

## MICROECONOMIC DETERMINANTS OF PRIVATE RETIREMENT SAVINGS: THE CASE OF TUNISIA

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### Abstract

In the last decade, the financial situation of pension funds in Tunisia has worsened because of demographic and economic factors. These changes will make solidarity between generations more difficult and will prompt the government to institute some reforms regulating basic pension. This scenario of probable changes involves voluntary contributions to retirement saving schemes offered by financial institutions in order to supplement future pensions of workers. The aim of this paper is to understand Tunisian working population's savings behaviour, referring, for this purpose, to microeconomic factors, while assessing the current status of life insurance and funded pension schemes in Tunisia. To this end, a survey<sup>1</sup> was carried out on a representative population of Tunisian individuals affiliated to the three main public pension schemes and approached through savings theories and the Life Cycle Model (Modigliani 1954), in particular.

**JEL Classification:** G22, D14, D15

**Keywords:** Life Insurance, Retirement Savings, Life Cycle Theory

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## I- Introduction

In Tunisia, the pay-as-you-go pension scheme is facing real financial difficulties because of critical demographic trends leading to an ageing population, and because of a difficult economic context, notably reflected in high unemployment rates and low economic growth. These factors and many others would make the number of retirees exceed the number of working people, rendering funded pensions a burden and inter-generational solidarity more difficult.

This increasing budgetary imbalance of public pension funds and the uncertainty surrounding the sustainability of pension plans has urged governments to put in place several tax and social incentives to promote funded pension schemes proposed in the form of individual or group life insurance plans offered by insurance companies. These incentives suggest that more assets need to be saved to ensure protection from uncertainty about the sustainability of basic schemes and from decreased retirement income (Modigliani 1954, Friedman 1957, Fisher 1973).

These funded pension products are managed by life insurance companies; they represent 60% of insurance activity worldwide and 11.5% in Tunisia. Indeed, despite the range of life insurance products offered on the Tunisian market, the turnover of the life insurance market consists mainly of premiums generated by the 'temporary life insurance' scheme generally required by lending financial institutions and of premiums on mortgages, equipment and leasing operations. In return, life insurance and funding (long-term insurance) remain scarce, despite the numerous tax benefits they offer.

Tunisian insurers offer two types of life insurance products to accumulate long-term savings, namely, pure savings contracts and mixed contracts (savings / pension).

- **Savings contracts:** These contracts aim at accumulating capital or an annuity at maturity. The insured entrusts the insurer with managing the former's contributions and the latter will pay them benefits<sup>2</sup> at a predetermined date in the case of a living person or a capital sum in the event of the insured person's death. Insurers offer a variety of savings products, such as: life insurance policies, capitalisation contracts and account-linked contracts.
- **Mixed contracts:** these are contracts that cover both pensions and savings, allowing for the payment of a capital sum in the case of a living person at the end of the contract or the beneficiaries in the case the insured dies before the contracted period ends.

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2. Offered services may be a capital sum or a lifetime annuity (with the option of spouse coverage for those who wish to do so). The insured chooses either exit modality (capital or annuity). In Tunisia, the exit modality is almost always that of a capital sum.

These life insurance and pension savings products are then offered by life insurers under general conditions, guarantees and benefits that meet the needs of different categories of individuals and businesses. They can be purchased as individual or group policies.

This sector is experiencing real growth and offers promising prospects for the Tunisian market, mainly thanks to favourable tax measures when subscribing to a Life product. Moreover, the amount of premiums generated by this sector has been steadily growing for several years (109 MD in 2014 as compared to 90MD in 2013 and 80 MD in 2012). Nevertheless, distribution of these premiums by insurance sector shows that the share of life insurance and capitalisation contracts in the Tunisian insurance market remains low (17.36% in 2014 as compared to 16.6% in 2013 and 16.4% in 2012).

Several factors may explain why this branch remains at such a bottleneck. On the one hand, there are economic factors, such as a low household savings capacity, inadequate investment in other financial instruments and economic instability. On the other hand, there are psychological and ideological factors, such as lack of trust in insurers, persistence of religious beliefs and lack of information about life insurance and funded pension schemes (Spaenjers 2012, Jamuldin 2013).

Public authorities also play an important role in developing life insurance, as it is an important vehicle of savings collection in the medium and long term. Tax exemption should also put forward a set of prudence rules and regulations concerning insurance investments. The development of this branch remains one of the main challenges of the sector.

Moreover, the generous pension plans hinder the development of life insurance and pension products (Feldstein 1979). Indeed, in Tunisia, a very large proportion of the active population is covered by pension and health schemes that offer attractive coverage rates, which does not encourage individuals to seek additional coverage from life insurers.

Beyond the scope of financial stability, understanding the economic and social specificities of the active population will help shape the potential development of this sector, hence, our interest in studying the socio-demographic, economic and financial determinants that may influence an individual's investment and savings strategies (Caroll 1992, Attanasio & Weber 1995, Lavigne & Freitas 2002).

Extending research on the issue of public pension schemes in Tunisia (Ben Brahem (2004), Houssi (2009), Chekki (2013)), the aim of this paper is to empirically determine the factors disengaging Tunisian assets from private pension schemes in the form of individual or group life insurance products. Despite the large number of studies examining the pay-as-you-go pension scheme in Tunisia, no empirical study has directly studied the factors that determine private funded pension schemes in Tunisia, proposed in the form of life insurance products for retirement.

The study first reviews the different theoretical and empirical studies that used the life-cycle hypothesis and examined the determinants of private life insurance and private pension schemes. Next, we present the model to-be-estimated, the data used and the methodology to determine the impact of socio-demographic and financial factors of Tunisian workers<sup>3</sup> on disengaging from life insurance for retirement in the four samples studied (Entire Population and three sub-groups RSNA<sup>4</sup>, RINA<sup>5</sup>, CNRPS<sup>6</sup>). We will then discuss the main results, while the last section concludes the paper.

## II- Literature Review

### *II.1- Life cycle theory and its extensions*

Household savings and investment behaviour represent a major financing instrument for the economy and are affected by permanent changes in financial markets, innovative savings products in addition to an ageing population. Studies have shown that saving is a difficult concept to comprehend and that it depends on different macroeconomic and microeconomic determinants and motives.

The main theory about savings behaviour is the life cycle theory (Modigliani & Brumberg 1954), which assumes that saving is a way to finance consumption in one's old age. Typically, individuals borrow money before becoming economically active, save during the activity period and consume their savings at retirement.

