HEDG
HEALTH, ECONOMETRICS AND DATA GROUP
THE UNIVERSITY of York

WP 16/16

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

Quitterie Roquebert and Marianne Tenand

August 2016

http://www.york.ac.uk/economics/postgrad/herc/hedg/wps/

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

Quitterie Roquebert† and Marianne Tenand‡

August 2016

HEDG Working Paper

Abstract

Although the consumption of home care is increasing with population ageing, little is known about its price sensitivity. This paper estimates the price elasticity of the demand for home care of the disabled elderly, using the French home care subsidy program ("APA"). We use an original dataset collected from a French District Council with administrative records of APA out-of-pocket payments and home care consumption. Identification primarily relies on inter-individual variations in producer prices. We use the unequal spatial distribution of producers to address the potential price endogeneity arising from non-random selection into a producer. Our results point to a price elasticity around -0.4: a 10% increase in the out-of-pocket price is predicted to lower consumption by 4%, or 37 minutes per month for the median consumer. Copayment rates thus matter for allocative and dynamic efficiencies, while the generosity of home care subsidies also entails redistributive effects.

JEL Classification: C24; D12; I18; J14.
Keywords: long-term care, price elasticity, public policy.

*We are grateful to the MODAPA research team and to the Hospinomics group (PSE) for fruitful discussions, and especially to Agnès Gramain for her patient supervision and many comments. We would like to express our gratitude to Isaac Barker, Matthieu Cassou, Fabrice Etilé, Amy Finkelstein, Pierre-Yves Geoffard, Helena Hernández–Pizarro, Simon Rabaté, Lise Rochaix, Nicolas Sirven and Jérôme Wittwer for their critical reading and suggestions. We also thank the participants of seminars at PSE, ED465, Liraes and Ined for their useful remarks. This paper also benefited from valuable feedback from the participants of the 2016 EuHEA Conference, the Summer 2016 HESG Conference, the 65th AFSE Annual Meeting and the 33rd JMA. All remaining errors are ours.

†Paris School of Economics – Université Paris 1, Centre d'économie de la Sorbonne. Corresponding author. 106-112 Bd de l'Hôpital, 75013 Paris. Tel: +33 1 43 13 62 14. E-mail: quitterie.roquebert@univ-paris1.fr

‡Paris School of Economics – Ecole normale supérieure, Paris-Jourdan Sciences économiques.

1 Introduction

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 falls short of 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 OECD countries, most disabled elderly keep on living in the community rather than entering specialized institutions [Colombo et al., 2011]. Besides medical and nursing care, community-dwelling disabled elderly are often provided with basic domestic help such as meal preparation, assistance with personal hygiene or house chores. Domestic assistance may be provided by relatives (informal care) but also by professional services (formal care) whose utilization is increasing. In most countries, public policies foster the utilization of formal home care by granting the disabled elderly subsidies to finance home care consumption. Public programs, however, only partially cover the cost of professional home care, such that the disabled elderly often bear non-negligible out-of-pocket costs. In France, the average monthly out-of-pocket payment on domestic help utilization for the elderly was estimated to reach, at least, 160€ in 2007 [Bérardier, 2011], or about 14% of the average monthly pension benefit.[1]

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 addresses the effect of the out-of-pocket price on consumption at the intensive margin, which has direct implications for the design of public policies. With a small price elasticity, consumption of domestic help reacts little to changes in the generosity of home care subsidies and such programs work as redistributive transfers (from taxpayers to the disabled elderly). If the consumption of home care services is notably elastic, home care 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, 2016, Rapp et al., 2015].

In order to quantify the price sensitivity of home care consumption, we make use of the French home care scheme targeted to the disabled elderly, the APA policy (*Allocation personnalisée d'autonomie*). With 738,000 beneficiaries in 2014,

[1] The average pension benefit (1,108€ per month in 2007) is provided in Deloffre [2009].

the APA policy for the elderly living in the community amounted to a spending of 3.1 billion euros in 2013,[2] or 0.15% of GDP. APA works as an hourly subsidy on professional domestic help. Administrative records of the scheme provide detailed information on home care consumption and out-of-pocket payments of APA beneficiaries, but they are available only at the local level. We use an original dataset, made of the individual records that we collected for the beneficiaries of a given District Council (*Conseil départemental*). We exploit inter-individual variations in producer prices to identify consumer-price elasticity. We first assume the producer prices to be exogenous, then relax this assumption to assess whether APA beneficiaries endogenously select into a given producer and thus into a certain price level. 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 an individual-specific censoring point.

Our baseline results indicate a significant, negative price elasticity of -0.7. However, this estimator seems to be inflated by some price endogeneity induced by non-random producer selection. Once this selection effect is taken out, 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 37 minutes per month for a beneficiary consuming the median monthly volume of 15.5 hours. Although precision is low, our results point to a price elasticity substantially lower than unity.

Our paper contributes to the literature by providing one of the first estimates of the price elasticity of the demand for home care services of the disabled elderly. Despite the growing concern about the financing of long-term care, the impact of out-of-pocket payments on the consumption of professional domestic help and personal care has been little investigated by the economic literature. A few papers, using US or European data, tested for the effect of benefiting from subsidies on the utilization of paid domestic help; but because of a lack of detailed information on out-of-pocket prices, they were not able to quantify the price sensitivity of home care consumption. The data we collected make it possible to fill in this gap in the international literature. In addition, by exploiting the unequal distribution of home care providers over the territory, our empirical strategy allows us to deal with the potential price endogeneity stemming from non-random producer selection. Our results entail important policy implications, as home care subsidy schemes in developed countries are expanding with population ageing.

[2]Drees, *Enquêtes annuelles Aide sociale*, 2013 et 2014. The APA program also has a component devoted to the elderly living in nursing homes; we focus here on the home care part of the scheme.

Our paper proceeds as follows. Section 2 reviews the related literature. Section 3 sketches the APA policy and presents the modeling of demand within the APA framework. Section 4 details our original administrative dataset and Section 5 explains the empirical strategy. Section 6 presents and discusses the estimation results. Section 7 concludes and suggests directions for extensions.

2 Related literature

Although in many countries home care services are not regarded as health care services strictly speaking, our paper directly relates to the large empirical literature that has investigated the question of the price sensitivity of health care consumption. Following the conceptual works on the notion of *ex post* moral hazard in the context of insurance, many papers have attempted to estimate the price elasticity of health care consumption.[3] Using the seminal RAND experiment, Manning et al. [1987] and Keeler and Rolph [1988] estimated the price elasticity of total health care spending to be -0.2. Subsequent works, making use of ingenious instruments to exploit exogenous variation in copayments and deductibles associated with individual health care plans, have found similar values [Eichner, 1998]. More recent works have highlighted the heterogeneity of the price sensitivity of health care consumption, which is lower at older ages and varies with the types of medical services [Duarte, 2012, Fukushima et al., 2016].

Home care provision being a more recent political and lesser budgetary concern, the literature on the price sensitivity of formal home care consumption is not prolific. The economic literature on long-term care has mainly focused on the relationship between informal and formal care, wondering whether they are complementary or substitute goods for the elderly living in the community. Some papers have addressed the potential "crowding-out effect" of informal care by privately- or publicly-funded formal care (see Fontaine [2012] for a recent review), while another strand has investigated the impact of informal care on professional care utilization (recent works include Bonsang [2009] and Holly et al. [2010]). The other determinants of the demand for formal care, such as its price, have been much less investigated.

Using American data [Coughlin et al., 1992, Ettner, 1994] but also European datasets [de Meijer et al., 2009, Kalwij et al., 2009, Fontaine, 2012], the existing contributions have nonetheless highlighted several determinants of home care

[3] In the field of health care, *ex post* moral hazard is defined as the propensity to consume more medical care in the presence of an insurance scheme relative to the situation of no insurance. It can thus be quantified by measuring the price elasticity of the uncompensated or compensated demand for health care (Pauly [1968], Nyman [1999]; see Bardey et al. [2003] for a survey).

consumption, like socio-demographic characteristics (age, sex, marital status, children's characteristics), geographical variables (area of residence, local market constraints) and health or disability measures. In addition, some of these papers have made use of variables indicating whether the individual benefits from -or is eligible to- a public program subsidizing formal home care. Using Medicaid and Medicare eligibility or actual benefits [Coughlin et al., 1992, Ettner, 1994, Pezzin et al., 1996], inter-regional differences in home care subsidies in Canada [Stabile et al., 2006] or the fact of receiving APA subsidies in France [Rapp et al., 2011, Fontaine, 2012], they capture the qualitative effect of receiving subsidies on home care consumption. Overall, the results show a statistically significant positive effect of subsidies on formal home care consumption. Individuals are thus found to be sensitive to the price they pay out-of-pocket on home care services.[4]

But these estimations do not allow a direct quantification of the consumer-price elasticity. This shortcoming is mainly explained by the lack of relevant data. Contrary to the health care sector, in which claims addressed to public or private health insurances contain information about the price charged by practitioners, producer prices of home care services are seldom observed, because price regulation is not systematic and coverage by private insurance is low [Brown and Finkelstein, 2009]. Moreover, in France as in many other countries, public programs financing home care services are decentralized at the local level. This feature of long-term care policies has two consequences. Firstly, there is no unified information system that would provide an administrative national dataset. Secondly, the price that individuals have to pay out-of-pocket on their home care consumption depends on local authorities' decisions. As a consequence, it is extremely difficult to obtain information on individuals' actual home care consumption and consumer price.

As far as we know, only two studies provide a direct estimation of consumer-price elasticity for home care services. They both find a negative price elasticity but with somewhat different magnitudes. Using the 2008 French Disability and Health Survey on Households (*Handicap Santé Ménages*, or HSM) supplemented with another dataset on the implementation of local policies, Hege [2016] estimates the price elasticity of professional home care utilization by computing an expected value of consumer price of each individual. This expected value depends both on the district in which the individual lives and on her expected copayment rate. Hege [2016] concludes to an average point estimate of -0.15, significantly different from zero. Given the lack of data, proxies and several assumptions on consumption and out-of-pocket costs are needed to estimate the price elasticity at the national

[4]Some recent papers, based on cross-country comparisons, provide additional though indirect evidence on price sensitivity of home care consumption, by underlining the effects of long-term care institutional settings on home care utilization [Motel-Klingebiel et al., 2005, Viitanen, 2007, Holly et al., 2010, Bakx et al., 2015].

level. In order to bypass them, Bourreau-Dubois et al. [2014] have chosen to work at the local level, at the cost of reduced external validity. Using administrative data on APA beneficiaries from a given District Council, they can observe the real value of the out-of-pocket payment. They find that a 10% increase in the price reduces the number of hours of care by 5.5%.

The methodology we use in this paper is similar to Bourreau-Dubois et al. [2014].[5] Our data are obtained from another local district with different socio-demographic characteristics. Compared to Bourreau-Dubois and coauthors' study, we explicitly address the concern that individuals may select into a given home care producer in a non-random way, which may cause the out-of-pocket price paid on home care to be endogenous in the demand equation. The comparison of the two sets of results provides an opportunity to discuss the robustness of the empirical strategy we adopted and the external validity of our conclusions.

3 The APA policy and the demand for home care

The 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 established 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 be recognized as disabled. This condition requires an assessment from a team managed by the District Council, which we call here the evaluation team. It is made of medical professionals (nurses, doctors) and/or social workers. The evaluation team visits each APA applicant in order to evaluate her needs of assistance in the daily living activities. 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 with seventeen measures of physical and cognitive capacities, together with measures of abilities to perform the basic daily living activities.[6] This scale enables the

[5] Our paper can be seen as a companion work to both Hege [2016] and Bourreau-Dubois et al. [2014], as 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.

[6] Compared to the more classical scales built with information on the restrictions in ADL and IADL, such as the Katz or Lawton scales [Katz et al., 1970, Lawton and Brody, 1969], the AGGIR scale does not include

evaluation team to assign the applicant a disability group ("GIR", or *Groupe Iso-Ressources*). There are six disability groups, going from the group of non-disabled individuals (GIR 6) to the group of extremely disabled individuals (GIR 1). Individuals found to be moderately to extremely disabled (GIR 4 to GIR 1) are eligible to APA.

For eligible individuals, the evaluation team establishes a "personalized care plan". This document lists the activities for which the individual needs assistance and sets the number of hours necessary to their realization. It gives the maximum number of hours that are eligible to APA subsidies, called the care plan volume.[7] Up to the care plan volume, the consumer price of each hour of care is reduced by the APA hourly subsidy. For hours beyond the care plan volume, there are no more subsidies from the District Council: the consumer bears the full price charged by the producer price of home care services she has chosen.

Computation rules of APA out-of-pocket payments

Up to the care plan volume, for each consumed hour, the APA beneficiary is charged an hourly out-of-pocket price. This consumer price depends on the producer price and a copayment rate increasing with her disposable income.[8] The scheme of the copayment rate is as follows. For individuals with low income (below 739€ per month in October 2014), the copayment rate is zero: the APA beneficiary bears no out-of-pocket payments on subsidized hours. For individuals with high income (higher than 2,945€ per month[9]), the copayment rate is set at 90%. For individuals with income between these two thresholds, the copayment rate is an increasing linear function of disposable income.[10]

The copayment rate usually applies directly to the producer price to get the

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. More information on AGGIR scale can be found on the official website of French public administration: https://www.service-public.fr/particuliers/vosdroits/F1229.

[7]The monetary valuation of the care plan volume must not exceed a given legal ceiling, which 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. These amounts might be related to the average pension benefit, which was of 1,419€ in 2012 [Solard, 2015].

[8]In the APA scheme, the disposable income is defined as the individualized income minus an amount proportional to the value of a national disability allowance (*Majoration pour Tierce-Personne*, or MTP). More precisely, the disposable income is the individualized income minus 67% of the MTP. For single individuals, individualized income is roughly equal to taxable income; for individuals having a spouse alive, it is equal to the household taxable income divided by a factor of economies of scale of 1.7.

[9]The bottom and top income thresholds are set to be proportional to the MTP.

