MACARTHUR NETWORK

LAKE NAIVASHA CONFERENCE

NAIROBI, KENYA

JUNE 04 – 07, 2005

SOCIAL WELFARE AND DEMAND FOR HEALTH CARE IN THE URBAN AREAS OF CÔTE D'IVOIRE

By:

Arsène KOUADIO
Vincent MONSAN
Mamadou GBONGUE

UNIVERSITY OF ABIDJAN-COCODY and C.I.R.E.S.

ABSTRACT[1]

This study looks at the relationship between insurance and demand for health care in the suburbs of Abidjan using a “Count Data” econometric model and a simultaneous equations model to establish the interdependence between demand the for insurance and the demand for health care in the face of uncertainty. The data on which this research is based were taken from a sample of 2,040 households that were interviewed as part of a survey called *"Recours aux soins et dépenses de santé ou PSA 92”* [Health care use and health expenses, or *PSA 92*] which was carried out in 1992 in Yopougon, a working class neighbourhood of Abidjan. The results show that the state of health and the anticipation of the choice of an insurance system appear to be the main important factors for the use of health care. Revenue, level of instruction, the relationship between the patient and the medical practitioner, and gender, all play an important role in the use of health care as well. In addition, the results indicate that consultation by a medical doctor is influenced by self-selection. The estimation of a simultaneous equations model confirms that there is a moral risk, manifested through seeking extra private insurance, in deciding to make use of health care services.

Classification JEL: I11, D81, D82.
Key words: Demand for health care, Insurance, Self -selection.

[1] This research was financed by AERC ; the document is a part from the final report (not revised) presented at the AERC BIANNUAL WORKSHOP, Nairobi, Intercontinental Hotel, May 28-June 03, 2005.

TABLE OF CONTENTS

LIST OF TABLES

I. BACKGROUND AND RESEARCH PROBLEM

Health is an essential need. People say it is the most valuable possession one can have; but it is an expensive one. It is because it both essential and expensive that public authorities, including the most liberal of them, are constantly engaged in actions to better the health sector. That is the case in Côte d'Ivoire, where the health policy is characterized by two ideological conceptions: a neo-liberal conception and a socialist one. The main lines of the evolution of this health policy highlight such a characterization.

The heath policy that was followed by the French colonial authorities was, according to Hours (1992), designed to maintain and develop the male population's productive strength in order to maximize output. The system rested on free health care and prevention. However, the same system worked differently depending on whether it was dealing with foreigners and African elites living in urban areas on the one hand, or with the rural population on the other: for the former, the policy was to offer medical care through hospitals, while for the latter the policy was mainly preventive (Brunet-Jailly, 1998). After independence (1960), the health policy still followed the guidelines set during the colonial period. For instance, most of the investment in the health sector has gone to the big urban hospitals, while the disparities, inherited from the colonial era, between basic medicine and medicine as practised in hospitals has persisted. Until the economic crisis of 1980, the aim was to equip the country with public health establishments of international standards. The issue of inequity against the poor and rural populations has been raised because of such a near-exclusive health care system, which has been followed by the majority of West-African countries.

At the international level, emphasis has been put on the need for restructuring the health systems in West Africa, to give priority to the development of primary health care. The Alma Ata Conference organised by the WHO and UNICEF in 1978 outlined new ambitious objectives, by defining health as global well-being, that is at the same time physical, mental and social, and by launching the slogan "Health for all in the year 2001". The will to reduce injustices between rural and urban populations, the elites and the masses, was one of the objectives of such a grand enterprise. The end of the 1970s was thus characterized by the will

to have a greater balance between the health system, the needs of the population and the resources of the country. In Côte d'Ivoire health care was free in principle in the 60s and 70s. In reality, though, the users of the health care system had to pay for a significant share of their health care expenses.

The economic crisis of the 1980s marked the beginning of a profound change in the organization of the health care system in the country. The crisis exposed, starkly, the limitations and weaknesses of the existing system. In the meantime, from 1980 to 1990, Côte d'Ivoire undertook a series of Structural Adjustment Programmes (SAPs) proposed by the World Bank and the International Monetary Fund. Tight control of public expenditure was one of the constraints imposed in the framework of these programmes. As part of this structural adjustment, the World Bank advocated the liberalization of the health sector and recommended saving up on costs. Payment for health care by its beneficiaries constituted an essential political response to the financial crisis which potential policyholders in many low-income countries were facing. It was an integral component of the political, neo-liberal macroeconomic policies proposed as part of the stabilization and structural adjustment programmes (Gilson et al. 1995).

The payment of the health care was not the only element of this new health policy proposed at the end of the 80s, though. The Bamako Initiative, launched in 1987 by the World Health Organization, UNICEF and the governments of West African countries, laid out the principles on which this re-orientation of the health policy was based. The policy aimed at enabling the majority of the people to have access to a minimum of health care through a restructuring of primary care services. It rested on a plan of action with three main pillars: the setting-up of a cost-saving system through having people pay for medical treatment, a policy of supplying generic medicines, and a system of resource management through community monitoring. The aim of such a re-organization of the health care system was two-fold: to find a solution to the financial constraints that plagued the system on the one hand, and, on the other hand, to offer solutions aimed at reducing problems in its management—problems essentially due to wastage and the mismanagement of existing resources.

Under the constraints of structural adjustment, today Côte d'Ivoire has no longer the resources for a generous health policy. A less interventionist policy is under implementation, under which cost-saving is done by having people pay for medical treatment. To make the policy

work, private community health centres have been set in Abidjan, the economic capital. In addition to the already existing public and private health centres, eight urban, community-based health units have been built since 1994, as part of a grand health scheme: the Abidjan health project. This confirms the policy of a liberal health care model based on individual contribution. At the same time, though, households have not been spared by the economic crisis either. After all, it renders poor entire sections of the population: in 1988, according to a World Bank report, 30% of the population of Côte d'Ivoire was poor, among whom 10% were extremely poor (Grootaert, 1993). Now, Côte d'Ivoire, once a welfare state, has become, in a few years, and under external pressure, the promoter of cost-saving, supplying generic medicines, and even setting-up community health centres (Brunet-Jailly, 1999). The deterioration of households' living conditions and the withdrawal of the public authorities from the health sector raise the acute issue of how to provide health care in Côte d'Ivoire.

The new health policy orientations seem to provide an answer to this question. Since the end of the 1990s, the idea of promoting a health insurance system and of expanding the health establishments network has been a major concern for the government (Koné, 2001). The extension of Côte d'Ivoire's health network was actually part of the ADB's Education/Health programme in the 1990s.

The new health policy aims at providing social security cover for health risks, as a direct consequence of the generalized cost-saving measures by charging fees for medical treatment and promoting private health care.

But in this new health policy, there are two divergent approaches in the strategy to implement an insurance system. The first claims to be cautious and progressive. "Cautious" in that its proponents want a locally based, mutual benefit insurance scheme, which would gradually become federative. "Progressive" because the initiative is first of all in its experimental phase, one which is necessary to put in place all the means of control over its future development. In line with this approach, the Ivorian government has encouraged the setting-up of private insurance companies in the country and, more significantly, has put in place institutions that have to see that done, namely the National Social Provident Fund *(CNPS)* and the General Mutual Insurance Company for Civil Service Employees (*MUGEFCI)*. But, so far, the government's efforts have borne much fruit. For instance, the vouchers issued by the Mutual Insurance Company are rarely accepted by dispensing chemists because of accumulated

unpaid arrears. Very often, despite paying social security contributions, people find themselves obliged to pay for total amount of the cost of medication. For its part, and according to the Ministry of Health and Social Security, the *CNPS* is unable to meet the needs of its members because of inadequate resources and lack of a strong organization (Ministère de la Santé et de la Protection Sociale, 1991). Furthermore, private insurance companies are not accessible to the populace because of the high cost of their benefits (ENSEA-DRSPS, 1992).

The other approach, which is currently a subject of debate, advocates a health insurance system called Universal Health Insurance *(AMU)* that guarantees to every person residing in Côte d'Ivoire health and maternity insurance cover. This system hinges on the principle of national solidarity which compels every beneficiary to pay a financial contribution. Insurance companies, mutual benefit insurance companies and provident funds societies will then offer a complementary insurance cover. This system has two schemes: the universal health insurance for the agricultural sector and the universal health insurance for all the other sectors. The former offers health and maternity insurance cover for people whose main activity is directly or indirectly linked to agriculture. These people become automatically affiliated to such a scheme. The latter offers health and maternity insurance cover to the rest of the people (Côte d'Ivoire, 2001). However, health risk insurance is still in an embryonic and uncertain state, a situation that is due to the difficulties encountered in its implementation. All this shows how social security is a major concern for the government of Côte d'Ivoire.

