ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2018

working paper series

DO MYOPIA AND ASYMMETRIC INFORMATION MATTER IN THE DEMAND FOR SOCIAL INSURANCE?

Walid Merouani, Nacer-Eddine Hammouda
and Claire El Moudden

Working Paper No. 1212

DO MYOPIA AND ASYMMETRIC INFORMATION MATTER IN THE DEMAND FOR SOCIAL INSURANCE?

Walid Merouani[1], Nacer-Eddine Hammouda[2] and Claire El Moudden[3]

Working Paper 1212

June 2018

This paper was generously funded by the research center on applied economic for development (Algeria).

Send correspondence to:
Walid Merouani
Centre de Recherche en Economie Appliquée pour le Développement (ALGERIE)
merouaniwalid@hotmail.fr

[1] Centre de Recherche en Economie Appliquée pour le Développement (ALGERIE) and Centre de Recherche en Economie et management (CREM-CNRS)
[2] Centre de Recherche en Economie Appliquée pour le Développement (ALGERIE).
[3] Centre de Recherche en Economie et management (CREM-CNRS)

First published in 2018 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This article challenges the topic of low demand for social insurance by exploring an original survey in the Algerian labor market. Related literature has focused on the efficiency of social insurance systems and discussed their ability to cover everyone. On the other hand, empirical studies highlighted the role of socio-demographic factors in understanding the low social insurance coverage. But the use of behavioral economics tools is still scarce in this field. This article highlights the impact of time discounting and knowledge of social policy on the demand for social insurance. To make the result more robust, we use the discrete choice model. The outcome clearly shows that forward looking and knowing social security rules increase the participation to social insurance system. Furthermore, we confirm the role of age, gender, income and education, to be significant determinants of social insurance demand. We argue these conclusions should have practical policy implications.

JEL Classifications: D12, D83, D91, J48

Keywords: demand for Social insurance; time discounting; knowledge of social security; behavioral economics, survey; Algeria.

ملخص

تناقش هذه المقالة موضوع انخفاض الطلب على التأمين الاجتماعي من خلال استعمال مسح مبتكر في سوق العمل الجزائري. ركزت الأدبيات ذات الصلة على كفاءة أنظمة التأمين الاجتماعي وناقشت قدرتها على تغطية الجميع. ومن ناحية أخرى، أبرزت الدراسات التجريبية دور العوامل الاجتماعية الديموغرافية في فهم تغطية التأمين الاجتماعي المنخفضة. ومازال استخدام أدوات الاقتصاد السلوكي نادر في هذا المجال. يسلط هذا المقال الضوء على تأثير خصم الوقت ومعرفة السياسة الاجتماعية على الطلب على التأمين الاجتماعي. للتوصل إلى نتيجة أكثر قوة، نستخدم نموذج الاختيار المنفصل. تتبين النتائج بوضوح أن قواعد الضمان الاجتماعي التي تتعلق بنظرة مستقبلية وبمعرفة أكثر للوائحه تزيد المشاركة في الضمان الإجتماعى. علاوة على ذلك، نؤكد دور العمر والجنس والدخل والتعليم كمحددات هامة للطلب على التأمين الاجتماعي. نحن نؤكد أن هذه الاستنتاجات يجب أن يكون لها تأثير عملي على سياسة الضمان الاجتماعي.

1. Introduction

The low rate of social coverage is observed in many developing countries (ILO, 2010). Governments of these countries attempt to extend social security using different strategies. Some of them use the Beverdgian means. They seek to cover the poor population through a non-contributive assistance program. Other countries seek to extend social security through a Bismarckian system that adapts the mechanisms for the collection of premiums and for the payment of benefits (Renena 1998). The Bismarckian strategy seems to be more opportune because it does not yield, theoretically, to funding problems. However, identifying the reasons for low coverage is necessary to implementing the right strategy for extending social security coverage. The previous studies have shown the role of sociodemographic factors in understanding the phenomenon of low social insurance coverage (Bellache, 2010). This paper go beyond socio-demographics and introduce behavioral determinants social security coverage. We will focus on Forward looking and knowledge about social security which the importance for the decisions of purchasing insurance has been proved by Samuelson (1937) and Chetty and al (2013). We will show the impact of these variables on the demand for social security in Algeria.

According to the Office for National Statistics [ONS] (employment survey, 2014), 42% of the workers do not have any coverage against potential social risks. Such workers will face unsolvable problems if any difficulties arise in the future (disease, aging, etc). The gap in social coverage will lead to lack of social cohesion and social inequalities in Algerian society in the future.

The Algerian social security system is public and Bismarckian (contributory) which means that workers need to contribute in order to get benefits when the social risks occur. The system is made by five insurance funds that offer insurance against all social risks (sickness, maternity, accidents and injuries at work, disability and death) as well as providing a retirement pension. All categories of workers, including self-employed, temporary workers and contributing family workers, are eligible for the various insurance funds (Merouani et al, 2014). In fact, the insurance system is compulsory, but the state looks the other way when workers do not demand social insurance in order to escape paying contributions. There is no severe punishment against such "free-riders". Thus, the problem of social security is a problem of demand, the supply is enough to cover everyone. This paper will uncover the behavioral determinants of this demand.

Many macro and microeconomic variables can impact the demand for social insurance (Bommier et al. 2014; Freidman 1974; Neyman 2001). In our previous study (Merouani et al, 2016), we have displayed a set of behavioral and socio demographic variables that impact significantly the demand for social insurance. As aforementioned, this paper will focus on: (1) the impact of forward looking (Brown et al. 2013; Caire 2002; Kessler 1986; Wang et al. 2009.) and (2) the knowledge that individuals have of social security rules (Leibman et al. 2011, Mitchell 1988, Chetty, 2013) on the demand for social insurance.

Indeed, information concerning social security may be available and straightforward to understand. Individuals who are familiar with social security rules will be more likely to demand social insurance. Forward looking can also impact the demand for social insurance. High time discounting rate (not forward looking) decreases the demand for social insurance. The individual will be less likely to demand social insurance if they don't think about their old age (retirement). To test that, we measure these variables, among a sample of insured and non-insured workers, using an experimental survey of the Algerian labor market.

The rest of this article proceeds as follows. Section 2. presents the theoretical background on time discounting and the impact of knowledge about social policy on individual behavior. Section 3. presents our methodology and the survey design. The summary statistics of the survey is presented in section 4. Section 5. presents the empirical outcomes. We conclude in

Section 6 by presenting policy recommendations enhancing peoples' willingness to participate to social security.

2. Knowledge about policy and individual forward looking: a literature review.

This section will provide an overview of the literature on time discounting and the impact of policy knowledge on individual behavior. Authors studied these issues in different ways. Here we will explore the literature to adapt it and seek a useful application to the Algerian social security context.

2.1 Demand for social insurance: does knowing rules of social security matters?

The demand for any good on the market is linked to information that the consumer has about this good and its provider. This is also true for social security services. Individuals buy social insurance if they perceive the information about the system (the rules of calculating benefits and contribution). Previous research suggests that individuals are not fully informed about tax and transfer policies (Leibman et al, 2011. Kling et al, 2011). These researchers studied the impact of providing information to consumers on their behavior. Leibman et al (2001) test the impact of providing information about social security on individual behavior. The authors randomized two groups of older workers. The first was informed about social security (a mailed brochure combined with an invitation to participate in a 15-minute online tutorial) and the second was not. One year after the information was provided, the authors did an experimental survey to gauge the impact of the information on the individual behavior regarding the labor market and social security. The results show that the group that was informed changed their behavior in the labor market: they tended to work longer in order to get higher old age pension.