[10]The copayment rate depends on the disposable income the individual had at the time her personalized care plan was set. If there is any change in the disposable income, the current disposable income of individuals might differ from the disposable income used for the copayment rate computation. Our empirical specification takes this possibility into account.

hourly out-of-pocket payment. An individual whose copayment rate equals 0.5 and receiving a home care hour priced at 22€ would pay 11€. In that case, the out-of-pocket price 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 (either an unregulated home care structure or an 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 of the prices of regulated producers only.

Modeling demand for home care with APA

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

$$h_i^* = g_i(CP_i, \hat{I}_i; X_i) \tag{1}$$

With:
h_i^* the number of hours of home care services consumed by individual i;
$g_i(.)$ the individual demand function for home care services of i;
CP_i individual i's 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.

Following Moffitt [1986], we assume a heterogeneity-only model such that:

$$g_i(CP_i, \hat{I}_i; X_i) = g(CP_i, \hat{I}_i; X_i) + \nu_i$$

where ν_i is an individual preference shifter: individuals with a higher ν are likely to consume more hours of care, for given consumer price, income and socio-demographic characteristics.

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

With the APA policy, the beneficiary receives an hourly subsidy, reducing the amount she has to pay out-of-pocket. The consumer price is now equal to a share of the home care producer price, which is the producer price times the copayment

rate depending on her individual disposable income I_i. Denoting c_i the copayment rate of individual i, we have: $c_i = c_i(I_i)$, where $c_i(.)$ is a linear function, thus: $CP_i = c_i(I_i)p_i$. Remember this is true only up to the care plan volume, i.e the maximum number of hours eligible to APA subsidies set 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 previous subsidized hours consumed.

We denote $\bar{h}_i$ the care plan volume of individual i; with APA, the budget constraint can be written as:

$$\begin{cases} I_i = c_i p_i h_i^* + Y_i & \text{if} \quad h_i^* \leq \bar{h}_i \\ I_i = c_i p_i \bar{h}_i + p_i(h_i^* - \bar{h}_i) + Y_i \iff I_i + (1-c_i)p_i\bar{h}_i = p_i h_i^* + Y_i & \text{if} \quad h_i^* > \bar{h}_i \end{cases}$$

where Y denotes the composite good, whose price is set to 1. In other words, the APA program creates a kink in the budget constraint of the beneficiary, as illustrated by Figure 1 (p. 10).

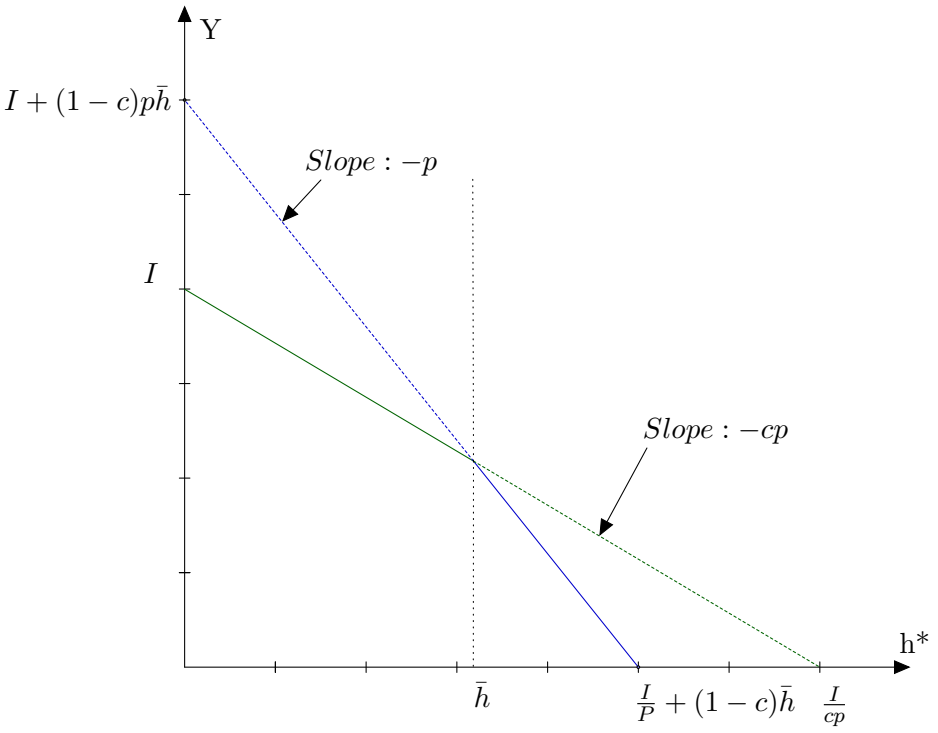
Denoting $\tilde{I}_i = I_i + (1-c_i)p_i\bar{h}_i$ the virtual income of individual i [Moffitt, 1986, 1990], we can rewrite the demand function specified in Equation (1) as follows:

$$\begin{cases} h_i^* = g(c_i p_i, I_i; X_i) + \nu_i & \text{if } h_i^* < \bar{h}_i \\ g(p_i, \tilde{I}_i; X_i) + \nu_i < \bar{h}_i < g(c_i p_i, I_i; X_i) + \nu_i & \text{if } h_i^* = \bar{h}_i \\ h_i^* = g(p_i, \tilde{I}_i; X_i) + \nu_i & \text{if } h_i^* > \bar{h}_i \end{cases}$$

The objective of the paper is to get an empirical estimate of the sample average of the percentage change in the hours consumed following a one percent change in the consumer price, which is simply the following quantity:

$$\frac{\mathrm{d}g(CP, \hat{I}; X)}{\mathrm{d}CP} \frac{CP}{g(CP, \hat{I}; X)}$$

Figure 1: Demand for home care services with APA: a kinked budget constraint



4 Data

Administrative data from a District Council

For our purpose, we need precise information on out-of-pocket payments and home care consumption. As of today, in France, no national survey provides reliable information on the out-of-pocket payments borne by the disabled elderly. As the APA program is implemented at the district level, there is no centralized administrative dataset that provides individual information on producer prices, copayment rate and participation computation rules.[11]

One way to get round data limitations is to collect and use the administrative records that District Councils keep on the APA recipients of their jurisdiction. 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.[12]

We also paid attention to selecting a District council whose demographic characteristics are close to national average values, with respect to several indicators: share of population aged 60 years and older in total population (around 25%), proportion of APA beneficiaries living in the population of the elderly aged 60 and more (about 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, against 64% of households nationwide) and a lower poverty rate (less than 10%, against 15% at the national level).[13] As the copayment rate on the home care price depends on income, APA beneficiaries of this district are more likely to support non-negligible out-of-pocket payments.

The data were collected for every month for the years 2012 to 2014. Infra-yearly variation in out-of-pocket prices is very low, so we picked up a single month for each of the three years. Averaging hours consumed and out-of-pocket prices on an annual basis would have hampered identification by blurring the true empirical relationship between price and consumption.[14] Given that our identification

[11] The comprehensive 2008 French Disability and Health Survey on Households only indicates whether participants benefit from the APA policy. The central administration only releases aggregate information on APA recipients that is not sufficient to compute individual out-of-pocket payments.

[12] In 2012, the MODAPA research team collected information on the different rules implemented by the French District Councils the APA subsidy. Out of the 73 District Councils that answered the questionnaire, 55 apply the national copayment rate schedule directly on the producer price for APA beneficiaries receiving care from a regulated producer [Bourreau-Dubois et al., 2015].

[13] National figures come from Insee, *Estimations de population*, 2012; *Enquête annuelle "aide sociale"*, 2013; Insee-DGFiP-Cnaf-Cnav-Ccmsa, *Fichier localisé social et fiscal*, 2012.

[14] In addition, censoring issues, which are explained below, make it impossible to deal econometrically with

strategy will draw on cross-sectional variations, we retained the month of October: it corresponds to a time of the year when home care consumption is less likely to be affected by temporary shocks on elderly households (like holidays and visits from children). Results obtained on October 2014 are presented as the baseline results; the Appendices provide the results obtained on each other available year and on the pooled sample as robustness checks.

Sample selection

We proceed to several selection steps in order to ensure clear identification, which, quite classically, comes at the cost of reduced external validity. We focus on APA beneficiaries that are served by a regulated home care producer, as we cannot observe the producer price – and thus the out-of-pocket price – in the District Council records for APA beneficiaries served by other professional caregivers. In our district, in 2014, the majority of APA beneficiaries (81%) receive domestic help through regulated structures. 17% are employing over-the-counter workers and 6% at least receive services from unregulated structures.[15] Beneficiaries receiving care exclusively from over-the-counter employees and non-regulated services are thus not retained in our estimation sample. We also drop the individuals that receive home care from more than one producer: the simultaneity of consumption decisions is likely to bias our estimators and adding as control a dummy indicating whether the individual receives home care from another producer would not adequately capture this feature of the data generating process.

As a last step, we keep only beneficiaries whose copayment rate is strictly greater than zero and strictly smaller than 90%. As recalled by Figure 2 (p. 13), APA schedule is such that copayment rate is null below a given threshold of income: the out-of-pocket price is zero for subsidized hours (12.7% of our sample at this stage of selection). In addition, beyond a certain level of income, 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% (1.4% of the sample at this stage of selection).

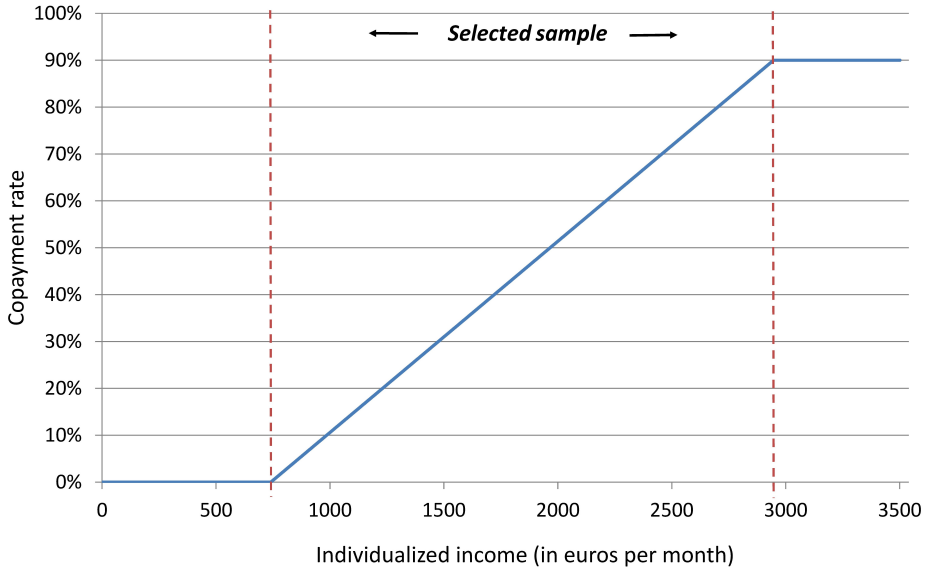
We end up with a sample of 2,862 individuals, representing 52.2% of initial sample. Appendix A.1 provides a summary of the different selection steps.[16]

an individual annual average of home care consumption.

[15] The total slightly exceeds 100%, since a small share of APA recipients are provided care by several home care producers at the same time.

[16] APA beneficiaries served by a regulated producer exhibit significant differences with recipients resorting to other types of providers, in terms of some socio-demographic characteristics (see Table A.1 for further details). However, given the lack of available excluded instruments, we did not add up a selection module to our model.

Figure 2: Sample selection on copayment rate: APA schedule in 2014.



Descriptive statistics

Table 1 (p. 14) describes the final sample used in the econometric analysis. Its socio-demographic structure can be compared with national data on APA recipients. They are similar regarding sex, with around two thirds of women. Strongly disabled individual are slightly less represented in our sample than at the national level. The average copayment rate on APA is slightly higher than the national one, reflecting the fact that individuals in our district tend to be richer. The majority (almost 2/3) of our sample lives alone, which is consistent with the high proportion of women and the average age of 84 years: given that the life-expectancy of men is shorter than the one of women, many disabled elderly are widowed women. Very few individuals have their spouse living in a 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 monthly volume is 20.5 hours, with a monetary equivalent of 455.5€, slightly less than the national average amount. On average, 17.7 subsidized hours are effectively consumed by the individuals in our sample. Six 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.[17]

[17] We do not expect the out-of-pocket payment to be the only reason why individuals might not consume all the hours they are entitled to. Indeed, half of individuals whose copayment rate is equal to zero are also not consuming the totality of their care plan volume.

Table 1: General descriptive statistics

	National population of APA recipients	*District baseline sample*	
Variable	Mean	Mean	Std-dev.
Care plan volume [a]	*n.a.*	20.5	10.7
Care plan monetary value [b]	489€[b]	455.5€	238.3€
Hours effectively subsidized [c]	*n.a.*	17.7	10.8
Amount of effective subsidies [d]	392€[b]	300.8€	201.4€
Underconsumption of care plan	*n.a.*	59.8%	-
Ratio [c]/[a]	-	84.9%	20.7 pp.
Ratio [d]/[b]	-	65.1%	22.2 pp.
Individualized income	*n.a.*	1,315€	423€
Copayment rate	20%[b]	23.7%	17.3 pp.
Producer price	*n.a.*	22.2€	1.3€
Hourly out-of-pocket price	*n.a.*	5.2€	3.8€
Total out-of-pocket payments on subsidized hours	*n.a.*	91.3€	98.6€
Age	*n.a.*	84.2	7.5
Women	73.0%[a]	73.9%	-
Disability level 1 (most severe)	2%[a]	1.2%	-
Disability level 2	17%[a]	12.5%	-
Disability level 3	23%[a]	19.6%	-
Disability level 4 (least severe)	58%[a]	65.7%	-
	100%	*100%*	-
Living with a spouse	*n.a.*	33.8%	-
Living alone	*n.a.*	66.6%	-
Spouse in institution	*n.a.*	0.6%	-
	-	*100%*	-
Number of individuals	721,000[a]	2,862	
Number of households	*n.a.*	2,785	

NOTES: "pp." stands for percentage points, "*n.a.*" for "not available". Care plan volume is expressed in hours per month and effective home care consumption, income, subsidies and out-of-pocket payments are expressed in euros per month. National data from [a] 2013 [Borderies and Trespeux, 2015] and [b] 4th quarter of 2011 [Drees, 2012]. District statistics computed on the baseline sample from October 2014.

