases from 21% to 51%) and, except for the employment link through a formal employment contract, the other variables included in the model reduce the probability of contributing to the pension system. The variable with the most negative effect is informality, which reduces the probability of contributions compared with formal workers by 13%. The type of employment situation is also relevant, with less probability for independent workers (-7.1%) and family workers (-4.5%). These figures may be associated with the special characteristics of the Peruvian labour market: first, there is the level of informality in Peru, which is one of the highest in Latin America and the Caribbean, amounting to 68.8% according to ILO figures. Then there is the proportion of 'vulnerable' employment[11], which corresponds to 38.7% of workers (the self-employed, auxiliary family workers, informal salaried workers, subsistence workers). Along the same lines, it is interesting to see

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11: Id., ILO (2013). 2011 data.

that the variable with the greatest positive effect on the probability of saving for retirement is work with a formal employment contract: 19.3% higher than those who do not have this kind of employment guarantee.

By economic sectors, workers in the primary sector have less probability, -2.3%, of making contributions compared with workers in the manufacturing sector. Similarly, it is less probable that employees in micro-enterprises, at -1.7%, and small companies, at -1.5%, make contributions to the pension system compared with workers in larger companies. Meanwhile, in geographical terms, when comparing the different regions with metropolitan Lima, it can be seen that, for those who reside in the Sierra or Selva regions, the probability of making contributions is reduced by 0.9% and 1.1% respectively. In contrast, living in the Costa region increases the probability by 1.4%.

5.2 The relevance of the labour market to the probability of making contributions: a Latin American comparative

Reviewing the results for the region as a whole, some interesting aspects emerge that are worth highlighting. They include how the characteristics of individuals included in national household surveys affect the probability of contributing to a pension scheme. In a way that cuts across the different countries, it can be seen that rural areas have a negative statistical effect on the probability of contributing, except in the case of Peru. The maximum effect can be seen in Colombia, with a reduction of 5% in the probability of saving, compared with living in urban areas. Belonging to one of the native ethnic groups in the country, particularly in the cases of Brazil, Chile and Mexico, has a negative effect on the probability of contributing, with a maximum of 4% in the case of Brazil. Low educational levels also have a significantly negative effect on the factors conditioning contributions to pension schemes, with a reduction in the probability of contributing in all cases, and a maximum impact of 8% in Peru. Being older appears to contribute positively, as it increases the probability of contributing, although the percentage difference is low; this would be in line with the reduced preference for immediate consumption in accordance with the life-cycle theory, although it is only seen in the case of Colombia, Mexico and Peru. However, it is interesting to observe the continued role of gender problems in the region, with negative and statistically significant effects on the probability of saving for retirement, at around 2%, and with a maximum negative effect in Colombia, where the contribution would fall by 6% simply because of being a woman (see *Figure 7*).

Other economic variables are also interesting, such as the case of public transfers, which give a negative and significant result in the cases of Mexico and Chile, at a maximum of 2%. Remittances from abroad, which is an important variable in Mexico, have a significant negative statistical effect only in this country, although with a probability coefficient of less than 1%. Greater access to the financial system is positively affecting the probability of making pension contributions in Peru and Colombia. In contrast, higher spending for house purchase, which could have been thought to have a negative effect as the families may consider it as significant household investment savings, is not statistically significant.

Aspects related to income are therefore important elements that affect the probability of making contributions to pension schemes. It is relevant here to note that the surveys which include a question measuring the ease of response to shocks that a person may experience show that this capacity positively affects the probability of making contributions, and that the results for Colombia and Mexico reveal impacts of around 2% in both cases. Measurement of income, classified by a person belonging to a specific income quintile, shows that the poorest groups have very negative and significant probability coefficients (*Figure 8*). The probabilities of contributions being reduced are above 10% in all the cases of people in quintile 1, with a maximum effect of 25% in the case of Brazil.

However, it is the characteristics of the labour market that present the most relevant and significant probabilistic effects, with a relevant effect in the adjustment of the model (R2) as a whole in all cases

(compare the size of the increase of the R2 in Model 3 with respect to Model 1 and 2 in all the tables). *Figure 9* shows the case of an informal worker, with negative and significant effects on the probability of contributing to a pension scheme, and maximum effects in Brazil of -49% and in Chile of -23%. *Figure 10* shows the situation of workers who have a legal employment contract, which increases the probability of contributing substantially in all cases, particularly in Brazil where this probability is 60% higher. *Figures 11* and *12* include more specific aspects such as being an independent worker, whose greater employment vulnerability means that the probability of contributing reduces in all cases, with maximum effects of -25% and -12% in the cases of Brazil and Colombia respectively; while in the case of workers in micro-enterprises, the effect is also negative in the region, with the highest level in Colombia, at -23%. Also worth noting is that in the case of Chile, being a family worker has a significant negative effect on the probability of contributing, at 25%.

