Poverty Risk at Old-Age: the Role of Private Retirement Incomes

Najat El Mekkaoui De Freitas[1], *Paris Dauphine University, LEDa-DIAL*
Bérangère Legendre[2], *University of Savoie, IREGE*
Gordon Clark[3], *Oxford University*

Preliminary draft

May, 2013

Abstract

In the context of pension reforms, the risk of poverty among elderly people is expected to increase. A complementary retirement income source could help alleviate this trend. Using an original representative French household survey, we study the relationship between old-age exposure to poverty and different private retirement income sources, controlling by socio-demographics characteristics among retirees.

Using a bivariate probit model, we show that old age exposure to poverty and the probability to receive a private retirement income are interrelated. Annuities from individual pension plan and property incomes are key feature to reduce the risk of poverty. Nonetheless, incomes from occupational savings contract seem to impact more strongly this risk.

JEL classification: D10, P46, O52.
Keywords: private retirement income, households behavior, poverty.

1 Email: najat.el-mekkaoui@dauphine.fr

2 Email : berangere.legendre@univ-savoie.fr

3 Email : gordon.clark@ouce.ox.ac.uk

Introduction

We study the risk of poverty according to assets holding behavior among elderly people in France. In France, in 2010, the at-risk-of-poverty rate[4] of elderly people (people aged 65 and over), amounted to 10%. In the context of pension reforms, we hypothesize that the risk of poverty among elderly people will increase in the case of pension cuts. We assume that a complementary retirement income source could prevent anincrease in the poverty risk among pensioners. According to the OECD (2005) increased retirement savings are urgently needed, particularly in countries where the benefits from a Pay-As-You-Go (PAYG) pension system are due to decrease. Reforms that have been undertaken in many OECD countries have cut benefits and will lead to lower expenditures on public pensions. Major reforms have been introduced in most OECD countries where public pension spending is projected to rise. Indeed, over the period 2004-2050, public pension spending is projected to rise by 2.3 % of GDP on average in the EU15 Member states despite pension reforms. In 2015, in France, Portugal, and Italy, the public spending could represent respectively 14.8%, 20.8% and 14.7% of GDP (Salomäki, 2006). In these countries, the pension systems are public and earnings-related.

To face the significant challenge of increasing public expenditures on pensions, pension reforms encouraging private pension funding are being carried out in OECD countries. Pension reforms in the United Kingdom differ from those in most other European countries. Funded pensions have already been largely developed in the United Kingdom. Thus, pension reforms in the UK are more focused on providing adequate pensions for low income earners, who are more affected by the low replacement rate of the first pillar. In Germany, the 2001 reform brought changes in the first pillar pension levels through the introduction of the sustainability factor and through the development of supplementary pension schemes, notably the creation of the strong state-supported *Riester rente*. By 2008, there were 12 million Riester annuities contracts, for a population of 35 million insured. In France, the situation is quite different as funded pensions are more recent: individual and professional pension plans[5] were introduced only in 2003. The 2003 Pension Reform (Fillon Law of 2003) increased the required contribution period and attempted to harmonize the private and public sector pension regimes. The reform also strongly

---

[4]Defined by Eurostat as the share of persons with an equivalent disposable income before social transfers below the risk-of-poverty threshold set at 60% of the national median equivalized disposable income after social transfers.

[5] These private plans are called " Plan d'épargne retraite entreprise " (PERE) and " Plan d'épargne pour la retraite collectif " (PERCO)

pushed for an increase in the importance of the second and third pillars. The introduction of new private savings vehicles encouraged employers to motivate their employees to save for retirement. Important tax benefits were introduced in order to develop the private savings schemes. Company contributions were exempted from taxes and individuals were placed under "unique" tax regimes and personal retirement plans.

Reforms will increase the extent to which individuals are responsible for their retirement income. Low-income earners and women are particularly vulnerable during their working life and then during their retirement period. Over the past decades, we observe that French households have typically made long-term investments via life endowment contracts, also called "life insurance" in France. However, they more rarely invest in individual retirement savings products.

In France, the pension system used to offer high replacement rates, and people were not accustomed to save for maintaining their standards of living during retirement. One has to understand the French mindset: a high proportion of older workers consider that they signed a social contract with the welfare state. They contributed to a system promoting intergenerational risk sharing. As a result, they do not understand why the rules are changing. Only the youngest cohorts of workers seem to be aware of the demographic and economic constraints that the system is facing.

It justifies our important and actual issue: if we understand how incomes from different retirement savings contracts may influence the risk of being in poverty in France, we will be able to provide retirement policy recommendations. Using an original representative French household data, we define econometric specifications to estimate the role of incomes from different assets in reducing the exposure of current pensioners to poverty.

This paper comprises four sections. After introducing the subject, we conduct a literature review and show how our paper complements the existing literature on poverty during retirement. Then we enumerate several facts about poverty and private pension holding in France. Third, the econometrics estimates are presented. Finally, we conclude and present some policy recommendations.

I. Poverty risk, retirement and assets accumulation: a literature review

The elderly, including particularly widows and widowers and the disabled, usually face a higher risk of being in poverty than other citizens. An abundant literature puts into perspective this overexposure in many countries. However, researchers also underline the decline of this type of poverty through retirement-related spending programs (Albuquerque et al., 2006; Rupp et al., 2003; Engelhardt and Gruber, 2004, Franco et al., 2008). Poverty during retirement is no longer the major issue of retirement policies in developed countries, as the standard of living improved. Engelhardt and Gruber (2004) arrive at the conclusion that the growth of social security directly explains the decline in poverty among the elderly in the post-World War II period.

However, older widows, divorcees and single women experience the highest risk of poverty in many countries (Smeeding and Williamson 2001). Female poverty status remains a concern in rich societies. Smeeding and Sandstrom (2005) establish that poverty is especially a problem for the oldest women who are living alone. Different specific factors impact the female poverty risk, but widowhood is a major cause of poverty among older women (Burkhauser et al., 2003; Yamada and Casey, 2002). Women often earned lower wages than their husbands, spent fewer years in the labour force, and experience a longer life expectancy, implying a high risk of becoming a widow (Rupp et al., 2003). In OECD countries, older women experience a poverty rate of about 15%, compared with 10% for men (Zaidi, 2012). In only a few countries is the poverty rate higher among older men than among older women: New Zealand, The Netherlands, Luxembourg.

In the United States and the United Kingdom, the oldest pensioners experience a higher poverty risk than do younger cohorts of retirees. In the United States, when men and women age, the differential in the poverty rate between both increases. Low levels of social and income-tested benefits account for the higher risk for women in English speaking countries (Smeeding and Williamson, 2001).

In Italy the high share of public spending devoted to the elderly has allowed them to fare relatively well. Franco et al. (2008) show that the economic conditions of pensioners vary substantially with age, gender, region and family characteristics. Pensioners are on average less frequently poor than are younger cohorts, but some of them experience severe poverty. The authors put into perspective the risks run by the young generations whose job quality and entry

salaries are lower. The pension reform of 1992 could increase the risk of future poverty for these current young cohorts. They conclude that the aim of poverty reduction should be pursued through other expenditure programs.

By contrast, the incidence of poverty is higher for retirees than for not retired people in Portugal. According to Albuquerque *et al.* (2006), retirement is still associated with a high risk of becoming poor. The oldest cohorts of pensioners are poorer, whereas younger cohorts are better protected. This is due to the fact that many individuals do not meet the requirements for entitlement to social security retirement benefits.

