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The non-take up of long-term care benefit in France: A pecuniary motive?

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ABSTRACT

With aging populations, European countries face difficult challenges. In 2002, France implemented a public allowance program (APA) offering financial support to the disabled elderly for their long-term care (LTC) needs. Although currently granted to 1.2 million people, it is suspected that some of those eligible do not claim it—presenting a non-take-up behavior. The granting of APA is a decentralized process, with 94 County Councils (CC) managing it, with wide room for local interpretation. This spatial heterogeneity in the implementation of the program creates the conditions for a "quasi-natural experiment", and provides the opportunity to study the demand for APA in relation to variations in CCs' "generosity" in terms of both eligibility and subsidy rate for LTC. We use a national health survey and administrative data in a multilevel model controlling for geographical, cultural and political differences between counties. The results show that claiming for APA is associated with the "generosity" of CCs: the population tends to apply less for the allowance if the subsidy rate is in average lower. This pecuniary trade-off, revealed by our study, can have strong implications for the well-being of the elderly and their relatives.

1. Introduction

Most developed countries have to cope with population aging [1] and face difficult challenges particularly with regard to healthcare, retirement systems and labour market supply [2]. The structure of long-term care (LTC) insurance systems differs between countries, depending on the national structure, history and culture, as well as on economic performance [3,4]. Treating and caring for the elderly entails both public and private costs that amount to billions of Euros per year. In France, the economic burden of LTC is particularly high, with an estimated public cost of about 21.6 billion Euros in 2009 (around 1% of the GDP) [5] and an equivalent amount for the indirect costs generated by informal care [6].

1.1. Public LTC policy in France

The LTC policy has been a long process since the 1980s in France, leading to a rather complex system [5]. The healthcare system covers medical and health costs but does not account for a large part of LTC expenditures, particularly

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non-medical home care which have to be paid out of pocket if the patient does not have a private insurance contract. Over the last decade, France has implemented various governmental policies to deal with this issue [5,7], since the demand for private LTC insurance is relatively small compared to the magnitude of the disability risk (only 3 million of French people hold a LTC insurance in 2008 for an adult population of 40 million [8,9]). The main public benefit is a cash-for-care allowance implemented in 2002 which currently covers 1.2 million beneficiaries, called 'Allocation Personnalisée d'Autonomie' or APA (Personalized Autonomy Allowance) [5,10]. This scheme is a national program but is implemented at the local level by public County Councils ('Conseils Généraux': political authorities managing the French territories called "départements", hereafter CC) [11]. The program is based on the principle of universality and is granted to people aged 60 and over living either at home or in institutions and needing help with daily activities. Disability is assessed using a scale distinguishing six disability classes (AGGIR grid). Only the first fours entitle individuals to receive the benefit, in the form of a subsidy for home care services [12]. The care package is determined by a team of professionals according to the needs of the recipients. The paid carers can either be professional workers or relatives (except spouses) [5].

In order to guarantee access to the same services across the country, each level of disability entitles recipients up to a maximum preordained allowance, which in 2014 was determined as follows: 1304.84 euro per month for the first disability class, 1118.43 euro for the second class, 838.82 euro for the third class and 559.22 euro for the fourth class [5]. Below a fixed income threshold (nationally set at 734.66 euro per month in January 2014), the recipient does not have to contribute to the care package (according to the principle of social solidarity); above this threshold, he/she pays part of the care-package according to his/her household income (the wealthiest families may have to copay up to 90%). Thus, every eligible person can receive the allowance, but their co-payment varies in line with their means.

1.2. Studies of non-take-up

It is suspected that part of the population eligible for the APA does not apply for it. The non-take-up behavior is observed for many social benefits and in many countries. It can be seen as a failure of the welfare state to provide those in need with the minimum necessary resources. The literature on the determinants of non-take-up of social benefits is usually consistent with standard economic theory of rational utility-maximizing individuals (e.g., [13,14]). Some studies stress the direct and indirect costs of applying for benefits, including both objective barriers and subjective motives [15]. Stigma and disutility associated with claiming a social benefit are suggested as possible explanations. Additionally, non-take-up may simply reflect a lack of awareness about the availability of the particular scheme, which has recently been observed for the APA [16], or an expectation that the cost of applying for the social program would exceed the amount of the benefit [17].

In France, non-take-up is a topical issue, especially in the social sector [18]. For example, in the healthcare field, a recent paper analysed the low take-up rate of a complementary health insurance program for the poorest populations [19]. In 2005, a monitoring agency analysing non-take-up of rights and services ('Observatoire des non-recours aux droits et services'—ODENORE) studied the APA from a qualitative point of view. The results highlighted that 9% of eligible elderly people did not claim it [20]. Many factors may explain this situation. First, the elderly may not be aware of the benefit or believe that the claiming procedure is too complex. Second, they may feel that taking up a social benefit is proof of disability (stigma). Third, they may have enough money to independently manage their home care. Fourth, they may refuse any intrusion into their administrative files or into their private life. Besides these factors, the non-take-up of the APA could be impacted by the level of the allowance itself (e.g. the subsidizing rate of the care package), as a result of a trade-off between the costs (queuing, stigma, etc.) and benefits.

1.3. Aim

This study aims at examining the factors associated with the propensity to apply for the APA. More precisely, it studies whether the take-up behavior could be influenced by the level of subsidy the individuals expect to obtain. Indeed, the local CCs who manage the APA may be more or less "generous" in its implementation: some spatial heterogeneity can be observed in terms of eligibility conditions and subsidized amounts. Part of these differences may be explained by disparities in the socio-demographic structure of the CCs (proportions of rural population, of poor elderly people, etc.). However, a study found that even after controlling for disability levels in the elderly population, the average subsidizing rate for the care package still varied from 70% to 90% across CCs [21]. This 20 points gap could be seen as "discretionary", probably reflecting factors such as political tendencies (left or right) and/or whether the median-voter is old or young. This heterogeneity will be therefore considered as a "quasi-natural experiment", which enables to examine APA take-up with respect to variations in the benefits provided.

