Is the disabled elderly's demand for formal home-care sensitive to the out-of-pocket cost? A multi-level analysis on French data

Robin Hege (Université Paris 1 Panthéon-Sorbonne)

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Abstract

This article focuses on the price-elasticity of demand for formal home-care received by disabled elderly. In France a public financing system of long-term care for disabled elderly - aged 60 and over - called APA (Allocation Personnalisée d'Autonomie) has been set up in 2001. This policy is based on a partial subsidization of demand for formal home-care so that an out-of-pocket cost remains. It rests on three variables : the department policy and the provider chosen by the recipient and the income level of the recipient. The induced heterogeneity of the out-of-pocket cost allows price-elasticity estimations but compels me to employ two databases. I use the HSM survey - an individual database on disability and health that is representative of the French - and the Territoire survey which provides information in each department on the APA policy parameters. The combination of these two databases enables me to approximate the out-of-pocket cost for each individual that is the one-hour formal home-care price. I estimate a multi-level model with random effects and find that the price-elasticity of demand for formal home-care has a value of -0.15 at my average point.

Introduction

The disabled elderly's demand for formal home-care in France is an important issue for at least two reasons. First, it concerns an important number of people : the French Department of Health estimates that there is 1.2 millions disabled elderlies in France, and 60% of them are still living at home. Second, this issue also concerns the families of these people : Bonsang for instance showed in 2008 [1] that formal care (professional care) and informal care (provided by the disabled elderly's family) are substitutes. Since the amount of informal care provided by the carers affects their availability in the job market [7] and their quality of life [5], the amount of formal home-care recieved by a disabled elderly can affect his carers.

Because of these concerns, a public policy has been set in motion in 2001, it is called APA - Personalized Autonomy Allocation. An APA recipient can either live at home or in an institution. In this article I only focus on the recipient living at home. For a recipient who stays at home the APA subsidize his demand for formal home-care. This subsidization is most of the time [1] partial and an out-of-pocket cost remains. So this allocation leads to a modification of the price paid by its recipient for a formal home-care hour.

The effects of the APA therefore depend upon the value of the price-elasticity of demand for formal home-care by the disabled elderly. Analyzing these effects is more newsworthy than ever because of the coming dependence reform in France. This reform - confirmed in 2013 by the former French Prime Minister Jean-Marc Ayrault [2] - will alter the way the out-of-pocket cost is calculated and so alter the price paid by the disabled elderly for a formal home-care hour. In this context, it is then important to know if the disabled elderly's demand for formal home-care is sensitive to the out-of-pocket cost.

But there are few studies about this subject in the litterature. I first present those which focus on the existence of the price's influence on the consumption of formal home-care and then those which focus on this influence's quantification.

Many articles show that there is a price effect on the consumption of formal home-care. The pioneering works of Coughlin & al. in 1992 [3], Ettner in 1994 [6] and Pezzin & al. in 1996 [13] all show that there is a negative price effect on the formal home-care consumption. Coughlin & al. used an American database, the National Long Term Care Survey which was conducted in 1982. This survey provides information about the weekly consumption of formal home-care and the public policies that each individual benefits from. Fontaine in 2012 [8] uses although an eligibility to a public policiy - the APA in this article. He uses a matching method to compare the formal home-care consumption between two very similar individuals, but one has the APA and the other does not. He although find a positive effect of the public policy on the consumption and so a negative effect of the price. Kim & al. in 2012 [12] use a similar identification method because they analyze the influence of an insurance for long-term care on its consumption. This study is the only one that find no price-effect on the formal home-care consumption. Stabile & al. in 2006 [14] and Golberstein & al. 2009 [9] use the differences between geographical regions in the formal home-care reimbursement to identify the price-effect. They found a negative price-effect on the formal home-care consumption.

If the existence of this price effect was shown, there is very few article that measure this price effect. This negative price effect on the formal home-care consumption was measured, to my knowledge, by only two studies in France. Thiébaud in her thesis in 2011 [15] found that if the out-of-pocket cost increases by 1€, the formal home-care consumption decreases by 19%. But this result is hard to interpret because

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1. The details of the APA subsidization will be explained in Section 1

2. See : *Déclaration de Jean-Marc Ayrault, Premier ministre, Concernant le projet de loi sur l'adaptation de la société au vieillissement* october the 14th of 2013

Bourreau-Dubois & al. in 2014 [2] found a price-elasticity of -0.55, but use a very specific sample.