Meanwhile, except for the case of Chile, geographical variables have a negative effect on the probability of making contributions to pension schemes, although they are most significant only in the case of Colombia, Brazil and Mexico.

Figure 7
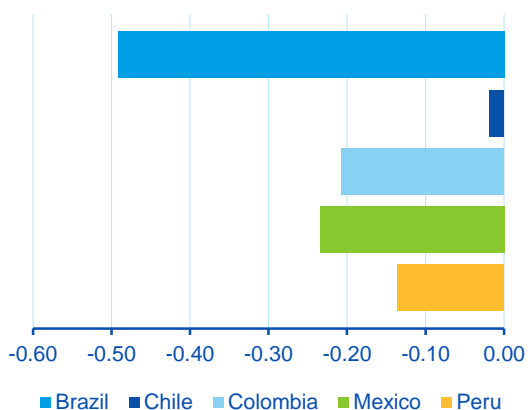**Women contribution probit coefficients**
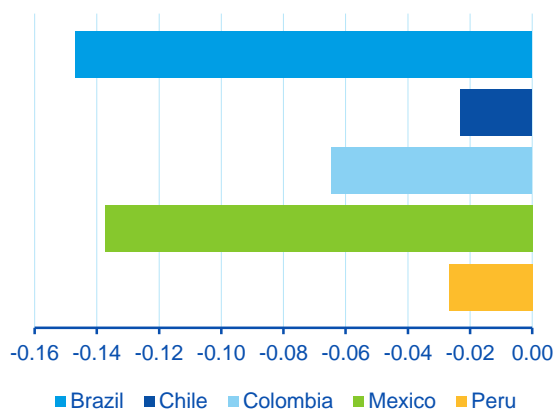
Source: Author's calculations

Figure 8
Poorest income quintiles contribution probit coefficients
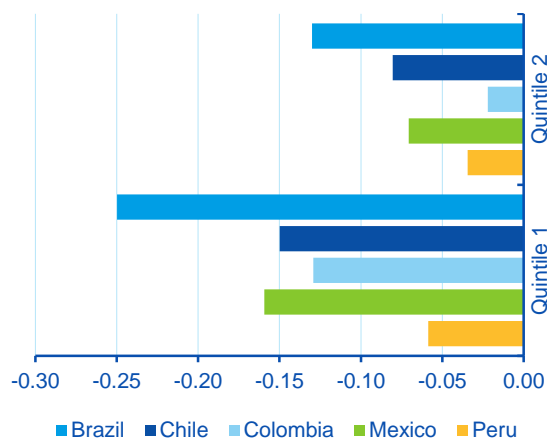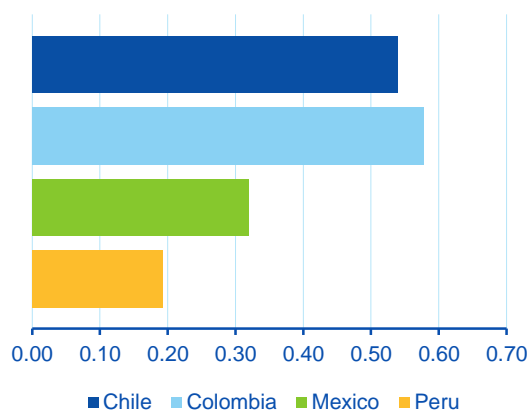

Source: Author's calculations
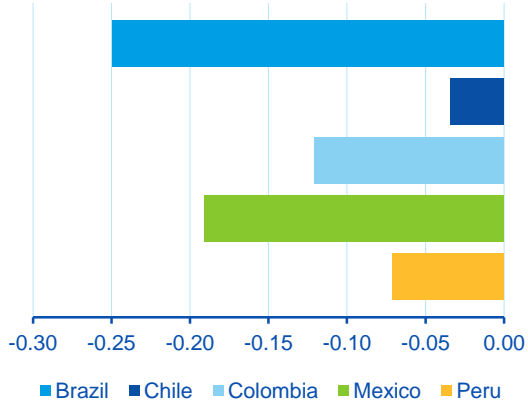
Figure 9
Informal worker contribution probit coefficient