2. Material and methods

To test whether CC generosity is correlated with individual take-up behavior, we matched survey micro-data with two types of data collected at the CC-level. The first-one contains information on the APA program itself, the second-one records variables that might impact APA demand and/or APA generosity—and will be used as controls.

2.1. Data and variables

2.1.1. Micro-data

In 2008, the French National Institute of Statistics (INSEE) and the Ministry of Health (Direction de la Recherche, de l'Evaluation, des Etudes et des Statistiques—DREES) performed a national representative survey on

disability and health (Handicap-Santé Ménages—HSM survey) [22]. Nearly 30,000 individuals living in the community were interviewed. Data were collected using a standardized questionnaire which covered medical information (diseases, impairments, functional limitations, restrictions of activity, healthcare use), socioeconomic characteristics (household composition, educational level, income) and a description of the environment (home layout and facilities, assistive devices). Types and levels of formal and informal care, provided by professionals and relatives, were also recorded.

We were interested in whether or not respondents had applied for APA at their local CC. The sample was restricted to individuals aged 60 and over, in line with APA eligibility criteria. This accounted for approximately one third of the original sample ($n = 8842$). In the survey, two questions were used to define the dependent variable (Appliance for APA; 1 = Yes). Interviewees were first asked whether they were currently receiving the allowance. In case they were not, they were asked "Did-you ever made (or did someone ever made on your behalf) a request to benefit from the APA?" The dependent variable was constructed using the latter question: we excluded those for whom information regarding APA application was not available ($n = 109$) and 620 respondents who were already receiving the allowance (they could have applied on possibly outdated conditions, e.g. levels of "generosity" fixed by the former local governments). The final sample comprised 8113 individuals living in 92 CCs.

The literature shows that many factors are associated with the demand for social benefits: economic resources, social or family support, health status, etc. [18,19]. The following variables were coded as categorical variables: age (60–69 (reference); 70–79; 80+), gender (MALE (ref.), FEMALE), equivalised monthly household income (<1500€ (ref.); 1500–3000€; >3000€; INCMISS), educational level (EDUC = 1 if the respondent completed secondary school or a higher degree), whether the respondent lives with spouse or partner (SINGLE (ref.), COUPLE), number of cohabiting sons (NOSON (ref.); NOCSON (no cohabiting son); 1 + CSON (at least one cohabiting son)) and daughters (NOD (ref.); NOCD; 1 + CD), level of disability using French AGGIR grid (GIR5–6 (low disability, ref.); GIR3–4; GIR1–2 (severe)), self-assessed health (SAH, coded as POORSAH (ref.), FAIRSAH; GOODSAH), and use of a proxy respondent (PROXY = 1). The latter variable allows including people with very poor health and controls for the resulting declaration bias [23].

2.1.2. CC-Level data

We assume that CC generosity encompasses two dimensions [11,21]. The first one, the "inclusion effect", regards eligibility to the allowance (an identical APA application might be granted in CC A but rejected in CC B); the second one, the "price effect", corresponds to the CC subsidizing rate of the care package. These two complementary indicators were computed on the basis of administrative data.

Every quarter, DREES collects data on APA from CCs which distribute the benefit [24]. The data records the total number of recipients, the distribution of recipients by disability level, as well as the total amount of the benefit granted by the CC, decomposed as the sum of the amount subsidized by the local authority and the amount financed by the beneficiaries themselves. In order to avoid seasonal effects and minimize missing data, three waves, collected between June 2008 and June 2009, were used. Out of the 94 CCs in mainland France, 72 provided data on amounts granted, while 91 produced their number of beneficiaries.

The "inclusion effect" q_j was measured by the proportion of people aged 60 and over receiving the APA from CC j:

$$q_j = \frac{(\text{number of APA recipients})_j}{(\text{number of people aged at least 60 years old})_j}$$

The second variable of interest, the "price effect" p_j, was defined as the mean subsidy rate of CC:

$$p_j = \frac{(\text{Per cipita subidized amount of APA})_j}{(\text{Per capita total amount of APA})_j} = \frac{S_j}{M_j}$$

Local authorities were classified into their respective quartile in the national distribution. For the "inclusion effect" the bounds of the intervals were 3.98%, 4.79% and 6%. Regarding the "price effect", the thresholds were 80.2%, 83.5% and 85.5%. The first quartiles were defined as the reference cases while CCs with missing values were combined into specific groups (QMISS ($m = 3$), PMISS ($m = 22$)).

Used directly, these measures may not only mirror CC generosity, because some geographical variations might be related to socio-demographic disparities across local authorities. Indeed, CC characteristics reflecting population health, wealth and living conditions have been found to pattern the rates of APA beneficiaries among people aged 75 and over [25]. The following contextual effects, collected in 2007, were coded as dummy variables indicating whether a CC is above (1) or below (0) the national median: the mortality rate (MORT, median = 9.8‰), the life expectancy of women at the age of 60 (LIFEEXP, median = 26.4 years; most APA beneficiaries are women [25]), the poverty rate among people older than 60 (POOR, median = 10.5%), the share of people aged 60+ in the population (SHAREOLD, median = 23.3%) and the proportion of the population living in urban areas (URBAN, median = 76.5%). In addition, we included two dummy variables indicating (1) the political positioning of the local authority at the time of survey (LEFT = 1 if the CC is run by left-wing parties) and (2) whether CCs have a higher/lower than average share of APA recipients with severe disability (SHAREGIR12). We also introduced a variable borrowed from a study of family anthropology in France [26]: CCs were characterized by their percentage of non-nuclear families in 1998 (PATRIARCHAL, dichotomized above/below the national median (8%)). This variable represents "early family structures", that may play a role in decisions to keep elderly people at home and (then) to ask for social assistance. Another advantage of this variable is that it cannot suffer from any endogeneity (it will thus be used as "instrument" in Section 3.3).

