

## The demand for health microinsurance services: assessment of the contribution effort using microeconomic data

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### Abstract

This paper analyzes subscription and willingness to pay (WTP) effort decisions among microcredit clients for a health microinsurance service in Morocco. We use data from a survey conducted among 562 microcredit clients belonging to two institutions.

To estimate clients WTPs' efforts, we choose the contingent valuation method. We analyze the different steps of decision by using simple and generalized Tobit.

The results highlight the effect of socio-economic and financial variables including clients' participation in formal and informal insurance mechanisms. We explain that they think in terms of substitution in one case, and complementarity in the other. The effect of savings reveals that clients want to maximize the collective utility of their households.

**keywords:** Truncated and censored models; Health Care Markets; Health Insurance, Public and Private; Valuation of Environmental Effects; Morocco

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### Introduction

#### *Context : health system and health care in Morocco*

As part of the commitment to achieve the Millennium Development Goals, Morocco has included health in its action plan. In 2012, a Health Sectorial Strategy (2012-2016) has taken place. One of its primary goals is generalizing health care to deprived populations through a public health insurance program called «régime d'assistance médicale (RAMED)»<sup>1</sup>.

Morocco has been suffering for a long time from a large deficit in social protection and health care rationing (El Fellousse and Kherbach, 2013). A large

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<sup>1</sup> Health Department (2012). The Sectorial Health Strategy 2012-2016 focuses also on other aspects: managing transmissible and non transmissible diseases, mental health and cancer, consolidation of rural health and fighting against maternal and infant mortality.

poor population engaged mainly in informal activities cannot benefit from medical coverage<sup>2</sup>.

Consequently, the share of population with access to health coverage in Morocco did not exceed 33.7% in 2010, and 25% in 2006 (Department of Planning and Financial Resources in the Health Ministry). These facts urged the implementation of RAMED as a health care program covering the poorest strata of the population.

Formal financing is another sector from which this category of the population was deprived. Rationing access to loans caused the exclusion of individuals leading informal activities from formal financing (Mourji, 1998).

Microfinance emerged in order to target these individuals, thus, allowing them access to microcredits (Mourji, 2002).

Activities of Micro Credit Associations (MCAs) have immensely been promoted in order to meet the strong demand. They have developed and enlarged their sphere of action through providing diversified services such as remittances. In 2013, an MCA has launched a pilot experience and offered a microinsurance service to its microcredit clients.

We can say therefore that microfinance industry tends to be inclusive in Morocco. Rutherford (2000) mentions also microsavings as an additional inclusive service.

By launching health microinsurance products, MCAs may be able to participate in generalizing access to health care by covering the individuals working in the informal sector, as well as their households' members.

### ***Addressed questions and goal of the study***

This study focuses on microcredit clients. It aims to evaluate and understand the determinants of subscription to health microinsurance and to estimate the share of the contributions in the clients' incomes, in order to access this service (contribution effort). In addition to the low coverage of the population, we must mention the effect of society stratification.

Existing health care schemes cover only workers in the public and semi-public sectors (excluding the non-permanent staff) and those working in the private sector (when declared by their employers). Also worth noting that the complementary insurance products offered by banks and insurance companies to their customers concern only a small stratum of society.

The most vulnerable layer of society is only partially covered by RAMED. In one hand, eligibility criteria to this program require that covered individuals should belong to a household where annual income per capita does not exceed 5650

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<sup>2</sup> According to the HCP's report on the national survey on the informal sector 2006-2007, the informal economy contributes to up to 40.8% in the labor market in Morocco (without taking into account employment in agriculture and government).

MAD (less than 470 MAD (45 €) a month)<sup>3</sup>. On the other hand, RAMED only guarantees “medically required services available in public hospitals, health facilities and health services under the State”<sup>4</sup>. These institutions’ supply is insufficient: in 2007, the density of medical and paramedical staff per 1,000 inhabitants did not exceed 1.64 whereas the threshold set by the World Health Organization (WHO) is 2.5 (El Fellousse and Kherbach, 2013).

Therefore, it seems that among the populations targeted by RAMED, an attractive option would be to have recourse, when it is possible, to more efficient alternative services.

This justifies the benefit of analyzing microcredit clients’ subscription to a health microinsurance and estimating their contributions’ efforts.

These clients belong to a vulnerable population mainly because they carry out informal activities. Their large majority does not have access to any form of formal medical care schemes (including RAMED)<sup>5</sup>.

To analyze subscription and willingness to pay effort, we use data from a survey conducted among 562 MCAs in Morocco. The survey was carried out by the LASAARE in September-October 2013 and was part of “Micro Finance in Crisis” project supported by the European Investment Bank (EIB)<sup>6</sup>.

We aim to understand clients behavior toward subscription and willingness to pay effort decisions. What effect do have clients’ demographic and socioeconomic characteristics, as well as their households’? What role do play financial variables including clients’ participation in formal and informal insurance mechanisms?

The following section in this paper presents the theories dealing with the willingness to pay and the methods allowing its assessment. The biases resulting from the use of those methods are also emphasized. We present also in the same section the results of empirical studies that analyzed this issue. The third section sheds the light on the models we adopt and the methods we use to choose explanatory variables and to choose between models. The fourth section presents the data. The fifth section is dedicated to results’ discussion. The sixth section concludes.

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<sup>3</sup> These criteria are specific to urban population. Other eligibility criteria are taken into account when considering rural population. See [www.ramed.ma](http://www.ramed.ma)

<sup>4</sup> Article 21, decree n° 2-08-177 du 28 ramadan 1429 (29 september 2008) implementing the provisions of the book III, law n° 65-00 related to the « régime d'assistance médicale ».