A censored measure of home care consumption

For each APA recipient, 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. However, we do not observe the *total* volume of home care consumed by each APA beneficiary, who are free to consume home care beyond their care plan volume. Our measure of home care consumption is then possibly right-censored.

Table 2 provides additional information on hours that were subsidized during the month for individuals of our sample. It distinguishes between the full sample

(Column (1)) and individuals consuming strictly less than their care plan volume (Column (2), uncensored observations). Half of our sample was subsidized for more than 15.5 hours during the month. It falls to 12.8 hours for uncensored observations. The distribution of effectively-subsidized hours is slightly skewed.

Table 2: Descriptive statistics on effectively-subsidized hours (2014)

Variable:	Effectively-subsidized hours during the month	
	Full sample	*Uncensored observations*
Mean	17.7	15.0
Median	15.5	12.8
Standard deviation	10.9	9.4
Minimum value	1	1
Maximum value	66	54
Skewness	1.1	1.2
Kurtosis	3.9	4.2
Number of individuals	2,862	1,711

NOTES: Baseline sample from October 2014.

5 Empirical strategy

Econometric specification

Denote h_i the number of hours of care billed to the District Council for beneficiary i, which is provided in the data. Remember that h_i^* denotes the number of hours effectively consumed, which may be right-censored. Thus, $h_i \leq h_i^*$ and $h_i \leq \bar{h}_i$. If the individual consumes less than the care plan volume, the consumption registered by the District Council is equal to 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 be equal to 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 observed consumption of home care is the following:

$$\begin{cases} h_i = g(c_i p_i, I_i; X_i) + \nu_i & \text{if} \quad g(c_i p_i, I_i; X_i) + \nu_i < \bar{h}_i \\ h_i = \bar{h}_i & \text{if} \quad g(c_i p_i, I_i; X_i) + \nu_i \geq \bar{h}_i \end{cases} \tag{2}$$

System (2) makes clear that the estimation of the parameters of the demand function $g(.)$ will need to rely on information relating to the first segment of the

budget constraint.

Given that the distribution of home care consumption is slightly skewed, we assume a log-linear specification of $g(c_i p_i, I_i; X_i)$:

$$ln(h_i^*) = \beta_0 + \beta_1.ln(c_i p_i) + \beta_2.ln(I_i) + X_i'.\theta + \epsilon_i \tag{3}$$

Both the consumer price and income are included in log so that β_1 represent the consumer price elasticity and β_2 represent the income elasticity of the uncompensated demand for home care service. The idiosyncratic term ϵ_i includes the empirical counterpart of the preference shifter ν_i, unobservable characteristics correlated with home care consumption and measurement errors on independent variables.

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 I_i^D. Current disposable income can be expressed as: $I_i = I_i^D.\gamma_i^D$, with γ_i^D the rate of increase of individual disposable income since i's last copayment rate was computed. As the rate of increase in disposable income γ_i^D is not directly observable, we write:

$$ln(h_i^*) = \beta_0 + \beta_1.ln(c_i p_i) + \beta_2.ln(I_i^D) + \sum_{d=2009}^{2014} \lambda^d 1_i^d + X_i'.\theta + \epsilon_i \tag{4}$$

where 1_i^d is a dummy equal to one when i's copayment rate was last revised in year d ($1^d, d = 2009, ..., 2014$) and coefficients λ^d should capture the rate of increase in income since year d.[18]

Together with the observational scheme summed up by System (2), Equation (4) corresponds to a Type-1 Tobit model. Estimation of parameters β and θ can be done by Maximum Likelihood[19], after making the following parametric assumption:

$$\epsilon \quad | \quad p, I^D, X, 1 \sim \mathcal{N}(0, \sigma^2). \tag{5}$$

We are then able to estimate the parameters of interests.[20]

[18]The rates of increase in disposable income are implicitely assumed to be identical for two individuals whose personalized plans were decided upon the same year d. Retirees' income is mostly made of pension benefits, which are reevaluated every year in a homogeneous way, following the inflation rate. In 2007, pension benefits amounted to 87% of gross income in households with at least one retired individual, living alone or with a partner [Deloffre, 2009]. Nonetheless, we make a strong assumption given the heterogeneity in income composition according to income level and the higher increase in financial and housing income relative to pension income that has been observed in the past decade.

[19]The likelihood function is provided in Appendix A.3, together with a discussion upon its derivation in the specific case of censoring at the kink of the budget constraint.

[20]We actually estimate a slightly different equation, equivalent to Equation (3), but less sensitive to measurement errors. For the sake of simplicity, we do not present this equation here. See Appendix A.2 for details.

Identification through cross-sectional variations in producer prices

As the copayment rate c_i depends *linearly* on disposable income I_i^D and producer price p_i, variation in the consumer price CP_i comes from a variation either in the producer price or in the disposable income. As our specification directly includes disposable income as a control, any variation in the consumer price (all other observable characteristics, including income, being equal) arises from a variation in the producer price. In other words, the *consumer-price* elasticity of demand (coefficient β_1) is identified by the cross-sectional variation in *producer prices*. In 2014, there are 27 different producers in the district. Some producers happening to be priced by 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€. Appendix A.4 details the price components in the home care sector, which may explain the observed differences in prices across producers.

For our estimation to give unbiased coefficients, the producer price applying to individual i must not be correlated with the unobserved factors affecting home care consumption, ϵ_i. Price endogeneity, however, may arise for different reasons [Zhen et al., 2013]. First, supply-demand simultaneity may bias the estimation of demand parameters if supply determinants are not properly (jointly) taken into account. Even though Zhen et al. [2013] argue that supply-demand simultaneity is not likely to be a major issue in micro data, it could be a concern with our dataset. 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. However, the market for home care services provided to the disabled elderly is heavily regulated by local authorities and the producer price cannot be seen as an equilibrium value jointly determined with the equalization of supply and demand. For each regulated producer, the price is set each year considering the overall average production cost of two years earlier. The current producer price depends on the current average cost only insofar as *current* and *past* average costs are correlated. Moreover, the computation of the average cost by the District Council is not done following an economic approach. The pricing process takes into account not only the average cost of production but also administrative and political considerations [Gramain and Xing, 2012]. Overall, price endogeneity caused by supply-demand simultaneity should remain negligible.

The second threat to price exogeneity is omitted variables bias. APA recipients are legally free to choose the producer they want to receive their subsidized home care hours from. When the personalized care plan is set, the evaluation team communicates a list of all regulated producers operating in the area. The list

includes both public and non-profit home care providers (*CCAS*, *CIAS* and *Associations d'aide à la personne*) together with for-profit providers. Beneficiaries may non-randomly select producers on the basis of their unobservable individual characteristics, like, for instance, quality expectations.[21] As suggested by Appendix A.4, a higher price could reflect a a higher qualification of employees and then better-quality services. Detailing price components, however, makes it possible to highlight other factors explaining price variation, such as differential transportation costs or service over the weekend. Additionally, from a theoretical prospective, uncertainties regarding the quality of services in home care invite to rule out vertical differentiation through prices [Messaoudi, 2012].

Still, other omitted variables are likely. Unobserved health condition, informal care provision and heterogeneity in individual preferences may also induce non-random selection into home care producers. In particular, ethnographic field observations have pointed out that the evaluation team is able to greatly influence the choice of a producer while taking into account health conditions and potential recipient's own and family desires, which are not recorded in our data [Billaud et al., 2012].

Overall, concerns about endogenous producer selection are difficult to dismiss *a priori*. We thus proceed in 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 space in the district to test the robustness of our results to potential non-random producer selection.

6 Results

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.[22] Table 3 (p. 19) presents our baseline results, obtained by running our estimation 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 very small variation of -0.05% in the hours of home care consumed. Comparison of Specifications (1) and (2) shows that there is a negative correla-

[21] Producers may, for instance, target well-off APA recipients with high quality expectations or, on the contrary, financially-constrained beneficiaries who look for relatively cheap services.

[22] The predicted impact is thus the sum of the impact on the volume of care subsidized by the District Council and of the effect on the volume of care possibly consumed beyond the care plan volume.

Table 3: Consumer price elasticity estimation - baseline (2014)

	Dependent variable: hours consumed (log)			
	(1)	(2)	(3)	(4)
Consumer price (log)	-0.050**	-0.268	-0.709***	-0.709**
	(0.019)	(0.310)	(0.256)	(0.290)
Disposable income (log)		0.220	0.660***	0.660**
		(0.309)	(0.255)	(0.291)
Woman			0.065*	0.065**
			(0.036)	(0.026)
Age: 60-69			-0.265***	-0.265***
			(0.069)	(0.079)
Age: 70-79			-0.070*	-0.070**
			(0.039)	(0.032)
Age: 80-89			*Ref.*	*Ref.*
Age: 90 or older			0.072*	0.072**
			(0.040)	(0.032)
Disability group: 1			0.729***	0.729***
			(0.137)	(0.128)
Disability group: 2			0.433***	0.433***
			(0.059)	(0.045)
Disability group: 3			*Ref.*	*Ref.*
			(0.039)	(0.023)
Disability group: 4			-0.523***	-0.523***
			(0.039)	(0.023)
Living with no spouse			0.317***	0.317***
			(0.034)	(0.032)
Spouse receives APA			0.031	0.031
			(0.083)	(0.059)
Spouse in institution			0.570***	0.570***
			(0.216)	(0.127)
Living with non-APA spouse			*Ref.*	*Ref.*
Constant	3.046***	3.954***	5.320***	5.320***
	(0.031)	(0.984)	(0.822)	(0.890)
Sigma	0.870***	0.725***	0.725***	
	(0.016)	(0.016)	(0.016)	(0.015)
Dummies for year of MTP	No	Yes	Yes	Yes
Dummies for latest plan	No	No	Yes	Yes
Observations	2,862	2,862	2,862	2,862
Censored observations	40.2%	40.2%	40.2%	40.2%
Number of clusters	2,785	2,785	2,785	27
AIC	5946.561	5951.525	5355.001	5355.001
BIC	5964.439	5993.240	5468.227	5468.227

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the household level in specifications (1) to (3) and at the producer level in specification (4). Data from October 2014.

tion between income and producer prices. The estimated coefficient increases (in absolute value) to -0.709 when we add disposable income and socio-demographic controls. The price elasticity 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. Comparing Specifications (3) and (4) of Table 3, we observe that 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. Clustering at the producer level allows some correlation across the error terms of observations with the same producer.[23]

Turning to the effects of 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%. Any marginal increase in disposable income actually entails two effects: (i) an income effect, through which the increase in the individual's budget set makes the consumption of all normal goods increase, (ii) a price effect playing in the opposite direction, due to the fact that an increase in income will induce the APA copayment rate to rise, increasing therefore the out-of-pocket payment borne on each subsidized hour consumed. Our coefficient captures the effect of an increase in income when the copayment rate is fixed (only effect (i) is playing), which is likely to be the case in the short-run. Given that we find a negative price elasticity, the estimated coefficient of 0.66 provides an upper bound for the overall effect of an income change on home care consumption when the amount of subsidies depends on income.

As expected, disability level is found to have a very significant effect: the heavier the disability level (as recorded by its administrative measure), the higher the predicted consumption, all other factors being equal. Even when controlling for disability level, age retains a significant effect on the consumption on home care services. In particular, the youngest APA beneficiaries (between 60 and 79 years old) are predicted to consume substantially less home care on average than the other recipients. This finding echoes de Meijer et al. [2011] who have studied the determinants of long-term care spending using Dutch data; they found that, once disability and chronic conditions are taken into account, age retains a significant though small positive effect on home care expenditures at the intensive margin.

To go further, we estimate the model on three subsamples corresponding respectively to individuals of disability levels 1 or 2, disability level 3 and disability level 4. As shown, Table A.6 (Appendix A.6), APA beneficiaries of disability group

[23] Another possibility would have been to cluster at the price level. As some producers are priced at the same level, it would imply some correlation across the error terms of observations with same price but different producers. We assume such correlation to be negligible relative to intra-producer correlation of errors. Standard error of the price elasticity estimator goes from 0.290 when we cluster at the producer level to 0.294 when clustering at the price level. The coefficient remains statistically significant at the 5% level.

4 (the least severely disabled) appear to be the most sensitive to price. Conversely, the most severely disabled individuals (disability groups 1 and 2) seem much less sensitive to the out-of-pocket price when consuming home care. This finding is consistent with previous works showing that poorer health status is associated with a lower price elasticity of healthcare consumption [Fukushima et al., 2016], receiving medical services being more discretionary for the relatively-more healthy patient. The precision on the subsample of the most severly disabled individuals is however very low, both because the sample is small and since the share of censored observations is higher than in the rest of the sample (44% versus 39%).[24]

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 does not affect own home care consumption (but only 6% of our sample has an APA recipient spouse). On the contrary, living alone (spouse in institution or no spouse) 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). Overall, the results on the effects of household structure are consistent with the literature on home care utilization: previous works have shown the importance of the co-residing spouse in providing informal care that partly substitutes for formal home care services. Finally, the dummies signaling the year when the most recent personalized care plan was established by the evaluation team of the District Council are jointly significant (at the 5% level) but their interpretation is hard to make. Even an alternative specification using the time elapsed since the latest care plan was set does not show support for the assumption that, the more time elapsed since the most recent evaluation, the further away actual home care needs relative to the personalized care plan.

Table A.7 in Appendix A.6 gives the results of the same estimation 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 closer to -1.0. However, given the low precision of our estimators, we cannot reject the assumption that the price elasticity is the same all three years. We also took profit from the panel dimension of our data: we estimated a population-average model as well as a random-effect model on the pooled observations from 2012, 2013 and 2014 (Table A.8 in Appendix A.6). Panel estimations make it possible to increase the precision of our estimates by providing an additional source of variation for identification: as the administrated price of each producer is re-evaluated every

[24] Lower precision in one subsample could also have arisen if some home care services were targeting the most (or the least) severely disabled individuals; it does not appear to be the case, as the variation in producer prices is similar in the 3 subsamples.

year, we observe some intra-individual variations in the producer price[25] over time, even when APA recipients do not change home care providers over time.[26] Results obtained with panel models are consistent with cross-sectional estimates.