2.2. Econometric models

Let X_i be a $(1 \times K)$ vector denoting a set of K explanatory variables x_k, $k = 1(1, \ldots, K)$ associated to individual $i \in \{1, 2, \ldots, n\}$ (e.g. age, gender, etc.). A binary Logit model enables to investigate how changes in the elements of X_i affect π_i, the propensity to take-up APA:

$$\text{Logit}(\pi_i) = \log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta X_i \quad (1)$$

where, β_0 is the intercept and β is a $(K \times 1)$ vector of parameters. Since we focus on between-CC variations in π, we allow for clustering in a two-level hierarchical structure. We have 8113 individuals nested within 92 CCs. A random intercept extension of the binary Logit model (1) is:

$$\text{Logit}\left(\pi i_j\right) = \gamma_{00} + \beta X_{ij} + u_{0j} \quad (2)$$

where, γ_{00} is the grand mean across CCs and u_{0j} the CC-level random effect. For example, $u_{0j} > 0$ indicates that a person from CC_j has an above-average propensity to take-up the APA.

We conducted a Hausman specification test to assess whether the estimates of model (2) are more efficient than those of model (1). The test, together with the intra-class correlation (ICC) and the median odd-ratio (MOR), inform whether individual heterogeneity in π is patterned by geographical disparities. If (2) leads to more efficient estimates than (1), Z, a $(1 \times M)$ vector of CC-level fixed effects z_m (e.g., generosity, political positioning), can be introduced in the model to capture inter-CC heterogeneity in π, i.e. the variance of u_{0j}:

$$\text{Logit}\left(\pi_{ij}\right) = \gamma_{00} + \gamma_0 Z_j + \beta X_{ij} + u_{0j} \quad (3)$$

where, γ_0 is a $(M \times 1)$ vector of parameters to be estimated. In the analysis, the variables z_m will be introduced following a forward selection strategy based on Akaike Information Criterion (AIC). To compare the estimates obtained using different specifications, Average Partial Effects (APEs) were computed as ratios between Average Predicted Probabilities (APPs) instead of nominal differences.

3. Results

3.1. Descriptive statistics

The proportion of APA recipients q_j exhibits a large variation across the French territory: it is lower than 4% in North-Western France, Eastern France and the Paris Area but higher than 8% in the South West and in the North (Fig. 1). As shown by Fig. 2, the Paris region had the lowest subsidy rates, whereas CCs in the centre and in the south-west had highest rates. Welch's tests suggest that variations in p_j and q_j are patterned by contextual differences in terms of poverty, political positioning and population's health (Table A in appendix). For instance, the generosity variables were in average higher in CCs with a higher poverty rate, an older and/or a less healthy population, and a higher share of non-nuclear families. Rural CCs and councils governed by left-wing parties also tend to have higher values for p and q.

The upper panel of Table 1 tabulates the dependent variable against the CC-level variablesss. Chi-Square tests suggest that the propensity to take-up the scheme is positively correlated with both generosity variables and is higher in left-wing CCs and in the 50% CCs with greater poverty rates among their elderly population. As shown in the lower panel of Table 1 (individual characteristics), SAH, disability status and the age-group were highly correlated with take-up rates. Compared to people who did not apply

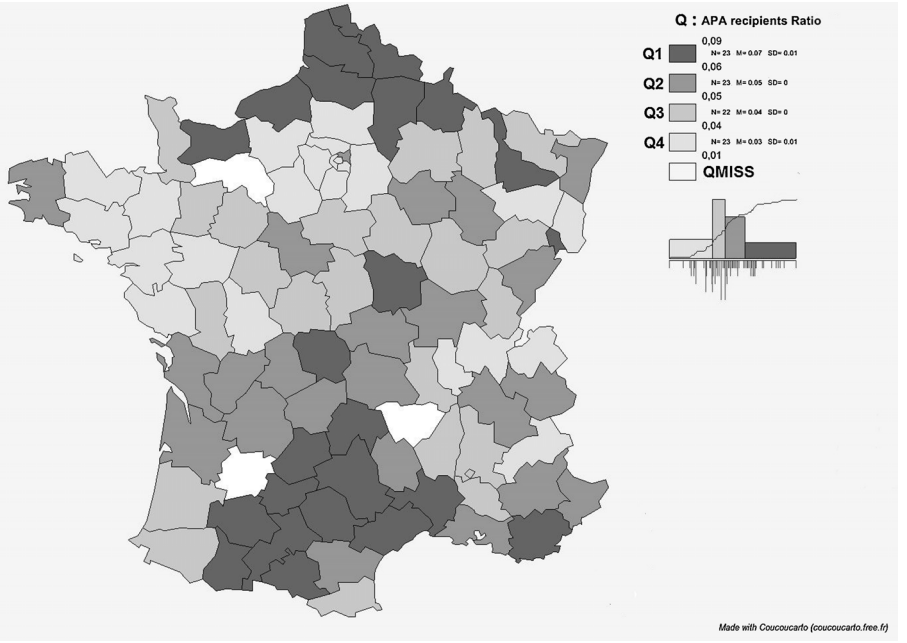

Fig. 1. Geographic variations in APA-recipient ratios.

