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Document de travail  
*Working paper*

## Deductibles and the Demand for Prescription Drugs: Evidence from French Data

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## **Deductibles and the Demand for Prescription Drugs: Evidence from French Data**

Bidénam Kambia-Chopin<sup>1</sup>, Marc Perronnin<sup>2</sup>

**ABSTRACT :** On January 1<sup>st</sup> 2008, a 0.5€ deductible levied on every prescription drug package purchased was introduced in France. This study aims at shedding light on the effect of this policy on prescription drug purchasing behavior among the targeted individuals.

Declared behavior from a cross-sectional study based on participants in the French Health, Health Care and Insurance Survey of 2008. The determinants of having changed one's prescription drugs consumption following the introduction of deductibles were explored based on the socio-behavioral model of Andersen and an economic model of drug demand. The empirical analysis used a logistic regression.

All other factors being equal, individuals' probability of having modified their drug consumption behaviour following the introduction of deductibles decreases with income level and health status (self-assessed health and suffering from a chronic disease).

Deductibles on prescription drugs represent a significant financial burden for low-income individuals and those in poor health, with the potential effect of limiting their access to drugs.

**JEL CODES:** D81, I13

**KEYWORDS:** User fees, Out-of-pocket payment, Prescription drugs, Financial access, France

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## **Effet des franchises sur la demande de médicaments : une analyse sur données françaises**

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**RÉSUMÉ :** Une franchise de 0,5 € par boîte de médicaments prescrite a été mise en place le 1<sup>er</sup> janvier 2008. Afin d'apporter un premier éclairage sur les effets de celle-ci sur la consommation de médicaments, une analyse a été menée en ayant recours au modèle comportemental d'Andersen et à un modèle économique de demande. À partir de données déclaratives de l'Enquête santé protection sociale (ESPS) 2008, nous montrons que la probabilité de modifier la demande de médicaments suite à la mise en place de la franchise est influencée par le niveau de revenu et l'état de santé : toutes choses égales par ailleurs, elle varie de manière opposée avec chacune de ces variables. Les franchises médicales représentent ainsi une charge financière pour les individus à bas revenus et ceux en mauvais état de santé, avec pour corollaire une limitation potentielle de leur accès financier aux soins.

**CODES JEL :** D81, I13

**MOTS-CLEFS :** Copaiements, Franchises médicales, Accès financier aux médicaments, France

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## 1. Introduction

Most developed countries are concerned with rising health costs and have adopted several cost containment policies (1). These countries have a special concern with controlling drug expenditure, in particular France who has the highest drug expenditure per capita in Europe (2). For this reason, France has adopted a demand-side policy to control drug expenditure: since January 1st 2008, a 0.5€ deductible is levied on every prescription drug package purchased for individuals aged 18 or older, with a maximum of 50€ per year. This measure is intended to address the issue of over-consumption of health care deemed too expensive with regard to their utility among individuals benefiting from high health insurance coverage<sup>1</sup>, the so-called moral hazard hypothesis (3).

France has a two-stage health insurance system. The first stage consists in the National Health Insurance (NHI) which is universal but incomplete: NHI defines a standard tariff on each care in its basket and leaves a co-payment on standard tariffs except when health care are related to a long term illness (*Affections de Longue Durée, ALD*)<sup>2</sup>. Furthermore, patients may be charged overbillings on several types of care but not on prescription drugs in NHI's basket. Complementary health insurance makes up the second tier. It is purchased by individuals mainly to cover co-payments on standard tariffs; parts of the contracts also cover overbillings. Although complementary health insurance is mostly optional in France, it covers about ninety percent of the French population (Health, Health Care and Insurance Survey (*Enquête Santé et Protection Sociale*)).

Prior to 2008, a significant percentage of prescription drugs were covered by the National Health Insurance (NHI) and co-payments left by the NHI were covered either by the Long-Term Illness scheme or by private complementary health insurance. The introduction of the new deductible reduced the overall insurance coverage for prescription drug spending among adults, except for individuals covered by 'non-responsible' contracts<sup>3</sup>, CMU-C<sup>4</sup> beneficiaries and pregnant women from the sixth month of pregnancy.

In the case of prescription drugs, the hypothetical effect of deductibles on making individuals more discerning about their drug demand gives rise to a number of questions. First of all, it assumes that individuals are enlightened consumers whose drug consumption choices take into account cost and utility. Yet the choice of appropriate medication is essentially under the responsibility of health professionals; they are those who determine the nature and quantity of medication, not the patients. Even assuming

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<sup>1</sup> Press release concerning the Social Security Funding Bill (PLFSS) 2008: 'In our concern to improve responsibility and efficiency with regard to health expenditures, the areas subject to deductibles correspond to areas in which expenditures are particularly dynamic (...) drug consumption is an example since in France, 90% of consultations give rise to a prescription, representing twice the rate observed in certain neighbouring European countries.'

<sup>2</sup> Drug consumption is highly concentrated among individuals covered by the long-term illness (ALD) scheme. Thus, in 2002, individuals registered on the ALD scheme generated 49% of drug expenditures reimbursed by the National Health Insurance scheme (HCAAM note on ALD, 2005).