The reason why there are so few articles about the price-elasticity of demand for formal home-care lies in the fact that the data are hard to collect. Since public policies alter the price paid by the disabled elderly it is very difficult to know the actual price paid, that is the exact out-of-pocket cost. I so have a dual objective - both practical and methodological. I estimate a value of the price-elasticity of demand for formal home-care by the disabled elderly. That is the non-compensated price-elasticity because I only focuse on the APA effects. To do so I take advantage of the specific French context and of the available data to achieve this estimation.

In this article I present first how the out-of-pocket cost is ascertain for an APA recipient. Then, based on the out-of-pocket cost I will present my model. Next I present the data that I use to achieve my estimations - which is my fourth section. Finally I present my results and calculate the price-elasticity of demand.

1   The Out-Of-Pocket's Components

In France the only public policy dedicated to the disabled elderly is the APA [4]. As I said earlier this policy is based on a partial subsidization of demand for formal home-care so that an out-of-pocket remains. This measure is a unique and thus interesting case in France because even though a national framework exists, each "département" - a French sub-region - chooses the settings of this measure. It means that the out-of-pocket-cost depends upon the disabled elderly individual characteristics, upon the national framework and upon the "département" where they live. The individual out-of-pocket cost is thus hard to figure out.

1.1   An intricate allocation

The out-of-pocket cost rests on three different elements, the percentage rate of the co-payment system, the hourly fee and the actual price charged :

- First the percentage rate of the co-payment system. This rate depends upon the recipient's income and shifts from 0% to 90%. The way it shifts is fixed by the national law with this formula :

  $\frac{R-(S\times 0.67)}{S\times 2} \times 0.90$ [3]

  Where R is the recipient's monthly income and S is the "Majoration pour tierce personne", an allocation recieved by the disabled that are under 60 years old. Its value is revalued every year[4]. This formula means that the percentage rate of the co-payment system can't be higher than 90%.

- Second the hourly fee. This fee depends upon the "département" and upon the type of formal home-care producer. Each "département" can fix its own hourly fee, that is the maximum amount that can

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3. Code de l'action sociale et des familles : article R232-11
4. In 2008 - the year where my data was collected - its value was 1010.82€.

be recieved by an APA recipient for a formal home-care hour. In other words, it is the amount recieved by an APA recipient whose co-payment rate is 0%.

In each "département" there are several hourly fee. They are different according to the type of producer chosen by the recipient - the producers which are regulated ("autorisés") or the producer which are accredited [5] ("agréés").

There is a special case for the regulated producers. For them the hourly fee is different according to the producer itself - that is true most of the time. In this case there is an hourly fee for each producer because of the regulation system of the formal home-care producers. In order to get the status "regulated" ("autorisé"), producers have to welcome a "départemental" agent who perform a financial analysis and reckon the marginal cost of a formal home-care hour for the producer. This marginal cost - which is different for each regulated producer - is then the hourly fee.

Finally, some "département" set two hourly fee for each producer. For instance one for business day and one for sunday or public holiday.

– Third the actual price charged. This price depends upon the producer chosen by the recipient. As I said earlier, if the producer is regulated its actual price charged is equal to the hourly fee.

For each APA recipient, the out-of-pocket cost is calculated by taking into account this three elements.

1.2   The individual out-of-pocket cost

The out-of-pocket cost can be calculated and I distinguish between two cases : the case where the producer chosen by the recipient is regulated and the case where it is accredited.