II. JUSTIFICATION OF THE STUDY

By way of response to this situation, the government of Côte d'Ivoire has set itself the objective of setting up a new system of reliable, free for all, social security, one that is capable of meeting the population's needs more effectively. For the time being, no definitive formula has been settled on. The experimentation in real conditions that was scheduled to take place in the centre-west and centre regions of the country has not been carried out yet. It was meant o be used as test case before the system was generalized to the entire country. It is clear, though, that such a project can only succeed if it is based one rigorous scientific studies. The present study was therefore designed to provide this now lacking quality information and to help the country's decision makers to make appropriate choices in relation to social security.

The real difficulties in the implementation of such a system are essentially linked to the lack of real studies on the feasibility of such a project.

The feasibility and experimental studies on health insurance in the [administrative] *départements* of Yamoussoukro and Daloa have not been carried out to completion. In fact, only household surveys have been carried out in these two localities, and for only for eleven days instead of the two months that would have been required. Those surveys covered 4,600 households spread fifty-fifty on the two localities (CEPRASS et al, 2001). The survey phase was separated from the experimental one, which has not yet taken place and is still planned to (CEPRASS et al, op. cit.). Evidently, there is no study yet that could serve as a reference for the viability of the Universal Health Insurance scheme.

The studies by KONE (2001) and Perrin (2001) analyse the impact of the policy of cost-saving on medical treatment on equitable access to health care. They show that this policy has greatly contributed to increasing the inequitable access to health care for the Abidjan suburbs residents since 1992.

However, none of the proposals made by the two studies seems to be related to the concern of the present study, namely to establish the relationship between the demand for health care (or the use of health care) and social security in Côte d'Ivoire.

III. AIM OF THE STUDY

The aim of our study is to bring out the link between insurance and demand for health care. More specifically, the study aims at answering the following question: *What types of medication does the population of Greater Abidjan make use of depending on whether they are beneficiaries of health insurance or not?* Our secondary concerns will bear on the difficulties that people encounter while trying to protect themselves, on non-insured people and the strategies that they use to receive modern health care.

IV. LITERATURE REVIEW

The review of the studies on the issue of demand for health care (or the use of health care) follows two approaches: one focussing on the demand for health care and the other on the provision of health care. But while the former issue has been widely researched, this has not been the case with the latter.

The demand-for-health-care approach analyses the therapeutic behaviour of potential policyholders with regard to the use of health care in the face of uncertainty (Arrow, 1963). This behaviour can be captured by an inter-temporal utility function whose arguments would be, among others, the state of health of the individual, the stakeholders' individual characteristics and the attributes of the medical expenses reimbursement system (insurance policy). The relevance of such an approach lies in the description of the health demand function derived from the intertemporal utility function.

Very few of the studies carried out in this area in Côte d'Ivoire have used this approach: most of the studies on health issues in this country have indeed focussed more on the provision of health care in relation to the notions of fairness, equity and efficacy than on the demand for health care.

Research by Perrin (2001) and Koné (2001) highlight the inequitable aspects of the health policy based on saving costs on medical treatment. Using a comparative study based on the standard of living, Perrin assesses the differential impact on the demand for a change in health care costs and some quality variables. Thus, improvement in the quality of health care influences more the behaviour of the rich than that of the poor, who are usually affected by an increase in prices.

KONE (op. cit.), using a socio-anthropological study based on data from a survey carried out in three Abidjan communes in 1998, looks at the determinants of the use of health care by the poor in the Urban Health Care Units *(FSU)* in the communes of Sagbé, Yopougon-Attié and Attécoubé-Centre. The quality of health care, the cost of services and the lack of social safety nets in the *FSUs* are the essential parameters for the use of health care by the poor. Although Koné's study admittedly is a good attempt at describing the use of health care, it says little on the nature of the expressed demand. Furthermore, it does not point out the importance of

taking into account a social security system in the use of health care. Its findings, especially regarding the description of the use of health care, corroborate those of the survey on living conditions, health care use and health expenses in the Yopougon commune carried out in 1992 (Projet Santé Abidjan, 1993), thus validating data collected five years earlier.

The analysis of questionnaires and results of the Household Living Conditions Surveys (*ECVM* 93, 95 and 98) conducted by the National Institute of Statistics *(INS)*—but which contain little information on health—shows that people's behaviour in terms of making use of health care did not really change between 1992 and 2001, as economic conditions did not improve since the crisis of the 1980s.

A tentative response to the nature of the relationship between social security and health care use appears in CEPRASS (1995). The central theme of the research was solidarity in health matters, since the access to health care is conditional upon the prior existence of mechanisms for reimbursing medical expenses. According to the CEPRASS study, it is advisable to have control over the non-state-controlled forms of solidarity by bringing into play only individual-to-individual or community-to-community relationships. The study sees the mutual insurance system as the collective mode that is most functional in the context of Côte d'Ivoire in terms of reimbursing medical expenses. In this connection, the study assesses the solidarity measures on which the population can depend in the prospect of having the health-related risks covered by a mutual insurance system. Furthermore, it highlights the constraints which any policy aimed at generalizing health insurance and social security cover in Côte d'Ivoire, like the Universal Health Insurance *(AMU)*, will be faced with. Two such constraints are the relatively low percentage of the salaried population in relation to the entire working population and the tight budget. Although this CEPRASS study describes social security institutions, it does not explain the link between the demand for health care and having a social security system. This is what our present study intends to explain.

V. RESEARCH HYPOTHESES

The moral risk influences the demand for health care services.

The control of such a risk by the promoters of the Universal Health Insurance *(AMU)* is, therefore, a determinant for the survival and development of this social security scheme.

VI. METHODOLOGY OF ANALYSIS

VI.1 Model for the demand for health care

VI.1.1. A theoretical model

The behaviour of a person who is likely to ask for health care is an economic and rational one. And being covered by a health insurance is a factor in the use of the health care scheme. In fact, one can logically expect that when a member of this scheme seeks to recover health, he/she takes into account of the services which he/she is entitled to by the social security system in use and does not simply aspire to all the health care services available. This behaviour raises the issue of the basic functions of a social security scheme, that is its capacity to largely cater for the expected and expressed demand for health care.

The present study is the first step of a vast research programme developed by the *CIRES*. The programme will lead to an estimation of the functions of insurance demand by the Ivorian population, both urban and rural and belonging to different socio-economic groups. These must be taken into account if a social security system meant to serve the entire national community is to succeed.

The economic model that will serve as a reference for the present study is that developed by Cameron et al. (1988), which shows the interdependence between the demand for insurance and the demand for health services in the face of uncertainty, a model that has already been applied in Australia.

In this model, we posit that there is a consumer with an inter-temporal utility function $U[C_0, C_1(s), H(e, s/A, B)]$ where C (respectively H) designates consumption (respectively health capital). We assume that U and H are increasing functions of their arguments. The 0 and 1 suffixes represent the current and future periods, respectively; s designates the state of health that is uncertain and on which depends the demand for health care, which itself is designated by e . A represents the vector of individual characteristics and B the vector of attributes of insurance policies. $H(e, s/A, B)$ is considered as a production function of the health of the consumer that is dependent upon e and s.

We assume that the state of health of the consumer is uncertain because at the time when he/she takes out an insurance cover, his/her future state is unknown. The state of health of the consumer follows a law that is conditional upon individual characteristics A which we will express as $\pi(s/A)$. The consumer can defer his /her consumption by buying sure financial assets α at P_a at return rate r, i.e. the interest rate. He/she consumes all his/her wealth while maximizing the expectation of his/her utility function. He/she takes into account the possibility that he/she will be able to take out an insurance cover or not.

The consumer's equation thus becomes:

$$\max_{(C_0, C_1, a, e)} E(U) = \int_s U(C_0, C_1(s), H(e, s/A, B))\, d\pi(s/A) + w_j \qquad (1)$$

under the constraints:

$Y_{oj} + P_j = Y_0$, $C_o(s) + a(s) = Y_{0j}$ et $C_1(s) + \overline{P}_j e(s) = Y_1 + (1+r)a(s)$

(1st constraint) $Y_{oj} + P_j = Y_0$: allocation of exogenous income Y_0 in buying insurance P_j and savings Y_{0j} at period 0.