<sup>5</sup> According to the results of our study, publicly covered clients via a public organism (CNOPS) represent 14%. Those covered by a private organism represent 3.3% and only 27% have access to Ramed. Even those who have access to this last program suffer from the previously mentioned difficulties linked to its use.

<sup>6</sup> See : [www.microfinance-in-crisis.org](http://www.microfinance-in-crisis.org)

### ***Literature Review***

Many methods are used in order to evaluate individuals' WTPs before placing on the market a new good or service, and / or experiencing its improved quality. In other words, its estimation informs on individuals' preferences in the sense of Samuelson (1948).

Authors use indirect methods to assess individuals' preferences in presence of a market. They deduce the value of non market goods (that corresponds to WTP) through observing individuals' behavior toward tradable goods on the market.

When there is no market allowing concrete revelation of these preferences, researchers adopt a specific method of evaluation: Contingent Valuation method (CVM).

We explain first in this section the concept of WTP and we introduce the CVM and the biases it could cause. We present also the results of empirical studies that dealt with the question of the willingness to pay for a health insurance service.

#### ***Willingness to pay and contingent valuation method: theoretical teachings***

##### *Willingness to pay concept*

The various works that studied WTPs dealt primarily with the field of environment. In other words, researchers measured the value given by the interviewees to an environmental good (to which they wanted to have access) through direct questioning.

However, in the case of environment (and also, in our case, microinsurance), the market doesn't exist. Consequently, there is no price informing on the value of the environmental good<sup>7</sup>.

Surveyed individuals are put in a hypothetical situation and face the challenge of quantifying the value of the good or the service object of study, especially in the context of budgetary constraints.

A solution to the problem might be inspired from the consumer theory: the value of a good is supposed to be measured by the satisfaction it provides to individuals. Every individual  $i$  accords a value  $j$  to the traded good or service. These values are subjective. There are as many subjective values as there are individuals. The market is the place where all these subjective values (corresponding to supply and demand) meet. Their confrontation results in the creation of a pricing system (Luchini, 2002).

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<sup>7</sup> Today in Morocco, the microinsurance market is still recent. In 2013, the MCA "Al Amana" has experimented offering a health microinsurance service to its clients in pilot regions.

The methods used to assess the WTPs are divided in two categories: the first one suggests ex-post behavior observation techniques (indirect methods). They are based on analyzing complementarity or substitution relationships between market and non market goods<sup>8</sup>. By examining individuals' behavior toward the market goods, it is possible to estimate the implicit value of the non market ones (or tradable goods corresponding to new markets).

We can give as examples; the hedonic pricing method that leads to compared analysis of houses' prices for which only the environmental component varies (Ridcker and Henning were the first to apply it to the case of air pollution in 1976). Protection costs method allows the quantification of protection expenses that could be engaged in the case of environment degradation (Blomquist, 1979). The second category is based on the evaluation of individual preferences according to a hypothetical scenario (direct approach). CVM is the technique that allows this because it is more appropriate to reveal WTPs in our case. We present this method in the next paragraph.

#### *Contingent Valuation Method*

CVM is based on developing a hypothetical scenario that describes the traded good and the conditions in which it will be demanded and exchanged.

Since the CVM is based on putting respondents in imaginary situations (via surveys), in order to directly assess their valuations of the studied good or service, it can present a double difficulty.

The first one is linked to the fact that information on economic agents' behaviors is collected through surveys. It is based in fact on collecting purchase intentions instead of observed information collected on concrete markets.

The second difficulty is related to the nature of the described good. Environmental goods are of a public nature, which means that they haven't been traded before. Researchers use the CVM for these kinds of goods and thus evaluate, on the basis of private interest, goods that belong to the public sphere (Luchini, 2002).

These difficulties will be extended if this method is used in other fields (like microinsurance)<sup>9</sup>. We apply CVM to test the feasibility of a microinsurance service and thus, explore a new market in which there is no pricing system yet.

To overcome these difficulties, researchers describe as precisely as possible the hypothetical market during the survey. Its characteristics should be as close as possible to the ones of an actual market. This condition will allow respondents to

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<sup>8</sup> The non market goods could be environmental, or belonging to other spheres like microinsurance in our case.

<sup>9</sup> The microinsurance service we describe and the environmental good have in common the fact that there is no market for both of them, and thus no pricing system. This is why researchers adopt the CVM when assessing the value of a health microinsurance service.

behave the same way they would do on a real market (Bonnieux *et al.*, 1995; Luchini, 2002).

As potential consumers, the respondents will behave accordingly and will announce the real amounts they will be ready to contribute with. Their subjective responses will be the basis for the instauration of pricing system on the hypothetical market. The consumer theory will be then generalized to the particular case of a microinsurance market.

The CVM suffers however from certain limits clearly identified in literature.

#### *Biases caused by the contingent valuation method*

Besides the difficulties previously mentioned, CVM could be the cause of certain biases if the hypothetical scenario isn't properly described (Bonnieux *et al.*, 1995; N'guessan, 2008).

We recall first the strategic bias. If the respondents perceive the consequences of the experience they are asked to go through, it is possible that their answers don't actually reflect their real intentions. In public economy, this bias results from the underestimation or overestimation of WTPs (Bonnieux *et al.*, 1995).

The second bias is called complacency bias. It is encountered when the interviewer suggests answers to the respondents. Interviewees might think that these answers are the "correct ones", and will therefore declare close responses (Mitchell and Carson, 1989).

