“Pay less, consume more? Estimating the price elasticity of demand for home care services of the disabled elderly”

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Like most developed countries, France is facing the ageing of its population: due to the increase in life expectancy and the advance in age of baby-boomers, the share of the population above 60 is predicted to grow from 21.5% in 2011 to 32.1% in 2060 (Blanpain and Chardon, 2010). As the rise in disability-free life expectancy does not match the increase in life expectancy (Sieurin et al., 2011), the number of the elderly needing assistance to perform the activities of daily living is expected to grow substantially.

In most countries, public policies foster the utilization of formal home care by granting the disabled elderly with subsidies to finance home care consumption. These programs, however, only partially cover the cost of professional home care. As a consequence, the disabled elderly often bear non-negligible out-of-pocket cost. In France, the average monthly out-of-pocket payment on domestic help utilization was estimated to amount, at least, to 160€ in 2007 (Bérardier, 2011), or about 14% of the average monthly pension benefit.

The existence of substantial out-of-pocket payments leads to an immediate concern: how sensitive to price are the disabled elderly when consuming home care services? This paper brings empirical evidence on this question by estimating the price elasticity of the demand for non-medical home care services of the disabled elderly. It specifically addresses the effect of price on consumption at the intensive margin. This effect is *a priori* unclear, but it has direct implications for the design of public policies. With small price elasticity, consumption of domestic help varies little following changes in out-of-pocket prices: home care subsidies work as pure redistributive transfers (from taxpayers to disabled elderly). With elastic home care consumption, support programs have efficiency implications: as in the health care context, generous subsidies may induce over-consumption and a welfare loss, while insufficient coverage could undermine the preventive effects home care was found to have on the health of the elderly (Stabile et al., 2006; Barnay and Juin, 2015; Rapp et al., 2015).

Our paper addresses this shortcoming by making use of the French home care scheme targeted to the disabled elderly, the APA policy (*Allocation personnalisée d'autonomie*). With more than 710,000 beneficiaries in 2013, the APA policy for the elderly living in the community amounted to a spending of 3.1 billion euros in 2013\(^1\), or 0.15% of GDP. APA works as an hourly subsidy on professional domestic help. Administrative records of the

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\(^1\) Drees, *Enquête annuelle Aide sociale*, 2013.
scheme provide detailed information on home care consumption and out-of-pocket payments of APA beneficiaries, but they are established separately by each District Council (Conseil départemental) and are not routinely converted into data bases. We use an original dataset, made of the individual records that we collected for the beneficiaries of a given District Council. To identify home care price elasticity, we exploit inter-individual variations in producer prices. We first assume the producer prices to be exogenous, and then relax this assumption to assess whether APA beneficiaries endogenously select into a given producer. We control for disposable income and other individual characteristics (disability levels, socio-demographic variables) that affect the consumption of home care. As the volume of care recorded in the administrative dataset is censored to the maximum number of subsidized hours, we fit a censored regression model with individual-specific censoring points.

Our baseline results indicate a significant, negative price elasticity of -0.7. However, this estimator seems to be inflated by nonrandom producer selection. Given this selection effect, the true price elasticity seems to be closer to -0.4. On average, an increase of 10% of the hourly out-of-pocket payment is predicted to reduce the (uncensored) care hours consumed by 4%, or about 40 minutes per month for a beneficiary consuming the median monthly volume of 15.5 hours. Although precision is low, our results point to price elasticity lower than unity. In that respect, this makes home care services closer to acute care than to elective health care services. Positive out-of-pocket payments can partly explain why many APA beneficiaries do not consume the full amount of care hours for which they are entitled to a subsidy. We can expect that increases in the generosity of public subsidies, as the ones planned by a 2016 French reform, would cause a small increase in home care consumption, and above all a decrease in total out-of-pocket payments borne by the disabled elderly.

Our paper thus contributes to the literature by providing further evidence that the consumption of home care services is price-sensitive. Despite the growing concern about the financing of long-term care, the price effect of professional domestic help had been little investigated. Previous literature has mainly focus on the impact of out-of-pocket payments on the consumption of medical services. Some papers tested for the effect of benefiting from home care subsidies on the utilization of paid domestic help (Coughlin et al., 1992; Ettner, 1994; Fontaine, 2012); but because of a lack of detailed information on out-of-pocket payments, they have not been able to quantify the price elasticity of demand. Our empirical strategy makes it possible to quantify price elasticity, whose magnitude turns out to be low.

The outline of the paper is as follows: Section I gives presents the modeling of the demand for home care in the APA framework. Section II gives details on the original administrative dataset used for estimation and Section III presents the econometric specification and empirical strategy. Section V presents the results and discusses them while Section VI concludes.
I. APA policy and demand for home care

a. APA program

The objective of the French APA program is to help financing the cost of professional care services for the elderly who require assistance in the activities of daily living (household chores, meal preparation, personal hygiene, grocery shopping...). This policy is defined at the national level and implemented at the district level (Département).