<sup>3</sup> 'Non responsible' complementary health insurance contracts are distinguished from 'responsible' contracts in that they also cover deductibles, coinsurances (*tickets modérateurs*) or financial penalties resulting from a deviation from the coordinated treatment pathway (*see* Issues in health economics n°124, 2007, for a description of this pathway). Furthermore, they are subjected to the tax on insurance contracts (7% of the premium). For their part, 'responsible' contracts must reimburse all or part of coinsurance for physician consultations, white label pharmaceuticals and biology carried out within the coordinated treatment pathway.

<sup>4</sup> *Couverture Maladie Universelle – Complémentaire*: a free complementary health insurance for the poorest.

that patients have a say in this matter, they are not able to assess the utility of the drugs prescribed. In this respect, the effectiveness of introducing deductibles is questionable. Secondly, the out-of-pocket (OOP) burden essentially weighs on individuals in poor health and those with low incomes. These populations thus face the risk of having to forego part of the drugs prescribed due to insufficient financial resources (4-6).

More generally, previous literature that has examined the impact of patient charges on the consumption of prescription drugs found that an increase in the value of the patient charge is associated with a reduction in prescription drug utilisation (6-10).

Our paper is related to this literature and aims at answering the following questions: Has the introduction of mandatory deductibles modified patients' prescription drug purchasing behavior? What are the significant factors of having changed one's drug consumption behavior or not? We notably examine whether the impact on individuals with a poor health status or low-income is more significant. The remainder of the paper is organised as follows. We developed an economic model in order to examine the impact of deductibles on individual drug purchasing behaviour. Then, we used declarative data from the 2008 Health, Health Care and Insurance Survey (*Enquête Santé et Protection Sociale, ESPS*) to conduct a quantitative analysis generating descriptive statistics and estimating econometrically to what extent declared modifications in drug purchasing behaviour were influenced by income and health status, and others factors. Finally, we discuss the results and conclude

## 2. An economic model of the demand for prescription drugs

### 2.1. Assumptions

We make the assumption that an individual has a specific demand for prescription drugs denoted by  $y(b)$ , where  $b$  represents the individual's health status. This demand depends on the individual's willingness to pay, denoted  $\theta(b)$  (with  $0 < \theta(b) < 1$ ). The parameter  $\theta(b)$  reflects the utility of drugs in relation to the consumption of other medical or non-medical care. It increases as an individual's health status  $h$  deteriorates. This specific demand for prescription drugs also depends on the disposable income  $R$  and on the residual out-of-pocket payments (OOP) denoted  $p_a$ . The individual specific demand for prescription drugs is given by the following expression:

$$y(b) = \theta(b) \cdot R \cdot p_a^{-\epsilon}$$

where  $\epsilon$  denotes the opposite of the price elasticity.

On the other hand, we assume that drug prescription  $x(b)$  made by the physician depends only on the patient's health status  $h$  and is decreasing with  $h$ .

The decision tree of the individual is the following: first, the physician prescribed  $x(b)$  and secondly, the individual choice  $q$  is given by  $q = \min(x(b), y(b))$ .

## 2.2. Individual drug purchasing behaviour

We denote:

- $p$ : the price per drug package,
- $\alpha$ : the rate of coverage by the statutory health insurance scheme,
- $\delta$ : the rate of coverage by complementary health insurance  
( $\alpha$  and  $\delta$  are both percentages of the government regulated tariff)
- $f$ : the amount of the deductible on every drug package
- $F$ : the maximum cumulative amount of deductibles per year.

### 2.2.1. Drug consumption prior to 2008 (time 0)

Let's  $q_0$  the drug consumption prior to 2008.

Residual OOP is given by:

$$p_a = (1 - \alpha - \delta) \cdot p$$

Individual budget constraint is given by:

$$C + (1 - \alpha - \delta) \cdot p \cdot q_0 = R$$

where  $C$  denoted a composite consumption good which is the numeraire.

Individual demand for prescription drugs is given by:

$$q_0 = \min(x(h), \theta(h) \cdot R \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon})$$

### 2.2.2. Drug consumption from 2008

Two cases are possible depending on whether the maximum amount of deductibles is not reached or is reached. Let's  $q_{1N}$  (resp  $q_{1R}$ ) the drug consumption in the first case (respectively in the second case)

**Case 1: the maximum cumulative amount of deductibles is not reached ( $f \cdot x(h) < F$ )**

Residual OOP is given by:

$$p_a = (1 - \alpha - \delta) \cdot p + f$$

Individual budget constraint is given by:

$$C + [(1 - \alpha - \delta) \cdot p + f] \cdot q_{1N} = R$$

Individual demand for prescription drugs is given by:

$$q_{1N} = \min(x(h), \theta(h) \cdot R \cdot [(1 - \alpha - \delta) \cdot p + f]^{-\epsilon})$$

**Case 2: the maximum cumulative amount of deductibles is reached or exceeded ( $f \cdot x(h) \geq F$ )**

Residual OOP is given by:

$$p_a = (1 - \alpha - \delta) \cdot p$$

as the maximum cumulative amount of deductibles is reached. However, unlike before 2008, the disposable income of the individual is reduced by the maximum cumulative amount of deductibles,  $F$ .

