An Exploratory Test of the Demand for Safety Model:

Relationships Between Health Status, Wealth and Risk Behaviour

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Abstract

The demand for health models explain how health care choices result from managerial decisions concerning human capital. But these models do not fully account for the uncertainty of illness and health care. In the demand for safety model, the individual considers the investment in health as one of the factors contributing to his safety. The management of health capital simply becomes one of the many means individuals use to confront uncertainty. Evaluating some relations of this model on French data, we found that higher probabilities of disease are significantly correlated with lower levels of wealth and more frequent risky behaviour.

Key words: demand for health; safety; risk behaviour; wealth inequalities.

1. Introduction

How can the economic approach help us analyse the individual determinants of health status and health care consumption ? Economic theory offers two types of model. Those derived directly from neo-classical theory are relatively simple and are based on the demand for goods and services of a medical nature. Completely different types of models of much greater complexity have been developed based on the premises of the human capital theorists, a perspective which takes into consideration the multiple economic interactions contributing to the determination of an individual's health status. But if we want to take into account the essential characteristic of health developments and of the role of medical care, i.e. their uncertainty, we must investigate the position that "demand for health" models assign health. If we consider that an individual tries to maximise his safety, or his peace of mind, it should follow that his health becomes all the more important a production factor of this ultimate objective.

These issues will be addressed in the theoretical part (**2**), in which the necessity of taking the fundamental relationship between health and uncertainty into account is underlined, particularly in the domains of risk management and of safety. In the following parts, this alternative model will be tested: successively by presenting an empirical model on French data (**3**), by displaying the results of this test (**4**), and by discussing them (**5**).

2. From the demand for health model to the demand for safety model

Healthcare accounting procedures are part of the public finance structure and, because of this, are derived directly from Keynesian theory and its global economic framework: patients are, first and foremost, consumers who buy medical goods and services from health suppliers and establishments. In this simplest neo-classical framework, the individual's demand is not for health; it is for medical treatment. But, in the 1960s, the "New Home Economics" theorists paved the way for something of a conceptual revolution. According to Becker [1964] and Lancaster [1966], consuming is in fact a production activity; in terms of health, for example, it is not the doctor's visit or the antibiotics which generate utility, but rather the ability to combine these purchases with personal time in order to relieve the sore throat, cure the flu, and be able to go back to work. Moreover, this results in increased income, which in turn translates into the possibility of future consumption, and so on. The consumer produces his own utility, and in order to produce it, he relies primarily on his free time, income, and capital (financial assets - if available, and human capital). Thus, the productive efficiency of this capital represents an important stake for the individual.

Grossman's 1972 health demand model and its theoretical shortcomings

On this conceptual basis, Michael Grossman [1972] postulated the existence of health capital in which the individual and society could invest to varying degrees, a premise which allowed him to consider health status and length of life as consequences of individual and collective investment choices. This economic model flourished and was adopted by many economists. It determines health status and an individual's care consumption at different times of his life relative to his initial health stock, time constraints, revenues, and preferences. Specifically, this model makes it possible to formalise the choices an individual makes by specifying the time he devotes to his cures and the amount of the medical goods and services he buys, which vary with a whole series of variables such as age, rate of health depreciation, income, initial wealth, work time and sick time.

A whole body of research followed in the wake of Grossman's first formalisations of "demand for health" thirty years ago, to the extent that it constitutes, in the words of Le Pen [1988 p.458] "a veritable genre with its specialists, problematics, and refinements - sometimes of a fairly esoteric nature". On the theoretical level, this research offered solutions to some shortcomings in Grossman's early formulations, but one limitation remained.

This important shortcoming concerns the model's lack of consideration of uncertainty. In its initial form, the Grossman model was basically determinist and included neither explicit acknowledgement of uncertainty nor the description of illnesses, even though the fundamental relationship between health and uncertainty had already been established by economic theory. In the first paragraph of an article widely credited with the foundation of the health economics field, Arrow [1963 p.941] stated that "the special economic problems of medical care can be explained as adaptations to the existence of uncertainty in the incidence of disease and in the efficacy of treatment". And yet, the first efforts to deal with the shortcomings of Grossman's model with respect to uncertainty occurred well after its appearance. There was no shortage of attempts to resolve this problem, the first of which used partial models: for example, by the definition of the risks of getting an illness for the purposes of describing insurance systems, as in Phelps' studies [1976], or the lethal risk studies by Cropper [1977]. More recently, additions were made to the Grossman model at the theoretical level in order to model the consequences of uncertainty regarding individuals' estimations of health status or the efficiency of health care, Dardanoni and Wagstaff [1990], Selden [1993]. Still, uncertainty was never included in the utility function.

According to Phelps [1995], uncertainty is a primary factor in care behaviour, and must be a priority of studies in this domain. If both illness and effectiveness of medical care are characterised by uncertainty, the analysis of behaviour concerning care must address this fundamental characteristic. Another way to take uncertainty into account is to consider the situation of that large part of the population which does not, indeed, seem to worry much about it at all, either because it considers itself in good health, or because its level of risk aversion is very low. These people, then, do not consider it useful to spend time and money on investments in medical care, even if they are conscious of their "aesthetic or physical capital". Le Pen [1998 p.469-70] sees in this phenomenon the essential explanation for another empirical criticism of the Grossman model. If, in contradiction to the model's predictions, care consumption is not positively correlated to health status (Wagstaff [1986] and van de Ven and van der Gaag [1982]), according to him, "that simply means that people in good health consume less medical care, (...) evidence which is not in keeping with the spirit of the household production model, where health status must be a result of some active investment strategy".

The demand for safety model: towards another model of health choice

The preceding remarks lead us to the following question: is it not true that for an individual's definitive choice, considerations of safety outweigh those of health, not only in old age or when health is precarious, but all life long, and especially when one is in good health? If we extend the Grossman approach beyond its original formulation, it follows that investment in health capital is one of the factors, like the many choices concerning risk such as the taking out of an insurance policy or the improvement of risk management, contributing to the production of an individual's safety. At time t, health capital H(t), or the corresponding flow, i.e. health time B(t), is therefore no longer an argument for the ultimate utility function U(t), as assumed by Grossman. Health capital becomes simply one of the inputs for the production of individuals' safety S(t) - an instantaneous notion which can also be associated with a flow, the degree of tranquillity or absence of anxiety during the time available to them. So, S(t) becomes one of the arguments of the individual's utility. To this variant conceptualisation corresponds another technical constraint: the household production function for the degree of safety.

In order to explain the differences of this conceptualisation of health choice vis-à-vis the Grossman model, I will now present a first sketch of the formalisation. But it must be emphasised that this is only a first draft whose analysis remains to be done in more depth, first at the theoretical level, and then, of course, via empirical tests[1]. In the interest of simplification, the model presented here assumed that the set of random events includes only health-related ones (concerning the occurrence of illness, accident and the success or failure of health care) and thus associates probabilities with health capital and, consequently, with healthy time, income, final wealth, safety and utility. This framework is sufficient for demonstrating the important structural differences between this type of model and the demand for health models.

In order to make this formulation concrete, I have chosen the case of risk taking associated with risky types of consumption (like tobacco, alcohol, risky devices) which may be associated with direct increasing of the utility and, on the other hand, with decreasing of the safety and, thus, of the utility. But the choice of risk taking behaviour is of little importance: it could just as well be the time an individual waits before visiting a physician when a symptom occurs (Menahem [1999]), the amount of health-damaging products he consumes (Menahem [1997]), or any other choice which leads both to immediate utility and a fairly considerable probability of accident, expense, or waste of time. In this conceptualisation, the management of health capital cedes its central role, becoming simply one means among many with which an individual confronts uncertainty. Granted, the importance of this management increases with age. But if an accident happens or if the necessity to cope with a serious handicap jeopardises one's personal income, the corresponding demand for safety could then completely relativise the health capital management.

Formalising the demand for safety model

In order to formulate health choices within the theoretical framework of the human capital theory, I will use the structure and the conventions used in **Muurinen's [1982] version of the demand for health model.** Her generalised model includes the choice of the time of death TD (which occurs when the stock of health falls below a given threshold). She also introduces, as arguments of the depreciation rate of health, environmental and educational variables E, into the technological constraint of health capital production. This production function is not assumed to have constant returns to scale.

Given an economic and health environment, specifying on the one hand the prices, the production, work and income conditions of an individual together with his initial wealth, and on the other hand his health production conditions, he is confronted with making a choice concerning his optimal repeated decisions over time regarding healthcare and health investment. This problem is formalised as follows, if we use the reduced form she proposes, and if we specify the value of the model's parameters at time t and multiply the values of utility by a discount factor $\alpha(t)$:

- ◊ the individual maximises the utility U[Z(t), B(t)] derived from the consumption of non-medical goods and services Z(t) and of healthy time B(t) ;
- ◊ he produces the health capital H(t), by using heterogeneous medical care goods M(t), which include usage time and this generates healthy time B(t) ;
- ◊ his budget constraint takes into account his income Y(t) and heterogeneous prices P(t).

He must therefore solve the following maximisation problem :

$$\text{Max } \sum_{o}^{TD} \alpha(t).U[Z(t), B(t)] \quad \text{with marginal utilities } U'_Z > 0 \text{ and } U'_B > 0 \qquad (1)$$

$$B(t) = B[H(t)] \qquad \text{with } B_H' > 0 \text{ and } B_H'' < 0. \qquad (2)$$

Two identities define the time of death TD: let H_{min} be the minimal health stock necessary to live, and f(t).M(t) be the new health produced by the use of medical care M(t), and $\delta[t, E(t)]$ the rate of depreciation of health, a function of E(t) exogenous variables including education:

$$H(t+1) = H(t) - \delta[t, E(t)].H(t) + f(t).M(t) \qquad \text{with } f(t) > 0 \text{ for all } t \qquad (3)$$

$$TD = \min \{ t : H(t) \leq H_{min} \} \qquad (4)$$

Healthy time B(t), investment in health M(t) – which involves both money and time expenses -, and wealth W(t) enter the budget constraint, where r is a constant rate of interest and Q(t) is a vector of variables describing the work environment:

$$W(t+1) - W(t) = Y[B(t), M(t), Q(t)] + r.W(t) - P_Z(t).Z(t) - P_M(t).M(t) \qquad (5)$$

$Y'_B \geq 0$, reflects the assumption that healthy time cannot decrease income, and $Y'_M \leq 0$ the fact that being engaged in the process of seeking care cannot increase health time.