There are two main eligibility conditions to the APA program. First, as the policy is targeted to the elderly, an individual must be at least 60 years-old to be eligible. Secondly, the individual must have been assessed as disabled. This last condition requires a specific evaluation from a team managed by the District Council, that we will call here the “evaluation team”, which is composed of medical professionals (nurses, doctors) and/or social workers. The evaluation team visits each APA applicant in order to evaluate her needs in terms of assistance in the activities of daily living. To do so, they use a national scale, the “AGGIR” scale (Autonomie Gérontologie Groupe Iso-Ressources), allowing an assessment of the individual's degree of autonomy\(^2\): the evaluation team defines the disability group of the individual “GIR” (Groupe Iso-Ressources). Six disability groups exist, going from the group of non-disabled individuals (GIR 6) to the group of extremely disabled individuals (GIR 1). Only individuals who are found to be moderately to extremely disabled (GIR 4 to GIR 1) are eligible to APA.

For eligible individuals, the team establishes a “personalized care plan”, which lists the activities for which the individual needs assistance and sets the number of hours necessary to their realization. This gives the maximum number of hours that are eligible to APA subsidies, called the care plan volume\(^3\).

Up to the care plan volume, the consumer price of each hour of care is reduced by the APA scheme, which works as an hourly subsidy. For hours beyond the care plan volume, there are no more subsidies from the District Council: the consumer bears the full price of home care services.

b. Computation rules of APA out-of-pocket payments

Up to the care plan volume, for each hour consumed, the APA beneficiary is charged an hourly out-of-pocket payment. It depends on the producer price and a copayment rate increasing with her disposable income. The scheme of the copayment rate is as follows. For

\(^2\) Compared to the more classical scales built with information on the restrictions in ADL and IADL, such as Katz or Lawton scales, AGGIR scale does not include all conventional Activities of daily living (ADL) and Instrumental activities of daily living (ADL), but it uses additional cognitive and physical disability criteria. It is also a more complex tool as it works as an algorithm.

\(^3\) The monetary valuation of the care plan volume must not exceed a given legal ceiling that depends on the individual’s disability group. For instance, in October 2014, the expenses associated with the care plan volume for an individual in disability group GIR 1 cannot exceed 1,313€ per month, whereas it cannot exceed 563€ per month for individuals in GIR 4.
individuals with low income (below 739€ in December 2014\(^4\)), the copayment rate is zero: the APA beneficiary has no out-of-pocket payments if she consumes no more than the care plan volume. For the individuals with high income (higher than 2,945€), the copayment rate is capped at 90%. For individuals with income between these two thresholds, the copayment rate is an increasing linear function of disposable income. The copayment rate is usually applied to the producer price to obtain the hourly out-of-pocket payment. An individual whose copayment rate is equal to 0.5 and who receives a home care hour priced at 22€ would pay 11€. In that case, out-of-pocket payment depends directly and linearly on both the individual disposable income and the producer price.

More precisely, this computation rule is applied by most District councils when the producer chosen by the beneficiary is a regulated structure (service autorisé), whose price is generally directly administrated by the District Council. If the producer chosen by the individual is not regulated (unregulated home care structure or over-the-counter worker), the copayment rate is applied to a lump-sum price, which does not depend on the producer price. This difference in the computation of the consumer's participation has important implications on what can be known of APA beneficiaries’ out-of-pocket payments, as District Councils usually keep track only of the prices of regulated producers.

c. **Modeling home care demand under APA**

Let us write the marshallian (uncompensated) demand for home care services under the general form:

\[
h_i^* = g(CP_i, \hat{I}_i; X_i)
\]

With:

- \(h_i^*\) effective hours of home care services consumed by individual \(i\);
- \(g(\cdot)\) demand function for home care services;
- \(CP_i\) individual's \(i\) consumer price for one hour of home care services;
- \(\hat{I}_i\) the individual total disposable income available for consumption;
- \(X_i\) a set of individual socio-demographic characteristics.

Without public subsidies, the consumer price equals the price charged by the home care producer, and the income corresponds directly to the disposable income of the individual: \(CP_i = p_i\) and \(\hat{I}_i = I_i\) where \(p_i\) is the price charged by the producer chosen by individual \(i\) for one hour of home care service, and \(I_i\) is individual \(i\)'s (monetary) disposable income.