Individual budget constraint is given by:

$$C + [(1 - \alpha - \beta) \cdot p] \cdot q_{IR} = R - F$$

Individual demand for prescription drugs is given by:

$$q_{IR} = \min(x(b), \theta(b) \cdot (R - F) \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon})$$

**2.2.3. Changing behaviour of drug consumption following the introduction of the deductible**

All things being equal, an individual who purchased fewer packages than that prescribed by the physician before the introduction of the deductible will purchase fewer packages after the introduction of the deductible whatever the case (ie. whether the maximum cumulative amount of deductibles is reached or not).

“An individual did not purchase all prescribed drug packages before 2008”

⇔

$$q_0 < x(h)$$

⇔

$$q_0 = \theta(b) \cdot R \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon} > \theta(b) \cdot R \cdot [(1 - \alpha - \delta) \cdot p + f]^{-\epsilon} = q_{IN}$$

$$q_0 = \theta(b) \cdot R \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon} > \theta(b) \cdot (R - F) \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon} = q_{IR}$$

⇔

$$q_{IN} < x(b)$$

$$q_{IR} < x(b)$$

⇔

“The individual will not purchase all prescribed drug packages after 2008”

Thus, all things being equal, there is no modification of an individual drug purchasing behaviour if and only if the individual buys the total quantity of drugs prescribed by the physician after the introduction of the deductible. In other words, the two cases are:

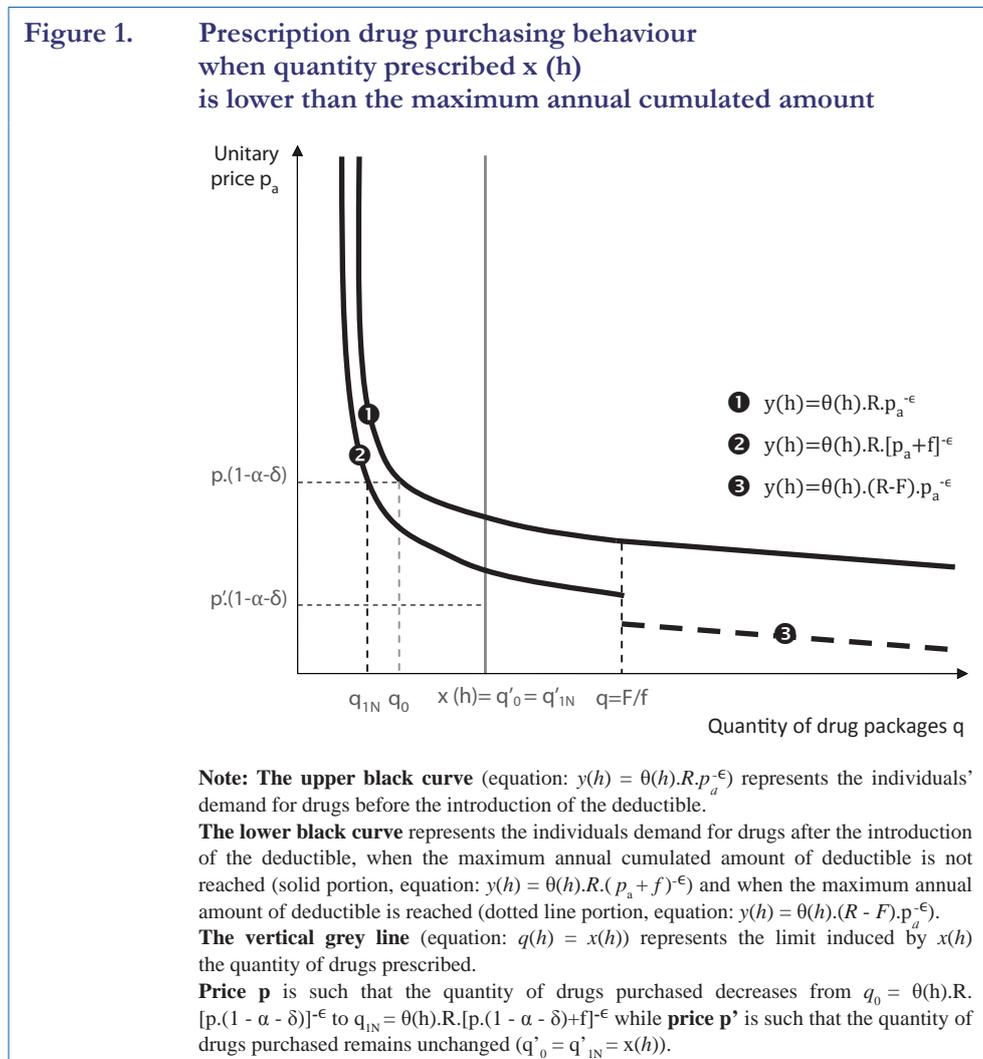
$$\text{Case 1 (if } f \cdot x(h) < F): q_{IN} = \theta(h) \cdot R \cdot [(1 - \alpha - \delta) \cdot p + f]^{-\epsilon} \geq x(h)$$

$$\text{Case 2 (if } f \cdot x(h) \geq F): q_{IR} = \theta(h) \cdot (R - F) \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon} \geq x(h)$$