Parallel to this theory, Fisher (1930) and Friedman (1957) developed the permanent income theory, which retains the same retirement savings motive but adds that an individual also has the desire to leave some inheritance to their descendants, a motive known as the generational transmission motive.

Several economists extended the life cycle model, such as Kotlikoff & Summers (1981), who assume that households transfer resources to their descendants, contrary to the life cycle theory, which supports that households ultimately consume all their resources.

Moreover, purchasing a life insurance policy is considered to be a form of savings, justified by the life cycle model. By extending the life cycle model, Fisher (1973) shows that the desire to transfer inheritance has some effect on holding life insurance contracts. Yaari (1975) and Campbell (1980) suggest that, just as household savings are motivated by a concern for distributing income across different life periods, so as to sustain more regular consumption patterns, purchasing life insurance policy aims at providing additional income or capital at a certain point in time.

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3. Public and private sectors.

4. non-agricultural employees' scheme in the private sector

5. non-agricultural, self-employed in the private sector

6. public sector employees' scheme

Knowing the economic, legal and financial environment is a crucial piece of information before deciding on purchasing savings contracts. Macroeconomic factors that influence pension schemes mainly include taxation (Feldstein 1995, Arrondel & Masson 2003, Attanasio 2004) and the nature of the public pension scheme (Feldstein 1979, Leiner & Leroy 1982, Kantor & Fishback 1996).

## ***II.2- Socio-demographic determinants of the savings behaviour***

Beyond the economic and fiscal environment, household savings will also depend on socio-economic, geographical and ideological characteristics. Empirical studies carried out in several countries have focused on microeconomic determinants that affect holding pension savings policies. The main conclusions drawn from these studies indicate that savings behaviour depends as much on economic development as on individual factors related to their resources, preferences and expectations. These factors include life cycle variables, such as age and income, which, all things being equal, have a significant effect on purchasing pension contracts (Browne & Kim, 1993; Arrondel, 1996; Munnell *et al.*, 2000; Dauriol, 2005; Brun-Schammé & Duée, 2009). These authors concluded that younger households hold fewer such contracts than middle-aged households. Nevertheless, older households have Life Insurance holding rates as low as those of young people. Therefore, holding life insurance policies depends on the individual's generation. Under the life cycle theory, Brun-Schammé & Duée (2008) found that high-income households frequently hold more long-term savings. The income effect reflects the household's savings capacity and proves that poor households find it more difficult to access financial markets and diversify their portfolios.

Similarly, some authors suggest that marital status and household structure affect savings behaviour and investment choices. This amounts to saying that a change in the number of household members during one's life cycle may influence consumption and, consequently, savings behaviour (Yaari, 1965; Fischer, 1973). In a similar line, Fournier V. & Vaillancourt F. (2011) deduce, from their study, that married, divorced or widowed individuals save significantly less than unmarried individuals.

Furthermore, several authors argue that creation of a real estate asset, mainly through the acquisition of a real estate property, is considered to be a factor that affects one's decision to purchase life insurance policies and contribute to pension schemes (Bosworth, Burtless & Sabelhaus, 1991; Burbidge & Davies, 1994; Brun-Schammé & Duée, 2008; Arrondel & Savignac, 2011). These authors state that homeowners save in pension products more than renters do. For many households, acquisition of a residence remains the central project of their wealth accumulation. Other types of savings and investments come second. There are several studies examining the relationship between one's vocation and their decision to purchase this type of products (Brun-Schammé & Duée, 2009; Marti, 2011; Fournier V. & Vaillancourt F, (2011).

The studies indicate that household obligations affect their ability to plan for financial investments and they opt for asset accumulation.

Moreover, Marti (2011) states that socio-demographic (age, social status, income, etc.) and economic differences between regions shape household wealth strategies and, consequently, savings behaviour across regions. Dauner, I (2002) notes that geographic location and the proximity of financial institutions may affect the probability of households holding savings products.

The contribution of this study is to further examine the determinants of holding funded pension schemes in the Tunisian context, referring to the literature mentioned above.

### **III- Methodology**

In what follows, we present, successively, our data, the empirical model to-be-estimated and the estimation method.

#### ***III.1- The Data***

The main difficulties facing the analysis of household savings products retention relate to observations and quantification. Indeed, there are no accurate microeconomic data on pension schemes and life insurance purchasing behaviour. At this level, we would like to highlight that our study originally contributes to the research conducted on savings and life insurance in Tunisia (Dahmane D. 2000<sup>7</sup>; Khabcheche 2005<sup>8</sup>). Our study reports on a survey conducted in 2015 on a population of Tunisian workers affiliated to private and public sectors. The sample consists of male and female workers in different vocations, belonging to different age groups, with different income packages, and living in distinct geographic areas. The sample is distributed among the three main pay-as-you-go public pension schemes, namely, the Civil Service Regime (CNRPS), the Private Non-Agricultural Employees Plan (RSNA) and the Non-Agricultural Self-Employed Plan (RINA).

The representative sample is then divided into three sub-samples according to the pension scheme (private or public) and to activity type (employee or self-employed)<sup>9</sup>. They consist, respectively, of 142 assets belonging to the public plan (CNRPS), 197 assets to the Private Non-Agricultural Employees Plan (RSNA) and 76 to the Private Non-Agricultural Self-employed Plan (RINA). The survey<sup>10</sup> was conducted at the Research and Social Studies Centre.

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7. Dahmane, D., 2000. Financial Liberalization and household saving behaviour: the case of Tunisia. Working Paper. IRD. University of Tunis 3.

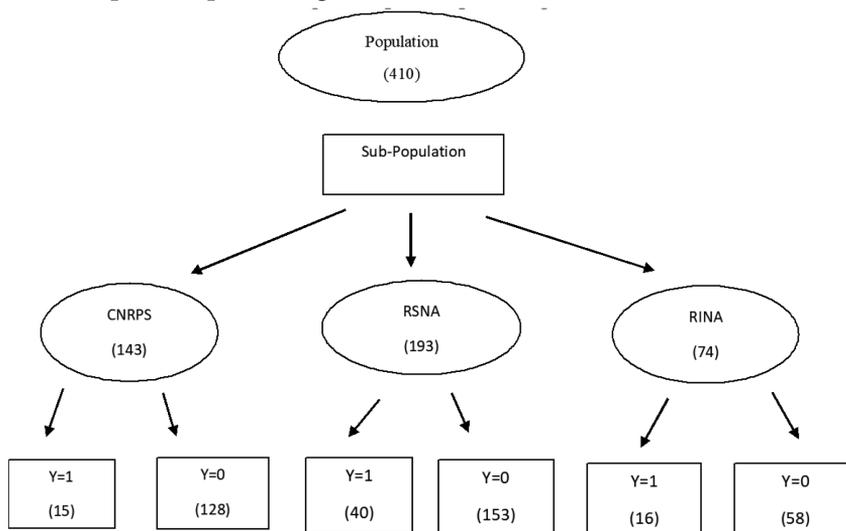
8. Khabcheche (2005) « The Echo of Life Insurance in Tunisia », FTUSA Letter, December 2006-N°8.