Dealing with the selection into a producer

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. Since there is no strong empirical fact supporting this assumption, we need to assess whether our results are empirically robust to such a source of price endogeneity. For this purpose, we exploit the unequal repartition of home care supply over the district. We decompose our sample into two subpopulations: on the one side, the individuals that live in a municipality where a single producer is found to operate (40% of beneficiaries); on the other hand, the individuals living in a municipality where two or more regulated producers have customers (60% of beneficiaries).[27] Selection into a producer should be negligible in the first subsample, while it may arise in the second subsample. Figure 3 (p. 23) 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.

APA recipients on the two types of areas differ in terms of some socio-demographic characteristics (Table A.3, Appendix A.5). However, once controlling for observable characteristics, living in a single-producer area does not affect significantly home care consumption nor its estimated price elasticity (Table A.9, Appendix A.6).[28]

We thus re-estimate Equation (4) on the two subpopulations. Table 4 (p. 24) 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

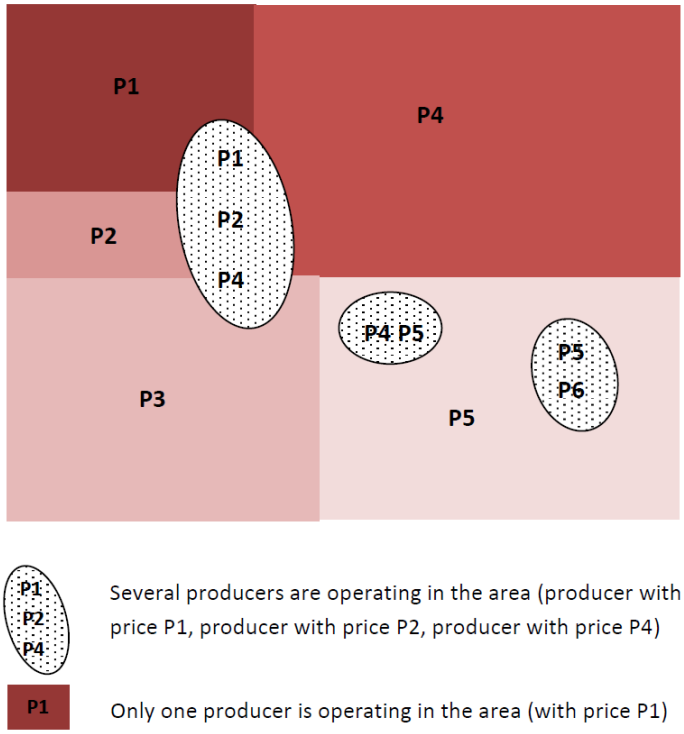
[25] On average, producer prices have increased by 1.9% between October 2012 and 2013 and by 1.3% between 2013 and 2014. For some services, the price has remained unchanged between two consecutive years, while, for some other services, the yearly price increase exceeded 3%.

[26] Once in the APA scheme, beneficiaries are allowed to change producers, provided a new personalized care plan is defined. It could result in endogenous price variations at the individual level if individuals change producers on the basis of prices; but in our sample, among the individuals present both in 2013 and in 2014 (39.7% of the pooled sample), only 5.8% have changed producers from one year to the other.

[27] In two municipalities, two regulated producers are found to operate but are priced at the same level. Beneficiaries living in these municipalities have been included in the first subsample as they cannot select their producer on the basis of its price.

[28] In Appendix A.5, we also have a look at the observable determinants of the producer type (public, non-for profit, for-profit) or of the price level (low-price).

Figure 3: Distribution of producers in the district - Schematic representation



NOTES: We provide only a schematic representation to preserve the anonymity of the District Council our data come from. Different shades of pink indicate different areas served by a unique regulated service, each being served by a different producer with a given price level.

Table 3[29]). When we restrict our sample to individuals who have no producer choice, the point estimate of the price elasticity is reduced to around -0.34. Given the smaller sample size and reduced identifying variation in prices, precision is much lower than in the baseline regression. Thus, we cannot formally reject that the 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 subpopulation of individuals who can choose between different providers. Despite the low precision, the estimator is significantly different from zero at the 1% level, with a point value of -1.03. This figure captures two effects: first, the price elasticity we are interested in; second, a selection effect that we may interpret as a form of price sensitivity. As the selection effect induces an inflating effect, it would mean that, on average, individuals willing to consume more hours go for relatively cheap services when they can choose among several producers.

[29]The difference with Table 3 is that standard errors are clustered here at the *producer price* level rather than at the producer level. It makes it possible to deal with the fact that the construction of the two subsamples artificially increases the empirical variance in prices and thus the precision of our estimates.

Table 4: Testing for selection into a producer (2014)

	Dependent variable: hours consumed (log)		
	(1)	(2)	(3)
Consumer price(log)	-0.697**	-0.344	-1.034***
	(0.295)	(0.608)	(0.391)
p-value	*0.016*	*0.572*	*0.007*
Socio-demographic controls	Yes	Yes	Yes
Dummies for year of MTP	Yes	Yes	Yes
Dummies for latest plan	Yes	Yes	Yes
Sample	All	Single producer	Multiple producers
Observations	2,862	997	1,865
Censored observations	40.2%	42.8%	38.8%
Number of clusters	23	14	23

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the producer price level. Data from October 2014.

Tables A.10 and A.11 in Appendix A.6 show that results obtained from cross-sectional and panel estimations on years 2012 and 2013 are similar: the point estimates obtained on the restricted sample of APA beneficiaries who have different producers providing care in their municipality of residence (Columns (1), (2) and (3)) are systematically higher (in absolute value) than those obtained on the sample of individuals with no apparent producer choice. For single-producer beneficiaries, the point estimate varies from -0.7 to -0.2 across estimations, but it remains roughly stable around -0.4. For some estimations, the precision gain, due to the increased number of observations and price variation (both at the intra and inter individual levels), even makes it possible to conclude to the significance of the estimator at the 1% level.

Discussion of results

Given our limited sample sizes and the limited variation in producer prices, our identification strategy does not allow us to reject systematically the hypothesis of a zero price elasticity. Still, we are able to draw some interesting conclusions that shed a new light on the disabled elderly behaviour in terms of demand for home care services. In line with the results obtained by previous literature [Coughlin et al., 1992, Ettner, 1994, Fontaine, 2012], our results confirm that the consumption of home care of the disabled elderly is sensitive to the hourly out-of-pocket payment. Home care consumption of the disabled elderly cannot be fully understood using solely the socio-medical notion of "needs" reflected in the personalized care plan. Despite the prescriptive nature of the care plan and its potential nudging effect, actual home care consumption seems to be influenced by 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 elasticity of the demand for domestic help is seemingly lower than unity at the intensive margin. This result is in line with what has been found by the companion works of Bourreau-Dubois et al. [2014] and Hege [2016], which 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. To compare these values with estimates obtained in the literature on the demand for medical services, it is better to retrieve the price elasticity of home care *expenditures*.[30] As our estimations suggest that the price elasticity of the *demand* for home care is around -0.4, we can infer that the price elasticity of home care *expenditures* will be positive: an increase in the unit out-of-pocket payment of formal care will lead to a less than proportional decrease in consumption and thus to an increase in expenditures. Manning et al. [1987], Keeler and Rolph [1988] found a price elasticity of overall medical care spending of -0.2; although its magnitude is subject to discussion [Aron-Dine et al., 2013], its negative sign was found to be robust.

Recent studies have provided evidence that price elasticity varies with the type of care considered: Duarte [2012] find acute care services to have a zero price elasticity of expenditures and Fukushima et al. [2016] similarly find elective care to have a high price sensitivity while generic drugs consumption reacts little to price. Our paper provides interesting evidence that, at the intensive margin, home care consumption is closer to acute care than to elective care in terms of price sensitivity. One implicit assumption of our empirical strategy is that hours of care are homogeneous, both in therms of nature and quality. We could expect the demand for some services to be less price-sensitive than the demand for other types of care but our data are not precise enough to allow us to distinguish between different types of care.

Regarding our out-of-pocket price measure, we have not taken into account tax reductions on home care services. In France, expenditures on home care of a given year can be partially offset by income tax reductions granted the following year. We do not observe the tax reductions the individuals in our sample may benefit from and do not have sufficient information to simulate it. Thus, our estimations rely on the implicit assumption that APA beneficiaries are sensitive to the "spot" or *ex ante* price [Geoffard, 2000].

[30] A unit price elasticity of demand corresponds to a price elasticity for expenditures equal to zero (since the variation in consumption exactly offsets the variation in the unit price) and a totally inelastic demand implies a price elasticity of expenditures of exactly +1 (any price increase inflates proportionally expenditures on the good).

One limitation of our cross-sectional identification strategy is that the consistency of our estimates relies on the classical assumption of no omitted variable bias. In population-average and random-effect models as well, identification relies on the assumption that the unobserved determinants of home care consumption, including time-invariant characteristics, are uncorrelated with the control variables. Given the administrative nature of our data, information on health status and family characteristics is poor. This is a serious downside 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]. Omitting information on informal care provision may then bias the estimates of our entire set of coefficients. As a robustness check, we include as control whether the individual receives formal home care during the weekend and public holidays.[31] For a given level of disability, individuals that do not receive care over the weekend are more likely to receive assistance from their relatives. Receiving home care during the weekend is associated with more hours consumed during working days (Table A.10, in Appendix A.6). Controlling for home care utilization during the weekend does not, however, significantly affect the price elasticity estimate. Fixed-effect models would provide a more comprehensive way of dealing with unobserved heterogeneity, in terms of informal care provision notably. However, no consistent parametric fixed-effect estimate can be built with censored data.

Furthermore, our estimation strategy implicitly assumes that the individual-specific censoring point is uncorrelated with the unobserved determinants of professional home care consumption. It is a strong assumption since unobserved informal care or health status can influence the evaluation team in the set up of the care plan volume [Billaud et al., 2012]. More importantly, we estimate price and income elasticities at the sample average, assuming these parameters to be constant with price and income. We would like to extend our framework to allow price and income elasticities to vary across observable characteristics. Semiparametric methods could also capture individual heterogeneity in the elasticities.[32]

[31] In our estimations, the dependent variable is the number of hours consumed between Monday and Saturday, except for public holidays. But APA beneficiaries may also receive a subsidy for a few hours of care to be received during weekends and public holidays, which are set separately in the personalized care plan. We did not include the home care hours received on weekends as a control in our baseline specifications because of a simultaneity concern. Only 7.5% of our baseline sample has weekend hours included in her personalized care plan, for a median volume of about 5 hours a month.

[32] Such extensions turn out to be complex, as censored quantile regressions with individual-specific censoring points have not been implemented yet in empirical works. Similarly, theoretical developments in semiparametric techniques have been proposed to deal with endogenous censoring points [Khan and Tamer, 2009] and with

7 Conclusion

This paper estimates the price elasticity of the demand for home care services of the community-dwelling disabled elderly. Our baseline results give a point estimate of -0.7 at the sample average. This value seems to be inflated by some price endogeneity stemming from non-random producer selection. 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). Conversely, the estimation on the subsample of individuals who can choose between different producers yields a statistically significant coefficient of -1.0. This coefficient captures what we may call the overall price sensitivity of consumption, including both an *ex ante* effect of 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").

Our results suggest a value of the (real) price elasticity of home care consumption inferior to one in absolute value. Although the significance at conventional thresholds is not systematic given the loss in statistical power, the point estimate of -0.4 we obtain when producer selection is shut down is stable across the three years of observation. External validity of our results should obviously be qualified: our sample is not nationally representative and we focus on APA recipients who consume home care from regulated services. Yet, we believe that general policy implications can be drawn from our results. The district we collected our data from was selected to be "average" in terms of socio-economic and demographic characteristics. In addition, customers of regulated home care services represent a large share of APA beneficiaries in France.

Public policy implications flowing from our results relate to the analysis and design of home care schemes. As the disabled elderly appear sensitive to the price of care, the copayment rates in home care subsidies programs entail allocative and dynamic efficiency implications. Given the low estimated value of the price elasticity (among the most severely disabled individuals notably), the generosity of home care subsidies also has substantial redistributive effects from taxpayers to the disabled elderly. Our estimates can also be used to predict the effects of potential reforms of home care subsidies. In France, the decrease of copayment rates planned by the 2016 APA reform,[33] more pronounced for recipients with severe disability levels, should reduce beneficiaries' overall out-of-pocket expenses on professional home care, while having little volume effect. Finally, our study

fixed effects in censored regression frameworks [Honore, 1992]. As far as we know, no empirical application of these developments has been done yet, which makes their practical implementation on our data challenging.

[33] *Loi n° 2015-1776 du 28 décembre 2015, Journal officiel n° 0301 du 29 décembre 2015.*

points out the unequal access to home care services over the territory. Individuals living in municipalities with a unique producer cannot choose 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.

Funding and acknowledgments

This research was carried out within the MODAPA project, which aims at studying the determinants of long-term care utilization in France (more information at: www.modapa.cnrs.fr).

It was supported by a research grant from the *Agence nationale de la recherche* (ANR) (ANR-14-CE30-0008) and benefited from the joint support of *Direction Générale de la Santé* (DGS), *Mission recherche de la Direction de la recherche, des études, de l'évaluation et des statistiques* (MiRe-DREES), *Caisse Nationale d'Assurance Maladie des Travailleurs Salariés* (CNAMTS), *Régime Social des Indépendants* (RSI) and *Caisse Nationale de Solidarité pour l'Autonomie* (CNSA), within the call for projets launched by the *Institut de recherche en santé publique* (IRESP) in 2013.