According to Zaidi (2012), 9 OECD countries[6] experience a low poverty rate (less than 6%) among people aged of 66 and over. In general, when this poverty rate is low, the corresponding rate among the working age population is considerably higher[7]. Ten countries[8] have a lower-than-average poverty rate (7% to 13%) and eleven[9] have a higher-than-average poverty rate (above 15%).

In earlier articles, Bernheim *et al.* (2001), Hausman and Paquette (1987), Bernheim (1993) suggested that workers do not save enough to maintain their consumption level during retirement. According to Love et al. (2007), when considering the value of social security and welfare benefits, 12% of American households do not have enough wealth to finance consumption at the poverty level.

Some countries are better able to maintain the relative living standards of older citizens. In France, we know from the National Statistics Office (INSEE) that current retirees have on average the same standard of living as the working age population. The redistributive architecture permits a reduction in the pensioners' vulnerability to poverty and inequality. But recent reforms will increase the extent to which individuals are responsible for their retirement income. People just about to retire and younger cohorts might not have saved enough and not have anticipated the consequences of these reforms. Consequently, the risk of poverty among elderly people is expected to increase. We know from the literature (Rupp, Strand, and Davies, 2003; Davies and Favreault, 2004) that targeted income transfer program[10] help to reduce the

---

[6] The Slovak Republic, Iceland, Poland, Hungary, Canada, Luxembourg, the Czech Republic, the Netherlands and New Zealand

[7] New Zealand and Poland

[8] Belgium, Italy, Finland, the United Kingdom, Denmark, Germany, Norway, France, Sweden and Austria

[9] Ireland, Mexico, Australia, the United States, Greece, Japan, Switzerland, Portugal, Spain and Turkey

[10] Using simulations, Rupp, Strand and Davies show that the Supplemental Security Income programme in the United States quite efficiently targets benefits to poor elderly people and more specifically older widows.

depth of poverty in vulnerable populations, such as older women. We hypothesise that retirement savings contracts could reduce the risk of poverty. The promotion of investment in institutional private savings could provide supplemental retirement income in retirement. However, less is known about the role of assets and income from savings in protecting the most vulnerable against a fall in the standard of living: the literature reports on the one hand the risk of poverty among pensioners in different countries, and on the other hand several researches have been devoted to the topic of holding of assets generally, and retirement savings contracts especially. We propose in this paper to bridge the gap between these two important issues and to show the relationship between the risk of being in poverty in retirement, and incomes from assets.

In the US, 33.9 % of families report that the primary savings motive is retirement related (Bucks, Kennickel, Mach and Moore, 2009). Saving for retirement has increased substantially since 1995 in the US. In France, in recent decades, we observed that households tend to make long-term investment by contracting life endowment contracts. However, they more rarely invest in individual retirement savings products. In 2004, 44% of French households held long term assets (endowment contracts or retirement savings). The primary motive to save through a life endowment contract is for retirement planning (28% of annuities holders) (Darmon and Pagenelle, 2005). In 1992, 12.3% of French households held at least one retirement-related financial asset. In 2004, this had risen to 15.1% (Brun-Schammé and Duée, 2008).

Life endowment contracts are typical French long-term savings vehicles. These contracts are also called "life insurance"[11]. These are savings products over a single period, with the tax benefits of insurance. Life endowment contracts allow funds to grow while maintaining a long-term goal: retirement, investment in real estate, etc. They also offer significant tax advantages for heirs. At the end of the contract, the beneficiary may receive an annuity or a capital.

To face the significant challenge of increasing public expenditures on pensions, pension reforms encouraging private pension funding and retirement savings have been also recently implemented in France[12]. French funded pensions are very recent. Individual and professional pension plans were introduced only in 2003. These private plans are the "Popular retirement savings plan" (Plan d'épargne retraite populaire, PERP), "Corporate retirement savings plan" (Plan d'épargne retraite entreprise, PERE) and "Collective retirement pension plan" (Plan d'épargne pour la retraite collectif, PERCO). The PERP is an individual retirement savings contract, the PERE and the PERCO are two professional retirement savings contracts. Among

---

[11] To avoid confusion in the article, we use the terms "life annuity" or "life endowment contracts".
[12] For a description of the French pension system, see Annex 1.

other measures, the 2003 and 2010 pension reforms increased the required contribution period and attempted to harmonize the private and public sector pension regimes. The reforms also strongly pushed for an increase in the importance of the second and third pillars. The introduction of new private savings vehicles in 2003 encouraged employers to motivate their employees to save for retirement. Important tax deductions were introduced in order to develop the private savings schemes.

We observe a strong intergenerational imbalance among the French: the standards of living of older citizens and their assets rose while the situation of working households deteriorated. Young families need to wait longer before becoming homeowners. Simultaneously, assets accumulated by households aged 50 and over increased. However, higher retirement savings are urgently needed, particularly in countries where benefits from a Pay-As-You-Go (PAYG) pension system are scheduled to fall. Reforms that have been undertaken in many OECD countries cut benefits and lead to lower pension expenditures. In France, despite a high household savings rate, inequalities in retirement planning remain. Among the 50-70 age group, we observe substantial differences in accumulation. Some households retire with a high level of financial and non-financial level of assets (Arrondel, Masson and Verger, 2008), while others did not save enough to maintain their standard of living during retirement.

In France, asset-holding behavior with a retirement related motive is consistent with the life cycle hypothesis. Using the French wealth survey (Patrimoine) of 1992, 1998 and 2004, Brun-Schammé and Duée (2008) distinguish the age effect from the cohort effect by examining long term asset holdings for several cohorts. The holding rate for a retirement motive increases significantly among households until the age of 60. The highest holding rate is observed for households headed by a 60 year-old individual. Subsequently, the holding rate falls to 5% for households aged 72 years. However, the possession of such long-term assets for any motive (i.e. not just for retirement) decreases only very slightly after the age of 55. The authors conclude that very few households liquidate their retirement related wealth, but rather change their holding motive. They keep their wealth but for other reasons (bequests, disability risk, tax deductions). It appears that retirement-related saving behavior depends strongly on age and the professional status. However, financial long term assets holding behavior, for any motive, depends significantly on the level of income (Brun-Schammé and Duée, 2008).

Girardot and Marionnet (2007) identify three factors that most influence the type of asset holding: age, revenue, and the total amount of assets. These factors are commonly cited in the literature. In addition to considering age and revenue, Chaput and Salembier (2011) acknowledge the importance of one's profession, family background, and even events during

youth,

money to acquire professional advice. Households that do not have much to invest may not find the benefits worth the cost.

Since Brun-Schammé and Duée's article, new data on holding behavior, including of the recent individual and professional pension plans, the PERP and the PERCO, have been published. At the end of 2010, 2.12 million individuals held a PERP[13], and 690 000 a PERCO (INSEE, 2013). Introduced in 2003, the number of employees covered by the PERP rose by of 13.3% between 2006 and 2010 (INSEE, 2013), and by the PERCO by 243%. 169 000 wage earners held a PERE in 2010. The French statistical office estimates that the number of employees covered by the PERE rose by 27% between 2006 and 2010. Before the implementation of these retirement pension plans, the possibility of saving retirement through a funded pension plan concerned only few professional categories, mainly executives. Being a collective professional pension plan, the PERCO concerns all employees, whereas the PERP concerns all working individuals. The PERP and the PERCO are defined contribution contracts. Thirty percent of the PERP holders belong to the 40-49 age group, and 35% of the PERCO holders belong to the 50-59 age group.