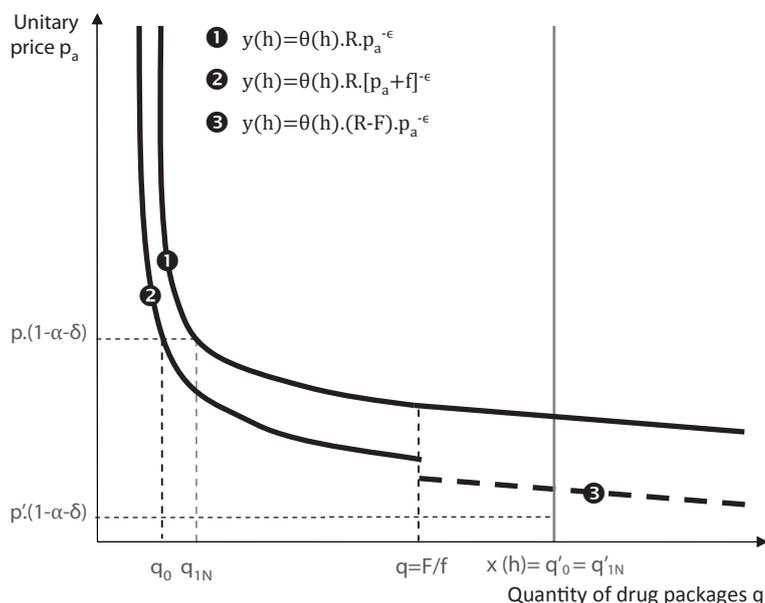
The mechanisms of consumption in these two cases are illustrated in Figures 1 and 2.

This can be summarised into the following condition:

$$I_{f \cdot x < F} \cdot \theta(h) \cdot R \cdot [(1 - \alpha - \delta) \cdot p + f]^{-\epsilon} + I_{f \cdot x \geq F} \cdot \theta(h) \cdot (R - F) \cdot [(1 - \alpha - \delta) \cdot p]^{-\epsilon} \geq x(h)$$



**Figure 2. Prescription drug purchasing behaviour when quantity prescribed  $x(h)$  is higher than the maximum annual cumulated amount**



**Note:** The upper black curve (equation:  $y(h) = \theta(h).R.p_a^{-\epsilon}$ ) represents the individuals' demand for drugs before the introduction of the deductible.

The lower black curve represents the individuals demand for drugs after the introduction of the deductible, when the maximum annual cumulated amount of deductible is not reached (solid portion, equation:  $y(h) = \theta(h).R.(p_a + f)^{-\epsilon}$ ) and when the maximum annual amount of deductible is reached (dotted line portion, equation:  $y(h) = \theta(h).(R - F).p_a^{-\epsilon}$ ).

The vertical grey line (equation:  $q(h) = x(h)$ ) represents the limit induced by  $x(h)$  the quantity of drugs prescribed.

Price  $p$  is such that the quantity of drugs purchased decreases from  $q_0 = \theta(h).R.[p.(1 - \alpha - \delta)]^{-\epsilon}$  to  $q_{1N} = \theta(h).R.[p.(1 - \alpha - \delta) + f]^{-\epsilon}$  while price  $p'$  is such that the quantity of drugs purchased remains unchanged ( $q'_0 = q'_{1N} = x(h)$ ).

### 2.3. Testable predictions

The first effect of interest is the relation between income and prescription drug consumption modification. First, the drug consumption reduction behaviour following the introduction of deductibles will depend directly on the income level  $R$ . Indeed, low-income individuals will be more likely to reduce their drug consumption as, all other things being equal, their budget constraint is binding before that of wealthier individuals. However, the extent to which this consumption is reduced will depend on the individuals' perceived utility of drugs,  $\theta(h)$ . The lower this utility, the lesser the decision to reduce their drug consumption will be affected by income, and so the higher the probability that the individuals will modify their drug consumption whatever the income level.

The second effect of interest, the one regarding health status on prescription drug consumption, is complex. On the one hand, the more individuals' health status deteriorates, the greater the amount they are willing to spend on medication (positive effect). On the other hand, the more health status deteriorates, the greater the quantity of drugs prescribed; consequently the greater the amount of deductibles the individuals have to borne (negative effect). Precisely, as long as the maximum cumulative amount of OOP

is not reached, the accumulated amount of deductibles increases as health status deteriorates. Once the maximum cumulative amount is reached, the accumulated amount of deductibles is constant and so is independent of health status. The final effect of health status on prescription drug consumption or on the probability that the individuals will modify their drug purchasing behaviour thus depends on which effect dominates (positive or negative).

