What Would be the Optimal Subsidy to Encourage Subscription to Supplementary Health Insurance?

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Health insurance reduces financial risk and plays an important role in low income households' access to care. However, these same households are the least likely to benefit from supplementary health insurance coverage. The average monthly income in households without supplementary coverage is 844€ against 1,382€ in households with supplementary coverage. Encouraging low income households to purchase supplementary health insurance can be achieved by subsidising part of the premium, an approach favoured by the ACS scheme introduced in France. The question is then to determine the optimal amount of financial assistance that will ensure an effective improvement in access to supplementary health insurance.

The aim here is to simulate the impact of different subsidy levels on the decision to purchase supplementary health insurance among households situated just above the CMU-C income threshold. To carry out this simulation, individual supplementary health insurance purchase behaviours were observed. According to our results, three quarters of potential ACS beneficiaries would accept paying a monthly premium of 50 Euros if the subsidy covered 80% of the premium.

*I*n France, the statutory health insurance scheme only partially covers health care costs. To counter the financial risk that can result from this partial cover, individuals are able to purchase supplementary health insurance.

Empirical studies carried out on French data show that individuals without supplementary health coverage are not only exposed to greater financial risks but equally consume less care than the rest of the population (Buchmueller *et al.*, 2004) and are in general poorer than average. Inequalities in supplementary health coverage thus translate into inequalities in access to health care.

In order to allow individuals with the lowest incomes better access to care, the Supplementary Universal Health Insurance scheme[1] (CMU-C) was instituted on January 1st 2000. It provides free supplementary health coverage for households situated below a certain income threshold. Since January 1st 2005, a second scheme addresses households with incomes situated just above the CMU-C eligibility threshold. The ACS scheme[2] subsidises the purchase of supplementary health insurance for households with income levels up to a maximum of 20% above the income cut-off for CMU (since January 1st 2007). The benefit, presented as a voucher, is used as a rebate on the individual's supplementary insurance premium.

Yet, despite the generosity of the ACS scheme (an average 50% subsidy on the cost of an average premium paid by ACS beneficiaries in 2006), demand remains

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1 Copy editor's note: Financial aid for purchasing a supplementary health insurance (Aide à l'acquisition d'une complémentaire santé).
2 Copy editor's note: Free of charge supplementary health insurance for low-income individuals.

relatively low: 240,659 vouchers were used in November 2006, 329,549 in November 2007 and 441,948 in November 2008, for an eligible population estimated at 2 million individuals in 2005 (*Lettre d'information du fonds CMU,* 2009).

One of the theories advanced to explain the scheme's failure suggests that the main cause could stem from potential beneficiaries' lack of information. It is effectively possible that information concerning the scheme failed to reach its target population and that potential beneficiaries were discouraged by administrative procedures. We propose an alternative hypothesis: the decision not to purchase supplementary health coverage is explained by insufficient financial assistance rather than a lack of information. On this basis, we aim to answer the following question: what optimal subsidy would guarantee households with an income level close to the CMU-C eligibility threshold access to supplementary health insurance?

Understanding rational behaviour regarding supplementary health coverage in order to model optimal aid

According to our hypothesis, even subsidised insurance premiums remain too expensive and thus inaccessible to potential ACS scheme beneficiaries. This hypothesis appears reasonable since the CMU-C

scheme itself was based on the premise that below a given income level, no-one rationally desires purchasing supplementary insurance, whatever the price. Furthermore, the non-insured interrogated during the course of surveys often quote the high price of insurance premiums as the main reason for not having supplementary health coverage [Marcial and Saint Pol (de), 2007]. Finally, a recent study effectuated by IRDES [Kambia-Chopin *et al.*, 2008] shows that the financial burden (or rate of effort) represented by a supplementary health premium, even modest, remains expensive for low income households close to the CMU-C eligibility threshold. It is not inconceivable that the cost of supplementary health insurance remains prohibitive for certain households even at the subsidy level proposed by the ACS scheme from 2005 to 2008.

Individuals' decisions to purchase supplementary health insurance are determined by three parameters: the value they attribute to the fact of being covered, the cost and their overall budget.

The value individuals place on the fact of being covered depends on their degree of aversion to the financial risk occasioned by health expenditures and the value they place on health.

The insurance premium is obviously modified by the ACS subsidy; it reduces the 'apparent' cost (visible to the consumer)

of supplementary health coverage and, all other factors being equal, is expected to increase the percentage of individuals purchasing supplementary insurance.