When the producer is regulated the actual price charged by the producer is equal to the hourly fee. The out-of-pocket cost can then be written as follows :

$$OOPreg_{id} = t_{1d}.m_i + \underbrace{(preg_i - t_{1d})}_{=0}$$

Where $OOPreg_{id}$ is the out-of-pocket cost paid by the recipient, it varies depending on individual characteristics and on the "département" where the recipient live. t_{1d} is the hourly fee fixed by the "département", m_i is the percentage rate of the co-payment system and $preg_i$ is the actual price charged by the producer. In this case the actual price charged is equal to the hourly fee so the out-of-pocket cost depends only upon the hourly fee and the percentage rate of the co-payment system. The following diagram represents the part paid by the recipient - the red section - and the part paid by the APA - the blue section.
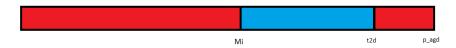

Mi   t1d / p_autd

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5. there are two other types of producers corresponding to two other hourly fee : the one which are independant and the one which are not professional - such as the family. But I don't take them into acount in this paper.

When the producer is accredited the actual price charged is different from the hourly fee so that the out-of-pocket cost differ from the case when the recipient choose a regulated producer :

$$OOPac_{id} = t_{2d}.m_i + \underbrace{(pac_i - t_{2d})}_{\neq 0}$$

In this formula $OOPac_{id}$ represents the out-of-pocket cost paid by the recipient if he choose an accredited producer, t_{2d} is the hourly fee for a formal home-care hour produced by an accredited producer, m_i is the percentage rate of the co-payment system and pac_i is the actual price charged by the producer. In that case, the hourly fee is different from the actual charged price and the out-of-pocket cost can be represented by the following diagram.

To figure out the out-of-pocket cost, and so calculate the actual price paid by an APA recipient, I need informations about all this elements.

2 Data

I need informations that are at an individual level and at the level of the "départements". I so use two databases, an individual one and a "départementale" one.

2.1 The HSM survey

The "Handicap-Santé-Ménage" (Disability - Health - Household) survey was conducted in 2008 at an individual level and is representative of the French population. This survey was conducted by the French Health Department - DREES - and by the National Institute of Statistics - INSEE. This survey focuses on disabled only, that includes disabled elderly. The researchers asked about 30 000 people about their health and their consumption of health care. There was although general questions about their profession or their income for instance. Individuals from this survey compose my sample and I need to figure out for each of them their out-of-pocket cost.

This survey gives me information about each recipient's monthly income, which allows me to calculate the percentage rate of the co-payment system. I use although the weekly consumption of formal home-care for each recipient. I use some socio-demographic control variable like the marital status or health. Finally I have informations about their living area, so I know in which "département" they live.

2.2 The "Territoire" Survey

The "Territoire" Survey was conducted in 2012 at the level of the "départements". This survey was conduceted by a research team from different discipline - Sociology, Politilogy and Economy - and from different University - Paris Dauphine, Paris 1 Panthéon-Sorbonne, Université de Bougogne and Ecole Normale Supérieure de la rue d'Ulm. This survey contains informations about APA parameters in each "département".

This surey gives me information about the hourly fee in each "département" for the producers that are regulated and accredited. I although get he actual price charged's distribution but only for the producers that are regulated. Finally I use the proportion of hours produced in each "département" for the producers that are regulated.

Crossing these two databases allows me to get the main information about the out-of-pocket cost for each individual in my database.

3 Model

In order to estimate the price-elasticity of demand I specify a demand function for formal home-care.

3.1 Assumptions

I make five assumptions to modelize the demand of formal home-care :

1. The link between the weekly consumption of formal home-care and the variables that affect it is not linear.

2. There are only two types of producer : the one which are regulated and the one which are accredited. I make this assumptions so I can calculate the proportion of hours produced in each "département" for the producers that are accredited.

3. There is a unique actual price charged by the accredited producers in each "département". That is to say that there is either a perfect competition or a perfect collusion between the producers.

4. Every hour of formal home-care consume by the recipient is subsidize by the APA. That is not true all the time because the APA subsidization cannot be higher than a seeling. This seeling depends upon the disability level of the recipient.

5. The price-elasticity of demand for formal home-care is not constant, it varies depending on the out-of-pocket cost. In other words, the sensitivity of demand for formal home-care rises if the out-of-pocket cost rises.

3.2 Demand Function For Formal Home-Care

Basing on these five assumptions I can write my demand function for formal home-care as follows :

$$ln(h_{id}) = aOOP_{id} + bR_i + gX_i$$

With h_{id} the number of formal home-care hours consume by the individual[6], OOP_{id} the out-of-pocket cost paid by the individual, R_i his monthly income and X_i a group of individual socio-demographic and health variables.