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\(^4\) This threshold depends on the value of a national disability allowance (Majoration pour Tiers-Personne), which is re-evaluated in April each year to take into account the inflation rate.
With APA policy, the beneficiary receives an hourly subsidy, which reduces the amount she has to pay out-of-pocket: the consumer price is now equal to home care market price times a copayment rate, which depends on her individual disposable income \( I_i \). Denoting \( c_i \) the copayment rate of individual \( I \), we have: \( c_i = c_i(I) \) where \( c_i \) is a linear function. Thus, 

\[
CP_i = c_i(I)p_i.
\]

But this is true only up to the care plan volume, i.e. the maximum number of hours eligible to APA subsidies, which is defined in the personalized care plan. For hours consumed beyond that threshold, the consumer price goes back to the full producer price; but the total disposable income available to consumption now integrates subsidies on the subsidized hours consumed. The APA program thus creates a kink in the budget constraint of the beneficiary.

Let us denote \( \bar{h}_i \) the care plan volume of individual \( I \) and \( \bar{I}_i = I_i + (1 - c_i)p_i \bar{h}_i \) the virtual income of individual \( i \) (Moffitt, 1986, 1990). We can write the demand function as follows:

\[
\begin{align*}
    h_i^* &= g(c_i, p_i, I_i, X_i) \quad \text{if} \quad h_i^* < \bar{h}_i \\
    g(p_i, \bar{I}_i, X_i) &< \bar{h}_i < g(c_i, p_i, I_i, X_i) \quad \text{if} \quad h_i^* = \bar{h}_i \\
    h_i^* &= g(p_i, \bar{I}_i, X_i) \quad \text{if} \quad h_i^* > \bar{h}_i
\end{align*}
\]

The objective of the paper is thus to get an empirical estimate of the following quantity, which is simply the point price elasticity (at the sample average):

\[
\frac{d}{d\ CP} \frac{g(\ CP, \bar{I}, X)}{\ CP} \frac{CP}{g(\ CP, \bar{I}, X)}
\]

II. Data

a. Administrative data from a District Council

For our purpose, we need precise information on out-of-pocket payments and home care consumption. In France, up to now, there has not been a national survey providing directly the out-of-pocket payments borne by the disabled elderly. Moreover, as the APA program is implemented at the district level, there is no centralized administrative dataset providing individual information on producer prices, copayment rate and participation computation rules. Available aggregate information on APA recipients is not sufficient to compute individual out-of-pocket payments. One way to quantify the effect of out-of-pocket payments, without making strong assumptions on consumption and out-of-pocket payments, is thus to collect and use the administrative files on the APA recipients of a given district.

We chose to collect data from a District council in which computation rules of out-of-pocket payments are similar to the ones applied in the majority of French districts: when home care is provided by a regulated service, the actual producer price is used to compute the out-of-pocket payment, while a lump-sum price is used when the producer is not regulated. We focus on APA beneficiaries that are served by a regulated home care structure, as we cannot observe the producer price - and thus the out-of-pocket price - for APA beneficiaries served by other
professional caregivers. In our district, in 2013, the majority of APA beneficiaries (81%) receive domestic help through regulated structures.

The demographic characteristics of the district are close to the national average values, with respect to several indicators: population aged 60 years and older over total district population (around 25%), APA beneficiaries living in the community with respect to the population of the elderly aged 60 and older in the district (around 5%). In terms of income, however, district indicators are slightly higher than national averages, with a higher ratio of households subject to the income tax (around 70% of households for 64% of households nationwide) and a lower poverty rate (less than 10%, for a 15% rate at the national level). As the copayment rate on home care expenditures depends on income, APA beneficiaries of this district are more likely to support non-negligible out-of-pocket payments.

The individual data were collected for every month for the years 2012 to 2014. As infra-yearly variation in out-of-pocket prices is very low, we picked up a single month for each year. We retained the month of October, when home care consumption is less likely to be affected by temporary shocks on elderly households (like holidays and visits from children). Given that our main identification strategy will draw on cross-sectional variations, results obtained on October 2014 are presented as the baseline results and we refer to the results obtained on the other years and panel data (not included here) as robustness checks.

b. Sample selection

Due to the difference in computation rules according to producer status, our District Council has direct information on out-of-pocket payments only for APA beneficiaries buying services from a regulated structure. Beneficiaries receiving care exclusively from over-the-counter employees (15% of the initial sample) and non-regulated services (5% of the initial sample) are thus not retained in the sample.

We also drop the individuals that receive home care from more than one producer: adding as control a dummy indicating whether the individual receives home care from another producer would not adequately take into account the simultaneity of consumption decisions and may bias our estimators.