9. CNSS or CNRPS

10. This study is carried out in collaboration with the Research and Social Studies Centre CRES Tunisia, under the MOBIDOC convention funded by the European Union, under the PASRI programme and administered by the ANPR.

The figure below shows the distribution of the entire sample and the sub-samples, specifying Life Insurance holding rates ( $Y = 1$  or  $Y = 0$ ).

**Figure 1.** Sample data processing



Source: Household Wealth survey 2015.

Our study tries to identify the determinants of holding Life Insurance contracts in the entire sample and according to the defined sub-samples. Details about the sample and sub-samples in terms of the different socio-demographic and financial variables mentioned above are presented in Table 1 below.

### III.2- The model

Private retirement savings behaviour and Life insurance holding can be described by a discrete random variable  $\tilde{Y}$ , written as follows:

$$Y = \begin{cases} 1 & \text{where 1 indicates holding a Life Insurance contract and 0 having} \\ 0 & \text{no pension scheme} \end{cases}$$

If we denote  $Y^*_{i,j}$  the probability that an individual holds a Life insurance contract can be formally written as follows:  $Y^*_{i,j} = X_{i,j} \beta + \varepsilon_{i,j}$

i: Tunisian assets

j: worker affiliation (affiliated with one of the three pension plans (RINA, RSNA, CNRPS))

$X_{i,j}$ : a vector of the characteristics of individual i of category j,

$\beta$ : vector of the parameters measuring the influence of characteristics

$\varepsilon_{i,j}$ : error term measuring the influence of the characteristics of non-observed assets.

By choosing to apply a logistic regression, we make the assumption that error terms are independent across individuals and follow a logistic distribution. We will try to estimate the probability that an individual  $i$  of category  $j$  holds or envisions purchasing savings contracts, taking into account their socio-demographic and financial characteristics, as follows:

$$\begin{aligned}\Pi_{i,j} &= P[y_{i,j} = 1/X_{i,j}] \\ &= P[T_{i,j} > 0] = P[\varepsilon_{i,j} > -X'_{i,j}\beta] \\ &= P[-\varepsilon_{i,j} < X'_{i,j}\beta] = g(X'_{i,j}\beta)\end{aligned}$$

where  $g$  is the distribution function of error terms  $\varepsilon_{i,j}$  defined by:

$$g(w) = P(-\varepsilon_{i,j} < w)$$

In this study, we choose to apply a logistic regression and we assume that  $\varepsilon_{i,j}$  are independent across Tunisian assets and follow a logistic distribution.

The Logit function is defined by:

$$G(\pi) = \text{logit}(\pi) = \ln\left(\frac{\pi}{1-\pi}\right) \quad \text{with } g^{-1}(x) = \frac{e^x}{1+e^x}$$

The ratio  $\frac{\pi}{1-\pi}$  is the 'odds' that express a rating. Logistic regression is interpreted as linear modelling of log odds, while the coefficients of the variables express odds ratios. In our case, the probability that a Tunisian asset  $i$  of a sub-population  $j$  holds life insurance or pension savings contracts is written as follows:

$$\Pi_{i,j} = \Lambda(X'_{i,j}\beta) = \frac{1}{1+e^{-X'_{i,j}\beta}}$$

Furthermore, the estimation of a logistic regression model that allows for determining the log value of the holding rate of life insurance is as follows:

$$\text{Ln}\left[\frac{\pi_{i,j}}{1-\pi_{i,j}}\right] = \alpha + X'_{i,j}\beta$$

### III.3- The variables of the model

The table below presents the variables  $X_{i,j}$  that will be introduced into the model and that represent each individual in the sample.

**Table 1.** Variables explaining the probability of holding a pension savings cont

Economic and socio-demographic characteristics	Variable	Description and values
Age	Age	Number of years
Generation	Gen1 Gen2 Gen3 Gen4	Age range Generation 1 [20-29[ Generation 2 [30-49[ Generation 3 [50-59[ Generation 4 >60 years
Gender	Gend	Man / Woman
Annual Income	IncBr	Annual Income Bracket < 10000 TND, [10001TND;20000TND[, [20001TND;50000TND[, >= 50000TND
Geographical Area of residence	East West	North East, Greater Tunis, Central East (Sahel), South East Central West, South West, North West
Professional Category	PubExec PrivExec SelfE	Senior Manager, Middle-grade Manager, Senior executive, Executive, Researcher/Teacher, Self-employed/Investor. All these categories are grouped into three variables according to the sector of activity ( public, private or self-employed)
Matrimonial status	Sing/ Wid/ Div	single, married , divorced (ee), widow (er)
Household Size	HSize	The number of individuals in the household dependent on the worker
Property ownership	PropOw	Owner or not of a principal residence

Source: Household Wealth survey 2015.

### III.3- Specification and Estimation of the model

When examining the correlation matrix of the independent variables representing the entire sample and the sub-samples, we notice significant correlation coefficients between the following pairs: age and generation, household size and single status, and East variable and West variables. Bearing on these correlations, we specify two logistic regression equations to dissociate the joint effect of these pairs of variables on the sample studied.

$$LN \left[ \frac{\pi_{i,j}}{1 - \pi_{i,j}} \right] = a + \beta_1 Age_{i,j} + \beta_2 Age^2_{i,j} + \beta_3 Gend_{i,j} + \beta_4 Div_{i,j} + \beta_5 Wid_{i,j} + \beta_6 HSize_{i,j} + \beta_7 PubExec_{i,j} + \beta_8 PrivExec_{i,j} + \beta_9 SelfE_{i,j} + \beta_{10} East_{i,j} + \beta_{11} IncBr_{i,j} + \beta_8 PropOw_{i,j} \quad (1)$$

$$LN \left[ \frac{\pi_{i,j}}{1 - \pi_{i,j}} \right] = a + \beta_1 Gen2_{i,j} + \beta_2 Gen3_{i,j} + \beta_3 Gen4_{i,j} + \beta_4 Gend_{i,j} + \beta_5 Sing_{i,j} + \beta_6 Div_{i,j} + \beta_7 Wid_{i,j} + \beta_8 PropOw_{i,j} + \beta_{10} PubExec_{i,j} + \beta_{11} PrivExec_{i,j} + \beta_{12} SelfE_{i,j} + \beta_{13} West_{i,j} + \beta_{14} IncBr_{i,j} \quad (2)$$

Equation (1) tests the joint effect of age, squared age, gender, vocational category, property ownership, the East variable, marital status, household size and the annual income range. As for equation (2), it tests the joint effects of generation, gender, marital status, property ownership, the West variable, vocational category and the annual income range.