We are grateful to an anonymous French District Council (*Conseil départemental*) for granting the access to its data, and to Fondation Médéric Alzheimer for the generous support provided to Marianne Tenand's doctoral research.

References

A. Aron-Dine, L. Einav, and A. Finkelstein. The RAND Health Insurance Experiment, Three Decades Later. *Journal of Economic Perspectives*, 27(1):197–222, Feb. 2013.

P. Bakx, C. de Meijer, F. Schut, and E. van Doorslaer. Going formal or informal, who cares? The influence of public long-term care insurance. *Health Economics*, 24(6):631–643, June 2015.

D. Bardey, A. Couffinhal, and M. Grignon. Efficacité et risque moral ex post en assurance maladie. *Revue française d'économie*, 18(2):165–197, Oct. 2003.

T. Barnay and S. Juin. Does home care for dependent elderly people improve their mental health? *Journal of Health Economics*, 45:149–160, Jan. 2016.

S. Billaud, C. Bourreau-Dubois, A. Gramain, H. Lim, F. Weber, and J. Xing. La prise en charge de la dépendance des personnes âgées: les dimensions territoriales de l'action publique. Rapport final réalisé pour la MiRe/Drees, 2012.

N. Blanpain and O. Chardon. Projections de population à l'horizon 2060 un tiers de la population âgé de plus de 60 ans. *INSEE Première*, 2010.

E. Bonsang. Does informal care from children to their elderly parents substitute for formal care in Europe? *Journal of Health Economics*, 28(1):143–154, Jan. 2009.

F. Borderies and F. Trespeux. Les bénéficiaires de l'aide sociale départementale en 2013. Document de travail, Série Statistiques 196, Drees, June 2015.

C. Bourreau-Dubois, A. Gramain, H. Lim, and J. Xing. Impact du reste à charge sur le volume d'heures d'aide à domicile utilisé par les bénéficiaires de l'APA. CES Working Paper 2014.24, Centre d'Economie de la Sorbonne, 2014.

C. Bourreau-Dubois, A. Gramain, and Q. Roquebert. Les disparités départementales dans la mise en oeuvre de l'APA à domicile, reflets des choix de politiques locales ? Notes MODAPA 3, 2015.

J. R. Brown and A. Finkelstein. The Private Market for Long-Term Care Insurance in the United States: A Review of the Evidence. *The Journal of Risk and Insurance*, 76(1):5–29, Mar. 2009.

M. Bérardier. APA à domicile : quels montants si l'APA n'était pas plafonnée ? Essai de modélisation. Document de travail, Série Sources et Méthodes 21, Drees, May 2011.

F. Colombo, A. Llena-Nozal, J. Mercier, and F. Tjadens. *Help wanted ? Providing and Paying for Long-Term Care*. OECD Health Policy Studies. OECD, Paris, OECD Publishing edition, 2011.

T. A. Coughlin, T. D. McBride, M. Perozek, and K. Liu. Home care for the disabled elderly: predictors and expected costs. *Health Services Research*, 27(4):453, Oct. 1992.

C. de Meijer, M. Koopmanschap, T. B. d' Uva, and E. van Doorslaer. Determinants of long-term care spending: Age, time to death or disability? *Journal of Health Economics*, 30(2):425–438, Mar. 2011.

C. A. M. de Meijer, M. A. Koopmanschap, X. H. E. Koolman, and E. K. A. van Doorslaer. The role of disability in explaining long-term care utilization. *Medical Care*, 47(11):1156–1163, Nov. 2009.

A. Deloffre. Les retraites en 2007. Document de travail, Série Etudes et Recherches 86, Drees, Mar. 2009.

Drees. Enquête sur l'allocation personnalisée d'autonomie réalisée par la Drees auprès des conseils généraux. APA - Résultats de l'enquête trimestrielle 1, Drees, 2012.

F. Duarte. Price elasticity of expenditure across health care services. *Journal of Health Economics*, 31(6):824–841, Dec. 2012.

M. J. Eichner. The Demand for Medical Care: What People Pay Does Matter. *The American Economic Review*, 88(2):117–121, May 1998.

S. L. Ettner. The Effect of the Medicaid Home Care Benefit On long-Term Care Choices of the Elderly. *Economic Inquiry*, 32(1):103–127, Jan. 1994.

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

K. Fukushima, S. Mizuoka, S. Yamamoto, and T. Iizuka. Patient cost sharing and medical expenditures for the Elderly. *Journal of Health Economics*, 45:115–130, Jan. 2016.

P.-Y. Geoffard. Dépenses de santé : l'hypothèse d'aléa moral. *Economie et prévision*, 142(1): 122–135, 2000.

A. Gramain and J. Xing. Tarification publique et normalisation des processus de production dans le secteur de l'aide à domicile pour les personnes âgées. *Revue française des affaires sociales*, 2-3(2):218–243, Dec. 2012.

R. Hege. La demande d'aide à domicile est-elle sensible au reste-à-charge : une analyse multi-niveaux sur données françaises. CES Working Paper 2016.22, Centre d'économie de la Sorbonne, 2016.

A. Holly, T. Lufkin, E. C. Norton, and C. H. Van Houtven. Informal care and formal home care use in europe and the united states. Working paper, 2010.

B. E. Honore. Trimmed Lad and Least Squares Estimation of Truncated and Censored Regression Models with Fixed Effects. *Econometrica*, 60(3):533, May 1992.

A. Kalwij, G. Pasini, and M. Wu. Home Care for the Elderly: Family, Friends, and the State. SSRN Scholarly Paper ID 1508430, Social Science Research Network, Rochester, NY, 2009.

S. Katz, T. D. Downs, H. R. Cash, and R. C. Grotz. Progress in Development of the Index of ADL. *The Gerontologist*, 10(1 Part 1):20–30, 1970.

E. B. Keeler and J. E. Rolph. The demand for episodes of treatment in the Health Insurance Experiment. *Journal of Health Economics*, 7(4):337–367, Dec. 1988.

S. Khan and E. Tamer. Inference on endogenously censored regression models using conditional moment inequalities. *Journal of Econometrics*, 152(2):104–119, Oct. 2009.

A. Laferrère and V. Angelini. La mobilité résidentielle des seniors en Europe. *Retraite et société*, (2):87–107, 2010.

M. P. Lawton and E. M. Brody. Assessment of older people: self-maintaining and instrumental activities of daily living. *The Gerontologist*, 9(3):179–186, 1969.

W. G. Manning, J. P. Newhouse, N. Duan, E. B. Keeler, A. Leibowitz, and S. M. Maquis. Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment. *American Economic Review*, 77(3):251–77, June 1987.

D. Messaoudi. La différenciation qualitative dans les services de l'aide à domicile : une lecture par les conventions de qualité. *Revue d'économie industrielle*, (138):65–91, 2012.

R. Moffitt. The Econometrics of Piecewise-Linear Budget Constraints: A Survey and Exposition of the Maximum Likelihood Method. *Journal of Business & Economic Statistics*, 4(3):317–328, July 1986.

R. Moffitt. The Econometrics of Kinked Budget Constraints. *The Journal of Economic Perspectives*, 4(2):119–139, Apr. 1990.

A. Motel-Klingebiel, C. Tesch-Roemer, and H.-J. Von Kondratowitz. Welfare states do not crowd out the family: evidence for mixed responsibility from comparative analyses. *Ageing and Society*, 25(06):863, Nov. 2005.

J. A. Nyman. The economics of moral hazard revisited. *Journal of Health Economics*, 18(6): 811–824, Dec. 1999.

M. V. Pauly. The Economics of Moral Hazard: Comment. *The American Economic Review*, 58 (3):531–537, June 1968.

L. E. Pezzin, P. Kemper, and J. Reschovsky. Does Publicly Provided Home Care Substitute for Family Care? Experimental Evidence with Endogenous Living Arrangements. *The Journal of Human Resources*, 31(3):650–676, 1996.

B. Poletti. Mission relative aux difficultés financières de l'aide à domicile et aux modalités de tarification et d'allocation de ressources des services d'aide à domicile pour publics fragiles. Mission confiée par Madame Roselyne Bachelot-Narquin, Ministre des Solidarités et de la Cohésion Sociale, 2012.

T. Rapp, A. Grand, C. Cantet, S. Andrieu, N. Coley, F. Portet, and B. Vellas. Public financial support receipt and non-medical resource utilization in Alzheimer's disease - results from the PLASA study. *Social Science & Medicine*, 72(8):1310–1316, 2011.

T. Rapp, P. Chauvin, and N. Sirven. Are public subsidies effective to reduce emergency care? Evidence from the PLASA study. *Social Science & Medicine*, 138:31–37, Aug. 2015.

A. Sieurin, E. Cambois, J.-M. Robine, and others. *Les espérances de vie sans incapacité en France: une tendance récente moins favorable que dans le passé*. Ined, Jan. 2011.

G. Solard. Les retraités et les retraites - Edition 2015. Collection Etudes et Statistiques, Drees, July 2015.

M. Stabile, A. Laporte, and P. C. Coyte. Household responses to public home care programs. *Journal of Health Economics*, 25(4):674–701, July 2006.

C. H. Van Houtven and E. C. Norton. Informal care and health care use of older adults. *Journal of Health Economics*, 23(6):1159–1180, Nov. 2004.

J.-M. Vanlerenberghe and D. Watrin. Rapport d'information fait au nom de la commission des affaires sociales sur l'aide à domicile. Rapport d'information 575, Sénat, 2014.

T. K. Viitanen. Informal and formal care in Europe. Working Paper 2648, IZA, 2007.

C. Zhen, E. A. Finkelstein, J. M. Nonnemaker, S. A. Karns, and J. E. Todd. Predicting the Effects of Sugar-Sweetened Beverage Taxes on Food and Beverage Demand in a Large Demand System. *American Journal of Agricultural Economics*, pages 1–25, July 2013.

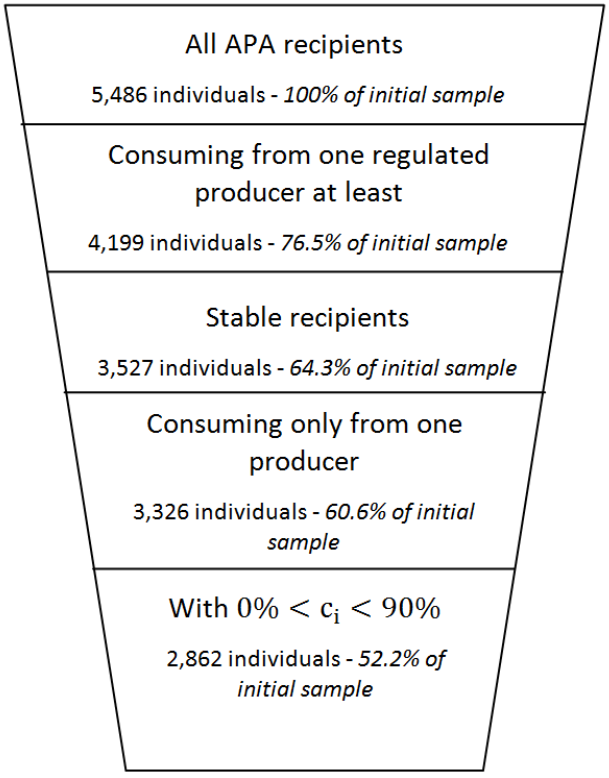
A Appendices

A.1 Construction of the sample

Sample selection

This Appendix aims at documenting the selection steps our initial dataset has gone through. For our baseline month (October 2014), administrative records indicate that 5,549 beneficiaries were receiving APA; but for 63 individuals, essential information on the hours subsidized, on copayment or on covariates was missing. These individuals are presumably former APA recipients not yet erased from the files, so we dropped them from our sample. The total number of beneficiaries is thus considered to be 5,486. Figure A.1 sums up the selection steps.

Figure A.1: Sample selection steps



In order to observe precisely both the out-of-pocket price and the number of hours that are effectively consumed and subsidized, we retain only the beneficiaries that receive care from a regulated producer. Beneficiaries registered as receiving care from a regulated producer represent the majority of APA recipients in the district (more than 4/5).

We then dropped the observations who have missing information for the cur-

rent month, the preceding month or the following month to avoid potential unobservable shocks likely to bias our estimations. Indeed, missing information could be related to temporary absences (like hospitalizations) or temporary disruptions (e.g. visits from relatives, who replace temporarily professional home care services by providing informal care). The remaining individuals can be regarded as "stable".

Some individuals receive home care from several producers at the same time. If taken into account, the simultaneity of home care consumption decisions for these individuals would make our empirical strategy considerably more complex. Given that individuals with two producers represent a small share of APA recipients, we prefer to drop them. In addition, so as to make the relationship between the consumer price and the producer price fully linear in disposable income (see Appendix A.2), we retain only those individuals with a copayment rate strictly between 0 and 90%.

We end up with a sample that represents 52% of total APA recipients of the district. We follow the same steps to construct the samples of October 2012 and 2013. Percentages of individuals selected at each step are very similar to what is found for 2014 and are available on request.

In order to assess the selection of our sample in terms of observable characteristics, we fit a Probit model on the probability to choose a regulated producer. Results are displayed in Table A.1 (p. 35). Older individuals are less likely to receive care from a regulated producer, while individuals living alone (no spouse or spouse in institution) are more likely to choose that type of provider. Income has not a linear effect, but it significantly affects the probability of choosing a regulated producer. A Heckman-type model would allow to take into account the selection of our sample on both observable and unobservable factors affecting the demand for home care. Given that we do not have any good instrument at hand to construct an estimator that would not entirely rely on a parametric assumption, we chose to estimate our parameters of interest directly on the selected sample. Such a choice imposes to remain cautious about the external validity of our estimates.