The main parameter of interest here is finally income level: why do low income consumers prefer not to purchase supplementary health insurance even with a subsidy that considerably reduces the premium? The hypothesis on which the CMU-C and ACS schemes are founded reasons that up to the CMU-C income cut-off, no-one will purchase supplementary insurance even subsidised at over 90%. One of the reasons explaining price insensitivity is a budget constraint that does not authorise spending on items other than the basic necessities of life: even if the price of other goods and services is low, individuals do not authorise themselves to consume them. Supplementary health insurance is not considered as a basic necessity of life (see Methods insert). However, following the same hypothesis, above the said income threshold, the percentage of individuals desiring to purchase low-cost supplementary health insurance will increase in proportion to income. We can thus obtain the desired behaviour without massively transferring resources to these modest households. Public fund managers effectively desire obtaining a maximal response (purchase of supplementary health insurance) for a minimal transfer to avoid a windfall effect.

To determine the optimal subsidy amount and shed light on the limited growth of the current scheme, it is first necessary to define and estimate the empirical relationship between the quantity of supplementary insurance consumed on the one hand, and the three parameters, 'taste', price and income on the other.

Modelling the demand for supplementary health coverage by unit price and income

Measuring the relationship between price and demand for insurance coverage requires a means of measuring the amount of coverage offered by these supplementary insurance contracts and the cost per unit of insurance for a given amount of coverage. In this case, amount of coverage refers to the total reimbursement an individual can expect during the course of the year cove-

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From the theoretical model explaining the rational choice of amount of coverage, we can deduce a relationship between cost per unit and amount of coverage demanded without directly observing it. The theoretical model allows us to express the mathematical relationship between the (rational) amount of supplementary coverage demanded, an individual's total disposable budget and the price of the corresponding insurance premium. This mathematical relationship is known except for one parameter provided by the empirical estimation of the relationship between the amount of insurance coverage consumed and income. Knowing this parameter, one can then easily simulate the impact of a reduction in the apparent price of supplementary health insurance on the demand for coverage and at the same time, determine the impact of an ACS type subsidy on the percentage of individuals covered. Of course, the quality of the simulation depends on the credibility of the theoretical model and the quality of the estimation on the empirical relationship between coverage and income.

The theoretical model is based on a limited number of hypotheses and is thus 'credible' in the sense that it imposes few behavioural restrictions. It stipulates that the total premium that each individual is prepared to pay for supplementary cover amounts to a fixed percentage of the remaining budget after having paid for the basic necessities (food, lodging, electricity etc.), less a certain amount proportional to the amount of statutory public insurance cover the individual considers non-essential. When this amount is negative, the individual does not purchase supplementary health insurance. The amount of insurance cover demanded is deduced by dividing the insurance premium by the cost per unit of insurance. The crucial phase consists in measuring the empirical relationship between insurance coverage and income.

For further details, see Grignon and Kambia-Chopin, 2009.

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red by the contract. This amount depends on the individual's health risk on the one hand, and the guarantee levels subscribed to on the other. The cost per unit of insurance corresponds to the amount an individual is obliged to pay for each euro reimbursed. The product of the amount of coverage and cost per unit thus defined gives the total premium observed in the 2004 Health, Health Care and Insurance survey (ESPS 2004).

The ideal scenario, for a given income level and the supplementary health insurance contracts offered, would consist in establishing the relationship between the cost per unit of insurance and the amount of coverage purchased by an individual. This being impossible, we propose a realistic hypothesis whereby the cost per unit of insurance does not vary much from one individual to the next[1]. In empirical terms, our problem concerns finding a means of measuring the relationship between this cost per unit and the amount of coverage subscribed to.

As it is impossible to directly observe the relationship between cost and consumption of supplementary health insurance, we thus established a 'rational' choice model for the amount of coverage purchased (Methods insert).

Measuring the relationship between income and the demand of supplementary health coverage in France

The empirical model consists in relating the total amount of the premium paid by an individual with that individual's income taking into account other factors susceptible of influencing the demand and thus distorting the estimated relationship between income and consumption. By using data from a survey conducted in 2004, and thus prior to the introduction of the ACS scheme, we can suppose that all non-CMU beneficiaries are confronted with unsubsidised supplementary health insurance costs.