In the demand for safety model, instead of focusing the analysis on the determinants of health capital alone, I will introduce the degree of safety concept S(t) – i.e. the perceived level of peace of mind, or of lack of anxiety -, which calls for another "production factor" in addition to health capital H(t) and wealth W(t): the individual's choices concerning the level of risk run daily R(t). In such a framework, the utility an individual seeks to maximise is a function of his consumption vector Z(t) and his safety S(t), rather than of Z(t) and his healthy time B(t) directly. Such an approach makes it possible to determine with much greater precision several characteristics of the relationship of the health capital H of an individual with the degree of safety S he experiences in his life and with the level of risk R he chooses to take in his everyday life.

In this article, given the state of the economic and health environment and specifying, as previously, the prices, the work and income production conditions, the initial wealth of an individual and his health production conditions, and added to that, a set of random events Ω concerning the occurrence of health problems or the efficacy of the treatment he uses, he is confronted with two types of decision: the choice of optimal repeated decisions over time for healthcare and health investment; the choice of the optimal repeated decisions over time with regard to the risks he decides to take or accept. It is important to specify first the differences between S and R, and then the relations which make them inextricable.

1. The risk R(t) is an objective measure while the safety S(t) is a subjective perception. R(t) is a vector gathering the indicators of decisions concerning the different risks he has chosen to take or is willing to take (number of cigarettes smoked a day, number of glasses of alcohol drunk, waiting time before consulting for a chest pain, a deficient health environment, etc). On the contrary, the safety S is a subjective perception which results from an individual’s overall appreciation of a set of risks R, which he has taken or accepted, combined with his fears about his health capital H and his wealth W. For instance, barring one's windows when living in an "unsafe" area is a decision which will both decrease the individual's risk (basically because he chooses to live in this area) and increase his safety S (both because his perceived safety is increased and because his property is valued, and thus his wealth W, when it is more protected).

2. S depends on H, W and R. The safety model allows to analyse the trade-offs involved by the fact that the safety an individual experiences at a given time S(t), results both from the level of his health capital H(t) (with $S_H' > 0$ and $S_H'' < 0$), from the level of risk he chooses to take in his everyday life R(t) (with $S_R' < 0$ and $S_R'' > 0$), and from the amount of his personal wealth W(t) (with $S_W' > 0$ and $S_W'' < 0$), given the state of his economic and health environment and his education E(t). Even if it is the level of these factors at time t that matters, each one – safety, health capital or wealth – is the result of a previous accumulation, which in turn depends on past events remembered by the individual even though he cannot know whether they will have harmful consequences or not. For example, failure to replace a defective car or computer component can compromise the user’s feeling of safety over a long period until it is replaced. On a more collective level, the fact of living in an area considered to be "high risk" can generate a feeling of anxiety which gradually increases as one's ability to cope diminishes with advancing age and failing health.

3. H depends on S and R. Given a probabilised set Ω of health events (illnesses, accidents, and also the possibility of a cure or a relapse in the case of healthcare concerning a particular disease), I will consider the variation in the state of health of an individual over a year, H(t+1) - H (t), as a random function. More precisely, if the mathematical expressions used in the formalisation by J. M. Muurinen of the generalised Grossman model are kept, we have:

$$H(t+1) - H(t) = E\{ f[t, R(t)].M(t) - \delta[t, S(t), R(t), E(t)].H(t) \} \quad (6)$$

with $\delta'_S < 0$, $\delta''_S > 0$ and $\delta'_R > 0$, $\delta''_R < 0$ for all t,

and $f(t) > 0$ with $f'_R < 0$, $f''_R > 0$ for all t.

As both f[t, R(t)].M(t) .H (t) and δ[t, S(t), R(t), E(t)].H (t) are random functions on Ω, this variation in the state of health is also a random function on the set of random events Ω.

Thus, this random function {H(t+1) – H(t)} may be viewed as a random variable whose expected value is both a function of the safety or anxiety the individual has experienced during that period, S(t), and of the overall level of risks he has chosen to take, or accept, R(t), with these factors possibly depending on separate parameters. There are three important improvements which are involved by such a formalisation of the "household health production",

◊ The negative correlation between the rate of depreciation of health δ and the individual's degree of safety S(t) reflects the positive impact of a feeling of safety experienced at a point in time in terms of a slower depreciation of health at the same time, and inversely, a correlation between unstable private or professional situations and a more rapid deterioration of health. For example, this correlation involves a positive effect of an increase of the level of wealth on health (with ?H= $-\delta'_S.S_W' > 0$). Inversely, referring back to the previous example about living in an area considered to be "high risk", the resulting anxiety may have a big impact on health, irrespective of a real rise in the risk of aggression.

◊ The positive correlation between the rate of depreciation of health δ and daily risk level R(t), translates the harmful effect on health of risky behaviours, such as maximum driving speed, inadequate precaution against accident, or more generally, insufficient vigilance with respect to the threats to or symptoms of the organism's dysfunctioning.

◊ The negative correlation between the new health produced f(t, R) and daily risk level R(t), translates the considerable effect on the effectiveness of health care of a lack of attention, bad compliance and other risky behaviours in using purchased health care, such as for instance stopping the use of antibiotics once symptoms have been alleviated, failure to follow doctor’s instructions, or delay or refusal in submitting to further prescribed investigations or health checks.

4. The determinants of R. In the case examined here, risk taking associated with types of consumption (tobacco, drugs, leisure activities, etc.), R(t), results basically from a trade-off choice between the gain in utility associated with the risks corresponding to the types of consumption Z(t) (so that $U'_Z.Z'_R(t) > 0$) and the reduction in utility associated with a loss of safety (so that $U'_S.S'_R(t) < 0$). For example, it could be assumed that by formulating how the choice of consuming the quantity ZT(t) of a toxic product (tobacco, alcohol, etc.) contributes to determining an individual's risk level R(t), and therefore his degree of safety S(t), it is possible to determine the optimum level of consumption, where $U'_{ZT}(t).ZT'_R(t) = U'_S(t).S'_R(t)$. It thus can be understood that a same $U'_S.S'_R$ leads to similar levels of risk taking when adopting different kinds of risky consumptions.[2]

Several studies may support this theoretical issue. They show in fact that the level of risk an individual accepts when making choices about his life and consumption is determined overall, particularly by dispositions inherited from his very early childhood, and this is taken into account in the level of both U'_S and S'_R. For instance, a similar approach is used by some researchers to conceptualise the many consequences of offsetting behaviour when facing risk (e.g. those emphasised by Viscusi, [1993], Viscusi and Carvallo, [1994]). In particular, data gathered by Evans and Graham [1991] showed that, although laws making the use of safety-belts compulsory have reduced deaths among car occupants, there is some evidence to suggest an increase in mortality among non-occupants. Such offsetting behaviour is not irrational: individuals tend to drive less carefully with safer cars [Pelzmann, 1975]. More recently, I showed how attitudes to risk in the fields of paying debts and bills, or with regard to work- or transport-related accidents showed a strong correlation with taking precautions in regard to health [Menahem, 1999]. Moreover, in former researches, I established some results concerning my own estimations of the level of an individual's risk taking: I showed that, as in the case of tastes for tobacco or alcohol consumption, this level is partially inherited by individuals from their childhood family environment[3], and partially learned from their playmates and relatives during their youth. Such results suggest how much that level of ability to accept risk (which may be evaluated by S'_R) is defined before there is investment in safety.

With the framework of the relationship between "demand for safety", demand for health and the relationship with risk thus specified, how is it possible to formalise an overall model showing how variations in health capital are linked to the level of risk R taken in everyday life and to the level of wealth ? If I continue to use J. M. Muurinen's formulation as my basis, and if I consider that individuals' taste for safety in the overall level of risk they are willing to accept in their consumption choices and also in their choice of trade-off between consumption and investment in safety, I can offer the following formulation for the demand for safety model:

The sketch of the formalisations of the demand for safety model: Given that at calendar time t, an individual maximises expected utility which is a function of Z(t) and the degree of safety S(t), over a probabilised set of health events Ω, from the present, t_0, to the time of his death, TD, we have:

$$\text{Max } E\{\textstyle\sum_{t0}^{TD} \alpha(t).U[Z(t), S(t)]\} \qquad (7)$$

with marginal utilities $U'_Z > 0$ and $U'_S > 0$

The equation of "household safety production" (8) specifies the role of these factors, namely the health capital H(t), wealth W(t), and the level of risk taking R(t), for a given E(t), the vector of environmental and educational variables:

$$S(t) = E\ \{\ S[H(t), W(t), R(t), E(t)]\ \} \qquad (8)$$

with $S_i' > 0$ and $S_i'' < 0$ for i = H or W,

and $S_R' < 0$, $S_R'' > 0$.

With the equation of "household health production" previously specified in (6):

$$H(t+1) = H(t) + E\ \{\ f[t, R(t)].M(t) - \delta[t, S(t), R(t), E(t)].H(t)\ \} \qquad (9)$$

with $\delta'_S < 0$, $\delta''_S > 0$ and $\delta'_R > 0$, $\delta''_R < 0$ for all t,

and $f(t) > 0$ with $f'_R < 0$, $f''_R > 0$ for all t.

Technical constraints still insist on the production by H(t) of healthy time B(t):

$$B(t) = E \{ B[H(t)] \} \quad \text{with } B_H' > 0 \text{ and } B_H'' < 0. \qquad (10)$$

and the relationship which determines the time of death TD, if H_{min} is the minimum level of health capital:

$$TD = \min \{ t : E \{H (t)\} \leq H_{min}\} \qquad (11)$$

As in (5) healthy time B(t), time expenses associated with investment in health M(t), and wealth W(t) enter the budget constraint, where P_z and P_m represent the different price vectors, r is the presumed constant interest rate[4], and Q(t) is a vector of variables describing the work environment:

$$W(t+1) - W(t) = E \{ Y[B(t), M(t), Q(t)] + r.W(t) - P_Z(t).Z(t) - P_M(t).M(t) \} \quad (12)$$

$Y'_B \geq 0$, reflects the assumption that healthy time cannot decrease income, and $Y'_M \leq 0$ the fact that being engaged in the process of seeking care cannot increase health time.

According to this model, in order to maximise both the degree of safety and the utility resulting from various types of consumption, an individual is faced with a trade-off between health and safety investment, and consumption choices involving risk and the level of risk acceptable to him.