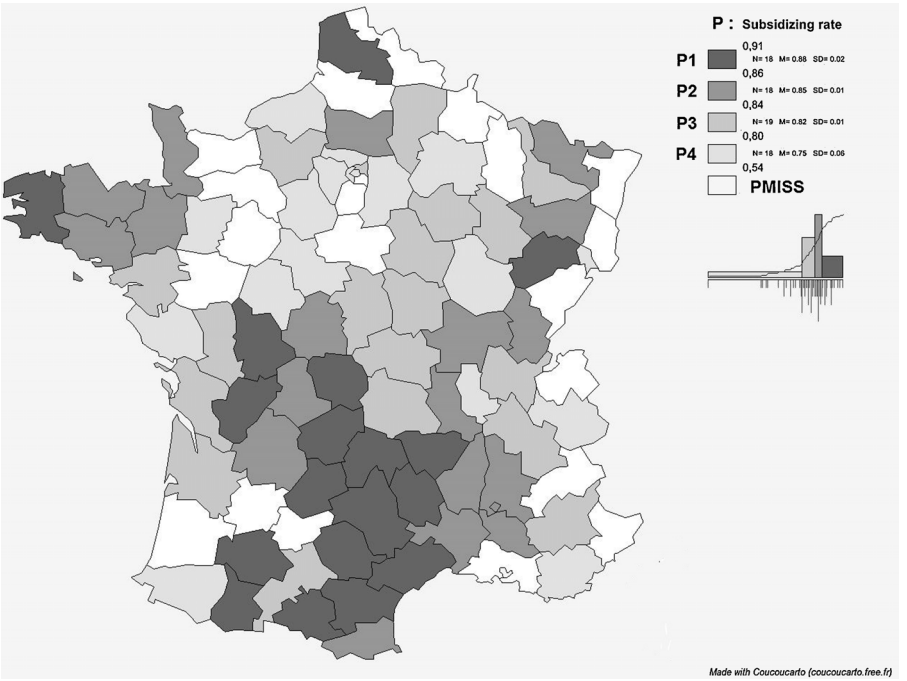

Fig. 2. Geographic variations in subsidy-rates.

for the benefit, those who did were poorer, less educated and more likely to live without partner.

3.2. Multivariate models

Tables 2 and 3 summarize results from the binary logit model (M1) and from random intercept models, with (M3–M7) or without (M2) CC-level fixed effects. Table 2 lists the APPs for all categories of the covariates, whereas Table 3 reports factor APEs for the non-omitted categories as well as the specifications' characteristics. In all regressions, the propensity to take-up the APA was stronger for women, older individuals (70–79 y.o. and 80+ vs. 60–69), those with moderate/severe limitations (GIR3–4 and GIR1–2 vs. GIR 5–6) as well as those using a proxy respondent (Table 3). On the other hand, richer and healthier individuals (>3000€ vs. <1500€; GOODSAH vs. BADSAH), those not reporting their income and interviewees living with their partner or their daughter had lower rates of APA appliance. These results come in line with findings from studies that examined the determinants of non-take-up [13–20] or aimed at characterizing the population of APA beneficiaries [25].

In M2, the Hausman test did not reject the null hypothesis (Table 3): adding a random component to the intercept equation captured some heterogeneity that was not related to individual characteristics. CC-level fixed effects can thus be introduced to model spatial variations in APA take-up. The selection procedure was carried out on two vectors of CC-covariates, ex/including the generosity variables. M3–M7 report the five best specifications, according to AIC values, out of 34 tested (details available upon request).

In M3, POOR and LEFT were introduced as CC-level fixed effects. The APE of LEFT = 1 (Table 3) suggest that if all respondents were living in left-wing CCs, they would be on average 1.2 times more prone to apply for APA (an APP of 7.65%) than if they were living in right-wing CCs (APP = 6.4%; Table 2). Besides, living in CCs with more deprived elders has a positive impact on the propensity to claim the benefit (8.21% vs. 6.33% for richer CCs, Table 2). Yet, some inter-CC residual variance remains unexplained (Table 3), but no variable from the reduced set of contextual effects enabled to capture it. For example, the effects of PARTIARCAL and LIFEEXP were not statistically significant once the model was adjusted on POOR and LEFT (the direction of the correlations remained unchanged compared to Table 1).

M4 and M5 included the four binary variables corresponding to p_j and q_j respectively. Tables 2 and 3 show that if the average predicted take-up propensity would be 5.52% if all CCs had the 25% lowest values for p_j, it would be significantly higher if CCs applied the 25% top subsidizing rates (10.05%, corresponding to a factor of 1.82). Yet, respondents leaving in other types of CCs (P2, P3, PMISS) did not have different take-up rates than the reference group. In M5, the APE corresponding to Q4 is greater than one and strongly significant: average take-up rate is 1.55 times larger than that of Q1. No statistical relationship was found for Q2, Q3 and QMISS.

M6 introduced both inclusion and price effects. It has the lowest AIC value, indicating the best fit from a statistical point of view (Table 3). The APEs associated with P3, P4 and Q4 were multiplicative and significant, although those of P4 and Q4 decreased compared to M4 and M5 (the generosity variables being indeed correlated). This result, which policy implications will be discussed in the concluding section of the paper, suggests that take-up behavior is subject to both price and inclusion effects. In addition,

Table 1
Descriptive Statistics.