Table A.1: Observable determinants of the choice of a regulated producer (2014)

Dependent variable:	Served by a regulated producer
Woman	-0.001
	(0.011)
Age: 60-69	0.019
	(0.024)
Age: 70-79	-0.014
	(0.014)
Age: 80-89	*Ref.*
Age: 90 or older	-0.172***
	(0.011)
Disability level: 1	-0.063
	(0.039)
Disability level: 2	-0.014
	(0.017)
Disability level: 3	*Ref.*
Disability level: 4	0.011
	(0.013)
Living with no spouse	0.041***
	(0.012)
Spouse receives APA	0.033
	(0.030)
Spouse in institution	0.202***
	(0.058)
Living with non-APA spouse	*Ref.*
Income quartile: 1	-0.045**
	(0.016)
Income quartile: 2	*Ref.*
Income quartile: 3	-0.038**
	(0.015)
Income quartile: 4	-0.134***
	(0.014)
Observations	5,486
Number of clusters	5,326

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the household level. Estimation is done by a probit model. Average marginal or partial effects (AME – APE) are displayed. The sample used correspond to all APA recipients in the District Council in October 2014, except for individuals for which data on the copayment rate, on hours consumed or on socio-demographic characteristics were missing.

Imputation of households

Although the data we collected contain information on the family status of APA beneficiaries, we do not know whether a given individual has her partner also receiving APA. To produce correct inference, in some of our estimations it is important to know whether two individuals belong to the same household. In addition, having an APA-recipient spouse may correlate with one's own home care consumption; failing to control for such a characteristic may bias our estimates.

In order to identify potential couples in our sample, we checked whether each individual could be matched with another recipient of the opposite sex, recorded as living with a spouse, with exactly the same income (as the APA copayment schedule takes into account the household income) and residing in the same municipality. If two individuals match, they are regarded as belonging to the same household. This is the piece of information we use to construct both a dummy for residing with a spouse receiving APA and a household identification number, which we use when clustering standard errors at the household level.

Note that the matching procedure may fail for individuals whose copayment rate is 0%. Indeed, the reported disposable income is the same for all such individuals, whether they are spouses or not. The same pitfall applies for individuals whose copayment rate is 90%. In October 2014, only 16 individuals were not matched for this reason; a figure which should be small enough not to affect the results presented in Table A.1. All other estimations rely on the sample of individuals with a copayment rate strictly between 0 and 90%, for who the matching procedure is systematically successful.

A.2 Identification

In Section 5, we presented the equation we want to estimate:

$$ln(h_i^*) = \beta_0 + \beta_1.ln(c_i p_i) + \beta_2.ln(I_i^D) + \sum_{d=2009}^{2014} \lambda^d.1_i^d + X_i'.\theta + \epsilon_i \qquad (6)$$

As the copayment rate is set to be strictly proportional to disposable income at the time the latest personalized care plan was defined, the consumer price on subsidized hours is a linear function of I_i^D:

$$c_i p_i = \frac{0.9}{2MTP_i^D} I_i^D p_i$$

where MTP_i^D is the value of a particular disability allowance (MTP; see Section 3) the year individual i's copayment rate was last computed. Equation (6) is thus equivalent to:

$$ln(h_i^*) = \beta_0 + \beta_1.\Big[ln(p_i) + ln(I_i^D) + ln\Big(\frac{0.9}{2MTP_i^D}\Big)\Big] + \beta_2.ln(I_i^D) + \sum_{d=2009}^{2014} \lambda^d.1_i^d + X_i'.\theta + \epsilon_i$$

Given that the disability allowance MTP^D will take the same value for two individuals whose copayment rate was last revised in the same year, dummies 1_i^d in Equation (6) will control for inter-individual variation in this parameter. Rearranging terms and introducing a new set of parameters $\mu^d_{d=2009,\dots,2014}$, we obtain[34]:

$$ln(h_i^*) = \beta_0 + \beta_1.ln(p_i) + (\beta_1 + \beta_2).ln(I_i^D) + \sum_{d=2009}^{2014} \mu^d.1_i^d + X_i'.\theta + \epsilon_i \qquad (7)$$

Equation (7) exhibits two interesting features of our econometric specification. First, it shows that inter-individual variations in *producer prices* of home care unambiguously identifies the *consumer price* elasticity of home care, β_1. Second, it indicates that any hypothetical variation in the disposable income that individual i had when her copayment rate was last computed would have had two distinct effects on the *current* volume of home care consumed:

- An income effect, which captures the additional home care consumption induced by a marginal increase in the *current* disposable income (since we assume current disposable income and past disposable income are mechanically related);

[34] Given that the dummies 1_i^d are also meant to capture the unobservable increase in disposable income since the time the observed income was registered in the District Council, the implicit assumption we have to make is that MTP and income have evolved at the same rate for a given individual. Provided income of the elderly evolves at the same pace as pension benefits, this assumption is reasonable: both pension benefits and the disability benefit MTP are set to follow the inflation rate.

- A price effect, as any change in the disposable income induces a change in the *current* individual consumer price when there is a new personalized care plan.

In order to obtain directly the standard errors associated with the estimator of coefficient β_2, (7) can be written alternatively as:

$$ln(h_i^*) = \beta_0 + \beta_1.\big[ln(p_i) + ln(I_i^D)\big] + \beta_2.ln(I_i^D) + \sum_{d=2009}^{2014} \mu^d.1_i^d + X_i'.\theta + \epsilon_i \quad (8)$$

Compared to Equation (6), Equations (7) or (8) are less sensitive to the measurement errors on the relationship between income and consumer price. Indeed, for 2% of our sample, the relationship between the income and the copayment rate does not verify the legal formula used to compute the copayment rate, using the disposable income and the value of the MTP disability allowance.[35] After a careful examination of the data, we hypothesize that most of these errors occurred when the copayment rate was computed while the values of income and copayment rate are assumed to be the real ones. It is then worthy –in terms of precision gained– to include the corresponding observations in the estimation. We add a dummy variable 1_i^e signaling whether the individual is affected by such a calculation error.

To sum it up, in order to take into account the various subtleties of the APA policy and the measurement errors, the true estimated equation is thus:

$$ln(h_i^*) = \beta_0 + \beta_1.\big[ln(p_i) + ln(I_i^D)\big] + \beta_2.ln(I_i^D) + \sum_{d=2009}^{2014} \mu^d.1_i^d + \zeta.1_i^e + X_i'.\theta + \epsilon_i$$

[35] In practical terms, this means that we are not able to retrieve the year in which the copayment rate was officially computed; as a consequence, for those individuals, all dummies 1^d take the value of zero.

A.3 Maximum likelihood estimation of the model

The objective of this appendix is twofold. First, it provides the expression of the likelihood function we maximize to derive our estimates of interest. Second, it aims at showing that, within the framework proposed by Moffitt (1986) for the empirical analysis of demand with a kinked budget constraint, the censoring of the measure of consumption at the kink and beyond does not prevent the identification of the price elasticity of demand, conditional on some assumptions on the stability of individual preferences.

General setting

For the sake of simplicity, in this appendix we consider home care consumption in level, while we include its log in the empirical specification. As set in Section 3, the demand for home care with the kinked budget constraint generated by APA writes:

$$\begin{cases} h_i^* = g(c_i p_i, I_i; X_i) + \nu_i & \text{if } h_i^* < \bar{h}_i \\ g(p_i, \tilde{I}_i; X_i) + \nu_i < \bar{h}_i < g(c_i p_i, I_i; X_i) + \nu_i & \text{if } h_i^* = \bar{h}_i \\ h_i^* = g(p_i, \tilde{I}_i; X_i) + \nu_i & \text{if } h_i^* > \bar{h}_i \end{cases} \tag{9}$$

with ν_i an individual preference shifter. In what follows, we denote:
$f(.|c_i, p_i, I_i, \bar{h}_i, X_i)$ the conditional density function of ν;
$F(.|c_i, p_i, I_i, \bar{h}_i, X_i)$ its conditional cumulative distribution function;
ψ a set of parameters characterizing the function $g(.)$;
κ a set of parameters that characterize the distribution of the error term ν;
S_1 the left-hand side segment of the budget constraint: $i \in S_1 \iff h_i^* < \bar{h}_i$;
S_2 the right-hand side segment of the budget constraint: $i \in S_2 \iff h_i^* > \bar{h}_i$;
K the kink of the budget constraint: $i \in K \iff h_i^* = \bar{h}_i$.

Observational scheme with censoring

With h_i the consumption in the data and h_i^* the true consumption, our observational scheme is:

$$h_i = \begin{cases} h_i^* & \text{if } h_i^* < \bar{h}_i \\ \bar{h}_i & \text{if } h_i^* \geq \bar{h}_i \end{cases} \tag{10}$$

From Systems 9 and 10, we know that:

1. For all individuals i such that $h_i = h_i^*$, we have $h_i^* < \bar{h}_i$ ($i \in S_1$):

$$h_i = g(c_i p_i, I_i; X_i) + \nu_i < \bar{h}_i$$

2. For individuals i such that $h_i \neq h_i^*$, we have $h_i^* \geq \bar{h}_i$; these individuals can be split in two different sub-groups:

   (a) Individuals i is such that $h_i^* = \bar{h}_i$ $(i \in K)$; then:

$$\begin{cases} g(c_i p_i, I_i; X_i) + \nu_i > \bar{h}_i \\ g(p_i, \tilde{I}_i; X_i) + \nu_i < \bar{h}_i \end{cases}$$

   (b) Individuals i is such that $h_i^* > \bar{h}_i$ $(i \in S_2)$; then:

$$\begin{cases} g(c_i p_i, I_i; X_i) + \nu_i > \bar{h}_i \\ g(p_i, \tilde{I}_i; X_i) + \nu_i > \bar{h}_i \end{cases}$$

Thus, all censored observations ($i \in S_2$ or $i \in K$) have in common the fact that:

$$g(c_i p_i, I_i; X_i) + \nu_i \geq \bar{h}_i$$

We can thus write:

$$h_i = \begin{cases} g(c_i p_i, I_i; X_i) + \nu_i & \text{if } g(c_i p_i, I_i; X_i) + \nu_i < \bar{h}_i \\ \bar{h}_i & \text{if } g(c_i p_i, I_i; X_i) + \nu_i \geq \bar{h}_i \end{cases} \tag{11}$$

which corresponds to the usual censored regression model setting.

The likelihood function with censoring

Let h be a random variable, from which h_i^* is a random draw. Conditional on the observable covariates, $h = g(CP_i, \hat{I}_i; X_i) + \nu$, where ν is a normally distributed random variable from which ν_i is a random draw. From System 11, we can derive the individual contributions to the likelihood function:

1. Contribution of an individual i such that $h_i < \bar{h}_i$ $(i \in S_1)$:

$$\begin{aligned} \mathbb{P}\big(h_i = h_i^* | c_i, p_i, I_i, X_i\big)_{|h_i^* < \bar{h}_i} &= \mathbb{P}\big(\nu = h_i - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big) \\ &= f\big(h_i - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big) \end{aligned}$$

2. Contribution of an individual i such that $h_i \geq \bar{h}_i$ ($i \in S_2$ or $i \in K$):

$$\begin{aligned} \mathbb{P}\big(h_i = \bar{h_i} | c_i, p_i, I_i, X_i\big)_{|h_i^* \geq \bar{h_i}} &= \mathbb{P}\big(h \geq \bar{h_i} | c_i, p_i, I_i, X_i\big) \\ &= \mathbb{P}\big(\nu \geq \bar{h_i} - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big) \\ &= 1 - F\big(\bar{h_i} - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big) \end{aligned}$$

Finally, the likelihood function can be written as follows:

$$L(\psi,\kappa) = \prod_{i=1}^{n} \Big[f\big(h_i - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big) \Big]^{\mathbb{I}_{[h_i < \bar{h}_i]}} \times \Big[\Big(1 - F\big(\bar{h_i} - g(c_i p_i, I_i; X_i) | c_i, p_i, I_i, X_i\big)\Big) \Big]^{\mathbb{I}_{[h_i = \bar{h}_i]}}$$

In our setting, the censoring of the dependent variable right at the kink prevents us from distinguishing between the individuals who actually consume exactly at the kink and those who actually locate on the right-hand side segment of the budget constraint. Interestingly, it does not prevent the identification of our parameters of interest (which relate to the function $g(.)$), although it comes with a cost in terms of precision. Assuming some stability of individual preferences (like in Moffitt (1986), the functional form of $g(.)$ is assumed to be invariant to changes in consumer price and income), we can interpret the price elasticity estimated using information relating to the left-hand side of the kink as the price sensitivity of demand along the entire budget constraint.

Weaker assumptions on individual preferences would not undermine the identification of the price sensitivity of home care consumption when the consumer price is subsidized by the APA scheme, but would make it more difficult to extrapolate our estimates to the hours consumed beyond the care plan volume.

Likelihood function of our sample

Using the previous section, we can derive the conditional likelihood function for our sample, that is to say the probability we observe the sample values of hours consumed, h_i, given the consumer price $c_i p_i$, disposable income at the time the personalized care plan was set, I_i^D and other individual characteristics X_i.

Remember we assume the following specification for the demand for home care:

$$ln(h_i^*) = \beta_0 + \beta_1 . ln(c_i p_i) + \beta_2 . ln(I_i^D) + \sum_{d=2009}^{2014} \lambda^d . 1_i^d + X_i' . \theta + \epsilon_i$$

In addition, we assume a normal distribution for the idiosyncratic shock ϵ:

$$\epsilon \sim \mathcal{N}(0, \sigma^2)$$

Finally, our likelihood function writes:

$$L(\beta,\lambda,\theta,\sigma)=\prod_{i=1}^{n}\Big[\frac{1}{\sigma}\phi\big(\frac{ln(h_i)-\beta_1.ln(c_ip_i)-\beta_2.ln(I_i^D)-\big(\sum_{d=2009}^{2014}\lambda^d.1_i^d\big)-X_i'.\theta}{\sigma}\big)\Big]^{\mathbb{I}_{[h_i<\bar{h}_i]}}$$
$$\times\Big[\Big(1-\Phi\big(\frac{ln(\bar{h_i})-\beta_1.ln(c_ip_i)-\beta_2.ln(I_i^D)-\big(\sum_{d=2009}^{2014}\lambda^d.1_i^d\big)-X_i'.\theta}{\sigma}\big)\Big)\Big]^{\mathbb{I}_{[h_i=\bar{h}_i]}}$$

Consistent estimators of β_1, β_2 and θ can be derived as the arguments of the maximization of the log-likelihood function, provided it is concave.