The table below reports the fit quality of the pension savings / life regression model and regression significance.

**Table 2.** Goodness of Fit of Logistic Regressions

	Equation	Population	Sub-Population		
			CNRPS	RINA	RSNA
<i>Number of observations</i>	1	396	143	73	193
	2	396	143	73	193
<i>Maximum Likelihood</i>	1	330.067	88.738	65.861	167.127
	2	324.342	85.309	65.861	167.127
<i>The Likelihood ratio test <math>X^2</math></i>	1	39.366	5.682	10.915	24.375
	2	45.092	9.110	10.915	24.375
<i>Sig(<math>X^2</math>)</i>	1	.000	.011	.001	.000
	2	.000	.017	.001	.000
<i>R<sup>2</sup> Cox&amp;Snell</i>	1	0.095	0.041	0.139	0.122
	2	0.108	0.065	0.139	0.122
<i>R<sup>2</sup> Nagelkerke</i>	1	0.156	0.082	0.213	0.191
	2	0.177	0.129	0.213	0.191
<i><math>X^2</math> Hosmer-Lemeshow</i>	1	11.110	3.598	1.090	.000
	2	8.320	1.720	1.090	.000
<i>Sig(<math>X^2</math> HosmerLemeshow)</i>	1	.196	.165	.580	1.000
	2	.403	.632	.580	1.000

(1) the joint effect of age, squared age, gender, vocational category, property ownership, the East variable, marital status, household size and the annual income range.(2) the joint effects of generation, gender, marital status, property ownership, the West variable, vocational category and the annual income range.

In the two pre-established regression models, we seek to identify the variables that would effectively predict the probability of purchasing a life insurance / pension savings policy. The Hosmer-Lemeshow test indicates whether there is significant difference between values predicted and values observed.

The significance of the HL results, (Sig ( $X^2$  Hosmer-Lemeshow) $> 0.1$ )), indicates, in our case, that the values predicted and observed are the same. Coefficients determining Cox and Snell and Nagelkerke allow for assessing the fit quality of the final model. The higher the R2 coefficient, the better the model fits the data. In light of this finding, it can be said that the two models with the included variables can significantly predict the probability of holding a life insurance / pension savings contract than models with only constants.

#### *Regression significance*

The results above are supported by the deviance test (D law) and the likelihood ratio test (lr) to establish model significance.

#### **- The deviance test**

The results of the deviance test are summarised in Appendix 7. The table shows that introducing the variables mentioned above into the model allows for better prediction of the probability of holding a pension savings product. Indeed, coefficients 3.950 and 4.273 are significant at  $p < 0.01$ . Thus, combining the independent variables significantly predicts the dependent variable Y.

### - The Likelihood Ratio test

For the likelihood ratio test two hypotheses are considered:

H0: all coefficients  $\beta_i$  of the independent variables are zero,

H1: there is at least one non-zero coefficient.

To this end, we use the likelihood ratio test. The relevant p-value uses Chi-square to indicate the impact of each independent variable on the model. The results of the likelihood ratio are summarised in the table below.

**Table 3.** Model Fit, the Deviance Test (ANOVA)

<i>ANOVA</i>	<i>Modèle</i>	<i>Population Globale</i>	<i>RSNA</i>	<i>CNRPS</i>	<i>RINA</i>
<b>D</b>	1	3.950	3.018	1.525	1.313
	2	4.273	2.999	1.330	1.473
<b>Sig(D)</b>	1	.000	.002	.130	.248
	2	.000	.001	.210	.171

(1) the joint effect of age, squared age, gender, vocational category, property ownership, the East variable, marital status, household size and the annual income range.(2) the joint effects of generation, gender, marital status, property ownership, the West variable, vocational category and the annual income range.

By assessing model parameters, we can determine the contribution of each variable of the model. Coefficient 'A' indicates the direction of the relationship between the independent variable and the dependent variable. In our case, property ownership, income range and vocational category 'private sector' vary in the same direction as the probability of holding a pension savings scheme, whereas the 'single' marital status variable varies in the opposite direction. The 't' value informs about the contribution of each variable of the model. T-values and their respective p show the impact of the independent variables on the dependent variable.

In Appendix 4, we found that the variable 'Annual Income IncBr' has a significant impact on the probability of holding a life insurance with  $t = 3.140$  and  $p < 0.01$ . The second variable that has a significant impact on the probability of holding a life insurance is the 'PropOw Property Ownership' with  $t = 2.380$  and  $p < 0.01$ .

The third variable that influences the probability of holding a life insurance is the vocational category 'Executive in Private sector PrivExec' with  $t = 2.233$  and  $p < 0.05$  as well as the 'SelfE self-employed vocational category' with  $t = 2.484$  and  $p < 0.1$ . However, the fourth variable that has a negative impact on the probability of holding a life insurance is the 'Single status Sing' variable with  $t = -2.172$  and  $p < 0.05$ .

In what follows, we will present, first, the descriptive statistics and, then, the results of the regression applied to the entire Population and to the three sub-population groups (RINA, CNRPS and RSNA).

