

WHERE DID CIVIL SERVANTS GO? A STUDY ON THE SINGULARITIES OF MULTI-STATE  
POOLING

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## **ABSTRACT**

In Portugal, Civil Servants may have a differential utilization of health services due to their supplementary Health Subsystem (ADSE), which grants them access to health services in the private sector at lower price. Following the recent increase in co-payments for Public services in the country, we exploit the impact of this double coverage on the demand for Portuguese Public Emergency Departments (ED).

Using panel data from 3 different EDs, one for each level of care in the Portuguese ED network, we rely on a difference-in-differences (DD) strategy, under the assumption that both civil servants and NHS users were targeted by the public co-payment increase, but just the former have the private alternative granted by their double coverage.

Our findings provide evidence for a transfer of civil servants' demand to their network's private providers following the increase in co-payment. This was due to a very sizeable decrease in public emergency department demand among ADSE beneficiaries, after adjustments for the general population behavior have been made, which was highest for low-severity conditions, but almost inexistent for high-severity resource-intensive conditions. Furthermore, this shift in civil servants' demand was no longer significant when we considered situations where accessibility to private providers is lower (e.g. night hours, weekend, mental health visits, elder patients), which strengthens our assumption of the difference between civil servants and NHS users during the period of the co-payment increase.

The implications of our findings are twofold: firstly, they suggest that the existence of a trustworthy alternative, as ADSE beneficiaries have, is a crucial factor for steering demand away from overcrowded public Emergency Departments, which is the explicit goal of increasing ED co-payments; secondly, they cast serious concerns over the financing of public EDs, which are still funded by severity-independent flat-fee, and over the equity of the Portuguese Health System, since civil servants increasingly opt out from public health services but must co-fund both the ADSE and the NHS.

**KEYWORDS:** Health Subsystem; Co-payments; National Health Service; Double Coverage.

**JEL CLASSIFICATION:** I10, I13, I18, I14

## 1. INTRODUCTION

In several countries with universal National Health Service (NHS) funded by taxation, some public or private subsystems, mutual funds or insurance schemes financed by a mix of employers and employees' contributions subsist. In the vast majority of these countries, opting out from the NHS is not possible and, therefore, these health subsystems represent a secondary layer of coverage, on top of the NHS, which usually grants access to a variety of services in the private sector.

There is nowadays a vast plethora of research that underlines a positive association between additional insurance coverage and healthcare utilization[1-6]. In Portugal, the double coverage that beneficiaries of the Civil Servants' Health Subsystem (*Direcção Geral de Protecção Social aos Funcionários e Agentes da Administração Pública* – ADSE) are entitled to indicates a situation which may act as a catalyst for a differential utilization of healthcare by these citizens, in comparison with the general population, only covered by the NHS. Barros and colleagues [7] found that the impact of this double coverage is positive and large for several health services: in their estimates, ADSE (double) coverage effect accounted for 6% of the average number of visits, 15.8% of the average number of blood and urine tests and 7% of the average probability of visiting a dentist at least once in 12 months. Lourenço [8] also found that NHS patients are less likely to have a doctor's visit, regardless of the public or private nature of the doctor's institution or of his speciality (family doctors or medical specialists), albeit the impact of ADSE coverage was higher for other medical specialities' visits than for family doctors' visits.

Equity concerns over the financing and utilization of the Health System arise in two scenarios: whenever Government Budgets (taxes from all the population) are used to guarantee the sustainability of these subpopulation insurance schemes, as regularly happened in Portugal, Greece[9] and Spain[10]; or, conversely, whenever these subsystems are self-sustainable but double insured users contribute to both systems and *de facto* only make use of one. In Portugal, the sustainability of the ADSE subsystem has been in the forefront of the political agenda and media cover in the last few years: from a employees' contribution of 1,5% of income in 2007, the rate has increased to 3,5% in 2014, and in this sense, Government Budget transfers to the ADSE ceased in 2012 and the system became self-sustainable for the first time.

Our paper tests whether a policy that targeted the entire population had any differential effect in the subpopulation of double insured civil servants. In November 2011, the Portuguese Government ordered an increase in the NHS co-payments (*“taxas moderadoras”*) for several health services, namely the Public Emergency Departments (ED) and changed the eligibility criteria for co-payment exemption, both changes taking effect on January 1<sup>st</sup> 2012[11].

The landmark RAND HIE showed that, in health services which are price-elastic, patients reduce their demand when faced with higher levels of cost-sharing.[12] Considering ED demand, the RAND HIE also showed that this reduction on demand was higher for low-severity than for high-severity ED conditions.[13]

Although policies of increasing cost-sharing for accessing health services are common, to our knowledge, any differential effects of these policies in the utilization of Health Services between NHS patients and double covered patients are unknown.

In this sense, our study aims to measure the effect of double coverage on the demand for Public EDs, following an increase in co-payments.