The starting point bias could also be caused by the CVM. In order to estimate WTPs, we could start by announcing a series of numbers (either in a discontinued way -discrete numbers- or in a continued one -by giving intervals-). It's called the bidding game approach (N'guessan, 2008).

The hypothetical bias is induced by the potential error that could be made by individuals given the fact that they are declaring WTPs in an imaginary situation (Bonnieux *et al.*, 1995). This bias could be amplified by the information bias that could be caused by insufficient or deformed information on the product's characteristics (N'guessan, 2008)<sup>10</sup>.

#### *Teachings of empirical studies*

To analyze subscription and WTP decisions, researchers used various models in order to understand the impact of explanatory variables. These variables reflect mainly demographic and socioeconomic factors.

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<sup>10</sup> We show how we took into account all these biases in the paragraph dealing with the source of the data and the logic of construction.

We identify in this section each one of them and highlight their potential effect on subscription and WTP decisions<sup>11</sup>.

*Impact of demographic variables*

The impact of age varies according to contexts: Makaudze *et al.* (2011) in Cameroun found that compared to elders, younger people are more likely to give higher contributions. N'guessan (2008) uses the quadratic form of this variable. He finds that WTP increases to a certain level then starts to decrease.

In a study carried out in Vietnam in 2008, Lofgren *et al.* found that older people are more risk averse than younger people. Therefore, they perceive with more precision the impact of illness in their households and declare consequently higher WTPs.

In Senegal, Bonan *et al.* (2012) explain that demand for a health microinsurance service is higher when the head of the household is a man. In terms of WTP, men declare higher WTPs than women in the poor rural regions in India (Dror *et al.*, 2006).

However, in other studies (cfr. Banthia *et al.*, 2009), authors emphasize women's stronger vulnerability, not only in terms of health but also in terms of revenues' uncertainty. Usually making a living by leading informal activities, they are more likely to subscribe for a health microinsurance compared to men. This behavior was verified in the work of Jehu-Appiah *et al.* in 2012.

Marital status could be significant or not according to contexts. In rural China, married persons are more likely to join a community health program compared to unmarried individuals (Wang, 2005). Mao (2000) in China and N'guessan (2008) in Ivory Coast find that this variable is not significant.

In Chinese rural areas, households' sizes reduce the propensity to subscribe for health microinsurance (Mao, 2000). Families with larger sizes anticipate higher contributions in order to join a community health system, which would weigh heavily on households' budgets. This negative effect could also be explained by the fact that large families are required to register every member in the health service program in order to circumvent adverse selection. The same behavior was found for N'guessan (2008), who instead of using households' sizes, has introduced the number of children in the households as an explanatory variable. This variable had a negative impact on the contribution level in the sequential process.

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<sup>11</sup> Even if the authors clearly evaluate the impact of these various variables, they do not however detail their theoretical expected effects; neither do they explain the economic reasons behind their results. In this paper, we explain the role of each explanatory variable (see the paragraph discussing the results).

Bonan *et al.* (2012) observed a different result in Senegal: individuals belonging to larger households are more likely to subscribe for a health microinsurance service compared to smaller households.

#### *Impact of socioeconomic variables*

In certain studies (Dror *et al.*, 2006; Lofgren *et al.*, 2008; N'guessan, 2008), authors have shown that education impacts subscription to health microinsurance. The explanation given to this behavior is that educational level promotes financial knowledge. Others point out that the effect of education is ambiguous (Giné *et al.*, 2008; Bonan *et al.*, 2012). Finally, when information on individuals' financial know-how is available (by measuring it through questions dealing with interest rates or risk diversification for example), it could be introduced as a new variable (or as a proxy to education). Giesbert *et al.* (2011) found that such variable is relevant and the impact of education vanishes.

In empirical studies, it is very rare to find that income has a negative effect on WTPs reported by individuals wishing to join a health micro-insurance program. Most researchers emphasize the positive effect of this variable. Examples include: Mao (2000), Lofgren *et al.* (2008), N'guessan (2008) and Jehu-Appiah (2012).

To the best of our knowledge, previous studies mostly emphasized the effects of demographic and socioeconomic variables on subscription and WTP decisions. In this study, we introduce additional variables dealing with microcredit clients' financial characteristics (households' indebtedness), and with the adoption of formal and informal insurance mechanisms.

#### **Presentation of the models**

Various models have been used in literature to model subscription and WTP decisions: Mao (2000) used a Logit model to explain Chinese households' decision to subscribe for a community health program. Dror *et al.* (2006) adopted a multiple linear regression to analyze the impact of demographic and socioeconomic variables on WTPs. Finally, N'guessan (2008) used generalized and simple Tobit models to explain the WTPs of rural households in Ivory Coast for a universal health insurance. In our study, we choose to analyze subscription and WTP decisions while taking into account the decision making process (simultaneous or sequential).



We use therefore limited dependent variable models (particularly, Tobit models) (Thomas, 2000)<sup>12</sup>. According to the nature of decision, we use a specific variant of the Tobit model: when subscription and WTP decisions are simultaneous, simple Tobit is adopted. In the opposite scenario, we opt for the generalized Tobit. Applying both models will allow a better understanding of the role of each explanatory variable.