II. Assets holding among French pensioners and poverty risk

II.1 Survey and methods

We use the latest household survey (The Wealth Survey) conducted in France in 2009-2010 by the French National Institute of Statistics and Economic Studies - *Institut National de la Statistique et des Etudes Economiques* (INSEE). The database includes a representative sample of the French population, consisting of 35729 individuals, within 15006 households. The wealth survey is particularly informative about the financial and non-financial assets of the households, and questions individuals on their income, age, professional category, education/training, marital situation, and work status (active, inactive, retired). Furthermore, the survey also includes the type of asset held by the household (checking account, savings account, real estate, corporate savings, etc.). Retirement pensions, both state and private (type and amounts by range), are also reported.

---

[13] There are about 28,3 million active individuals in France, including Employed and Unemployed. The French statistical Office estimates that 2.9 million workers are covered by an individual and voluntary pension contract (PERP, specific contracts for civil servants, ..)

To calculate the risk of poverty we use the income of elderly households over the twelve months prior to the survey. The survey gives no information about redistribution. Consequently, the income variable excludes redistribution. Each member of the household is assigned an income calculated using an equivalence scale. The economies of scale in housing and the consumption of goods and services are considered by controlling for household composition[14]. We assign the value of 1 to the head of household, 0.5 to each additional adult member and 0.3 to each child[15]. This methodology has the advantage of illustrating more precisely the living standard of individuals belonging to a household and allows us to examine well-being.

To capture the exposure to poverty among retirees, we use the Foster- Greer-Thorbecke index (Foster, Greer and Thorbecke, 1984):

$$P_\alpha(y,z) = \frac{\sum_{i=1}^{q}\left(\frac{(z-y_i)}{z}\right)^{\alpha}}{N}$$

where z is the exposure-to-poverty threshold within the total population, defined as 50% of the median equivalent income before redistribution, y_i the average income of individual i of the number of individuals with income at or below the poverty line, N the total population in the sample, and α the sensitivity aversion parameter. If $\alpha = 0$, $P_\alpha(y,z)$ provides the poverty rate, measuring the incidence of the exposure to poverty. The poverty gap (for $\alpha = 1$), defines the difference between the average income of poor families and that at the poverty line, and is a measure of intensity of poverty. Finally, when $\alpha = 2$, the index measures the income distribution among the poor. The higher the value, the greater the proportion of the very poor. We focus in the econometric analysis on the exposure-to-poverty rate.

II.2 Statistical analysis

In France, recent statistical analyses show that current retirees do not have a lower standard of living than active individuals (COR, 2008). Table 1 reports income per consumption

---

[14] Part of the existing literature underlines the potential asymmetry in the management of and access to the household's resources (Browning, Bourguignon, Chiappori and Lechene, 1994; Roy, 2005; Belleau et Proulx, 2010, 2011). Nevertheless, assuming that most households share and manage their income fairly, we deflate household resources by the number of consumption units in the household.

[15] Are considered as children people under 14.

unit (PCU) before redistribution within the whole population, compared with retirees' income PCU. There are no significant differences, except for the richest 20%. The richest 20% among retirees earn 49595 euros PCU whereas this income amounts to 56391 for the richest 20% among the whole population (See Table 1).

Only few current pensioners receive an annuity in addition to their social security pensions: on average, 13.5% receive an annuity from an individual retirement savings contract, and 7.8% from an occupational pension plan. For the richest 20%, these proportions rise to 18.5 and 13.6% (See Table 1).

Table 1 Equivalent households' Income before social benefits and assets holding by quintile

	Quintile					
	1	2	3	4	5	
Average income per CU within the population	4304	11603	17022	24242	56391	N=136951
Pensioners' average income per CU	3891	11619	17018	24261	49595	N=3421
Exposure-to-poverty threshold	7920					N=13681
Proportion of retirees receiving an annuity from an individual retirement savings contract	8,07%	10,6%	10,8%	13,1%	18,5%	
Average proportion of retirees receiving an annuity from an individual retirement savings contract in the sample	13,5%					N=3343
Proportion of retirees receiving an annuity from a professional retirement savings contract	4%	4,3%	8%	7,9%	13,6%	
Average proportion of retirees receiving an annuity from a professional retirement savings contract in the sample	7,8%					

Proportion of retirees receiving a property income	18,9%	28,2%	22,08%	24,7%	46,2%
Average proportion of retirees receiving a property income in the sample	28,5%				
Proportion of retirees receiving a life annuity	4,2%	5,04%	6,67%	7,9%	8,9%
Average proportion of retirees receiving a life annuity in the sample	6,7%				

Source: Authors' calculations, Wealth Survey 2009-2010, INSEE

We know from the literature that the French prefer life endowment contracts to prepare for retirement. However, only 6.7% of current retirees receive an annuity from such a contract (See Table 1).

Brun-Schammé and Duée (2008) showed that the holding of life endowment contracts decreases only very slightly at old ages. Households keep their wealth for different reasons (bequests, disability risk, tax deductions). This behavior probably explains that although people prefer saving via life endowment contracts for retirement, they do not really use their contracts to have an additional source of retirement income.

We highlight different interesting trends of poverty exposure by age (Table 2). Firstly, we observe that the poverty rate is lower for retirees than for workers. Secondly, among the elderly, the poverty rate is higher at the oldest ages. We observe the same trend when looking at the depth of poverty.

Table 2 Foster, Greer and Thorbecke's indicator according to age

	Exposure - to - poverty rate	Exposure - to - poverty gap	Squared exposure - to - poverty gap
20-59	15,57%	8,63%	0,063
60+	17,72%	11,55%	0,091
60-69	11,85%	7,77%	0,061

70-79	18,12%	12,06%	0,0978
80+	23,5%	16,69%	0,1363
Population	17,84%	10,15%	0,0753

We consider 3 types of additional incomes during retirement in the econometric specifications: an income from an individual contract (PERP, etc.), including individual retirement savings accounts and life endowment contracts, from a collective/occupational retirement contract (PERCO, PERE, etc), and from property, including housing and land revenues.

The exposure to poverty is lower for retirees having these kinds of additional income (Table 3). However, receiving an income from a collective retirement contract and/or from property seems to protect more efficiently against being in poverty than for other types of contract. For instance, the exposure-to-poverty rate is 10.81% for retirees having an annuity from a collective retirement contract against 16.76% for those who do not receive such a kind of additional income (Table 3). Retirees receiving an annuity from an individual retirement contract are 15.27% below the poverty line.

These previous results are reinforced when we observe the depth of poverty (Table 3). Indeed, the poverty gap is much lower for retirees having an annuity from a collective retirement contract and/or from property incomes. The gaps attain 7.99% and 7.57%, respectively. The lowest poverty severity concerns retirees having collective contracts (0.0625) and property (0.0597).