As a last step, we keep only beneficiaries whose copayment rate is strictly greater than zero and strictly smaller than 90%. As explained in Section I, APA schedule is such that below a given threshold of income, copayment rate is null: out-of-pocket price is zero for subsidized hours (this is the case for 13% of our sample at this stage of selection). Beyond a second income threshold, the copayment rate does not vary with income anymore: the relationship between disposable income and the copayment rate is not linear anymore, and this makes identification more complex. We then dropped beneficiaries whose copayment rate is equal to 90% (2.3% of our sample at this stage of selection). We end up with a sample of 2,862 individuals.
We estimated a Probit model to assess the impact of observable characteristics on the probability to choose a regulated producer (not included here). We find a small selection bias: more disabled, poorer and living-alone individuals are more likely to receive care from a regulated producer.

c. Descriptive statistics on the sample

We briefly present the characteristics of the sample used for the estimation. The socio-demographic composition can be compared with national data on APA recipients. The composition of the sample is similar to the national one regarding sex: it counts 74.0% of women while their share is 73% at the national level (Borderies and Trespeux, 2015). Strongly disabled individual are slightly less represented: respectively 1.2% and 12.5% of the sample are GIR 1 and GIR 2, the least two severe disability levels, whereas these rates are respectively 2% and 17% at the national level. As individuals in our district are richer than the national average, the average copayment rate on APA is slightly higher than the national one (23.7%, against 20% at the national level). The large majority (almost 2/3) of individuals in our sample lives alone, which is consistent with the high proportion of women and the average age of 84 years. Few individuals have their spouse living in an institution (nursing home or specialized hospital unit), while 18.6% of those who live with a spouse have their partner also receiving APA.

The average personalized care plan volume is 20.6 hours per month, with a monetary equivalent of 456€: this is slightly less than the national average amount, of 489€ in 2011 (DREES, 2012). On average, 17.7 subsidized hours are effectively consumed by the individuals in our sample. Almost 6 APA beneficiaries out of 10 do not consume the maximum number of hours for which they are entitled to a subsidy; out-of-pocket price sensitivity of the disabled elderly is a natural candidate to explain part of this high figure.

III. Econometric specification and empirical strategy

a. Censoring issue and econometric specification

For each APA recipient of the district, the dataset contains the number of home care hours that are charged by the producer to the District Council or, equivalently, the consumption of subsidized hours of home care. We do not observe, however, the total volume of home care consumed by each APA beneficiary, who are free to consume home care beyond \( \bar{h}_i \).

Let us denote \( h_i \) the number of hours of service billed to the District Council for beneficiary \( i \). Only effectively-consumed hours can be billed, and this within the limit of the care plan volume. Thus, \( h_i \leq h_i^* \) and \( h_i \leq \bar{h}_i \). Our measure of effective home care consumption may thus be right-censored. If the individual consumes less than the care plan volume, the

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5 The average income used in the data is an “individualized income”. For individuals having a spouse alive, it is equal to the household income divided by a factor of economies of scale of 1.7. It is the individualized income that is used by the District Council to compute the copayment rate.
consumption registered by the District Council equals her effective consumption \( h_i = h_i^* \) if \( h_i < \bar{h}_i \): in such a case, there is no censoring issue. But if the individual consumes more than the care plan volume, the consumption registered by the District Council will systematically equal her individual ceiling \( h_i = \bar{h}_i \) if \( h_i^* \geq \bar{h}_i \). Consequently, when \( h_i = \bar{h}_i \) is observed, we either have \( h_i^* = \bar{h}_i \) (no censoring) or \( h_i^* > \bar{h}_i \) (right-censored consumption). Thus, the observational scheme of the uncompensated demand for home care is the following:

\[
\begin{cases}
 h_i = g(c_i, p_i, l_i, X_i) & \text{if } g(c_i, p_i, l_i, X_i) < \bar{h}_i \\
 h_i = \bar{h}_i & \text{if } g(c_i, p_i, l_i, X_i) \geq \bar{h}_i
\end{cases}
\] (1)

System (1) makes clear that the estimation of the parameters of the demand function \( g(\cdot) \) relies on information relating to the first segment of the budget constraint. Given that the distribution of home care consumption is highly skewed, we assume a log-linear specification of \( g(c_i, p_i, l_i, X_i) \), which is standard in the literature on health care expenditures:

\[
\ln(h_i^*) = \beta_0 + \beta_1 \ln(CP_i) + \beta_2 \ln(l_i) + X_i.i \cdot \theta + \epsilon_i
\] (2)

In order to capture directly elasticities, we include out-of-pocket price and income in log. \( \beta_1 \) represents the consumer price elasticity and \( \beta_2 \) represents the income-elasticity of the uncompensated demand for home care service. On the observable segment of the budget constraint, the consumer price equals the out-of-pocket price after the subsidy: \( c_i p_i \).