In the case of individuals who choose a less risky behaviour, for whom the level of overall risk taken contributes only slightly to the rate of depreciation of health capital, and where age is the most important determinant, the model is quite similar to Muurinen's demand for health model. If, then, the consequences of an investment M(t) in health capital are examined, few differences in the two models of health choice can be observed. In both cases the model predicts an increase in health capital H, which leads to an increase of healthy time B which, after subtracting the time spent on care T_M, contributes to the increase in income, and therefore, to that of final consumption. There (are) only two improvements:

- in the demand for safety model, the lower depreciation of health capital δ[H(t), W(t), R(t), t] . H(t) - induced both by a higher degree of safety S(t) and the lower level of risk run daily R(t) - is a way to express the role of multiplier of the effects of health gain measured over a period, to the following periods. Because of this, the increase of final utility and of income due to the increase of H(t) is more important in this model, which accentuates the dynamic character of such a formalisation of the role of safety.
- The demand for safety model predicts the effect of the level of wealth W(t) on the state of health H(t) while safety is positively correlated with wealth and negatively with depreciation δ.

In the case of individuals who choose a more risky behaviour, for whom the level of risk taken is the most important determinant of the depreciation rate of health capital, the level of investment M(t) in health capital takes on a completely different signification. Losses of health capital due to high risk taking R(t) indirectly incur health expenditure for repairing the damage, which then cannot be seen as "profitable" from the point of view of rational management of health investment. In such a case, contrary to the Grossman model, the demand for safety model should predict a stability, if not a decrease, in health capital coexisting with investment M(t). Such predictions would be more compatible with the "paradoxical" effects previously presented: the absence of a correlation between health status and health expenditure underlined by Wagstaff [1986], van de Wen and van der Gaag [1982]. However, in order to detail the result, approximations regarding risk- taking attitudes would have to be defined.

The overall character of the links between risk taking and health status could be taken into account. For instance, it could be asserted that by formulating how average driving speed V(t) contributes to determining an individual's risk level R(t), and therefore his degree of safety S(t), it is possible to describe an economic optimum V*(t), S*(t), and R*(t)[5] where $U'_V(t).V'_R(t).dR = U'_S(t).S'_R(t).dR$ and where $H(t+1) = H(t)+E\{f[t, R^*(t)].M(t) - \delta[t,S^*(t),R^*(t),E(t)].H(t)\}$.

Finally, this alternate choice of health model emphasises much more than the preceding ones, the close link between health management and different choices and parameters which contribute to the determination of the degree of uncertainty an individual faces. It is then possible to see how the safety model facilitates the analysis of random aspects of health and health care, for example, those involving individuals' relationships with uncertainty, risky behaviour and safety.

3. A test of the demand for safety model

It is impossible to evaluate subjective variables such as utility U or safety S. Moreover, it is only possible to build proxies for variables like health capital H or level of risk taken in everyday life R. Thus the econometric tests which I present below cannot be considered as estimations of the "demand for safety model". They are only first tests giving some information about the ability of this new model to support relationships linking health status with economic variables which are not yet predicted by the classic Grossman "demand for health model". Thus, there are two implications of the demand for safety model distinct from the Grossman one which are testable: whether the healthy time and the probability of experiencing disease are significantly related or not, firstly, to the main factor of safety deficiency which is risky behaviour - such as evaluated by many proxies -; secondly, to another factor of safety deficiency such as a pessimistic view of work prospects, knowing that a possibility of inverse causality limits the significance of such a link.

The INSEE "Survey on living conditions 1986-1987" makes it possible to test the demand for safety model because it enables us to evaluate the relationships between health status and some individual characteristics related to attitudes towards uncertainty, such as household wealth, risky behaviour and employment prospects.

The INSEE "Survey on living conditions 1986-1987"

This survey was conducted in 1986 and 1987 by INSEE, the French National Institute for Studies in Statistics and Economics, on a nationally representative sample of 13,154 adults resident in France. Individuals responded on their health status and consumption of preventive and curative medicine. Information was also gathered on different components of the household's wealth, involvement in any serious accidents or any experience of overdue payments (see Borkowski, [1986]). The survey allowed us to evaluate the relationships between health variables and some aspects of an individual's characteristics in terms of risky behaviour. For the purposes of our research we limited the sample to the 7,875 householders whose wealth was known at the time of the survey.

Empirical model

The econometric model is designed to evaluate the statistical significance of relationships between the probability of experiencing disease and the level of safety resources or factors of safety deficiency such as risky behaviour proxies or a pessimistic view of work prospects. The econometric model – either demand for safety or Grossman - must take into account the other main influences affecting vulnerability to disease such as resource variables and exogenous socio-demographic factors.

As the utility function is impossible to approximate, I focused the empirical test on an estimation of the relationship between health status H and key parameters of the household safety production and household health production functions. It is also necessary to take into account the fact that the observation of illness or healthcare utilisation is dichotomous, not continuous. To meet these needs, the parameters of the logistic function were estimated :

$$\text{Prob}(\text{ILL}_k) = f(X) = 1 / (1 + e^{-\beta_k X}) \qquad (13)$$

where $\text{Prob}(\text{ILL}_k)$ is the probability of experiencing at least one disease from the disease group k during the year preceding the survey, X is the vector of explanatory variables, and β_k is the vector of estimated parameters for group k.

The same model was used to estimate a proxy for the probability of having at least one day off sick within the last three weeks.

$$\text{Prob}(\text{DAYSOFF}) = f(X) = 1 / (1 + e^{-\pi X}) \qquad (14)$$

where π is the vector of estimated parameters for the likelihood of days off.

Dependent variables

The INSEE survey provides us with the incidence of illness during the previous year for 28 diseases and 30 symptoms. The following were selected and divided into seven different pathological groups:

- 1 disease and 3 symptoms relating to the respiratory system (1,449 individuals);
- 1 disease and 3 symptoms relating to psychiatric and nervous disorders (2,482 individuals);
- 2 diseases and 4 symptoms relating to the digestive system (1,680 individuals);
- 2 diseases and 3 symptoms relating to the cardiovascular system (2,325 individuals);
- 5 diseases and 3 symptoms relating to the locomotor system (4,057 individuals);
- 1 disease and 2 symptoms relating to allergies and related conditions (1,080 individuals);
- 16 "other diseases" not related to a specific organic system (4,615 individuals).

The INSEE survey also provides us with the number of days off sick during the last three weeks of illness: 565 individuals fell into this category. (See Table 1 for the 8 corresponding dummy dependent variables).

Explanatory variables

Two different types of variables were used. From the classic Grossman production of health function, four socio-economic resource variables were selected, which were also used by Kenkel [1991, 1994], (namely cultural assets, professional skills capital, employment status, the householder's total income6) and three healthcare resource variables (nature of health insurance cover; marital status, which is associated with non-medical healthcare resources; and level of urbanisation, which is correlated with the density of general practitioners). Two exogenous socio-demographic factors (the householder's age and gender) were added. These nine variables are among the principal factors which need to be taken into account in the analysis of the Grossman demand for health model.

Secondly, to take into account the individual's ‘demand for safety’ characteristics, six other factors were considered: one 'safety resource', the householder’s total wealth[7]; and four proxies of a ‘safety deficiency’, the ratio of the value of share investments to total wealth, a pessimistic view of employment prospects[8], the number of serious accidents relating to transport or work activities experienced by the individual during his life, and the number of overdue payments experienced over the last three years (either in paying the rent, electricity, gas or phone bills, in credit repayments or, lastly, in holiday expenditures - number standardised for age, sex and income). (See Table 2 for the 42 corresponding dummy explanatory variables).

It is useful to point out that the French health insurance variables are considered as individuals’ resource variables because they contribute a reduction in the cost of healthcare. Under the French social security system, in these variables, the majority are the result of administrative decisions. We may therefore assume that these variables are not linked to the risky behaviour variables. Some sick individuals have a right to free health care. This special kind of health insurance is thus not considered in the health insurance variable, since it is administratively related to the disease and healthcare variables. Moreover, to try to avoid any problem of colinearity between the risk behaviour variable and the health insurance variable, it was verified that Pearson’s R^2 coefficients were not significantly different from zero, either for these two variables, or for the associated dummy variables shown in Table 2.

Each modality of the fifteen variables was tested versus the standard situation, i.e. a married male graduate, 26 to 45 years old, employed as a *cadre* (executive) with a total family income per unit of more than twice the national guaranteed minimum wage, living in a town with a population of 1,000-100,000, who is covered by national health insurance and a mutual fund, has never had a serious transport- or work-related accident, has good employment prospects and has a total family wealth of less than 20,000 French francs without any share investments.

4. Results

Two main econometric results appear which lead to economic assumptions in support of the "demand for safety" model, compared with the results of the classic demand for health model. Firstly, the proxies of adopting risky behaviour and, secondly, the pessimistic attitude regarding work prospects are significantly related to the probability of suffering from several types of disease and of experiencing days off sick.

It is as if a higher level of safety deficiency, i.e. risky behaviour, a pessimistic view of employment prospects and a higher proportion of risky assets, contribute to endangering health status and, as a consequence, to an increase in days off sick.

If we wish to provide a clearer demonstration of relationships, we need a model which takes into account the main determinants of health and thus, of safety. Table 3 shows the detailed results of maximum-likelihood logit regressions in which the probabilities of suffering from several types of disease are a function of the level of total wealth, of transport- or work-related serious accidents as proxies of risky behaviour, and of the nine resource and socio-economic variables. The logit coefficients and their t-ratios provide information on the sign, magnitude and statistical significance of each influence.

Five results thus appear:

1. The most striking result is *the high significance of the risky behaviour coefficients*, whatever the type of disease, or days off sick. As Table 3 shows, the relationship between vulnerability and traffic-related accidents is highly significant for each of the eight dependent variables; and is still highly significant with work-related accidents for seven of the eight dependent variables. Hence, these proxies of risky behaviour are closely linked with higher beta, i.e. with a greater increase in the probability of being ill.

As Table 4 shows, these results are confirmed with logit regression involving overdue payments experienced during the last three years (used as a proxy of risky behaviour) instead of serious accidents: the relationship between the two highest frequencies of overdue payments and vulnerability to disease is highly significant for each of the eight dependent variables (at a level of 0.001).

2. Another important result is *the significance of the pessimistic view of employment prospects coefficient*, in particular for respiratory and psychiatric diseases. The significance of the relationship is still high for the seven diseases: (in 5 cases at a level of 0.002 and in 2 cases at a level of 0.06 according to Table 4 involving overdue payments, and in 7 cases according to Table 3 involving serious accidents); but it is weaker for days off (at a level of 0.07 according to Table 3 but non significant according to Table 4). Nevertheless, the direction of causality for these relationships is not quite obvious. For example, it would be possible that individuals with a serious disease or with many days off

sick, which involves a decreasing of their health capital, estimate that their risk of being dismissed in the next two years is increasing, mainly because of their poor health.