Our hypothesis is that the increase in ED's co-payments induced a larger reduction on demand for ADSE beneficiaries than for NHS patients. To the extent that increased cost-sharing (price) may moderate demand for NHS EDs, the possibility that ADSE beneficiaries have of resorting to a low-price private alternative within their plan's network lowers their reservation price and enhances such moderation effect following the co-payments' increase.

The rest of the paper is organized as follows. In section 2 we explain the methodology we used. Section 3 presents the main results of our econometric model, while section 4 is dedicated to the discussion of these main findings and of the limitations of our study. Section 5 concludes.

## 1.1. CONTEXT

Portuguese have the right to health protection through a National Health Service (NHS), which should be general, universal and tend to be free of charge, according to patients' social and economic status. The non-gratuity of the System translates into the existence of co-payments ("taxas moderadoras") that some patients – those who are not exempt due to their social and economic situation – have to pay when accessing the NHS services. In 2012, these co-payments had a very sizeable increase: for instance, before 2012, patients accessing public Emergency Departments (ED) had to pay 8,60 or 9,60 €, according to the level of the ED1, and after 2012 have to pay 15, 17,5 or 20€ for accessing these services. Furthermore, co-payment exemption criteria changed, which resulted on a decrease of the number of patients who had to pay the fee.

One other feature of the Portuguese Health System which is important for our work is the existence of health subsystems, alongside the NHS. These are health insurance schemes that were established before the NHS and that now represent a second layer of health protection for some citizens. Usually these give easy access to a wide range of private providers at a lower price. Naturally, regarding the NHS, these citizens are subject to the same conditions as any NHS patient: they have to pay the services' co-payments (as long as they are not eligible for exemption) and they have waiting times for outpatient consultation or surgery.

The focus of our work is on the Civil Servants' health subsystem (ADSE), the largest subsystem in Portugal, covering a population of 1,3 million citizens (more than 10% of the population).

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<sup>1</sup> The Portuguese Emergency Network comprises three levels of care: the Polyvalent, the Medical-Surgical and the Basic ESs, which differ in terms of the complexity of the cases they receive, the resources they have (e.g. human resources, lab and imaging exams), the price the Government pays the hospitals for each ES visit and the level of co-payment required to each patient.

ADSE is funded both by employer (State) and employees' contributions, with additional transfers from the State budget, but increases in the level of civil servants' contributions have recently been made (see above). ADSE beneficiaries may access private services by two ways: first, there is a list of private providers with whom ADSE has agreements and where access is almost free (they only have to pay small co-payments); second, they may access other providers that are not in the list, pay the service fee and submit it for reimbursement.

## 2. METHODOLOGY

Our study used administrative electronic data obtained from three Portuguese hospital EDs in the North of Portugal: a Polyvalent, a Medical-Surgical and a Basic ED representing therefore all the levels within the Portuguese ED network.

We compared ED demand made, respectively, by ADSE beneficiaries and NHS patients in the three EDs we selected. Data concerns the demand made for a period of 6 months before the co-payments' change (January to June, 2011) and an equal period after the changes (January to June, 2012). Moreover, since our aim was to measure the effect of the co-payment's increase, we selected only patients that ought to pay the co-payment – patients who were not exempt.

For estimating this effect, we resorted on a *difference-in-differences* approach.

Consider the following general model, without covariates for the moment:

$$Y = \beta_0 + \beta_1 T + \beta_2 SUB + \beta_3 T * SUB , \tag{1}$$

where Y is our measure of the ED demand (see below); T is a dummy variable which equals 1 if the ED visit was made in 2012 and 0 if it was in 2011 and captures any aggregate factors that caused changes in ED demand over time; SUB is a dummy variable which equals 1 if the ED visit was made by a double insured ADSE beneficiary and 0 if the visit was made by a NHS user and captures the differences in ED demand between these populations before the payment increase. The DD estimator,  $\beta_3$ , gives the differences in ED demand between ADSE and NHS patients after the policy that increased co-payments.

As in any study that adopts the DD methodology, its main assumption is that any differential variation (2011-2012) of utilization of Public EDs by NHS patients and ADSE beneficiaries which is not related to “the double coverage effect” should be captured by the demand of NHS patients, who don't have an alternative. Therefore, using the variation of NHS patients demand as our control measure, any difference in variation on the ED demand between ADSE beneficiaries and NHS patients, during the period of the increase in co-payments, should reflect the effect of the existence of a (low price) private alternative within the ADSE's network – “the double coverage effect” – which could lead to a shift to/from the private sector. Differences in utilization of Healthcare services between NHS and ADSE patients are well documented [7, 8, 14] and even a fairly different average income level is argued to exist between the two

groups. Such factors should not bias our results since we studied the demand between 2011 and 2012 and those different utilization patterns already existed in 2011.