Variable	Demand for APA		Sample sizes and % of the pop.	Nb. of CCs ($m = 92$)	χ^2 test
	No ($n = 7513$)	Yes ($n = 600$)			
Characteristics of the local authorities					
P1	2419 [95.5%]	115 [4.5%]	2534 [31%]	18 [20%]	65.4 ***
P2	922 [92.9%]	70 [7.1%]	992 [12%]	17 [18%]	
P3	831 [92.5%]	67 [7.5%]	898 [11%]	18 [20%]	
P4	1478 [88.9%]	185 [11.1%]	1663 [21%]	17 [18%]	
PMISS	1863 [92%]	163 [8.1%]	2026 [25%]	22 [24%]	
Q1	2613 [95.2%]	131 [4.8%]	2744 [34%]	23 [25%]	66.6 ***
Q2	1062 [93.7%]	71 [6.3%]	1133 [14%]	23 [25%]	
Q3	1228 [92.3%]	102 [7.7%]	1330 [16%]	21 [23%]	
Q4	2494 [89.6%]	289 [10.4%]	2783 [34%]	22 [24%]	
QMISS	116 [94.3%]	7 [5.7%]	123 [2%]	3 [3%]	
POOR = 0	4816 [94%]	309 [6%]	5125 [63%]	48 [52%]	37.9 ***
POOR = 1	2697 [90.3%]	291 [9.7%]	2988 [37%]	44 [48%]	
SHAREOLD = 0	5431 [92.8%]	419 [7.2%]	5850 [72%]	47 [51%]	1.7
SHAREOLD = 1	2082 [92%]	181 [8%]	2263 [28%]	45 [49%]	
MORT = 0	5716 [92.7%]	450 [7.3%]	6166 [76%]	51 [55%]	0.4
MORT = 1	1797 [92.3%]	150 [7.7%]	1947 [24%]	41 [45%]	
LIFEEXP = 0	3732 [91.6%]	341 [8.4%]	4073 [50%]	49 [53%]	11.4 ***
LIFEEXP = 0	3781 [93.6%]	259 [6.4%]	4040 [50%]	43 [47%]	
LEFT = 0	3738 [94.4%]	224 [5.7%]	3962 [49%]	46 [50%]	34.3 ***
LEFT = 1	3775 [90.9%]	376 [9.1%]	4151 [51%]	46 [50%]	
PATRIARCAL = 0	5451 [92.9%]	416 [7.1%]	5867 [72%]	49 [53%]	2.9 *
PATRIARCAL = 1	2062 [91.8%]	184 [8.2%]	2246 [28%]	43 [47%]	
URBAN = 0	1742 [91.7%]	157 [8.3%]	1899 [23%]	45 [49%]	2.8 *
URBAN = 1	5771 [92.9%]	443 [7.1%]	6214 [77%]	47 [51%]	
Individual characteristics					
MALE	3191 [94.6%]	183 [5.4%]	3374 [42%]		32.8 ***
FEMALE	4322 [91.2%]	417 [8.8%]	4739 [58%]		
60–69	2928 [97%]	91 [3%]	3019 [37%]		211.0 ***
70–79	2902 [92.5%]	234 [7.5%]	3136 [39%]		
80+	1683 [86%]	275 [14%]	1958 [24%]		
<1500€	2706 [89.5%]	318 [10.5%]	3024 [37%]		90.5 ***
1500–3000€	2835 [93.3%]	204 [6.7%]	3039 [37%]		
>3000€	1183 [97.5%]	31 [2.6%]	1214 [15%]		
INCMISS	789 [94.4%]	47 [5.6%]	836 [10%]		
EDUC = 0	2180 [89.7%]	250 [10.3%]	2430 [30%]		42.4 ***
EDUC = 1	5333 [93.8%]	350 [6.2%]	5683 [70%]		
SINGLE	2820 [89.2%]	341 [10.8%]	3161 [39%]		87 ***
COUPLE	4693 [94.8%]	259 [5.2%]	4952 [61%]		
NOSON	2431 [92.8%]	189 [7.2%]	2620 [32%]		1.6
NOCSON	4511 [92.7%]	357 [7.3%]	4868 [60%]		
1 + CSON	571 [91.4%]	54 [8.6%]	625 [8%]		
NOD	2399 [92.4%]	197 [7.6%]	2596 [32%]		1.8
NOCD	4688 [92.8%]	362 [7.2%]	5050 [62%]		
1 + CD	426 [91.2%]	41 [8.8%]	467 [6%]		
GIR5–6	6886 [95.6%]	314 [4.4%]	7200 [89%]		912.3 ***
GIR3–4	465 [72.8%]	174 [27.2%]	639 [8%]		
GIR1–2	162 [59.1%]	112 [40.9%]	274 [3%]		
POORSAH	2498 [86%]	408 [14%]	2906 [36%]		314.4 ***
FAIRSAH	2876 [94.9%]	156 [5.2%]	3032 [37%]		
GOODSAH	2139 [98.3%]	36 [1.7%]	2175 [27%]		
PROXY = 0	6557 [94.8%]	357 [5.2%]	6914 [85%]		340.3 ***
PROXY = 1	956 [79.7%]	243 [20.3%]	1199 [15%]		

The first two columns provide conditional frequencies and proportions.
The third column provides the distribution of the entire sample ($n = 8113$) according to each covariate.
Column 4 gives the distribution of CC characteristics.
Column 5 presents the test statistic and the associated p-value of Chi-Square tests of independence.
The first line of descriptive statistics can be interpreted as follows: out of the 2534 individuals living in the 18 CCs with the lowest subsidizing rate (31% of the sample; 19% of the 92 CCs), 115 (4.5%) applied to receive the APA. Chi-square tests suggest that the proportion of appliers is significantly associated with the quartiles of the price effect ($\chi^2 = 65.4$; P-value < 0.001).

* $P \leq 0.1$.
*** $P \leq 0.01$.