As I said in the section 1.2 the out-of-pocket cost depends upon the producer chosen by the APA recipient. My demand function is then :

$$ln(h_{id}) = \begin{cases} aOOPreg_{id} + bR_i + gX_i & \text{if the APA recipient choose a regulated producer} \\ aOOPac_{id} + bR_i + gX_i & \text{if the APA recipient choose an accredited producer} \end{cases}$$

That is

$$ln(h_{id}) = \begin{cases} a[t_{1d}.m_i] + bR_i + gX_i & \text{if the APA recipient choose a regulated producer} \\ a[t_{2d}.m_i + (pac_d{}^7 - t_{2d})] + bR_i + gX_i & \text{if the APA recipient choose an accredited producer} \end{cases}$$

Though in my data I don't have the type of producer chosen by the recipient, I do have the proportion of hours produced in each "département" by regulated producers ($propreg_d$). Because of my second assumption, I can calculate the proportion of hours produced in each "département" by accredited producers, that is : $propac_d = 1 - propreg_d$.

With this two proportions I calculate the expected out-of-pocket cost for each recipient given the "département" where he leaves :

$$\mathbb{E}(OOP_{id}) = \Big[\underbrace{t_{1d}.m_i.propreg_d}_{regulated} + \underbrace{[t_{2d}.m_i + (pac_d - t_{2d})].propac_d}_{accredited} \Big]$$

My demand function for formal home-care is then :

$$\begin{aligned} ln(h_{id}) &= a\mathbb{E}(OOP_{id}) + bR_i + gX_i \\ &= a\Big[\underbrace{t_{1d}.m_i.propreg_d}_{regulated} + \underbrace{[t_{2d}.m_i + (pac_d - t_{2d})].propac_d}_{accredited} \Big] + bR_i + gX_i \end{aligned}$$

4   Estimation

Based on this model I adapt my estimation strategy and use a sample that allows me to calculate all the variables.

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6. I use the logarithm of h_{id} because of my first assumption

4.1 Estimation Strategy

Since I don't have information about pac_d - the actual price charged by the producers that are accredited - I can't estimate directly my demand function. Developing my previous model I find :

$$ln(h_{id}) = \alpha\Big[(t_{1d}.m_i.propreg_d) + (t_{2d}.m_i.propac_d) - (t_{2d}.propac_d) + \underbrace{pac_d}_{unknown}.(propac_d)\Big] + \beta R_i + \gamma X_i$$

I made the assumption that in each "département", all the accredited producers charge the same price. I can therefore rewrite pac_d :

$pac_d = \overline{pac} + u_d$ where $\overline{pac}$ is the actual price that would be charged by all the accredited producers if there were no effect of the "départements" and u_d the change of this price linked to each of the "départements".

By assuming that u_{ud} follows a gaussian distribution it is possible to estimate the following equation :

$$ln(h_{id}) = \alpha z_{id} + \beta R_i + \gamma X_i + \underbrace{\theta}_{\alpha(\overline{pac}+u_d)} (propac_d) + v_d + \epsilon_i$$

With $z_{id} = (t_{1d}.m_i.propreg_d) + (t_{2d}.m_i.propac_d) - (t_{2d}.propac_d)$

I use the method developped by Harville [10] in 1977 to estimate a multi-level model with random effects. This restricted maximum-likelihood estimation allows to separate the random effects associated with $propac_d$ from those associated with each "département" in general.

This estimation is induced by the demand function's development but can easily be interpreted : the actual price-charged by the accredited producers and its variation accross the "départements" depend upon the proportion of producers that are accredited in each of these "départements".

4.2 The Price-Effect's Identification

Because the out-of-pocket cost depends upon the recipient's income it can be hard to distinguish between the price effect and the income effect. But the fact that I use different levels variables allows me to distinguish between these two effects. Indeed the expected out-of-pocket is :

$$\mathbb{E}(OOP_{id}) = \Big[\underbrace{t_{1d}.m_i.propreg_d}_{regulated} + \underbrace{[t_{2d}.m_i + (pac_d - t_{2d})].propac_d}_{accredited}\Big]$$

And so two individuals with the same income can have a very different out-of-pocket. Empirically I find that there is a 0.53 correlation between the monthly income of the recipient and his out-of-pocket. This correlation is quite high but still allows me to identify the price-effect.