### ***Simple censored Tobit : the case of simultaneous decisions***

Simple censored Tobit model (Tobin (1958)) aims to determine the variables that affect contribution effort under the assumption of simultaneous decisions:  $U_i^* = \beta X_i + \varepsilon_i$ , where:

$U_i^*$  is a latent variable expressing the share of the maximum contribution in an individual's (i) income.  $X_i$  is the vector of explanatory variables.  $\beta$  is the vector of coefficients associated with these variables.  $\varepsilon_i$  is the normally distributed error term (zero mean and constant variance  $\sigma^2$ ).

$Y_i$  the amount the individual  $i$  announces willing to pay:

$$Y_i = \begin{cases} X_i\beta + \varepsilon_i & \text{if } U_i^* > 0 \\ 0 & \text{if } U_i^* \leq 0 \end{cases}$$

Based on the observation of  $Y_i$  and  $X_i$ , generalized Tobit model allows the estimation of the parameters  $\beta$  and  $\sigma^2$ . Since, in this case, the contribution's share in the income ( $Y_i$ ) is either zero or positive, the likelihood function can be expressed as follows:

$$L(\beta, \sigma^2 / Y, X) = \prod_{Y_i=0} \left[ 1 - \Phi \left( \frac{X_i' \beta}{\sigma} \right) \right] \prod_{Y_i>0} \left[ \frac{\phi[(Y_i - X_i' \beta) / \sigma]}{\sigma} \right]$$

Where  $\Phi$  and  $\phi$  represent the distribution and density functions.

<sup>12</sup> Since the WTP (contribution amount) is a limited variable (only observed on the positive interval), we adopt limited dependent variables' models. In other words, we can't have negative contribution amounts. Even if it is not our endogenous variable, it will allow us to build our explained variable through calculating the share of contributions in the incomes of clients willing to pay.

**Generalized Tobit: the case of a sequential decision making process**

In this case, we analyze the decision to contribute and the weight of the contribution in the client's income under the hypothesis that the two decisions are made sequentially (Heckman, 1979).

The subscription decision could be approached in a first step by a dichotomous variable  $Y'_{1i}$ :

$$Y'_{1i} = \begin{cases} 1 & \text{If individual } i \text{ decides to subscribe.} \\ 0 & \text{If individual } i \text{ refuses to subscribe.} \end{cases}$$

Once the individual's decision expressed, we move to the second step and estimate the contribution's share in the income (for individuals  $i$  willing to pay):

$$Y'_{2i} = \begin{cases} Y'_{2i} & \text{If } Y'_{1i} = 1 \\ 0 & \text{If } Y'_{1i} = 0 \text{ (Non considered in this estimation)} \end{cases}$$

We point out also that  $Y'_{1i} = \beta_1 X_1 + \varepsilon_1$  et  $Y'_{2i} = \beta_2 X_2 + \varepsilon_2$

Where:  $X_1$  and  $X_2$  are the vectors of explanatory variables.  $\beta_1$  and  $\beta_2$ , are the parameters to be estimated, and  $\varepsilon_1$  and  $\varepsilon_2$  are the error terms distributed according to a bivariate normal distribution.

**Variables' selection methods in generalized Tobit model and Models' choice criterion***Variables' selection method in generalized Tobit Model*

According to Sartori (2003), the estimators of a generalized Tobit Model are not consistent if the two equations contain the same variables. The problem becomes more important with small samples. In literature, there are two solutions to improve the estimators:

The first one is to adopt a Sartori's estimator (Sartori, 2003). This estimator is used when the same variables are included in both steps. Sartori's estimator allows for the errors in both equations to be identical. In spite of improving the quality of the estimation (Allen *et al.*, 2012), Sartori's estimator does not help stating on the dependence of the two equations (since the errors are identical).

The second solution is based on the researcher's ability to formulate appropriate hypotheses in order to divide explanatory variables and affect each one of them to the corresponding equation. Consequently, information on a variable's double effect on both explained variables (subscription and WTP) could be lost. However, by choosing such a solution, the researcher has the capacity to conduct tests and decide which variable is most relevant for each equation.

The first procedure does not allow us to decide on the correlation between the two equations. In fact, if we opt for this solution, we will not be able to assess the decision making process and we will not be able to choose the most appropriate model to reflect subscription and WTP decisions. Thus, we are adopting in this work the second procedure.

We present in the next paragraph the criterion that will allow us to choose between the two models.

#### *Models' choice criterion*

Akaike (1973) and Schwarz (1978)'s criterion is the instrument used in literature to choose between generalized and simple censored Tobit models. It is a calculated indicator based on information provided by the likelihood function, if the generalized Tobit model is estimated by the maximization of that function. According to Akaike (1973), the best model is the one to which corresponds the lowest value. However, for non convergence reasons<sup>13</sup>, we chose a two stage method to estimate generalized Tobit. By adopting this technique, we will not obtain later a value for Akaike and Schwarz criterion.

To overcome this problem, we use as a criterion for comparison between the two models the inverse of Mills ratio: If it's insignificant, this would mean that the two decisions are independent. In other words, we can go to the second step without having to go through the first one. In this case, censored Tobit is considered as the best model to reflect the decision of the share of contribution in the income. In the opposite case, generalized Tobit will be preferred.

#### **Data used and descriptive statistics' teachings**

In addition to the source of the data used, we present in this section the precautions taken during its collection. We show also how we took into account the risk of biases that could be caused by the CVM during the construction of the questionnaire and the conduction of the survey. Thus, the processing we perform

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<sup>13</sup> We tried to estimate the model with the maximum likelihood, but had convergence issues. Wooldridge (2002) considers that this problem is usual when using this estimation method and also mentions that a two steps estimation is more robust than the maximum likelihood estimation.

on the data gives consistent results. Finally, we present the main results of the descriptive statistics.