### **3. Materials and methods**

#### **3.1. Data collection and sample**

The study is based on declarative data obtained during the 2008 Health, Health Care and Insurance survey (*Enquête Santé et Protection Sociale*). This survey, conducted biennially by the Institute for Research and Information in Health Economics (IRDES, Paris) among approximately 8,000 households amounting to 22,000 individuals, provides data on socio-demographics, health status and social protection. A specific section was introduced in 2008 to identify how individuals had modified their drug consumption following the introduction of deductibles. First, respondents were asked whether they had heard about the “new deductibles that apply on Health insurance reimbursements”. After a brief reminder about the nature of deductibles, respondents were asked to state whether they had been prescribed drugs since January 1st 2008. Finally, those who had been prescribed drugs were questioned as to the effects of the deductibles on their drug purchasing habits: discussion with the physician to reduce the number of drugs prescribed, decision to purchase only part of the drugs prescribed, decision to delay the purchase of some drugs, other consequences, no change in behaviour (they continued to purchase drugs as before).

The initial data used in the following analysis consisted of 7,223 individuals. After excluding those who were not concerned by the deductibles (individuals aged below 18, CMU-C beneficiaries and women from their sixth month of pregnancy at the time of the survey), the data consisted of 6,454 individuals. For the behaviour modification analyses, we selected individuals who had been prescribed drugs since January 1st 2008: 5,044 individuals. After excluding non-responses and incoherent responses regarding changes in drug purchasing habits subsequent to the introduction of deductibles, the final sample was comprised of 4,985 individuals.

A response was considered incoherent when individuals had mentioned a change in behaviour whilst also declaring that they had not changed their drug purchasing habits.

#### **3.2. Econometric strategy**

We analyse the determinants of the probability of modifying prescription drug consumption behaviour by means of a logistic model. This type of model is used to analyse a dichotomic dependent variable (11). The explanatory variables we used are derived from the conceptual framework of Anderson regarding the determinants of health care utilisation (12). These include predisposing factors such as age<sup>5</sup>, gender and

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<sup>5</sup> We also included age square as this allowed taking into account the effects of age in a U shape or inverted-U shape frequently encountered within the framework of medical consumption analyses.

education level; variables characterising financial access to health care such as income per consumption unit, complementary health insurance coverage, 100% coverage on the Long-Term Illness scheme; variables related to care needs (self-reported health status, suffering from a chronic disease). Variables related to health services availability were also taken into account: density of GPs and specialists in the area of residence. The survey wave is also taken into account since the later individuals were interviewed, the higher the probability they were prescribed drugs between January 1st 2008 and the interview date. Finally, we introduced the interview method (face-to-face or by phone) as it is likely to influence the responses obtained.

## 4. Empirical Results

### 4.1. Descriptive statistics

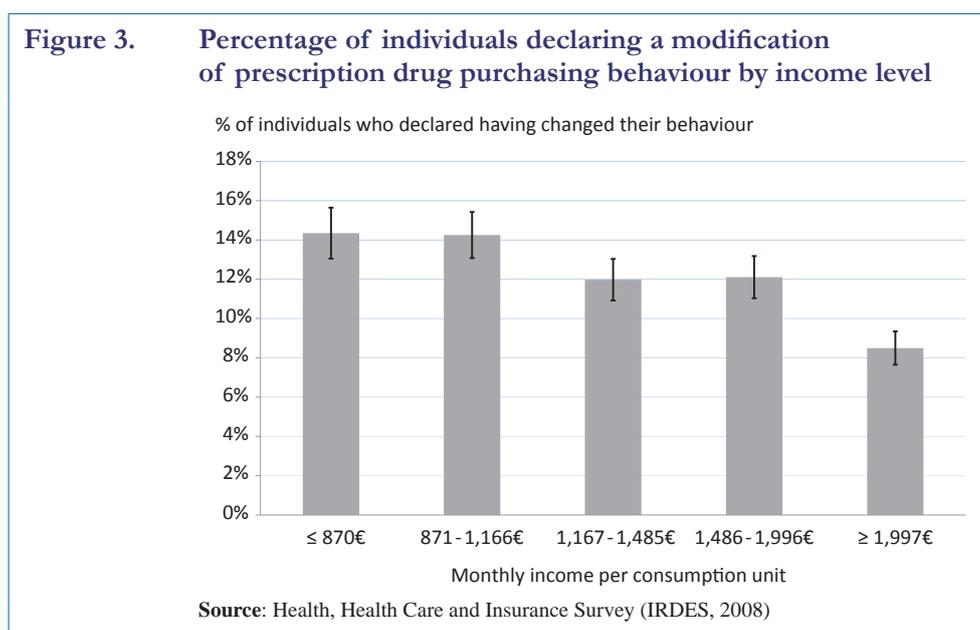
Among the 4,985 individuals retained for the study, 88% of respondents (4,391 individuals) declared not having changed their prescription drug consumption. Only 12% (594 individuals) declared having modified their consumption in one way or another. Invited to explain these changes, the individuals concerned provided the following responses:

- 28% discussed the possibility of reducing the number of drugs prescribed with their GP who, in 8 out of 10 cases, accepted to do so. This can be interpreted as the existence of an interactive relationship between the patient and the physician during the course of which the patient may, to a certain extent, influence prescription contents;
- 64% decided to purchase only a portion of the drugs prescribed;
- 33.5% decided to delay purchasing some of the drugs prescribed;
- 13% mentioned other strategies: greater control of their pharmacy budget, self-regulatory drug consumption, and self-medication.