In the data, the observed value of the disposable income is not the current value of income, but the value of income when the copayment rate was computed or last revised, denoted \( l_i^0 \). We then express current disposable income as: \( l_i = l_i^0 \cdot \gamma_i^0 \) with \( \gamma_i^0 \) the rate of increase of individual disposable income since \( i \)'s first personalized plan was set. As the rate of increase in disposable income \( \gamma_i^0 \) is not directly observable, we write:

\[
\ln(h_i^*) = \beta_0 + \beta_1 \ln(CP_i) + \beta_2 \ln(l_i^0) + \sum_{d=2009}^{2014} \lambda^d \mathbb{1}_i^d + X_i.i \cdot \theta + \epsilon_i
\] (3)

where \( \mathbb{1}_i^d \) is a dummy equal to one when \( i \)'s copayment rate was last revised in year \( d \) and coefficients \( \lambda^d \) should capture the rate of increase in income since year \( d \).

Together with the observational scheme summed up by System (1), Equation (3) corresponds to a Type-1 Tobit model. Estimation of parameters \( \beta \) and \( \theta \) can be done by Maximum Likelihood, after making the following parametric assumption: \( \epsilon_i \mid p_i, l_i^0, X, \mathbb{1} \sim N(0, \sigma^2) \)

**b. Identifying variation: cross-sectional variation in producer price**

As explained earlier, the copayment rate \( c_i \) depends linearly on disposable income and on the producer price. Variations in the consumer price, \( C_i P \), thus come from a variation either in the producer price \( p_i \) or in the disposable income \( l_i^0 \). As our specification includes disposable
income $I^D$ as a control, any variation in the consumer price arises from a variation in the producer price. In other words, the consumer-price elasticity of demand is identified by the cross-sectional variation in producer prices. In 2014, there were 28 different producers in the district. Some producers being priced at the same level, we end up with 23 different prices. The minimum price is set to 19.7€ and the maximum to 23.5€, for an average value of 22.2€ and a standard-deviation of 1.3€.

For our estimation to give unbiased coefficients, the producer price for an individual $i$ must be exogenous: it has to be uncorrelated with the unobserved factors, $\varepsilon_i$, that affect home care consumption. We discuss here the reasons why price endogeneity may arise (Zhen et al., 2013). The first threat for price exogeneity is supply-demand simultaneity: the estimation of demand parameters is biased if supply determinants are not properly (jointly) taken into account. The APA beneficiaries of our sample may represent a high proportion of the customers of the home care services whose prices are used for identification here. The price endogeneity caused by supply-demand simultaneity should however be negligible since producer prices are regulated by local authorities. The price of each producer is set every year considering the overall average production cost of two years earlier. The current producer price then depends on the past average cost. Moreover, the computation of the average cost is not done following an economic approach: the pricing does not only take into account the average cost of production, but also administrative and political considerations (Gramain and Xing, 2012). Consequently, the producer price cannot be seen as an equilibrium value jointly determined with equalization of supply and demand.

The second threat to price exogeneity is omitted variable bias. Beneficiaries could non-randomly select producers on the basis of their unobservable individual characteristics. One expected unobservable characteristics could be, for instance, quality expectations. Uncertainties regarding the quality of services in home care makes it possible, however, to invalidate the vertical differentiation through prices (Messaoudi, 2012). But still, beneficiaries could be targeted by producers developing specific commercial strategies. For-profit services for instance, may target quite rich APA recipients with high quality expectations or, on the contrary, financially-constrained beneficiaries who look for relatively cheap services. Moreover, ethnographic field observations have shown that the evaluation team is able to greatly influence the choice of a producer, taking into account health conditions and potential recipient's own and family desires, which are not recorded in our data (Billaud et al., 2012). More generally, unobserved health condition, informal care provision and heterogeneity in individual preferences may induce non-random selection into home care producers. It could make between-producer variations improper to use for price elasticity identification.

With regards to the threat of price endogeneity, our estimation strategy follows two steps. We first provide a «naïve» estimation, assuming producer prices are actually exogenous. We then make use of the unequal repartition of producers over the territory to test the robustness of our results to potential non-random producer selection.
IV. Empirical results
   a. Baseline results

As we estimate a censored regression model, the coefficients displayed in the results tables give the predicted impact of a marginal (or 0/1) change in a given explaining variable on the total, uncensored home care consumption. Table 1 presents our baseline results, obtained on the data from October 2014. Specifications (1) and (2) do not include socio-demographic controls, while Specifications (3) and (4) do. With no controls whatsoever, a 1% increase in the consumer price is associated with a small increase of -0.05% in the hours of home care consumed. The estimated coefficient increases (in absolute value) to -0.709 when we add disposable income and socio-demographic controls. The coefficient is significantly negative in Specifications (3) and (4), suggesting that the disabled elderly are indeed sensitive to the consumer price of home care services. It means that a 10% increase in the hourly consumer price would increase consumption by about 7%, or 65 minutes a month for an APA beneficiary consuming the median consumption of home care of 15.5 hours a month.

The price elasticity is significant at the 1% level when clustering at the household level, but only at the 5% level when we cluster at the producer level. As some producers are priced at the same level, we could have clustered at the price level. It would mean we would expect some correlation in the error term of observations with same price but different producers. We assume such correlation to be negligible relative to intra-producer correlation of errors.