### ***Source of the data and logic of construction***

The data used in this study comes from a survey conducted by the LASAARE in 2013 and deals with microcredit clients' repayment performances in a crisis context<sup>14</sup>. Questions were introduced in order to analyze the clients' demand in microinsurance services. The survey was carried out among 562 MCA's clients in Morocco<sup>15</sup>.

The survey involved 14 investigators and lasted six weeks. The field included three main areas covering rural and urban regions: Casablanca and regions, Rabat and regions and Fez and regions. The questionnaire was administered by Applied Econometrics master students at Hassan II University. For the purposes of the study, the sample was defined in order to have three categories of clients: active clients (currently client at their MCA), clients who left without problems (clients who have paid back their microcredit and have developed their activities) and clients who left with problems. These groups of clients represent accurately all the profiles that can be met in the microcredit population.

The first and the last question of the questionnaire deal respectively with the clients' demographic and socioeconomic characteristics (and their households') as well as specific microinsurance questions. The other sections include clients and their households' financial data (savings, indebtedness, etc.). The information collected at this level allowed us to measure control variables that will be used later in our estimations. A pilot survey was conducted among about forty clients and helped improve the questionnaire.

The interviews were conducted face to face. The investigators visited the clients at their homes or at their work places after being given the addresses by loan officers. The WTP declarations were collected directly (CVM). It was then necessary to correct the biases that could be caused by this method.

We show now how we proceeded in order to avoid such biases when conceiving the questionnaire and administering the survey.

Strategic bias: in order to avoid any strategic behaviors (and the risk of having wrong estimations of WTPs) due to clients' perception of the experience's consequences, many necessary measures were taken<sup>16</sup> :

Let's note that in 2013, a MCA (Al Amana) launched for the first time a microinsurance service destined to its clients in predefined pilot zones. The

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<sup>14</sup>The survey was part of a larger project « *Micro Finance in Crisis* », supported by EIB with the contribution of the LASAARE and Paris I university (IRD).

<sup>15</sup> The surveyed clients belong to the following MCAs: AMSSF and ATTAWFIQ Microfinance.

<sup>16</sup> The consequences of the experience are in fact related to the implementation of the project.

service provides transportation fee to the hospital and covers partially medical fees<sup>17</sup>.

The presence of this service on the market at the moment of the survey does not create a strategic bias. The reason is that its offer is limited only to Al Amana's clients. We consider therefore that the number of clients having information about this service is very low.

In order to ensure the strategic bias' perfect circumvention, we asked the interviewees to take into account their budgetary constraints when reporting their possible contributions. We previously explained (first section) that the WTP is a compensatory variation of the utility level that keeps the individuals at the same level of utility after its levy (Luchini, 2002). The question to assess WTPs was asked in the following way: How much will you be ready to pay monthly in order to have access to this service? (*Please take into account your current payment capacities*).

The complacency bias was avoided by asking an open question when evaluating the clients' WTPs. This ensured that there was no *orientation* or suggestions from the investigators that would have been considered as *correct responses* by the clients.

Moreover, besides the training that was provided to investigators, a conduct and guidance leaflet (usually distributed in the LASAARE's investigations) includes a note that reminds them of the need to stay perfectly neutral (See appendix 1). The same strategy was followed in order to avoid *the starting point* and *information* biases.

At the moment of the investigation, *hypothetical bias* risk seemed to be very low. Indeed, the surveyed population was aware of the purpose of such service: a large part of it was familiar with the RAMED, a public health program to which a part of the surveyed clients (the higher segment) had already access to. In the next paragraph, we describe the sample using descriptive statistics indicators.

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<sup>17</sup> This health microinsurance product (called *Al Amana assistance*) is different from the one we describe in the survey since the reimbursements it allows are limited and depend on the gravity of the pathology (See [www.alamana.org.ma](http://www.alamana.org.ma)). Our described service is more similar to the « Assurance Maladie Obligatoire (Amo) ». The idea behind our choice is to describe a product that can cover private health care services (at the opposite of the Ramed that only covers public services). See the guidance note presenting the characteristics of the described service (appendix 1).

**Global characteristics of the obtained sample****Table 1. Presentation of the variables and univariate statistics on the survey data**

Abbreviation	Definition of the variables	Mean or Proportion
Sexclt_M	Dummy variable=1 if the client is male, 0 otherwise.	0.38
Age_clt	Client's age, in years.	43.05
Study_years_number_clt	Number of succeeded years at school	4.95
Income_clt	Client's income	4,166.8
Marital_Status_Cj	Dummy variable = 1 if the client is married, 0 otherwise.	0.7331
Household_Savings	Total savings in the household.	15,488.43
Household_Size	Number of members in the client's household	4.83
Relationship-HH	Dummy variable = 1 if the client is the household head, 0 otherwise	0.548
Household_indebtedness	Share of total household debt in global income	3.589
Healthcare_dispo	Dummy variable= 1 if the client has a health care, 0 otherwise.	0.4555
Informalinsur_dispo	Dummy variable= 1 if the client has an informal insurance, 0 otherwise.	0.468
Subscription_healthMI	Dummy variable = 1 if the client accepts to join the health service microinsurance, 0 otherwise.	0.5847
Contribution_clt	The average amount of contribution declared by the clients (in MAD)	122
Contribution_effort	Share of the WTP amounts reported by the clients willing to subscribe in their incomes (in %)	3.87

We note that the average age of the surveyed clients is 43 years, the average monthly income is 4,167 MAD and the average size of their households is slightly less than five<sup>18</sup>. 73.31% of the clients are married. The proportion of women (62%) reflects the distribution characteristics of all the clients of both MCAs (one of them primarily targets women).