The main difficulty of using this DD methodology and measuring this effect results from the change in the co-payment exemption criteria: if the number of non-exempt patients has not decreased by the same amount in both ADSE and NHS groups, simply comparing these groups' demand rates before and after the co-payment increase would be pointless. Considering that the main change in the exemption criteria was a decrease in the households' wage cut-off for financial exemption, a fairly different average income level that exists between civil servants and private employees indicates that utilization comparison is inappropriate.

We deal with this methodological issue with our model's design: we develop a logistic regression model for comparing the probability of (ADSE and NHS) patients visiting the ED with a low-severity condition instead of a high-severity condition. In this sense, we classified ED demand using the Manchester Triage's color on the admission - "green" and "blue" visits were considered low-severity visits and "orange" and "red" were considered high-severity visits<sup>2</sup> - and we argue that only low-severity visits are price sensitive. i.e., health conditions in which demand is expected to reduce due to a co-payment's increase, in the spirit of Duarte[15], who found that acute conditions, such as appendicitis or cholecystitis - the typical situations that drive patients into the ED with high-severity conditions - are virtually price-inelastic.

Note that with this design we bypass the need for adjustments on the co-payment non-exempt populations of ADSE and NHS patients due to the change of exemption criteria since we argue that high-severity demand in the *logit* model is not price sensitive and therefore necessarily incorporates changes that are not price-related (the change in NHS and ADSE non-exempt subpopulations, but also any epidemiological or health-system related change).

Considering this, let us rewrite our eq.(1):

Let  $Y$  be a binary variable such that,

$$Y = \begin{cases} 1, & \text{if Low - Severity Visit} \\ 0, & \text{if High - Severity Visit} \end{cases}$$

and

$$\pi' = \mathcal{L}n\left(\frac{\pi}{1-\pi}\right) = \mathcal{L}n\left(\frac{Prob_{Low-Severity Visits}}{Prob_{High-Severity Visits}}\right) = \beta_0 + \beta_1 T + \beta_2 SUB + \beta_3 T * SUB + \beta X, \quad (2)$$

Vector  $X$  includes demographic characteristics' variables - sex and age at admission (in years) and distance from patients' municipality centre to the ES (in Kilometres) - and health care demand related variables - month of visit, date of admission (week vs weekend) and time of admission (night vs day),

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<sup>2</sup> We excluded the Manchester Triage's "yellow" and "white" group visits, since they are more difficult to classify according to their price-elasticity, i.e., they may vary between a "more price-sensitive" and "less price-sensitive" visits. In order to discard selection bias, we did, however, include "yellow" ("urgent") visits in our high-severity group and "white" visits in our study group, and the overall findings we report did not change (data available on request).

type of visit (psychiatric, ophthalmologic or others), patient provenience (No referral, Primary Healthcare Network referral, public hospitals transference or private hospitals transference) and a categorical variable “ED Level” (coded as two dummy variables representing the 3 levels of care in Portuguese EDs).

STATA Ver.12<sup>®</sup> was used to build the multivariate model.

### 3. RESULTS

#### 3.1 THE SAMPLE

Throughout the period of our analysis, we identified a set of 86 860 ADSE and NHS beneficiaries’ visits in the selected EDs, from patients who had to pay the copayment. From this set we selected and analysed a sub-set of 39 477 visits, corresponding to high and low-severity visits.

#### 3.2 DEMOGRAPHIC CHARACTERISTICS

We compared patient demographics in each year between the two groups we analysed – NHS and ADSE beneficiaries according to High and Low severity, with *t* tests or chi-square tests, as appropriate (Table 1).

In both years, ADSE beneficiaries were more frequently women, older and living farther to the ED for low-severity visits and closer for high-severity visits than NHS patients.

DEMOGRAPHIC INFORMATION	2011		2012	
	NHS	ADSE	NHS	ADSE
<b>HIGH-SEVERITY VISITS</b>				
% WOMEN	45,09%	58,51 % <sup>¥</sup>	45,69%	64,82% <sup>¥</sup>
AVERAGE AGE	48,6	58,6*	50,5	59,5*
AVERAGE DISTANCE	11,9 KM	11,6 KM*	12,6KM	10,4 KM*
<b>LOW-SEVERITY VISITS</b>				
% WOMEN	47,63%	64,6 % <sup>¥</sup>	49,05%	64,39% <sup>¥</sup>
AVERAGE AGE	39,55	49,01*	42,4	52,01*
AVERAGE DISTANCE	14,36 KM	15,8 KM*	14,78 KM	17,38 KM*

\*, ¥ P<.001 between ADSE and NHS patients (*t* and *chi-square* tests)

**Table 1-** Patients’ Demographic Information

#### 3.3 MAIN RESULTS

Table 2 shows the number of ED visits, stratified by insurer (NHS and ADSE) and visit’s severity, for each of the periods we analysed, and the variations that occurred between 2011 and 2012. From 2011 to 2012, overall ED visits decreased by 10,56%, with considerably higher decreases in ADSE beneficiaries’

visits (23,10%). NHS patients' demand also decreased in every severity category, between the 2 years, with an overall decrease of 9,65%.