The total number of individuals declaring a change in prescription drug consumption being relatively low, it was statistically not pertinent to study each possible choice of change according to individuals' characteristics. We thus analysed the binary variable "having changed one's drug consumption behaviour or not". It is constructed by aggregating the different items relating to change. We thus considered that individuals modified their consumption behaviour if they discussed the possibility of reducing the number of drugs prescribed with their GP, if they decided not to purchase all the drugs prescribed, if they delayed purchasing certain drugs, or if they mentioned any other form of change.

The higher the income level, the lower the impact of deductibles on drug consumption: 14% of individuals with a monthly income below 1,167€ per consumption unit declared having changed their consumption behaviour against 8% of individuals with an income equals to or over 1,997€ per consumption unit.

The percentage of individuals declaring a change in consumption behaviour following the introduction of deductibles is significantly higher among individuals self-reporting a fair, poor or very poor health status than among individuals self-reporting good or very good health (13% against 11%). A significant difference is also observed between individuals suffering from a chronic illness and the others (13% against 11%). On the contrary, there is almost no difference between individuals suffering from a long-term illness and the others.



Finally the difference is small between those without and those with a complementary health insurance (11.9% against 13.3%). Finally the percentage of women declaring changes is higher than that of men (13.1% against 9.9%).

## 4.2. Regression results

Results of the regression are provided in Table 1. In the following, we give results as multiplicative coefficients. For example, if a characteristic increases by 88% the individual probability of changing purchasing behaviour compared to the difference, we will say that this individual has a 1.88 times higher likelihood (or probability) to change behaviour.

### *Income effect*

All other factors being equal, individuals' probability of having modified their drug consumption behaviour following the introduction of deductibles increases as income level decreases. Compared with individuals whose income per consumption unit exceeds 1,997€, the likelihood of declaring a modification of drug consumption behaviour following the introduction of deductibles is one and half times higher among individuals whose income per consumption unit falls between 1,167€ and 1,996€ and almost twice higher for individuals whose income per consumption unit is below 1,167€. The latter figure corresponds to a twofold increase in the probability of declaring a change in behaviour.

According to the theoretical model, this significant income effect seems to indicate that the introduction of deductibles had a negative effect on access to medication: a same cumulative effect of deductibles per box represents a greater financial burden the lower the individuals' income. For a given health status, low-income individuals have a higher probability of modifying their drug consumption behaviour compared to high-income individuals.

**Table 1. Determinants of drug purchasing modification**

	Variation			Signi- ficance
	in % points	in elasticity	in %	
<b>Monthly income per consumption unit</b>				
Below 1,167€	7.30	0.6341	88.53	***
1,167 to 1,996€	4.04	0.3742	45.39	***
Above 1,996€	Ref.			
Income unknown	4.94	0.4166	51.67	***
<b>Coverage by complementary health insurance</b>				
Uncovered	Ref.			
Covered	-1.94	-0.1751	-16.07	ns
<b>Education</b>				
No schooling, primary education	3.13	0.2887	33.47	**
Secondary education	0.18	0.0177	1.78	ns
High school education	Ref.			
Higher education	0.18	0.0765	7.95	ns
Education unknown	0.80	-0.1179	-11.12	ns
<b>Gender</b>				
Male	-2.17	-0.216	-19.42	
Female	Ref.			
<b>Age variables</b>				
AGE	0.51	0.0493	5.05	***
AGE*AGE	-0.01	-0.0006	-0.06	***
<b>Self-assessed health</b>				
AHS : very good, good	Ref.			
AHS: Fair, poor, very poor	2.09	0.1982	21.92	**
<b>Having a chronic disease</b>				
No chronic disease	Ref.			
Chronic disease	2.05	0.1966	21.73	**
<b>Coverage by long term illness scheme</b>				
Uncovered under LT illness	Ref.			
Covered under LT illness	0.73	0.0698	7.23	ns
<b>Smoking behaviour</b>				
Never smoked	Ref.			
Former smoker	-1.76	-0.1783	-16.33	*
Smoker	-1.80	-0.1843	-16.83	*
<b>Density of physicians</b>				
Density of generalists	-0.02	-0.0018	-0.18	ns
Density of specialists	0.06	0.0061	0.61	**
<b>Questioning characteristics</b>				
First wave of interviews	Ref.			
Second wave of interviews	0.81	0.0785	8.16	ns
By phone survey	Ref.			
Face-to-face survey	-8.62	-0.8209	-55.99	***
Number of observations	4,985			
Number of changes	594			
Pseudo-R2	0.0572			
Likelihood ratio-test	p<0.0001			

**Note:** the first column gives partial effect of each variable Z on the dependent variable C (conditional to other explanatory variables X) as variation in percentage points of the probability to change purchasing behavior:

$$\Delta p = 100.[p(C = 1|Z = 1, X) - p(C = 1|Z = 0, X)]$$

The second column gives partial effect of each variable Z on the dependent variable C (conditional to other explanatory variables X) as variation in elasticity of the probability to change purchasing behavior:

$$\Delta_e p = \ln[p(C = 1|Z = 1, X)] - \ln[p(C = 1|Z = 0, X)]$$

The third column gives partial effect of each variable Z on the dependent variable C (conditional to other explanatory variables X) as variation in elasticity of the probability to change purchasing behavior:

$$\Delta_e p = 100.[(p(C = 1|Z=1, X) - p(C = 1|Z=0, X)) / [p(C = 1|Z=0, X)]] = 100.[\exp(\Delta_e p) - 1]$$

The last column gives the significance levels: \* 10% ; \*\* 5% ; \*\*\* 1%.