**Table 4.** Goodness of Fit of Independent Variables (Xi)

Variable	Equation	Coefficient	Population	Sub-population		
				RSNA	CNRPS	RINA
Constant	1	A	-0.330	0.749	-1.116**	-0.223
	t		(-0.930)	(1.283)	(-2.054)	(-0.200)
	2	A	-0.072	-0.167		0.243
	t		(-0.662)	(-1.268)		(0.448)
Age	1	A	0.013	-0.050*	0.058**	0.030
	t		(-0.721)	(-1.611)	(2.112)	(0.504)
Age <sup>2</sup>	1	A	0.000	0.001	-0.010	0.000
	t		(0.507)	(1.549)	(-2.026)	(-0.648)
Gend	1	A	0.030	0.066	0.014	0.055
	t		(0.752)	(1.090)	(0.242)	(0.451)
	2	A	0.035	0.061	0.031	0.063
	t		(0.879)	(1.014)	(0.534)	(0.526)
IncBr	1	A	0.075*	0.057**	0.049	0.163*
	t		(3.140)	(1.529)	(1.352)	(2.729)
	2	A	0.074*	0.056	0.059	0.126**
	t		(3.116)	(1.467)	(1.619)	(2.096)
PropOw	1	A	0.099*	0.180*	0.048	-0.061
	t		(2.380)	(2.854)	(0.763)	(-0.540)
	2	A	0.085**	0.167*	0.036	-0.081
	t		(2.055)	(2.678)	(0.563)	(-0.715)
HSize	1	A	0.009	0.207	-0.007	0.017
	t		(0.609)	(0.819)	(-0.283)	(0.419)
Sing	2	A	-0.118**	-0.096	-0.37	-0.225***
	t		(-2.172)	(-1.277)	(-0.503)	(-1.667)
Div	1	A	0.145	0.268***	0.305	0.032
	t		(1.604)	(2.020)	(1.633)	(0.871)
	2	A	0.112	-0.253	0.246	-0.007
	t		(1.239)	(-0.643)	(1.329)	(-0.038)
Wid	1	A			-0.157	
	t				(-0.705)	
	2	A	-0.165	-0.218	-0.127	
	t		(-0.772)	(-0.557)	(-0.559)	
PubExec	1	A	0.072		-0.211	
	t		(0.947)		(-1.298)	
	2	A	0.088		-0.192	
	t		(1.160)		(-1.169)	
PrivExec	1	A	0.167**	0.246*		
	t		(2.233)	(2.823)		
	2	A	0.185**	0.264*		
	t		(2.484)	(3.015)		
SelfE	1	A	0.120			-0.513
	t		(1.445)			(-0.865)
	2	A	0.139***			-0.310
	t		(1.678)			(-0.586)
Est	1	A	0.001	-0.106	0.071	-0.010
	t		(0.019)	(-0.911)	(0.889)	(-0.037)
Owest	2	A	-0.009	0.101	-0.072	-0.144
	t		(-0.135)	(0.875)	(-0.037)	(-0.520)
Gen2	2	A	-0.73	-0.158	0.060	0.023
	t		(-1.222)	(-1.844)	(0.649)	(0.115)
Gen3	2	A	0.019	-0.026	0.187**	-0.032
	t		(0.230)	(-0.203)	(1.537)	(-0.140)
Gen4	2	A	-0.130	-0.135	-0.037	-0.351
	t		(-1.212)	(-0.722)	(-0.503)	(-0.946)

(1) the joint effect of age, squared age, gender, vocational category, property ownership, the East variable, marital status, household size and the annual income range.(2) the joint effects of generation, gender, marital status, property ownership, the West variable, vocational category and the annual income range.

\* Significance ( $p < 1\%$ ,  $p < 5\%$  and  $p < 10\%$ ) is indicated by the symbols \*, \*\*, \*\*\*

#### IV- Results and Interpretation

In order to compensate for loss of income when they retire, workers exhibit a life insurance savings behaviour, which can change during their working lives. Our results show that specific factors shape holding life insurance for retirement schemes. First, we will present the descriptive statistics of the entire population and the three sub-population groups. Secondly, we will interpret the regression results about the relationships that may exist between the different variables studied and the probability of individuals holding retirement savings contracts.

##### IV.1- Descriptive statistics

###### *Holding retirement savings products in the population studied*

Descriptive statistics show that of the sample studied, only 17.3% of individuals hold life insurance or pension savings products. This rate varies according to the sub-sample to which the individual belongs. Indeed, within the sub-sample 'CNRPS', the rate of holding a pension savings scheme is only 10.5%. As for 'RSNA' private sector affiliates, the rate is 20.7% and 21.6% for the 'RINA' self-employed affiliates regime.

Table 5 reports the different Life Insurance holding rates for each sub-population group and the entire population.

**Table 5.** Life-Insurance holding rates by category of workers

			Y		Total
			,00	1,00	
<b>Sub-population</b>	RSNA	Number	153	40	193
		% in the sub-population	79.3%	20.7%	100.0%
		% in the population	<b>37.3%</b>	<b>9.8%</b>	<b>47.1%</b>
	CNRPS	Number	128	15	143
		% in the sub-population	89.5%	10.5%	100.0%
		% in the population	<b>31.2%</b>	<b>3.7%</b>	<b>34.9%</b>
	RINA	Number	58	16	74
		% in the sub-population	78.4%	21.6%	100.0%
		% in the population	<b>14.1%</b>	<b>3.9%</b>	<b>18.0%</b>
<b>Population</b>	Number	339	71	410	
	% in the population	82.7%	17.3%	100.0%	

Source: Household Wealth survey 2015.

Rate differences between the private and the public sector can be explained by the fact that assets in the public system are not affected by a significant loss of income upon retirement, unlike assets of the private sector, the income in which declines after retirement. Coverage rate is significantly higher in the public system than in the private system. Insurers tend to offer their products to private sector assets rather than to the public sector, since these contracts are intended to supplement incomes of active individuals and are usually settled upon retirement. This also explains the difference in Life insurance contracts holding rates across affiliate schemes.

**Table 6.** Life-Insurance holding rates by type of subscription

Life Insurance / Retirement Savings holders		Type of Subscription		Total	
		Individual	collective		
Sub- population	RSNA	Number	22	17	39
		%	<b>56.4%</b>	<b>43.6%</b>	<b>100.0%</b>
	CNRPS	Number	12	2	14
		%	<b>85.7%</b>	<b>14.3%</b>	<b>100.0%</b>
	RINA	Number	16	0	16
		%	<b>100.0%</b>	<b>0.0%</b>	<b>100.0%</b>
Population	Number	50	19	69	
	%	72.5%	27.5%	100.0%	

Source: Household Wealth survey 2015.

In the sample studied, only 27.5% of contract holders are members of group pension savings contracts, purchased by their employers, 89.5% of which work in the private sector.

Funded pension schemes are scarce, although they offer the same range of benefits as those of life insurance products, like disposing of the entire amount at retirement or collecting a reversible or non-reversible life premium. These contracts are mainly taken out by large private sector companies and are essentially meant for senior executives and managers.

The tax benefits offered to these contracts are, in principle, insufficient to convince employers about the usefulness of purchasing such products. Life insurers should deploy more efforts to increase the purchasing rate of these products in the market.

### ***Life insurance policy-holders by socio-demographic and financial variables in the sample studied***

Descriptive statistics of the sample studied indicate that the proportion of life insurance policy-holders differs according to pension scheme and also according to the socio-demographic characteristics of each individual in the sample.