Source: Author's calculations

Figure 10
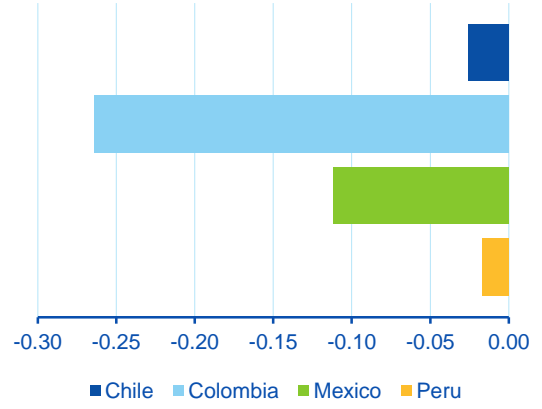**Worker with legal contract contribution probit coefficient**

Source: Author's calculations

Figure 11
Independent worker contribution probit coefficient

Source: Author's calculations

Figure 12
Microenterprise worker contribution probit coefficient

Source: Author's calculations

6 Conclusions

Pension coverage in Latin America continues to be a pending challenge in the region. After approximately twenty years of structural reforms, progress has been minimal. Different studies have identified macro and microeconomic factors behind this reality, but efforts properly to quantify and identify common explanatory variables have been scarce. In this sense, this research has taken advantage of the information that national household surveys have been gradually recording on social security issues. Based on this, the study has designed probit models for each of the five representative countries in Latin America (Brazil, Chile, Colombia, Mexico and Peru) in order to identify individual's conditions that affect the likelihood to contribute to savings for retirement. Three groups of explanatory variables have been included in the models: personal characteristics (age, marital status, education, type of household, income, expenditure, zone of residence); labour market variables (sector, type of company, labour relationship, type of contract, formality); and the geographical dimension.

Some relevant aspects stand out. It can be seen that rural areas have a negative statistical effect on the probability of contributing in most of the cases. Belonging to one of the native ethnic groups has a negative effect on the probability of contributing. Low educational levels also have a significant negative effect on the factors conditioning contributions to pension schemes. Being older appears to contribute positively, as it increases the probability of contributing in the case of Colombia, Mexico and Peru. Also relevant is the continued role of gender problems in the region, with negative and statistically significant effects on the probability of saving for retirement.

Interesting is the case of public transfers, which give a negative and significant result in the cases of Mexico and Chile, and remittances from abroad, an important variable in Mexico, with a significant negative statistical effect. It is also relevant to note that the surveys which include a question measuring the ease of response to shocks that a person may experience show that this capacity positively affects the probability of making contributions. Measurement of income shows that the poorest groups have very negative and significant probability coefficients. Meanwhile, except for the case of Chile, geographical variables have a negative effect on the probability of making contributions to pension schemes, although they are most significant only in the case of Colombia, Brazil and Mexico.

However, labour markets in Latin America seem to be the most important aspect affecting the capacity of individuals to save for retirement. Labour market variables included in each of the country probit models stand out for their explanatory contribution to the estimates and their statistical significance. In those countries where there is a problem of informality, or greater vulnerability of employment (as manifested in more independent employment, family work or belonging to a small firm) the predictive value of the estimation model created increases substantially, as well as the absolute value of the probability coefficients of making contributions to a pension system. The results imply that if we want to achieve substantial improvements in the active participation of workers in pension systems, two actions are probably required: first, in the long-term, to reduce the distortions that may hinder the improvement of how Latin American labour markets operate; second, and simultaneously, to take actions in the short and medium term to adapt the current Latin American to an informal labour market reality. Obviously, how to operate both policies is beyond the scope of this study and a topic for future research.

References

Acosta, O. and J. Ramirez (2004). 'Las Redes de Proteccion Social,' Series Financiamiento del Desarrollo No. 141. Santiago de Chile, Chile: Cepal.

Allen, F., A. Demirgüç-Kunt, L. Klapper and M. Martinez Peria (2012). 'The Foundations of Financial Inclusion: Understanding Ownership and Use of Formal Accounts,' Policy Research Working Paper Series No. 6290. Washington, DC: The World Bank.

Ashraf, N., D. Karlan and W. Yin (2006). 'Tying Odysseus to the mast: evidence from a commitment savings product in the Philipines,' *Quaterly Journal of Economics* 121 (2): 635-72.