4.3 Sample and Descriptive Statistics

To perform this estimation, I cross the two databases I presented in the section 2. I keep all the APA recipient from whom I have information on the "département" where they live. My final database is composed

by 291 individuals living in 47 "départements" [8].

Individual characteristics	Effectif : 291	
Variables	Mean	Std. Err.
Age (year)	80.7	8.7
Monthly income (€)	1395	740.
Variables	%	
Women	0.77	
Living alone	0.49	

Public policy characteristics	Effectif : 47	
Hourly fee (€) (regulated)	19.6	1.44
Hourly fee (€) (accredited)	18.6	0.9

We can see that my sample is composed by 77% of women, probably because of the average year - 80.7 years.

5 Results

In this section I present my estimation results which allow me to calculate the price-elasticity of demand for formal home-care.

5.1 Estimation Results

I performed two regressions. The first is the model I presented earlier (table 1), the second is the same model but without the random effects associated with $propac_d$ - without u_d (table 2). So in the second model, I make the assumption that all the accredited producers in France charge exactly the same price.

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8. For 95 "départements" in metropolitan France

```
                                        Wald chi2(26)      =      116.43
Log restricted-likelihood = -391.73207  Prob > chi2        =       0.0000

----------------------------------------------------------------------
         log(hours per month) |     Coef.   Std. Err.      z    P>|z|
------------------------------+---------------------------------------
                   sum of ADL |   .1217312   .0347096    3.51   0.000
                  sum of IADL |   .0725867     .02799    2.59   0.010
                    alzheimer |   .1572199    .143351    1.10   0.273
         695<Month. Inc.<1000 |  -.5547956   .1912095   -2.90   0.004
        1000<Month. Inc.<1500 |  -.2767557   .1707631   -1.62   0.105
        1500<Month. Inc.<2000 |  -.1330469   .1962535   -0.68   0.498
        2000<Month. Inc.<2772 |   .2111095   .2406841    0.88   0.380
             2772<Month. Inc. |     .48078   .4867069    0.99   0.323
          city population<20000 |  -.2452643   .1678732   -1.46   0.144
 20000<city population<100000 |  -.2762767   .1931171   -1.43   0.153
     100000<city population   |  -.2717905   .1418484   -1.92   0.055
   prim./low second. education |  -.0860717   .1113441   -0.77   0.440
      upper secondary education |   -.079527   .1931335   -0.41   0.681
       post secondary eduction |   .0575549   .3956634    0.15   0.884
           live with a partner |  -.4472224   .1342817   -3.33   0.001
                     nb of son |     .00507   .0417634    0.12   0.903
                nb of daughter |   .0278722   .0514066    0.54   0.588
                        female |   .0152793   .1326538    0.12   0.908
                   65<age<70 |   .2404884   .3417211    0.70   0.482
                   70<age<75 |   .3239414   .2678019    1.21   0.226
                   75<age<80 |   .1799365   .2512085    0.72   0.474
                   80<age<85 |   .2026464   .2563981    0.79   0.429
                   85<age<90 |  -.0022852   .2605377   -0.01   0.993
                     90<age<  |   .0242521   .2971047    0.08   0.935
                         z_ij |   -.022745   .0124628   -1.83   0.068
    proportion of acc. producers |  -.4349364   .4614114   -0.94   0.346
                      constant |   2.036433   .3527468    5.77   0.000
----------------------------------------------------------------------


----------------------------------------------------------------------
    Random-effects Parameters  |   Estimate   Std. Err.    [95% Conf. Interval]
------------------------------+---------------------------------------
dep: Independent              |
                         u_i  |   1.052717   .3751399     .5235793    2.116609
                         v_i  |   4.97e-06          .            .            .
------------------------------+---------------------------------------
                 sd(Residual) |   .8476705   .0383116      .775811     .926186
----------------------------------------------------------------------
LR test vs. linear regression:        chi2(2) =      4.99   Prob > chi2 = 0.0824
```

