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The Microeconomic Determinants of Demand for Social Security: Evidence from the Algerian Labour Market[1]

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Abstract: *The aim of this paper is to identify the determinants of demand for social security. International institutions (World Bank, International Labor Organisation etc.) consider social security to be a human right. However, in Algeria, 73% of workers in the private sector do not have any social insurance coverage (employment survey, ONS, 2013). Risk aversion (Barsky et al., 1997; Freidman, 1973), time discounting (Arrondel et al., 2004; Brown et al., 2013) and the orientation of social value orientations (Murphy et al., 2011) are all potential determinants of demand for social insurance. This paper measures these variables using experimental methods and by means of a survey administered to the active labour force in Algeria. It was found that risk aversion increases demand for social insurance, loss aversion decreases demand, and time discounting has negative effect on the demand for social insurance. In terms of personality, individualistic respondents were less likely to purchase social insurance while pro-social individuals were more likely to demand social insurance.*

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1. Introduction

According to the Office for National Statistics in a survey conducted in 2013, 73% of workers in the private sector in Algeria do not have any social insurance (ONS employment survey, 2013). Such workers will face intractable problems if any difficulties arise in the future (disease and aging

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among others). The gap in social coverage will lead to deterioration in social cohesion and social inequalities in Algerian society; hence, there is a dire need to extend social security to informal workers without any delay. This study aims to understand why the social coverage rate is so low.

The Algerian social security system offers 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 are eligible to sign up for various insurance funds. In fact, the insurance system is compulsory, but the state looks the other way when workers do not demand social insurance to avoid contributing to the funds. There is no severe punishment against such "free-riders". Thus, the problem of social security is a problem of demand as the supply side is enough to cover everyone.

This study aimed to discover the determinants of demand for social security through exploring selected theoretical and empirical studies. In microeconomic terms, social insurance is a consumer good: we can purchase it in the market. But social insurance is also a merit good (Brahic et al., 2007; Musgrave, 1957; Ver Eecke, 2001) though individuals do not know always realise the benefits of consuming it. It is easier to appreciate the benefits of consuming chocolate than the benefits of consuming social insurance.

The literature describes how certain behaviours can affect the demand for social insurance. This paper focuses mainly on three behavioural variables: the first one is risk aversion, a concept introduced by Arrow (1965) and Pratt (1964) who have demonstrated that risk aversion increases with wealth. Since these publications, numerous studies have endeavoured to estimate risk aversion using different methods (Arrondel et al., 2002; Bommier et al., 2014; Brasky et al., 1997; Brown et al., 2013; Eisenhauer, 2006; Eling et al., 2013; Freindman, 1973; Kahneman et al., 1979; Mossin, 1968). Some of these studies seek to estimate risk aversion parameters (coefficient of risk aversion) using utility function, assuming that populations have constant relative risk aversion utility function (CRRA). Others researchers use experimental methods and gamble data to infer differences in individual risk aversion, rather than calculating risk aversion parameters, according to a set of demographic and socioeconomic variables. The present paper uses three methods to measure risk aversion and determine its relationship with the demand for social insurance.

The second behavioural variable is social value orientation (SVO). This variable reflects individual attitude towards others. People can be individualistic, prosocial, or altruistic. Social value orientation arises from the theory of moral sentiments (Smith, 1957) and opposes the assumption of rational choices (homo-economecus) that suppose that individuals care only about their own payoff, regardless of others. Many researchers (Arrondel et al., 2004; Murphy et al., 2012; Van Lang et al., 1997) have used several tools of game theory to measure SVO and show that individuals, according to their

characteristics, assume different behaviours toward others.

The third behavioural variable that can impact demand for social insurance is time discounting. Time discounting measures attention that individuals pay to the future. The higher their attention, the higher their demand for annuities and participation to pension system. The previous study is concerned with inter temporal choices (Benzio et al., 1989; Brown et al., 2013; Wang et al., 2009), using gambles and experimentation to measure individual time discounting. We will exhibit the main methods in the present paper.

Alongside these behavioural variables, there are a number of socioeconomic and demographic variables that can also impact the demand for social insurance: wealth, income, liquidity constraints, education, financial literacy, family structure, age, gender, confidence in government and the social security system among others. In this paper, these theoretical factors are explored empirically. Behavioural variables are measured using experimental surveys, to test whether these assumptions are relevant to the Algerian situation. To measure risk aversion we use three methods: life time income gamble, certainty equivalent, and scale method. We ask respondents to choose between alternatives of immediate and differed payments to measure time discounting and finally, we will show in this paper how to use dictator game to measure social value orientation. The present paper examines the correlation between these behavioral variables and demand for social insurance (social security coverage); as this approach is rather unusual in literature, this article can be considered original.

The next (second) section provides background information about the Algerian social security system, highlighting the low level of demand for social security coverage in the Algerian labour market. The third section presents a literature review on the microeconomic determinants of demand for social insurance and also explains the main variables of this study. The fourth section describes the survey design and the methods used to measure the variables. The fifth section presents the results, showing the impact of the different variables on the demand for social insurance.

2. The Algerian Social Security System: A Brief Description

The Algerian social security system was created in 1949 to cover workers and their families against social risk. Currently, it is a Bismarckian[2] corporatist system, composed of five funds that provide a retirement pension and insure against all social risks (sickness, maternity, accident or injury at work, death, disability and unemployment[3]). The National Insurance Fund for Salaried Workers (CNAS) administers the salaried employees' benefit. Under this scheme, the contribution rate is 34.5% of the salary. Social security contributions are due from employees and employers, the former paying 9%, the latter 25.5%. The CNAS recovers all contributions and allocates them to

other funds: 17.25% goes to the National Retirement Fund (CNR); 1.5% to the National Unemployment Insurance Fund (CNAC); 14% to health insurance; 0.5% to early retirement; and 1.25% for occupational injury and illnesses.

Insured salaried workers receive preventive and curative healthcare, including medical care, dental care and hospital care. The CNAS reimburses 80% of pharmaceutical fees. In the case of an accident at work, the salaried worker is paid about 100% of his wage. Sickness benefit is about 50% of the daily salary if the illness lasts less than 15 days and 100% of the salary if it lasts more than 16 days. The CNAS also covers full maternity and mothers are entitled for 98 days of maternity leave and receive 100% of their wages during this period. Disability benefit is accessible to workers who are incapacitated more than 50% of the time; in fact, disability benefit kicks in after the sickness benefit period expires. Disability is classified into three categories: category 1: the person is disabled but still able to work; category 2: the person is completely disabled and cannot carry out their work; category 3: the person is completely disabled and needs another person to help accomplish the ordinary actions of daily life. Pensions are specified for each category: the CNAS offers 60% of their annual salary (subject to taxation) to workers in category 1; 80%, under the same conditions to those in the second category; and category 3 benefit is about 80% of the annual salary plus 40% for the person who assists the disabled individual.

The National Retirement Fund administers the retirement pension programme for salaried employees. The legal age for retirement is 60 for men and 55 for women[4]. However, some special forms of retirement exist. A worker who has worked and contributed to social security for 32 years can retire regardless of age (unconditional age retirement). If the worker is 50 (45 for women) and they have contributed for 20 years (15 years women), he or she can demand proportional retirement. Workers over 50 who lose their job for economic reasons can also demand early retirement (Merouani, 2014).