Table 3 Foster, Greer and Thorbecke's indicator according to holding

	Exposure - to - poverty rate		Exposure - to - poverty gap		Squared exposure - to - poverty gap	
	Receive	Do not receive	Receive	Do not receive	Receive	Do not receive
Annuity from an individual retirement contract	15.27%	16.48%	10.39%	11.13%	0.0825	0.08987
Annuity from a collective retirement contract	10.81%	16.76%	7.99%	11.27%	0.0625	0.091

Annuity from an individual life endowment contract	14.30%	16.45%	9.06%	11.15%	0.0666	0.0902
Property income	12.19%	17.25%	7.57%	11.81%	0.0597	0.0954

Source: Authors' calculations, Wealth Survey 2009-2010, INSEE

III. Econometric analysis

III.1 The models

We estimate the probability of exposure to poverty among French retirees, taking into account the impact of retirement income variables (annuities from an individual retirement contract including life endowment contracts, from a collective contract, and property incomes), and controlling for several socio-demographic characteristics.

In a first step, we test univariate probit models explaining the probability of being exposed to risk of poverty, formulated as:

$$y_i^* = \alpha_{1,i} IC_i + \alpha_{2,i} CC_i + \alpha_{3,i} PI_i + \alpha_{4,i} X_i + u_i$$

$$u_i \sim N(0,1)$$

Where :

$$y_i^* \begin{cases} 1 \text{ if the per consumption income is under the exposure-to-poverty line} \\ 0 \text{ if the per consumption income is above the exposure-to-poverty line} \end{cases}$$

IC_i is a binary variable representing the probability for an individual i to receive an annuity from an individual contract, including an annuity from a life endowment contract, CC_i the probability to receive an annuity from a collective/occupational pension plan, and PI_i to

receive an income from property. X_i is the covariate vector, including several socio-demographic characteristics impacting the risk of poverty.

 In a second step, we run a recursive bivariate model to deal with a possible endogeneity bias of the variables representing supplementary incomes from private sources (annuity from an individual pension contract, annuity from an occupational pension contract and property incomes). The variable determining the occurrence of poverty is assumed to be impacted by the binary variable representing the receiving of private supplementary income sources. As we hypothesized, the risk of being poor may be influenced by unobserved characteristics impacting also the probability to receive an annuity from a private pension and/or property incomes, we expect the covariance matrix of the two error terms (u_i) to be significantly different from zero.

We estimate the following model:

$$
\begin{cases}
y_1 = \alpha y_2 + X_1 \beta_1 + u_1 \\
y_2 = X_2 \beta_2 + Z \gamma + u_2
\end{cases}
$$

Where y_1 represents the probability of being poor and y_2 the probability to receive a supplementary income source during the retirement. X_i are the vectors of explanatory variables, Z the instruments, and u_i the error terms. This model is performed using first the probability to receive an annuity from an individual retirement savings contract as dependant variable in the second equation ($y_2 =, IC_i$), then using the probability to receive an annuity from a collective pension plan ($y_2 =, CC_i$), and to finish using the probability to receive an income from property ($y_2 =, PI_i$).

The error terms follow a standard multivariate normal distribution, where V represents the residual covariance matrix, with ρ as the correlation coefficient.

$$\begin{pmatrix} u_1 \\ u_2 \end{pmatrix} \to N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, V\right)$$

$$V = \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}$$

The parameters of the second equation are not identified unless at least one instrument (Z) is included in the second equation (Maddala, 1983). The parameters chosen should respect the following properties:

$$Cov(y_2, Z) \neq 0$$

$$Cov(Z, u_1) = 0$$

We retain 2 instrumental variables: the first variable consider the highest level of diploma and the second one indicates if he/she holds a pure life insurance[16]. In probit estimates, the highest level of diploma variable is not statistically significant, whereas the binary variable representing the absence of diploma strongly impacts the exposure to poverty. Consequently, having a diploma does not seem to protect current retirees against the poverty risk. However, having no diploma induces a higher exposure to poverty.

The second instrument is a dummy variable representing the holding of a voluntary life insurance. A voluntary life insurance is not a savings vehicle, but might indicate if the individual is risk averse. We assume that both instruments do not affect directly the risk of being poor.

III.2 Variables definitions

Private retirement incomes

The pension system used to offer high replacement rates, and people were not used to save for maintaining their standard of living during retirement. Understanding how private pensions affect the exposure to poverty before redistribution will allow promoting some savings vehicles for young workers. We consider in our regressions dummy variables for people receiving annuities from individual retirement savings contracts, occupational retirement savings contracts, and incomes from property.

---

[16] We refer pure life insurance, the same asset that in other countries, protecting against death.

The dummy variable "annuity from an individual retirement savings contract" includes incomes from PERP and contracts already existing before the 2003 reform[17], but also incomes from life endowment contracts. Annuities from the PERCO and the PERE are recorded in the variable "annuity from an occupational retirement contract", as well as older devices[18].

We also consider property incomes. According to Williamson and Smeeding (2004), home ownership may be a particularly important factor in avoiding poverty in old age in countries where public pension benefits are lower, compared with other countries. If property values increase, home ownership could become an important source of financial support.

Standard control variables

Bloom et al. (2003) argued that higher life expectancy should lead to an increase of precautionary savings. It may also affect supplementary retirement incomes sources and exposure to poverty. Ages are usually introduced in regressions explaining poverty, or even assets holding behaviors. However, in our view, life expectancy provides more complete information than age. Life expectancy allows to control for many factors such as social exclusion, including for example access to health care systems. Life expectancy depends also on gender. We compare models including ages or life expectancy at each age for assessing whether or not life expectancy provides more complete information. The average age of persons in the sample is 72.49, with a life expectancy of 14.45 years (See Table 4).

Disability may reflect two different situations among old people. First, disability might be the consequence of aging, a deterioration of the state of health among the oldest. Second, an accident may have occurred earlier in the career, creating a shock, with repercussions throughout the remainder of life. In this second case, we expect to find a positive sign in our regressions: such a career accident compromises the ability to save for retirement. Proportion of disable people is higher among people exposed to poverty: 5.78% against 2.92% in the total sample (See table 4).

We consider women and men living without any partner. The exposure to poverty among widows and widowers is frequently emphasised, particularly among women, who live longer than men. However, we assume that even among men, the risk of poverty is higher than for couples. Indeed, people who now live alone do not benefit from economies of scale in current expenditures anymore. We expect to find positive signs for both men and women living

---

[17] For instance the PREFON contract for civil servants, or the MADELIN contracts for the Self Employed.
[18] Articles 39, 82, 83

alone, but the marginal effects should be higher for women. Within the sample of those living below the poverty line, we find a higher proportion of people living alone.

According to Scholz and Seshadri (2007), children are a significant determinant of wealth accumulation. Using a life cycle model with endogenous fertility choices, they show that children largely account for the low levels of wealth accumulation by households with low lifetime income. The number of children may negatively affect the standard of living during retirement if household could not save enough to maintain their consumption levels. Furthermore, it impacts the activity choices within households. Consequently, pension provided by the PAYG pension system might be lower for women who decided to reduce their professional activity for raising children.

Tableau 4 Descriptive statistics

Exposed to poverty risk before social benefits	16,78%
Age	72,49
Life expectancy	15,45
Disabled	2,92%
Women living alone	34,34%
Men living alone	13,50%
Children	2,22
Private debt (consumption)	19,61%
Executives	10,22%
Farmers	8,26%
Self employed (shopkeeper, etc.)	8,70%
Employee	30,49%
Blue collar workers	22,47%
Master's degree	2,84%
Bachelor's degree	2,83%
No diploma	82,19%
Received Pension estimate	3,53%
Annuity from an individual pension contract	12,11%
Annuity from an occupational pension	7,38%

contract	
Property income	17,69%
N	3343

Source: Authors' calculations, Wealth Survey 2009-2010, INSEE

Private debt includes for example consumption credit but also mortgages. We expect a negative sign because it is mainly middle or high-income earners who have access to credit in France.