Kling et al (2011) posit that consumers need information to compare the different alternatives on the market and to make an efficient choice. Focusing on the Medicare program in USA, he got gathered two sample groups: the first one received information that allows comparing between the different drug-insurance plans; the second was a control group. Introduction of such information had an impact on the individual behavior. It increased the probability of switching to a lower priced plan.

Chetty and al (2013) posit the hypothesis that providing information about policies to individuals enables them to make better economic choices. This hypothesis was tested on the recipients of Earned Income Tax Credit[4] (EITC) in USA. He observes that the EITC rules are not well known by the potential filers. He provided information about the EITC and he tested if individuals who were informed would change their behavior toward this institution (EITC). The study finds that tax preparers may be able to influence their client's earnings decisions by providing advice about how to respond to tax incentives.

Starr-McCluer et al (1999) examined how much knowledge the workers had about their pension plan. He linked data provided by workers (Survey of Consumer Finances) with data provided by employers (Pension Provider Survey) to measure the knowledge that workers have about their pension plan. The paper’s finding is that the workers’ knowledge about their pension is limited.

Mitchell (1988) analyzes both administrative data and workers reports about pension. He found that workers are misinformed about their pension plan. Higher income workers and those in large firms, the better educated, and those with greater seniority better understood their pension plan. This myopia about pension plan has an effect on the individual choices (participating in the plan or not and if yes, how much?).

[4] The EITC is the largest cash transfer program for low income families in the United States and it generates large marginal subsidies or taxes on the earnings of recipients

Bernheim (1987) conducted a survey on elderly workers (close to retirement) to identify their expectation about social security benefits. He found that consumers do not form expectations on the basis of all available information.

On the basis of these works, we posit the hypothesis that the low social security demand in Algeria is due, to misinformation that workers have about social security. We will analyze the quality's information that people have through our survey.

2.2 Forward looking: how do people discount future?

Inter temporal choices and the perception that people have about the future play a key role in life cycle theory. These variables impact the individual consummation pattern. It impacts the demand of diffident goods and services as well as demand of social insurance. Previous works dealt with the question of forward looking used different concepts: myopia, inter temporal choices, time inconsistent and time preferences. Since Samuelson's seminal paper (Samuelson 1937), many authors have discussed this issue, drawing mixed conclusions. Some studies found that most people do not discount the future highly (Barsky et al. 1997; Loewenstein 1987; Loewenstein and Prelec 1991, 1992; Loewenstein and Thaler 1989). Others obtained the opposite result, encountering high levels of time discounting (Warner and Pleeter 2001; Sawmick 1998; Hausman 1979; Lawrence 1991; Brown et al. 2013; Arrondel et al. 2002, 2004).

Brown et al (2015) analyze the inter temporal choices of Croatian retirees. These later had to choose between two forms of pension plan. The first give them differed payment and the second offers more immediate payment. 70% of the respondents chose the latter. The author used the second method to estimate the time discounting rate. He asked participants to choose between placing a received amount of money in a solvent bank for one year or taking the money and doing whatever they want with it. Respondents who did not want to put the money in the bank for a year were asked what interest rate would be required for them to change their minds. The interest rate that was required constituted the individual's time discounting rate. The mean interest rate required was 8.7%.

Samwick (1998) used a consumption survey to measure time preference using the lifetime model. Brasky et al 1997 measured individual inter temporal choices using a survey. He found very low time discounting rate.

Warner et al (2001) studied with military time discounting. The military was forced to downsize and had to choose between two pension plans. The first program offered annuities. The second offered a lump-sum payment. Most pensioners chose the lump-sum payment. Time discounting rate was estimated in this study. It varies between 0 and 30% with education, age, sex, and other socio-economic characteristics. Wang et al (2009) conducted an international survey measuring time discounting. He used several methods proposing an alternative of immediate and delayed payments. The findings reveal different ways to discount the future. Individuals tend to disregard the near future decidedly more than the distant future. People also discount small amounts more than larger ones. The result of time discounting rate varies also with country. Arrondel et al (2004) analyzed the time preference of the French population using a survey. They asked individuals many questions about their daily life: do they drop a book after reading only the few first pages; do they use the freeway instead of the national route to get work. The author crosses inter temporal preferences with wealth accumulation. The finding is that more patient individuals (forward lookers) were wealthier.

On the basis of the papers exhibiting supra we built a questionnaire to conduct a survey on the Algerian labor market. We explain our survey in the next section.

3. Methodology

3.1 Sampling

To measure the variables above we conducted a survey. We have administered an experimental questionnaire to 654 workers between 15 and 65 years of age employed in the labor market of the Algiers province. The survey was focused on the private, non-agricultural sector. The public sector was excluded because all public sector workers are affiliated with social security. The agricultural sector was also excluded. The sample was chosen using a quota method on ONS 2010 household employment survey. Five control variables were used in order to apply quota method of sampling: affiliation to the social security system, gender, age, employment status, and sector of activity. We chose these variables because they are determinant in the context of social security (Merouani et al, 2016). 31% of the respondents was affiliated to social security system. Female represents 15% of the sample. The employment status of the population is made by 10% of permanent employees, 42% of temporary employees and 48% of employer and self-employed. As in ONS employment survey, 19% of the population of our sample was occupied in industry and manufacture sector, 22% in building and 59% in trad and services sectors. Hence the structure of our sample is similar to the structure of the household employment survey (ONS, 2010).

We lead a big survey that measure many variables. However, this paper will only[5] present the measurement of two key determinants of the demand for social insurance, namely time discounting (forward looking) and knowledge of the social security system.

3.2 knowledge about social security rules

To quantify how much people know about social security, we went beyond the declarative questions to which it is possible for a respondent to declare that he knows a lot about social security system even when he does not know much in reality. We ask two declarative questions: first, whether or not the respondent knows the existence of the social security system; if the response is affirmative, we ask him if he knows how the social security system works[6] (source of income and expense). After these two declarative questions, we ask five test questions and we calculate the score of social security knowledge according to the number of correct answers.

The first question is whether or not the social security system is funded by workers' contributions? The respondent chooses between three answers: true, false, or I don't know.

The second question we evoke many risks[7] (health care, reimbursement of medication, fire insurance, disability, accident in work and work injury, unemployment, old age pension, and road accident), and we ask respondents to tell us which of these risks are covered by the social security system.

The third question asks respondents about the nature of social security system. If it is "pay as you go" or a funded system. We explain in our question that a "pay as you go" system means that the actual contribution of workers aims to finance the actual pension retirees. On the other hand, in funded system, contribution are saved (or invested) till the age of retirement to be paid to the workers as pension. The correct answer is that the social security system is a pay as you go system.

The fourth question asks respondents about the way to calculate the old age pension. Is it based on the income of all your active life, on the income of the last ten years, on the income of the last five years, on the best ten incomes in your active life, or on the greatest five incomes of your active life? The correct answer is the greatest five income of the active life for the salaried workers and the greatest ten incomes for employers and the self-employed.