The National Unemployment Insurance Fund administers unemployment benefits to salaried employees who lose their job involuntary for economic reasons (downsizing or bankruptcy of the company). The National Social Security Fund for Non-wage Earners administers the social benefit programme for non-wage earners. The contribution rate is 15% of the annual income of self-employed individuals. The fund insures the same risks as the CNAS and provides the same retirement pension[5] to self-employed workers as salaried ones. However, accident at work and family allowance benefits are not applicable to the self-employed.

Besides these funds, a special fund exists for employees in the construction sector which provides paid leave and unemployment due to bad weather. Employers contribute 12.21% of the salary for paid leave and 0.75% (0.375% is supported by the salaried worker) for unemployment due to bad weather. In both situations, salaried workers receive 75% of their salary.

Participation in the social security system is mandatory for all workers. However, it is seen from the ONS employment survey that 73% of workers in the private sector have no social security coverage. These workers avoid participating as they do not pay their contribution. The relationship between individuals and insurance has always been complicated. As a merit good, many people do not see the benefits of consuming social insurance, hence, they do not spontaneously demand it. The literature indicates some other determinants of demand for insurance, which are explored in the following section.

3. The Microeconomic Determinants of Demand for Social Security

This section presents a literature review of the main and most typical studies of the microeconomic determinants of demand for social security, focusing on behavioural variables and the methods used to measure them.

3.1 Risk Aversion

Risk aversion can affect demand for social security (Barsky et al., 1997; Eckles et al., 2011; Kessler, 1986; Kouame et al., 2012; Nayman, 2003). Risk-averse individuals are more likely to demand social security. Many scientific studies have explored the issue of risk aversion. Luttmer et al. (2012) studied uncertainties surrounding future social security policy in USA by measuring the risk premium using the certainty equivalent method. Their results showed that on average individuals would be willing to forego 4%-6% of the benefits to which they are entitled under current law in order to remove policy uncertainties associated with their future benefits.

Economists have investigated the issue of risk aversion in different ways: some have studied risk aversion in general (Aarbu et al., 2009; Cleeton et al., 1993; Donkers et al., 2001; Donfouet et al., 2013; Hartog et al., 2002; Guiso et al., 2008; Moureau et al., 2004; Pratt, 1964; Shoven et al., 2006; Szpiro, 1986; Vickrey, 1945) while others have studied risk aversion with respect to other socioeconomic and demographic variables. Bommier (2006, 2014) and Deplart (2013) studied risk aversion according to longevity, finding that risk aversion was positively linked to the demand for annuities. Cramer et al. (2002) studied risk aversion according to employment status, finding that the self-employed are greater risk takers than employees. Arondel et al. (2002, 2004) found that risk aversion stimulates wealth accumulation in France. They also found risk aversion correlated negatively with time discounting: risk-averse individuals showed fewer disregards for the future than risk-takers (Arondel et al., 2002).

Many theories propose that individuals have constant relative risk aversion. Brown et al., (2013) found that risk aversion had a definite effect on individuals' time discounting rate. They noted risk-tolerant people were more

likely to pick a deferred payment when given the choice between receiving a small payment immediately and a more substantial payment later. Most people picked the immediate payment because they were uncertain about the changing rules governing the deferred payment. Neyman (2003) opposes such theories, arguing that individuals are usually risk tolerant, which is why they do not purchase health insurance. In an article entitled "Too risk averse to purchase insurance", Bommier et al. (2014) show that risk aversion decreases the demand for annuities. The last two articles are particularly relevant for social insurance, in the context of the relationship between risk aversion and demand for insurance. These variables can impact the demand for social insurance in Algeria as well. The present paper provides the first case study of Algeria.

The literature review revealed a variety of methods used to measure risk aversion, most of them experimental. Three main methods emerged. The certainty equivalent method was used in Luttmer et al. (2012) study, which used a survey to assess the risk premium of the population of the United States[6].

The second method to measure risk aversion was "lifetime income gambling", which was used in many studies. This method asks the following question:

> *"Suppose that you are the only income earner in your household. Suppose also that reasons beyond your control force you to change occupation. You can choose between two alternatives. Job 1 guarantees you the same income as your current income. Job 2 gives you a 50% chance of an income twice as high as your current income, but with a 50% chance it results in a reduction of your current income by one third. What is your immediate reaction? Would you choose job 1 or job 2?"*

If the respondent selects the safe alternative (Job 1), the interviewer asks the same question with a new alternative: the downside risk of job 2 is reduced from a potential one third loss of current income to one fifth. If, on the other hand, job 2 is selected, the same question will be asked but with the downside of risk of job 2 increased to a loss of half the respondent's current income.

The third method is based on asking subjective questions that reveal the respondent's level of risk aversion, for example: do you park your car in areas where it is forbidden; do you ever drive above the speed limit; do you consume unhealthy food.

Empirical literature on risk aversion doesn't indicate whether some methods are better than the rest. Researchers use several methods in order to compare the results of each method (Brasky et al., 1997; Brown et al., 2013).

As mentioned in the introduction, the present paper will use three methods to measure risk aversion and present comparative analysis on the results.

3.2 Time Discounting

Time discounting is another factor that can affect demand for social security. People who discount future tend to be less likely to insure themselves against aging (retirement). However, inter temporal choices (time discounting) play a fundamental role in theories of savings and investment, economic growth, interest rate determination and asset pricing, addiction and many other issues that are increasingly of interest to economists. Since Samuelson's seminal article in 1937, many others 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 & Prelec, 1991, 1992; Loewenstein & Thaler, 1989). Others obtained the opposite result, encountering high levels of time discounting. Warner and Pleeter (2001) found the discounting rate = 0 at 30%; Sawmick's discounting (1998) rate = 0 at 20%. (see also Arrondel et al., 2002, 2004; Brown et al., 2013; Hausman, 1979; Lawrence, 1991).

Time discounting is affected by demographic and socioeconomic variables (age, ethnicity, income, education among others). Many authors have studied the nature of this relationship (Becker et al., 1997; Black, 1984; Brown et al., 2013; Gilman, 1976; Kifmann et al., 2011; Laibson et al., 1997; Lawrance, 1991; Pender, 1996; Pleeter, 2001; Redelmeier, 1993; Ruderman et al., 1986; Shoji et al., 2012; Strotz, 1956). The literature also reveals that people do not discount the near and distant future in the same way, but tend to disregard the near future decidedly more than the distant future. Additionally, people discount small amounts more than larger ones. Gilman (1976) estimated the degree of time discounting using the number of people who participate in non-lucrative retirement system. He found a time discounting rate of 8.5% and 16.2%. Black (1984) investigated time discounting in the military. He proposed two kinds of retirement system: the first with a more immediate pension and the second with a deferred pension. The most relevant studies on time discounting and social security are those by Kessler (1986) and Caire (2002). They show that theoretically people are more likely to demand social security if they are forward looking (with low time discounting). These two studies corroborate our findings.