Banerjee, A. & E. Duflo (2011). *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty,* New York, NY: Public Affairs-Perseus Group Book

Bassett, W., M. Fleming and A. Rodrigues (1998). 'How Workers Use 401(k) Plans: The Participation, Contribution, and Withdrawal Decisions,' Staff Reports No. 38, March. New York, NY: The Federal Reserve of New York.

Bertranou F. and F. Grafe (2007). 'La Reforma del Sistema de Pensiones en Brasil: Aspectos Fiscales e Institucionales,' Draft not edited No. RG-P1126. Washington, DC: Banco Inter-Americano de Desarrollo.

Beshears, J., J. Choi, D. Laibson and B. Madrian (2008) 'The Importance of Default Options for Retirement Savings Outcomes: Evidence from the United States,' in S. Kay and T. Sinha, eds., *Lessons from Pension Reforms in the Americas.* Oxford, UK: Oxford University Press: 59-87

Beshears, J., J. Choi, D. Laibson and B. Madrian (2010). 'The impact of employer matching on savings plan participation under automatic enrolment' in David. A. Wise, ed., *Research Findings in the Economics of Aging.* Chicago, IL: Chicago University Press: pp. 169-210.

Börsch-Supan, A., M. Coppola & A. Reil-Held (2012). 'Riester Pensions in Germany: Design, Dynamics, Targetting Success and Crowding-In,' in R. Hinz, R. Holzman, D. Tuesta and N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience.* Washington, DC: The World Bank: pp. 81-101.

Bravo, D., J. Eguiguren, T. Rau & J. Vásquez (2008). "Determinantes del Ahorro Previsional

Voluntario en Chile". Departamento de Economía Universidad de Chile. Versión Preliminar. Julio 2008

Bosch, M., A. Melguizo & C. Pages (2013) "Mejores pensiones, mejores trabajos. Hacia la cobertura universal en América Latina y el Caribe". Banco Interamericano de Desarrollo, Washington D.C.

Carranza, L. A. Melguizo & D.Tuesta (2012). 'Matching contributions in Colombia, Mexico and Peru: experiences and prospects,' in R. Hinz, R. Holzman, D. Tuesta and N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience.* Washington, DC: The World Bank: pp. 193-213.

Cepal & ILO (2013). 'Coyuntura laboral en América Latina y el Caribe: Avances y Desafíos en la Medición del Trabajo Decente' Reporte Nº 8, May. Santiago de Chile, Santiago: United Nations-ILO.

Clark, R. & S. Schieber (1998). 'Factors affecting participation levels in 401 (k) plans,' in O. Mitchell and S. Schieber, eds., *Living with defined contribution plans: remaking responsibility for retirements.* Philadelphia, PA: University of Pennsylvania Press: pp. 69-96.

Choi, J., D. Laibson, B. Madrian & A. Metrick (2002). 'Defined Contribution Pensions : Plan Rules, Participant Decisions, and the Path of Least Resistance,' in J. Poterba, ed., *Tax Policy and the Economy*, Vol. 16. Cambridge, MA: MIT Press: pp. 67-113.

Choi, J., D. Laibson, B. Madrian & A. Metrick (2004a). 'Plan design and 401 (k) Savings Outcome,' *National Tax Journal,* 57 (2): 275-98.

Choi, J., D. Laibson, B. Madrian & A. Metrick (2004b). 'Saving for retirement on the path of Least Resistance,' in NBER Papers, Nº NB04-08, Cambridge, MA: National Bureau of Economic Research.

Christiadi & B. Cushing (2007). 'Conditional logit, IIA, and alternatives for estimating models of interstate migration' Research Paper presented at the 46th annual meeting of the Southern Regional Science Association. Charleston, SC, March 29-31.

Correa, G. (2011). 'Un Estudio Empírico sobre el Ahorro Voluntario Previsional,' Tesis de Grado Magister en Economía. Diciembre. Santiago de Chile, Chile: Pontificia Universidad Católica de Chile.

Costa, R. Da, J.R. de Laiglesia, E. Martinez & A. Melguizo (2011). 'The Economy of the Possible: Pensions and Informality in Latin America,' OECD Development Centre Working Paper Nº 295, Paris, France: OECD Development Centre.