[5] For more details about the questionnaire survey please see (Merouani et al, 2016).
[6] The possible answers to this question are Yes, No or moderately.
[7] Some of the risks are not social and they are not covered by social security.

In the fifth question, we explain that the pension is calculated as proportion (replacement rate) of reference income. Reference income is equal to 2.5 times the mean of the five best wages (the highest ten incomes for non-salaried workers). We ask respondents what the higher replacement rate for the old age pension is, 50%, 60%, or 80%? The correct answer is 80%.

In all these five questions the respondents can answer simply "I don't know''. Based on the answers, we calculate a score of social security knowledge. For good knowledge, a respondent must get 5/5 correct answers. Medium knowledge is indicated by 3/5 or 4/5 correct answer and low knowledge by 1/5 or 2/5 correct answers. No knowledge is indicated by no correct answers.

This score provides empirically categorical variables that measure the knowledge that respondents have about social security. We will see statistics of this variable in the next section.

3.3 Measuring forward looking skills:

After reviewing previous studies (Wang and al, 2009; Brown et al, 2013), we chose the most suitable methods to determine if respondents are forward-looking or not. We pose several questions in our survey. In the first question, respondents were asked to choose between a preference for immediate payment and a deferred payment that was a more substantial payment as follows:

Amount in Algerian dinar	First year	second year	third year	fourth year	Fifth year	sixth year	seventh year
A	15000						
B		5000	5000	5000	5000	5000	5000

We asked the same question proposing monthly payments rather than annuities. Responses to the questions above indicate to us if the respondent is patient or not. In the second method we proposed the following alternatives to respondents (as per Wang 2009):

Please consider the following alternatives:
A. a payment of 1,000 DA now
B. a payment of X DA one year from now
X payment has to be at least …….DA, such that B is as attractive as A.

Next, the same question was asked but with a changed horizon and amount:
A. a payment of 1,000 DA now
B. a payment of X DA ten years from now
X payment has to be at least ……. DA, such that B is as attractive as A.

A. a payment of 10,000 DA now
B. a payment of X DA one year from now
X payment has to be at least ……. DA, such that B is as attractive as A.

A. a payment of 10,000 DA now
B. a payment of X DA ten years from now
X payment has to be at least ……. DA, such that B is as attractive as A.

To estimate the time discounting rate from these answers, the relationship between the present value of cash, denoted by P, and its future value, denoted by F, was used. Formally,

$$F = P\,(1 + R)^{t}$$

where R is the discount rate and t is the time to be waited. Since both P and t are given in our questions, the inferred discount rate can be obtained from

$$R = (F/P)^{(1/t)} - 1$$

In addition to these two variables, the survey measured the socioeconomic and demographic characteristics of the respondent. We hypothesized that characteristic variables could impact the demand for social insurance. We will present the interaction of these variables with forward looking and knowledge of social security rules in the following section.

4. Descriptive statistics and summary results.

This section presents the main results of our survey. We will display the summary statistics of the main variables of this paper (time discounting rate and knowledge about social security) as well as to present the cross table with other socio-demographic variables.

4.1 Knowledge about social security system

Our respondents seem to be misinformed about social security system. For the first declarative question: 3% of the respondents are unaware of the existence of social security system. These respondents were not asked the test questions. The second question shows that 23% declare that they know the rules of social security system. 46% declare that they don't know how the social security system works, and 32% say that they have minimal knowledge of the rules of the social security system. Scores of the test questions show that only 3% of the respondents have good knowledge. 33% have medium knowledge. 55% have low knowledge and 7% have no knowledge.

Analyzing knowledge about social security with respect to age is somewhat messy. According to Mitchell (1988) the senior workers were more informed about their pension scheme. For the case of our study, we can observe that knowledge about social security is almost the same for all the age categories. However, some differences appear: medium knowledge increases with age 27% of the workers who have (15-24 years) against 42% of who have 55-64 years are in the medium knowledge. We observe that many young and elderly workers have low knowledge about social security. There are more young workers than seniors that have no knowledge about social security. 14% of the workers between 15 and 24 years have no knowledge. This proportion is about 3% for the 45-54 years and 0% for the workers who are between 55 and 64 years old. This is why we think that age is a determinant variable in demand for social insurance.

Table 1: Knowledge of social security by age

Age by year	15-24	25-34	35-44	45-54	55-64
Good Knowledge	5%	4%	4%	4%	0%
Medium Knowledge	27%	35%	31%	35%	42%
Low Knowledge	54%	54%	58%	58%	58%
No Knowledge	14%	7%	7%	3%	0%
Total	100%	100%	100%	100%	100%

Source: Source: author's data, DDSS survey.

The comparison of knowledge held by men women is presented in table 2. Men seem to be more informed about social security, which can explain why man are more likely to be insured than women (employment survey ONS). The table below shows that 35% of men have medium knowledge as compared to 22% of women. 54% of the men have low knowledge compared to

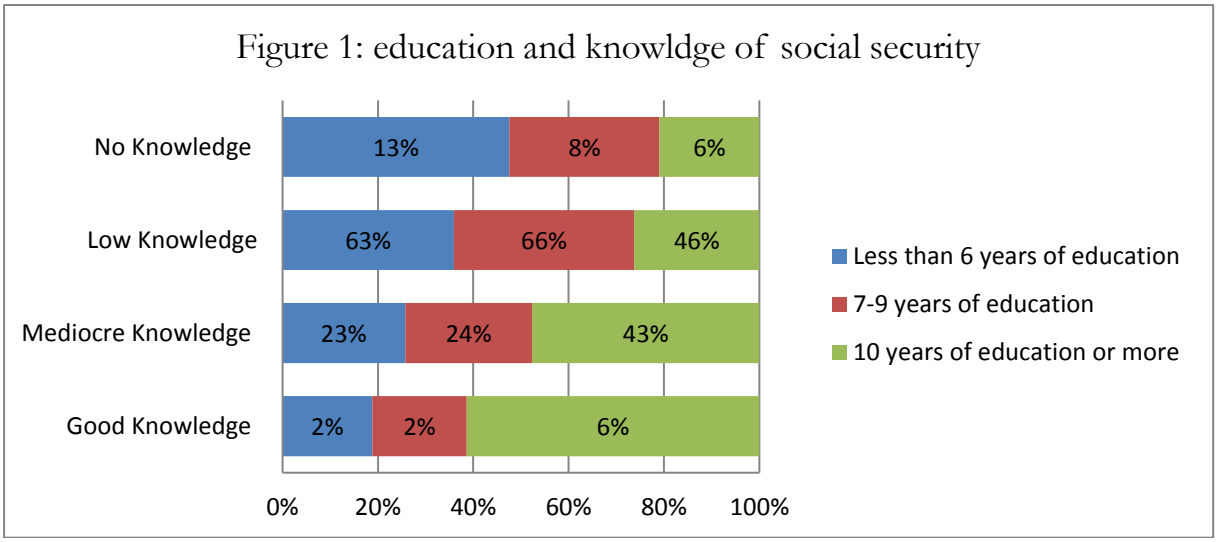
63% for the women. 7% of the men have no knowledge compared to 10% of the women. Our result does not corroborate with Mitchell (1988) who finds that women are more informed about pension plans than men.

Table 2: knowledge about social security by sex.