Table 1 : Multi-level model with random effects and
random coefficient

```
corr(u_i, X)    = 0 (assumed)                  Wald chi2(26)      =     113.44
                                               Prob > chi2        =      0.0000

------------------------------------------------------------------------------
       log(hours per month) |    Coef.    Std. Err.      z     P>|z|
----------------------------+-------------------------------------------------
                 sum of ADL |   .1222794    .0347849     3.52   0.000
                sum of IADL |   .0726361    .0282056     2.58   0.010
                  alzheimer |   .1638523    .1431998     1.14   0.253
     695<Month. Inc.<1000   |  -.5636941    .1921599    -2.93   0.003
    1000<Month. Inc.<1500   |  -.2838573    .1723252    -1.65   0.100
    1500<Month. Inc.<2000   |  -.1339895     .197258    -0.68   0.497
    2000<Month. Inc.<2772   |   .1845303    .2420742     0.76   0.446
         2772<Month. Inc.   |    .411466    .4883424     0.84   0.399
      city population<20000 |  -.2493163    .1696074    -1.47   0.142
  20000<city population<100000 | -.2872136  .1977636    -1.45   0.146
     100000<city population |  -.2592606    .1438483    -1.80   0.071
  prim./low second. education |  -.0788967   .1118554   -0.71   0.481
    upper secondary education |  -.0633861   .1934479   -0.33   0.743
      post secondary eduction |   .1020258   .3960249    0.26   0.797
          live with a partner |  -.4520471   .1347295   -3.36   0.001
                    nb of son |   .0108626   .0420553    0.26   0.796
               nb of daughter |   .0260748   .0519477    0.50   0.616
                       female |   .0114201   .1328903    0.09   0.932
                   65<age<70  |   .1841776   .3444532    0.53   0.593
                   65<age<70  |   .2798819    .267966    1.04   0.296
                   65<age<70  |   .1469271   .2516711    0.58   0.559
                   65<age<70  |   .1695604   .2572457    0.66   0.510
                   65<age<70  |  -.0335808   .2605047   -0.13   0.897
                   65<age<70  |   .0062681   .2971971    0.02   0.983
                         z_ij |  -.0245717   .0125464   -1.96   0.050
  proportion of acc. producers |  -.5148436  .4329351   -1.19   0.234
                     constant |   2.112807   .3619506    5.84   0.000
----------------------------+-------------------------------------------------
                    sigma_u |   .26689795
                    sigma_e |   .85178202
                        rho |   .08940443   (fraction of variance due to u_i)
```

Table 2 : Multi-level model with random effects

As we can see, the number of ADL and of IADL has a positive influence on the formal home-care consumption. It is surprising that the dummy variable "alzheimer" has no effect but we can imagine that the alzheimer's influence on the formal home-care consumption only pass by ADL and IADL.

The coefficient associated with the second income category is significativly negative and different from zero. It means that compared to my reference category - the first income category - people with a monthly income between 695€ and 1000€ have a lower formal home-care consumption. It may seems strange because they have a higher income but they although have a higher co-payment rate. Indeed, people in my first income category have a co-payment rate of 0%, so if they choose a regulated producer they may have an out-of-pocket cost equal to 0€.

We can although see that people living in the biggest cities consume less formal home-care than those living in the countryside, maybe because there is too much demand in the biggest cities.

More intuitively people living with their partner get less formal home-care than the other, it is probably because of the substitution between formal and informal care.

Finally we can see that the α coefficient, the one associated with z_{id} is significativly different from zero and thus can be used to estimate the price-elasticity of demand for formal home-care.

5.2 The Price-Elasticity Of Demand For Formal Home-Care

Based on my demand function I calculate that the price-elasticity of demand for formal home-care is :

$$\epsilon_i = \alpha.OOP_i$$

I thus need my α coefficient but although the out-of-pocket cost. As I showed earlier the out-of-pocket cost depends upon the unknown actual price-charged by the accredited producers in each "département". But my results allow me to calculate $\overline{pac}$: the coefficient associated with the proportion of accredited producers in each "département" is $\alpha.\overline{pac}$. Then :

$$\overline{pac} = \frac{-0.4349364}{-0.022745} = 19.12$$

This results is perfectly consistent with the price charged in reality for one formal home-care hour. We can see that the obtained results with the second regression are quite similar. With the assumption that there is a unique price charged by all the accredited producers in France called pac we have :

$$pac = \frac{-0.5148436}{-0.0245717} = 20.95$$

These results allows me to calculate the expected out-of-pocket cost for each individual and so the average out-of-pocket cost. For an out-of-pocket cost of 7€per hour, my sample's average, the price-elasticity of demand for formal home-care has a value of -0.15.