Contrary to the cost per unit of insurance and amount of coverage, the total premium amount is known and recorded in the ESPS survey (Sources insert) for each contract declared by interviewed households. A premium is calculated per individual (for a family contract we divide the premium by the number of individuals covered), and all the premiums paid by a same individual having subscribed several individual insurance contracts are added together.

A Tobit model is used to estimate the theoretical relationship between premium and income (cf. Grignon et Kambia-Chopin, 2009).

We take into account the fact that premiums vary with risk level and contract size: the parameters commonly used by supplementary health insurance companies to calculate individual premiums (subscriber's age and contract size) are introduced as explanatory variables.

Other than these objective pricing variables, income is introduced as an explanatory variable (our main interest variable) together with variables controlling the 'preference' for health coverage so as to control eventual correlations between revenue and preference for supplementary health insurance. The 'preference' for supplementary health insurance has a high probability of being correlated to income for the following reasons: firstly, the greater the financial burden generated by out-of-pocket payments the lower the household budget. Secondly, individuals may want to purchase supplementary coverage to meet anticipated health expenditures. Anticipated expenditures cannot be correctly described by 'objective' health variables: for example, individuals may have personal information concerning their health status leading them to anticipate high health expenditures. If this personal information is more likely among poorer individuals, income will be correlated to the demand for coverage. It is equally possible that anticipated expenditures are based on a general preference for health: the individual wants to subscribe to sufficient supplementary health coverage to commit to purchase a quantity of primary care considered good for the health. In this case, preference can equally be correlated to income. So as to control these two correlations, we introduce the following variables in our econometric analysis: firstly a measure of the value of reducing financial risk, based on the hypothesis that utility of income is given by the square root of income and that individuals seek to protect themselves from the risk of high out-of-pocket expenses. From our 2004 data, the annual average for the 20% highest out-of-pocket expenses amounts to 1,235 € – from that point, the financial risk is the same for all, but its impact on individual utility varies with income. Secondly, a measure of the value of private information is the individual's out-of-pocket expenses for the preceding year (2003): all things being otherwise equal, this amount indicates an individual's higher propensity to spend on healthcare whether it reflects a higher need or a higher taste for health[3].

The empirical analysis concerns individuals having subscribed to supplementary health insurance on the private market. Individuals covered by a group contract subscribed by their employers or that of their spouse, and individuals covered by the CMU-C[4] are excluded. The initial sample represents 5,106 individuals, but the analysis concerns only the 3,618 individuals for whom information on all the explanatory variables was available to us (that is 71% of the initial sample).

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3   This hypothesis is discussed in detail in the working paper written by Grignon and Kambia-Chopin, 2009, in which it is also validated that the price of insurance does not systematically vary with income (the poor do not pay more than the rich for the same contract).

4   Group contracts are often mandatory. Moreover in the majority of cases the employer contributes financially which reduces the price paid by the employee. The demand for coverage is thus not governed by the same demand mechanisms as the private insurance market.

The demand for supplementary health insurance increases with income

The regression highlights a robust positive correlation between income and the amount of coverage demanded: for each additional euro of income over and above the minimum non-reducible household expenditures, 20 cents are spent on supplementary insurance. The probability of subscribing to supplementary coverage (in other words strictly positive premium expenditure) thus equally increases with income. Beyond a certain coverage level, demand becomes saturated and the income-coverage relationship reaches a threshold, a factor taken into account in our empirical model by entering a non-linear income effect; a non-linear income effect not taken into account in our theoretical model (graph 1). We note that in the interval of 'reasonable' income values, the relationship between income and amount of insurance coverage is linear.

The demand for insurance increases with age squared; for example, the premium paid by an individual aged 60 is 44% higher than the average premium. The insurance premium decreases as the number of beneficiaries increases, which seems to indicate that families are subsidised by single persons. This result, already brought to light in the United States by Gruber (2008), seems justified by the fact that contract premiums are lower per individual when the contract covers a whole family. Finally, the results indicate that the demand for supplementary insurance is very marginally correlated to increased copayments. More precisely, an additional euro of out-of-pocket expenses generates an increase in insurance coverage consumption of between 0.03 and 0.06 Euros.