(2nd constraint) $C_o(s) + a(s) = Y_{0j}$: the consumer chooses a contingent consumption and buys assets with Y_{0j} deposited at interest rate r.

(3rd constraint) $C_1(s) + \overline{P}_j e(s) = Y_1 + (1+r)a(s)$: at period 1, the budgetary balance is assured with contribution Y_1 (exogenous) for the consumption at that period $C_1(s)$ and the (net) consumption of health services, after deducting reimbursements due to disasters.

C_0, α, e, C_1 have to be satisfied for each value of s.

w_j is the error term on individual characteristics.

We assume that the direct utility function, which integrates risk, takes the following form:

$$U() = C_0 C_1^{\sigma+1} H(e/s, A, B)^{\sigma+1} \qquad (2)$$

where the constant $|\sigma|$ indicates the relative aversion to risk with $-1<\sigma<0$.

We further assume that the health production function is:

$$H(e/s, A, B) = \prod_k e_k^{\alpha_k(S,A,B)} \qquad (3)$$

where e_k designates the function of demand for health care service k.

It is shown, in this case (Cameron 1988), that the expectation for the demand for health care service No. k, conditional upon the choice of insurance j, is:

$$E[e_k(s/j)] = \exp[Z'\beta_k + \eta_{jk} D_j] \qquad (4)$$

where $\boldsymbol{Z}$ is the vector of individual characteristics

$\boldsymbol{B_k}$ the vector of the parameters related to health service No. *k*

$\boldsymbol{D_j}$ is the variable indicating the choice of insurance $\boldsymbol{j}$

$\boldsymbol{\eta_{jk}}$ is the parameter related to the rate of insurance cover.

The expectation for the demand for health service No. **k,** conditional upon choice of insurance *j*, is given by:

$$E[e_k(s)] = \exp\left(Z'\beta_k + \sum_{j=1}^{J} \eta_{jk} D_j + \varepsilon_k\right) \qquad (4')$$

This model was used for data collected in 1977-78 as part of the "*Australian Health Survey" (AHS);* they were collected by the *"Australian Bureau of Statistics" (ABS).* The survey covered 40,650 individuals and entire families. It should be recalled that since 1975 Australia has offered, to its entire population, a universal health insurance scheme, but with the possibility for each person to take out a complementary private insurance. The results of this study (see Cameron et al. 1988) show that, with regard to the demand for health care, in Australia the state of health is more important than having taken out some insurance policy, and that income is a greater determinant than the demand for health care in the choice of health insurance. The study reports that moral risk and adverse selection influence the use of health care through health insurance.

VI. 1. 2 The estimation method

In order to highlight the demand for health care in relation to individual characteristics, we will estimate the number of consultations (by physicians and healers), the number of hospitalisation days, etc., in relation to individual characteristics. To this effect, let us designate with y_i, for example, the number of consultations for individual No. i. Usually, for the estimation of models of this type, i.e. "count data models", the Poisson model is used. We then assume that y_i follows the Poisson law of parameter $\boldsymbol{\xi}_i$, i>0; this means that

$$P(Y_i = r) = e^{-\xi_i} \frac{(\xi)^r}{r!} \qquad (5)$$

where

r=0,1..., indicates the number of effective consultations

with ξ_i=exp [Z_i'B];

Z_i = the vector of individual characteristics, including the state of being insured or not, expressed by D_j;

B = the vector of unknown parameters.

In this case, the numbers of events occurring during two unconnected times are independent. This hypothesis has not been borne out in the present study. This is because the number of consultations at time two depends, necessarily, on the number of consultations at time one. In such cases (Cameron, 1986), it is advisable to use the negative binomial law of parameter γ_i>0, δ>0 defined by

$$P(Y_i = r) = \frac{\Gamma(\gamma_i + r)}{\Gamma(r+1)\Gamma(\gamma_i)} \left(\frac{\delta}{1+\delta}\right)^{\gamma_i} \left(\frac{1}{1+\delta}\right)^{r}, \quad r=0,1,2,..... \qquad (6)$$

where δ is a dispersion parameter and

γ_i = exp [Z_i'β] is related to individual No. i.

Here, contrary to the Poisson law, $E(Yi) \neq V(Yi)$

with $E(Y_i) = \frac{\gamma_i}{\delta}$

and $\mathrm{var}(y_i) = \gamma_i(1+\delta)/\delta^2$

When $\delta \to \infty$, we go back to the Poisson law; parameter δ enables us to measure the difference between the variance and the mathematical expectation.

This is flexibility that the negative binomial law offers, by allowing dispersion in the number of consultations, which dispersion is linked to interpersonal heterogeneity.

The second estimation method which we intend to use is the instrumental variables method, which highlights the demand for insurance. As we have already indicated in paragraph 6, the choice of insurance is based, in part, on the anticipated future use of health care. As a

consequence of this self-selection, the variables that indicate the choice of insurance in the demand for health care are endogenous.

By using the linear form of the function of the unconditional demand for insurance, namely:

$$e_{ik} = Z_i \beta_k + \sum_{j=1}^{J} \eta_{jk} D_{ij} + \varepsilon_{ik} \qquad (7)$$

and by allowing D_{ij} to be correlated with ε_{ik}, the equation (7) can be estimated using the instrumental variables approach, by designating $\hat{D}_{ij}$ as instruments of D_{ij}. This method is relatively more flexible in relation to the hypotheses on the structure of errors (Heckman, 1978; Amemiya, 1978; McFadden, 1984).

VI. 2 Risk management

VI.2.1. A two-equation model

Let us consider a consumer (Ricardo and Jaime, 2002), who is faced, ex ante, with uncertainty, given his state of health, characterized by parameter θ. His/her utility function is of the neo-classical type and takes the following form:

$$u = [c(\theta), y(\theta)] \qquad (8)$$

C designates the consumption of non-health goods, while Y is the health production and takes this form:

$$y(\theta) = g(X(\theta), \theta, P) \qquad (9)$$

where X and P represent health services expenses and individual characteristics, respectively.

The consumer is presented with the possibility of taking out insurance with a private company provided that he/she pays a voluntary premium $m(R)$, while continuing to enjoy the benefits of public health services for which he/she obligatorily pays a proportion (Ω) of his/her income considered as exogenous. *R* expresses the risk that the consumer represents. It is dependent on sex and age. The respective reimbursements from the government and the insurance company are $S(\theta)$, a lump sum, and α.

If the consumer is happy with just public services, his/her maximum utility is estimated using the indirect utility function:

$$V(I+S(\theta)-\Omega I, \theta, P) = U[I+S(\theta)-\Omega I - X(I+S(\theta)-\Omega I, \theta, P), g(X(I+S(\theta)-\Omega I, \theta, P))] \qquad (10)$$

with X being defined as follows:

$$X = X\left(I + S(\theta) - \Omega I, \theta, P\right) \qquad (11).$$

The consumer considers also that complementary private insurance generates the following utility:

$$V\left[(1-\Omega)I - m(R), \alpha, \theta, P\right] = U\left[(1-\Omega)I - m(R) - (1-\alpha)X\left((1-\Omega)I - m(R), \alpha, \theta, P\right), g\left((1-\Omega)I - m(R), \alpha, \theta, P\right)\right] \quad (12)$$

Similarly to equation (11), the demand for health services that follows the choice of complementary private insurance will be written as:

$$X = X\left((1-\Omega)I - m(R), \alpha, \theta, P\right) \qquad (13)$$

Given that the consumer is already paying for a compulsory social security scheme, he/she will subscribe to another insurance policy only if his/her overall welfare improves by:

$$\Delta V\left(I, R, \alpha, \Omega, P\right) = \int_{\theta_0}^{\theta_1} V\left[(1-\Omega)I - m(R), \alpha, \theta, P\right] dF(\theta) - \int_{\theta_0}^{\theta_1} V\left[I + S(\theta) - \Omega I, \theta, P\right] dF(\theta) \qquad (14)$$

with ΔV being positive, even though not directly observable.

In a context of lack of coherent information and of uncertainty, it is important to understand the source of deviant behaviours on the part of the beneficiaries of private insurance in order to minimize the costs which the insurers will have to incur by way of reimbursements to policyholders.

Those behaviours, which can generally be explained by the self-selection of stakeholders, are identified through adverse selection and moral risk. In this context, the definition of insurance and co-insurance premiums can influence the intensive use or otherwise of health care services.