We also observed that people with primary school education have a significantly higher probability (1.33 times) to have changed their consumption behaviour than people with higher level of education.

#### ***Effect of health status***

Individuals self-reporting fair, poor or very poor health have a higher probability of declaring a change in drug consumption behaviour following the introduction of deductibles than those declaring a very good or a good health (the likelihood of declaring a modification of drug consumption behaviour following the introduction of deductibles is 1.22 times higher among the former individuals compared to the latter ones). Similarly, the probability to change purchasing behaviour is 1.22 times higher among individuals who declare a chronic disease than among people who do not. These effects seem to indicate as well reduced access to medication: *a priori*, individuals in poor health have a greater need for medication but are constrained to forego some drugs due to the cumulative effect of deductibles. This interpretation should be viewed with caution as there is no available data concerning the nature of the drugs the individuals chose not to purchase or delayed purchasing. It is thus possible that individuals in poor health chose to forego drugs of less utility.

Being registered on the long-term illness scheme (ALD) has no significant effect on the probability of declaring a change in drug consumption behaviour following the introduction of deductibles. To understand this result it is worthwhile to notice that the variables “self-assessed health” and “having a chronic disease” already capture part of the health status effect on changes in drug consumption behaviour and thus limit the influence of the variable “being registered on ALD” as an health status indicator. Moreover, since individuals covered by the ALD scheme are exonerated from co-payments on medication directly related to their registered disease, the total OOPs are lower than those for individuals with an equivalent health status but not covered by the ALD scheme.

#### ***Gender effect***

Men have a significantly 0.81 time lower probability of declaring a change in drug consumption behaviour following the introduction of deductibles than women. This result is coherent to the extent that some previous studies have shown that women have more medical consumption than men (13). Consequently, women have higher deductible-generated OOP than men.

#### ***Age effect***

The positive effect of age and the negative effect of age squared indicate that the probability of declaring a change in drug consumption behaviour increases with age until the age of 43, and subsequently decreases. This effect can be interpreted as follows: individuals aged 18, the youngest individuals in our sample, have a low drug consumption level and are thus less affected by the introduction of deductibles. With age, the need for medication increases but generally concerns average utility drugs whose purchase can be delayed. Beyond the age of 43, the need for medication continues to increase but the drugs concerned have a greater utility.

#### ***Effect of other variables***

The fact of being covered or not by complementary health insurance (CHI) has no significant impact on the probability of declaring a change in drug purchasing behaviour. This result was relatively unexpected since individuals not covered by CHI have no refunds on OOP left by National health insurance scheme. Consequently, unlike

individuals with CHI, their budget constraint was more likely to be bound before the introduction of deductibles. It therefore appeared less likely that they would be able to cope with extra OOP generated by deductibles.

Finally, the likelihood of declaring a change in drug consumption behaviour following the introduction of deductibles is significantly lower among individuals interviewed face-to-face compared to those interviewed by telephone. This phenomenon can be interpreted as a reporting bias: a given individual will reply differently depending on whether the interview is conducted face-to-face or by phone. This result does not, however, put into question the other results obtained. Indeed, the results are the same whatever the respondent's profile and thus do not significantly affect the estimated effects of individual characteristics on changing one's prescription drug consumption behaviour.

## 5. Discussion and conclusion

The introduction of the 0.5€ deductible on each drug package provides a context for analysing two issues. First, the effect of a change in reimbursements on individual purchasing behaviour regarding prescribed health care: the nature and the quantity of health care purchased is limited greatly by the physician decision, which questioned about such a demand-side policy. Second, the introduction of this small deductible enables to test the effect of variation of health insurance coverage at the margin, an issue that was highlighted by Blomqvist in his response to Nyman (14). Two observations emerge from this analysis: firstly, among individuals who were prescribed drugs between January 1st 2008 and the date of the survey, only a small percentage of them declared having modified their drug consumption behaviour due to the introduction of deductibles. The limited effectiveness of these deductibles can be explained on the one hand by their relatively low level (0.5€ per drug package purchased, with a maximum cumulative amount of 50€ per year) for individuals with average to high incomes, and on the other hand by the fact that individuals have a limited ability to influence physicians' prescriptions and evaluate the utility of drugs prescribed.

Secondly, changes in consumption behaviour are more frequent among individuals with a low-income and those with a poor health status. For these two populations, deductibles represent a significant financial burden with the effect of limiting their access to drugs.