	Men	Women
Good Knowledge	3%	5%
Medium Knowledge	35%	22%
Low Knowledge	54%	63%
No Knowledge	7%	10%
Total	100%	100%

Source: author's data, DDSS survey.

Level of education should influence knowledge about social security. We observe that even the well-educated respondents are not well informed about social security system, as seen in figure 1



Source: author's data, DDSS survey.

The figure above is quite logical. It seems that education and knowledge about social security are positively correlated. The good and medium knowledge categories are constituted by more educated respondents. 6% of the more educated respondents (more than 10 years of education) compared to 2% of the less educated (less than 6 years) in this category. The ''No knowledge'' category is mostly composed by respondents with low level of education. 13% of those who have less than six years of education fall in this category compared with just 6% of the more educated that fall in the category of ''No knowledge''. Thus, the level of education can improve knowledge about social security. It can also improve the demand for social insurance.
The table below summarizes the individual knowledge according to their income.

Table 3: knowledge of social security and monthly income (in Algerian dinars)

Income in dinars	Income<18000	18001<income<36000	36001<income<56000	income>56000
Good Knowledge	0%	3%	3%	7%
Medium Knowledge	19%	31%	35%	50%
Low Knowledge	67%	57%	56%	42%
No Knowledge	13%	8%	6%	1%
Total	100%	99%	100	100

Source: author's data. DDSS survey.

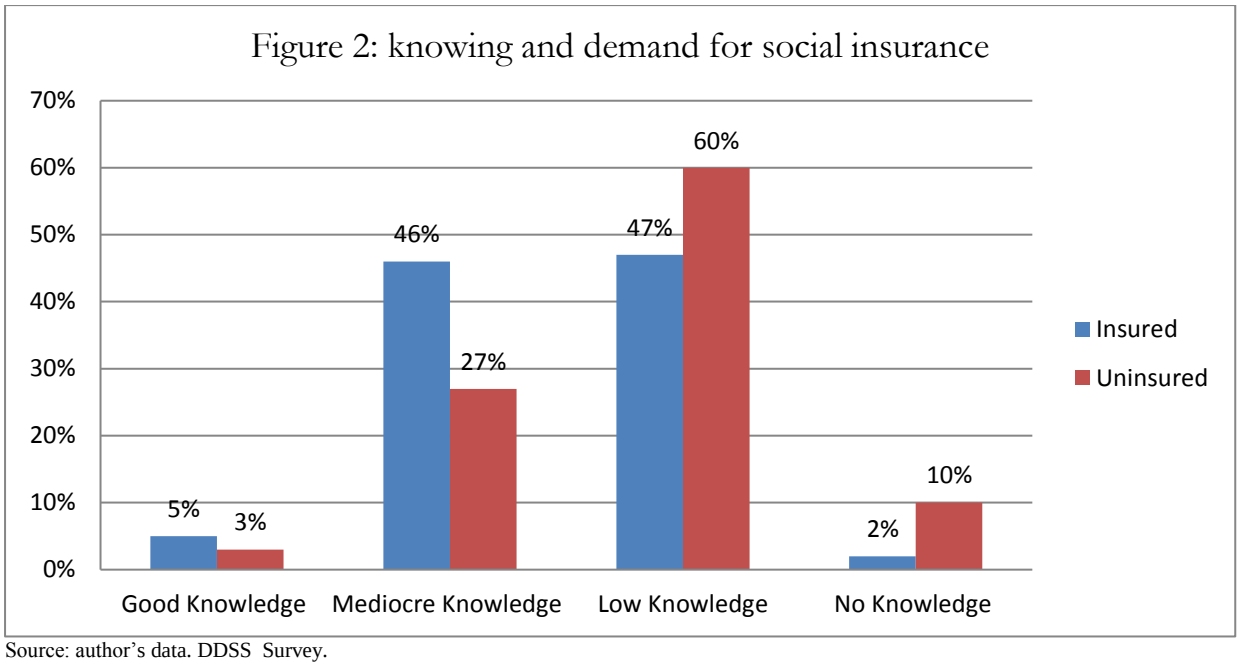
The table above shows that higher income workers are more informed about social security rules. Our results correspond to Mitchell (1987). The percentage of respondents with good and medium knowledge increase with income. Only 19% of respondents with income below 18,000 DA have good knowledge. This proportion is about 50% of the respondents with income superior to 56,000DA. However low knowledge decreases with increased income. It passes from 67% for those who earn less than 18,000DA to 42% for those who earn more than 56.000DA. We observe the same thing for the categories ''No knowledge'': 13% of respondents who earn less than 18000Da have no knowledge about social security. This percentage is about 1% for those who earn more than 56.000 DA by month.
The table below presents the knowledge of social security according to firm size:

Table 4: knowledge of social security and firm size

	Self employed	1-4 employees	5-9 employees	10-49 employees	More than 50 employees
Good Knowledge	0%	6%	3%	3%	2%
Medium Knowledge	33%	30%	35%	39%	50%
Low Knowledge	56%	58%	44%	57%	48%
No Knowledge	11%	5%	16%	1%	0%
Total	100%	100%	100%	100%	100%

Source: author's data. DDSS Survey.

Table four shows that the workers of biggest firms could be more informed about social security. The percentage of respondents whose have a good or medium knowledge, increase with incresed firm size. Otherwise, the percentage of respondents whose have low or no knowledge decrease with increased firm size The figure below is the most important of our findings. It provides the key to testing the impact of social security information on the demand of it.

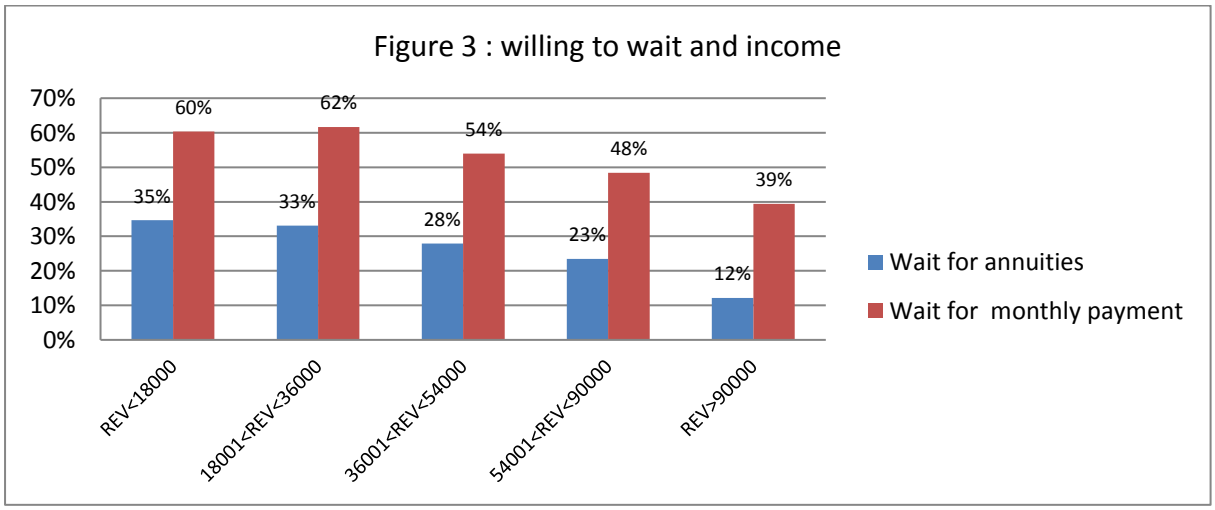


Source: author's data. DDSS Survey.