T1 — The determinants of demand for insurance

Variables	Tobit Model	
Constant	-666.71	**
Out-of-poket payments (OOP)	63.42	***
OOP squared	-4.39	**
Age	2.45	**
Age squared	0.06	***
Number of beneficiaries (NB)	467.59	***
NB squared	-70.19	***
Income/1000	223.13	***
(Income/1000) squared	-30.36	***
(Income/1000) cubed	1.03	***
Risk premium	1.69	
Observations	3,618	
R2 adjusted (maximum probability Log)	- 19,590	
Scale	346.25	

*: 10% threshold; **: 5% threshold; ***: 1% threshold.
Data: 2004 Health, Health Care and Insurance survey matched with the Permanent Sample of National Health Insurance Beneficiaries.
Exploitation: Irdes.

Simulation of the impact of different subsidy levels on subscription to supplementary health coverage

We now use the theoretical model of demand for supplementary health coverage according to price per unit, income and the empirical estimation above explaining the relationship between income and demand for coverage so as to deduce the relationship between price and amount of coverage demanded.

For each individual, using the results of the preceding model, we determine the price per unit of insurance the individual is prepared to pay for a given amount of coverage (Methods insert). For each individual, we compare this maximum price to the market price (that we estimate at 1.3, which corresponds to a charging rate of 30%, higher than the average rate for individual and group contracts but that must correspond to the rate of individual contracts) or the apparent price after subsidy (adjusted market price after deducting the percentage of subsidy) and we deduce, for each income category, the percentage of individuals that would purchase the target amount of supplementary coverage (those for whom the maximum price is higher than the market price or the apparent price after subsidy). The results of these simulations are presented in graph 2 for a target level chosen by the public authorities at 50 Euros per month[5].

For individuals with an income ranging between 600 and 700 Euros, and thus potentially eligible for ACS, when the price of insurance is subsidised at over 90% (which corresponds to a cost of 0.1), the percentage of buyers is 100%. With a 50% subsidy, the simulation predicts 55% of buyers which is 25% higher than the actual percentage observed (the difference possibly originating from a lack of information). If 75% of ACS beneficiaries are to accept to subscribe to an insurance contract costing 50 Euros, the subsidy would therefore need to cover 80% of the premium.

The model equally suggests that the implicit 100% CMU-C subsidy is possibly too high because, even without being free of charge (for example subsidised at 80%), it would be half the individuals eligible for CMU-C that would rationally purchase

G1 — Income effect on the contract premiums
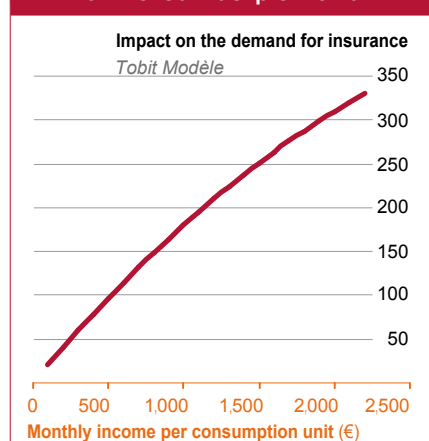
Impact on the demand for insurance
Tobit Modèle

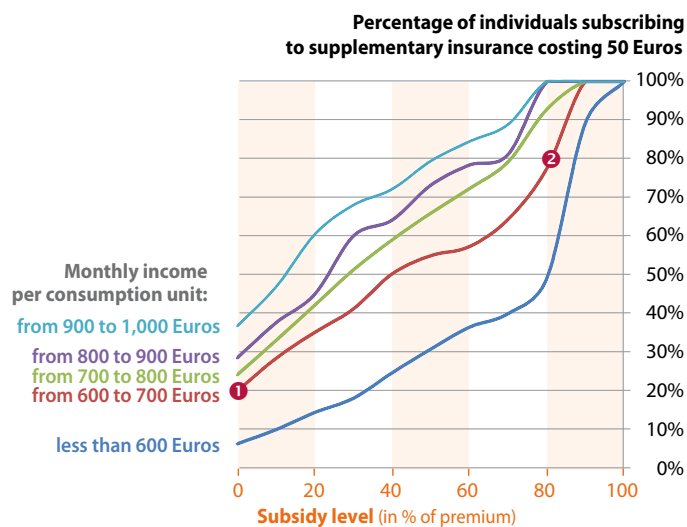Monthly income per consumption unit (€)

Data: Health, Health Care and Insurance survey matched with the Permanent Sample of National Health Insurance Beneficiaries.
Exploitation: Irdes.

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5 This insurance level corresponds to an annual premium of Euros slightly above the average premium which amounts to527 Euros calculated from our sample of individual contracts.