Table 2
Average predicted probabilities.

Variable	M1 (%)	M2 (%)	M3 (%)	M4 (%)	M5 (%)	M6 (%)	M7 (%)
Individual characteristics							
MALE	6.42	6.01	6.13	6.22	6.38	6.42	6.41
FEMALE	7.95	7.49	7.64	7.76	7.94	7.98	7.98
60–69	4.51	4.21	4.32	4.43	4.52	4.58	4.58
70–79	7.62	7.12	7.26	7.38	7.56	7.61	7.61
80+	9.49	8.99	9.14	9.22	9.49	9.48	9.49
<1500€	8.56	7.88	8	8.09	8.3	8.32	8.32
1500–3000€	7.57	7.22	7.35	7.45	7.66	7.68	7.69
>3000€	3.77	3.96	4.04	4.2	4.24	4.32	4.3
INCMISS	5.35	5.05	5.18	5.24	5.33	5.33	5.34
EDUC = 0	7.25	6.71	6.85	6.94	7.08	7.12	7.12
EDUC = 1	7.49	7.13	7.26	7.38	7.57	7.61	7.61
SINGLE	9.17	8.78	8.94	9.1	9.28	9.34	9.33
COUPLE	5.91	5.46	5.58	5.66	5.81	5.85	5.85
NOSON	6.85	6.52	6.64	6.78	6.89	6.95	6.93
NOCSON	7.66	7.18	7.34	7.43	7.63	7.67	7.68
1 + CSON	7.77	7.16	7.25	7.32	7.51	7.48	7.47
NOD	7.97	7.57	7.65	7.79	8.03	8.04	8.02
NOCD	7.31	6.89	7.05	7.15	7.29	7.34	7.35
1 + CD	5.73	5.03	5.19	5.23	5.39	5.41	5.44
BADSAH	10.24	9.66	9.77	9.93	10.17	10.2	10.19
FAIRSAH	5.78	5.39	5.53	5.59	5.74	5.77	5.78
GOODSAH	2.93	2.77	2.85	2.92	3.01	3.04	3.03
PROXY = 0	6.33	5.89	6.03	6.1	6.27	6.29	6.3
PROXY = 1	10.54	10.07	10.22	10.51	10.67	10.81	10.78
GIR5–6	4.9	4.56	4.67	4.77	4.9	4.95	4.95
GIR3–4	16.95	16.09	16.4	16.54	16.86	16.89	16.9
GIR1–2	22.72	21.25	21.46	21.58	21.94	21.92	21.93
Characteristics of the local authorities							
POOR = 0			6.33				6.95
POOR = 1			8.21				8
LEFT = 0			6.4				
LEFT = 1			7.65				
P1				5.52		5.88	6.15
P2				6.89		7.02	7.25
P3				7.04		8.31	8.16
P4				10.05		9.24	8.52
PMISS				6.8		7.09	7.31
Q1					6.03	6.74	6.86
Q2					5.7	5.62	5.66
Q3					6.93	7.04	6.68
Q4					9.36	8.76	8.85
QMISS					6.41	6.13	5.95

APPs are reported in percentages.
For a given category of a covariate, e.g. MALE, the APP is defined as the average probability that the 8113 respondents applied for APA, assuming they were all male and other characteristics remaining unchanged.

this specification enabled to capture all spatial variations in the dependent: the Hausman test does not reject the null anymore (Table 3). M7, which adjuncts POOR to M6, has a lower quality. The APEs associated with P3 and P4 decreased compared to M6, as there is a certain degree of correlation between p_j and POOR. Nevertheless, the APEs associated with P3, P4 and Q4 remained statistically significant, whereas that of POOR, although greater than one, was not: the generosity variables have better predictive power.

3.3. Robustness checks

Nine models based on M6 were estimated to assess the robustness of our results (Table 4). In T1, we discarded CCs with missing p_j or q_j. This sample was then used to correct analyses from a potential endogeneity bias (T2). In T3, we discarded observations from Paris region which is far wealthier and less generous than the national average. T4–T9 replicated the baseline analysis on different sub-populations (men vs. women, interviewees living with vs. without partner, low vs. moderate-severe disability level).

Our main results might indeed be subject to an endogeneity bias because (1) correlations between CC generosity and APA take-up could be the result of an "omitted variable" that impacts both variables, (2) generosity in some CC may be higher because families from these CCs are more prone to ask for social support (reverse causality). To correct for such potential bias, we implemented a two-stage residual inclusion (2SRI) model [27]. At the first stage, fractional Logit models were used to "instrument" q_j and q_j. Regression estimates, which were obtained by forward selection on the set of CC-level continuous controls, are provided for reference in Table B (appendix). These

Table 3
Average partial effects.