Davalos, J. (2013) 'Labor Exclusion and Informality in a Latin American country, a Latent Class model approach,' Presentation in *Jornadas sobre Análisis del Mercado Laboral, 2013*. Bogota: Colombia. http://www.oit.org.ar/WDMS/bib/publ/presentaciones/analisis_mercado_laboral_sep2013/Davalos_informalidad_segmentacion.pdf

DANE-Departamento Administrativo Nacional de Estadística (2013) "Medición del empleo informal y seguridad social" Bogotá. http://www.dane.gov.co/files/investigaciones/boletines/ech/ech_informalidad/re_ech_informalidad_may_jul2013.pdf

DANE-Departamento Administrativo Nacional de Estadística (2011) "Gran Encuesta Integrada de Hogares-GEIH para Colombia" http://formularios.dane.gov.co/pad/index.php/catalog/185

DANE-Departamento Administrativo Nacional de Estadística (2012) "Pobreza en Colombia" press release. 5 May 2012 http://www.dane.gov.co/files/investigaciones/condiciones_vida/pobreza/cp_pobreza_2011.pdf

DNP-Dirección Nacional de Planeamiento (2005) "Censo Económico" https://www.dnp.gov.co/Programas/DesarrolloEmpresarial/MicroPeque%C3%B1asyMedianasEmpresas/Estad%C3%ADsticasyEstudios.aspx

Demirgüç-Kunt, A. and L. Klapper (2012). 'Measuring Financial Inclusion: The Global Findex Database,' Policy Research Working Paper Series 6025. Washington, DC: The World Bank.

Duflo, E., W. Gale, J. Liebman, P. Orzag & E. Saez (2006). 'Saving Incentives for Low- and Middle-Income Families: Evidence from a Field Experiment with H&R Block,' in *Quarterly Journal of Economics,* 121 (4): 1311-1346.

Engelhardt, G & A. Kumar (2007). 'Employer Matching and 401 (k) Saving: Evidence from the Health and Retirement Study,' *Journal of Public Economics,* 91 (10): 1920-1943.

Francke P. & W. Mendoza (2005). 'El Grado de Orientación Pro-pobre de las Políticas Económicas Peruanas: Una Revisión Bibliográfica,*' Revista Economía,* 28 (55-56): 11-82.

Gill I., T. Packard, & J. Yermo (2005). Keeping the Promise of Social Security in Latin America, Washington, DC: World Bank.

Greene, William (2011). *Econometric Analysis*, 7th Edition. Prentice Hall

Hastings, J., B. Madrian & W. Skimmyhorn (2012). 'Financial literacy, financial education and economic outcomes,' Working Paper No.18412, September. Cambridge, MA: National Bureau of Economic Research

Hausman, J. & D. Wise (1976). 'A conditional probit model for qualitative choice: discrete decisions recognizing interdependence and heterogenous preferences'. MIT Working Paper Department of Economics No. 173. Cambridge, MA: Massachusetts Institute of Technology.

Holzmann, R., R. Hinz & D. Tuesta (2012). 'Early lessons from country experience with matching contribution schemes,' in R. Hinz, R. Holzman, D. Tuesta & N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience.* Washington, DC: World Bank: pp. 3-26.

Huberman, G., S. Iyengar & W. Jiang (2007). 'Defined Contribution Pension Plans: Determinants of Participation and Contributions Rates,' *Journal of Financial Services Research,* 31 (1): 1-32.

INEI- Instituto Nacional de Estadística e Informática (2012). 'Encuesta Nacional de Hogares (ENAHO) para Peru' http://www.inei.gob.pe/srienaho/Enaho2012N.asp

INEGI-Instituto Nacional de Estadistica y Geografia (2010) "Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIG) para México"
http://www3.inegi.org.mx/sistemas/microdatos2/micdirecto.aspx?s=est&c=33472

Instituto de los Mexicanos del Exterior (2010). *Remesas.*
http://www.ime.gob.mx/index.php?option=com_content&view=article&id=45&Itemid=382&lang=es

IBGE-Instituto Brasileiro de Geografia e Estatística (2011) "Pesquisa Nacional por Amostra de Domicílios (PNAD) para Brasil"
http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2011/default.shtm

Kay, S. & T. Sinha (2008). 'Overwiew: Lessons from Pension reforms in the Americas,' in S. Kay and T. Sinha, eds., *Lessons from pension reforms in the Americas.* Oxford, UK: Oxford University Press: pp. 6-21.

Karlan, D, M. McConnelly & S. Mullainathanz (2010). 'Getting to the Top of Mind: How Reminders Increase Saving". Working Paper No. 16205. Cambridge, MA: National Bureau of Economic Research.

Kast, F., S. Meier & D. Pomeranz (2012). 'Under-savers Anonymous: Evidence on Self-help Groups and Peer Pressure as a Savings Commitment Device,' IZA Discussion Paper No. 6311. Bonn, Germany: Institute for the Study of Labor.