<b>ACCESSIBILITY INFORMATION</b>				
<b>NUMBER OF VISITS (NHS + ADSE)</b>	<b>2011</b>		<b>2012</b>	
	20 839		18 638	
<b>YEAR-on-YEAR</b>			-10,56%	
	<b>NHS</b>		<b>ADSE</b>	
	<b>2011</b>	<b>2012</b>	<b>2011</b>	<b>2012</b>
<b>NUMBER OF VISITS</b>	19 432	17 556	1407	1082
<b>YEAR-on-YEAR</b>			-23,10%	
<b><u>HIGH-SEVERITY VISITS</u></b>	4451	3749	376	307
<b>YEAR-on-YEAR</b>			-18,35%	
<b><u>LOW-SEVERITY VISITS</u></b>	14981	13807	1031	775
<b>YEAR-on-YEAR</b>			-24,83%	

**Table 2 - Accessibility Information**

We also show the monthly variation – between 2011 and 2012 – of the number of visits to the ED for each health subsystem, and by visit's severity (Table 3).

We observe that the difference in demand between ADSE and NHS users is considerably higher for low-severity visits than for high-severity visits. Indeed, a mean comparison *t*-test indicates that the unconditional mean differs between the 2 groups (NHS and ADSE) for low-severity demand, but does not differ for high-severity demand.

<b>UNIVARIATE ANALYSIS</b>	<b>MINIMUM</b>		<b>MAXIMUM</b>		<b>AVERAGE</b>		<b><i>t</i>-test</b>
	<b><u>ADSE</u></b>	<b><u>NHS</u></b>	<b><u>ADSE</u></b>	<b><u>NHS</u></b>	<b><u>ADSE</u></b>	<b><u>NHS</u></b>	
<b>HIGH-SEVERITY VISITS</b>	-36,92%	-37,18%	-4,84%	3,65%	-18,11%	-15,49%	p=0,7
<b>LOW-SEVERITY VISITS</b>	-40,31%	-26,35%	-3,76%	10,36%	-23,78%	-6,87%	p<0,01

**Table 3 - Univariate analysis of the studied groups; The *p*-value results of a two-sample mean-comparison test and indicates if the probability of the mean of each variable does not significantly differ between the two groups. Thus, in four categories, for the comparison it was considered**

A summary of our *difference-in-difference* model estimates is presented in Table 4 (the full results are reported in annex 1). The results of interest ( $\beta_1$  &  $\beta_3$ ) are presented in rows (2 & 4). The second row ( $\beta_1$ ) represents the aggregate factors that caused changes in ED demand over time in the absence of the co-payment's increase policy, while the third row ( $\beta_2$ ) represents possible differences in ED demand between NHS and ADSE patients prior to the policy. Finally, the fourth row presents the DD estimate ( $\beta_3$ ), an estimate of the effect of having double health coverage, following a policy of increased co-



payments for ED. For easiness of interpretation, we present results both in the probability and in the odds metric. Note that the OR gives multiplicative effects relative to the baseline odds in each category of the variable, while the marginal effects present the effect in an additive scale.

MODEL	Coefficient (SE)	OR (95% CI)
$\beta_1$	0.028 (0.004) ***	0.194 (0.141 – 0.245) ***
$\beta_2$	- 0.013 (0.008)	0.016 (-0.114 – 0.147)
$\beta_3$	-0.031 (0.018)*	-0.199 (-0.394 – -0.005) **
N		39 389
Pseudo R <sup>2</sup>		0.0809

Notes: Table 4 presents the results of the *logit* regression. Column 2 presents the marginal effects (AME): these give an approximation of how much ED demand is expected to increase or decrease for a unit change in an independent variable. Robust standard errors are shown in parentheses. Background controls include an indicator for the patient's gender, one continuous variables for patients' age and age squared, one indicator variable for patient's provenience, one indicator variable for type of visit (general vs. psychiatric vs. ophthalmologic), five dummies for the month, one indicator variable for the visit's time of the day (night vs. day), one indicator variable for the visit's day of the week (weekday vs. weekend), two dummies for the three level of ES and the natural log of patients' distance. \* p<10%. \*\* p< 5%. \*\*\* p< 1%.

Table 4 shows that the *difference-in-difference* coefficient was statistically significant and negative. The policy of increasing co-payments was associated with a decrease in demand of 3.1% among ADSE patients, after controlling for the demand made by NHS patients. In other words, the existence of a (low-price) alternative in the private sector caused ES demand to decrease 3.1% following a policy that increased co-payments in public hospitals. The OR shows us that the policy had an effect of decreasing the odds of ED demand of about 20% for ADSE patients compared with NHS patients.