Education is a proxy for job quality and the general economic awareness (Amerik et al., 2003; Lusardi and Mitchell, 2005, 2007). Well educated people being better informed about retirement related savings, being better aware also of tax deduction possibilities, are more likely to hold financial assets for retirement (Bernstein, 2002). We believe also, as Lusardi, Mitchell and Curto (2009), that people who lack financial education are much less likely to plan for retirement. Joo and Grable (2000) showed that individuals with higher education, higher income, and who are financially literate, plan better their retirement. We consider the level of education as a proxy of financial literacy. However, we know that elder people are less educated than younger cohorts. Consequently, it could be relevant to consider professional category rather than educational background. Indeed, the current retirees may have enjoyed rewarding careers without having high-level diplomas. We compare competing models: a first including the level of diploma, the second including only professional categories.

We estimate the impact of the introduction of the pension information right in France. As from 2004, households receive a letter containing some information about their accumulated pension rights. According to conventional wisdom, individuals can make optimal decisions. In the context of the retirement decision, it is assumed that rational agents are able to anticipate the longevity and sustainability risks of their current pension system. Consequently, agents optimize their allocation decisions throughout their lifetime. However, we do not always observe this behavior. This is mainly because rational agents are often subject to imperfect information. Many studies have been devoted to the subject of imperfect information, but information in the context of inter-temporal allocation decisions between consumption and leisure remains for the most part unexamined. From a microeconomic perspective, an information system allows the individual to foresee their future pension amount and to optimize consumption and savings decisions over their life cycle. By informing the insured, political authorities encourage citizens to better anticipate their retirement financing. Pension

information is meant to inform individuals on financial and demographic constraints, which strongly affect the current pension schemes. For these reasons, we introduce a dummy variable representing those having received an estimate of their benefits: it concerns cohorts born between 1949 and 1953. As we selected in our sample only retired people, aged 60 and over, we kept here only cohorts from 1949 and 1950: they represent only 3,53% of our sample. The French law on the pension information being quite recent, we do not expect a strong effect on the poverty risk at old ages.

Lack of information and education explains partly the fact that many households do not accumulate enough in order to finance retirement. The pension information right helps improving economic education (El Mekkaoui *et al.*, 2010). Education variables and variables related to the reception of individual pension benefits statements could be complementary.

III.3 Regression diagnostics

We calculate measures of how well our models fit. After computing usual test to check the overall significance of our models, we compare different competing models. Consequently, we implement first Hosmer and Lemeshow's (2000) goodness of fit test for 10 percentiles. The test assess whether or not observed exposure-to-poverty rates match expected exposure-to-poverty rates in 10 subgroups of the model population.

We then produce observed and predicted outcomes, calculating the sensitivity and the specificity of the models. The sensitivity of the probit model is the probability of predicting exposure to poverty among people who are exposed to poverty. The specificity is the probability of predicting non-exposure to poverty among people not exposed to poverty.

When estimating the univariate probit model , the Hosmer and Lemeshow's goodness of fit test shows that it is the regression including age rather than life expectancy, and the level of diploma rather than the professional category results in a closest match between the predicted frequency and the observed frequency. With a p-value of 0,25, Hosmer and Lemeshow's goodness-of-fit test indicates that this model best fits the data.

To assess the validity of our instruments in the recursive bivariate probit model, we run univariate probit models. Both instrumental variables do not impact the poverty risk. When estimating the bivariate probit models, the covariance matrix of the two errors terms are significantly different from zero. The probability of being poor and the probability of receiving

an annuity from an individual retirement savings contracts, an annuity from a collective pension plan, or income from property are not independent. The models performed show the impact of each variable representing the private retirement income sources and confirm that the exposure to poverty is affected by unobserved characteristics also influencing the likelihood of receiving a private retirement income. The correlation coefficients are statistically significant in each case.

IV/ Results

We took several types of retirement securities into account in our estimates: individual savings contracts including retirement assets and life endowment contracts, occupational retirement savings contracts, and incomes from property, including land revenues. Each type of private retirement income impacts significantly the exposure to poverty (see Table 5 in appendix 2).

Individual receiving an annuity from an individual retirement contract experience an exposure to poverty on average 3.5% lower than those without such an income source (see Table 6 in appendix 2). In the univariate probit models, this variable is significant at the 5% level.

The strongest impact is observed for those receiving an annuity from an occupational pension plan. This variable is negative and significant at the 1% level in each estimate. Those who contracted this type of contract during their working lives reduced their exposure to poverty by 6% (see Table 6). Amounts received on average from such contracts are difficult to estimate due to lack of precise data. However, the stronger impact of annuities from occupational pension plan may be explained by a double contribution: employers and employees contribute to employer provided pension plans.

Occupational pension plan are more frequently credited than individual retirement related assets. In France, for instance there are many ways to fund an occupational pension plan : the employees can contribute their performance incentives payments, their profit sharing payments, or make a voluntary contribution. In the same time, employees' accounts are also supplemented by the employer contributions on performance incentives payments, on profit sharing, and employees' voluntary contributions. PERCOs are mainly funded by employers' contribution (35%). Profit sharing payments to employees represent 32% of the contributions, performances incentives payments and voluntary contributions represent respectively about 20 and 13%. The investment returns may vary considerably depending on the risk profile chosen by the employee. But the employers' contribution might significantly increase the collective

contracts' rates of return. The different contributions patterns explain why occupational pension plan seem better to shield from poverty exposure.

However, in 2010, households hold more frequently individual retirement contracts. The French Statistical Office estimates the total outstanding amounts to 6.5 billion euros for about 2.12 million holders. But although only 690 000 individuals held a PERCO, the total outstanding amounts on this occupational pension plan is estimated to 4 billion euros. Given the probability of better returns, we could expect the development of these schemes over the coming years.

We also investigate the impact of property incomes. The availability of a supplementary property income for retirees reduces their exposure to poverty. This result is confirmed in all our estimates. To be an owner-occupier and/or having revenues from ownership of land may provide an important source of financial support. The marginal effect of the variable "property income" is comprised between 2.7% and 3.7% depending on the model performed.

Running a recursive bivariate probit model allows us to conclude that unobserved characteristics impact simultaneously the exposure to poverty and the probability to receive an annuity from a private pension and/or property incomes. In the first recursive bivariate probit model, the correlation coefficient between the likelihood of poverty and the probability to receive an annuity from an individual retirement contract is 0.968 and is highly significant. The annuity variable included in the first equation impacts the risk of poverty at the 1% level.

The second biprobit model yield also significant results: the correlation coefficient between the exposure to poverty and the probability to receive an annuity from an occupational retirement contract reaches 0.948. Receiving an annuity from a collective pension plan affects the exposure to poverty at the 1% level, and the effect seems once again stronger: the coefficient is -1.753, whereas it is -1.59 in the previous model.