Many methods have been used to measure inter temporal choices. Brown et al. (2013) asked respondents 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. Samwick (1998) used a consumption

survey to measure time preference using the lifetime model. Some studies invited respondents to choose between immediate payment and a delayed one; for example, Wang (2009) asked respondents to choose between a payment of US$3,400 this month or a payment of US$3,800 next month. Other studies asked respondents to choose between two alternatives of payment: option A - a payment of US$100 now and option B - a payment of US$ X one year from now. Respondents were then asked to state the amount X that made option B as attractive as A. Wang's study shaped the methodology of the present study. The survey adapted Wang's method and replicated it in the Algerian labour market. This approach will be new in an Algerian context. The previous studies of the Algerian social security system neither uses nor evokes the variable of time discounting. Very few international studies combine the demand for social security and the behavioural variable of time discounting, as well. The present paper exhibits a new approach for analysing social security.

3.3 Social Value Orientation

Homo-economicus (rational choice) theory alone is unable to explain an individual's behaviour. It postulates the individual is only concerned with maximising his own gains regardless of the gains of others around him but this is not always true. Adam Smith, in *The Theory of Moral Sentiments* (1759), postulates that individuals feel sympathy towards each other. Decision makers are influenced in part by the benefits to other persons around them.

Many researchers (Arrondel et al., 2004; Benjamin et al., 2010; Fehr, 2003; Gassmann, 2010; Murphy et al., 2011; Van Lange et al., 1997) deal with this issue using behavioural concepts such as selfishness, prosocial, individualism and altruism among others. Arondel et al. (2004) distinguished between familial and non-familial altruism. These behaviours can affect the global demand for social security: prosocial individuals might be more willing to contribute to a social security system that covers the old and the sick. The insurance also often covers the family members, thus, employees, with familial altruistic tendencies would be more likely to demand social insurance than individualistic employees. Altruistic behaviour could increase the global demand for social security. Several methods have been used to measure individual behaviour, most of which are derived from behavioural game theory. The three main methods are the dictator game, the ultimatum game and the public good game (Henrich et al., 2007). Murphy et al. (2012) study on social value orientation is particularly relevant. The authors showed a set of methods that can be used to measure SVO and concluded the slider measure (explicit form of the dictator game) is the most efficient. The present paper uses this method to measure social value orientation in the Algerian labour market. The methodology is discussed in the next section. The literature concerned with social security doesn't usually evoke the variable of social value orientation. This variable could be relevant for the pay-as-you-

go system because it is based on solidarity and altruism. The present paper is original in the Algerian and international contexts. We will examine the impact of social value orientation on the demand for social insurance.

Besides these three behavioural variables (risk aversion, time discounting and social value orientation) this article considers many other socioeconomic and demographic variables: wealth, income, liquidity constraints, education, financial literacy, family structure, age, gender, confidence in government and the social security system and religion. Measuring these variables is easier than measuring behavioural variables: the respondent was simply asked direct questions in order to determine his main social characteristics.

The variables discussed above form the theoretical database of this study. These variables must be tested and measured to find its relevance in the Algerian context. The next section discusses survey questionnaires and methodology used to obtain empirical data.

4. Methodology

Many studies concerned with gap in social coverage note the ineffectiveness of social security systems and their inability to cover all the workers (Rhomari, 2015). Our methodology is quite different; we ask the question from its origin and seek to find out the determinants of demand for social security. Why is demand for social security so low in Algeria? In order to answer this question, we carried out a survey to measure individual behaviour toward social security.

4.1 The Survey Instrument

The survey was administered to 654 workers between 15 and 65 years of age employed in the Algiers province. The survey was focused on the private, non-agricultural sector. The public sector was excluded because all public sector workers are covered by social security. The agricultural sector was also excluded. The sample was chosen using quota sampling from ONS' (2010) employment survey. Five control variables were used: affiliation to social security system, gender, age, employment status and sector of activity. We chose these variables because they are considered determinants in the context of social security. The household employment survey showed that women were less likely to be covered by social security than men. The demand for social security was low in the construction sector and higher in the service and industry sectors (Merouani et al., 2014). The demand for social coverage by the self-employed and employers was less than the demand by salaried workers. As described above, these two categories of workers do not access the same social insurance funds.

The following table shows a comparison between the structure of the basic population and our sample:

Table 1: Comparison between this study's sample and the basic population

	Basic population	**Our sample**
Affiliation to social security system	29%	31%
Women	11%	15%
Permanent salaried workers	9%	10%
Non-permanent salaried workers	42%	42%
Employer and self-employed	49%	44%
Industry	17%	18%
Construction	29%	21%
Services	53%	56%

Source: Employment survey and DDSS survey.

It can be seen that the structure of the sample was similar to the structure of the population in the household employment survey (basic population). The difference in the construction sector was slightly more because workers were always busy and it was harder to find respondents. A survey was used to measure the above-mentioned behavioural variables.

4.1.1 First Section of the Survey

The first section of the questionnaire measured risk aversion using three methods.The first of these was the certainty equivalent method. Respondents were asked about their future income: "Let's think about your income when you turn 60 years old (including all incomes). Do you expect to receive a higher, lower or the same income as today?" If the answer was "less than today" respondents were asked to give a percentage between 0 and 100%, which was taken as the uncertainty equivalent or expected income. Next, respondents were offered the following choices:

> "The previous question shows that you expect to receive [X]% of your current income. It also shows that you could receive more or less than this [X]%. Imagine a contract that instead guarantees you a certain percentage of your current income. This contract is unbreakable and cannot be changed by anybody, even the government. Would you choose:"

1. A guaranteed amount equal to [Y]% of your current income.
2. An uncertain amount around [X]% of your current income.

A respondent who chooses the guaranteed benefits at a given Y_1 is then offered a lower value of Y_2 and asked the same question. The question continues, with the differences between Y_n and Y_{n+1} narrowing, until the respondent has answered that he would take the uncertain benefits. The answers to these questions provide us a certainty equivalent: the mean of Y_n and the Y_{n+1} at which the respondent changed his answer. Subtracting this certainty equivalent from the expected income yields the risk premium that the respondent would pay to insure against future income uncertainty. The process is applied in reverse if the respondent chooses option 2 at a given X_1: she is then offered a higher value of X_2, and asked the same question until she changes her answer for option 1.

The second method used to measure risk aversion was lifetime income gamble (see also Arbu et al., 2009; Barsky et al., 1997; Bommier 2006; Brown et al., 2013; Luttmer et al., 2012; Wilson et al., 2008). The game was adapted to the context of social security. Respondents were asked the following question:

> "Suppose that reasons beyond your control force you to change occupation. You can choose between two alternatives. Job 1 guarantees you a fixed income throughout your working life. Job 2 gives you a 50% chance of an income twice as high as the job 1, but with a 50% chance that it results in a reduction of the job 1 income by one third. What is your immediate reaction? Would you choose job 1 or job 2?"

If the respondent selected the safe alternative (job 1), they were presented with a new alternative in which the risk of job 2 was reduced from earning one third less than job 1 to one fifth less (and one tenth less if he chooses again the job 1). If, on the other hand, job 2 was selected, a follow-up question presented a choice in which the risk of job 2 was increased from one third to one half (and three forth if he chooses again job 2). According to the point at which respondents opted for the other job, they were assigned to one of six-risk taking categories. Risk aversion coefficients can also be estimated through this question, as shown in Aarbu and Schroyen (2009):

Table 2: Categories of individual risk aversion

Categories	Accept the risky Job (zi)	Reject the risky job (zi)	Risk aversion Coefficient		Risk tolerance coefficient	
1	-	1/10	0,00	0,11	-	9,00
2	1/10	1/5	0,11	0,25	9,00	4,00
3	1/5	1/3	0,25	0,50	4,00	2,00
4	1/3	1/2	0,50	1,00	2,00	1,00
5	1/2	3/4	1,00	3,00	1,00	0,33
6	3/4	-	3,00	-	0,33	-

Source: Sham, 2007.