The figure below shows the difference of knowledge about social security between insured and uninsured respondents. It seems that the insured respondents are more informed than the uninsured. 46% of the insured have medium knowledge compared to 27% of the uninsured. The insured are less represented than the uninsured in the category of low knowledge: 47% of the insured have low knowledge while a higher proportion of uninsured (60%) fall in this category. These results support our hypothesis that people would demand more social insurance if they better understood its rules.

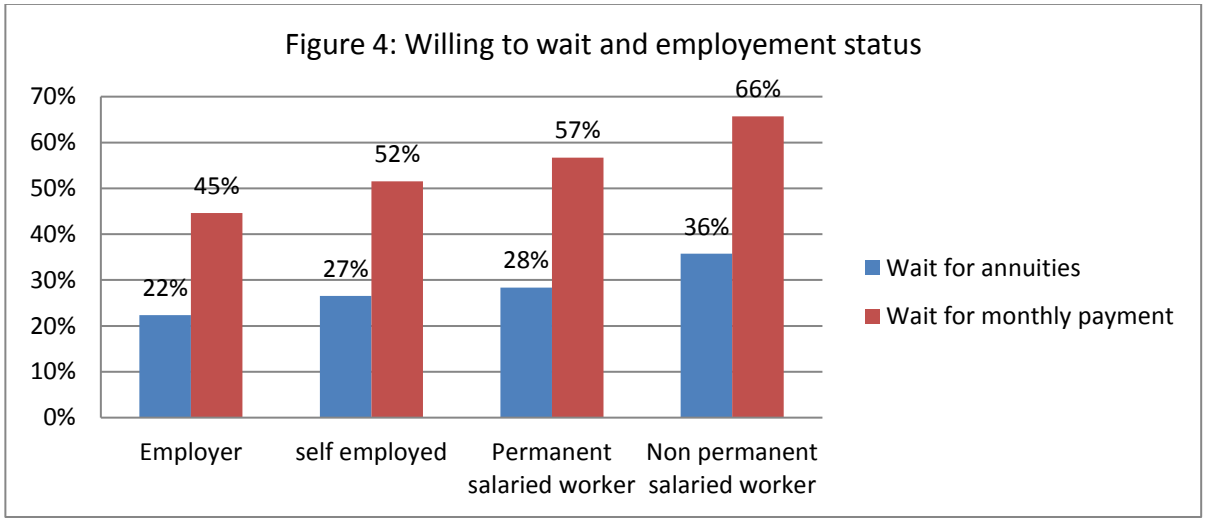
4.2 Forward-looking:

This subsection presents the summary statistic of inter-temporal choice measurement. The result showed that respondents were quite impatient: 29% of people chose to wait for an annuity (5,000DA for 6 years = 30,000DA) payment than toreceive 15,000DA immediately. 59% of respondents chose the monthly payment (5,000DA every month for six months) over 15,000DA immediately. Women seem to be more patient than man. 40% of women chose to wait for annuities against 28% of the man. 70% of women choose to wait for monthly payments against 54% for the man.



Source: author's data. DDSS Survey.

The result of willingness to wait according to income (Figure 3) shows that the higher the income, the less one is willing to wait. 35% (60%) of the respondents with lower income (income less than 18000DA) chose to wait for annuities (for monthly payments). These percentages derease for the higher income: 12% (39%) of the respondents who earn more than 90,000 DA chose to wait for annuities (monthly payment).



Source: author's data. DDSS Survey.

The figure above shows that those willing to wait vary according to employment status. Salaried workers are more patient than the self-employed and employers. 22% (45%) of employers, 27% (52%) of self employed, 28% (57%) of permanent salaried workers, and 36% (66%) of non permanent salaried workers chose to wait for annuities (monthly payment).

We asked four questions about inter temporal choices that gave four kinds of time discounting. We assigned P1 for a discounting rate of 1,000 DA in one year; P2 for discounting 10 000 DA in one year; P3 for discounting rate of 1,000 DA in ten years; and P4 for discounting rate of 10,000 DA in ten years. The result showed that time discounting rate is very high: it cannot be compared to interest rate in the market or to inflation rate. The result gave an average P1 of 16004%; the median was equal to 400%. The average value of P2 is equal to 3774%. The mean of P3 was equal to 55% (median of 53%). The last rate P4 has average value of 53%. It was not surprising that we get so high time discounting rates; previous empirical studies gave very variant time discounting rate: Wang et al (2009) have found that, for the small amounts, time discounting changes between countries: it is about 11% in Australia and 17400% in Georgia. For the more important amount and far future, the finding was of 16% in Thailand and 70% in Georgia. Other studies have found very high discount rate: Kirby et al (1995) findings shows that time discounting rate varies from 3678% to +∞; Kirby (1997) find that time discounting rate vary from 159% to 5747%. Kirby et al, (1999) insist that time discounting rate can reach 55700%. Chapman et al (1999) find that time discounting rate varies from 13% to 19000%.

The questions that we asked in our survey allow calculating time discounting rate using the following quasi- hyperbolic model:

$$R = \beta \delta^t X$$

$\delta = \frac{1}{1-i}$ discount factor. i time discounting rate.
t Number of years
β : refers to the degree of \present bias". Larger β implies less present bias.
R is equal to 1000 or 10000 according to the question and X is the answer of the respondent.

$$\begin{cases} R = \beta\delta X_1 \\ R = \beta\delta^{10} X_{10} \end{cases}$$

The above equation allow to measure δ as well as β. The result gave an average δ of 0,78 and 0,44 for β . This result is consistent with literature (Mangot, 2007).

Our result corresponds with the literature. The near future and the small amount are more discounted than the far future and highest amount. The discount rate of 1,000 DA is higher than that of discounting 10,000DA while the discounting rate for one year is higher than that of discounting for 10 years.

Table 5: time discounting by age

	15-24 Years	25-34 Years	35-44 Years	45-54 Years	55 years or more
P1	45776%	3919%	10040%	3341%	56464%
P2	7928%	2690%	2757%	1897%	5956%
P3	70%	52%	50%	49%	67%
P4	64%	50%	50%	50%	52%
i	35%	31%	28%	26%	36%

Source: author's data, DDSS survey.

The table above presents the different time discounting rates with respect to age. It seems that the younger and the elderly discount the future more than other age categories. We observe that all time discounting rates are high for the respondents between 15-24 years old. The rate is lower for the categories of 25-34, 35-44, and 45-54. Time discounting rate is higher for respondents who are more than 55 years old. These last could sub estimate their life expectancy. This is result is coherent with literature (Arrondel et al, 2004; Brown et al, 2015).

Table 6: time discounting for men and women

	Men	Women
P1	18236%	3724%
P2	4041%	2301%
P3	55%	56%
P4	52%	59%
i	31%	30%

Source: author's data, DDSS survey.