Our results also show that, prior to this policy, there was no significant difference in ED demand between ADSE and NHS patients.

In order to test whether these results subsisted considering only patients and/or periods when utilization of the private sector is less likely, we re-estimate the DD coefficient separately in 5 scenarios presented in table 5: demand during the night, demand during weekends, demand for mental health problems and demand by patients older than 60y.o.

Our results show that, in every scenario, the DD coefficients lose their statistical significance. In other words, the demand reduction we reported in table 4 is only significant for day-time visits, for week-day visits, for general ED visits, for patients younger than 60y.o. and for patients who live at a distance shorter than 10Km from the ED. We will address these findings in our discussion section.

MODEL	Night Visits	Weekend Visits	Mental Health Visits	Elder patients' Visits
$\beta_3$	-0.006 (0.040)	-0.022 (0.033)	0.106 (0.138)	-0.013 (0.031)
N	9981	10855	688	7241
Pseudo R <sup>2</sup>	0.0835	0.0798	0.0590	0.1345

Notes: Table 5 presents the results of the *DD* coefficient. Row 2 presents the marginal effects (AME). Robust standard errors are shown in parentheses. Background controls are the same as in table 3, excluding for each scenario the indicator variable that labels that scenario. \* p<10%. \*\* p< 5%.\*\*\* p< 1%.

#### 4. DISCUSSION

In this study, we estimate the effect that the recent increase in co-payments had on the demand for ED care by double insured ADSE (civil servants) patients. To our knowledge, even though co-payments are becoming increasingly widespread among European Health Systems, we are the firsts to access the impact of an increase in NHS copayments on these subpopulations' demand for health services.

We used a difference-in-differences design to estimate this “double coverage effect”, using the NHS patients as the control group, under the assumption that, during the period of the co-payment's increase, the only difference between NHS and ADSE patients is the latter's opportunity to resort to a low-price private alternative. Furthermore, we strengthened this assumption by studying only the conditions that should be “price-sensitive”, compared to conditions that should not, using the Manchester Triage to cluster conditions into low and high-severity groups, and in this sense accounting for any variation that should exist besides price-sensitivity (e.g. epidemiological factors, referral networks' redesigning, etc.).

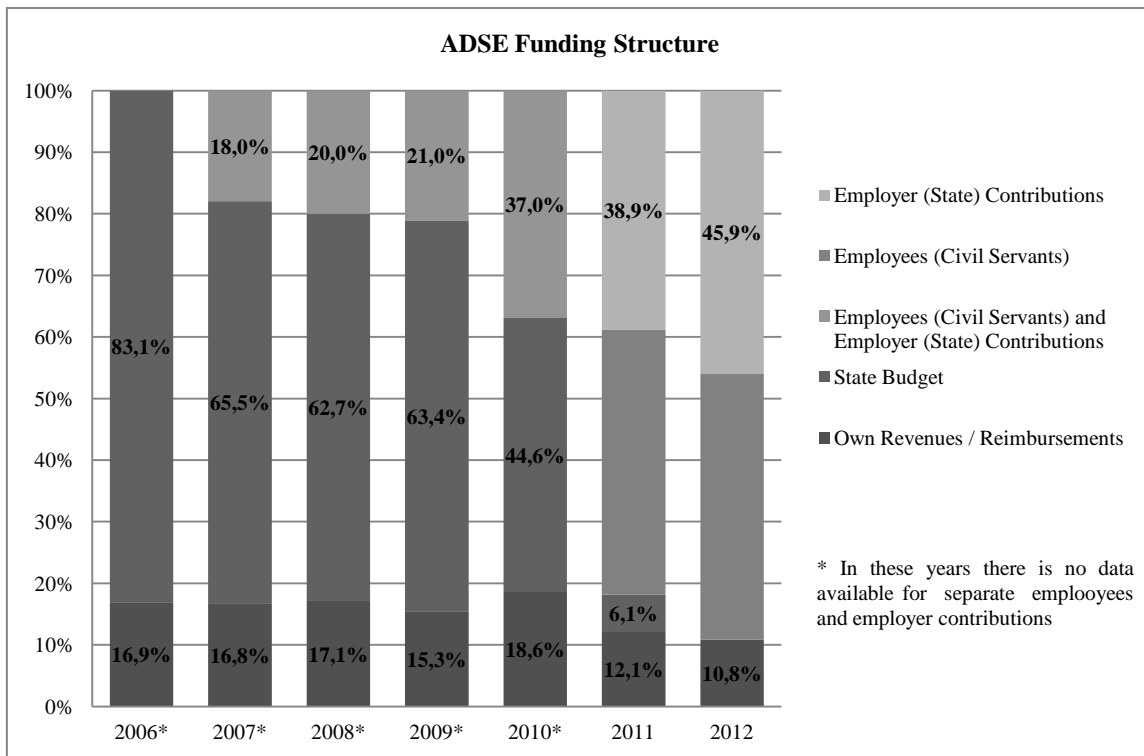
We found that following the increase in co-payments, ADSE beneficiaries had a sizeable decrease on Public ED demand, compared to NHS patients. Interestingly, prior to the increase in co-payments, we did not find any significant difference in the utilization of ED between these two subpopulations. Furthermore, in order to strengthen our assumption that the difference between NHS and ADSE patients is the latter's access to a private sector network, we tested whether this decrease on demand subsisted considering only patients and/or periods when utilization of the private sector is less likely. We found that our DD estimate (the “double coverage effect”) lost significance in ES visits taken during the night and during the weekend – when some private offices are closed –, for mental health visits – for which supply in the private sector is lower –, for older patients – who usually rely more and make more use of the public sector[16]. Alongside our results, another fact that reinforces our conclusion of relocations of demand from public to private sector is an increase of ADSE consultations per capita in private providers between 2012 and 2011[17], which reinforces our assumption of reallocation of demand from the public to the private sector.