The methodology in this study's survey has been changed to see whether the same results are obtained. In the third method, respondents were asked questions about their daily life in order to assess whether they were risk tolerant or not. For example, respondents were asked to rank themselves between 1 (I am always taking risks) and 5 (I never take risks). A question was asked whether respondents consumed unhealthy products (alcohol, tobacco etc.). Answers to this question were organised according to a Likert scale. Respondents could choose from five responses: strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree.

4.1.2 Second Section of the Survey

The second section measured time preference. Two methods were used to estimate the time discounting rate. Respondents were asked to choose between immediate payment and a deferred but more substantial payment. In the second method, we proposed the following alternatives to respondent (Wang, 2009):

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

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

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

A) a payment of 10,000 DZD now.
B) a payment of X DZD ten years from now.
X has to be at least.....DZD, 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,

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

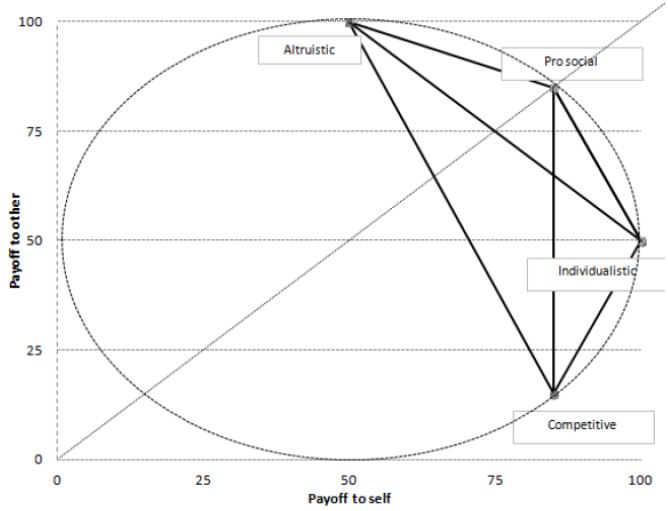
where R is the discount rate and t is the time to be waited. Since both P and t are given in our questions, the inferred discount rate can be obtained from

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

4.1.3 The Third Section of the Survey

The third section of the survey measured respondents' social value orientation. One of the many forms of the dictator game was used. The slider measure scale proposed by Murphy et al. (2011) was applied. This method distinguishes between four behaviours: the altruistic, who tend to maximise others' payoff; the pro-social type, who tends to minimise inequality between his payoff and the payoff of others; the individualist, who tends to maximise his payoff without regard to others' payoff; and the competitive individual, who tends maximise inequality between his payoff and the payoff of others. These four behaviours can be presented in a social value orientation circle:

Figure 1: the social value orientation circle



Source: Murphy et al., 2011.

The link between the four behaviours provides six lines that can be formalised in the tables below. These six items were presented to the respondent, who is asked to choose for each table one of the nine allocations. Respondents are asked, "Suppose that you have to choose between the following way of allocating an amount between you and another unknown person. Which allocation (1 to 9) would you choose in the six following items?"

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	85	85	85	85	85	85	85	85	85	
Other receive	85	76	68	59	50	41	33	24	15	

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	85	87	89	91	93	94	96	98	100	
Other receive	15	19	24	28	33	37	41	46	50	

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	50	54	59	63	68	72	76	81	85	
Other receive	100	98	96	94	93	91	89	87	85	

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	50	54	59	63	68	72	76	81	85	
Other receive	100	89	79	68	58	47	36	26	15	

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	100	94	88	81	75	69	63	56	50	
Other receive	50	56	63	69	75	81	88	94	100	

Choice	1	2	3	4	5	6	7	8	9	answer
You receive	100	98	96	94	93	91	89	87	85	
Other receive	50	54	59	63	68	72	76	81	85	

"The measure can be scored in a straight-forward manner to yield a single index of SVO as follows. The mean allocation for self is computed as is the mean allocation for the other. Then 50 is subtracted from each of these means in order to "shift" the base of the resulting angle to the center of the circle (50, 50) rather than having its base start at the Cartesian origin. Finally, the inverse tangent of the ratio between these means is computed, resulting in a single index of a person's SVO" (Murphy et al., 2011).

- Altruism: SVO° > 57.15◦
- Prosociality: 22.45◦ < SVO° < 57.15◦
- Individualism: –12.04◦ < SVO° < 22.45◦
- Competitiveness: SVO° < –12.04◦

In addition to these behavioural variables, the survey measured the socioeconomic and demographic characteristics of the respondent. The main characteristics were wealth, income and liquidity constraints; family structure and demographic variables; attitude toward government and the political system; confidence in the social security system; macro-economic context; religion; health and longevity. We hypothesised that these variables could impact the demand for social insurance.

5. Primary Results: Descriptive Statistics

This section summarises the principal results of the survey and compares it to findings in previous literature. The risk premium shows how much respondents would pay in the form of lower income to avoid uncertainty surrounding their future income. The summary statistic of risk premium shows that the mean of risk premium was 0.12%; this value is considerably smaller than that of the US population: Luttmer et al. (2012) estimated a risk premium of 6%. So, it can be said that our sample is more risk tolerant than Luttmer's US sample. This paper is not aimed at comparing results of our and other's survey; we provide only examples to show the consistency of our result. Dispersion of risk premium around the mean shows difference in risk tolerance among respondents; 29% of respondents were found to have negative risk premium, 57% of respondents have positive risk premium and 13% have null risk premium. The small value of risk premium shows respondents' willingness to pay, for covering themselves against the variation of future income, is low. In the same way people don't want to pay for social security to cover themselves against social risks. We will evaluate the impact of risk premium on demand for social security in the next section. Otherwise, the lifetime income gamble responses define a range for an individual's risk tolerance (or risk aversion). The summary statistic shows that 29% of the sample population was classed as category 1; the same game in USA yielded 43% of population to category 1. The following table compares our result with the result of Sahm (2007).

Table 3: Results of lifetime income gamble

Categories	Accept the risky Job (zi)	Reject the risky job (zi)	Our result	HRS Survey 2002 (in Sahm 2007)
1	-	1/10	29%	43.2%
2	1/10	1/5	11.7%	18.8%
3	1/5	1/3	16.9%	15.6%
4	1/3	1/2	15.4%	9.9%
5	1/2	3/4	12.6%	6.5%
6	3/4	-	14.3%	6%

Source: authors' data, DDSS survey.

In both samples the majority of people were classed as category 1, confirming the relative risk aversion most people have. The difference between the two surveys shows in the last two categories. Only 6.5% and 6% belong to the highest risk-tolerant in the 2007 HRS survey. In our survey, 12.6% belong to category 5 and 14.3% belong to category 6, indicating that our sample was more risk tolerant than Sahm's US sample.

We can also compare our result with Brown et al. (2013). In this case, the interviewers did not ask what respondents would do if the risk were ¾ and 1/10, so the game yielded only four categories of respondents:

Table 4: Results of lifetime income gamble

Categories	Accept the risky Job (zi)	Reject the risky job (zi)	Our result	Brown et al., 2013*
1		1/5	40%	52.8%
2	1/5	1/3	16%	9.9%
3	1/3	1/2	15%	15.2%
4	1/2		27%	8.8%

Source: authors' data, DDSS survey.