The table below summarises the distribution of life insurance policy-holders and funded pension savings scheme-holders according to membership categories.

**Table 7.** Microeconomic Characteristics of « Life Insurance/ Retirement Savings » Holders

Variable		« Life Insurance/retirement Savings » holding							
		CNRPS		RINA		RSNA		TOTAL	
		Obs*	Rate%	Obs*	Taux%	Rate%	Taux%	Rate%	taux
<b>Gender</b>	M	10	67	13	81.25	27	67.5	50	70.41
	F	5	33	3	18.75	13	32.5	21	29.59
	Total	15	100	16	100	40	100	71	100
<b>Age</b>	20-29	--	--	--	--	7	17.5	7	9.85
	30-39	7	46.67	10	62.5	21	52.5	38	53.52
	40-49	2	13.33	2	12.5	3	7.5	7	9.85
	50-59	5	33.33	4	25	7	17.5	16	22.54
	60-65	1	6.67	--	--	2	5	3	4.22
	Over 65 years	--	--	--	--	--	--	--	---
Total	15	100	16	100	40	100	71	100	
<b>Average age of the holder</b>		42,8		40,87	100	38,1	100	39,71	
<b>Property Ownership</b>	Owner	12	80	11	68.75	31	77.5	54	76.05
	Not Owner	3	20	5	31.25	9	22.5	17	23.95
	Total	15	100	16		40	100	71	100
<b>Geographical Area</b>	Grand Tunis	9	60	9	56	30	75	48	67.6
	North East	3	20	1	6	0	0	4	5.63
	North West	0	0	0	0	0	0	0	0
	Centre East	2	13.33	2	13	6	15	10	14.08
	Centre West	1	6.67	0	0	0	0	1	1.4
	South East	0	0	4	25	2	5	6	8.45
	South West	0	0	0	0	2	5	2	2.81
Total	15	100	16	100	40	100	71	100	
<b>Income Bracket</b>	[10000TND-20000TND[	7	47	1	6.3	11	27.5	19	26.76
	[20000TND-50000TND[	7	47	7	43.7	21	52.5	35	49.3
	>=50000TND	1	7	8	50	8	20	17	23.94
Total	15	100	16	100	40	100	71	100	
<b>Occupational Category</b>	Senior Executive	12	36,36	--	--	21	63,63	33	39,44
	Middle-grade Executive	3	20	--	--	19	47,5	22	30,98
	Self-Employed	--	--	16	100	--	--	16	12,68
Total	15	100	16	100	40	100	71	100	
<b>Matrimonial Status</b>	Married	13	86.67	15	94	29	72.5	57	80.28
	Single	1	6.67	0	0	7	17.5	8	11.27
	Divorced	1	6.67	1	6	4	10	6	8.45
Total	15	100	16	100	40	100	71	100	
<b>Property Ownership</b>	Owner	12	80	11	68.75	31	77.5	54	76.05
	Not owner	3	20	5	31.25	9	22.5	17	23.95
	Total	15	100	16	100	40	100	71	100
<b>Household size</b>	1	4	26.67	2	13	18	45	24	33.8
	2	0	0	2	13	5	12.5	7	9.86
	3	10	66.67	8	50	11	27.5	29	40.85
	>= 4	1	6.67	4	25	6	15	11	15.49
	Total	15	100	16	100	40	100	71	100

Source: Household Wealth survey 2015.

Descriptive results are presented with regression results, in order to identify the determinants of holding funded pension savings schemes that are presented in the next section.

#### ***IV.2- Regression Results***

Interpretation of regression results will allow for determining the effect of socio-demographic and financial factors on the probability of holding a pension scheme funded by a Tunisian asset, whether positive or negative. In other words, there may be factors that increase or decrease the probability of holding a pension scheme funded by a Tunisian asset. As previously explained in the model, a logistic regression is interpreted as linear modelling of Log-Odds, while the coefficients of the independent variables express the Odds-Ratio.

$$\text{O-R} = \frac{\pi_{ij}}{1 - \pi_{ij}} \text{ with } \pi_{ij} \text{ the probability that a worker } i \text{ of population } j$$

holds a life insurance or a funded pension scheme.

**If O-R > 1: increase in Xj leads to increase in the probability that Y is achieved.**

**If O-R = 1: increase in Xj has no impact on the probability of holding a funded pension scheme.**

**If O-R < 1: increase in Xj leads to decrease in the probability that Y is achieved.**

The tables below report a summary of the results of the regressions, namely Odds ratios and Standard deviations. The coefficients will be interpreted, first, for the entire sample, then, for each sub-sample. This will allow us to determine, first, the common Life Insurance holding factors for the entire sample and, secondly, for each sub-sample.

#### ***Age and Generation***

The analysis of the results of logistic regressions partially contradicts the life-cycle hypothesis, which states that age has a significant effect on holding life insurance for retirement. In the Tunisian context, the hypothesis about the relationship between age and purchasing life insurance contracts does not completely hold. Investment in life insurance products is a long-term endeavour and assets allocated to this type of product seek to supplement people's retirement rather than to achieve high profitability in the short term. Nevertheless, our results indicate that the probability of holding a life insurance or a funded pension product is not significantly influenced by age, irrespective of the public pension plan purchased ( $p = 0.652 > 0.1$ ).

**Table 8.** “Life Insurance/Retirement savings” Holding: results of regressions

Variables	Model	Model	Sub-population			
			Population	CNRPS	RINA	RSNA
AGE	1	Age	1.074	3.389**	1.215	1.004
	1	Age2	0.99	0.99	0.99	0.99
	2	Gen 2	0.503	--	0.00	0.282***
	2	Gen 3	0.812	--	0	0.629
	2	Gen 4	0.272	--	0.062	0.261
Marital Status	2	Single	0.347**	0.448	0	0.415**
	1	Div	2.472	37.368**	1.376	4.558***
	2		2.18	5.622	0.969	3.14
Income Bracket		IncBr	1.768*	1.57	3.099**	1.463***
	2		1.842*	1.796	2.476**	1.578
Vocational Category	1	PubExec	4.084	0.053**	--	--
	2		4.695	0.099	--	--
	1	PrivExec	8.313**	--	--	--
	2		10.020**	--	--	--
	1	SelfE	5.534***	--	--	--
	2		6.274***	--	0.098	--
Property Ownership	1	PropOwn	2.051**	1.689	0.741	3.424*
	2		1.989**	1.514	0.826	3.307**
Geographical Area	1	East	1.232	6.134	--	0.541
	2	West	0.813	0.214	0	1.993
Household Size	1	TMen	0.47	0.42	0.15	0.69***
Gender	1	Gend	1.172	1.34	1.435	1.638
	2		1.379	1.385	1.67	1.67

Logistic regression coefficients “O-R”, Significance ( $p < 1\%$ ,  $p < 5\%$  and  $p < 10\%$ ) is indicated by the symbols \*, \*\*, \*\*\*

However, by introducing the generation factor into our model, we found a significant negative relationship between membership to the age group of 30 - 40 year olds and log odds ( $OR = 0.503 < 1$ ), significant at  $p = 0.095 < 0.1$ . In other words, belonging to this generation decreases the likelihood that the asset will be allocated to life insurance in order to supplement one’s retirement. This finding can be explained by the fact that at the beginning of their working lives, individuals lack vocational stability and face many financial constraints, such as debt repayment and large family expenses.