This evidence on opting-out behaviour by double insured ADSE patients is consistent with the work of Fabbri and Monfardini [18] in the Italian voluntary health insurance (VHI) market, who found that double insured patients consumed more private services while simultaneously reduced public demand. Recently, Sogaard and colleagues [19] also found that, in Denmark, employer-paid health insurance led to a 10% reduction of public hospitals and substitution with private hospitals.

In this sense, our findings provide a practical example of the Besley and Coate (1991) argument - which states that the public provision of healthcare may be redistributive when low income patients resort to public facilities, whereas high income citizens, who contribute to subsidizing the public services through income taxes, opt out to the private sector.[20]

These findings have several implications, both in the economic and political arena.

Firstly, note that, interestingly, this opting out behavior we found following the increase in co-payments for public EDs highlights an overall discussion that is taking place in Portugal over the equity of the entire Health System: if and whenever taxpayer budget helps financing these subsystems, as was the case for the civil servants' subsystem (ADSE) until 2012 (graph 1), the general population felt this was iniquitous since they were financing the private alternative network ADSE grants to their beneficiaries (and as we demonstrated, a specially attractive alternative following the increase in co-payments for public facilities); if the employees (civil servants) and employer (State) contributions are sufficient for financing the subsystem these beneficiaries feel this is iniquitous since they are financing both the subsystem and the NHS but increasingly make use of the former and cannot opt out from the latter. Since much of the issue stands along the capability of the civil servants' subsystem to become self-sustainable (ie., the end of government budget transfers into these systems' accounting) and, in this sense, dependent on the recent increases in civil servants' contributions to their subsystem, our findings provide one additional piece of information for the current discussion over the sustainability and future of the civil servants' health subsystem.



**Graph 1 - ADSE Funding Structure** (Source: ADSE)

Secondly, the decrease in ADSE demand occurred regardless of the ED level and, in this sense, of the different ED co-payment levels. This implies that the double coverage effect takes place even in the lower levels of co-payment and this may be related to the existence of alternative not only in the private EDs, but also in the private outpatient sector (doctors' appointments) that can be a reliable alternative for a low-severity ED visit (e.g. a throat pain, a skin rash, etc.). The main advantage of ADSE is that it offers "cheap alternatives" to its beneficiaries within the private sector, compared to the full price of accessing that private care (an *access effect* [21-23]). While out-of-pocket payments are still naturally higher in this access to the private sector (av.50€) compared to the public co-payments (15-20€), the balance between direct costs and indirect costs (e.g. travel costs and opportunity cost of time) may present the agreements within the ADSE network as a more viable alternative, especially in the context of an increase in co-payments. Also in this respect, it is worth mentioning the appearance of low-cost marketing strategies in the private sector, which focused on the higher co-payments in the public sector and targeted both private and subsystems' insured patients.

Additionally, our findings emphasize the importance of the existence of a perceived trustworthy alternative, rather than the mere reliance on demand-side measures, in order to successfully redirect patients towards more cost-effective settings. This is extremely meaningful, in light of the recent research that found limited – if any – impact of the increase in co-payments on the general NHS population [24-26], and stresses the need for tailoring supply-side measures at the primary health care (PHC) setting and at the PHC-ED gap (e.g. a deeper financial and organisational formal or informal integration of PHC and Hospital care), as a way of increasing accessibility and freedom of choice within the Portuguese NHS, in order to cope with heterogeneous preferences and enhance reliance in the alternatives to the ED.