The table above compares time discounting rate between men and women. We observe that men discount the near future (1 year: P1 and P2) more than women. On the other hand, women discount distant future (10 years: P3 and P4) more than men, the same result was found by Arrondel et al (2004). These results can explain why women are less likely to be enrolled in pension system. Women have a great disregard for the distant future. In the same way they discount their old age pension. This can support our hypothesis stipulating that the higher the time discounting rate, the less probability there is of demand for insurance. Otherwise, the hyperbolic discounting rate seems to be the same for men and women.

Very few studies have test the relationship between marital status and time discounting; Brown et al (2015) have found no significant impact of financial marital status on inter temporal choices We observed in the data (Employment survey, ONS) that married people are more likely to participate to social security system; their participation allows to cover their family against social risks. Our survey show the same thing as presented in the following table:

Table 7: time discounting rate with respect to marital status[8]

	Married	Single
P1	18691%	13688%
P2	3027%	4295%
P3	51%	60%
P4	49%	57%
i	30%	32%

Source: author's data, DDSS survey.

The table bellow shows that single people discount future more than married. This can support again our hypothesis of the negative impact of time discounting on demand for social insurance.

It is well known that forward looking behavior is linked to education level (Peart, 2000). The table below draws the relation between time discounting and education in our survey:

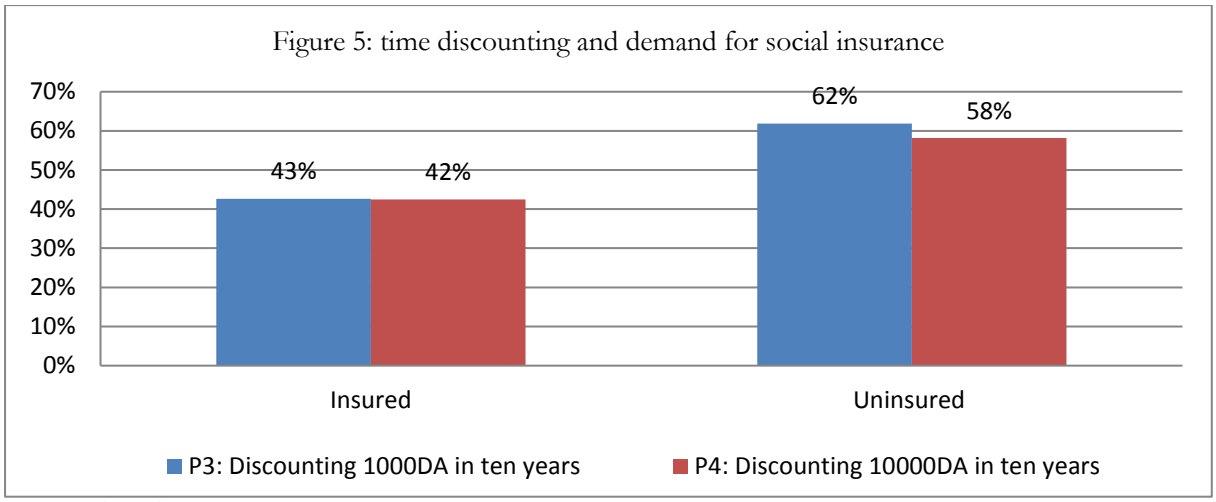
Table 8: time discounting rate with respect to education

	Less than 6 years of education	7-9 years of education	10 years of education or more
P1	24718%	2894%	26089%
P2	5464%	1793%	5220%
P3	77%	54%	52%
P4	73%	52%	49%
i	42%	30%	29%

Source: author's data, DDSS survey.

The literature showed that higher education decreases time discounting. Our result appears to follow this logic. Except discounting small amount in the near future (P1), time discounting rate decreases with education level. P3 is equal to 77% for the respondents who have less than 6 years of education compared to 52% for those who have more than 10 years of education. The time discounting of high amounts over the long term (P3) is about 73% for those who have less than 6 years of education against 49% for who have more than 10 years of education. Obviously, education plays a key role in the demand for social security.

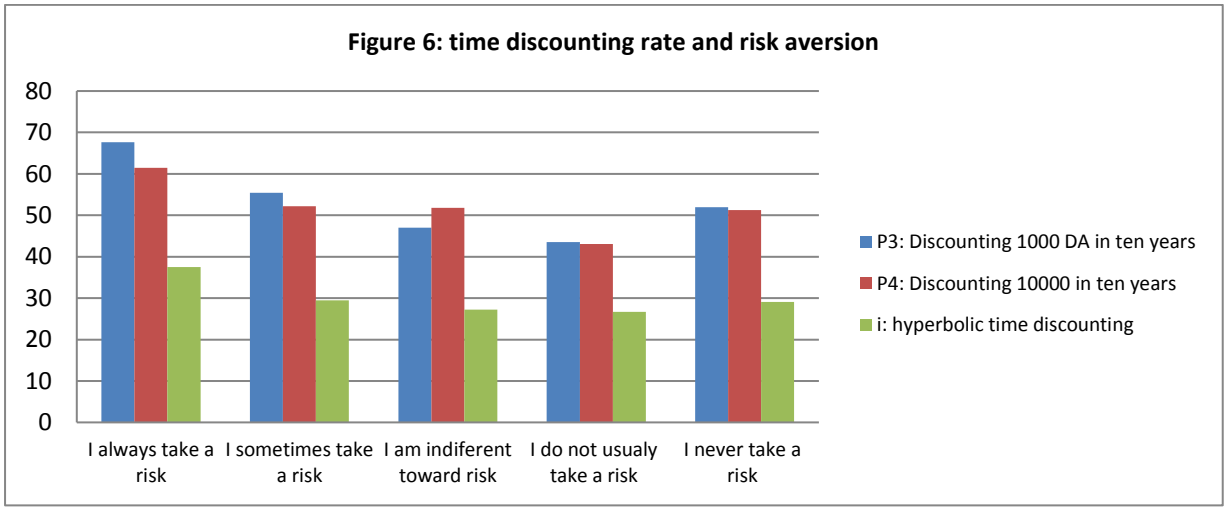
[8] The number of widowed and divorced is very small in our sample; this is why we focus only on married and single.



Source: author's data, DDSS survey

The figure above shows that uninsured respondents discount future more than the insured. Time discounting rate is equal to 43% (P4=42%) for the insured people and 62% (P4=58%) for the uninsured respondent. The hyperbolic time discounting confirms this relationship; it is equal to 28% for insured and 32% for uninsured respondents. This can support our hypothesis about the negative impact of time discounting on the demand for social insurance. We will confirm our hypothesis in the next section using direct choice models.

In our survey we have asked respondents about their risk aversion. Many methods have been used to measure risk aversion in the literature (Merouani et al, 2016, Barsky et al, 1997, Luttmer et al, 2002). However, in this article we present a unique method that ask respondent to rank themselves in Lickert scale from one -which means I always take risk- to five –which means I never take risk- in my daily life. This method is straightforward but the best method according to Dohmen et al (2011). The relationship between risk aversion and time discounting is presented in the following figure:



Source: author's data, DDSS survey

The figure above reveal the negative relationship between risk aversion and time discounting; risk averse people discount future less than risk tolerant people. The relationship between these two variables is interesting but not very much discussed in the literature; Arondel et al (2005) stipulate that risk aversion and forward looking have positive relationship when he measured risk aversion in several domains of life. However, other authors found an opposite relationship when they measure financial risk aversion. As Epper (2015) recognized, we believe that the

relationship between time discounting and risk aversion depends on the nature of this later (see Merouani et al, 2016). In the case of pension, people who are risk averse to be enable to work in the future (health risk) are more likely to demand entitlement to pension system. In the case of financial risk; individuals may see a pension system as a gamble that offers a gain if the individual lives until retirement but provides a loss if individual dies before this age (Gottlieb, 2012), hence, more risk averse people will be less likely to demand for pension because of the uncertainty surrounding their future benefit.