*13.2% answered "don't know".

Comparing the results our sample was, on the whole, more risk tolerant then Brown's. The present study also compared the survey with literature to show that our results were not far from others; comparison is not the subject of the present paper. The aim of this study is to know the impact of risk tolerance on demand for social insurance in Algeria. Risk tolerance of our sample could decrease demand for social insurance. We will confirm this hypothesis in the econometric analysis below.

The third method used to measure risk aversion was to ask questions about daily behaviour: "How do you behave in your daily life?" Respondents

classed themselves in a scale from 1 (I am always taking risks) to 5 (I never take risks) (non-monetary method). The mean value of responses to this question was 2.42, meaning most respondents were risk tolerant. Dohmen et al (2011) argued that this method was the best way to measure risk aversion attitude.

Considering risk aversion levels (based on the lifetime income gamble) with respect to employment status and whether or not the respondent had social insurance, yielded the following results:

Table 5: Risk tolerance by social insurance coverage and employment status

Employment status		**Employer**		**Self employed**		**Permanent salaried worker**		**Non-permanent salaried worker**	
Social insurance		No	Yes	No	Yes	No	Yes	No	Yes
Risk tolerance categories	1	30%	44%	54%	38%	45%	23%	41%	35%
	2	27%	11%	14%	22%	5%	13%	18%	12%
	3	6%	11%	9%	9%	20%	32%	21%	18%
	4	37%	33%	24%	31%	30%	32%	20%	35%

Source: authors' data, DDSS survey.

The table above shows levels of risk tolerance according to whether or not the individual is affiliated to social security system and broken down by employment status. Except for the employer category, it appears that risk averse individuals were less likely to demand social insurance, a result that differs from Barsky et al. (1997). This result could be explained by the loss aversion of the respondents, suggesting that the respondents tend to see social security system as a kind of risky lottery.

The table below shows risk tolerance by category of income. Risk tolerance increases with respect to income: low income workers were less likely to choose the risky job option.

Table 6: Risk tolerance with respect to individual income

		Income in Algerian Dinar				
		REV <18000	**18001<REV <36000**	**36001<REV <54000**	**54001<REV <90000**	**REV> 90000**
Categories of risk tolerance	1	48%	44%	35%	36%	36%
	2	22%	17%	15%	16%	15%
	3	11%	14%	20%	17%	12%
	4	20%	26%	30%	31%	36%

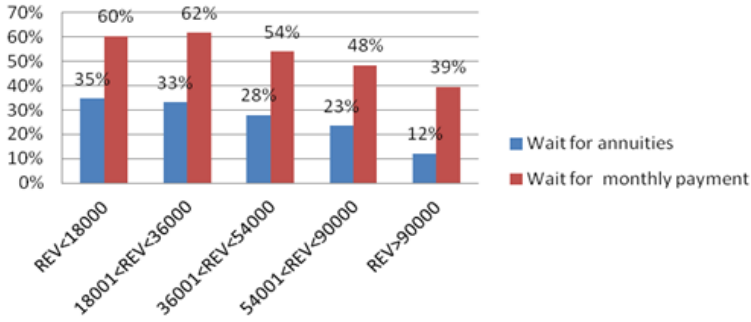
Source: Authors' data, DDSS survey.

Time preference measurements showed that 29% of people chose to wait for an annuity (5,000DA for 6 years = 30,000DA) payment rather than receive 15,000DA immediately and 59% of respondents chose the monthly payment (5,000DA every month for six months) over 15,000DA immediately. Next, respondents were asked to name the amount, X, they would have to receive in one year from now to renounce to 1,000DA today. This method gave an average time discounting rate of 16004%; the median was equal to 400%. Previous studies have found that time discounting changes between countries is about 11% in Australia and 17400% in Georgia (Wang et al., 2009). When respondents were asked to name the amount, X, that would be as attractive in 10 years as 1000DA today, they gave a time discounting rate of 55%, median 53%. The same question yielded a median of 16% in Thailand and 70% in Georgia (Wang et al., 2009). When asked what amount would make it worth waiting one year instead of receiving 10,000DA immediately, they gave a time discounting rate of 3773%. The last question which asked how much they would need to receive in 10 years' time to turn down 10,000DA today, yielded a time discounting rate of 53%.

These instances of time discounting are analogous to those found in previous literature. Respondents discounted the short-term higher than the long-term, and small amounts higher than big amounts. Time discounting rates differ based on individual characteristics.

The figure below shows that patience decreases as income increases: higher earners were less likely to wait for a deferred payment. The proportion of patient respondents decreased from 60% (35% for the annuity) to 39% (12% for the annuity) as income increased from under 18,000 DA to over 90,000DA.

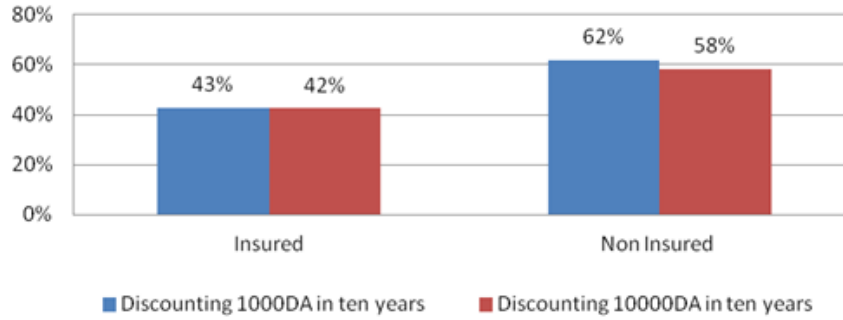
Figure 2: Willingness to wait for deferred payments according to income



Source: authors' data, DDSS survey.

The figure below shows that uninsured respondents discount the future more than insured respondents. The time discounting rate for insured respondents was 43% (42% for the high amount) and 62% (58% for the higher amount) for the uninsured. This supports the assumption that time discounting can negatively affect demand for social security.

Figure 3: Time discounting and social insurance



Source: Authors' data, DDSS survey.

The survey question on social value orientation (SVO) yielded answers that could fit into four behavioural categories: the individualist who endeavours to maximise her or his own payoff; the pro-social individual who maximises joint payoffs, the altruist who maximises the other's payoff and the competitive person who minimises the other's payoff. The survey found that 42% of respondents were individualistic, 54% were prosocial, 1.07% was altruistic and the rest were competitive. Compared with the results of Murphy et al. (2011) our sample was slightly less prosocial. Murphy et al. found 58% of their sample to be prosocial, 39% individualistic and 3% altruistic. Lang et al. (1997) used other methods to estimate the social value orientation of a sample of students in Amsterdam. The following table compares those results and ours:

Table 7: Social value orientation: results of the dictator game

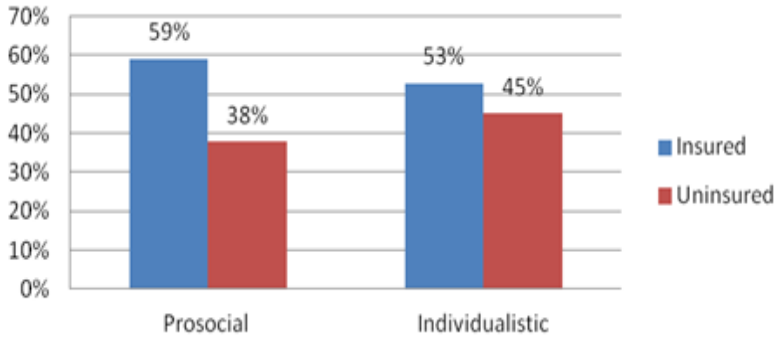
	Our result	**Lang et al., 1997**	**Murphy et al., 2011**
Prosocial	54%	43%	59%
Individualistic	42%	29%	35%
Competitive	2%	8%	3%
Altruistic	3%	-	-
Unclassifiable	0%	20%	4%

Source: Authors' data, DDSS survey.