The clients' households' average savings attain 15,488 MAD; 46.8% of them have an informal insurance and 45.55% have a formal medical coverage.

58.47% are willing to join the described health microinsurance service and the average contribution is 122 MAD (table 1).

<sup>18</sup> The average household size of our sample is close to the national average household size (4.7 individuals per household in 2013. See: [www.hcp.ma](http://www.hcp.ma)). This confirms, on one aspect, the representativeness of the collected data.

## Explanation of the subscription and contribution effort decisions: discussion of econometric results

### *Implemented techniques and selected specifications*

We adopt two estimation methods. The first one apprehends the case where the two decisions (subscription and contribution effort) are made simultaneously. The second one takes into account the sequentiality of the two decisions<sup>19</sup>. The specifications we selected are adapted to these estimation methods. All the explanatory variables are included in the estimation with the simple Tobit.

In the generalized Tobit, we introduce different variables at each step. For example, in order to explain subscription we include the clients' marital status and their age. In the same vein, and in order to explain the contribution effort, we introduce the households' sizes. We choose to add also the nature of the income (seasonal or regular) to explain subscription and its level to explain the WTP effort<sup>20</sup>.

Hence the specifications for each situation are as follows:

Specification in the case of decisions taken simultaneously: use of the simple censored Tobit

$$\text{Effort}_{cotisation} = H(\text{Age}_{clt}, \text{Sex}_{clt\_M}, \text{Marital\_Status\_Sp}, \text{Relationship\_HH}, \text{Healthcare\_dispo}, \text{Informalinsur\_dispo}, \text{Household\_Size}, \text{Study\_years\_number\_clt}, \text{Income\_clt}, \text{Household\_savings}, \text{Household\_Indebtedness})$$

Two stage specification under the assumption of sequentiality : generalized Tobit

$$\text{Subscription} = F(\text{Age}_{clt}, \text{Sex}_{clt\_M}, \text{Marital\_Status\_Sp}, \text{Relationship\_HH}, \text{Healthcare\_dispo}, \text{Informalinsur\_dispo})$$

$$\text{Contribution\_Effort} = G(\text{Household\_Size}, \text{Study\_years\_number\_clt}, \text{Income\_clt}, \text{Household\_savings}, \text{Household\_Indebtedness}, \text{Inverse\_Mills\_Ratio})$$

<sup>19</sup> Let's remind here that the « the contribution effort » was captured by calculating the share that the contribution represents in the income. As we previously mentioned, and unlike previous works, we adopt a relative approach in order to analyze the amounts of the contributions (WTP efforts).

<sup>20</sup> The introduction of these variables in the first or second step of the estimation is justified by the teachings of descriptive statistics elaborated in the master thesis from which this article was obtained (See El Aida and El Kadiri, 2014). Bivariate statistics analyses allowed us to decide on the expected effects of every explanatory variable on the two endogenous variables (subscription and WTP effort).

**Table 2. Results of the estimations**

Variables	Generalized Tobit	Simple censored Tobit
	<i>1<sup>st</sup> step (Subscription)</i>	
Sexclt_M	-0.2518986 (-1.62) <sup>NS</sup>	-1.48 (-2.49)**
Age_clt	-0.001435 (-0.26) <sup>NS</sup>	-0.005 (-0.20) <sup>NS</sup>
Marital_status_Sp	0.33 (2.35)**	1.24 (2.20)**
Relationship_HH	0.23 (1.50) <sup>NS</sup>	0.45 (0.69) <sup>NS</sup>
Healthcare_dispo	-1.009 (-8.77)***	-3.50 (-6.35)***
Informalinsur_dispo	0.19 (1.67)*	0.60 (1.28) <sup>NS</sup>
Constant	0.40 (1.64) <sup>NS</sup>	1.83 (1.42) <sup>NS</sup>
	<i>2<sup>eme</sup> Etape (WTP effort)</i>	
Income_clt	-0.0004 (-5.06)***	-0.0003 (-3.49)***
Study_years_number_clt	0.126 (2.61)***	0.067 (1,08) <sup>NS</sup>
Household_Size	-0.082 (-0.72) <sup>NS</sup>	0.048 (0.37) <sup>NS</sup>
Household_savings	0.000024 (2,20)**	0.000018 (1,73)*
Household_Indebtedness	-0.046 (-3.49)***	-0.029 (-1.07) <sup>NS</sup>
Inverse_Mills_Ratio	-0.47 (-0.61) <sup>NS</sup>	
Constant	5.546 (6.13)***	
	<b><i>1<sup>st</sup> step : Probit</i></b>	F (11, 498) = 4.88
	Wald chi2(6) = 84.33	Prob > F = 0.0000
	Prob > chi2 = 0.0000	Likelihood log = -
	Likelihood log = -336.32542	1,019.0508
	Pseudo R2 = 0.1155	Pseudo R2 = 0.0334
	Pouvoir prédictif = 68,39%	
	<b><i>2<sup>nd</sup> step : Linear regression (OLS)</i></b>	
	F (6 ; 284) = 6.33	
	Prob > F = 0.0000	
	R <sup>2</sup> = 0.1580	
	Root MSE = 3.5274	

Notes: T-tests between brackets.

\* Significant coefficients at a 10 % threshold;

\*\* Significant coefficients at a 5 % threshold;

\*\*\* Significant coefficients at a 1 % threshold.