3. The third result, shown in Tables 3 and 4, is also very important, in terms of the economic analysis of the relationship between wealth and health: in Table 3, the data clearly shows that *higher levels of total wealth are significantly related to a decrease in the probability of suffering* from various types of diseases and of experiencing days off sick (relationships reinforcing the correlations established by health-health analysis studies according to which "richer is safer"[9]). This negative relationship is clearly significant for respiratory diseases, for the "other diseases", and for days off sick; it is weaker for psychiatric diseases (only the second level, with a significance of 0.05, and not the third); but it is not significant for the three other types of disease and, for locomotor diseases, the relationship is positive in Table 4, which means that higher levels of wealth are related to increase in the probability of suffering from locomotor diseases when overdue payments are considered.

But the direction of causality is not so obvious for these relationships. While, clearly, wealth involves health, if we consider only mild diseases (cold, headache, influenza), where the level of the householder's wealth exists before the time when these diseases and associated days off sick may occur, the same is not true for chronic diseases which may involve a serious loss in the householder’s income-earning capacity and thus of his wealth. But, according to Chapman and Hariharan [1994], who estimated the effect of wealth on the age of death, while checking for initial health status or not, the wealth-mortality link is "substantially" reduced by such a control but not eliminated[10]. Thus, for the main part, wealth involves health more than the opposite.

Once more, as Table 4 shows, these relationships are confirmed with logit regression involving overdue payments instead of serious accidents as proxies for risky behaviour, with two exceptions: the relationship with psychiatric diseases is not now significant, and the relationship between higher levels of wealth and locomotor system diseases becomes significantly positive.

4. A last important though not obvious result concerns the significance of the relationships with the proportion of total wealth represented by the share investments variable: in 3 cases out of 8 it is significant at a level of 0.05 for the highest proportion, and in 2 cases out of 8 it is significant for the lowest proportion, but not for the same types of disease. It can be observed that these relationships are complementary to former negative associations with higher total wealth variables: not significant for respiratory diseases and only slightly significant for "other diseases" when total wealth has a strong negative effect; but highly significant for digestive and locomotor diseases when total wealth is not significant.

Table 4 shows that these relationships are almost the same when serious accidents are replaced by overdue payment as proxies of risky behaviour: the significance of former relationships is retained and even increased for "other diseases" and allergic diseases. Moreover, there is a weak relationship with respiratory diseases (significant at a level of 0.1).

5. Socio-economic and socio-cultural variables seem to be important factors only for locomotor, cardiovascular, allergic and psychiatric diseases and for days off sick. In particular, lack of health insurance, female gender and greater age are positively associated with days off sick and with most of the disease types.

Surprisingly, the relationships between lower levels of income per capita and probabilities of disease or of days off are not significant. Yet numerous studies show the importance of the relationship between health and income on other samples (cf. for instance, Stronks et al. [1997], Turell et al. [1995], Abramson et al., [1982]). A way to explain this difference is to assume that level-of-wealth variables account for the main part of the correlation between health status and wealth levels[11]. Moreover, referring to the article of Chapman and Hariharan [1994], it can be observed that the probability of an individual's death over 10 years is correlated with his permanent wage, his Social Security benefits and his net worth at the beginning of the period. In our results correlations are also split between various elements of personal wealth. The distribution between these different elements may refer to the relationship with the level of risks which may be assumed to take into account some of the links with wealth.

5. Discussion

Many of the weaknesses in the evidence presented here stem from the data that was used. The remainder are related to the economic model. Nevertheless, the data allows some far-reaching conclusions to be derived.

1. The first weakness in the evidence arises from the very nature of the survey. Questions about accidents and payment difficulties were retrospective. People may well tend to rationalise their responses to some degree to try to make them more 'presentable', or exaggerate past events as a way of justifying more easily their present failures. In order to test these hypotheses and compare quantitative results with more reliable respondents' reports, a qualitative survey was conducted, in collaboration with a psychiatrist, P.

Bantman, and an anthropologist, S. Martin (see Menahem, Bantman and Martin [1994]). The conclusion was clear: none of the individuals studied appeared to have fabricated reported events occurring in their youth, even if some of them clearly presented a revised version of their experiences. Also, when family problems encountered in youth were reported in the survey, they were always an indicator of a major event, even if this was often very different from that described in the questionnaire.

2. The limitation of the interpretations of the pessimism about employment prospects variable is of another nature. Indeed, it is difficult to differentiate in this point of view of the possibilities of redundancy or crisis for a firm between what stems from the individual's forecasts of his prospects over 2 years and what stems from his tendency to anxiety. So the dual character of this variable limits the interpretation which can be deduced of the strong significance of its negative correlation with health capital. Is it more an effect of the individual's anxiety on the probability of disease or of days off? Or is-it more the relationship of safety with the probability of future unemployment which is working? In both cases, the feeling of safety is working, but not in the same way.

3. We may wonder about the significance of the relations highlighted between certain health problems and the indicators of risky behaviour. First, the occurrence of accidents in the past may have entailed health problems resulting in sequels or vulnerability on the locomotor level, which increases the probability of the outbreak of a locomotor disease, and thus for days off sick. Hence this remark diminishes the signification which can be given to the statistical correlation between locomotor diseases and accident indicators.

On the contrary, it is difficult to presuppose the existence of such direct relations between accidents or payment problems and cardiovascular, respiratory, digestive, psychiatric and allergic disorders, or even of other diseases. Furthermore the observation of indirect links between diseases which are as multi-factor as psychiatric, allergic or even digestive system disorders and the memory of traumatic events can be interpreted within the framework of the safety function. Indeed the fact that trauma-inducing memories, payment problems or serious accidents which occurred in the past, are manifested in a greater probability of anxiety feelings, insomnia and psychosomatic disorders associated on the digestive or allergy level, is in fact taken into account by two relations in the demand for safety model. The equation of "household safety production" (8) specifies that the safety S(t) is reduced when the level of risk taking R(t) increases; and the equation of "household health production" (9) specifies that the rate of depreciation δ of the health capital increases when the safety S(t) decreases (while $\delta'_S < 0$). So the combination of these two relations expresses the fact that the probability of health problems increases when the fact of having taken greater risk compromises the feeling of safety.

4. Due to the limitations imposed by the questionnaire used in the survey, the multidimensional nature of risk situations was approximated by only two variables. These limits imply a considerable simplification of the risk attitudes which were to be described. Furthermore, it is likely that some of the risky situations taken into account were the consequence of randomly determined economic difficulties or accidents rather than the consequences of risky behaviour. Due to these two limitations, statistical tests are less accurate than would have been the case with more precise indicators of risk.

Nevertheless, alternative interpretations for these results must be considered. For instance, how could the relationships between lower levels of wealth and higher probability of suffering from a respiratory disease, a psychiatric disease or, one of the "other diseases" be explained? Lower wealth seems to be a strong determinant of both an individual's lack of safety feeling and vulnerability to various diseases. We may assume that it does so by cumulating the effects of the minor traumas that occur throughout one's life. Such a mechanism might help explain why the level of wealth is related to health status, whereas this does not appear to be the case for level of income when wealth is taken into account.

However, the data is insufficient to determine which relationship is most influential. Does higher wealth become a determining factor through the safety resources which it helps to build? Or does its impact derive from the feeling of safety which it helps to instil?

5. The meaning of the relationship between health indicators and the proportion of total wealth invested in shares must be discussed. This proportion is often interpreted as an indicator of risky assets. Does it mean then that the ownership of a higher proportion of wealth invested in shares can be used as another indicator of risky behaviour? In France, the proportion of shareholders in the population is low (14.8% at the time of the survey). Moreover, shareholders are found in the richest households. This ratio is therefore probably more relevant as an indicator of risky behaviour for that population than for the whole sample. It could also mean that this indicator should be interpreted differently from other risky behaviour indicators such as the number of severe accidents or of overdue payments.

6. Conclusions

The demand for safety model aims to give a general framework for understanding the relationships between health status and variations in the uncertainty of situations or of lifestyles, for instance, those which translate into feelings of lower safety or which come from a higher level of risky behaviour. Our empirical results confirm the interest of testing this broader framework on other problems and data.

I have previously hypothesised that the demand for safety model presents a number of advantages over the family of demand for health models (cf. Menahem [1998]). As our data demonstrated, the demand for safety model allows for the integration of the consequences of inequality in family resources or any change in lifestyle into an improvement of or a decline in health capital. After this test, it still may be assumed that it does so directly, through the link between the depreciation rate of the stock of health and the degree of safety ($\delta'_S < 0$) or the risky behaviour ($\delta'_R > 0$), and, indirectly, through the parameters of the safety production function S(t). For instance, the model may help to formalise the individual's trade-offs when taking a risk, between the associated decline in health (since $\delta'_R > 0$) and the financial gain from increased time or income.

Moreover, the very nature of our results could also be very interesting for the social sciences. It seems that inequalities in health status may be determined more by differences in risky behaviour and by different levels of the feeling of safety (in particular those derived from pessimistic/optimistic prospects of employment) and by different levels of wealth than by classical inequalities in income or in social status. If these results were substantiated by further empirical testing on other data, we could then reflect on the relationship between the feeling of safety and the determinants of stress which, according some clinical results, is closely linked to the level of immunity (cf. for example Sgoutas-Emch et al. [1994] or Cacioppo et al. [1995]).

Another interest of such a model lies in the possibility it offers of putting into perspective choices regarding health vis-à-vis the different parameters of the individual’s safety. It allows comparisons between the returns of an investment in health and other investments which contribute to increasing safety, for instance by stabilising assets or expected income. Work could be undertaken to test such an interpretation framework and to further formalise the demand for safety model to this end.

Conversely, regarding deterioration in the individual's security, the demand for safety model might be particularly adapted to the description of the relationship between health status and increases in the uncertainty of the individual's environment, which have been underscored by several sociological, anthropological, epidemiological and economic studies:

◊ the association of health problems and work-related issues such as redundancy, long term unemployment, or, more generally crises in the employment market (among others Forbes [1981], Forbes and McGregor [1984], Kasl et al. [1975]);

◊ the relationship between sickness and changes in the family's equilibrium induced by divorce, domestic strife, or widowhood (among others Mirsky [1948], Holmes et al. [1957], Brown [1967]);

◊ the link between deterioration in health and precarious socio-economic circumstances marked by increased uncertainty of income and future possibilities (for instance Koegel et al. [1995]).

Attempting to model these strong relationships within a demand for safety framework would present several advantages. If it were to succeed, it would allow a sensitivity analysis of the link between health and increased uncertainty about income when age and initial wealth vary, since these variables have an impact on the individual's ability to face uncertainty by changing their accepted risk constraint or their level of insurance.

In conclusion, even if it might prove difficult to develop these theoretical perspectives, they do attest to the dynamic aspect of the research which relates health concerns to individual economic and sociological behaviour. Such a dynamic could be reinforced by taking into consideration the attitudes toward uncertainty of consumers regarding their health problems. In doing so, these studies would play an even greater part in the transformation resulting from the conceptualisations of home economics currently working on the body of consumer theory.