In order to derive the expression here-above, we must assume the censoring point $\bar{h}_i$ does not depend on the error term, ϵ_i. In other words, the individual censoring point is assumed to be exogenous, conditional on the observable variables. Note also that the censoring point might depend on the price of the chosen producer: when the evaluation team sets the personalized care plan, it has to check that the monetary equivalent of the care plan volume is below the legal ceiling associated with the disability level of the individual. The monetary equivalent is equal to the number of hours granted by the evaluation team times the producer price. If the monetary equivalent is higher than the legal ceiling, individuals might choose a cheaper producer in order to be entitled to a higher amount of subsidized hours.[36]

[36]For 7% of our sample at most, the monetary equivalent of their care plan volume would exceed their legal ceiling if they choose the most expensive producer of their municipality.

A.4 Components of home care prices

In this section, we detail the components of prices in order to shed some light on why customers may exogeneously face different producer prices. Regulated producers are priced by the District Council and the hourly price of each producer is computed as the overall average hourly production cost of the producer. The various components of production costs are described in qualitative studies, either in academic works (Gramain and Xing, 2012) or in public reports.[37] By order of importance (top-down), production costs can be decomposed as follows:

- Employee costs (80% of total charges): earnings, paid to professional caregivers and, for a small part (around 10% of total charges), to the supervising staff.[38] Caregivers' wages depend on the qualification of the employee, according to collective labour agreements. The price of a producer with a larger proportion of skilled caregivers among its employees is thus expected to be higher than the price of another producer with relatively less qualified employees. Wages are also augmented if employees work on Sunday or on public holidays, in accordance with general labour legislation;
- Operating costs (10-15% of total charges): those include rents for the service offices and other running expenses;
- Transportation costs (5-10% of total charges): they correspond to the compensation of caregivers for the costs borne to go to the consumer's home. This item is likely to largely vary across services according to their geographical area of intervention;
- Contrary to the health care sector, technological progress and capital costs are negligible in the home care industry.

We represent graphically the relationship between the producer price and several variables for regulated producers serving the APA beneficiaires of our sample. We distinguish between non-public (mainly non-profit) producers and public producers. The latest are likely to receive grants or advantages (e.g., a free office) from local municipalities, which reduce operating costs. Such advantages are taken into account in the pricing process and lower down the regulated price of public producers. In the graphical representation, we exclude the biggest producer of

[37] There is, though, no national, comprehensive benchmark study on the costs of home care services. Public reports regularly deplore the lack of information on costs as a major shortcoming preventing from understanding the functioning of the sector (Vanlerenberghe and Watrin, 2014, Poletti, 2012).

[38] The size of the supervising staff relatively to the number of professional caregivers is indirectly regulated by the District Council through the pricing process. The District Council ensures that the proportion of supervising staff relative to caregivers that is taken into account in the administered price is similar across all producers.

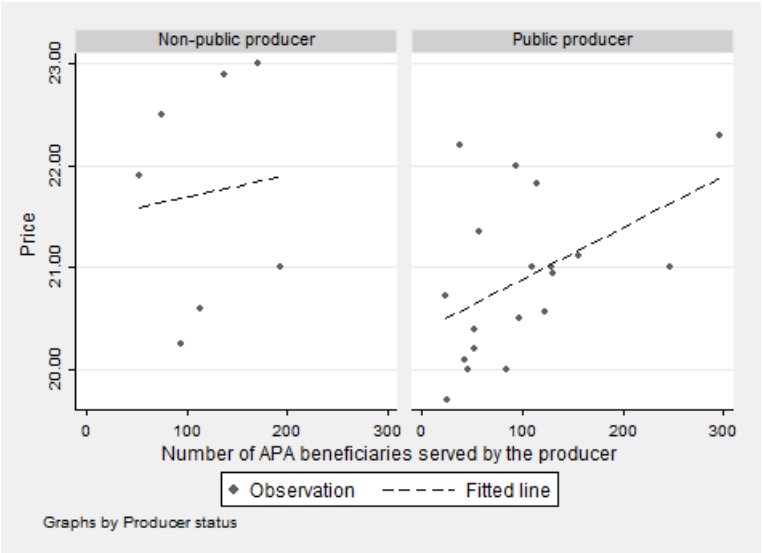
the district, a nationwide non-profit organization, which has systematically the highest values for the variables we are here interested in.

In Figure A.2 (p. 45), we plot producer prices against the number of APA beneficiaries served by the corresponding services. Graphically, the more customers the producer has, the higher its price. Having more customers might be associated with more municipalities to serve and thus higher transportation costs. Producers with more customers might have more employees (caregivers, but also administrative staff) and the increase in hours might not necessarily compensate for the increase in charges for additional employees. For instance, unproductive hours (meetings, training) could be relatively more numerous when a service gets relatively large. In that case, economies of scale may not occur. This graph should be interpreted with caution though: we only have the number of APA recipients served by each producer, instead of the total number of customers served in the whole district (which may include disabled individuals below age 60 or regular households that consumes domestic help).

Figure A.3 (p. 45) shows the relationship between the price of producers and the share of hours they serve on Sundays or on public holidays. Public producers have a very low share of these hours, as most public services do not operate on weekends and holidays. A higher share of hours made on holidays tends to be associated with a higher price, which is consistent with the financial compensation of employees for working on public holidays set by general labor legislation.

Finally, Figure A.4 (p. 46) shows that the relationship between the price and the number of municipalities served by the producer is actually increasing. To refine this analysis, it would be relevant to take into account the spatial distribution of municipalities, so as to reflect transportation costs.

Figure A.2: Producer price according to the number of APA beneficiaries served by the producer, by status

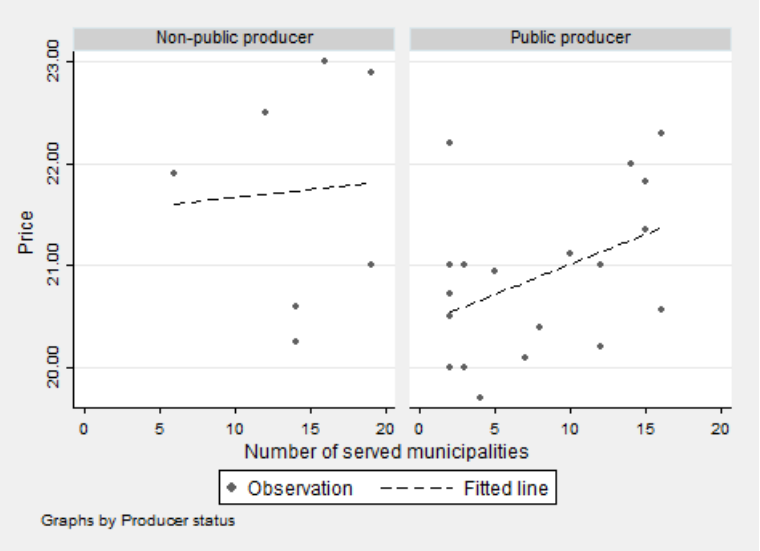


Sample: Regulated producers of the district serving at least one APA beneficiary in October 2014.
Notes: The largest producer, which is priced at 23.5€ and serves 43% of the APA beneficiaries who receive care from a regulated producer in the district, is not included.

Figure A.3: Producer price according to the share of the producer hours served on Sundays and public holidays, by status

Sample: Regulated producers of the district serving at least one APA beneficiary in October 2014.
Notes: The largest producer, which is priced at 23.5€ and makes 1.80% of its home care hours on Sundays and holidays, is not included.

Figure A.4: Producer price according to the number of served municipalities, by status



SAMPLE: Regulated producers of the district serving at least one APA beneficiary in October 2014.
NOTES: The largest producer, which is priced at 23.5€ and serves 199 municipalities, is not included.

A.5 Single-producer and multiple-producer areas: information on home care supply structure

Comparison of single-producer and multiple-producer areas

According to their geographical location in the district, beneficiaries do not have the same access to home care producers. Some individuals live in a municipality where a single producer is found to operate. It is the case for 79% of the municipalities represented in our sample, in which live 35% of beneficiaries of our sample, as displayed in A.2. The remaining beneficiaries are living in a municipality where two or more regulated producers have customers. Multiple-producer municipalities are typically the biggest cities of the district or middle-size cities with a local public provider and an additional producer operating in several areas. Table A.2 interestingly reflects spatial concentration: 65% of the beneficiaries in our sample live in 21% of the represented municipalities.

Table A.2: Single-producer areas and multiple-producer areas

	Municipalities		Beneficiaries	
	Number	*Frequencies*	*Number*	*Frequencies*
Single producer	221	79.2%	997	34.8%
Several producers	58	20.8%	1865	65.2%
Total	279	100%	2,862	100%

NOTES: Baseline sample from October 2014.

Table A.3 (p. 48) presents the descriptive statistics computed on the two subsamples and the p-value of the difference in means for each variable. The two subsamples are similar in terms of average socio-demographic characteristics. Although they slightly differ in terms of the average care plan volume, the average home care consumption is similar in both areas. Producer prices are higher on average in single-producer municipalities, but the effect on the out-of-pocket price is counterbalanced by the lower average income of their resident and thus lower copayment rates.

It should be noticed that the residential mobility of the elderly is generally low (see Laferrère and Angelini (2010)). When they occur, moves are mainly explained by family motives or the need for adapted residences. Price endogeneity of home care due to residential mobility should thus be negligible.

Overall, the two subsamples do not seem do differ substantially in terms of our outcome and of the explaining variables. Provided there are no systematic differences in the unobservable characteristics associated with home care consumption between the two types of municipalities, the estimate of the price and income elas-

ticities we obtain on the subsample of individuals with no choice of producer price can be reasonably extrapolated to our entire baseline sample of APA recipients.

Table A.3: Descriptive statistics on two subsamples (single- or multiple-producer areas, 2014)

Variable	Single-producer areas (1)	Multiple-producer areas (2)	P-value (diff. in means) (3)
Care plan volume	20.1	20.8	0.06
Care plan monetary value	456.8€	454.8€	0.83
Hours effectively subsidized	17.5	17.8	0.37
Amount of effective subsidies	311.7€	294.9€	0.03
Underconsumption of care plan volume	57.2%	61.2%	0.03
Individualized income	1,272€	1,339€	0.00
Copayment rate	21.9%	24.6%	0.00
Producer price	22.8€	21.8€	0.00
Hourly out-of-pocket price	5.0€	5.4€	0.01
Total out-of-pocket payments on subsidized hours	86.0€	94.2€	0.03
Age	84.4	84.0	0.19
Women	72.5%	74.7%	0.19
Disability level 1 (most severe)	1.5%	1.0 %	0.25
Disability level 2	12.2%	12.6%	0.78
Disability level 3	20.7%	19.1%	0.31
Disability level 4 (least severe)	65.6%	67.3%	0.36
	100%	-	
Living with a spouse	34.7%	33.3%	0.45
Living alone	64.7%	66.1%	0.45
Spouse in institution	0.6%	0.6%	0.96
	100%	-	-
Number of individuals	997	1,865	-
Number of households	965	1,820	-

NOTES: Baseline sample from October 2014. Descriptive statistics are computed on the subsample of APA beneficiaries living in single-producer municipalities in Column (1) and those living in multiple-producer municipalities in Column (2). Column (3) presents the p-values associated with the bilateral tests of comparison of the means.

Producer types in multiple-producer areas

Beneficiaries living in areas with several operating regulated producers can, in principle, choose their home care provider. It can be either public, for profit or non-profit. This aim of this Appendix is twofold. First, it documents both the "supply mix" available in the municipalities of the district and the profiles of consumer resorting to each of the three different types of regulated providers. Second, it highlights the correlation between APA recipients' characteristics and the fact of resorting to a "low-price" service.

Historically in France, non-profit organizations were important providers of home care and they remain predominant in many rural areas. In our district of interest, there are 5 non-profit services, providing care to exactly 50% of our baseline sample. In addition, several municipal services (20 in the district) are providing home care services to APA recipients. As displayed in Table A.4, within the sample of individuals who live in municipalities where only one regulated provider is found to operate, more than 3/4 of beneficiaries are served by a non-profit organization, while public services provide care to the remaining 23%. Finally, private structures can be found in the home care sector, but they still represent a small share of the regulated home care providers. In our district, there are only 3 for-profit services, which provide home care to 3.4% of our baseline sample. Private services happen to operate only in municipalities where at least a public service can be found.

Within beneficiaries living in a municipality with several regulated providers, the most frequent supply mix is a combination of all three types of regulated providers. This mix characterizes only 1/4 of the municipalities with several producers, reflecting the fact that the supply mix is more diversified in the largest municipalities. Conversely, the typical supply mix in medium-sized municipalities is the combination of non-profit and public providers.

Table A.4: Types of regulated producers in the municipality of residence

	Municipalities with one regulated producer		Municipalities with several regulated producers	
Types of producers operating in the municipality	*Share of municipalities*	*Share of beneficiaries*	*Share of municipalities*	*Share of beneficiaries*
Public only	27.5%	22.8%	3.3%	0.7%
For-profit only	0.0%	0.0%	0.0%	0.0%
Non-profit only	72.5%	77.2%	8.2%	1.9%
Public & for-profit only	-	-	0.0%	0.0%
Public & non-profit only	-	-	59.0%	41.8%
For-profit & non-profit only	-	-	4.9%	2.2%
Public, for-profit & non-profit	-	-	24.6%	53.4%
Total	100%	100%	100%	100%
Number	218	967	61	1,895

NOTES: Baseline sample from October 2014. In order to determine which types of regulated producers operate in a given municipality, the entire sample of APA beneficiaries being served by a regulated producer at least was used.

In order to see whether each type of regulated producer has a specific profile of customers, we regress the type of provider chosen by each APA recipient who lives in a municipality with several producers on her individual characteristics. Columns (1), (2) and (3) of Table A.5 (p. 51) present the average impact over the sample of each observable characteristic on the probability to be provided care by,

respectively, a public, a for-profit or a non-profit provider. Note that 4 individuals out of 10 in the sample used for the estimation can actually choose only between two different types of producers (and not 3) and that we do not control for any systematic difference in prices between the different types of regulated producers. The estimated coefficients should not be considered as the individual determinants of the choice of a given producer, but more largely as the distinctive characteristics of the subpopulation of customers of each producer type.