The table above does not aim to compare between those samples because they are not similar (different countries, different cultures). The table allows us to confirm that our results are consistent with literature and we can observe the small proportion of the altruistic and competitive behaviour in all the samples. This gives more credibility to our survey result.

The assumption of this paper is that individualistic behaviour has a negative impact on demand for social insurance. The following figure presents the behaviour of respondents according to social insurance demand.

Figure 4: Social value orientation and social security



Source: Authors' data, DDSS survey.

The figure above shows that prosocial respondents were more likely to demand social security than individualistic respondents, supporting the assumption of this paper. This will be further confirmed in the next section, using the discrete choices model.

Figure 5: SVO and employment status

Source: Authors' data, DDSS survey.

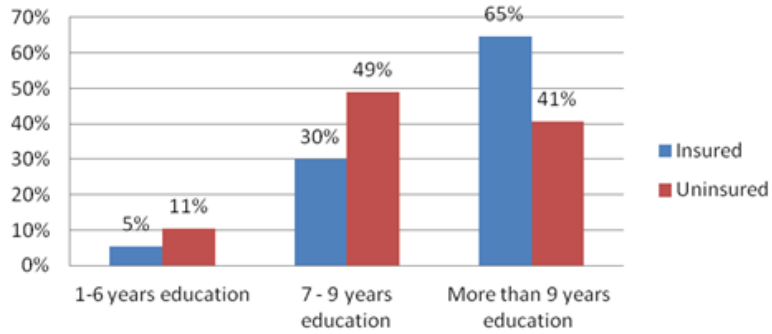
The comparison of SVO with employment status shows that employers and the self-employed were less prosocial than salaried workers. This confirms the assumption that individualistic behaviour can be a reason for low demand for social coverage.

Men are more likely to be prosocial than women. The results of the survey show that 45% of women and 42% of men were individualistic. Married respondents (54%) were more pro-social than single respondents Brown et al (2013) study yielded a similar result).

The survey also dealt with other variables that can affect social security demand. Confidence in government and the political system[7] appeared very weak whereby 70% of respondents were not at all confident in government while 80% were not all confident in the political system. The uninsured were less confident in the government and political system than the insured respondents: 73% were not at all confident in government while 83% were not at all confident in political system; these figures were 65% and 77% respectively for insured respondents. These results support the assumption that confidence in government and political systems can improve the demand for social security.

Respondents were asked about education levels and tested for financial literacy in our survey. Both these variables can affect demand for social security. The figure below shows that demand for social security mostly increased along with the level of education. The proportion of insured respondents rose from 3% amongst respondents with less than six years of education to 36% for those with more than 12 years.

Figure 6: Insurance and Education



Source: Authors' data, DDSS survey.

Respondents were given three financial literacy problems to solve.[8.] 31% of insured and 24% of uninsured respondents gave a correct answer to the Interest Compounding Question; 38% insured and 24% uninsured respondents answered the Doubling Compounding Question correctly; and 43% insured

and 29% uninsured respondents got the Simple Inflation Question right. These results show that insured respondents were more financially literate than the uninsured respondents consistent with the assumption that financial literacy may have positive impact on the demand for social security.

6. Econometric Analysis

In this section, logit models are used to show the impact of behavioural 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. As shown in the last section, our survey is quite large and contains numerous variables. These variables could be correlated. We have run several logistic models to know the impact of each variable separately and to facilitate readability and presentation (results are nearly identical if we include all the variable in one regression). Results are shown in a table of variables like follow:

6.1 Is the Social Security System a Risky Gamble?

Individual attitudes towards risk and its relationship with economic choices (see section 3) were examined. There are several methods that can be used to measure risk aversion. This paper employed two monetary methods (certainty equivalent and lifetime income gamble methods) and a non-monetary Likert scale survey. The results made it possible to distinguish between risk aversion and loss aversion. In this study, the results disagreed with the postulation that individuals translate health and all kinds of risk into pecuniary values (Viscusi & Evan, 1990) and the attitudes they adopt toward risk arise from this. Instead, it corresponds to Beri and Ward-Batts (2012), who distinguish between health risk aversion (non-monetary risk) and loss aversion (monetary risk). In our survey, it was observed that respondents behaved differently when asked monetary question and non-monetary questions. The following table shows the impact of risk aversion, as obtained from both methods, on the demand for social security.

Table 8: The impact of risk aversion on the demand for social insurance

	Odds ratio
Variables	**Dep. Variable : demand for social security**
Risk premium	0.994***
	(0.00241)
Category 2	1.225
	(0.271)

Table 8: (Continued)

Category 3	1.975**
	(0.273)
Category 4	2.311***
	(0.237)
Age	1.040***
	(0.00879)
Female	0.712
	(0.269)
Sometimes take risks	1.774**
	(0.249)
Neutral towards risk	1.918*
	(0.345)
Don't usually take risks	3.123***
	(0.269)
Never take risks	3.071***
	(0.357)
Constant	0.0456***
	(0.406)
Observations	615

Source: Authors' data. DDSS survey.
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above shows that the risk premium (monetary method) had negative impact on the demand for social security. The odds ratio shows that a 1 percentage increase in risk premium leads to a slight decrease (1.01) in the probability of the individual demanding social security. The lifetime income gamble (monetary method) showed that the respondents from categories 3 and 4 (more risk tolerant) were 1.97 and 2.31 more likely to demand social security. This suggests that individuals tend to see social security as risky and a form of gambling. This result corresponds with the findings of Giesbert et al. (2011) who measured the impact of risk aversion on the demand for life insurance in Ghana. The Likert scale method (non-monetary) showed the opposite of these two last monetary methods. The more risk tolerant were less likely to demand social security. The odds ratio showed that respondents who never take risks were 3 times more likely to demand social security than those who always take risks (reference variable). The respondents who were neutral toward risk were 1.91 more likely to demand social security than who always take risks. Individuals who sometimes take risks were 1.77 more likely to

demand social security than who always take risks.