Regarding control variables, specifications (3) and (4) show that an increase of 10% in disposable income is predicted to increase home care consumption less than proportionally, by 6.6%. Note that any marginal increase in disposable income entails two effects: (i) the income effect, through which the increase in the individual's budget set would make the consumption of all normal goods increase, and (ii) an offsetting price effect, due to the fact that an increase in income will induce APA copayment rate to rise, increasing therefore the out-of-pocket payment. The presented coefficient captures the effect of an increase in income when the copayment rate is fixed (only effect (i) is playing), which is likely in the short-run. As we find negative price elasticity, the estimated coefficient of 0.66 provides a lower bound for the overall effect of a marginal income change on the consumption on home care consumption.

As expected, disability level is found to have a very significant effect: the heavier the disability level, the higher the predicted consumption, all other factors being equal. Even when controlling for disability level, age has a significant effect on the consumption on home care services. In particular, the youngest APA beneficiaries (between 60 and 69 years old) are predicted to consume substantially less home care on average than the other recipients.
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<tr>
<td><strong>Dependent variable</strong>: hours consumed (log)</td>
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<tr>
<td><strong>Consumer price (log)</strong></td>
<td>-0.050**</td>
<td>-0.268</td>
<td>-0.709***</td>
<td>-0.709**</td>
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<td>(0.019)</td>
<td>(0.310)</td>
<td>(0.256)</td>
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<tr>
<td><strong>Disposable income (log)</strong></td>
<td>0.220</td>
<td>0.660***</td>
<td>0.660**</td>
<td>0.709**</td>
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<td>(0.309)</td>
<td>(0.255)</td>
<td>(0.292)</td>
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<td><strong>Age</strong>: 60-69</td>
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<td>-0.265***</td>
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<td>(0.069)</td>
<td>(0.078)</td>
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<td><strong>Age</strong>: 70-79</td>
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<td>-0.070*</td>
<td>-0.070*</td>
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<td>(0.039)</td>
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<td><strong>Age</strong>: 90 and older</td>
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<td>0.072*</td>
<td>0.072*</td>
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<td>(0.040)</td>
<td>(0.032)</td>
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<tr>
<td><strong>Woman</strong></td>
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<td>0.065*</td>
<td>0.065*</td>
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<td></td>
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<td>(0.036)</td>
<td>(0.026)</td>
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<tr>
<td><strong>Living with no spouse</strong></td>
<td>0.317***</td>
<td>0.317***</td>
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<td>(0.034)</td>
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<td><strong>Spouse receives APA</strong></td>
<td>0.031</td>
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<td>0.031</td>
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<td></td>
<td>(0.083)</td>
<td></td>
<td>(0.059)</td>
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<tr>
<td><strong>Spouse in institution</strong></td>
<td>0.570***</td>
<td></td>
<td>0.570***</td>
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<tr>
<td></td>
<td>(0.216)</td>
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<td>(0.127)</td>
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<tr>
<td><strong>Living with non-APA spouse</strong></td>
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<tr>
<td><strong>Disability group: 1</strong></td>
<td>1.253***</td>
<td>1.253***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.134)</td>
<td>(0.141)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Disability group: 2</strong></td>
<td>0.956***</td>
<td>0.956***</td>
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<tr>
<td></td>
<td>(0.050)</td>
<td>(0.049)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Disability group: 3</strong></td>
<td>0.523***</td>
<td>0.523***</td>
<td></td>
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<tr>
<td></td>
<td>(0.039)</td>
<td>(0.024)</td>
<td></td>
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<td><strong>Disability group: 4</strong></td>
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<tr>
<td><strong>Constant</strong></td>
<td>3.046***</td>
<td>3.954***</td>
<td>4.761***</td>
<td>4.796***</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
<td>(0.984)</td>
<td>(0.820)</td>
<td>(0.895)</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Dummies for latest plan</strong></td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Censored observations</strong></td>
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<td></td>
<td></td>
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<td><strong>Number of cluster</strong></td>
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<td>2785</td>
<td>2785</td>
<td>27</td>
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<td><strong>AIC</strong></td>
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<td>5951.604</td>
<td>5355.254</td>
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<tr>
<td><strong>BIC</strong></td>
<td>5964.454</td>
<td>5993.319</td>
<td>5468.480</td>
<td>5468.480</td>
</tr>
</tbody>
</table>

*Note: Standard errors in parenthesis. * p< 0.10, ** p<0.05, *** p<0.01.
Clustering of standard errors is done at the household level in specifications (1) to (3) and at the producer level in specification (4).*
Being a woman, rather than a man, increases the consumption of professional home care by a small but statistically significant amount. Compared to having a co-residing spouse not receiving APA, having a co-residing spouse receiving APA (6% of our sample) does not affect own home care consumption. On the contrary, having a spouse in institution increases significantly the amount of professional assistance received; this effect does not depend on sex (as was tested with an interacted term, not included in the baseline regression). Finally, having no spouse alive is associated with higher professional home care consumption. Overall, the results on household structures are consistent with the literature that has shown the importance of co-residing spouse providing informal care that partly substitutes for formal home care services.