G2 **Impact of different subsidy levels according to income on the percentage of individuals subscribing to a supplementary health insurance contract costing 50 Euros**

Percentage of individuals subscribing to supplementary insurance costing 50 Euros

Monthly income per consumption unit:
- from 900 to 1,000 Euros
- from 800 to 900 Euros
- from 700 to 800 Euros
- from 600 to 700 Euros
- less than 600 Euros

Subsidy level (in % of premium)

Interpretation: without the subsidy, 20% of individuals earning 600 € to 700 € subscribe to a supplementary health insurance contract costing 50 € (❶). When the subsidy corresponds to 80% of the premium, 80% of individuals in this income category subscribe to the contract (❷).

Data : 2004 Health, Health Care and Insurance survey matched with the Permanent Sample of National Health Insurance Beneficiaries.

Exploitation: Irdes.

Finally, if the aim is to counter the inequality of access to care effect generated by the differences in supplementary health insurance determined by income, it would appear preferable to think about raising the income cut-off for CMU-C eligibility. An additional positive effect would eliminate the inequality of treatment based on age or handicap generated by the fact that the current cut-off is situated just below the minimum pension allowance and the adult disability allowance thus depriving the aged and the disabled from benefiting from the CMU-C. ◆

*F*URTHER INFORMATION

- Buchmueller T. *et al.* (2004). "Access to Physician Services: Does Supplemental Insurance Matters", *Health Economics*, 13(7), 669-687.

- Bundorf K., Pauly M. (2006). "Is Health Insurance Affordable for the Uninsured?", *Journal of Health Economics* 25, 650-673.

- Fonds CMU, (2009). *Rapport du Fonds CMU au gouvernement sur l'évolution du prix et du contenu des contrats ayant ouvert droit à l'aide à la complémentaire santé en 2008*.

- Grignon M., Kambia-Chopin B. (2009). "Income and the Demand for Complementary Health Insurance in France", *Irdes Working Paper* 24.

- Gruber J. (2008). "Covering the Insured in the U.S.", *NBER Working Paper* 13758.

- Kambia-Chopin B. *et al.* (2008). « La complémentaire santé en France en 2006 : un accès qui reste inégalitaire. Résultats de l'Enquête santé protection sociale 2006 », *Questions d'Economie de la Santé* n° 132, mai.

- Marcial F., Saint Pol (de) T. (2007). « La complémentaire santé : une généralisation qui n'efface pas les inégalités », *Insee Première* 1142.

- *Références CMU* n° 35, Lettre d'information du fonds CMU, Avril 2009.

- Thomas K. (1995). "Are Subsidies Enough to Encourage the Uninsured to Purchase Health Insurance? An Analysis of Underlying Behaviour", *Inquiry* 31, 415-424.

*G*LOSSARY

- **[EPAS] Permanent Sample of National Insurance Beneficiaries:** [EPAS] Echantillon permanent d'assurés sociaux

- **[ESPS] Health, Health Care and Insurance Survey:** [ESPS] Enquête santé protection sociale

- **Supplementary Health Insurance Coverage:** couverture santé complémentaire

supplementary health insurance at the amount desired by the public authorities. These results should, however, be interpreted with caution; despite the exclusion of CMU beneficiaries in our analysis, the final sample contains individuals whose income is inferior to 600 Euros per month and thus potentially eligible for CMU-C.

Finally, the curve for small subsidy rate values is slight which may suggest that affordability is not the only factor to play a role in choosing supplementary health coverage (a theoretical result suggested by Bundorf and Pauly, 2006), even if it plays an important role.

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This study's originality stems from the fact that, contrary to other studies that model the binary decision to purchase insurance or not, it focuses on the determinants of a continuous variable of demand for insurance. In this way, it reveals the main determinants of the demand for supplementary health insurance in France. Individuals purchase supplementary cover essentially to reduce the financial burden of copayments. We equally highlighted a significant income effect: the demand for insurance increases with income level (but at a decreasing rate). From the theoretical model and the relationship between income and the demand for insurance, we simulated the impact of different subsidy rates on the purchase of supplementary health insurance. The simulation results show that financial incentive does not provide the desired effect: those who are subsidy-sensitive already purchase supplementary health insurance whereas those who do not purchase insurance will not change their behaviour even with a high subsidy. This empirical conclusion based on French data corresponds to those obtained from attempts to introduce policies to subsidise private health insurance in countries where the public health system provides considerable basic coverage (such as the United Kingdom and Australia).