Finally the recursive bivariate model investigating the effect of a property income show also significant results. Nonetheless, the correlation coefficient is lower (0.786) than those observed in the two previous estimates. The coefficient of the variable representing the property income in the first equation shows also a lower impact (-1.33) though it remains significant at the 1% level.

The life expectancy variable is significant and negatively influences the risk of poverty. It suggests that the lower is life expectancy, the higher is the exposure to poverty (See Tables 5). When introducing an age variable instead of life expectancy, the result is consistent with this

conclusion. We find a positive and significant effect on the poverty risk. This result suggests that the oldest retirees are more frequently exposed to the risk of poverty.

As mentioned above, disability might be the consequence of aging or a consequence of an accident earlier during the career. Among the retiree population, the disabled are more exposed to the risk of poverty. We find a positive and significant effect in the univariate probit model (See Tables 5). The disabled had a strong constraint on accumulation of pension rights during their careers. Because pension benefits are calculated on the basis of earnings, the disabled might get lower pensions. This results is confirmed only two of the three recursive bivariate probit model, and at the 5 and 10% levels.

Elderly people living alone are more exposed to poverty by about 9%, compared with couples. This result is robust for women as well for men, especially for widows and widowers, and especially for the former, who also tend to be more numerous. This could reflect economies of scale within the household. For single persons who were already single during their working lives, a negative impact of raising children could be expected: single parent families may not be able to plan for their retirement, given that their careers are negatively impacted by time spent on bringing up children.

Having children also has an effect on the probability of being in poverty. We find a negative impact on this risk among household having several children. Raising children has a cost and constrains the ability to save. It also affects women's careers: those who choose to reduce their salaried employment activity to bring up children often have lower pensions. This is particularly true for current retired women. Indeed, the female activity rate was lower among these older cohorts than among current working women.

The level of education is very low among older people (82% of retirees do not have any diploma, Table 4). A lack of financial literacy characterises of this population. They did not plan for their retirement. As expected, having no diploma increases the exposure to poverty. The marginal effect on the poverty exposure for those having no diploma is 7%. However, among this population, the highest degree of diploma is not statistically significant to explain the risk of poverty. For this reason, the variable was introduced as instrument in the recursive bivariate probit model. The choice of this instrument turns to be particularly relevant. Although a high level of education does not protect against the risk of poverty, it affects strongly the probability to contract a savings contracts. The variable is significant at the 1 or 5% levels in the estimates. The second instrument is also suitable as it affects significantly the probability to receive a private retirement income source.

Looking at the professional category rather than the level of education shows that the exposure to poverty is lower for former executives than for other professional categories. The marginal effect is 6.7%. On the opposite, former farmers are more exposed with a marginal effect of 10.5%.

Conclusion

The main contribution of this paper is to better understand retirement insurance mechanisms in France and particularly those that reduce the risk of exposure to poverty in old age.

We study the relationship between old age exposure to poverty and incomes from retirement savings assets, controlling by socio-demographics characteristics. As far as standard characteristics are concerned, the estimates yield significant and expected results. Retirees with no diploma and those living alone are more exposed to poverty.

The type of retirement insurance (individual versus collective) and the level of a household's education are found to be key feature in explaining households' risk of exposure of poverty.

We have focused on several types of retirement securities in our estimates: individual retirement savings contracts, collective/occupational retirement savings contracts, and incomes from property. We find a strong effect of collective/occupational retirement savings on the exposure of poverty risk. Our results suggest that occupational retirement savings strongly reduce the risk of exposure to poverty. Households having entered into

The private funding for retirement planning is a sensitive issue in France. As the households were not accustomed to save for maintaining their standards of living, one cannot anticipate the results of a policy supporting the development of pension plans. Would retirement savings policies induce an increase in retirement related wealth accumulation?

However, the savings rate is quite high in France. However, most of the time, both poor and middle-income earners are not able to increase sufficiently their wealth to maintain their standard of living during retirement. This is particularly the case for single parent households, or families with an inactive adult. That is why we believe the Welfare State has to contribute to encouraging retirement savings through targeted sponsored mechanisms, which are more incentive that only tax devices. It would help families who cannot save enough and promote neutral actuarial pension funding.

References

Albuquerque PC., Arcanjo M., Escaria V., Nunes FJ., and Pereirinha J. (2006) Retirement and the poverty of the elderly in Portugal, Working Papers 2006/15, Department of Economics at the School of Economics and Management (ISEG), Technical University of Lisbon, 2006.

Ameriks J,. Caplin A., and Leahy J. (2003) Wealth accumulation and the propensity to plan. The Quarterly Journal of Economics, 118(3):1007–1048

Arrondel L., Masson, A., and Pestieau, P. (2003) Epargne, Assurance Vie et Retraite, assurance, audit, actuariat edn.

Arrondel L., Masson, A., and Verger D. (2008) Le patrimoine en France : état des lieux, historique et perspectives. Economie et Statistique, 417-418:3–25,

Belleau H., and R. Proulx (2010) "Equilibre et déséquilibre des comptes amoureux contemporains. Le revenu familial remis en question" Recherches familiales, 7:85–101,

Belleau H., and R. Proulx (2011) "Le revenu familial, un concept vague et insidieux: analyse critique et historique des relations économiques familiales" Enfances, Familles, Générations, 15:78–109, 2011.

Bloom, DE., Canning, D., and Graham, B. (2003) "Longevity and life-cycle saving", The Scandinavian Journal of Economics, 105: 319-328.

Browning M., Bourguignon F., Chiappori P.A., and Lechene V. (1994) "Income and outcomes: a structural model of intra household allocation", Journal of Political Economy, 102 (6): 1067–1096,

Bernheim, D.B. (1993) "Is the baby-boom generation preparing adequately for retirement?" New York: Merrill Lynch, 1993.

Bernheim, D.B., Forni, L., Gokhale, J., and Kotlikoff, L.J. (1999) "The Adequacy of Life Insurance: Evidence from the Health and Retirement Survey", NBER working paper n°7372.

Bernheim, B. D., Carman, K. G. , Gokhale, J., and Kotlikoff, L.J. (2001) "The mismatch between life insurance holdings and financial vulnerabilities: Evidence from the survey of consumer finances", NBER Working paper no. 8544.

Brun-Schammé A., and Duée M. (2008), « L'épargne financière en prévision de la retraite: comportements de détention et montants investis ». Economie et Statistique, 417-418:93–118, 2008.

Bucks B., Kennickell A., Mache T., and Moore K. (2009) « Changes in u.s. family finances from 2004 to 2007: Evidence from the survey of consumer finances ». Federal Reserve Bulletin,

Burkhauser R.V., Giles P., Lillard DR., and Schwarze J. (2003) "After Death Do Us Part: An Analysis of the Economic Well being of Widows in Four Countries." Unpublished manuscript. Calvet L.E, Campbell J.Y and Sodini P. (2009) "Fight or Flight? Portfolio Rebalancing by Individual Investors" The Quarterly Journal of Economics 124 (1): 301-348.

Chaput, H. and Salembier L. (2011) "Les choix de détention patrimoniale des ménages ne sont pas seulement lies à leurs ressources." INSEE, 2011.

Croguennec Y. (2009) L'´epargne retraite en 2007. Etudes et résultats, DREES, 685,

Darmon, C., and Pagenelle, H. (2005) "Patrimoine : quand les ménages prennent de l'assurance", Insee Première, 1015.