6.2 Impact of Time Discounting on Demand for Social Security

Inter-temporal choices have an impact on individual behaviours. In the last section, the relationship between time preference and economics choices (consumption, saving etc.) was presented. The following logit model illustrates the impact of time discounting on demand for social insurance:

Table 9: Impact of inter-temporal choices on the demand for social insurance

Models	**Odds ratio 1**	**Odds ratio 2**	**Odds ratio 3**
Variables	**Dep. variable demand for social security**	**Dep. variable demand for social security**	**Dep. variable demand for social security**
Time discounting rate (P3)	0.986***	-	0.991***
	(0.00291)		(0.00296)
Age	1.038***	1.037***	1.034***
	(0.00885)	(0.00942)	(0.00988)
Female	0.549**	-	0.598*
	(0.266)		(0.282)
Education: 9 years or less	1.227	1.399	0.918
	(0.388)	(0.422)	(0.463)
Education: 10 years or more	3.170***	3.315***	2.633**
	(0.376)	(0.409)	(0.442)
ln_P1: log time discounting rate	-	0.727***	-
		(0.0514)	
Forsighted scale (1-10)	-	-	0.907**
			(0.0394)
Subjective probability of surviving to age 75	-	-	1.006
			(0.00510)
Constant	0.140***	0.337*	0.174**
	(0.547)	(0.647)	(0.734)
Observations	644	602	527

Source: Authors' data; DDSS survey.

Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above shows that the time discounting rate (of the distant future - 10 years - as tested in the last section of the survey) has a negative impact on the demand for social security. A 1% increase in the time discounting rate slightly decreased (by 1.09 times) the probability of demand for social security. Time discounting rates for the near future had a greater impact on the demand for social security: a 1% increase in time discounting (of the near future, Ln_P1) gave a 1.38 decrease in the probability of purchasing social insurance. Respondents were also asked to class themselves according to a scale between 1 (live from hand to mouth) and 10 (farsighted); the impact of this variable on the demand for social security was somewhat unexpected. It was found that the more farsighted respondents were less likely to demand social security. Such respondents were likely to prepare for their retirement alone out of the social security system.

6.3 Impact of Social Value Orientation on Demand for Social Security

Social value orientations (SVO) affect many social dilemmas (Murphy et al., 2012). In this paper, the effect of SVO on the demand for social insurance was explored. The statistics show that most of the respondents were prosocial (54%) or individualistic (42%), with only a very small proportion competitive or altruistic. The logit model was run to evaluate the coefficients of the model. The results are presented in the following table:

Table 10: Impact of SVO on demand for social insurance

Variables	Odds ratio 1	Odds ratio 2
	Dep. variable demand for social security	Dep. variable demand for social security
Prosocial	1.429*	-
	(0.187)	
Non-permanent salaried worker	0.256***	0.254***
	(0.228)	(0.222)
Self employed	0.408***	0.376***
	(0.230)	(0.223)
Age	1.032***	1.030***
	(0.00924)	(0.00863)
Female	0.455***	0.520**
	(0.269)	(0.263)
Education: 7- 9 years in education	1.541	-
	(0.392)	
Education: 10 or more years	3.899***	-
	(0.380)	

Table 10: (Continued)

Individualistic	-	0.699*
		(0.184)
Constant	0.126***	0.470**
	(0.571)	(0.361)
Observations	652	654

Source: Authors' data; DDSS survey.
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above shows prosocial respondents were more likely to demand social security (Logit 1). The odds ratio shows that prosocial respondents were 1.49 more likely to demand social security while individualistic respondents were 1.44 less likely to demand social security (Odds ratio 2). These results correspond with the literature findings and the assumptions of this study: Prosocial individuals are more likely to cooperate in social dilemmas. The table below also shows that non-permanent salaried workers and the self-employed were less likely to demand social security: non-permanent salaried workers were four times less likely and the self-employed 2.44 less likely to demand social security than those with other occupational status.

6.4 Trust in Government and Political System

Literature review showed that trust in government and political systems improves the demand for public goods. In this section, the effect of trust in government and political systems on the demand for social security is studied. The results showed that 78% of respondents did not trust the government and 88% lacked trust in the political system. The logit model of these variables on the demand for social security is presented in the following table:

T**able 11:** Trust in government and demand for social insurance

Variables	**Odds ratio 1**	**Odds ratio2**
	Dep. variable demand for social security	**Dep. variable demand for social security**
Neither confident or not confident in government	0.653	-
	(0.371)	
Not confident in government	0.502***	-
	(0.267)	
Age	1.039***	1.040***
	(0.00862)	(0.00856)
Female	0.500***	0.531**
	(0.265)	(0.264)

Table 11: (Continued)

Education: 9 years or less	1.720 (0.381)	1.711 (0.381)
Education: 10 years or more	4.633*** (0.372)	4.332*** (0.370)
Neither confident or not confident in political system	-	0.979 (0.542)
Not confident in political system	-	0.710 (0.467)
Constant	0.0845*** (0.549)	0.0641*** (0.669)
Observations	650	651

Source: Authors' data; DDSS survey.
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above shows that respondents who lack trust in government were less likely to demand social security (Logit 1). They were twice as unlikely (odds ratio 1) to demand social security than those who trust the government. Trust in the political system did not appear to be significant in this model. However, the coefficient was negative, which means that the demand for social security did increase with trust in the political system.

6.5 Effects of Understanding Social Security on Behaviour

Questions were posed in order to identify whether the respondents understood the basic roles of the Algerian social security system. They were asked five questions which were classified into four categories based on the number of correct answers. Good knowledge was defined as giving 5/5 correct answers; medium knowledge was for those giving 3 or 4/5 correct answers; those classed as having low knowledge gave 1 or 2/5 correct answers; those giving no correct answers at all were classed as having no knowledge. The results were as follows:

Table 12: Knowledge of social security

Variables	**Odds ratio 1**	**Odds ratio 2**
	Dep. variable demand for social security	**Dep. variable demand for social security**
Low knowledge	0.590*** (0.188)	
No knowledge	0.179*** (0.550)	

Table 12: (Continued)

Female	0.696 (0.266)	0.677 (0.265)
Age	1.036*** (0.00877)	1.038*** (0.00871)
Education: 9 years or less	1.626 (0.387)	1.703 (0.385)
Education: 10 years or more	3.468*** (0.377)	3.636*** (0.375)
Good knowledge	-	1.686 (0.450)
Medium knowledge	-	1.835*** (0.190)
Constant	0.0901*** (0.533)	0.0431*** (0.522)
Observations	632	632

Source: Authors' data; DDSS survey.

The table above indicates that the people who know the social security system well were more likely to be enrolled. Respondents with a low level of knowledge were 1.69 less likely to demand social security. Respondents with no knowledge were 5.88 less likely to demand social security. Respondents with good knowledge were 1.68 more likely to demand social security (the coefficient was not significant) and respondents with a medium amount of knowledge were .83 more likely to demand social security. The results correspond with Liebman et al (2011).

6.6 Financial Literacy and Demand for Social Security

Some researchers look beyond the level of education to explain certain economic behaviours, exploring the effect of financial literacy on their dependent variable (Luttmer et al, 2012). In this survey, the financial literacy of respondents was measured by asking some financial questions (see section 5). The assumptions stipulate that financial literacy improves demand for social security. The logit model for this variable gave the following results:

Table 13: Education and financial literacy

	Odds ratio 1	**Odds ratio 2**
Variables	**Dep. variable demand for social security**	**Dep. variable demand for social security**
Education: 9 years or less	1.694 (0.386)	1.130 (0.367)

Table 13: (Continued)

Education: 10 years or more	3.103*** (0.384)	2.442** (0.365)
Failed interest rate question	0.400*** (0.237)	-
Failed shares and bonds question	0.584** (0.219)	-
Age	1.040*** (0.00882)	-
Correctly answered Compounding Interest Rate question	-	1.373 (0.203)
Correctly answered inflation question	-	1.237 (0.195)
Correctly answered shares and bonds question	-	1.348 (0.243)
Constant	0.0892*** (0.542)	0.219*** (0.337)
Observations	652	652

Source: Authors' data; DDSS survey.
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above shows the positive relationship between financial literacy and the demand for social security. The logit model shows that respondents who could not answer the simple interest rate or the shares and bonds question were 2.5 and 1.72 less likely to demand social security respectively. The number of correct answers was low, hence, no significant coefficient was obtained in the second logit model. However, the sign of coefficients corresponds to our assumption: respondents who gave correct answers were more likely to demand social security.