Levy, S. (2008). Good intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico, Washington, DC: Brookings Institution Press.

Lederman, D., N. Loayza, & R. Soares (2005). 'Accountability and Corruption: Political Institutions Matters,' *Economics and Politics*, 17 (1): 1–35.

Loayza, N. (2008). 'Causas y consecuencias de la informalidad en el Peru,' *Revista de Estudios Económicos del Banco Central de Reserva del Peru*, 2013 (15): 43-64.

Madrian, B. (2012). 'Matching contributions and savings outcomes: a behavioral perspective,' in R. Hinz, R. Holzman, D. Tuesta & N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience.* Washington, DC: World Bank: pp. 289-310.

Mesa-Lago. C. (2008). 'Social Insurance (Pensions and Health), Labour Markets and Coverage in Latin America,' Social Policy and Development Programme Paper No.36, August. Washington, DC: United Nations-Research Institute for Social Development

Ministerio de Desarrollo Social de Chile (2011) "Encuesta de Caracterizacion Socioeconómica Nacional (CASEN) para Chile" http://observatorio.ministeriodesarrollosocial.gob.cl/casen/casen_usuarios.php

Mitchell, O. & S. Utkus (2004). 'Lessons from Behavioural Finance for Retirement Plan Design,' in O. Mitchell and S. Utkus, eds., *Pension Design Structure, New Lessons from Behavioural Finance.* Oxford, UK: Oxford University Press: pp. 3-42.

Mitchell, O, S. Utkus, T. Yang (2007). 'Turning workers into savers? Incentives, liquidity and choice in 401 (k) plan design,' in *National Tax Journal,* 60 (3): 469-89.

Mills, G., W. Gale, R. Patterson, G. Engelhardt, M. Eriksen & E. Apostolov (2008). 'Effects of Individual Development Accounts on Asset Purchases and Saving Behaviour: Evidence from Controlled Experiments,' *Journal of Public Economics*, 92 (5-6): 1509-1530.

Palacios, R. & R. Sane (2012). 'Learning from the Early Experience of India's Matching Defined Contribution Scheme,' in R. Hinz, R. Holzman, D. Tuesta and N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience*. Washington, DC: The World Bank: pp. 243-260.

Pizarro, E. (2008). 'Ahorro Privado en Chile: Un Análisis Microeconómico,' Tesis para optar al Título de Ingeniero Comercial, Mención Economía. Facultad de Economía y Negocios. Escuela de Economía y Administración. Universidad de Chile.

Rashbrooke, R. (2012). 'New Zealand´s Experience with the KiwiSaver,' in R. Hinz, R. Holzman, D. Tuesta & N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience*. Washington, DC: The World Bank: pp. 103-132.

Roa, J. (2013). 'Financial Education and Behavioral Finance: New Insights into the role of information in financial decisions,' in *Journal of Economic Surveys,* 27 (2): 297–315

Rofman, R., L. Lucchetti & G. Ourens (2008), 'Pension Systems in Latin America: Concepts and Measurements of Coverage,' Social Protection and Labour Discussion Paper No. 0616. Washington, DC: The World Bank.

Saavedra, J&M. Torero (2000). 'Labor Market Reforms and Their Impact on Formal Labor Demand and Job Market Turnover: the case of Peru,' Working Papers-Research Network No. R-394. Washington, DC: Inter American Development Bank.

Soman, D. & A. Cheema (2011). 'Earmarking and Partitioning: Increasing Saving by Low-Income Households,' *Journal of Marketing Research,* 48 (1): 14-22.

Subsecretaría de Previsión Social (2013). 'Encuesta de Protección Social'
http://www.previsionsocial.gob.cl/subprev/?page_id=7185

Tuesta, D. (2011). 'A Review of the Pensions Systems in Latin America,' BBVA Research Working Papers No. 1/15. Madrid, Spain: BBVA Research.

Whitehouse, E. (2012). 'Policies to encourage private pension savings: evidence from OECD countries" in R. Hinz, R. Holzman, D. Tuesta and N. Takayama, ed., *Matching Contributions for Pensions: A Review of International Experience*. Washington, DC: The World Bank: pp. 27-50.

Ziegler, A. (2010). 'Individual characteristics and stated preferences for alternative energy sources and propulsion technologies in vehicles: a discrete choice analysis'. Working Paper No. 10/125, March. Zurich, Switzerland: CER-ETH – Centre for Economic Research at ETH.

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