The relationship exposed above will be tested using econometric model in the next section. This model (logit model) will reveal mainly the impact time discounting and knowing social policy on the demand for social insurance.

5. Econometric analysis:

In this section, logit models are used to show the impact of time discounting, knowledge about social security, and other socioeconomic variables on the demand for social security. The dependent variable in the model is demand for social security: the value is 1 if the individual demands social security (is enrolled in the social security system) and 0 otherwise. In order to test collinearity, we calculate VIF (Variation Inflation Factors) (Mansfield & Helms, 1981). These factors measure the inflation of the coefficients of the model induced by correlations of the independents variables. In our case VIFs are shortlisted in table 10 that shows that they are all inferior to 10 which means that there is no problem of collinearity in our three logit models.

Table 9: logit models

Dependent variable: demand for social insurance	Odds ratio1	Odds ratio2	Odds ratio3
Low knowledge about social security		0.671**	
		(0.135)	
No knowledge about social security		0.265**	
		(0.149)	
AGE	1.029***	1.028***	1.030***
	(0.0097)	(0.0091)	(0.0091)
Income (Ref Var Income<18000 Da)			
18000<Income<36000		2.531**	2.588**
		(0.945)	(0.964)
36000<Income<56000		5.096***	5.254***
		(1.949)	(2.004)
Income>56000		5.342***	5.622***
		(2.206)	(2.319)
Ref Var: I Know social security rules)			
2.I don’t know social security rules		0.448***	0.429***
		(0.113)	(0.108)
3.I moderatly know social security rules		0.878	0.860

		(0.212)	(0.208)
P4/ time discounting rate	0.976***		
	(0.00321)		
Femal	0.482***		
	(0.133)		
Ref Var : less than 6 years of education			
2. Between 7-9 years of education	1.170		
	(0.467)		
3.More than 9 years of education	2.957***		
	(1.143)		
Non permanent salaried workers	0.254***		
	(0.0593)		
Self-employed	0.348***		
	(0.0827)		
Good and medium knowledge about social security.			1.544**
			(0.310)
Hyperbolic discount factor	0.403***		
	(0.047)		
Constant	0.473	0.111***	0.0659***
	(0.287)	(0.0589)	(0.0357)
Observations	645	630	630

Source: author's data. DDSS survey.
* - significant at 10% level, ** - significant at 5% level, ***- significant at 1% level.
Standard error in brackets

Table 10: Collinearity Diagnostics

Variable	VIF	Squared VIF	Tolerance	R-Squared
Model 1				
AGE	1.11	1.05	0.8994	0.1006
P4/ time discounting rate	1.64	1.28	0.6099	0.3901
Female	1.05	1.02	0.9569	0.0431
Education	1.05	1.02	0.9544	0.0456
Non pemanent salaried workers	1.59	1.26	0.6276	0.3724
Self employed	1.49	1.22	0.6714	0.3286
Hyperbolic discount factor	1.59	1.26	0.6273	0.3727
Model 2				
Low Knowledge of sociale security rules	1.36	1.17	0.7334	0.2666
No knowledge about social security	1.44	1.20	0.6952	0.3048
AGE	1.14	1.07	0.8788	0.1212
Income	1.09	1.05	0.9143	0.0857
Existance of of social security system	1.02	1.01	0.9827	0.0173
Knowing social security rules	1.04	1.02	0.9631	0.0369
Model 3				
AGE	1.08	1.04	0.9235	0.0765
Income	1.12	1.06	0.8941	0.1059
Knowing social security rules	1.13	1.06	0.8864	0.1136
Medium Knowledge about social security	1.08	1.04	0.9273	0.0727
Good Knowledg about social security	1.16	1.08	0.8594	0.1406

Source: Author's data using stata.

The table above presents the result of the three logit models that allow us to confirm our hypothesis. It explains the impact of time discounting (forward-looking) and the degree of knowledge about social security on the demand of this last. The first model in the second colon of the table shows that increase of 1% in the exponential time discounting rate decreases the probability of demand for social insurance by 1.02 times and 1% increase in the hyperbolic discounting rate, decreases the probability of demand for social insurance by 2,5 times. Age increases the willingness to demand insurance. The literature showed that older people are more forward-looking (Arrondel et al, 2004). Women have 2.08 less chance to demand social insurance. Previous studies (Brown et al 2013; Wang et al 2009) showed that education improves forward-looking thinking. Our model shows that more educated respondents are more likely to demand social insurance. The respondents who had studied for more than 10 years were 2.95 times more likely to demand social insurance than the respondents who had less than six years of education. Non permanent salaried workers are 4 times less likely to demand social insurance. Self employed workers are 2.95 times less likely to demand social insurance.The literature shows that the self-employed are risk tolerant and less likely to cover themselves against risk (Cramer et al 2002).

The second model in the third colon of the table shows that the impact of knowledge about social security on the demand of it. The respondents who have low knowledge about social security are 1.46 less likely to demand for social insurance. Respondents who have no knowledge about social security are 3.84 times less likely to demand social insurance. The older we are, the higher the probability of demanding insurance (Odds ratio=1.02). The model

shows also that the higher one's income, the higher the probability of demanding insurance. Respondents who earn an income of between 18,000-36,000DA are 2.53 times more likely to demand insurance than those who earn less than 18000 DA (reference variable). The respondents who earn between 36,000 and 56,000DA are 5.09 more likely to demand insurance than those who earn less than 18,000DA. Respondents who earn more than 56000DA are 5.34 times more likely to demand social insurance. Brown et al (2013) found that income has positive relation with forward-looking thinking. Respondents who declare that they don't know social security rules are 2.38 times less likely to demand social insurance than respondents who declare that they know social security rules (reference variable). The third model in the last colon of the table shows that the respondents who have good and medium knowledge are 1.54 more likely to demand social insurance.

The econometric models confirm our hypothesis. Our result seems to be coherent and corresponding to the literature. Demand for social insurance is low in Algeria because people do not take the future into consideration. Indeed, they discount it very highly. They also know very little about social security rules. They don't know that social security benefits are quite important. That the replacement rate for the old age pension can be 80%. On the basis of these results, and considering successful experiences in some developing country, we will discuss in our conclusion some ways to motivate people to demand social security.

6. Conclusion

The present paper deals with a complicated issue. Extending social security is a topical question that the World Bank and ILO pursue. Our approach is quite different from the many previous studies that suppose that the social security system is not efficient enough to cover everyone. We look at social security from the agent's point of view. We study the behaviors of the agents that keep them from seeking social insurance. We have used innovative surveys to measure our variables and to verify the hypothesis.