Finally, and considering the public hospitals' financing, our results of a bigger decrease among low-cost low-severity ED visits, compared to resource-intensive high-severity ED visits, provide evidence of skimming in the ED market and may imply a perception that public EDs are better prepared to address ED visits that may evolve with severe complications[16]. While for the Health subsystem ADSE the net effect can be null - or even positive if competition leads to a lower ED visit price -, the impact on public hospitals is surely negative for at least two main reasons: firstly, allocative efficiency measures to cope with changes in demand are difficult to implement in the ED setting (e.g. by law, doctors from other departments have to devote a certain amount of their week time to work in the ED), resulting in high fixed costs; secondly, the payment mechanism to hospitals concerning ED production is a severity-independent flat-fee, which back-of-the-envelope calculations show that does not even accurately represents the costs of an average ED visit. To the extent that Public EDs have to deal with an average higher case-mix now, this will certainly incur public hospitals into operating with (even higher) negative economic profits in this line of production. In this sense, this ED skimming calls for changes in the financing of Public EDs, namely by the establishment of severity and outcome-adjusted payment. Recent news have indicated the inclusion of these criteria in the hospital-contracts for 2015, yet formal confirmation by the MoH is still lacking.

Nevertheless, our paper has some limitations.

Firstly, we did not consider the fact that some NHS patients may be enrolled in a private health plan and, in this sense, may be also double insured. Furthermore, Portugal has been experiencing several constraints in the public sector and, during this period, the existence – or perception – of a lower quality of care in public providers may lead to a higher reliance on the private sector. Arguably, both these effects may overestimate our results.

Moreover, it is somehow difficult to disentangle the effect of the co-payment increase and the context of the economic crisis in the country. Nevertheless, for one to argue that the results we found were due more to the latter than to the former, should also have to claim that the effect of the crisis in this (higher-income) group was harder for ADSE beneficiaries than for NHS citizens. While it is difficult to speculate on that, the several decisions of the Constitutional Court during 2011-2012 ruling public sector austerity measures unconstitutional seem to point otherwise.

Finally, our study focused on the demand for public EDs in the North of Portugal. While crisis and the reduction of disposable income were probably higher in this region, the number of private providers is lower compared to Lisbon, for instance. The overall net result and the extent to which they are generalizable to the rest of the country is therefore unknown.

## 5. CONCLUSION

In this study, we exploit the impact of the civil servants' health "double coverage" on the demand for public Emergency Departments in Portugal, following an increase in co-payments for these services. We found that civil servants experienced a sizeable reduction on ED demand, after controlling for the behavior of the single insured NHS users. During this period, the main difference between these two sub-populations was the former's possibility of resorting to a low price private alternative within their own supplementary insurance scheme's network.

In several taxation-based National Health Services, the co-existence of supplementary health subsystems and mutual schemes raises concerns about the overall equity of the Health System, since some citizens subsidize both their Health subsystem and the universal NHS, but increasingly opt out from using the latter. We show that an increase in the direct costs of health within the National Health Service may exacerbate these equity and efficiency implications and should be taken into account in the current discussion over the future of the civil servants' subsystem.

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## REFERENCES

1. Cameron, A.C., et al., *A Microeconomic Model of the Demand for Health Care and Health Insurance in Australia*. The Review of Economic Studies, 1988. **55**(1): p. 85-106.
2. Vera-Hernández, Á.M., *Duplicate coverage and demand for health care. The case of Catalonia*. Health Economics, 1999. **8**(7): p. 579-598.
3. Buchmueller, T.C., et al., *Access to physician services: does supplemental insurance matter? evidence from France*. Health Econ, 2004. **13**(7): p. 669-87.
4. Kang, S., et al., *Effects of supplementary private health insurance on physician visits in Korea*. J Formos Med Assoc, 2009. **108**(12): p. 912-20.
5. Schokkaert, E., et al., *Supplemental health insurance and equality of access in Belgium*. Health Econ, 2010. **19**(4): p. 377-95.
6. Bolhaar, J., M. Lindeboom, and B. van der Klaauw, *A dynamic analysis of the demand for health insurance and health care*. European Economic Review, 2012. **56**(4): p. 669-690.
7. Barros, P.P., M.P. Machado, and A. Sanz-de-Galdeano, *Moral hazard and the demand for health services: a matching estimator approach*. J Health Econ, 2008. **27**(4): p. 1006-25.
8. Lourenço, Ó., *O Efeito dos Subistemas de Saúde na Utilização de Consultas de Especialidade e/ou de Consultas Privadas*, in *Economia e Política da Saúde*. 2012: press.
9. Economou, C., *Greece: Health system review*. Health Syst Transit, 2010. **12**(7): p. 1-177, xv-xvi.