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Acknowledgements

The comments of Agnès Couffinhal, Paul Dourgnon and Philippe Ulmann have led me to change various elements of previous versions of this paper, and in particular to add more critical comments to my presentation of Grossman's model. Thank you. Moreover, I want to thank Philippe Ulmann for his encouragement and Michel Grignon for his helpful and critical insights, without which this demand for safety model would have remained a virtual construction and would never have been presented and hence made open to discussion. Last, an anonymous referee's comments were also very helpful, specially for improving and deepening the relationships between demand for safety, level of risk and health capital. I remain, however solely responsible for any errors or shortcomings.

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1 Specifically, several theoretical difficulties need to be resolved: the analysis of transversality conditions linking, for example, the determination of an entire life's optimal equilibrium dynamic with the initial parameters, the study of the conditions under which the model's solution could be interior, and at a more fundamental level, the complete description of uncertainty. More than any other, this choice of safety model must, indeed, rely on probabilistic formulations and regard the utility function as the maximisation of an expected utility, which demands the formulation of various consumptions, productions, and other parameters of economic activity within the framework of an uncertain world.

2 In a later stage of development of this model, it could be interesting to try to formalise the relations of the different risk aversion coefficients – considered in the Arrow-Pratt sense (-U"/U') if we extend Pratt's theorem established in the case of wealth of decreasing utility (cf. J.W. Pratt, 1964) to the cases of other uncertain goods of decreasing utility - with indicators of risk taken in different fields. In particular, knowing that the concavity of the utility function is expressed both in its relations with S and with Z, a first problem would be to translate and formalise the relations between the respective risk aversion coefficients: $-U''_S/U'_S$ *for S and* $-U''_{ZT}/U'_{ZT}$ *for the different ZTs. Another problem would correspond to interpreting economically the meaning to*

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be given to the concavity of U vis-à-vis the safety S and to its relations with the arguments of R: does it correspond to an individual's aversion to the risk of seeing his subjective safety being reduced ? And how would it be possible to understand and formalise its links with the other levels of risk R which correspond to the concavity of U vis-à-vis the risky consumptions ZTs and at the same time are arguments of the safety function S(H, R, W, E, t)?

[3] Social problems during childhood are a key determinant of risk behaviour. If we accept my estimations of level of risk taking (which is presented in four classes in Menahem, 1999, page 714), statistical data shows that, while less than half (46.4%) the individuals in the lowest level of risk-taking class declared having experienced some such event during childhood, the figure for the highest level of risk-taking class was over two-thirds (68.3%). The difference is even more marked when we consider long-term relational problems before the age of 18 years (parental discord, lack of affection, serious illness of either parent or their absence for more than one year). Individuals in the lowest level of risk-taking class are 1.6 times less likely to have experienced such events than individuals in the highest level of risk-taking class (28.6% compared to 46.6%) (ibidem, p. 711) .

[4] In a more elaborate version of this model, it could be possible, first, to enlarge it by the consideration of the relationship between the income, Y(t), and the level of risk run daily, R(t), and, second, to account for changes across time of the interest rates, and especially to account for their relationship to the level of acceptable risk. The functions Y[B(t), R(t), t] and r[t, R(t)] could indeed better take into consideration the tradeoffs between, on the one hand, expected additional income derived from marginal risk taking and, on the other hand, the induced increase of the probability of accident or damage.

[5] We can notice that this solution is equivalent to the one resulting from the maximum programmed risk constraint R(t) £ R*(t) that I borrowed from Wilde's work [1994] and which enabled me to formalise the links between payment risk and medical vulnerability risk (Menahem [1997]). Nevertheless, there is one important difference: the demand for safety model authorises choices which diverge from the optimum, at the price of lesser or greater decreases in utility, for

risks higher or lower than R(t), whereas the model associated with Wilde's programmed risk constraint permits only the latter. But, presumably, the empirical tests that validated the programmed risk models are easily transposable to demand for safety models. To fully prove the pertinence of the introduction of safety functions, proxies for random charges linked to insured risk would have to be chosen and variations of these charges introduced.

[6] *The householder's total income includes wages, various social security benefits and aids, tax-free income.*

[7] *The householder's total wealth includes his various tangible assets (personal house, property, land, farms, businesses) and his various intangible assets (bonds, shares, investment funds, savings accounts, current accounts).*

[8] *This indicator is built with the answers to two questions according the individual's employment status. If he were an employee and answered "probably" or "perhaps" to the question "do you think that in the next two years, there is a risk you may be made redundant (as part of a group or as an individual)?"; if he were self-employed and answered "probably" or "perhaps" to the question "do you think that in the next two years, your firm is likely to encounter serious difficulties?".*

[9] *A whole body of research was conducted to verify and deepen the relationships between wealth, income and health status, particularly because of theirs implications: health-health analysis - which is aimed at discussing the effectiveness of social regulations intended to reduce risk - assumes in particular that reduced income causes increased mortality, meaning that people made poorer by costly regulations are more likely to die and that net costs of some regulations are negative (cf. Lutter and Morall, [1994]).*

[10] *Chapman and Hariharan published their article in the issue specially devoted to risk-risk analysis and health-health analysis of* The Journal of Risk and Uncertainty *(vol. 8, no 1, 1994). These authors estimated precisely the effect of wealth in 1969 (as measured by wages, Social*

Security, and savings in the Retirement History Survey) on the age of death, if it occurred between 1969 and 1979, while controlling for initial health status in 1969 or not.

[11] *A way to check this equivalence is to compare these issues to the results of a model which does not include either wealth or a share of risky assets as exogenous variable. For example, such compensations can be viewed with a classic Grossman model including only the nine variables needed to formalise the production of health function: i.e. the four socio-economic resource variables (cultural assets, professional skills capital, employment status, the householder's total income), the three healthcare resource variables (nature of health insurance cover; marital status and level of urbanisation) and the two exogenous socio-demographic factors (the householder's age and gender). But the relationships with the level of the householder's total income are statistically significant only for respiratory disease (at a level of 0.03 and 0.01, respectively for the medium and lowest levels).*

Table 1: The dependent variables

DEPENDENT VARIABLES: Probability of declaring	Number	Proportion
ILLRESP: at least one respiratory disease	1,449	0.184
ILLPSY: at least one psychiatric disease	2,482	0.315
ILLDIG: at least one digestive disease	1,680	0.213
ILLCARV: at least one cardiovascular disease	2,325	0.295
ILLLOC: at least one locomotor system disease	4,057	0.515
ILLALL: at least one allergic disease	1,080	0.137
ILLOTHER: at least one other disease (out of 16, excluding respiratory, psychiatric, digestive, cardiovascular, allergic, locomotor system diseases)	4,615	0.586
DAYSOFF: at least one day off sick during the previous 3 weeks	565	0.072

Table 2: The explanatory variables

DUMMY EXPLANATORY VARIABLES	Coding	Mean
Householder's total assets value variable		
VACR0 under 20,000 French francs	0	0.28
VACR1 20,000 to 285,000 French francs	1	0.27
VACR2 285,000 to 652,000 French francs	1	0.23
VACR3 over 652,000 French francs	1	0.22
Proportion of total wealth invested in shares		
RACJ0 No share investments	0	0.85
RACJ1 share investments < 10% total wealth	1	0.09
RACJ2 share investments 10% - 30% total wealth	1	0.04
RACJ3 share investments over 30% total wealth	1	0.02
View of employment prospects		
TOPTW non pessimistic view of employment prospects	1	0.88
TPESW pessimistic view of employment prospects	1	0.12
Serious accident at any time up to present		
ACCO no serious accident	1	0.82
ACCC transport-related serious accident	1	0.08
ACCW work-related serious accident	1	0.10
Overdue payments during the last three years (standardised for age, sex and income)		
NDIF0 class 0 no overdue payment during the last three years	1	0.57
NDIF1 class 1 of expenses where household made overdue payment	1	0.17
NDIF2 class 2 of expenses where household made overdue payment	1	0.16
NDIF3 class 3 of expenses where household made overdue payment	1	0.10
Socio-demographic variables		
AG1 18 to 25 years	1	0.07
AG2 26 to 45 years	0	0.37
AG3 46 to 65 years	1	0.21
AG5 65 to 75 years	1	0.23
AG6 over 75 years	1	0.12
SEXM Male householder	0	0.66
SEXF Female householder	0	0.34
Health insurance cover variables		
SS0 No health insurance cover	1	0.01
SS1 National Health Insurance only	1	0.15
SSA NHI and private complementary insurance	1	0.60
SSM NHI and mutual fund complementary. insurance	1	0.04
SSMA NHI, mutual fund and private complementary. insurance	1	0.04
SST 100% insurance cover	1	0.16
Proximity of health care resources variables		
URB1 Rural area	1	0.16
URB2 Town with a population of 1,000 to 100,000	0	0.46
URB3 Town with a population of over 100,000	1	0.38
Non medical healthcare resource variables		
MAT1 Married	0	0.45
MAT2 Unmarried and cohabiting	1	0.05
MAT3 Single and living alone	1	0.50
Socio-economic resource variables		
PCS1 Farmer	1	0.07
PCS2 Self-employed	1	0.08
PCS3 Cadre	0	0.12
PCS4 Cadre, technician	1	0.17
PCS5 Office worker	1	0.21
PCS6 Skilled worker	1	0.22
PCS7 Unskilled worker	1	0.13
ACT1 In employment	0	0.56
ACT2 Registered unemployed	1	0.05
ACT3 Inactive, retired	1	0.39
REV1 Householder's total income less than 60% legal minimum wage/person	1	0.09
REV2 60 to 120% legal minimum wage/person	1	0.41
REV3 120 to 200% legal minimum wage/person	1	0.38
REV4 Over twice the legal minimum wage/person	0	0.12

DIP1	No academic qualifications	1	0.36
DIP2	Primary school level	1	0.34
DIP3	School certificate	1	0.14
DIP4	Baccalaureate	1	0.09
DIP5	Higher education	0	0.16

Table 3: Maximum-likelihood logit regression results for probability of being ill or of having days off sick

(with transport- or work-related serious accident as proxies of risky behaviour)