Source: Authors' estimations from survey data.



To ensure compliance with the hypothesis of non collinearity, we apply Belsley *et al.*'s test (1980). The test consists in computing a condition index of the independent variables matrix. If the value given by the test is 30 or more, there might be a collinearity problem. In our case, the value of the test was 10.66, indicating a low risk of collinearity.

For both regressions, we corrected heteroscedasticity to obtain robust standard deviations and consistent significance tests.

In the simple censored Tobit model, Fisher test is significant at a 1% threshold. The same result is obtained for the OLS estimation. Concerning the model related to the analysis of subscription (Probit), Wald statistic at 6 degrees of freedom is significant at 1%. This last model allows predicting 68.39% of the observations. The relatively low value of  $R^2$  (0.158) complies with the usual values obtained on individual data.

### ***Results' discussion : the impact of demographic, socioeconomic and financial variables***

The estimations show that there is a gender effect when it comes to subscribing for a health microinsurance service. Being a woman seems to increase significantly the share of the contribution in the income. In the case of sequential decisions, this modality seems statistically less significant but not considered without interest ( $t = - 1.62$ ). The position that women occupy in their households (ensuring the children's nutrition and health care) is verified here. We recall that in this study, interviewees are microcredit clients. When it's a woman generating revenues, she is more able to satisfy her ambitions and ensure the welfare of her household. Let's also note that this position increases her part in decision making process (Mourji, 2001).

These results corroborate Banthia *et al.* (2009): facing more frequent health problems and having less certain revenues due to their engagement in informal activities, women perceive better the risk of confronting health chocks.

Apparently, being married increases not only the propensity to subscribe ( $t= 2.35$ ) but also the share of the contribution ( $t= 2.20$ ). In the Moroccan society, living with a partner means being married, and marriage commonly aims to founding a family. The perspective of having children increases health risk aversion, which explains the stronger propensity to subscribe and sacrifice an important part of the income for a health microinsurance service.

The results show also the absence of impact of the household size variable in both estimations. It seems that this variable could act in two opposite ways. A first mechanism could reflect the fact that a larger household size implies a higher dependence rate (an important share of inactive persons: children and elderly people). This means that once all consumption needs are satisfied, few

means remain to subscribe for insurance. This explains the results of Mao (2000) and N'guessan (2008).

The second opposite mechanism would be that a large household is synonymous to an important number of active persons. Having more employed persons in the household facilitates subscription to health microinsurance. This justifies the results found by Bonan *et al.* (2012).

In many specifications tested on our data, this variable was insignificant. This means that the two effects neutralize each other conferring a statistically ambiguous role to the variable.

A similar heterogeneity would explain the insignificance of the interviewee's status in the household (his or her relationship with the household head). This result is analogous to the one emphasized by Lofgren *et al.* (2008).

The effect of demographic variables is therefore not stable. However socioeconomic variables' impact seems to be more net.

The results of the estimations reveal that an increase in the educational level impacts positively and significantly the contribution effort in the sequential decisions' process ( $t=2.61$ ). All things being equal, if we fix all the characteristics of two individuals  $i$  and  $j$ , the most educated is the most sensible to the role of microinsurance in a situation of health shock. This result is largely shared by the previously mentioned literature. In the case of simultaneous process, this variable appears to be insignificant ( $t=1.08$ ). This result is also underlined in other works (Giné *et al.*, 2008; Bonan *et al.*; 2012).

Income influences significantly and negatively the interviewees' contribution efforts in both estimations. In other words, the share of the contribution in the income decreases when the income increases. It seems that poor individuals are more vulnerable to health shocks, which makes them, compared to richer individuals; sacrifice a higher part of their revenues in order to have access to insurance.

This result is different from the ones emphasized in the studies dealing with the explanation of the amount of the contribution (WTPs). In absolute terms, the level of the contribution increases with the income (Mao, 2000; Dror *et al.*, 2006; Lofgren *et al.*, 2008; N'guessan, 2008; Makaudze *et al.*, 2011).

The importance of global savings in the household increases the interviewees' contribution effort. The explanation would be that the households who are concerned with savings are also the ones who encourage their family members to subscribe for health microinsurance.

The households' indebtedness reduces significantly the contribution efforts of the clients ( $t= -3.49$ ). This means that the clients take into account the global

utility of their households as well as their budgetary constraints when reporting the amounts of their contributions<sup>21</sup>.

The participation in informal insurance mechanisms increases significantly the propensity to subscribe for a health microinsurance service ( $t=1.67$ ), but does not impact the contribution effort. By making contributions to a family or a community member's care or death fees, the interviewees are expecting to be helped in the same way when such events occur to them. These practices, however, are often combined with some uncertainty about the behavior of community members. From this perspective the two strategies are complementary.

In the opposite, having access to a health care coverage reduces significantly the probability to subscribe for a health microinsurance service ( $t= -8.77$ ) as well as the contribution effort ( $t=-6.35$ ). All things being equal, individuals who don't have access to any kind of formal medical coverage are more interested in health microinsurance. And since it has been explained to them that the service will be offered by MCAs, they will see it as similar to the ones offered by formal or official health care coverage organisms. The two mechanisms seem to be substituting each other.

We separated RAMED and the other health care programs (CNSS, CNOPS, private insurance and other) in our regression trials, in order to better understand their effect on subscription. Both variables had the same significant and negative impact on subscription and WTP effort, in all the estimations<sup>22</sup>.