If we consider all these elements, then the use of a simultaneous equations model is justified, a model in which the demand for private insurance and the demand for health services are endogenous.

Thus, the demand for insurance motivated by the positive value of ΔV, in the preceding equation, can be expressed by the following equation:

$$\Delta V_i = \delta_1 HS_i + Z_{1i}\beta_1 + \mu_{1i} \qquad (15)$$

where HS_i is the demand for health care services, Z_{1i} is the vector of the other variables that determine the choice of private insurance, δ_1 and β_1 are the parameters to be estimated and μ_{1i} is the error term.

By considering, in equation (13), health expenses in the context of complementary private insurance, one can express the demand for health services as follows:

$$HS_i = \delta_2 \Delta V_i + Z_{2i}\beta_2 + \mu_{2i} \qquad (16)$$

VI. 2. 2 Estimation methods

The empirical form of the system of the equations for the demand for insurance and health services (equations 15 and 16) is the following:

$$\begin{cases} PRIVATEINSUR_i = \delta_1 USE_i + X_{1i}\beta_1 + \mu_{1i} \\ USE_i = \delta_2 PRIVATEINSUR_i + X_{2i}\beta_2 + \mu_{2i} \end{cases} \qquad (17)$$

as the variable indicating the subscription to a private insurance system is discrete (dichotomous); see Madala (1983, Chap. 8).

In this specification, the probability of taking out private insurance is affected by the required level of health services *(USE)* and by a set of exogenous variables *X1*. Likewise, the fact that one has taken out private insurance and a set of exogenous variables *X2* influence the demand for health services.

The estimation procedure is done in two steps (Madala, op. cit.). It first requires putting equation (17) into its reduced form, as in equation (18):

$$\begin{cases} PRIVATEINSUR_i = \Pi_1 X + \nu_{1i} \\ USE_i = \Pi_2 X + \nu_{2i} \end{cases} \qquad (18)$$

where X comprises all the exogenous variables X_1 and X_2. Since $PRIVATEINSUR_i$ is not observed directly (see equation 14), we can only estimate Π_1 / σ_1, where $\sigma_1^2 = Var(\nu_1)$. Thus, the first equation of the reduced form becomes:

$$PRIVATEINSUR_i^* = \frac{PRIVATEINSUR_1}{\sigma_1} = \frac{\Pi_1}{\sigma_1} X + \frac{\nu_1}{\sigma_1} = \Pi_1^* X + \nu_1^* \qquad (19)$$

If we take equations (18) and (19) into account, equation (17) becomes equation (20):

$$\begin{cases} PRIVATEINSUR^{*} = \dfrac{\delta_1}{\sigma_1} USE + X_1 \dfrac{\beta_1}{\sigma_1} + \dfrac{\mu_1}{\sigma_1} \\ USE = \delta_2 \sigma_1 PRIVATEINSUR^{*} + X_2 \beta_2 + \mu_2 \end{cases} \qquad (20)$$

The first step of the estimation procedure consists in estimating Π_2 by the OLSs and Π_1^* by the probit model-ML. The second consists in estimating the second equation in (20) by the OLSs after having replaced $\Pi_1^* X$ by *PRIVATEINSUR** and the first equation in (20) by the probit model-ML after replacing $\Pi_2 X$ by *USE* . The parameters to be estimated in this model are:

$$\frac{\delta_1}{\sigma_1}, \delta_2 \sigma_1, \frac{\beta_1}{\sigma_1}, \beta_2 \quad and \quad \frac{1}{\sigma_1}$$

VI. 3. Source of data

The main source of the data used in the present study is the survey called "*Recours aux soins et dépenses de santé ou PSA92"* [Health care use and health expenses, or *PSA92*] which was carried out in April and May 1992 in Yopougon, a working class neighbourhood of Abidjan. It was carried out by *ENSEA* (under the supervision of *ORSTOM* with funding from the French Cooperation).[2].We had to use these data for two reasons: first, because of the insufficiency of the data collected on health care use by the National Institute of Statistics *(INS)* (in 1993, 1995 and 1998) and of those collected as part of the other studies we have mentioned previously; second, because of the multifaceted nature of the variable which our model centres on, namely the insurance system. The object of our present study is indeed to understand the nature of the relationship between the insurance system chosen and the use of health care. A comparison of the data bases set up between 1992 and 2001 on health issues in Côte d'Ivoire shows that only the 1992 data perfectly describe all the existing options of the insurance system (whether associative or not, whether formal or informal).

During the 1992 survey, 7,217 people from 2,040 households were interviewed. It had two objectives: one, to describe the use of health care and health expenses by the population of the

[2] *ENSEA : Ecole Nationale Supérieure de la Statistique et de l'Économie Appliquée* (: National Higher Institute of Statistics and Applied Economics)
ORSTOM : Office de Recherche Scientifique d'Outre-mer (: Overseas Office for Scientific Research)

Yopougon commune; two, to relate health expenses to indicators of households' living standards. The 1988 census was used a basis for the survey.

From the 1992 survey, our study analysed data from 4,163 individuals.

It is the sole study, to date, which enabled researchers to describe the use of medical care by pointing out, for every episode of the illness that occurred during the period of the survey, the details of the stages followed by the patients in seeking and using medical care.

For each stage, information was collected on the expenses that might patients may have incurred while being diagnosed or when buying the prescribed medication or both.

VI. 4 Description of entry variables in our model

The analysis of the interdependence of the relation between the demand for health care and the demand for a health insurance policy rests on a number of variables that indicate the degree of choice of insurance or of use of health care.

VI.4.1. Indicators of the use of health care

The indicators of the use of health care – not to be confused with those of access to health care, which indicate the degree at which an individual needs basic health care – indicate the demand for health care. From Cameron et al. (1984; 1988), Piaser and Raynaud (2002), and *PNDS* (1996)[3] on the one hand, and from specific information contained in the *PSA 92* data base on the other, we have extracted the indicators of the use of health care, which are given in Table 1 below.

[3] *PNDS : Plan National de Développement Sanitaire* (: National Plan for Health Development)

Table 1: The variables of health care use as defined in the *PSA 92* data

Variable	*Definition of the variable*
CONMED	Number of consultations done by a medical doctor
CONTRADI	Number of consultations by a traditional healer
CONMODERN	Number of consultations by a modern health official
CONNONMED	Number of consultations by a health official who is not a doctor
DURHOSP	Number of hospitalisation days

From the variables CONMED, CONMODERN, DURHOSP, one overall indicator of the use of health services, called "USE", was later calculated using the Principal Component analysis method.

Table 2 below shows the distribution of the rate at which these variables influence the use of health care.

Table 2: Distribution (in %) of the intensity of the health care use variables

	Variable				
Number of uses (X=n)	CONMED (N= 1729)[a]	CONTRADI (N= 1729)	CONMODERN (N= 1729)	DURHOSP (N= 1729)	CONNONMED (N= 1729)
0	60.09	87.00	33.56	94.17	69.64
1	33.37[4]	12.13[5]	53.67[6]	1.04[7]	26.26
2	5.38	0.75	9.65	0.64	3.30
3	0.98	0.12	2.31	0.75	0.69
4	0.93		0.64	0.23	0.06
5	0.17		0.12	0.23	0.06
6	0.06		0.06	0.23	
7				0.81	
8				0.12	
10				0.35	
>10				0.01	
Mean	0.520	0.1399	0.834	0.1826	0.3517
SD	0.580	0.0222	0.450	0.934	0.1296

Source: Authors' computations

a) : N: population size

NB: Total observations = 4,163

[4] Proportion of individuals who went for a medical doctor's consultation once
[5] Proportion of individuals who went for a traditional healer's consultation once
[6] Proportion of individuals who were admitted at a health centre once
[7] Proportion of individuals who were hospitalised for a day

VI.4.2 Typical insurance variables

The insurance variables that reflect the health risk cover from the *PSA 92* data are defined in a binary form in the table below.