Variable	M1	M2	M3	M4	M5	M6	M7
Individual characteristics							
FEMALE	×1.24 ***	×1.25 ***	×1.25 ***	×1.25 ***	×1.24 ***	×1.24 ***	×1.24 ***
70–79	×1.69 ***	×1.69 ***	×1.68 ***	×1.67 ***	×1.67 ***	×1.66 ***	×1.66 ***
80+	×2.1 ***	×2.14 ***	×2.12 ***	×2.08 ***	×2.1 ***	×2.07 ***	×2.07 ***
1500–3000€	×0.88	×0.92	×0.92	×0.92	×0.92	×0.92	×0.92
>3000€	×0.44 ***	×0.5 ***	×0.51 ***	×0.52 ***	×0.51 ***	×0.52 ***	×0.52 ***
INCMISS	×0.63 ***	×0.64 ***	×0.65 ***	×0.65 ***	×0.64 ***	×0.64 ***	×0.64 ***
EDUC = 1	×1.03	×1.06	×1.06	×1.06	×1.07	×1.07	×1.07
COUPLE	×0.64 ***	×0.62 ***	×0.62 ***	×0.62 ***	×0.63 ***	×0.63 ***	×0.63 ***
NOCSON	×1.12	×1.1	×1.11	×1.1	×1.11	×1.1	×1.11
1 + CSON	×1.13	×1.1	×1.09	×1.08	×1.09	×1.08	×1.08
NOCD	×0.92	×0.91	×0.92	×0.92	×0.91	×0.91	×0.92
1 + CD	×0.72 **	×0.66 ***	×0.68 ***	×0.67 ***	×0.67 ***	×0.67 ***	×0.68 ***
FAIRSAH	×0.56 ***	×0.56 ***	×0.57 ***	×0.56 ***	×0.56 ***	×0.57 ***	×0.57 ***
GOODSAH	×0.29 ***	×0.29 ***	×0.29 ***	×0.29 ***	×0.3 ***	×0.3 ***	×0.3 ***
PROXY = 1	×1.67 ***	×1.71 ***	×1.69 ***	×1.72 ***	×1.7 ***	×1.72 ***	×1.71 ***
GIR3–4	×3.46 ***	×3.53 ***	×3.51 ***	×3.47 ***	×3.44 ***	×3.41 ***	×3.41 ***
GIR1–2	×4.64 ***	×4.66 ***	×4.6 ***	×4.52 ***	×4.48 ***	×4.43 ***	×4.43 ***
Characteristics of the local authorities							
Var(u_{0j})		0.1614	0.0956	0.0671	0.076	0.0214	0.0185
POOR = 1			×1.3 **				×1.15
LEFT = 1			×1.2 *				
P2				×1.25		×1.19	×1.18
P3				×1.28		×1.41 **	×1.33 *
P4				×1.82 ***		×1.57 ***	×1.39 *
PMISS				×1.23		×1.21	×1.19
Q2					×0.95	×0.83	×0.83
Q3					×1.15	×1.04	×0.97
Q4					×1.55 ***	×1.3 **	×1.29 **
QMISS					×1.06	×0.91	×0.87
Model characteristics							
AIC	3385.578	3359.086	3352.699	3352.836	3352.847	**3351.286**	3352.116
BIC	3511.600	**3492.109**	3499.725	3513.864	3513.875	3540.319	3548.15
Hausman		28.49 ***	7.23 ***	2.98 **	4.43 **	0.14	0.12
ICC		0.04676	0.02824	0.01999	0.02259	0.00647	0.00558
MOR		1.46696	1.34303	1.28027	1.30085	1.14984	1.13837
Sample size	$n = 8113$; $m = 92$						

APEs can be interpreted as factor deviations from the APP associated with the omitted category (reported in Table 2).
For example, in M1, the APP for FEMALE is 1.24 times that of MALE.
AIC $= 2k - 2\ln(L)$; where, k is the number of parameters, L the likelihood and n the sample size.
$\text{ICC} = \frac{\text{Var}(u_{0j})}{\text{Var}(u_{0j}) + \frac{\pi^2}{3}}$; $\text{MOR} = \exp\left(\sqrt{2 \times \text{Var}\left(u_{0j}\right)} \times 0.6745\right)$.
* $P \leq 0.10$.
** $P \leq 0.05$.
*** $P \leq 0.01$.

variables are valid instruments since they were not associated with APA appliance once generosity is controlled for (see M7 in Table 3). At the second stage, we included the quartiles of the generosity variables, as in M6, but also the residuals estimated in the first-stage equation. On a restricted sample of 6045 observations, T1 and T2 show significant effects for P3 and P4. Their magnitudes are increased once potential endogeneity is addressed, suggesting that the baseline's result was in fact conservative. Although living in the CCs with the 25% highest q_j was associated with a significant higher take-up propensity in M6, it does not have a significant effect in T1 and T2. The withdrawal of CCs with missing p_j (which had above-average q_j) is the most plausible explanation to this result. Besides, the 1st stage residual was not significant.

In all subsequent robustness checks (T3–T9), a significant effect of P4 was found: its APE ranged from a factor of 1.44 (T9—moderate/high disability population) to 1.67 (T7—respondents living with partner). These figures remain very close from that obtained for baseline (1.57). The take-up behavior of subgroups with lower needs for help with daily activities (those living with partner or with a low disability status) was more strongly influenced by variations in p_j than other subgroups which, besides, have higher take-up rates (single and disabled persons). Contrasted results were obtained regarding the inclusion effect. The APE of Q4 is around 1.45 among males, single persons as well as those with a low level of disability. In T5, T7 and T9, it was not significant although greater than one. This explains why the effect of Q4 in weaker in baseline than in T4, T6 and T8.

4. Discussion

This study is intended as a first step in the investigation of user behaviors in the field of the demand for APA, a French social LTC subvention scheme which has been shown to provide to the elderly an improved support for

Table 4
Robustness checks.