As announced in the paragraph dealing with the models' choice criterion, we use the information given by the inverse of Mills ratio. The results in table 2 show that the ratio is insignificant which means that the two equations are independent. We can say therefore that the simple censored Tobit model is more appropriate, in a statistical point of view, to reflect the individuals' behavior in terms of subscription and contribution efforts. However, we can't reduce the analysis of such behavior to only a statistical criterion. Hence the importance of having analyzed the results of the various estimations.

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<sup>21</sup> We introduced this variable for two reasons. The first one is to evaluate the effect of household indebtedness on the contribution effort and the second one is to verify the absence of the strategic bias. As we explained earlier, in order to control this bias, we asked interviewees to consider their budgetary constraints when reporting their WTPs. If unconsidered, it could result in an over or under estimation of the amounts of the contributions. See the paragraph dealing with the source of the data and the construction logic.

<sup>22</sup> Since they have the same effect on subscription and contribution effort, we decided to combine both variables and introduce a single one « health care disposal ». See the results of the simple and generalized Tobit models with the two modalities « Ramed » and « Access CNSS, Cnops, private insurance and other » (appendix 2).

## **Conclusions**

The attention paid to medical care system in Morocco is increasing. Authorities have engaged measures to encourage private firms to declare their employees (AMO). Public sector employees are also supposed to subscribe for public insurance services. Ramed completes the coverage system by targeting the poorest strata in the population (without access to the previous programs). Independent workers are the remaining layer that needs to be covered.

MCAs have a significant role to complete in this endeavor. Inclusive microfinance is not only limited to the offer of financing tools, but includes also providing diversified services like microinsurance.

The principal results of this study showed that microcredit clients are averse to health risks. It seems also that this population considers MCAs' future health microinsurance services as liable as the health coverage provided by official health care organisms.

The estimated coefficients show that the two services are substitutable. The perception is different when considering informal insurance mechanisms (more seen as complementary).

It appears also that savings and subscription behaviors are associated. More generally, subscription and contribution effort are constrained by financial variables (income and household indebtedness). Finally, the interviewees base their decisions on the collective utility of the households to which they belong.

At the methodological level, this work shows clearly that we can use and adapt the techniques developed by environment economists in order to apprehend economic agents' behavior toward the introduction of new services, like microinsurance in our case.

Finally, the models we use enable us to conduct complementary analyses.

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## **Appendices**

### ***Appendix 1***

The following note presents the characteristics of the health microinsurance service. Investigators must abide by the descriptions specified in the document when presenting the service to the interviewees.

Please explain to respondents that they must take into account their budgetary constraints when declaring their willingness to pay, if they decide to subscribe for this health microinsurance service. In other words, their other monthly expenses should remain at the same level they were before joining the program. Never give the respondents suggestions about the amounts to pay (WTPs):

“This microinsurance service allows you and your immediate family (spouse and children) to benefit from health coverage in case of illness/accidents requiring medical expenses including hospitalization.

The covered children should be under 21 years old, unemployed and unmarried. This age limit may be extended to 26 years old if evidence stating that children are still pursuing their studies is presented.”



**Appendix 2**

Variables	Generalized Tobit	Simple censored Tobit
	<i>1<sup>st</sup> step (Subscription)</i>	
Sexclt_M	-0.27 (-1.72)*	-1.58 (-2.66)***
Age_clt	-0.0009 (-0.17) <sup>NS</sup>	0.002 (0.08) <sup>NS</sup>
Marital_status_Sp	0.32 (2.26)**	1.16 (2.26)**
Relationship_HH	0.16 (1.02) <sup>NS</sup>	0.135 (0.21) <sup>NS</sup>
Ramed	-0.796 (-6.09)***	-2.44 (-4.16)***
Access_CNSS_Cnops_Privinsur	-1.36 (-8.36)***	-5.52 (-6.08)***
Informalinsur_dispo	0.177 (1.58) <sup>NS</sup>	0.6 (1.28) <sup>NS</sup>
Constant	0.44 (1.76)*	1.66 (1.30) <sup>NS</sup>
	<i>2<sup>nd</sup> step (WTP effort)</i>	
Income_clt	0.00002 (2.22)**	-0.0003 (-3.59)***
Study_years_number_clt	0.13 (2.68)***	0.1 (1.60) <sup>NS</sup>
Household_Size	-0.082 (-0.71) <sup>NS</sup>	.036 (0.28) <sup>NS</sup>
Household_savings	0.00002 (2.22)**	0.00002 (1.92)*
Household_Indebtedness	-0.045 (-3.44)***	-0.012 (-0.44) <sup>NS</sup>
Inverse_Mills_Ratio	-0.74 (-0.98) <sup>NS</sup>	
Constant	5.68 (6.39)***	
	<b><i>1<sup>st</sup> step : Probit</i></b> Wald chi2(7) = 90.18 Prob > chi2 = 0.0000 Likelihood log = -330.75 Pseudo R2 = 0.1301 Pouvoir prédictif = 68,39%	F (12, 497) = 4.83 Prob > F = 0.0000 Likelihood log = -1011.8528 Pseudo R2 = 0.0402
	<b><i>2<sup>nd</sup> step : Linear regression (OLS)</i></b> F (6 ; 284) = 6.37 Prob > F = 0,0000 R <sup>2</sup> = 0,1580 Root MSE = 3.5236	

Notes: T-tests between brackets.

\* Significant coefficients at a 10 % threshold;

\*\* Significant coefficients at a 5 % threshold;

\*\*\* Significant coefficients at a 1 % threshold.

NS Not significant

Source : Authors' estimations from survey data.