Davies, P.S, and Favreault, M. (2003) "Interaction between social security reform and the supplement security income program for the aged", Working Paper for the Urban Institute Research of Recor.

El Mekkaoui De Freitas N., Legendre, B. and Kukla B. (2010) Les systèmes d'information sur les retraites en Europe et aux États-unis. Rapport de recherche n°59, Centre d'Etude de l'Emploi, Octobre 2010.

Engelhardt GV., and Gruber J. (2004) Social security and the evolution of elderly poverty. Berkeley Symposium on Poverty,

Foster J., Greer J. & Thorbecke E. (1984) A class of decomposable poverty measures, Econometrica, vol. 52, pp. 761-776,

Franco, D., Marino, M.R., and Tommasino, P. (2008), "Pension policy and poverty in Italy : Recent developments and new priorities", *Giornale degli Economisti e Annali di Economia*, **67**: 119-160.

Garnier, O. and Thesmar D. (2009) "Epargner à longue terme et maitriser les risques financiers: Réflexions sur l'épargne financière des ménages français." Rapport du Conseil d'Analyse Economique. Mai 2009

Girardot, P. and Marionnet, D., (2007)"La composition du patrimoine des ménages entre 1997 et 2003." Bulletin de la Banque de France n° 167, November, 2007

Hausman, J., and Paquette, L. (1987) "Involuntary Early Retirement and Consumption" in Gary Burtless (ed.), *Work, health and income among the elderly,* Washington, DC: Brook- ings Institution, pp. 151-81.

Hosmer D.W., Lemeshow S., (2000) Applied logistic regression, Wiley Series in Probability and Mathematical Statistics,

Insee (2009) Enquête Patrimoine, Insee.

Joo, S., and Grable, J. (2000) "A Retirement Investment and Savings decision model : influencing factors and outcomes", Proceedings of the 46th annual conference of the American Council on Consumer Interests, 43-48.

Lusardi A., Mitchell O. and Curto V. (2009) "Financial Literacy and Financial Sophistication Among Older Americans", NBER Working Paper No. 15469.

Lusardi A. and Mitchell OS (2005) Financial literacy and planning: Implications for retirement wellbeing. DNB Working Paper, No. 78

Lusardi A. and Mitchell OS (2007a) Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. Journal of Monetary Economics, 54:205–224,

Lusardi A. and Mitchell OS (2007b) Financial literacy and retirement preparedness: evidence and implications for financial education. Business Economics, 42(1):35–44, 2007.

Love, D.A, Smith, P.A, and McNair, L.C (2007) *Do Households Have Enough Wealth for Retirement?*, Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C.

Maddala, G. S. (1983) Limited Dependent and Qualitative Variables in Econometrics. Cambridge : Cambridge University Press.

Newey, W. K. 1987. Efficient estimation of limited dependent variable models with endogenous explanatory variables. Journal of Econometrics 36: 231-250.

OECD (2005), *OECD Pensions at a Gla*nce 2005: Public Policies across OECD Countries, OECD Publishing.

Peress J. (2011) "Wealth, Information Acquisition, and Portfolio Choice", Review of Financial Study, 24 (9): 3187-3195.

Roy D. (2005) Tout ce qui est à moi est à toi? Terrain, 45:41–52, Rupp K., Strand, A., and Davies, P. (2003) "Poverty among elderly women : Assessing SSI options to strengthen social security reform", *Journal of Gerontology*, **58B**, pp359-368.

Salomäki A., (2006) Public pension expenditure in the EPC and the European Commission projections: an analysis of the projection results, Economic Papers n°268, December.

Scholz JK., and Seshadri A. (2007) Children and household wealth. Working Papers wp158, University of Michigan, Michigan Retirement Research Center, 2007.

Smeeding, TM., and Williamson J. (2001) "Income Maintenance in Old Age: What Can Be Learned from Cross-National Comparisons." Luxembourg Income Study Working Paper No. 263. Syracuse, NY: Center for Policy Research, Syracuse University.

Smeeding TM., and Sandstrom S. (2005) Poverty and income maintenance in old age: A cross national view of low income older women. Feminist Economics, 11(2):pp 163–197,

Yamada A., and Casey B., (2002). "Getting Older, Getting Poorer? A Study of the Earnings, Pensions, Assets and Living Arrangements of Older People in Nine Countries." Luxembourg Income Study Working Paper No. 314. Syracuse, NY: Center for Policy Research, Syracuse University. April.

Zaidi A, (2012) Poverty and Income of Older People in OECD Countries, Available at SSRN: http://ssrn.com/abstract=1992492

Appendix:

1- The French pension system:

The first pillar:

The French retirement system is primarily based on a statutory pay-as-go system financed by social security contributions and taxes. The State pension scheme is dependent on the sector of activity in which the worker participates and is supplemented by complementary mandatory regimes.

The General State Pension regime, run by the Caisse Nationale d'assurance Vieillesse (CNAV), covers employees from the private sector as well as public sector agents who are neither civil servants nor members of public institutions such as the Bank of France or EDF-GDF (gas, electricity companies). The General State pension is calculated on the basis of the person's wage, rate of contribution, and length of contribution. The length of the contribution period necessary to obtain a full state pension is 41.5 years. The official retirement age is 62. Depending on the length of the career, individuals who began to work early are authorized to retire earlier.

The supplementary pension schemes complement the general State regime and are financed on a pay-as-you-go basis. These compulsory supplementary pensions are financed by the ARRCO for all the employees except executives, who are financed by the AGIRC. The employees of the farming sector are also covered by different organizations, ARRCO and the AGIRC. Agents who are not civil servants or members of public institutions such as the Bank of France or EDF-GDF are covered by IRCANTEC. These supplementary benefits are calculated through a point system: every year of contributions allows the individual to acquire points. These points are allocated a specific price. The amount of supplementary pension amount is thus calculated by value of the point times the accumulated amount of points.

Civil servants and public-sector company employees are covered by many special schemes. Civil servants, after completing 15 years of service, are covered by the State pension service. Local government employees are covered by the CNRACL. Their pension amounts depend on the number of years of service, and their last salary (excluding bonuses). Public-sector company employees (gas, electricity, transport companies, etc.) are calculated in a similar manner.

Farmers and liberal professions also possess their own compulsory schemes (MSA, CANCAV, ORGANIC, etc.).

These schemes represent the first pillar.

The second schemes and third pillars:

In France there are two forms of occupational pension schemes, defined benefit and defined contribution schemes.

The PERCO (*plan d'épargne pour la retraite collectif*) a corporate defined contribution scheme, which was created so that employers or branches could allow their employees to save for retirement. It is a funded scheme in which all employees, having worked over 3 months in a given company, may have access to. The employee is able to choose their investment portfolios consisting of 3 different products with different risk/return profiles. The funding of this scheme can come from the following sources: personal savings, profit-sharing, voluntary contribution by employers and time related savings (CET) accounts. This scheme is also beneficial for its tax incentives. Some employees must request membership into this plan, while in other companies enrolment is automatic. At retirement age, the individual may choose to receive their pension amount in the form of life annuities or lump sum capital withdrawal depending on the original collective or employer agreement. Some advantages of this pension plan are that it is very portable, flexible, cost effective and secure.

PERE plan is pension scheme for a defined category of workers (usually managers) covered by insurance companies upon agreement between Unions or companies. Company contributions are mandatory and, if defined in the initial agreement, employee contributions can also be compulsory. The pension sum is only available upon retirement in the form of life annuities. Civil servants also possess their own occupational pension schemes.