DEPENDANT VARIABLES	Number	ILLRESP	1,449		ILLPSY	2,482		ILLDIG	1,680		ILLCARV	2,325	
		Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi--Square	Parameter Estimate	Standard Error	Pr > Chi-Square
	INTERCPT	-2.7841	0.2083	0.0001	-1.3101	0.1482	0.0001	-1.8535	0.1695	0.0001	-2.6198	0.1768	0.0001
Householder's total asset value													
20,000 to 285,000 French francs	VACR1	-0.2791	0.0862	0.0012	-0.1105	0.0715	0.1224	0.00571	0.0793	0.9425	0.0542	0.0792	0.4939
285,000 to 652,000 French francs	VACR2	-0.3453	0.0950	0.0003	-0.1573	0.0797	0.0484	-0.0733	0.0889	0.4100	-0.1337	0.0867	0.1229
over 652,000 French francs	VACR3	-0.5199	0.1149	0.0001	-0.1395	0.0931	0.1340	-0.0856	0.1047	0.4133	-0.0485	0.1008	0.6302
share investments < 10% total wealth	RACJ1	0.1730	0.1198	0.1485	0.1844	0.0973	0.0581	-0.0341	0.1125	0.7619	0.0250	0.1050	0.8120
share investments 10%-30% total wealth	RACJ2	0.0127	0.1838	0.9448	0.0911	0.1413	0.5193	-0.00446	0.1625	0.9781	0.1282	0.1526	0.4010
share investments over 30% total wealth	RACJ3	-0.1861	0.2330	0.4246	-0.0800	0.1696	0.6372	0.4452	0.1714	0.0094	0.1081	0.1869	0.5631
Pessimistic view of employment prospects	TPESW	0.4925	0.1088	0.0001	0.3921	0.0849	0.0001	0.2285	0.0977	0.0194	0.2163	0.0993	0.0294
Transport-related serious accident	ACCC	0.3599	0.1041	0.0005	0.3731	0.0876	0.0001	0.2814	0.0963	0.0035	0.2197	0.0985	0.0257
Work-related serious accident	ACCW	0.4853	0.0947	0.0001	0.2499	0.0861	0.0037	0.2148	0.0945	0.0230	0.1630	0.0901	0.0705
Female householder	SEXF	0.1109	0.0939	0.2377	0.6830	0.0770	0.0001	0.4615	0.0874	0.0001	0.6582	0.0850	0.0001
AG1 18 to 25 years	AG1	-0.3109	0.1614	0.0540	-0.2952	0.1120	0.0084	0.0581	0.1252	0.6426	-0.3156	0.1489	0.0341
AG3 46 to 65 years	AG3	0.6537	0.0963	0.0001	-0.0819	0.0758	0.2801	0.0900	0.0865	0.2985	0.8728	0.0832	0.0001
AG5 65 to 75 years	AG5	0.8508	0.1306	0.0001	-0.1491	0.1086	0.1696	0.1607	0.1204	0.1819	1.2268	0.1140	0.0001
AG6 over 75 years	AG6	0.9582	0.1486	0.0001	-0.3230	0.1277	0.0114	0.3182	0.1383	0.0214	1.3099	0.1328	0.0001
No health insurance cover	SS0	0.2660	0.2733	0.3304	-0.3272	0.2565	0.2020	0.5831	0.2424	0.0162	0.1464	0.2501	0.5584
National Health Insurance only	SS1	0.0175	0.0960	0.8557	-0.0864	0.0781	0.2684	-0.1123	0.0890	0.2069	-0.1258	0.0857	0.1423
NHI & private complementary insurance	SSA	0.1569	0.1717	0.3610	-0.0869	0.1389	0.5316	-0.2483	0.1665	0.1359	-0.0846	0.1530	0.5805
NHI, mutual fund & private complementary insurance	SSMA	-0.0725	0.1902	0.7032	-0.0595	0.1405	0.6721	-0.0672	0.1615	0.6775	-0.3323	0.1681	0.0480
100%insrance cover	SST	0.9192	0.0796	0.0001	0.4197	0.0743	0.0001	0.4968	0.0786	0.0001	0.7569	0.0756	0.0001
Rural area	URB1	-0.2084	0.0944	0.0273	-0.2408	0.0802	0.0027	-0.1283	0.0887	0.1480	-0.0486	0.0812	0.5494
Town with a population of over 100,000	URB3	0.0100	0.0721	0.8892	0.0399	0.0589	0.4976	0.0922	0.0657	0.1605	-0.0270	0.0653	0.6785
Unmarried and cohabiting	MAT2	-0.0156	0.1660	0.9250	-0.1427	0.1326	0.2818	-0.0831	0.1473	0.5726	0.0304	0.1510	0.8406
Single and living alone	MAT3	0.0422	0.0935	0.6513	0.2056	0.0775	0.0080	-0.0180	0.0881	0.8383	0.0178	0.0850	0.8340
Farmer	PCS1	0.3446	0.1806	0.0563	-0.3355	0.1524	0.0277	-0.3265	0.1671	0.0508	0.2980	0.1608	0.0640
Self-employed	PCS2	0.1199	0.1712	0.4836	0.0155	0.1328	0.9072	-0.1623	0.1498	0.2786	0.4115	0.1495	0.0059
Cadre, technician	PCS4	0.1620	0.1422	0.2547	-0.1517	0.1061	0.1529	-0.2177	0.1202	0.0701	0.4683	0.1239	0.0002
Office worker	PCS5	0.2158	0.1524	0.1567	0.1102	0.1154	0.3399	-0.1308	0.1300	0.3143	0.3259	0.1351	0.0158
Skilled worker	PCS6	0.1274	0.1543	0.4090	-0.1130	0.1179	0.3380	-0.1554	0.1321	0.2393	0.3121	0.1368	0.0226
Unskilled worker	PCS7	-0.0845	0.1684	0.6159	-0.2653	0.1322	0.0447	-0.2733	0.1471	0.0631	0.2047	0.1492	0.1702
Registered unemployed	ACT2	0.5181	0.1430	0.0003	0.6756	0.1166	0.0001	0.0924	0.1391	0.5063	0.1887	0.1346	0.1609
Inactive, retired	ACT3	0.3418	0.1138	0.0027	0.4726	0.0954	0.0001	0.2981	0.1056	0.0048	0.3108	0.0987	0.0016
Householder's total income less than 60% legal min wage/person	REV1	0.2885	0.1672	0.0843	-0.0684	0.1361	0.6153	-0.0367	0.1523	0.8095	0.1160	0.1472	0.4305
60 to 120% legal min wage/person	REV2	0.1758	0.1333	0.1872	0.0644	0.1028	0.5309	0.00889	0.1159	0.9389	0.0744	0.1142	0.5144
120 to 200% legal minimum wage/person	REV3	0.1573	0.1243	0.2057	0.0166	0.0941	0.8602	-0.00160	0.1065	0.9880	0.0208	0.1056	0.8435
No academic qualifications	DIP1	0.2164	0.1788	0.2263	0.00277	0.1266	0.9825	0.2694	0.1455	0.0641	0.2492	0.1486	0.0935
Primary school level	DIP2	0.1328	0.1756	0.4497	0.1141	0.1230	0.3533	0.1519	0.1425	0.2862	0.2381	0.1449	0.1003
School certificate	DIP3	0.2790	0.1796	0.1204	0.0609	0.1248	0.6256	0.2157	0.1440	0.1342	0.0298	0.1503	0.8429
Baccalaureate	DIP4	0.2969	0.1858	0.1101	-0.00136	0.1279	0.9915	0.0259	0.1496	0.8625	-0.2365	0.1604	0.1403
		Somers' D	0.429		Somers' D	0.334		Somers' D	0.277		Somers' D	0.527	
		Gamma	0.431		Gamma	0.336		Gamma	0.279		Gamma	0.529	
		Tau-a	0.129		Tau-a	0.144		Tau-a	0.093		Tau-a	0.219	
		c	0.715		c	0.667		c	0.638		c	0.764	