The estimates show that individuals with the most severe disability level and individuals receiving formal care on weekends (for a given disability level) are more likely to receive care from a non-profit producer and less likely to be served by a public provider. This can be explained by the fact that the operating hours and days of public services are more restricted than the intervention schedules of private structures. Belonging to the top income quartile income correlates positively (negatively) with the probability to choose a private (public) service. This might be explained by the fact that home care delivered by private structure is generally more expensive: on average, in October 2014, the price charged per hour is 20.9€ in public services, 21.3€ in for-profit structures and it reaches 22.2€ in non-profit structures. Individuals with the least severe disability level are less likely to be served by a non-profit structure and more likely to be provided care by a public service. This might reflect some orientation behaviour from the evaluation team, who may tend to recommend more often public structures for the least dependent APA recipients (who will be less likely to need interventions in the evening and during the weekend).

We also investigate the importance of the producer price level in the choice of a given home care provider. Column (4) of Table A.5 presents the individual characteristics associated with the choice of a "low-price" producer, defined as a provider charging a price strictly below the price charged on average by the producers operating in the municipality of residence of a given APA recipient. We estimate the probability of choosing a "low-price" producer by a Probit, on the sample of individuals who live in a municipality where at least two different prices are offered. Beyond a slight age effect, only the disability level is found to have a significant impact. The least severely disabled are more likely to choose a "low-price" producer, possibly reflecting that they perceive home care as less necessary and are thus *ex-ante* more sensitive to its price.

Table A.5: Determinants of producer type in multiple-producer areas (2012–2014)

	Probability of choosing a:			
	Public producer	For-profit producer	Non-profit producer	"Low-price" producer
		Multinomial logit		*Probit*
	(1)	(2)	(3)	(4)
Woman	0.023	-0.001	-0.022	-0.033
	(0.018)	(0.005)	(0.017)	(0.020)
Age: 60-69	-0.141***	0.078**	0.063*	-0.053
	(0.040)	(0.035)	(0.036)	(0.053)
Age: 70-79	-0.089***	0.018*	0.071***	-0.040*
	(0.019)	(0.010)	(0.020)	(0.021)
Age: 80-89	*Ref.*	*Ref.*	*Ref.*	*Ref.*
Age: 90 or older	-0.008	-0.008	0.017	-0.031
	(0.025)	(0.006)	(0.021)	(0.023)
Disability group: 1	-0.230**	0.051	0.179**	-0.120
	(0.091)	(0.063)	(0.075)	(0.096)
Disability group: 2	-0.004	-0.015*	0.018	-0.033
	(0.039)	(0.009)	(0.035)	(0.033)
Disability group: 3	*Ref.*	*Ref.*	*Ref.*	*Ref.*
Disability group: 4	0.065**	0.024	-0.089***	0.085***
	(0.023)	(0.018)	(0.022)	(0.021)
Living with no spouse	-0.010	-0.014	0.024	-0.006
	(0.025)	(0.009)	(0.026)	(0.025)
Spouse receives APA	-0.047	0.049	-0.001	0.009
	(0.059)	(0.033)	(0.057)	(0.051)
Spouse in institution	-0.033	0.053	-0.020	-0.105
	(0.095)	(0.043)	(0.095)	(0.108)
Living with non-APA spouse	*Ref.*	*Ref.*	*Ref.*	*Ref.*
Income quartile: 1	-0.049**	0.025	0.025	-0.011
	(0.024)	(0.022)	(0.036)	(0.025)
Income quartile: 2	*Ref.*	*Ref.*	*Ref.*	*Ref.*
Income quartile: 3	-0.061	0.037*	0.024	-0.009
	(0.039)	(0.022)	(0.030)	(0.026)
Income quartile: 4	-0.130**	0.090**	0.039	-0.004
	(0.042)	(0.038)	(0.026)	(0.029)
Care plan volume	0.001	0.002*	-0.003*	0.002
	(0.001)	(0.001)	(0.001)	(0.002)
Receives care on weekends	-0.113**	0.027	0.086*	-0.079
	(0.051)	(0.020)	(0.047)	(0.050)
Sample	Municipalities with at least 2 types of regulated producers			Multiple-price municipalities
Observations	5,516			5,699
Number of clusters	72			82

NOTES: Standard errors in parentheses; $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the municipality level. Average marginal or partial effects (AME – APE) are displayed. Columns (1) to (3) were obtained by estimating a multinomial logit on three mutually exclusive outcomes (choosing a public provider, a for-profit provider or a non-profit producer) on the sample of individuals who live in a community where several types of regulated providers are found to operate. In Column (4), "low-price" providers are charging a price below the average price of regulated producers within a given municipality; the estimation uses the sample of beneficiaries living in a municipality where at least two different prices are offered. Data pooled from October 2012, October 2013 and October 2014 (population-average model). Specifications include year fixed effects.

A.6 Robustness checks

Table A.6: Robustness check: Price elasticity estimation by disability level

	Dependent variable: hours consumed (log)		
	Disability groups 1 & 2	*Disability group 3*	*Disability group 4*
	(1)	(2)	(3)
Consumer price(log)	0.122	-0.701***	-0.998***
	(0.656)	(0.002)	(0.248)
Disposable income (log)	-0.092	0.683***	0.935***
	(0.653)	(0.003)	(0.247)
Woman	0.211***	0.119***	0.062***
	(0.074)	(0.016)	(0.024)
Age: 60-69	0.056	-0.073***	-0.179***
	(0.142)	(0.011)	(0.049)
Age: 70-79	0.006	0.052***	-0.108***
	(0.079)	(0.012)	(0.033)
Age: 80-89	*Ref.*	*Ref.*	*Ref.*
Age: 90 or older	0.016	0.015	0.153***
	(0.086)	(0.011)	(0.022)
Living with no spouse	0.633***	0.404***	0.245***
	(0.082)	(0.016)	(0.027)
Spouse receives APA	0.280**	0.092***	-0.080
	(0.138)	(0.013)	(0.049)
Spouse in institution	1.100**	0.471***	0.372**
	(0.519)	(0.013)	(0.174)
Living with non-APA spouse	*Ref.*	*Ref.*	*Ref.*
Constant	2.218	1.483***	5.966***
	(2.059)	(0.019)	(0.779)
Sigma	0.783***	0.729***	0.662***
	(0.044)	(0.003)	(0.014)
Observations	1,145	1,655	5,390
Censored observations	44.4%	39.5%	38.6%
Number of clusters	27	28	28

NOTES: Standard errors in parentheses; $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the producer price level. All specifications include as controls socio-demographic variables, dummies for the year the latest plan was decided upon as well as dummies the year in which the copayment rate was computed. Data pooled from October 2012, October 2013 and October 2014 (population-average model). Specifications include year fixed effects.

Table A.7: Robustness check: Cross-sectional estimations (2012–2014)

	Dependent variable: hours consumed (log)		
	2012	2013	2014
	(1)	(2)	(3)
Consumer price (log)	-0.977***	-0.726**	-0.709**
	(0.260)	(0.299)	(0.290)
Disposable income (log)	0.945***	0.687**	0.660**
	(0.263)	(0.296)	(0.291)
Woman	0.102***	0.129***	0.065**
	(0.030)	(0.031)	(0.026)
Age: 60-69	-0.125*	-0.029	-0.265***
	(0.066)	(0.052)	(0.079)
Age: 70-79	-0.048	-0.062**	-0.070**
	(0.044)	(0.030)	(0.032)
Age: 80-89	*Ref.*	*Ref.*	*Ref.*
Age: 90 or older	0.138***	0.128***	0.072**
	(0.032)	(0.032)	(0.032)
Disability group: 1	0.784***	0.360*	0.729***
	(0.202)	(0.206)	(0.128)
Disability group: 2	0.259***	0.377***	0.433***
	(0.039)	(0.061)	(0.045)
Disability group: 3	*Ref.*	*Ref.*	*Ref.*
Disability group: 4	-0.534***	-0.513***	-0.523***
	(0.039)	(0.040)	(0.023)
Living with no spouse	0.342***	0.336***	0.317***
	(0.035)	(0.034)	(0.032)
Spouse receives APA	-0.082	0.044	0.031
	(0.082)	(0.058)	(0.059)
Spouse in institution	0.404*	0.458	0.570***
	(0.209)	(0.302)	(0.127)
Living with non-APA spouse	*Ref.*	*Ref.*	*Ref.*
Constant	5.828***	4.689***	5.320***
	(0.793)	(0.879)	(0.890)
Sigma	0.692***	0.668***	0.725***
	(0.020)	(0.026)	(0.015)
Observations	2,571	2,757	2,862
Censored observations	40.4%	38.2%	40.2%
Number of clusters	28	28	27

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the producer level. All specifications include the year the latest plan was decided upon as well as the year in which the copayment rate was computed. Data from October 2012, October 2013 or October 2014.

Table A.8: Robustness check: Panel estimations (2012–2014)

	Dependent variable: hours consumed (log)		
	Pooled model	— Random-effects model —	
	Unbalanced sample	*Unbalanced sample*	*Balanced sample*
	(1)	(2)	(3)
Consumer price (log)	-0.795***	-0.699***	-0.760***
	(0.248)	(0.065)	(0.169)
Socio-demographic controls	Yes	Yes	Yes
Dummies for year of MTP	Yes	Yes	Yes
Dummies for latest plan	Yes	Yes	Yes
Observations	8,190	8,190	3,600
Censored observations	39.6%	39.6%	40.2%
Number of clusters	28	-	-

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are either clustered at the producer level in the pooled (PA) model (Column (1)), or bootstrapped (25 replications) in the random-effect (RE) model (Columns (2) and (3)). Data pooled from October 2012, October 2013 and October 2014. Specifications include year fixed effects. PA and RE models do not allow to control for individual heterogeneity, as identification relies on the assumption that the unobserved individual determinants of home care consumption, including time-invariant characteristics, are uncorrelated with control variables.

Table A.9: Robustness check: Inclusion of an indicator for single-producer areas (2012–2014)

	Dependent variable: hours consumed (log)	
	(1)	(2)
Consumer price (log)	-0.795***	-0.845***
	(0.248)	(0.317)
Only one producer price in the area		0.019
		(0.040)
Socio-demographic controls	Yes	Yes
Dummies for year of MTP	Yes	Yes
Dummies for latest plan	Yes	Yes
Observations	8,190	8,190
Censored observations	39.6%	39.6%
Number of clusters	28	28
AIC	14,900.852	14,901.900
BIC	15,090.140	15,098.199

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard-errors are clustered at the producer level. Data pooled from October 2012, 2013 and 2014 (population-average model). Specifications include year fixed effects.

Table A.10: Robustness check: Selection into a producer – cross-sectional estimations (2012–2014)

	Dependent variable: hours consumed (log)					
	—2012—		—2013—		—2014—	
	(1)	(2)	(3)	(4)	(5)	(6)
Consumer price (log)	-0.730*	-1.202***	-0.372***	-0.803**	-0.344	-1.054***
	(0.441)	(0.418)	(0.002)	(0.351)	(0.608)	(0.391)
p-value	*0.098*	*0.004*	*0.000*	*0.022*	*0.572*	*0.007*
Socio-demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for year of MTP	Yes	Yes	Yes	Yes	Yes	Yes
Dummies for latest plan	Yes	Yes	Yes	Yes	Yes	Yes
Sample (type of area)	Single–producer	Multiple–producer	Single–producer	Multiple–producer	Single–producer	Multiple–producer
Observations	738	1,833	756	2,001	997	1,865
Censored observations	39.7%	40.7%	38.6%	38.0%	42.8%	38.8%
Number of clusters	16	28	15	25	14	23

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are clustered at the producer price level. Data from October 2012, October 2013 or October 2014.

Table A.11: Robustness check: Selection into a producer – panel estimations (2012–2014)

	Dependent variable: hours consumed (log)			
	— PA model —		— RE model —	
	(1)	(2)	(3)	(4)
Consumer price (log)	-0.452***	-1.001***	-0.229	-0.910***
	(0.001)	(0.251)	(0.434)	(0.352)
Socio-demographic controls	Yes	Yes	Yes	Yes
Dummies for year of MTP	Yes	Yes	Yes	Yes
Dummies for latest plan	Yes	Yes	Yes	Yes
Sample (type of area)	Single–producer	Multiple–producer	Single–producer	Multiple–producer
Observations	2,491	5,699	2,491	5,699
Censored observations	40.6%	39.2%	40.6%	39.2%
Number of clusters	37	60	-	-

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors are either clustered at the producer level in the population-average model (columns (1) and (2)), or bootstrapped (25 replications) in the random-effects model (columns (3) and (4)). PA stands for population-average (or pooled) model and RE stands for random-effects model. Both PA and RE are estimated on the unbalanced panel subsamples. Data pooled from October 2012, 2013 and 2014. Specifications include year fixed effects.

Table A.12: Robustness check: Inclusion of home care received on weekends (2012–2014)

	Dependent variable: hours consumed during the week (log)		
	(1)	(2)	(3)
Consumer price (log)	-0.795***	-0.921***	-0.867***
	(0.248)	(0.253)	(0.260)
Consumes care on weekends		0.491***	0.076
		(0.056)	(0.107)
Number of hours received on weekends			0.119***
			(0.031)
Socio-demographic controls	Yes	Yes	Yes
Dummies for year of MTP	Yes	Yes	Yes
Dummies for latest plan	Yes	Yes	Yes
Observations	8,190	8,190	8,190
Censored observations	39.6%	39.6%	39.6%
Number of clusters	28	28	28
AIC	14,900.852	14,720.439	14,675.321
BIC	15,090.140	14,916.738	14,871.619

NOTES: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard-errors are clustered at the producer level. Data pooled from October 2012, 2013 and 2014 (population-average model). Specifications include year fixed effects.