Table 3: Definitions of typical insurance variables

Variable	*Definition*
NONINSUR	This takes the value 1 if the surveyed person is not insured, that is neither a mutual insurance nor a private insurance company; it takes the value 0 otherwise
MUTUALINSUR	Mutual Medical Insurance: it takes the value 1 if the surveyed person is a beneficiary of it; it takes the value 0 otherwise
PRIVATEINSUR	Private Medical Insurance: it takes the value 1 if the surveyed person is a beneficiary of it; it takes the value 0 otherwise
MUTUALAID	Organised system of mutual aid: it takes the value 1 if the surveyed person belongs to such a system; it takes the value 0 otherwise

The distribution of these types of insurance in relation to sex, age group and income is given in the following tables:

Table 4: Distribution of individuals by type of insurance in relation to sex

	Type of insurance					
Sex	MUTUALINSUR		PRIVATEINSUR		MUTUALAID	
Male	338[a]	(75.28)[b]	264	(83.02)	936	(68.47)
Female	111	(24.72)	54	(16.98)	431	(31.53)
Total	449		318		1367	

Source: Authors' computations

a: Absolute frequency of individuals

b: Proportion in percentage in parentheses

Table 4 reveals that males are more covered by health insurance, of whatever type, than females. The most used insurance type is that of organized mutual aid; the second most used is the mutual benefit insurance system operated by civil servants, since it is compulsory for them. These findings are identical with those revealed by Koné (2001), Perrin (2001), CEPRASS (1995) and CEPRASS et al. (2001). The Koné and CEPRASS studies looked at the patients' behaviour vis-à-vis the use of health care at the urban health units of Abobo and Yopougon (for the former), and at solidarity in health-related issues using survey data collected from Daloa and Yamoussoukro for the latter. The studies showed for instance that the spirit of solidarity among the different grassroots (ethnic, economic and religious)

communities was the best shared (by about 38% of the people interviewed) with regard to the use of health care. The mutual benefit insurance system, which primarily concerns civil servants, came second, with 22% of health care insurance cover. The distribution by sex of the different insurance systems which was revealed by the *PSA 92* survey is reflection of that at the national level, according to Koné (op. cit.) and CEPRASS et al. (op. cit.).

Table 5a: Distribution of individuals by type of insurance in relation to revenue category

	Revenue category						
Insurance type	R<SMIG	SMIG<R<100	100<R<200	200<R<300	300<R<500	500<R<800	800<R
NONINSUR	2,526	530[a]	232	63	31	10	6
	(95.25)	(77.37)[b]	(42.49)	(35.39)	(41.89)	(52.63)	(50.00)
MUTUALINSUR	89	113	167	58	18	3	2
	(3.36)	(16.50)	(30.59)	(32.58)	(24.32)	(15.79)	(16.67)
PRIVATEINSUR	37	42	147	57	25	6	4
	(1.40)	(6.13)	(26.92)	(32.02)	(33.78)	(31.58)	(33.33)
MUTUALAID	639	287	290	96	40	13	4
	(24.10)	(41.90)	(53.11)	(53.93)	(54.05)	(68.42)	(33.33)

Source : Authors' computations

a: Absolute frequency of individuals

b: Proportion in percentage in parentheses

SMIG = CFAF 55,000 *(Salaire minimum interprofessionnel garanti*: Guaranteed minimum wage)

Table 5b: Distribution of individuals by revenue category (in thousands of CFAF) and by type of insurance

	Type of insurance							
Revenue category	NONINSUR		MUTUALINSUR		PRIVATEINSUR		MUTUALAID	
R<SMIG	2,526		89[a]	(19.78)[b]	37	(11.64)	639	(46.68)
	(74.34)							
SMIG<R<100	530		113	(25.11)	42	(13.21)	287	(20.96)
	(15.60)							
100<R<200	232	(6.83)	167	(37.11)	147	(46.23)	290	(21.18)
200<R<300	63	(1.85)	58	(12.89)	57	(17.92)	96	(7.01)
300<R<500	31	(0.91)	18	(4.00)	25	(7.86)	40	(2.92)
500<R<800	10	(0.29)	3	(0.67)	6	(1.89)	13	(0.95)
800<R	6	(0.18)	2	(0.04)	4	(1.26)	4	(0.29)
Total of individuals	3398		450		318		1369	

Source: Authors' computations

a: Absolute frequency of individuals

b: Proportion in percentage in parentheses

The results in Table 5a and Table 5b indicate that the proportion of non-insured individuals (modern insurance) is significant irrespective of the revenue category. It looks even more significant for those with low income. The tables show also that the proportion of the beneficiaries of the mutual aid system decreases in line with income level. The

100000<R<200000 category has the highest proportion of individuals with an insurance cover (of whatever type). Finally, the tables reveal that a significant proportion of individuals whose revenue is lower than the *SMIG* make use of the organised mutual aid system.

Table 6: Distribution of individuals by age group and by type of insurance

	Type of insurance					
Age group	NONINSUR		MUTUALINSUR	PRIVATEINSUR		MUTUALAID
0 – 15	101	(2.97)	1[a] (0.22)[b]	0	(0.00)	8 (0.58)
16 – 30	1,635	(48.16)	51 (11.33)	34	(10.69)	352 (25.71)
31 – 60	1,338	(39.41)	328 (72.89)	243	(76.42)	821 (59.97)
61 and above	321	(9.46)	70 (15.56)	41	(12.89)	188 (13.73)
Total	3,395		450	318		1,369

Source: Authors' computations

a: Absolute frequency of individuals

b: Proportion in percentage in parentheses

Table 6 shows a relatively low level of insurance cover by individuals in the 16-30 years age group. These people are, however, well represented in the organised mutual aid system. In addition, senior citizens (61 years and above) more insured than those aged below 30 years, except in the case of the mutual aid system. Finally, insurance cover, irrespective of which type, is highest for the 31-60 years age group.

VI.4.3 The explanatory variables in our model

According to Cameron et al. (1988), explanatory variables be grouped into two categories:

- those describing the socio-economic characteristics of the surveyed households, and
- those describing the state of health.

All these variables are listed in Table 7 in accordance with the *PSA 92* data.

Table 7: Definitions of the explanatory variables in the model

Socio-economic variable	*Definition*
SEX	0 if male and 1 if female
AGE (A)	0 si A<15 ans ; 1 si 15<A<30 ; 2 si 30<A<45 ; 3 si 45<A<60 et 4 si 60<A
MARITSTATUS	Marital status. 1 if single; 2 if divorced; 3 if married; 4 if cohabitation; 5 if widowed
ETHNIC GROUP	0 if Akan; 1 if Mandé; 2 if Krou; 3 if Voltaic; 4 if foreign nationality
RELIGION	0 if no religion; 1 if Muslim; 2 if Christian
EDUCATION	Level of instruction: 0 if no instruction; 1 if primary; 2 if secondary; 4 if tertiary, and 5 if Koran school
REVENUE (R)	Revenue category in CFA francs. 0 if R<SMIG; 1 if SMIG<R<100000; 2 if 100000<R<200000; 3 if 200000<R<300000; 4 if 300000<R<500000; 5 if 500000<R<800000; 6 if R>800 000
MDIST	Average distance from the patient's house to the medical consultation centre
RELATION	Relation between patient and health official: it takes the value 0 if there is no relation between them, and 1 if there is some.
State of health variable	*Definition*
CHRONICAS	Number of cases of chronic illness
NUMBILL	Number of episodes of illness
DURILL	Duration of illness
MEDICCONS	Type of medical official people went to for consultation in the last two months: 1 if doctor; 2 if nurse; 3 if midwife; 4 if nursing auxiliary; 5 if other.

VII. RESUTLS OF THE ESTIMATION

VII.1. Results of the estimation of the negative binomial model

For the variables CONMED, CONMODERN, CONTRAD and CONNONMED, The Poisson model has been used (dispersion parameter = 0, using the negative binomial law estimation).

The results are summarized in Table 8 below.