DEPENDANT VARIABLES	Number	ILLLOC	4,057		ILLALL	1,080		ILLOTHER	4,615		DAYSOFF	565	
		Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square
	INTERCPT	-1.0256	0.1378	0.0001	-1.7825	0.1806	0.0001	0.0539	0.1356	0.6911	-3.4186	0.2985	0.0001
Householder's total asset value													
20,000 to 285,000 French francs	VACR1	0.1091	0.0678	0.1076	0.0567	0.0957	0.5538	-0.0147	0.0689	0.8308	-0.1928	0.1210	0.1112
285,000 to 652,000 French francs	VACR2	0.1127	0.0747	0.1316	0.0482	0.1074	0.6533	-0.1846	0.0754	0.0143	-0.3925	0.1393	0.0048
over 652,000 French francs	VACR3	0.0971	0.0860	0.2588	0.1076	0.1223	0.3791	-0.3121	0.0862	0.0003	-0.4494	0.1667	0.0070
share investments < 10% total wealth	RACJ1	0.1011	0.0904	0.2635	0.2867	0.1193	0.0163	0.1647	0.0905	0.0688	0.2146	0.1799	0.2330
share investments 10% - 30% total wealth	RACJ2	0.3681	0.1323	0.0054	0.1811	0.1727	0.2943	0.2373	0.1333	0.0749	0.4874	0.2400	0.0423
share investments over 30% total wealth	RACJ3	0.1940	0.1558	0.2130	0.1868	0.1972	0.3434	-0.2005	0.1541	0.1932	0.1208	0.3032	0.6903
Pessimistic view of employment prospects	TPESW	0.3105	0.0771	0.0001	0.2338	0.1056	0.0268	0.2337	0.0770	0.0024	0.2572	0.1418	0.0697
Transport-related serious accident	ACCC	0.3832	0.0861	0.0001	0.2873	0.1102	0.0091	0.2680	0.0878	0.0023	0.4021	0.1384	0.0037
Work-related serious accident	ACCW	0.6155	0.0824	0.0001	0.3851	0.1086	0.0004	0.1980	0.0814	0.0150	0.3612	0.1334	0.0068
Female householder	SEXF	0.5895	0.0737	0.0001	0.2775	0.1030	0.0070	0.4210	0.0741	0.0001	-0.0633	0.1354	0.6400
AG1 18 to 25 years	AG1	0.0459	0.1009	0.6491	0.3107	0.1296	0.0165	-0.0147	0.1001	0.8829	0.0515	0.1856	0.7816
AG3 46 to 65 years	AG3	0.3914	0.0675	0.0001	-0.0875	0.0965	0.3644	0.1872	0.0678	0.0058	0.2934	0.1275	0.0214
AG5 65 to 75 years	AG5	0.70_41	0.1008	0.0001	-0.1274	0.1428	0.3722	0.0593	0.1031	0.5650	-0.2103	0.1867	0.2598
AG6 over 75 years	AG6	0.7910	0.1224	0.0001	-0.5020	0.1824	0.0059	0.0910	0.1265	0.4718	-0.4555	0.2273	0.0451
No health insurance cover	SS0	-0.0306	0.2263	0.8926	0.2244	0.3046	0.4613	-0.0151	0.2232	0.9461	-0.1097	0.4752	0.8175
National Health Insurance only	SS1	-0.2060	0.0721	0.0043	-0.1666	0.1067	0.1185	-0.1948	0.0709	0.0060	-0.1533	0.1474	0.2982
NHI & private complementary insurance	SSA	-0.0870	0.1248	0.4855	-0.4074	0.2065	0.0485	-0.3066	0.1222	0.0121	-0.1816	0.2691	0.4999
NHI, mutual fund & private complementary insurance	SSMA	-0.0571	0.1242	0.6458	0.1592	0.1669	0.3400	-0.3350	0.1226	0.0063	-0.5367	0.3167	0.0901
100%insrance cover	SST	0.2992	0.0745	0.0001	0.1776	0.1022	0.0823	0.8411	0.0818	0.0001	0.9548	0.1178	0.0001
Rural area	URB1	-0.0720	0.0710	0.3104	0.2408	0.1026	0.0189	-0.0949	0.0708	0.1802	-0.0677	0.1418	0.6333
Town with a population of over 100,000	URB3	-0.0505	0.0557	0.3643	0.2366	0.0775	0.0023	0.1367	0.0563	0.0151	0.0925	0.1025	0.3666
Unmarried and cohabiting	MAT2	0.0475	0.1131	0.6746	0.2715	0.1479	0.0664	-0.1363	0.1113	0.2209	-0.00753	0.2147	0.9720
Single and living alone	MAT3	-0.1901	0.0707	0.0072	0.00227	0.1019	0.9822	0.0422	0.0700	0.5466	0.0870	0.1313	0.5076
Farmer	PCS1	0.2800	0.1378	0.0421	-0.4907	0.2030	0.0156	-0.1154	0.1372	0.4003	0.4442	0.3053	0.1457
Self-employed	PCS2	-0.00756	0.1223	0.9507	-0.5252	0.1818	0.0039	0.0437	0.1225	0.7213	0.7634	0.2671	0.0043
Cadre, technician	PCS4	0.0427	0.0973	0.6603	-0.0796	0.1256	0.5265	-0.0478	0.0964	0.6198	0.7024	0.2248	0.0018
Office worker	PCS5	0.2438	0.1081	0.0241	-0.0852	0.1423	0.5495	-0.0890	0.1081	0.4101	0.6711	0.2413	0.0054
Skilled worker	PCS6	0.2283	0.1083	0.0351	-0.2055	0.1453	0.1573	-0.1725	0.1078	0.1095	0.6375	0.2424	0.0085
Unskilled worker	PCS7	0.1271	0.1221	0.2976	-0.5674	0.1752	0.0012	-0.2247	0.1222	0.0659	0.5442	0.2634	0.0388
Registered unemployed	ACT2	-0.0417	0.1124	0.7104	0.2861	0.1514	0.0587	0.0174	0.1119	0.8763	-0.0616	0.2080	0.7671
Inactive, retired	ACT3	0.00359	0.0891	0.9678	0.0791	0.1247	0.5259	0.3407	0.0911	0.0002	0.1242	0.1594	0.4361
Householder's total income	REV1	-0.0166	0.1241	0.8938	0.0309	0.1759	0.8606	0.0360	0.1242	0.7723	0.0337	0.2384	0.8875
less than 60% legal min wage/person													
60 to 120% legal min wage/person	REV2	-0.0123	0.0952	0.8971	0.0518	0.1292	0.6886	0.0499	0.0951	0.5999	0.0111	0.1874	0.9527
120 to 200% legal minimum wage/person	REV3	-0.0629	0.0871	0.4702	0.0556	0.1157	0.6309	0.0393	0.0866	0.6504	-0.0286	0.1752	0.8705
No academic qualifications	DIP1	0.4068	0.1169	0.0005	-0.3961	0.1489	0.0078	-0.0323	0.1153	0.7794	0.1036	0.2442	0.6713
Primary school level	DIP2	0.4004	0.1137	0.0004	-0.3550	0.1433	0.0133	-0.0724	0.1120	0.5182	0.1358	0.2389	0.5697
School certificate	DIP3	0.2559	0.1158	0.0271	-0.2504	0.1433	0.0806	-0.0645	0.1138	0.5708	0.2542	0.2414	0.2923
Baccalaureate	DIP4	0.1115	0.1188	0.3477	-0.2836	0.1462	0.0524	-0.0586	0.1161	0.6136	-0.1800	0.2671	0.5003
		Somers' D	0.322		Somers' D	0.243		Somers' D	0.289		Somers' D	0.315	
		Gamma	0.324		Gamma	0.245		Gamma	0.291		Gamma	0.320	
		Tau-a	0.161		Tau-a	0.057		Tau-a	0.140		Tau-a	0.042	
		c	0.661		c	0.621		c	0.645		c	0.657	

Table 4: Maximum-likelihood logit regression results for probability of being ill or of having days off sick
(with overdue payment class as proxies of risky behaviour)

DEPENDANT VARIABLES	Number	ILLRESP	1,449		ILLPSY	2,482		ILLDIG	1,680		ILLCARV	2,325	
		Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi--Square	Parameter Estimate	Standard Error	Pr > Chi-Square
	INTERCPT	-2.9102	0.2108	0.0001	-1.4743	0.1510	0.0001	-1.9383	0.1721	0.0001	-2.6824	0.1791	0.0001
Householder's total asset value													
20,000 to 285,000 French francs	VACR1	-0.2166	0.0871	0.0129	-0.0233	0.0727	0.7486	0.0695	0.0804	0.3875	0.0898	0.0800	0.2617
285,000 to 652,000 French francs	VACR2	-0.2889	0.0957	0.0025	-0.0789	0.0806	0.3276	-0.0171	0.0899	0.8490	-0.1010	0.0874	0.2477
over 652,000 French francs	VACR3	-0.4594	0.1154	0.0001	-0.0568	0.0940	0.5458	-0.0288	0.1056	0.7851	-0.0134	0.1014	0.8951
share investments < 10% total wealth	RACJ1	0.1993	0.1198	0.0962	0.2146	0.0976	0.0279	-0.0187	0.1127	0.8681	0.0369	0.1052	0.7260
share investments 10% -30% total wealth	RACJ2	0.00241	0.1841	0.9896	0.1119	0.1419	0.4302	0.00528	0.1629	0.9742	0.1299	0.1529	0.3956
share investments over 30% total wealth	RACJ3	-0.1678	0.2328	0.4709	-0.0600	0.1703	0.7247	0.4603	0.1718	0.0074	0.1170	0.1871	0.5318
Pessimistic view of employment prospects	TPESW	0.4528	0.1090	0.0001	0.3334	0.0855	0.0001	0.1838	0.0983	0.0615	0.1922	0.0997	0.0538
Class 1 of household overdue payment	NDIF1	0.2207	0.0910	0.0153	0.2225	0.0742	0.0027	0.0173	0.0850	0.8386	0.1019	0.0815	0.2111
class 2 of household overdue payment	NDIF2	0.4209	0.0911	0.0001	0.5235	0.0748	0.0001	0.3100	0.0836	0.0002	0.2056	0.0842	0.0146
class 3 of household overdue payment	NDIF3	0.5279	0.1123	0.0001	0.7061	0.0921	0.0001	0.5585	0.1010	0.0001	0.3225	0.1048	0.0021
Female householder	SEXF	0.0128	0.0931	0.8904	0.6198	0.0767	0.0001	0.4094	0.0870	0.0001	0.6202	0.0843	0.0001
AG1 18 to 25 years	AG1	-0.2805	0.1614	0.0822	-0.2407	0.1125	0.0324	0.1062	0.1255	0.3973	-0.2901	0.1491	0.0517
AG3 46 to 65 years	AG3	0.7135	0.0963	0.0001	-0.0252	0.0761	0.7409	0.1319	0.0867	0.1282	0.8991	0.0834	0.0001
AG5 65 to 75 years	AG5	0.9615	0.1318	0.0001	-0.0293	0.1097	0.7896	0.2485	0.1215	0.0408	1.2817	0.1151	0.0001
AG6 over 75 years	AG6	1.0870	0.1510	0.0001	-0.1656	0.1295	0.2011	0.4280	0.1403	0.0023	1.3779	0.1349	0.0001
No health insurance cover	SS0	0.1970	0.2742	0.4726	-0.4283	0.2587	0.0978	0.5203	0.2436	0.0327	0.1070	0.2503	0.6692
National Health Insurance only	SS1	0.00409	0.0959	0.9660	-0.1185	0.0785	0.1311	-0.1336	0.0892	0.1343	-0.1363	0.0857	0.1118
NHI & private complementary insurance	SSA	0.1658	0.1716	0.3340	-0.0882	0.1396	0.5276	-0.2460	0.1668	0.1404	-0.0819	0.1531	0.5928
NHI, mutual fund & private complementary Insurance	SSMA	-0.0462	0.1902	0.8082	-0.0295	0.1409	0.8343	-0.0422	0.1617	0.7942	-0.3208	0.1682	0.0565
100%insrance cover	SST	0.9211	0.0796	0.0001	0.4140	0.0745	0.0001	0.4937	0.0788	0.0001	0.7574	0.0756	0.0001
Rural area	URB1	-0.1801	0.0941	0.0556	-0.2210	0.0803	0.0059	-0.1118	0.0886	0.2072	-0.0375	0.0812	0.6440
Town with a population of over 100,000	URB3	0.00646	0.0723	0.9288	0.0320	0.0592	0.5885	0.0837	0.0660	0.2045	-0.0309	0.0654	0.6368
Unmarried and cohabiting	MAT2	-0.0201	0.1654	0.9033	-0.1575	0.1329	0.2359	-0.0930	0.1474	0.5278	0.0282	0.1508	0.8515
Single and living alone	MAT3	0.0461	0.0933	0.6212	0.2073	0.0778	0.0077	-0.0160	0.0882	0.8557	0.0217	0.0850	0.7983
Farmer	PCS1	0.3898	0.1805	0.0308	-0.2954	0.1528	0.0532	-0.2912	0.1673	0.0817	0.3181	0.1609	0.0481
Self-employed	PCS2	0.1058	0.1712	0.5368	0.00208	0.1333	0.9875	-0.1704	0.1501	0.2563	0.4043	0.1496	0.0069
Cadre, technician	PCS4	0.1673	0.1421	0.2390	-0.1604	0.1063	0.1315	-0.2190	0.1203	0.0686	0.4674	0.1239	0.0002
Office worker	PCS5	0.2261	0.1524	0.1377	0.1046	0.1159	0.3665	-0.1302	0.1303	0.3176	0.3252	0.1351	0.0161
Skilled worker	PCS6	0.1686	0.1539	0.2732	-0.0926	0.1180	0.4328	-0.1346	0.1320	0.3078	0.3243	0.1367	0.0176
Unskilled worker	PCS7	-0.0470	0.1679	0.7796	-0.2609	0.1324	0.0489	-0.2631	0.1470	0.0734	0.2144	0.1490	0.1500
Registered unemployed	ACT2	0.4788	0.1435	0.0008	0.6114	0.1174	0.0001	0.0269	0.1403	0.8480	0.1606	0.1352	0.2349
Inactive, retired	ACT3	0.3580	0.1139	0.0017	0.4936	0.0958	0.0001	0.3005	0.1059	0.0045	0.3171	0.0988	0.0013
Householder's total income less than 60% legal min wage/person	REV1	0.1077	0.1695	0.5251	-0.2802	0.1386	0.0433	-0.1885	0.1549	0.2237	0.0193	0.1496	0.8975
60 to 120% legal min wage/person	REV2	0.0698	0.1344	0.6035	-0.0613	0.1041	0.5561	-0.0729	0.1172	0.5342	0.0197	0.1153	0.8646
120 to 200% legal minimum wage/person	REV3	0.1196	0.1243	0.3358	-0.0242	0.0943	0.7975	-0.0284	0.1067	0.7899	0.000243	0.1057	0.9982
No academic qualifications	DIP1	0.2564	0.1787	0.1512	0.0110	0.1270	0.9310	0.2720	0.1455	0.0616	0.2599	0.1486	0.0802
Primary school level	DIP2	0.1737	0.1756	0.3225	0.1292	0.1233	0.2947	0.1606	0.1425	0.2597	0.2503	0.1449	0.0841
School certificate	DIP3	0.3085	0.1796	0.0859	0.0701	0.1252	0.5756	0.2224	0.1441	0.1227	0.0388	0.1503	0.7963
Baccalaureate	DIP4	0.3113	0.1862	0.0946	0.0117	0.1283	0.9276	0.0338	0.1498	0.8217	-0.2315	0.1606	0.1495
		Somers' D	0.429		Somers' D	0.350		Somers' D	0,290		Somers' D	0.528	
		Gamma	0.431		Gamma	0.351		Gamma	0,292		Gamma	0.529	
		Tau-a	0.129		Tau-a	0.151		Tau-a	0,097		Tau-a	0.220	
		c	0.715		c	0.675		c	0,645		c	0.764	