Purchasing life insurance or funded pension contracts often takes place during later years of one’s working life, before retirement, which seems to be conducive to saving. Savings accumulated through these products respond to the need to supplement an individual's income after retirement.

In general, the generation variable highlights the effect of the socio-economic factor on savings behaviour. In other countries, uncertainty about the evolution of the financial situation of public pension funds and the anticipation of possible reforms encourages younger generations to save more resources for their retirement

(Brun-schammé and Duée 2009). Nevertheless, in the Tunisian context, we notice that belonging to a younger generation has the opposite effect on the probability of self-employed persons in the private sector holding life insurance. Moreover, results show that belonging to older, close-to-retirement generations does not have a significant impact on the probability of holding pension savings. These retirees are confident about their future retirement pension and believe they will not be affected by pension reforms that might be made to basic pension plans. In addition, when approaching retirement, these retirees consider that long-term savings products are not profitable investments in the short-term, nor are the tax benefits gained through such products.

**Table 9.** “Life Insurance/Retirement savings” Holding: results of regressions (Standard deviation)

Variable	Equation	Sub-population				
		Population	CNRPS	RINA	RSNA	
AGE	Age	1	0.158	0.517	0.424	0.234
	Age2	1	0.002	0.006	0.005	0.003
Generation	Gen 2	2	0.531	--	--	0.674
	Gen 3	2	0.632	--	--	0.887
	Gen 4	2	0.896	--	--	1.224
Marital Status	Sing	2	0.461	0.159	9150.395	0.591
	Div	1	0.578	1.788	1.228	0.845
		2	0.58	1.408	1.25	0.849
Income Bracket	IncBr	1	0.19	0.385	0.457	0.274
		2		0.387	0.463	
Vocational Category	PrivExec	1	1.056	--	--	7688.64
		2	1.095	--	--	7618.815
	PubExec	1	1.084	1.739	--	--
		2	1.065	1.633	--	--
		Self-E	1	1.083	--	40193.01
2	1.089	--	48990.321	--		
Property Ownership	PropOw	1	0.335	0.781	0.724	0.473
		2	0.337	0.79	0.719	0.472
Geographical Area	East	1	0.685	1.455	23184.905	1.022
	West	2	0.685	1.337	23205.422	1.027
Household Size	HSize	1	0.134	0.313	0.244	0.222
Gender	Gend	1	0.319	0.683	0.813	0.445
		2	0.324	0.667	0.807	0.45

### ***Income***

An analysis of regression results confirms the hypothesis that income has a significant effect on the probability of an individual holding life insurance for retirement. This observation confirms the life-cycle assumption that this factor has a prominent effect on savings-for-retirement behaviour. The logistic regression results indicate that holding a life insurance contract by a Tunisian asset positively relates to one's annual income. Indeed, results suggest that the probability of holding insurance products increases when an individual's income is in the upper range  $OR = 1.768 > 1$  and  $p = 0.003 < 0.01$  and individuals with low income are the least likely to purchase such contracts. These results confirm those found in previous studies.

This significantly positive relationship between income and the probability of purchasing a life insurance / funded pension contract holds for in the entire sample as well as for the RSN and RINA sub-samples. High annual incomes increase the probability of life insurance ownership only among private sector employees with  $O-R = 1.463 > 1$  and  $p = 0.065 < 0.1$ . Contracts may be purchased individually or collectively and this allows an employee to enjoy tax benefits. Similarly, results show that this positive relationship also holds for the RINA sub-sample with  $O-R = 3.099 > 1$  and  $p = 0.013 < 0.05$ .

These results can be explained by the fact that private sector assets (employees and self-employed) with higher annual incomes are more likely to experience a large loss of income upon retirement, contrary to those holding public sector assets. The latter will receive a public pension quite similar to their working income, since the reference salary base taken into account while calculating the retirement pension is much more advantageous for the public sector than for the private sector. The probability of purchasing a funded pension plan increases with the growth of one's annual income. These highly-remunerated assets have significant savings capacity and express one's willingness to offset the sharp decline in income anticipated after their retirement, while benefiting from tax deductions (Carroll 1998, Arrondel 1996).

### ***Marital Status and Household Size***

Looking at the regression results, we found that marital status has a significant impact on holding life and pension products, which confirms the assumption made initially. In our study, a 'single' person is less likely to hold a pension savings product than a married person. Being single reduces the probability of holding life insurance / pension savings in the group with  $O-R = 0.347 < 1$  and  $p = 0.022 < 0.05$ . This can be explained by the fact that a single person seems to be less interested in products that provide coverage for spouse and children than in other savings products that may be less expensive without offering these features.

However, results show that household structure and size do not have a decisive impact on holding pension savings for the entire sample. This confirms the results of some previous studies (Mahieu (2001), Mekkaoui de Freitas (2002)).

Although tax law regulating life insurance products allows for an increase in tax deductions with an increase in the number of dependent children, our results indicate absence of a positive relationship between household size and the probability of holding life insurance or retirement savings.

The tax advantage does not seem to be an incentive for purchasing such savings products. This may be explained, on the one hand, by the fact that most households are poorly informed about these benefits and tax deductions and, on the other hand, by the limited savings capacity of large families (Brun -Schammé & Duée 2008).

Nevertheless, we notice that belonging to the 'couple with 3 or more children' category under the RINA sub-sample increases the probability of holding a life insurance product. This can be explained by a concern to protect the future of one's family and to compensate for the risk of not having provided for oneself after retirement. The long-term saving decision expresses a desire to maintain a future income allowing one to cope with rising expenses, given their large household size (Lewis 1989, Fischer 1973).

### *Vocational Category*

Vocational category in Tunisia reflects other socio-economic parameters, like income level, prospects of salary raise, and educational level.