10. Garcia-Armesto, S., et al., *Spain: Health system review*. Health Syst Transit, 2010. **12**(4): p. 1-295, xix-xx.
11. LegislativeOrder306-A/2011, *Legislative Order 306-A/2011*, P. Government, Editor 2011.
12. Newhouse, J.P., et al., *Some interim results from a controlled trial of cost sharing in health insurance*. N Engl J Med, 1981. **305**(25): p. 1501-7.
13. O'Grady, K.F., et al., *The impact of cost sharing on emergency department use*. N Engl J Med, 1985. **313**(8): p. 484-90.
14. Moreira, S. and P.P. Barros, *Double health insurance coverage and health care utilisation: evidence from quantile regression*. Health Economics, 2010. **19**(9): p. 1075-1092.
15. Duarte, F., *Price elasticity of expenditure across health care services*. J Health Econ, 2012. **31**(6): p. 824-41.
16. Costa-Font, J. and M. Font-Vilalta, *Preference for National Health Service Use and the Demand for Private Health Insurance in Spain*. The Geneva Papers on Risk and Insurance - Issues and Practice, 2004. **29**(4): p. 705-718.
17. ADSE-MF, *Relatório de Atividades*, 2012, Ministério das Finanças: Lisbon.
18. Fabbri, D. and C. Monfardini, *Opt Out or Top Up? Voluntary Healthcare Insurance and the Public vs. Private Substitution*, 2011, Institute for the Study of Labor (IZA).
19. Sogaard, R., M.S. Pedersen, and M. Bech, *To what extent does employer-paid health insurance reduce the use of public hospitals?* Health Policy, 2013. **113**(1-2): p. 61-8.
20. Besley, T. and S. Coate, *Public Provision of Private Goods and the Redistribution of Income*. The American Economic Review, 1991. **81**(4): p. 979-984.
21. Jofre-Bonet, M., *Public health care and private insurance demand: the waiting time as a link*. Health Care Manag Sci, 2000. **3**(1): p. 51-71.
22. Nyman, J.A., *The value of health insurance: the access motive*. Journal of Health Economics, 1999. **18**(2): p. 141-152.
23. Jones, A.M., X. Koolman, and E.v. Doorslaer, *The Impact of Having Supplementary Private Health Insurance on the Use of Specialists*. Annals of Economics and Statistics / Annales d'Économie et de Statistique, 2006. **83/84**(Health, Insurance, Equity (Jul. - Dec., 2006)): p. 251-275.
24. Barros, P.P., et al., *Impacto das taxas moderadoras na utilização de serviços de saúde (v.1)*, ACSS, Editor 2013, Nova School of Business and Economics: Lisboa.
25. Canedo, M.A., *How demand for medical care responds to user-charges: A quasi-experiment for Portugal*, in *London School of Economics and Political Science* 2012, London School of Economics and Political Science: London.
26. Ramos, P., *The impact of a rise in co-payments on the demand for emergency services in Portugal*, in *Faculdade de Economia do Porto* 2013, Universidade do Porto.

ANNEX

<b>Variable</b>	<b>B</b>	<b>Odds ratio (95% CI)</b>
<b>Constant</b>	1,846**	6,335 (5,242; 7,656)
<b><u>Conditional effects</u></b>		
<b>Year (T)</b>		
2011		Reference category
2012	0,194**	1,214 (1,152; 1,279)
<b>Subsystem (SUB)</b>		
NHS		Reference category
ADSE	0,016	1,016 (0,891; 1,158)
<b>Year * Subsystem</b>	-0,199*	0,819 (0,675; 0,995)
<b>ED Level</b>		
Polyvalent ED		Reference category
Medical-Surgical ED	-0,310**	0,734 (0,690; 0,780)
Elementary ED	0,514**	1,673 (1,526; 1,833)
<b>Month</b>		
January		Reference category
February	-0,014	0,986 (0,907; 1,072)
March	0,050	1,052 (0,968; 1,143)
April	0,191**	1,211 (1,111; 1,320)
May	0,162**	1,176 (1,080; 1,380)
June	0,255**	1,290 (1,185; 1,405)
<b>Gender</b>		
Female		Reference category
Male	0,187**	1,206 (1,147; 1,268)
<b>Date of admission</b>		
Week		Reference category
Weekend	-0,042	0,959 (0,907; 1,013)



<b>Time of admission</b>		
Day		Reference category
Night	-0,547**	0,579 (0,548; 0,612)
<b>Type of care</b>		
Regular care		Reference category
Psychiatric care	-1,060**	0,346 (0,296; 0,406)
Ophthalmologic care	1,212**	3,361 (3,030; 3,728)
<b>Patient Provenience</b>		
No referral		Reference category
Primary Health Care Network referral	-0,208	0,812 (0,632; 1,043)
Public Hospital's transference	-0,572**	0,564 (0,438; 0,726)
Private Hospital's transference	-0,426*	0,653 (0,488; 0,874)
<b>Distance - Ln (Kilometres)</b>	0,030*	1,031 (1,002; 1,060)
<b>Age (in years)</b>	-0,008*	0,992 (0,985; 0,998)
<b>Age squared (in years)</b>	-0,001**	0,999 (0,999; 0,999)

\*=p<0,05; \*\*=p<0,01

Annex 1 – Full model estimates