The most recent reforms have widely encouraged the development of privately managed pension provision through life insurance and specific individual accounts. PERP is an individual, voluntary retirement plan run under insurance directives, which was introduced in 2004. This optional savings vehicle is available to all individuals. It was designed to complement other retirement income sources. By contributing regularly to this savings plan, the individual can acquire enough savings to receive an additional annuity amount upon retirement or after the age of 60. Madelin plans are individual accounts for the self-employed. The plan is based on

voluntary contributions, made in order to acquire a supplementary pension amount. These plans benefit from a tax deduction.

2- Estimates results:

Table 5 : Results of the Probit model: estimate of the probability to be exposed to poverty

	1/ Poor	2/Poor	3/ Poor	4/ Poor
Age	-	0.012	-	0.011
	-	(0.004)***	-	(0.004)**
Life expectancy	-0.017	-	-0.017	-
	(0.005)***	-	(0.005)**	-
Disabled	0.344	0.335	0.327	0.319
	(0.162)**	(0.163)**	(0.162)**	(0.162)**
Women living alone	0.400	0.375	0.411	0.39
	(0.064)***	(0.065)***	(0.066)***	(0.067)***
Men living alone	0.385	0.408	0.359	0.379
	(0.094)***	(0.093)***	(0.095)***	(0.094)***
Children	0.038	0.038	0.032	0.032
	(0.017)**	(0.017)**	(0.017)*	(0.017)*
Debt	-0.227	-0.227	-0.221	-0.222
	(0.080)***	(0.080)***	(0.081)**	(0.081)**
Master's degree	-0.228	-0.216	-	-
	(0.181)	(0.181)	-	-
Bachelor's degree	-0.363	-0.365	-	-
	(0.222)	(0.22)*	-	-
No diploma	0.411	0.414	-	-
	(0.095)***	(0.095)***	-	-
Executives	-	-	-0.340	-0.332
	-	-	(0.123)**	(0.123)**
Farmer	-	-	0.487	0.491
	-	-	(0.105)***	(0.105)***
Self employed-Shopkeeper	-	-	0.271	0.278
	-	-	(0.104)**	(0.105)**
Employee	-	-	0.25	0.241
	-	-	(0.087)**	(0.087)***
Blue collar workers	-	-	0.362	0.371
	-	-	(0.092)***	(0.091)***
Received Pension estimate	0.221	0.196	0.207	0.183
	(0.198)	(0.196)	(0.200)	(0.198)
Annuity from an individual pension contract	-0.202	-0.196	-0.199	-0.192
	(0.093)**	(0.093)**	(0.093)**	(0.093)**

Annuity from an occupational pension contract	-0.372	-0.369	-0.361	-0.357
	(0.125)**	(0.125)**	(0.126)**	(0.126)**
Property income	-0.143	-0.144	-0.197	-0.198
	(0.068)**	(0.068)**	(0.072)**	(0.072)**
Intercept	-1.289	-2.417	-1.147	-2.26
	(0.135)***	(0.303)***	(0.120)***	(0.303)***
N	3,343	3,343	3,343	3,343
Chi2(14)	192,19***	191,04***	204,1***	203,07***
Outcomes correctly classified	86%	86%	86%	86%
Hosmer-Lemeshow Chi2(8)	12,19	10,15	11,96	13,14
	Prob>Chi2 = 0,1429	Prob>Chi2 = 0,2547	Prob>Chi2 = 0,153	Prob>Chi2 =0,107

* p<0.1;** p<0.05; *** p<0.01.

Robust standard errors are reported in brackets.

Table 6 : Marginal effects of private retirement incomes

	1/ Poor	2/Poor	3/ Poor	4/ Poor
Annuity from an individual pension contract	-0.036	-0.035	-0.035	-0.034
	(0.015)**	(0.015)**	(0.015)**	(0.015)**
Annuity from an occupational pension contract	-0.060	-0.059	-0.058	-0.057
	(0.016)***	(0.016)***	(0.016)***	(0.016)***
Property income	-0.027	-0.027	-0.036	-0.037
	(0.012)**	(0.012)**	(0.012)***	(0.012)***
N	3,343	3,343	3,343	3,343

* p<0.1;** p<0.05; *** p<0.01.

Robust standard errors are reported in brackets.

Table 7 Results of the recursive bivariate probit model

	Biprobit 1		Biprobit 2		Biprobit 3	
	1/ Poor	2/ Annuity from an individual retirement contract	1/ Poor	2/ Annuity from an occupational pension contract	1/ Poor	2/ Property income
Annuity from an individual retirement contract	-1.59 (0.06)***	- -	- -	- -	- -	- -
Annuity from an occupational pension contract	- -	- -	-1.753 (0.089)***	- -	- -	- -
Property income	- -	- -	- -	- -	-1.33 (0.097)***	- -
Age	0.008 (0.003)**	-0.001 (0.003)	0.006 (0.003)*	-0,008 (0.004)*	0.008 (0.003)**	-0.003 (0.003)
Disabled	0.256 (0.152)*	0.042 (0.19)	0.34 (0.15)**	0.233 (0.200)	0.146 (0.156)	-0.259 (0.173)
Women living alone	0.19 (0.058)***	-0.138 (0.073)*	0.284 (0.061)***	-0.018 -0.081	0.107 (0.069)	-0.400 (0.062)***
Men living alone	0.333 (0.079)***	0.162 (0.092)*	0.45 (0.08)***	0.361 (0.098)***	0.125 (0.09)	-0.335 (0.088)***
Children	0.024 (0.014)*	-0.003 (0.017)	0.249 (0.015)*	-0.005 (0.02)	0.024 (0.015)	-0.077 (0.014)
Debt	-0.156 (0.064)**	-0.085 (0.072)	-0.219 (0.689)***	-0.18 (0.086)**	-0.19 (0.069)***	-0.124 (0.061)**
Bachelor's degree	-0.161 (0.147)	0.042 (0.144)	-0.43 (0.165)***	-0.315 (0.188)*	-0.231 (0.178)	0.013 (0.123)
No diploma	0.169 (0.069)**	-0.915 (0.075)	0.189 (0.083)**	-0.095 (0.087)	0.175 (0.081)**	-0.244 (0.066)***
Pension record	0.130 (0.174)	-0.078 (0.209)	0.116 (0.167)	-0.078 (0.222)	0.067 (0.184)	-0.169 (0.176)
Master's degree	- -	0.219 (0.085)**	- -	0.394 (0.113)***	- -	0.267 (0.096)***
Life insurance	- -	0.165 (0.046)***		0.024 (0.06)***	- -	0.500 (0.049)***
Intercept	-1.5 (0.253)***	-1.05 (0.294)**	-1.54 (0.273)***	-0.899 (0.334)**	-1.34 (0.302)***	-0.035 (0.259)
N	3,343		3,343		3,343	
Rho	0.968		0.948		0.786	
Chi2(21)	806.91***		563,3***		939,5***	
Wald test of rho	Chi2(1)	56.602	Chi2(1)	19.51	Chi2(1)	45.38
	Prob>Chi2	0,000	Prob>Chi2	0,000	Prob>Chi2	0,000

* p<0.1;** p<0.05; *** p<0.01.

Robust standard errors are reported in brackets.