The high disregard for the future (i.e. focus on the present) may be counterbalanced by offering immediate benefits to insured workers and their families, for example, by introducing child care into the social security system (Renana 1989) or improving family allowances and extending them to the self-employed. Calvo et al (2011) demonstrated the positive impact on insurance demand of extending family allowance to self-employed workers in Chili. Unemployment benefits should also be improved and extended to non-permanent salaried workers. Forward looking can be improved by promising people higher income (pension) in the future. It can be also improved by reduce the payroll tax for people who save for retirement by contribution to social security system.

The results of the survey show that people are misinformed about social security. This lack of information fails to provide incentives for them to cover themselves against social risks by demanding insurance. The social security system has to be more visible. The information about its rules has to be available. The availability of the information is perhaps too limited or inaccessible. Social security system has to spread information using the new technology that are developing very quickly these last years (Smartphone, internet).

Otherwise, the social security system must be suited to the needs of informal workers. The mechanism of collecting premiums and paying benefits has to be adequate and easily accessible.

Most recent experiences in other countries provide some lessons. Renana (1998) showed that the market could help to improve social coverage. Insurance company are more likely to offer services at peoples' doorstep. These companies instruct people on the advantage of enrolling in social insurance. So, the insurance market should be developed in Algeria. There is no private company that provides health or pension insurance in Algeria.

Many countries in Latin America have established a monotax system (ILO 2014) that allows informal workers to make just one contribution containing all the usual taxes (social security contribution, taxes on income, etc.). This monotax is fixed according to the total income of the workers, their electricity bill and the area they live in (Charme 2014). These monotax systems have delivered an increased rate of social coverage in many countries in Latin America, including Brazil, Argentina, Ecuador, and others. Such a reform could prove successful for Algeria.

References

Barsky, R., Juster, T., Kimball, M., Shapiro, M. (1997). Preference parameters and behavioral heteregenity: experimental approach in the health and retirement study. The Quarterly Journal of Economics, 112 (2), 538-579.

Becker Gary, S., Mulligan Casey, B. (1997). The Endogenous Determination of Time Preference. The Quarterly Journal of Economics, 112 (3), 729–758.

Bellache, Y.(2010). L'économie informelle en Algérie, une approche par enquête auprès des ménages- le cas de Bejaia. Thèse pour obtention du diplôme de docteur en sciences économiques

de l'Université de Bejaia (Algérie) et de l'Université Paris -Est Créteil (France).

Bommier, A. (2006). Uncertain lifetime and intertemporal choice: risk aversion as a rationale for time discounting. International Economic Review, 47(4), 1223-1246

Brown, J, R., Ivkovic, Z., Weisbenner, S., (2015). Empirical determinants of intertemporal choice. Journal of Financial Economics. Volume 116, Issue 3, June 2015, Pages 473–486

Caire, G. (2002), économie de la protection sociale, Paris : Breal edition

Calvo, E., Bertranou, F., Bertranou, E., (2010). Are Old-age Pension System Reforms Moving Away from Individual Retirement Accounts in Latin America?. Jnl Soc. Pol, 39(2), 223–234

Chetty, R., Saez, E., (2009). Teaching the tax code: earnings responses to an experiment with eitc recipients. En ligne http://www.nber.org

Cramer, J., Hartogb, J., Jonker, N., Van Praag, C. (2002). Low risk aversion encourages the choice for entrepreneurship: an empirical test of a truism. Journal of Economic Behavior & rganization, 48(1), 29–36.

Hausman, J. (1979). Individual Discount Rates and the Purchase and Utilization of Energy-Using Durables. The Bell Journal of Economics, 10(1), 33-54

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., Wagner, G., (2011). Individual risk

attitudes: measurement, determinants and behavioral consequences. Journal of the European

Economic Association, 9 (3), 522–550.

Epper, T., 2015. "Income Expectations, Limited Liquidity, and Anomalies in Intertemporal Choice," Economics Working Paper Series 1519, University of St. Gallen, School of Economics and Political Science.

Gottlieb, Daniel, Prospect Theory, Life Insurance, and Annuities (July 2, 2012). The Wharton School Research Paper No. 44. Available at SSRN: http://ssrn.com/abstract=2119041

International Labour Organization. (2010). World Social Security Report 2010/11: Providing coverage in times of crisis and beyond », International Labour Office – Geneva: ILO.

Kessler, D. (1986). Sur les fondements économiques de la sécurité sociale. Revue française des affaires sociales, 1.

Kirby, K. N., Petry, N. M., & Bickel, W. K. (1999). Heroin addicts discount delayed rewards at higher rates than non-drug using controls. Journal of Experimental Psychology: General, 128(1), 78-87.

Kirby, K. N. (1997). Bidding on the future: Evidence against normative discounting of delayed rewards. Journal of Experimental Psychology: General, 126(1), 54-70.

Kirby, K. N. & Marakovic, N. N. (1995). Modeling myopic decisions: Evidence for hyperbolic delay-discounting within subjects and amounts. Organizational Behavior and Human Decision Processes, 64(1), 22-30

Kling, Jeffrey R., Mullainathan, S., Shafir, E., Vermeulen, L., V. Wrobel, L. (2011). Comparison Friction: Experimental Evidence From Medicare Drug Plans. Unpublished manuscript. Harvard University

Laibson, D. (1997). life cycle consumption and hyperbolic Discount Functions. European economic review, 42, 861-871.

Lawrance, E. (1991). poveroty and rate time preference: evidence from panel data. Journal of political economy, 99(1), 54-77.

Liebman, J., Luttmer, E. (2011).Would People Behave Differently If They Better Understood Social Security ? Evidence From a Field Experiment. En ligne http://www.nber.org/papers

Loewenstein, G. (1987). Anticipation and the Valuation of Delayed Consumption. The Economic Journal, 97(387), 666-684.

Loewenstein, G., Prelec, D. (1992). Anomalies in intertemporal choice : evidence and interpretation. The Quarterly Journal of Economics, 107(2), 573-597.

Loewenstein, G., Thaler, H. (1989). Anomalies: Intertemporal Choice. The Journal of Economic Perspectives, 3(4),181-193.

Luttmer, E., Samwick, A., (2012). The Welfare Cost of Perceived Policy Uncertainty: Evidence from Social Security. En ligne http://users.nber.org

Mansfield, E. R., & Helms, B. P. (1981). Detecting Multicollinearity. The American Statistican, 36(3a), pp. 158-160

Mitchell, Olivia S. (1988). Worker Knowledge of Pension Provisions, Journal of Labor Economics, 6 : 21-39

Merouani, W., Hammouda, NED., El Moudden, C. (2014). Le système algérien de protection sociale entre bismarckien et beverdgien. les cahiers du CREAD. N°107-108.

Merouani, W. (2014). Modélisation des dépenses et recettes du système algérien des retraites. Sarrebruck : éditions universitaires européennes.

Nayman, J. (2003). The theory of demand for health insurance. Standford: university press.

Samuelson, P. (1937). A note on measurement of utility. The Review of economic Studies, 4 (2),155-161.

Samwick, A. (1998). Discount rate heterogeneity and social security Reform. Journal of Development Economics, 57, 117–146

Peart, J S., (2000). Irrationality and Intertemporal Choice in Early Neoclassical Thought. The Canadian Journal of Economics / Revue canadienne d'Economique, Vol. 33, No.1 pp 175-189

Starr-McCluer, M., Sundén, A. 1999. Workers' Knowledge of their Pension Coverage: A Reevaluation. En ligne http://www.federalreserve.gov