Variables	Baseline M6	T1 ≠ Missing	T2 2SRI	T3 ≠ Paris	T4 Men	T5 Women	T6 Single	T7 Couple	T8 GIR 5–6	T9 GIR 1–4
Individual covariates	×	×	×	×	×	×				
P1	5.88%	5.56%	5.34%	6.31%	4.17%	6.94%	8.46%	4.03%	3.2%	26.42%
P2	7.02% [×1.19]	7% [×1.26]	6.96% [×1.3]	7.32% [×1.16]	6.78% [×1.62 *]	7.26% [×1.05]	8.79% [×1.04]	6.06% [×1.5]	3.71% [×1.16]	32.96% [×1.25]
P3	8.31% [×1.41 **]	7.65% [×1.37 *]	7.88% [×1.48 *]	8.65% [×1.37 **]	5.08% [×1.22]	10.73% [×1.55 **]	13.08% [×1.55 **]	5.5% [×1.36]	4.74% [×1.48]	35.22% [×1.33]
P4	9.24% [×1.57 ***]	9.18% [×1.65 ***]	9.57% [×1.79 ***]	9.47% [×1.5 ***]	6.49% [×1.56 *]	10.91% [×1.57 ***]	13.22% [×1.56 **]	6.75% [×1.67 **]	5.33% [×1.66 **]	38% [×1.44 *]
PMISS	7.09% [×1.21]			7.49% [×1.19]	5.2% [×1.25]	8.69% [×1.25]	10.89% [×1.29]	4.77% [×1.18]	4.73% [×1.47 **]	27.91% [×1.06]
Q1	6.74%	6.88%	6.96%	7.27%	4.67%	8.15%	9.24%	5.23%	3.81%	30.63%
Q2	5.62% [×0.83]	5.95% [×0.87]	6.09% [×0.88]	5.91% [×0.81]	5.05% [×1.08]	6.08% [×0.75 *]	7.48% [×0.81]	4.3% [×0.82]	2.79% [×0.73]	27.58% [×0.9]
Q3	7.04% [×1.04]	6.46% [×0.94]	6.56% [×0.94]	7.46% [×1.03]	4.35% [×0.93]	8.79% [×1.08]	10.67% [×1.15]	4.59% [×0.88]	3.77% [×0.99]	33.87% [×1.11]
Q4	8.76% [×1.3 **]	8.5% [×1.24]	8.36% [×1.2]	9.19% [×1.26 **]	6.76% [×1.45 *]	10.24% [×1.26]	13.14% [×1.42 **]	6.1% [×1.17]	5.62% [×1.47 **]	32.55% [×1.06]
QMISS	6.13% [×0.91]			6.52% [×0.9]	1.49% [×0.32 *]	10.86% [×1.33]	12.64% [×1.37]	1.71% [×0.33 *]	4.02% [×1.06]	21.61% [×0.71]
1st Stage residuals			×							
Sample sizes	8113	6045	6045	7213	3374	4739	3161	4952	7200	913

Models were adjusted for individual covariates (estimates not reported).
APPs are reported for all categories, including the omitted one.
Factor APEs and their associated *P*-values are reported in brackets.

* $P \leq 0.10$.

** $P \leq 0.05$.

*** $P \leq 0.01$.

their daily activities [28] and to lower the use of emergency care [29]. In France, local authorities benefit from a certain degree of autonomy for granting the benefit. This gave us the opportunity to examine, through the use of hierarchical models, the influence of contextual effects – such as the generosity of the local authorities – beyond individual determinants. Ideally, applications to the program should only be motivated by the needs for care of families, NOT by their expectations about the generosity of the program. Our key result is that individual take-up behavior is indeed linked to the generosity of the scheme (mainly in terms of subsidizing rate). This confirms results from the literature analysing the take-up of other types of social programs, wherein pecuniary trade-offs have been clearly documented [17].

A first set of results obtained at the individual level helped to understand some mechanisms that underlie family decisions on the care and the daily support provided to community-living people aged 60 and over. Old age, poor health and level of disability were associated with higher take-up rates, whereas the better-off and those living with a partner or with daughter(s) – not with son(s) – were less prone to ask for social assistance. These findings have already been established by other studies (e.g., [25]). The fact that contextual poverty and political positioning of the local government also play a role is original in the literature, but rather understandable; this could be linked to the spread of information about available social benefits and/or to cultural differences in the conception of the public intervention by the population. Yet, these determinants captured spatial variations in APA appliance to a lesser extent than the generosity variables, tending to prove that pecuniary motives are more crucial determinants of the take-up of social benefits. The decision to apply for APA could also be influenced by other elements, such as the complexity of the paper work, the reluctance to disclose information about the person's health status, or about the family wealth assets. From our results, we learn that all these obstacles tend to lower when the granting authority is financially more generous.

It may also be noted that some other results from our study confirm this financial deliberation: the level of household income, for example, reduces the APA take-up. Yet, it is difficult to assess if this is the result of the same price-sensitivity phenomenon, or if the richest households simply tend to substitute public coverage by private insurance schemes (the information about private LTC insurance was not available in the dataset). The results of this study clearly need to be confirmed by complementary work. First, the generosity variables are collected by DREES from CCs' administrative records. Therefore, they might (1) depend on the quality of the data provided, (2) mask larger variations that are only known by the CCs, (3) reflect other elements of heterogeneity at the CC-levels which we could not check for (e.g. communication campaigns about APA). Secondly, the declarative nature of the data for APA demand certainly introduces statistical noise (memory bias). However, since this noise certainly cannot help us to explain the correlation found (on the contrary, it would probably make such a correlation more difficult to obtain), there is no reason to think that the nature of the dependent variable was at the origin of our findings and (may) weaken the strength of our conclusions.

Highlighting such pecuniary trade-offs in the take-up of APA is particularly interesting in the context of the currently debated national reform of LTC policies, which considers a reduction of APA benefits and/or a move towards private insurance schemes. This study suggests that a restriction of the APA attribution conditions – for example, a cut in the subsidizing rates of the care package – would be followed not only by expected financial effects (e.g. money flows modified by the very principle of the reform), but also by "real" behavioral effects: one could expect a crude reduction in the utilization of formal care by community-living elderly people. Our fear is that this reduction may in turn deteriorate the wellbeing of disabled persons [28] and increase their demand for more costly health care [29].

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.healthpol.2015.07.003.

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