According to our results, one's vocation has a significant impact on holding a life insurance plan only for private RSNA and RINA plans. In fact, 'senior managers' and 'senior executives' are more likely to hold supplementary pension products. The relationship is positive between vocational category and the probability of holding life insurance for RSNA-affiliated employees with  $OR = 8.313 > 1$  and  $p = 0.045 < 0.05$ . This can be explained by the fact that members of this vocational category in Tunisia are generally known for high wages and salaries and prospects for favourable future income trends (Marti 2011).

Moreover, it should be noted that for the public sector, vocational category does not have a significant impact on the probability of holding pension products. Results indicate that the 'vocational category' variable does not significantly affect the probability of holding a life insurance policy. This means that one's vocation does not determine the purchase of a life insurance policy for the public sector regime. This result can be explained by the fact that affiliates to the Tunisian public sector regime do not risk significant loss of income when they retire. Their retirement pension paid by the Social Security Fund is not capped, as in the case of private sector affiliates, and the standard of living of public service retirees is similar to that of alternative assets.

Such pension coverage reduces the probability of holding funded pension supplements for this asset class.

Nevertheless, results show that the 'self-employed' category is more likely to contract pension savings with  $O-R = 6.247 > 1$  and  $p = 0.093 < 0.1$ . This can be explained by the fact that members of this group wish to protect their future pensions, since the basic retirement amount of the self-employed is significantly lower than their actual activity income (Brun-Schammé 2009).

### ***Property Ownership***

Property ownership is a common holding factor to all Tunisian asset classes. Indeed, regression results indicate that ownership of a main property has a positive effect on the probability of holding a life insurance or a funded pension supplement with  $OR = 2.164 > 1$  and  $p = 0.021 < 0.05$ . This significant positive relationship holds both for the entire sample and for the three sub-samples, i.e., RSNA, RINA and CNRPS. Moreover, it is owners of main properties who tend to purchase this type of contracts, which confirms the results of Arrondel & Savignac (2011), and Brun-Schammé & Duée (2008).

Results indicate that it is necessary to differentiate between owners of a main property and tenants who pay rent and who generally have lower savings capacity than homeowners. This makes them less interested in life insurance and pension products and also reflects the savings priorities of a Tunisian asset and shows that Tunisians allocate their resources to acquiring a house first, and that accumulating savings for retirement in the form of life insurance comes next. However, those who do not have access to owning a property are unlikely to purchase insurance or pension products.

### ***Geographical Area***

Several authors stipulate that the geographical area determines holding life and common insurance for both the private and public sectors. This assumption is not confirmed by our regression results, suggesting, all things being equal, that the geographical area of the household is not a significant factor determining holding life insurance for retirement.

Indeed, living in the Greater Tunis, Central East (Sahel) and South East (mainly Sfax) regions does not significantly impact the probability of holding a pension product. This is inconsistent with other studies in other countries, which consider the geographical area as a factor determining pension savings behaviour (Dauner 2002). In our study, geographical area does not have a significant impact, despite the difference in the demographic and economic characteristics of the sample in each region (income level, education, age, etc.). This can be explained by the proximity of financial institutions that offer such contracts in all regions of the country (Marti 2011, Dauner 2002). Indeed, life insurance agencies are located in all cities of Tunisia and offer the same life insurance and savings products to all citizens.

### Gender

Previous studies state that asset type has a significant impact on the probability of holding life insurance / funded pension products, and that men are more likely to purchase such contracts than women. Nevertheless, according to the regression results, this stipulation is not confirmed. Gender does not have a significant effect on life insurance savings decisions.

All of the results above are summarised in the following table which indicates the negative or positive impact of each variable on retirement savings and holding a life insurance product in Tunisia.

**Table 10.** Effects of the variables on the probability of Life Insurance contracts holding

Variable		CNRPS	RINA	RSNA
<b>AGE</b>	Age	©	©	©
<b>Generation</b>	1981- 1990	-	-	-
	1971 - 1980	-	-	-
	1961 - 1970	©	©	©
	1951 - 1960	©	©	©
	1931 - 1950	©	©	©
<b>Marital Status</b>	Sing	-	-	-
	Div	©	©	©
	Wid	©	©	©
<b>Income Bracket</b>	IncBr	+	+	+
<b>Vocational Category</b>	PrivExec			+
	PubExec			
	SelfE		+	
<b>Property Ownership</b>	PropOw	+	+	+
<b>Geographical Area</b>	East	©	©	©
	West	©	©	©
<b>Household Size</b>	HSize	©	©	©
<b>Gender</b>	Gend	©	©	©

Source: Authors' calculations - 2015.

(©) The variable has no significant effect on the probability of holding a life insurance contract

(+) The variable has a positive significant effect on the probability of holding a life insurance contract

(-) The variable has a negative significant effect on the probability of holding a life insurance contract.

### IV-Conclusion

The financial difficulties faced by Tunisian pension systems in addition to the harsh demographic and economic developments have been considered in this study. Our aim is to highlight the determinants of holding a funded pension or life insurance plan. We referred to many studies carried out in different countries to examine the behaviour of different population groups in regard to holding complementary retirement savings products. Our contribution is that we focus on a Tunisian sample and distinguish individuals according to the pension scheme they are affiliated to.

This allowed us to test our hypotheses, taking into account the specificity of each category.

The results of the logistic regressions pointed to the determinants of holding a pension plan that are common to all categories, notably life cycle variables and ownership property. The latter seem to have a significant impact on group pension savings behaviour.

Nevertheless, we found other factors specific to each asset class, such as vocational category, which is a significant factor for private assets but has no effect on public assets. This result can be explained by differences in the parameters considered and the rules for calculating pension rights for the private and public sectors.

As for marital status, results prove that this factor does influence the decision to hold a supplementary pension savings plan and that a 'single' Tunisian is less interested in these products than a 'married' one. Married people hold assets to try and protect the future of their spouses and children. Moreover, results indicate that socio-demographic and financial factors exert the same effect on the entire sample and on the sub-samples. Moreover, the level of impact of each factor varies from one category to another. Similarly, some factors can be decisive in a specific category of the sample but not in the entire sample.

Results highlight the socio-demographic and financial characteristics that influence a Tunisian in regard to holding a life insurance product for retirement. This might give a general idea about the potential of developing life insurance and funded pension products for Tunisia. Nevertheless, the present study examines data observed at a given point in time. It may be interesting to follow a developmental approach to savings behaviour over several years in the future, take into account the premiums paid and assess the amounts invested in such contracts.

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