Table 8: Results of the estimation of the health care use equations (N = 1,339)

	DURHOSP	CONMED	CONMODERN	CONTRAD	CONNONMED
Constant	-9.1648	-2.8701	-1.1909	-0.7355	-1.3777
	(0.0828)[a*]	(0.0003)***	(0.0432)**	(0.6669)	(0.2284)
SEX	-1.1138	-0.0882	-0.0715	0.1675	-0.1142
	(0.0174)**	(0.2817)	(0.2488)	(0.3835)	(0.2284)
LAGE[C]	2.0936	0.5039	0.1348	-0.4600	-0.0652
	(0.1148)	(0.0142)**	(0.3765)	(0.2987)	(0.8247)
REVENUE	0.0015	0.0006	0.0002	-0.0020	-0.0019
	(0.6303)	(0.0031)***	(0.4061)	(0.1304)	(0.0402)**
RELATION	-0.1985	0.0972	0.1679	1.1233	0.3750
	(0.8160)	(0.5056)	(0.1161)	(0.0001)***	(0.0622)*
MDIST	0.0122	0.0023	0.0016	-0.0048	-0.0045
	(0.4594)	(0.0018)***	(0.0196)**	(0.4808)	(0.3715)
DURILL	0.0218	0.0039	0.0024	0.0048	-0.0011
	(0.0007)***	(0.0001)***	(0.0001)***	(0.0001)***	(0.3667)
NUMBILL	-0.4164	0.2672	0.3841	0.3485	0.5387
	(0.4594)	(0.0018)***	(0.0001)***	(0.0048)**	(0.0001)***
INSURANCE[d]	-0.2884	0.4312	0.1588	-0.1468	-0.2569
	(0.7280)	(0.0001)***	(0.0811)*	(0.5504)	(0.1390)
MUTUALAID	0.0004	0.1352	0.1155	0.1262	0.0879
	(0.9992)	(0.0813)*	(0.0524)*	(0.4818)	(0.4773)
-log (l)	1794.4163	1062.6749	1251.0554	340.3369	537.2359
$\chi(2)^{2b}$	0.7934	16.5696**	4.3878	0.7938	2.6142
$1/\delta^{e}$	46.5752	00.00****	00.00****	00.00****	00.00****

Notes:
(a) p-value between parentheses
(b) Joint significance test for insurance dummy variables
(c) Logarithm for the age variable
(d) The INSURANCE variable covers both private and mutual insurance
(e) This value is estimated only for the DURHOSP variable
* Significant at the 10% level
** Significant at the 5% level
*** Significant at the 1% level
**** The Poisson law has been used here. It is a sub-model of the negative binomial law (using the likelihood ratio test)

Source: Authors' computations

A number of observations can be made by analysing the results of the estimation of the health care use equations using the negative binomial and Poisson models in the table above. The use of health care is little influenced by socio-economic characteristics such as SEX, AGE, REVENUE, MDIST and RELATION. It should be noted, though, that sex significantly influences the duration of hospitalisation—with females staying longer than males on the hospital bed. The number of consultations by a medical doctor increases with revenue and age. Overall, the socio-economic variables have little influence on the number of

consultations by a health official. The number of consultations by a medical doctor increases with distance. This can be explained by the fact that health centres with a medical doctor are located far away.

The RELATION variable positively influences the consultation by a traditional healer and a health official who is not a doctor.

Health state indicators are, overall, more statistically significant than socio-economic variables in accounting for the behaviour related to the use of health care. The variables DURILL and NUMBILL, which have to do with the state of health, positively influence almost all the indicators of the use of health care.

The “type of insurance” variables are, overall, less statistically significant than the indicators of the state of health in accounting for the use of health care. Only the “organised system of mutual aid” variable positively influences (at the 10% level) the CONMED and CONMODERN variables. Modern insurance (mutual benefit or private insurance) is not significant vis-à-vis the use of health care. This can be explained by two things: one, the low level of cover offered by either type of insurance (for example the mutual insurance reimburses only medication and not consultation); two, the low proportion of insured individuals in the sample. That the mutual aid system is significant as a variable influencing the use of health care is quite understandable: after all, it is a system that expresses the solidarity of African communities and families in the face of the vicissitudes of life (which go with death, weddings, illnesses, farming, etc.) In general, it is this kind of solidarity, manifested through contributions and various donations, that enables the sick in the community to settle health bills, in particular consultation and hospitalisation fees.

The analysis of the data from the Household Living Standards Survey *(ENV)* conducted in 2002 by the National Institute of Statistics *(INS)* shows that the modern insurance systems (mutual benefit or private insurance) influence the use of health care by only 3.8%; they mostly influence the choice to go for consultations (*INS*, 2003).

The result of the $\chi^2(2)$ test (in the second line from the bottom in the table above) for insurance dummy variables is significant (at the 5% level) in the equation of the number of

consultations by a medical doctor. This means that the effects of the various insurance systems are more important for medical doctor consultations when aggregated than when disaggregated.

The estimation of the health care use equations using the negative binomial model and the Poisson model enables us to understand the demand, from individuals, for health care. It shows that the individuals' state of health is more important in the demand for health care services than being an insurance policy holder and having a source of revenue.

VII.2 Results of the estimation of the instrumental variables method

The instrumental variables method describes a model for the demand for insurance. This model suggests that the choice of type of insurance is based, in part, on the anticipated future use of health care services. As already mentioned previously, this self-selection causes the dummy variables related to types of insurance to be endogenous in the equation of health care use.

The approach consists in replacing, in the equation (7), D_{ij} by $\hat{D}_{ij}$, taken as instruments. A discrete choice model of insurance types is then estimated to obtain the instruments. This model could be a Probit model, a Logit model or a linear probability model. To generate the instruments for the two types of insurance we have studied (viz. the mutual aid (MUTUALAID) system and insurance (INSURANCE)—with two options: "insured" and "not insured"—we have used the Logit model. And the results of the Logit estimation are summarized in Table 9 below.

Table 9: Results of the Logit equation estimation for the choice of type of insurance

Explanatory variables	Mutual aid system (MUTUALAID)	Modern insurance system (with INSURED = 1 and NONINSUR = 0)
Sex (male)	0.11 (0.39)[a]	-0.30 (0.085)*
Ethnic group (Ethgr.)		
* Akan	0.18 (0.55)	-0.22 (0.577)
* Foreigner	0.24 (0.44)	1.39 (0.007)***
* Krou	0.16 (0.60)	0.39 (0.409)
* Mandé	0.36 (0.22)	-0.16 (0.680)
* Voltaic	-	-
Religion (relig.)		
* Christian	-0.14 (0.37)	-0.16 (0.400)
* Muslim	-0.57 (0.004)***	0.81 (0.005)***
* No religion	-	-
Marital status (Marstat.)		
* Single	-1.12 (0.016)**	1.47 (0.015)**
* Divorced	-0.21 (0.708)	0.57 (0.435)
* Married	-0.48 (0.287)	0.45 (0.444)
* Cohabitation	-0.75 (0.126)	0.51 (0.412)
* Widowed	-	-
Level of instruction (LEVINST)		
* LEVINST 0	0.42 (0.306)	-21.24 (0.001)***
* LEVINST 1	0.91 (0.065)*	-22.37 (0.001)***
* LEVINST 2	0.63 (0.127)	-22.36 (0.001)***
* LEVINST 3	0.94 (0.021)**	-23.74 (0.001)***
* LEVINST 4	0.96 (0.030)**	-24.15 (.)
* LEVINST 5	-	-
Relation	0.39 (0.089)*	-0.06 (0.851)
Revenue (Rev.)	0.0002 (0.636)	-0.002 (0.0008)***
Duration of illness (Durill)	-0.001 (0.123)	-0.0003 (0.817)
Number of illnesses (Numbill)	0.11 (0.308)	-0.12 (0.425)
Hospitalisation (Hospit[8])	0.11 (0.648)	-0.48 (0.085)*
Constant	-0.64 (0.360)	24.17 (0.001)***
LOG-LIKELIHOOD	-873.19	-560.27

Note: (a) p-value in parentheses
* significant at the 10% level
** significant at the 5% level
*** significant at the 1% level

Source: Authors' computations

The results of the Logit estimation indicate that, generally speaking, the variables having to do with the state of health (viz. DURILL, NUMBILL, HOSPIT) play a minor role in

[8] Hospit: number of times when the individual was hospitalised

predicting the choice of type of insurance. With the exception of the HOSPIT variable, which is significantly related to the insurance variable (NONINSUR), these variables are not significant. For their part, the socio-economic characteristics, particularly the level of instruction, do play an important role in the prediction. It should also be noted that the higher the revenue is, the higher the probability of taking out an insurance policy is.

The MUTUALAIDP and NONINSURP variables, estimated using the Logit model and considered as instruments for the dummy variables MUTUALAID and NONINSUR, will be used in the equations of use health care services. The approach is interesting because it enables us to understand the importance of predicting the choice of an insurance system in the use of health care. The equations of health care use are re-estimated by using the instruments in the negative binomial model. The results are summarized in Table 10 below.