These results can be compared with those obtained by a previous study on the 1€ co-payment for GP consultations (15). In this study, only 8% of respondents declared that this new co-payment had definitely or probably modified their behaviour regarding GP consultations. As for the deductible on prescription drugs, the most frequent changes were observed among low-income individuals. Such a study could be extended to other type of prescribed health care as ancillary care or laboratory procedures.

A limitation of this study comes from the declarative nature of the response variable analysed (having modified one's drug purchasing behaviour or not). This variable in fact only provides summary information concerning individuals' behaviour. It neither provides information on the nature of the drugs forgone by an individual nor does it permit to ascertain whether some drugs have been substituted by others. To cope with this limitation, a complementary study based on administrative data on drugs consump-

tion should be conducted. Nevertheless, finding an adequate control group represents a challenge as the group of individuals not concerned by the deductible (people aged under 18, CMU-C beneficiaries, pregnant women) differs significantly from the group of individuals affected in terms of age and socioeconomic status, thus probably in terms of drug needs.

Finally, concerning the economic model of drugs demand, the study can be extended to take into account a more general demand model.

## 6. References

1. Ginsburg P. Controlling health care costs. *New England Journal of Medicine*. 2005;351:1591-3.
2. Ess S. European healthcare policies for controlling drug expenditure *Pharmacoeconomics*. 2003;21:89-103.
3. Pauly MV. The economics of moral hazard: comment. *The American Economic Review* 1968;58(3):531-7.
4. Jatrana S, Crampton P, Norris P. Ethnic differences in access to prescription medication because of cost in New Zealand. *Journal of Epidemiology and Community Health* 2011;65(5):454-60.
5. Kennedy J, Coyne J, Sclar D. Drug affordability and prescription noncompliance in the United States: 1997-2002. *Clinical Therapy*. 2004;26:607-14.
6. Tamblyn R. Adverse Events Associated With Prescription Drug Cost-Sharing Among Poor and Elderly Persons. *Journal of the American Medical Association* 2001;285:421-9.
7. Winkelmann R. Co-payments for prescription drugs and the demand for doctor visits. Evidence from a natural experiment. *Health Economics* 2004;13(11): 1081-9.
8. Steinman M. Self-restriction on medications due to cost in seniors without prescription coverage. *Journal of general interne medicine*. 2001;16:793-9.
9. O'Brien B. The Effect of Patient Charges on the Utilisation of Prescription Medicines. *Journal of health economics*. 1989;8(1):109-32.
10. Leibowitz A, Manning W, Newhouse J. The demand for prescription drugs as a function of cost sharing. *Social Science and Medicine*. 1985;21:1063-9.
11. Wooldridge J. *Econometric Analysis of Cross Section and Panel Data*: MIT Press.; 2002.
12. Andersen R. Revisiting the behavioural model and access to medical care: does it matter? . *Journal of Health and Social Behavior*. 1995;36:1-10
13. Raynaud D. Les déterminants individuels des dépenses de santé : l'influence de la catégorie sociale et de l'assurance maladie complémentaire. *Etudes et Résultats DREES*; 2005.

14. Blomqvist Å. Does the Economics of moral hazard need to be revisited? A comment on the paper by John Nyman. *Journal of Health Economics*. 2001;20:283–8.
15. Simon M-O. *Les français, la réforme de l'assurance maladie et la complémentaire santé*. Paris: CREDOC, 2006.

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## Deductibles and the Demand for Prescription Drugs: Evidence from French Data

### *Effet des franchises sur la demande de médicaments : une analyse sur données françaises*

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On January 1<sup>st</sup> 2008, a 0.5€ deductible levied on every prescription drug package purchased was introduced in France. This study aims at shedding light on the effect of this policy on prescription drug purchasing behavior among the targeted individuals.

Declared behavior from a cross-sectional study based on participants in the French Health, Health Care and Insurance Survey of 2008. The determinants of having changed one's prescription drugs consumption following the introduction of deductibles were explored based on the socio-behavioral model of Andersen and an economic model of drug demand. The empirical analysis used a logistic regression.

All other factors being equal, individuals' probability of having modified their drug consumption behaviour following the introduction of deductibles decreases with income level and health status (self-assessed health and suffering from a chronic disease).

Deductibles on prescription drugs represent a significant financial burden for low-income individuals and those in poor health, with the potential effect of limiting their access to drugs.

\* \* \*

Une franchise de 0,5 € par boîte de médicaments prescrite a été mise en place le 1<sup>er</sup> janvier 2008. Afin d'apporter un premier éclairage sur les effets de celle-ci sur la consommation de médicaments, une analyse a été menée en ayant recours au modèle comportemental d'Andersen et à un modèle économique de demande. À partir de données déclaratives de l'Enquête santé protection sociale (ESPS) 2008, nous montrons que la probabilité de modifier la demande de médicaments suite à la mise en place de la franchise est influencée par le niveau de revenu et l'état de santé : toutes choses égales par ailleurs, elle varie de manière opposée avec chacune de ces variables. Les franchises médicales représentent ainsi une charge financière pour les individus à bas revenus et ceux en mauvais état de santé, avec pour corollaire une limitation potentielle de leur accès financier aux soins.