Conclusion

Even though my sample is quite small and I have few individuals per "département", my results seems consistent. Because the two estimation I perform gives me similar results. And although because the value of $\overline{pac}$ fit with the reality. By using two databases and so two level for my variables, I find a value for the price-elasticity of demand for formal home-care equal to $-0.023.OOP_{id}$, and -0.15 at my average point. It means that for a disabled elderly who uses 22 hours of formal home-care per month, an increase of 10% of the out-of-pocket cost leads to a decrease of 20 minutes of formal home-care used per month.

So the price-elasticity of demand for formal home-care seems close but lower than the price-elasticity of demand for health care. Keeler & Rolph [11] found in 1988 a value of -0.2 for this price-elasticity. It means that the demand for formal home-care is exceptionnaly unsensitive to a change of the price, and so that there is not much as a moral hazard in this sector. It can encourage to subsidize more the demand of formal home-care.

Références

[1] Eric Bonsang. Does informal care from children to their elderly parents substitute for formal care in europe ? *Journal of health economics*, 28(1) :143–154, 2009.

[2] Cécile Bourreau-Dubois, Agnès Gramain, Helen Lim, and Jingyue Xing. Impact du reste à charge sur le volume d'aide Ã domicile utilisé par les bénéficiaires de l'APA. *Working Paper du CES nÂ°2014-24*, 2014.

[3] Teresa A. Coughlin, Timothy D. McBride, Maria Perozek, and Korbin Liu. Home care for the disabled elderly : predictors and expected costs. *Health Services Research*, 27(4) :453, 1992.

[4] Cour des Comptes. La vie avec un handicap. Technical report, 2003.

[5] Theresa J. Drinka, Jane C. Smith, and Paul J. Drinka. Correlates of depression and burden for informal caregivers of patients in a geriatrics referral clinic. *Journal of the American Geriatrics Society*, 1987.

[6] Susan L. Ettner. The effect of the medicaid home care benefit on long-term care choices of the elderly. *Economic Inquiry*, 32(1) :103–127, 1994.

[7] Roméo Fontaine. Aider un parent âgé se fait-il au détriment de l'emploi ? *Retraite et societe*, (2) :31–61, 2010.

[8] Roméo Fontaine. The effect of public subsidies for formal care on the care provision for disabled elderly people in france. *Economie publique/Public economics*, (28-29) :271–304, 2012.

[9] Ezra Golberstein, David C Grabowski, Kenneth M Langa, and Michael E Chernew. Effect of medicare home health care payment on informal care. *INQUIRY : The Journal of Health Care Organization, Provision, and Financing*, 46(1) :58–71, 2009.

[10] David A. Harville. Maximum likelihood approaches to variance component estimation and to related problems. *Journal of the American Statistical Association*, 72(358) :320–338, 1977.

[11] Emmett B. Keeler and John E. Rolph. The demand for episodes of treatment in the health insurance experiment. 7(4) :337–367.

[12] So-Yun Kim, Gong-Soog Hong, and Catherine P Montalto. The effect of long-term care insurance on home care use among the disabled elders. *Journal of family and economic issues*, 33(3) :353–362, 2012.

[13] Liliana E. Pezzin, Peter Kemper, and James Reschovsky. Does publicly provided home care substitute for family care ? experimental evidence with endogenous living arrangements. *Journal of Human Resources*, pages 650–676, 1996.

[14] Mark Stabile, Audrey Laporte, and Peter C. Coyte. Household responses to public home care programs. *Journal of health economics*, 25(4) :674–701, 2006.

[15] Sophie Thiebaut. Maladies chroniques et pertes d'autonomie chez les personnes agees : evolution des depenses de sante et de la prise en charge de la dependance sous l'effet du vieillissement de la population, 2011.