Table 10: Equations of the use of health care services re-estimated using the instrumental variable estimates (N = 1,339)[a]

	DURHOSP	CONMED	CONMODERN	CONTRAD	CONNONMED
Constant	-6.925	-1.108	-0.599	0.2731	-1.3246
	(0.127)	(0.0001)***	(0.0004)***	(0.8752)	(0.2503)
SEX	-1.130	-0.140	-0.095	0.0974	-0.1129
	(0.0171)**	(0.0938)*	(0.1336)	(0.6218)	(0.3853)
REVENUE	0.0004	0.0005	0.0002	-0.0034	-0.0018
	(0.8887)	(0.0118)**	(0.4695)	(0.0243)**	(0.0672)*
RELATION	-0.2701	0.0623	0.148	1.0422	0.3981
	(0.7573)	(0.6713)	(0.1673)	(0.0001)***	(0.0495)**
LAGE[b]	1.867	0.011	0.0028	-0.5495	-0.0919
	(0.1126)	(0.0101)**	(0.4014)	(0.2251)	(0.7565)
MDIST	0.0128	0.0025	0.0016	-0.0055	-0.0049
	(0.5433)	(0.0007)***	(0.0138)**	(0.4662)	(0.3592)
MUTUALAIDP	0.1573	0.242	0.134	0.3959	0.0049
	(0.7780)	(0.0112)**	(0.0720)*	(0.0733)*	(0.9752)
NONINSURP[c]	0.322	0.282	0.079	0.1585	-0.2467
	(0.5979)	(0.008)***	(0.3705)	(0.5736)	(0.2821)
DURILL	0.0227	0.0038	0.0028	0.0050	-0.0010
	(0.0010)***	(0.0001)***	(0.0001)***	(0.0001)***	(0.4223)
NUMBILL	-0.6424	0.242	0.370	0.3035	0.5261
	(0.2156)	(0.0001)***	(0.0001)***	(0.0208)**	(0.0001)***
-log (l)	-1794.32	1073.62	1254.60	338.4978	537.8983
χ^2	0.5778	7.6948**	1.1700	4.4720	1.2894
H-statistic[d]	NS[e]	31.607	NS	NS	NS
$1/\delta$[f]	46.793	00.00	00.00	00.00	00.00

Note: (a): p-value in parentheses
(b) log of the age variable
(c) concerns the private insurance and mutual benefit insurance variables
(d) H-statistic is the $\chi^2(2)$ test-statistic for the endogeneity of the NONINSUR variable
(e) Not significant
(f) This value is estimated only for the DURHOSP variable.
*significant at the 10% level

** significant at the 5% level
*** significant at the 1% level
Source: Authors' computations

The results in the table above confirm, overall, those obtained using the negative binomial model without instrumental variables. In both cases the state of health variables (DURILL and NUMBILL) continue to play an important role in accounting for the behaviour related to the use of health care services. The predicted variables MUTUALAIDP and NONINSURP are significantly and positively related to the health care use variable CONMED respectively at the 5% and 1% levels. This suggests that the more individuals take out an insurance policy, the more they consult a medical doctor. This result thus shows that the choice of an insurance system can positively influence the use of health care services. In addition, revenue is positively and significantly related to the consultation by a medical doctor at the 5% level. However, if we consider the coefficient (0.0005), this relationship remains weak, which validates the results obtained by using the negative binomial model estimation.

The choice of an insurance system can be influenced by self-selection problems. The Hausman specification test (the test H-statistic distributed according to $\chi^2(2)$), which explains the endogeneity of the dummy insurance variable, enables us to test the problem of insurance policy self-selection. Thus, when there is endogeneity, we talk of self-selection. If we posit the null hypothesis, that is that of the exogeneity of the NONINSUR variable, we observe that it is rejected with regard to the number of consultations done by a medical doctor. This means that the NONINSUR variable is endogenous in the CONMED equation.

VII. 3 Results of the estimation of the simultaneous equations system

In this section we will present the results of the estimation of predictions of the demand for health care and for insurance by using reduced form equations, which will later be replaced using the structural form of simultaneous equations.

Table 11: Estimation of the reduced forms of the equations for the demand for health services and private insurance

	Dependent variables estimates	
	HEALTH CARE USE	PRIVATEINSUR
Constant	-0.781 (0.0002)	-1.926 (0.0001)
Sex: Male	-0.057 (0.3878)	0.437 (0.0004)
Female	- -	- -
Religion: (Muslim)	-0.176 (0.0882)	-0.371 (0.0528)
(Christian)	-0.080 (0.3284)	0.288 (0.0329)
(No religion)	- -	- -
Ethnic gr.: (Mandé)	-0.171 (0.2517)	0.493 (0.1048)
(Akan)	-0.144 (0.3578)	0.286 (0.3440)
(Krou)	-0.059 (0.7182)	0.125 (0.6911)
(Voltaic)	- -	- -
(Foreigner)	-0.266 (0.0948)	-0.033 (0.9239)
Maristat : (Single)	-0.203 (0.0698)	-0.364 (0.0354)
(Married)	0.071 (0.4997)	-0.115 (0.4463)
(Cohabitation)	- -	- -
Instruction: (No instruction)	-0.153 (0.0624)	-0.812 (0.0003)
	- -	- -
(Educated)		
Relation	0.452 (0.0003)	0.308 (0.1166)
Revenue	0.0005 (0.0122)	0.0013 (0.0001)
Durill	0.005 (0.0001)	-0.0008 (0.4442)
Numbill	0.607 (0.0001)	0.092 (0.3215)
R-Square	0.522	
Log likelihood		-389.436

Source: Authors' computations
(p-value in parentheses)

On the whole, the Relation, Revenue and state of health (Numbill and Durill) variables significantly and positively contribute to predicting the use of health care. The coefficients of the parameters estimated by the ordinary least squares indicate the direction of the variation of the incidence of these variables on the prediction of the dependent variable, namely Use of health care. An analysis of these coefficients shows the relatively high importance of the state of health variable (Numbill) in the anticipation of future use of health care. The relation that exists between the household and the person doing the medical consultation (a health official) is a variable of interest in terms of policy recommendations in connection with a universal health insurance scheme. Indeed, the positive coefficient (0.452) for the Relation variable means that households will seek medical care more when they are related to the consulting health official than when they are not. These findings actually corroborate those reported in the previous sections which were obtained by using the model used in Cameroon and Trivedi (1986).

As far as the sex variable is concerned, the results indicate that males (-0.057) make use of health care services than females. This seems plausible if one takes into account the fact that, because of their physiology, women require more health care (antenatal consultation, maternity, etc.). Individuals with no instruction make use of health services less than educated people. In fact, when the level of instruction decreases by one unit, the demand for health care decreases by 0.153. Concerning marital status, being single is negatively related to the use of health care. Divorced people make little use of health care services.

The PRIVATEINSUR variable is significantly influenced by sex, revenue, religion and level of instruction. Concerning the Sex variable, more males than females want to take out insurance cover, understandably because of differences due to revenue, job opportunities and, especially, the fact that the man is the household head. When it comes to religion, being a Muslim is negatively related to the demand for insurance, whereas being a Christian is positively related. These findings corroborate those reported in INS (2003) obtained from the 2002 survey of households' standards of living. Regarding revenue, it positively influences the choice for private insurance. This is confirmed in Table 5. As for level of instruction, households with instruction hardly go for private insurance (cf. the negative sign on the estimated parameter, -0.812). Finally, with regard to the marital status variable, being single is negatively related to PRIVATEINSUR, which means that single people hardly go for private insurance.

The estimation of the reduced forms of the equations of the use of health care and the demand for private insurance has enabled us to obtain predictions of the two variables. These predictions are in turn incorporated into their structural forms, and then re-estimated. The results are given in Table 12 below.