DEPENDANT VARIABLES	Number	ILLLOC	4,057		ILLALL	1,080		ILLOTHER	4,615		DAYSOFF	565	
		Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square	Parameter Estimate	Standard Error	Pr > Chi-Square
	INTERCPT	-1,1449	0,1398	0.0001	-1.8684	0.1837	0.0001	-0.0778	0.1378	0.5722	-3.5696	0.3024	0.0001
Householder's total asset value													
20,000 to 285,000 French francs	VACR1	0.1784	0,0685	0,0093	0.1181	0.0970	0.2232	0.0482	0.0697	0.4895	-0.0963	0.1228	0.4329
285,000 to 652,000 French francs	VACR2	0.1724	0,0752	0,0219	0.1017	0.1084	0.3481	-0.1300	0.0760	0.0871	-0.3109	0.1407	0.0271
over 652,000 French francs	VACR3	0.1593	0,0864	0,0653	0.1596	0.1233	0.1957	-0.2524	0.0868	0.0036	-0.3711	0.1679	0.0271
share investments < 10% total wealth	RACJ1	0.1234	0,0902	0,1713	0.3042	0.1195	0.0109	0.1895	0.0907	0.0368	0.2486	0.1804	0.1680
share investments 10% -30% total wealth	RACJ2	0.3724	0,1327	0,0050	0.1878	0.1727	0.2769	0.2577	0.1339	0.0542	0.5078	0.2403	0.0346
share investments over 30% total wealth	RACJ3	0.2113	0,1554	0,1740	0.1987	0.1974	0.3142	-0.1843	0.1544	0.2328	0.1458	0.3041	0.6315
Pessimistic view of employment prospects	TPESW	0.2698	0.0772	0.0005	0.1982	0.1060	0.0615	0.1948	0.0775	0.0119	0.1957	0.1426	0.1699
Class 1 of household overdue payment	NDIF1	0.2332	0.0683	0.0006	0.0941	0.0974	0.3340	0.2516	0.0687	0.0002	0.1263	0.1346	0.3479
class 2 of household overdue payment	NDIF2	0.4102	0.0709	0.0001	0.3156	0.0964	0.0011	0.4084	0.0720	0.0001	0.5237	0.1253	0.0001
class 3 of household overdue payment	NDIF3	0.5607	0.0885	0.0001	0.4905	0.1164	0.0001	0.4547	0.0902	0.0001	0.7749	0.1444	0.0001
Female householder	SEXF	0.4922	0.0730	0.0001	0.2099	0.1026	0.0409	0.3742	0.0738	0.0001	-0.1674	0.1353	0.2159
AG1 18 to 25 years	AG1	0.0736	0.1009	0.4658	0.3404	0.1298	0.0087	0.0175	0.1006	0.8617	0.1122	0.1856	0.5456
AG3 46 to 65 years	AG3	0.4571	0.0675	0.0001	-0.0381	0.0965	0.6929	0.2294	0.0680	0.0007	0.3565	0.1275	0.0052
AG5 65 to 75 years	AG5	0.8179	0.1015	0.0001	-0.0400	0.1434	0.7801	0.1457	0.1040	0.1614	-0.0656	0.1880	0.7273
AG6 over 75 years	AG6	0.9176	0.1238	0.0001	-0.4060	0.1840	0.0273	0.2043	0.1280	0.1106	-0.2817	0.2304	0.2214
No health insurance cover	SS0	-0.0969	0.2257	0.6676	0.1622	0.3054	0.5955	-0.0772	0.2240	0.7303	-0.1988	0.4767	0.6767
National Health Insurance only	SS1	-0.2268	0.0720	0.0016	-0.1901	0.1070	0.0756	-0.2163	0.0712	0.0024	-0.1905	0.1479	0.1978
NHI & private complementary insurance	SSA	-0.0834	0.1243	0.5024	-0.4078	0.2066	0.0484	-0.3101	0.1226	0.0114	-0.1787	0.2698	0.5077
NHI, mutual fund & private complementary insurance	SSMA	-0.0331	0.1241	0.7898	0.1819	0.1670	0.2761	-0.3184	0.1229	0.0096	-0.5001	0.3171	0.1148
100%insrance cover	SST	0.3049	0.0744	0.0001	0.1792	0.1022	0.0796	0.8383	0.0819	0.0001	0.9555	0.1182	0.0001
Rural area	URB1	-0.0494	0.0709	0.4853	0.2582	0.1025	0.0118	-0.0821	0.0710	0.2472	-0.0427	0.1416	0.7629
Town with a population of over 100,000	URB3	-0.0551	0.0556	0.3225	0.2324	0.0776	0.0028	0.1331	0.0564	0.0183	0.0817	0.1030	0.4279
Unmarried and cohabiting	MAT2	0.0393	0.1127	0.7274	0.2614	0.1479	0.0770	-0.1419	0.1116	0.2035	-0.0311	0.2151	0.8850
Single and living alone	MAT3	-0.1833	0.0705	0.0093	0.00486	0.1020	0.9620	0.0435	0.0702	0.5355	0.0903	0.1315	0.4926
Farmer	PCS1	0.3272	0.1376	0.0174	-0.4472	0.2028	0.0274	-0.0911	0.1375	0.5075	0.5082	0.3055	0.0962
Self-employed	PCS2	-0.0142	0.1223	0.9074	-0.5304	0.1819	0.0035	0.0363	0.1228	0.7678	0.7567	0.2677	0.0047
Cadre, technician	PCS4	0.0408	0.0971	0.6742	-0.0820	0.1256	0.5139	-0.0569	0.0966	0.5558	0.7089	0.2249	0.0016
Office worker	PCS5	0.2525	0.1081	0.0195	-0.0811	0.1424	0.5688	-0.0939	0.1083	0.3861	0.6824	0.2419	0.0048
Skilled worker	PCS6	0.2727	0.1081	0.0116	-0.1712	0.1448	0.2370	-0.1602	0.1078	0.1373	0.6778	0.2423	0.0052
Unskilled worker	PCS7	0.1665	0.1217	0.1712	-0.5468	0.1749	0.0018	-0.2196	0.1223	0.0725	0.5691	0.2634	0.0307
Registered unemployed	ACT2	-0.0846	0.1126	0.4526	0.2410	0.1521	0.1132	-0.0262	0.1126	0.8161	-0.1333	0.2092	0.5239
Inactive, retired	ACT3	0.0174	0.0890	0.8447	0.0882	0.1248	0.4797	0.3602	0.0914	0.0001	0.1326	0.1600	0.4071
Householder's total income less than 60% legal min wage/person	REV1	-0.1776	0.1256	0.1574	-0.1046	0.1783	0.5573	-0.0992	0.1260	0.4313	-0.2264	0.2429	0.3514
60 to 120% legal min wage/person	REV2	-0.0997	0.0959	0.2985	-0.0248	0.1306	0.8492	-0.0329	0.0960	0.7315	-0.1462	0.1898	0.4412
120 to 200% legal minimum wage/person	REV3	-0.0868	0.0870	0.3183	0.0325	0.1159	0.7794	0.0148	0.0868	0.8644	-0.0952	0.1754	0.5874
No academic qualifications	DIP1	0.4297	0.1168	0.0002	-0.3835	0.1487	0.0099	-0.0262	0.1156	0.8204	0.1279	0.2443	0.6005
Primary school level	DIP2	0.4265	0.1135	0.0002	-0.3373	0.1431	0.0184	-0.0640	0.1122	0.5688	0.1732	0.2390	0.4686
School certificate	DIP3	0.2689	0.1157	0.0200	-0.2405	0.1432	0.0932	-0.0625	0.1141	0.5841	0.2811	0.2416	0.2447
Baccalaureate	DIP4	0.1200	0.1188	0.3124	-0.2743	0.1462	0.0607	-0.0528	0.1164	0.6502	-0.1513	0.2676	0.5718
		Somers' D	0.319		Somers' D	0,242		Somers' D	0.299		Somers' D	0.332	
		Gamma	0.320		Gamma	0,245		Gamma	0.300		Gamma	0.337	
		Tau-a	0.159		Tau-a	0,057		Tau-a	0.145		Tau-a	0.044	
		c	0.660		c	0,621		c	0.649		c	0.666	