The estimation has also been implemented using data using data from October 2012 and October 2013. Results for 2013 are very similar, while results obtained on 2012 data give a point estimate for the price elasticity of -1.0%.

b. Dealing with selection into a producer

As explained earlier, our cross-sectional identification strategy relies on the assumption that individuals do not select into a given producer based on unobserved factors affecting home care consumption. We now want to assess whether our results are empirically robust to non-random producer selection.

We exploit the unequal repartition of supply over the District. We decompose our sample into two sub-populations: on the one side, the individuals that live in a municipality where a single producer is found to operate (35% of beneficiaries); on the other hand, the individuals living in a municipality where two or more regulated producers have customers (65% of beneficiaries). Selection into a producer should be negligible in the first sub-sample, while it may arise in the second sub-sample. Figure 1 illustrates in a schematic way the distribution of producers on the territory: in some locations (highlighted in grey on the figure), which correspond to the largest cities of the district, several regulated producers can serve APA beneficiaries. But in most municipalities of the district (highlighted in pinkish), which are of small size, there is only one regulated producer serving the area.
We re-estimate the model on the two sub-populations. Table 2 presents the results of these estimations, reporting in addition the price elasticity estimator found on the entire sample (column (1), same as column (3) of Table 1). When we restrict our sample to individuals who have no producer choice, the point estimate of the price elasticity is reduced to -0.349. With the smaller sample size and reduced identifying variation in prices, precision is much lower compared to the baseline regression: we cannot formally reject the hypothesis that price elasticity is zero at conventional statistical significance levels. The point estimate of the price elasticity is higher when we run the estimation on the sub-population of individuals who can choose between different providers: the estimator is significantly different from zero at the 1% level, with a point value of -1.054. This figure captures two effects: first, the price elasticity we are interested in; second, a selection effect that can be interpreted as a form of price-sensitivity. The selection effect would be that, on average, individuals willing to consume more hours choose relatively cheap services. Overall, price elasticity seems clearly lower than unity while the low precision does not make it possible to reject formally the hypothesis of a zero price elasticity. Estimations on years 2012 and 2013 yield similar results.

Note: Only a schematic representation of the distribution of producers over the territory is given to preserve the anonymity of the district. The different shades of pink indicate different areas served by a unique regulated service, each being served by a different producer.

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6 The difference with Table 1 is that we cluster here at the producer price level rather than at the producer level. It makes it possible to take into account the fact that the construction of the two subsamples artificially increases the empirical variance in prices and thus the precision of our estimates.
TABLE 2: Testing for selection into a producer (2014)

<table>
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<tr>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td>Dependent variable:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>hours consumed (log)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consumer price (log)</strong></td>
<td>-0.709** (0.295)</td>
<td>-0.349 (0.608)</td>
<td>-1.054*** (0.390)</td>
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<td>controls</td>
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</tr>
<tr>
<td>Dummies for year of</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MTP</td>
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<tr>
<td>Dummies for latest</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>All</td>
<td>Single producer</td>
<td>Multiple producers</td>
</tr>
<tr>
<td>Observations</td>
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<td>1867</td>
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<td>42.8%</td>
<td>38.8%</td>
</tr>
<tr>
<td>Number of clusters</td>
<td>23</td>
<td>14</td>
<td>23</td>
</tr>
</tbody>
</table>

*Note: Standard errors in parenthesis, clustered at the producer price level.
*p< 0.10, ** p<0.05, *** p<0.01

**c. Discussion**

Given our limited sample sizes and the limited variation in producer prices, our identification strategy does not allow us to end up with a precise estimate of the price elasticity of demand for home care of APA recipients. Still, we are able to draw some interesting conclusions that shed a new light on the disabled elderly behavior in terms of demand for home care services.

In line with the results obtained by previous literature, our results suggest that home care consumption of the disabled elderly is sensitive to the hourly out-of-pocket payment. Despite the likely importance of “needs”, actual home care consumption results from a trade-off between the out-of-pocket cost of an extra hour and its marginal value. Our results also provide evidence that the price-sensitivity of the demand for domestic help is seemingly lower than unity. It is in line with what has been found by the companion works7 of Bourreau-Dubois et al., 2014 and Hege, 2016: they estimated the average price elasticity of demand to be respectively -0.5 and -0.15. Home care services can then be regarded as necessary goods, in the sense that any increase in price will not be fully compensated by the decrease in consumption.