Table 12: Estimation of the simultaneous equation of structural forms

Variable		Probit	OLS
PUse of health care[a]		1.606 (0.0001)	
Pprivateinsur[b]			0.206 (0.0368)
Sex:	(Male)	0.517 (0.0001)	-0.209 (0.1175)
	(Female)	- -	- -
Ethnic gr.:	(Mandé)	0.795 (0.0124)	
	(Akan)	0.540 (0.0833)	
	(Krou)	0.236 (0.4607)	
	(Voltaic)	- -	
	(Foreigner)	0.433 (0.2430)	
Religion:	(Muslim)	-0.071 (0.7325)	
	(Christian)	0.417 (0.0031)	
	(No religion)	- -	
Marstat:	(Single)	-0.349 (0.0466)	
	(Married)	-0.457 (0.0098)	
	(Cohabitation)	- -	
Instruction:	(No instruction)	--0.513 (0.0314)	
	(Educated)	- -	
Lage			0.452 (0.1093)
Relation		-0.393 (0.1415)	0.404 (0.0608)
Revenue		0.0005 (0.1376)	0.001 (0.0470)
Mdist			0.008 (0.0001)
Numbill		-0.883 (0.0009)	0.476 (0.0001)
Durill		-0.009 (0.0001)	0.008 (0.0001)
Constant		-0.516 (0.3188)	-2.172 (0.0472)
Log-Likehood		-381.086	
R^2-Adjusted			0.170

Source: Authors' computations
(p-value in parentheses)
a: prediction of the use of heath care variable
b: prediction of the privateinsur variable

Two interesting observations can be made from the results presented in the table above. First, the demand for health care is positively and significantly related to the probability of taking out an insurance policy, that is, future anticipation of private insurance. Thus, a household is likely to make more use of heath services if it anticipates the possibility of future private insurance cover. And when it does so, its use of health care will increase by 0.206. This is a known phenomenon which usually characterizes moral risk. The REVENUE, MDIST, RELATION and state of health (DURILL and NUMBILL) variables are positively and significantly related to the demand for health care as well. This result shows that the REVENUE variable, taken together with the PRIVATEINSUR one (as in Tables 5 and 6), increases the degree of moral risk (Ricardo and Jaime, 2002). Finally, women seek medical consultation more often than men: the coefficient for the male variable is negative and not significant.

The second interesting observation is the positive and significant relation there is between the probability of taking out a private insurance policy and the future anticipation of the demand for health care; the coefficient linking the two is 1.606. The fact that this coefficient is high and its sign positive suggests that by making endogenous the use of health care variable in order to express the probability of taking out a private insurance policy, the adverse selection bias becomes evident and high.

Men take out an insurance policy more often than women, as suggested by the (0.517) coefficient for the SEX variable. The Mandé and Akan ethnic groups tend to seek insurance cover more often than the other ethnic groups identified in the sample. Concerning religion, being a Christian is significantly and positively related to the demand for private insurance.

VIII. LESSONS FOR THE UNIVERSAL HEALTH INSURANCE PROJECT

The adoption, in 2000, by the government of Côte d'Ivoire of a compulsory health insurance system called Universal Health Insurance *(AMU)* guarantees to every person residing in the country health and maternity insurance cover. This system hinges on the principle of national solidarity that compels every beneficiary to pay a financial contribution. Insurance companies, mutual benefit insurance companies and provident funds societies will then offer a complementary health and maternity insurance cover. The system has two schemes: the universal health insurance for the agricultural sector and the universal health insurance for all the other sectors. The former offers health and maternity insurance cover for people whose main activity is directly or indirectly linked to agriculture. These people become automatically affiliated to such a scheme. The latter offers health and maternity insurance cover to the rest of the people.

The performance and durability of such a system will depend on its capacity to overcome moral risk problems, abuses and cases of fraud, which considerably increase the cost of insurance management. As the results of the present study show with regard to private insurance, when households anticipate taking out such insurance, they increase their demand for health care. This phenomenon is thus an important reality which our analyses have brought out. Therefore, with regard the Universal Health Insurance *(AMU)*, the government of

Côte d'Ivoire runs the risk of having to face an increased demand for health care beyond the resources allocated for this AMU project.

IX. CONCLUSION

The present study set out to investigate the relationship between the demand for health care and that for health insurance. By combining an analysis of discrete and continuous models with a simultaneous equations model, the study has come with significant results for policy making. The main finding is that, in relation to the demand for health care, state of health seems to be more important than choice of an insurance system. However, when potential policyholders anticipate the possibility of taking out an insurance policy, they increase their demand for health care. Besides these two key variables, there are also those of revenue, level of instruction, the relation that a patient has with the health official he/she is dealing with, and sex, which the study found to play an important role. Another finding is that self-selection influences the demand for consultation services offered by a medical doctor.

Furthermore, the results of the present study have shown that the problems linked to moral risk and adverse self-selection are major impediments to an effective implementation of the universal health insurance project.

X. BIBLIOGRAPHICAL REFERENCES

Amemiya, T. (1978). "The Estimation of a Simultaneous Equation Generalized Probit Model". *Econometrica*. 46. 1193-1206.

Arrow, Kenneth J. (1963). "Uncertainty and the welfare economics of medical care". *The American Economic Review*. Volume LIII. Number 5.

Australian Bureau of Statistics (1982). *Australian Health Survey 1977-78: Outline of concepts. methodology and procedures used* (cat. No. 4324.0)

Brunet-J., Joseph (1998). *La santé. chapitre 7 de Etude relative aux défis démographiques majeurs et au développement durable en Côte d'Ivoire*. sous la direction de G.P.Tapinos. P. Huguon and P.Vinard.

Brunet-J., Joseph (ed.) (1999). *Santé en capitales – la dynamique des systèmes de santé des capitales Ouest-africaines*. CEDA. Abidjan.

Cameron, A. C., Trivedi, P. K., Milne, F. and Piggot, J. (1988). "A Microeconomic Model of the Demand for Health Care and Health Insurance in Australia". *Review of Economic Studies*. LV. 85-106.

Cameron. A. C. and Trivedi. P. K. (1986). "Econometric Model Based on Count Data : Comparisons and Applications of some Estimators and Test". *Journal of Applied Econometrics*. 1. 29-53

CEPRASS (1995). *Les coûts des prestations et systèmes de protection sociale*. Projet Santé Abidjan (P.S.A). MSPAS. DRS.

CEPRASS, MSA, GTZ, MUTUALITE CHRÉTIENNE**.** (2001). *Atelier d'harmonisation à mi-parcours des « études sur les expériences pilotes de l'assurance maladie en Côte d'Ivoire.* Projet de développement des services de santé intégrés. Ministère des affaires sociales et de la solidarité nationale. Brussels, 18 May.

ENSEA-DSRP. (1992). *Enquête sur le recours aux soins et dépenses de santé : commune de Yopougon*

Grootaert, C. (1993). *The evolution of welfare and poverty under structural change and economic recession in Côte d'Ivoire*, 1985-88, World Bank, Washington.

Heckman, J. A. (1978). "Dummy Endogenous Variables in a Simultaneous Equation System", *Econometrica*, 46, 931-960.

INADES. (1992). *Action sociale en milieu urbain. Concepts et pratiques de santé à Abobo-Sagbé,* Abidjan.

INS (2003). *Profil de pauvreté en Côte d'Ivoire 200,.* Abidjan, Côte d'Ivoire.

Jolly D. (1992). *Réflexions sur l'hôpital de demain*, OMS, Genève.

Klimek, C. and Peter, G. (1995). *Une politique de médicament pour l'Afrique : contraintes et choix*. Karthala, Paris.

Koné, Mariétou (2001). *L'équité dans l'accès aux soins à Abidjan (Abobo-Sagbé, Yopougon-Attié et Attécoubé-centre). Etude socio-anthropologique,* Final Report. UNICEF / Coopération Française / IRD /GIDIS-CI.

Madala, G. S. (1983). *Limited-dependent and qualitative variables in econometrics.* Cambridge University Press. Cambridge.

Mcfadden, D. and Dubin, J. A. (1984). “An Econometric Analysis of Residential Electrical Appliance Holdings and Consumption”, *Econometrica*, 52, 345-362.

Ministère de la Santé Publique. (1996). *Plan National de Développement Sanitaire : 1996-2005*. Volumes 1 and 2.

Ministère de la Santé et de la Protection Sociale. (1991). *Planification-Programmation-Budgétisation dans le secteur de la Santé*. Abidjan.

Perrin, Hélène (2001). *Justice sociale et santé. L’accès aux soins à Abidjan. Thèse pour le doctorat en Sciences économiques*. Université Toulouse/IRD.

Piaser G. and D. Raynaud (2002). "Consultation médicale: l’influence du revenu et de l’assurance complémentaire". *Revue économique* – Vol. 53, No. 1, January 2002, pp. 113-133.

Projet Santé Abidjan (1993). *Enquête sur les conditions de vie, recours aux soins et les dépenses de santé des ménages dans la commune de Yopougon*. MSPAS, DRS. General Report. May.

Ricardo S. and Jaime R-T. (2002). “Choosing health insurance in a dual health care system: the Chilean case”, *Journal of Applied Economics*, Vol. V, No. 1, 157-184.