6.7 Demand for Social Insurance: Does Income Matter?

It is well known that income impacts consumer behaviour through many other variables. This study estimates individual income and reveals its impact on demand for social insurance. The logit model that displays the link between the two variables is presented in the following table.

Table 14: Impact of income on demand for social insurance

Variables	Odds Ratio
	Dep. variable demand for social security
Reference variable: Income <18000	
18000<Income<36000	3.029***
	(0.368)
36000< Income <54000	5.840***
	(0.384)
54000< Income <90000	6.536***
	(0.435)
Income >90000	5.812***
	(0.505)
Saving	1.484**
	(0.190)
Married	1.501*
	(0.235)
Age	1.025**
	(0.0110)
Constant	0.0352***
	(0.499)
Observations	652

Source: Authors' data; DDSS survey. Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1

The table above show that income increases demand for social security. Respondent who have income between 36000 and 54000 dinars is 5.84 times more likely to demand social insurance than who earn less than 18000 dinars (reference variable). Respondents who earn more than 90.000 dinars a month are 5.81 more likely to participate in social security. Bellache (2010) found the same result when he undertook a survey in the region of Bejaia (Algeria). The table shows also that respondents who have savings (no liquidity constraint) are 1.84 more likely to demand social security. This shows that liquidity constraints could be determinant of demand for social insurance (Brown, 2013). Married and older respondents are 1.5 and 1.02 more likely to participate to social security system.

7. Conclusion

This paper dealt with the topical issue of extending social security, expanding the general literature on social security systems with an innovative example based on the case of Algeria. The actual problems of social security systems were linked to the theoretical background of the microeconomics of social insurance. Within the Algerian social security system, the social insurance on offer is enough to cover all workers (and their families) against every social risk; in other words, the supply of social insurance is, theoretically, adequate. However, the equilibrium of the social security market is vulnerable because of low demand from workers. As seen in literature, individuals (at least some of them) behave in ways that reduce their safety. This paper focuses on three main behaviours, namely risk aversion, time discounting, and social value orientation. We constructed a questionnaire and used experimental tools to measure these variables, for the first time, among Algerian workers. This study should prove valuable in its methods especially with respect to the Algerian social security system. We used three methods to measure risk aversion and have shown that risk aversion can differ according to the nature of risk; monetary risk is not the same as non-monetary risk, and loss aversion is different risk aversion. We have also found that time discounting can be different whether we discount near or far future, small or big amount. Finally, measure of social value orientation shows that respondent can be individualistic or prosocial according to many socioeconomic and demographic variables that we discussed in this paper. This paper tests the impact of behavioural variables on demand for social security. Logit models were used to test our assumptions. The impact of different variables was significant, confirming the assumptions. First of all, risk aversion has a significant impact on the demand for social security: people who are risk-averse are more likely to demand social security. This relation changes when the risk is monetary; risk aversion measured by life time income gamble method (monetary method) decreases demand for social security. Second, time discounting decreases demand for social security; people who don't care about the future or a retirement plan, do not seek out an old age pension. Third, social value orientation has a significant impact on demand for social security as well. Pro-social people are more likely to participate in the social security system. Finally, this paper deals with other demographic and socio-economic variables which have an effect on demand for social security.

From this, it can be seen that working on these determinants is crucial in the battle to extend social insurance coverage. Studies by the International Labor Organisation and the World Bank deal with the subject of extending social security to all, but they focus on the Beveridgian[9] approach to doing so. Our approach is quite different, focusing on extending the contributive Bismarckian system to all workers. This approach allows workers to cover themselves and their family against risk and allows the insurance funds to

attract additional contributions and decrease their shortfall.

Based on our results and looking at successful reforms in several developing countries, we suggest some ways to extend social security coverage to all workers:

With any merit good, price must decrease to improve demand. The risk aversion analysis showed that people are not willing to pay too much for social security, so a decrease in the social contribution rate could contribute to increasing demand for social security. Such reforms were observed in Ecuador (ILO, 2014) with positive results. A decrease in the contribution rate would be compensated for by an increase in the number of insured. Caire (2002) showed that the more people who are insured, the lower the probability of a shortfall in the insurance fund.

The high time discounting rate (i.e. focus on the present) may be counterbalanced by offering immediate benefit to insured workers and their families, for example, by introducing child care into the social security system, or improving family allowance and extending it to the self-employed. Calvo et al (2011) demonstrated the positive impact on insurance demand by extending family allowance to self-employed workers in Chile. Unemployment benefit should also be improved and extended to non-permanent salaried workers.

Developing the insurance market can improve demand for social insurance. Informal workers like to save money buy gold in case of financial emergency. Some buy land to use in times of crisis. These strategies are a kind of insurance mechanism, so insurance is not unknown to informal workers. Renena (1998) showed that informal workers usually want to enrol in the insurance system if it adequately meets their needs and expectations. The insurance company should offer services at peoples' doorstep. The mechanisms for collecting premiums and paying benefits must suit the needs of informal workers.

Many countries in Latin America have established a monotax system (ILO, 2014) that allows informal workers to have a single 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 reforms could be successful for Algeria.

Notes

1. This study was funded by Centre de Recherche en Economie Appliquee pour le Developpement (CREAD-Algiers).

2. Bismarck created for the first time the social protection system in Germany in 1883. It is compulsory and contributory, funded by employers and employees and administered via pre-existing "social security funds".

The rights are associated with labour status.

3. Unemployment insurance only covers salaried workers with permanent contracts.
4. This number decreases by one year for every child educated and limited to three children.
5. Pension is calculated according to the 10 best annual incomes (5 best annual wages for salaried workers).
6. in three stages, respondents are first asked how much social security benefit they expect to receive in the future. These expectations are calculated as a proportion - X% - of the social security benefit respondents are actually entitled to under current law; this figure is called the "uncertainty equivalent". In the second stage, a contract is proposed to the respondent that guarantees Y=X% of the benefits that she is supposed to get under current law. If the respondent rejects/accepts the contract, the researchers ask the same question with a higher value Yi/lower value Yi until the respondent accepts/rejects the contract. The amount that makes the respondent change his choice is called the certainty equivalent. The risk premium is the difference between the uncertainty equivalent and the certainty equivalent.
7. Respondents were asked to class themselves from 1 (very confident) to 5 (not at all confident).
8. 1. Interest Compounding Question: How much will be in the bank account at the end of two years if the initial balance is 100DA and the interest rate is 5% with no withdrawals? 2. Double Compounding Question: How long would it take an account to double in value at an annual interest rate of 10%? 3. Simple Inflation Question: How much can you buy a year from now if the interest rate is 2% and inflation is 3%?
9. Beveridge created sociale security system in UK in 1948. The system is non-contributory funded from general government revenues. It extends to the entire population. The right is associated with citizenship.

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