One limitation of our work is that the consistency of our estimates relies on the classical assumption that there is no omitted variable bias. Given the administrative nature of our data, the piece of information we have on health status and family characteristics is poor. This is a serious limitation given that the economic literature has provided empirical evidence that informal care and formal care tend to substitute to one another. In particular, receiving more informal care from relatives was found to decrease formal care use by the disabled elderly, both at the extensive and intensive margins (Van Houtven and Norton, 2004; Bonsang, 2009).

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7 These authors and we are part of a same research team. The “MODAPA” research project aims at studying the determinants of long-term care utilization in France, and especially the effect of out-of-pocket payments on professional home care utilization by the means of different empirical strategies. More information on the project can be found at: www.modapa.cnrs.fr.
As a robustness check, we include as control whether the individual receives formal home care during the weekend and public holidays (not included here). Indeed, for a given level of disability, individuals that do not receive care over the weekend are more likely to receive assistance from their relatives. We find that receiving home care during the weekend is associated with more hours consumed during the labor days of the week, but controlling for home care utilization during the weekend does not affect significantly the estimate of the price-elasticity.

Furthermore, our estimation strategy implicitly assumes that the individual-specific censoring point is uncorrelated with the unobserved determinants of professional home care consumption. Some recent developments semiparametric estimation methods may allow us to relax the assumption that the individual censoring point is uncorrelated with unobserved factors.

Other refinements of the analysis could be conducted. Formal home care could be broken down in different categories of intervention. The APA scheme subsidizes the provision of human assistance in the various activities of daily living: it includes house chores, grocery shopping, assistance with personal hygiene or with transfers (from bed to a chair or from a chair to the bathroom), etc. If the demand for home care services follows a pattern similar to the demand for medical care services, we would expect the demand for some home care services to be less price-sensitive than the demand for others. However, our data are not precise enough to allow such a refined analysis. Thus, the implicit assumption we make is that hours of care are homogeneous, both in terms of their nature and quality.

More importantly, our work identifies price elasticity at the sample average. We would like to extend this work by allowing price elasticity estimates to vary across observable characteristics, such as income, disability level or level of consumption. To do so, we intend to use semi-parametric methods. Such extensions are quite complex in terms of methodology since, as far as we know, implementing semi-parametric methods with individual-specific censoring point has not been done yet.

V. Conclusion

This paper estimates the consumer price elasticity of the demand for home care services of the disabled elderly living in the community. The empirical strategy draws on the French APA program, which works as a partial hourly subsidy on professional domestic help. We extracted data from local administrative records providing unique information on home care consumption and copayments. Our censored-regression model exploits inter-individual variation in producer prices to identify the consumer-price elasticity.

Our baseline results show a point estimate of -0.7 at the average. This estimator, however, seems to be inflated by nonrandom producer selection. Indeed, the disabled elderly intending to consume more might choose ex ante a cheaper producer. We test this hypothesis by
estimating the model on two different subsamples. When restricting the sample to individuals who receive care from the only provider operating in their municipality, the point estimate is lower (around -0.4), and, because of a loss in statistical power, no more significantly different from zero. Conversely, the estimation on the subsample of individuals who can choose between different producers yields a statistically significant coefficient of -1. This coefficient captures both some endogenous selection into a producer and the actual price elasticity.

Our baseline empirical strategy thus captures what we may call the overall price sensitivity of consumption, which includes both an ex ante selection into a producer on the basis of expected consumption (“pay less to consume more”), and the real price elasticity (“consuming more when paying less”). The value of (real) price elasticity is partially identified: it seems to be, in absolute value, inferior to one. Although never statistically significant at conventional thresholds, the point estimate we obtain when producer selection is shut down is stable across our three years of observation.

The external validity of our results should obviously be qualified: our dataset is not nationally representative, and our study focuses on APA recipients who consume home care from regulated services. Yet there are several reasons to think that general policy implications can be drawn from our results. Indeed, our district was selected to be “average” in terms of economic and socio-demographic characteristics. In addition, customers of regulated home care services represent a large share of APA beneficiaries in France. Finally, our estimates are in line with what was obtained by Bourreau-Dubois et al., 2014 on data from another French district.

Our study makes it possible to draw some interesting public policy implications. Given the very low price elasticity found on APA recipients, the decrease of copayment rates planned by a recent APA reform can be predicted to reduce beneficiaries’ overall out-of-pocket expenses on professional home care, while having little volume effect. In such a context, the degree of generosity of home care subsidies essentially reflects the extent of redistribution between taxpayers and the disabled elderly. Our study pointed out another policy issue relative to the unequal access to home care producers among territories. Individuals living in municipalities with a unique producer cannot select their producer, on the basis of price or other characteristics such as quality or weekend service. It evidences the need for further development on spatial equity in access to home care services.

REFERENCES:


