GreeSE Papers

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Paper No. 137

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LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

June 2019

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Contents

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Ioannis Laliotis[*], Mujaheed Shaikh[†], Charitini Stavropoulou[‡], Dimitrios Kourouklis[§]

ABSTRACT

We examine the impact of own and spousal retirement on household expenditure during a period of financial deterioration. We use detailed household data covering the period 2009-2016 in Greece, during which the country experienced a severe financial crisis that affected retirees in ways that were not anticipated. Similar to Moreau and Stancanelli (2015) our empirical strategy allows for the household expenditure to depend on both own and spousal retirement status. We employ an instrumental variable identification strategy by exploiting variation coming from the early retirement age threshold. Our Two-Stage Least Squares estimates show that, even after controlling for income, total expenditure drops significantly when the husband retires and as he becomes older. The reduction is stronger in 2010, when the first wave of austerity plans, including measures affecting pensioners were announced, and after 2014 when horizontal pension cuts were implemented. Expenditure does not change significantly when the wife retires neither the older she gets. A drop-in expenditure for clothing, transport, housing and communication drives the overall reduction in expenditure. Overall, our results can have significant policy implications in the design of structural pension reforms in a period of financial hardship.

Keywords: Retirement, Household Expenditure, Crisis, Greece

Acknowledgement: We would like to thank Jo Blanden, Margaret Kyle, Vassilis Monastiriotis, Sonia Oreffice, Platon Tinios and participants of MINES ParisTech seminar for their comments and suggestions. The usual disclaimer applies. Declarations of interest: none.

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1. Introduction

An increasing body of microeconomic evidence suggests that there is a sharp decline in consumption expenditures of households at retirement. This is a stylized fact, albeit at odds with the standard life-cycle model according to which agents use their current level of information to make sequential decisions that will lead to a stable consumption level over time. This finding is both spatially and temporally consistent, with early evidence from the US (Bernheim et al., 2001; Hamermesh, 1984), the UK (Banks et al., 1998), Italy (Battistin et al., 2009), Germany (Schwerdt, 2005) and more recently Spain (Luengo-Prado and Sevilla, 2013) China (Li et al., 2015) and France (Moreau and Stancanelli, 2015) pointing towards a drop in expenditures around retirement. Several explanations for this inconsistency between the drop in expenditures at retirement and lifetime optimizing behaviour have been proposed. For example, reduction in work-related expenses, leisure substitution, changes in household composition, liquidity constraints, and mortality risk among others.

We add new knowledge to this literature by providing alternative explanations for the decline in household expenditure upon retirement during a period of national financial crisis. Specifically, we assess the causal effect of own and partner's retirement on household expenditure in Greece within the context of the recent financial crisis, which was marked by severe financial downturn and significant pension reforms. Within this framework, unanticipated shocks to retirement income might have led to revisions of expected future pension wealth. The Greek sovereign debt crisis provides an ideal setting to evaluate the effect of retirement on household consumption expenditures incorporating unexpected shocks to pensions during the period that followed. We use nationally representative detailed household expenditure survey data collected using expenditure diaries covering the period from 2009 to 2016. To address the endogeneity of retirement we exploit the retirement legislation in Greece in an instrumental variables framework where the probability of retiring increases strongly as individuals reach the early retirement age. Under a Two-Stage Least Squares empirical framework we use the early retirement eligibility threshold as an instrument for individual retirement status. There are three central findings in this paper.

First, we observe a decline in total household consumption expenditures during the crisis period by as much as 33% in response to the retirement of the head of the household. This estimate is by far the highest in magnitude compared to previous studies and indicates that during a period of financial crisis a retirement-consumption puzzle can be more evident. A part of this reduction is attributed to income. Controlling for income, our models indicate that the reduction in expenditure decreases by 20% after retirement. By analysing detailed categories of expenditure, we can attribute the total decline to life-style, work and housing-related expenditures, a finding similar to prior literature.

Second, after interacting the retirement variable with year dummies from 2009 to 2016 we observe that household expenditure of retirees declines substantially in the beginning of the crisis, followed by insignificant differences between retirees and non-retirees up until 2014. Post 2014 we again observe a sharp decline in expenditures with decreasing magnitudes of the coefficients year by year until 2016. The decline in 2010, the year the first wave of austerity measures were announced, can be credited to the uncertainty around income and pension replacement due to the onset of the crisis, while that from 2014 onwards to the implementation of a series of measures. These results suggest that while retirees react to unanticipated income shocks by reducing expenditure, there seems to be an eventual

adjustment to income changes as suggested by the non-significance of the coefficients in the years right after the drop. Interestingly, as Aguiar and Hurst (2005) suggest, the decline in total expenditures that we find, due to unexpected shocks to income, mainly occurs along non-food dimensions.

Third, spousal retirement has no direct impact on household expenditure – not even in years of unanticipated income shocks, and this result is robust to controlling for income. Moreover, its effect on expenditures does not vary with the age of the spouse. However, it varies with the age of the household head. Specifically, total expenditure decreases by around 3% as the retired head grows older by one year. This decline is largely due to decreases in alcohol and tobacco, household and communication expenses. Although our data do not allow us to explore further mechanisms, the effect of retirement varying with the age of the individual can be explained through age related reduction in marginal utility of consumption, and reductions in complementarities as one partner becomes older.

Our paper makes a number of contributions in the literature of retirement and household consumption. First, it reconciles evidence on the retirement-consumption puzzle and life-cycle behaviour by demonstrating that, during the crisis period considered here, a drop in consumption is observed even after we have controlled for income changes. To the best of our knowledge, Banks et al. (1998) and Aguiar and Hurst (2005) are the only two papers that seek to distinguish between expected and unexpected income shocks. In fact, Banks et al. (1998) argue that to fully rationalize the drop in consumption at retirement we must consider the impact of unexpected unwelcome information. Owing to our modelling strategy, we are able to investigate the effect of retirement of both partners and the effect of the crisis separately, and allow for an interaction of the two to assess how the marginal effect of retirement varies during the crisis period. Our rich dataset allows us to analyse broad and quite narrow household expenditure categories. Therefore, unlike what has been reported in the literature so far, we are able to examine whether retirement causes any changes in very detailed consumption categories that can be linked to individual and health-related behaviours.

Second, within the consumption debate, the role of spouses has become central in understanding household decisions, with the evidence suggesting that women play an important role in determining consumption smoothing (Lundberg et al., 2003; Moreau and Stancanelli, 2015; Stancanelli and van Soest, 2012). Yet, so far, only Moreau and Stancanelli (2015) have allowed for spousal retirement in the empirical model and assessed the effect of couples' retirement directly on expenditures in France. By considering the direct impact of the wife's retirement, we show that household expenditure changes are driven mainly by the husband's retirement and to a much lesser extent by the spouse's. Two possible explanations can be given here. First, the husband is the main income earner, therefore his retirement has a bigger impact on the household's expenditure upon retirement. Second, given that the husband is likely to retire first, this may imply that household consumption is affected mainly by the first partner to retire, and by the time the second partner retires, the household has learned to adjust better to changes imposed by retirement.

Third, and more generally, we make an important contribution to the literature that analyses the role of individual and household heterogeneity in consumption smoothing behaviour during periods of crisis or income shocks. Fallon and Lucas (2002) summarize findings of the limited number of studies looking into household responses to financial crisis and report important differences between the rich and poor households in their ability to smooth

consumption. Bloemen and Stancanelli (2005) conclude similarly – allowing for household heterogeneity in terms of wealth is important to detect discernible differences in food consumption. There is some evidence suggesting the young and the old behave differently during periods of recession (Crossley et al., 2013), yet no previous study has focused specifically on household expenditure of retirees during these periods. Finally, this is also the first study within the Greek context and thus makes a novel contribution to this literature.

The rest of the paper is structured as follows. Section 2 presents the institutional setting, explaining in brief the Greek pension system, before and during the crisis years. Section 3 presents the data used in the study and section 4 the empirical strategy employed to analyse them. Section 5 presents the results of the analysis while section 6 concludes.

2. Institutional setting

Following the 2008 financial crisis, Greece was heavily exposed to the consequences of international financial pressures and their own economic and fiscal deficiencies. Unemployment had reached record levels and the government debt was 146.2% of the total GDP in 2010 (Eurostat, 2018). A rescue plan was agreed in May 2010 leading to the first Memorandum of Understanding (MoU) between the Greek government, the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF). The MoU acted as a programme towards economic adjustment and fiscal consolidation (Economou et al., 2017). It imposed a number of market and institutional reforms as well as constraints to public expenditure (Maresso et al., 2015). Two subsequent MoUs were agreed in 2012 and 2015.

During the crisis period, the pension system went through a number of reforms and cuts. The first cut was applied by the Greek government in May 2010, even before the first MoU, as a response to the debt crisis. The Act 3845/2010 abolished the 13th and 14th pension that pensioners were receiving as bonuses during the Christmas and Easter periods. A few months later and under the provisions of the first loan agreement, Act 3863/2010 and Act 3865/2010 established a new pension calculation formula that was activated after 2015. Moreover, official and early retirement ages were increased to 65 and 60 years, respectively, although those about to retire were not much affected (Panageas and Tinios, 2017).

A number of pension cuts were introduced during the period 2011-2013, but those were mostly focused to those receiving high pensions and to those receiving high pensions and had retired before 55 years old. A further targeted policy was implemented in November 2012 (Act 4093/2012) introducing progressive cuts for higher pensions, starting from 5% for pensions between 1,000 and 1,500 euros, to 20% for pensioners receiving more than 3,000 euros. Moreover, in 2012 official retirement age increased to 67 years for both men and women, with the early retirement age being set at 62 (National Actuarial Authority, 2015; Symeonidis, 2016; Tinios, 2016).

In July 2014, for the first time, a horizontal cut of 5.2% was implemented based on the provisions of the Act 4254/2012. In 2015, under the provisions of the third MoU (Act 4336/2015), new horizontal cuts were implemented through the implementation of various levies on pensions. Further legislation passed in May 2016 (Act 4387/2016) generalised many of the post-2010 changes to the entire population.

Although the reforms aimed at a radical change of the pension landscape, it took some time for them to bite (Tinios, 2016). Thus, while the 2010 reforms increased retirement ages they rather incentivised early retirement, especially among women, in an effort to shrink workforce in the public services (Lyberaki et al., 2015). For example, those close to retirement age in 2010 were allowed to "buy up" up to 7 years of extra contributions in order to facilitate exit, while mothers were allowed to bring retirement earlier by up to 5 years. In other words, many people saw their retirement age to be effectively reduced. It soon became clear that the targeting of the initial reforms, apart from restoring pension sustainability, was to address structural imbalances in the long-term. What really seems to have hit pensioners during the crisis years was pension cuts, in particular the implementation of the abolition of the 13th and 14th bonus pensions and the horizontal cuts after 2014. In an effort to reduce public expenditure, pensions were reduced on twelve separate occasions since 2010. In several occasions, the only criterion behind the pension cuts was their size, without justifying those cuts on the basis of age or contribution years (Lyberaki and Tinios, 2016).

3. Data

Our analysis is based on individual and household-level data drawn from the Greek Household Budget Survey (HBS). HBS is a national survey collecting information from a representative sample of households regarding their composition, members' demographics and employment status, living conditions and mainly focusing on household expenditure on goods, services as well as on income. The survey run sporadically from 1956 till 2004 but it was not until 2008 that it started being conducted annually and more consistently. However, due to inconsistencies between the 2008 and more recent waves, our data cover the period 2009-2016. HBS is carried out by applying a two-stage stratified sampling. The primary units are the areas (one or more unified building blocks) and the final sampling units are the households. There are two levels of area stratification in the sampling design. The first one partitions the country into fifteen major geographical strata and the second one by population density level (dense, intermediate and sparse) within each one of the major strata.

For each surveyed household, the person being approved by the other members as responsible for the decision making and household management responsibilities is considered to be the household head. For the 2009-2016 waves, the HBS data contained information about 87,360 individuals from 35,710 surveyed households. However, as information on expenditure is reported only at the household level we restricted our sample only to household heads, i.e. 35,710 observations. Moreover, in order to ensure that we keep married couples in the sample and avoid cohabiting ones, we dropped those unmarried and widowed living in household with size greater than one member (Moreau and Stancanelli, 2015). We also excluded households where both the head and its spouse declare "Working" as their main activity status yet they report that the household's main income source comes from unemployment benefits. Finally, we excluded households where the household head and its spouse were of the same gender, most likely due to misreporting, as same-sex marriage has not been legalized in Greece. These exclusion criteria resulted in losing 10.4 percent of our original sample, i.e. 3,715 observations.

Our dataset includes information on a number of subcategories of expenditure: food and non-alcoholic beverages; alcoholic beverages and tobacco; clothing and footwear; housing, water

and electricity; health; household equipment; transport; communication; recreation and culture; restaurants; miscellaneous goods and services. While in related literature (Hurd and Rohwedder, 2008) household budget data have been extensively used, the expenditure categories are strictly separated based on whether a good is durable or not, or based on the setting that they serve (health, labour, etc.). On the contrary, our data are detailed and allow for further research with broader implications, at a different level and unit of analysis. In addition, we have information on the quantities consumed by household for food, non-alcoholic and alcoholic beverages.

Since we focus on the effects of retirement and joint retirement on household expenditures, we construct a binary indicator for whether heads and their spouses are retired or not. Retirement status is set equal to 1 if individuals report "Retired" as their main activity status and equal to 0 if "Working" is reported instead. In this way, we avoid classifying unemployed, students, those performing domestic tasks, disabled and those in military or community service as either retired or non-retired.

Table 1 below displays descriptive statistics on basic variables, both for the total sample and the two groups of retired and non-retired participants. Our sample is restricted to those 15 years on each side of the early retirement age (ERA hereafter) and for non-missing information on their own and their status' retirement, i.e. 7,304 observations. ERAs have been defined using the reports of the National Actuarial Authority (National Actuarial Authority, 2018, 2015, 2012). For both genders ERA was set to 55 years old until 2010 and it was increased to 60 years old until 2012. For the period 2013-2016 it was set to 62 years old. When comparing retirees relative to non-retirees, we observe that they vary in terms of household composition. Non-retirees live in households of bigger size than retirees (3.4 vs 2.5 members) mainly due to a larger number of children staying with them. Total income is higher for non-retirees than retirees (40,004 vs 30,897 euros) and as expected retirees depend much more on pensions and retirement benefits than those who are not retired yet. All those differences are statistically significant at the 1 percent level.

The lower panel of Table 1 presents descriptive statistics regarding the household expenditure for the total period. According to the presented descriptive analysis, the total expenditure in households where the head is not retired is 11,555 euros higher relative to their retired counterparts. The higher expenditure differences between the two household types are observed for transport, housing, water, electricity and fuels, and restaurant and hotels. Again, all those mean differences are statistically significant at the 1 percent level. This provides some first descriptive evidence regarding a differentiated expenditure behavior between the two household types that needs to be analyzed using a formal econometric framework.

Table 1. Descriptive statistics on basic variables

	Total sample [1]	Retired [2]	Non-retired [3]	Difference: [3]-[2] [4]
Retired	.518	-	-	-
Spouse retired	.439	.728	.129	-.599***
Age (years)	60.05	66.84	52.76	-14.072***
Female	.058	.055	.061	.006
Spouse gender	.942	.945	.939	-.006
Primary schooling	.286	.372	.194	-.178***
Secondary schooling	.320	.263	.382	.119***
Tertiary schooling	.311	.235	.393	.158***
Still studying	.000	-	.001	-
Household size (in persons)	2.94	2.53	3.39	.859***
Number of children in household	.354	.112	.614	.503***
Economically active in household	2.24	2.22	2.26	.035***
Monetary income (in euros)	30,884.1	26,769.8	35,306.9	8,537.1***
Total income (in euros)	35,286.1	30,897.2	40,004.1	9,106.9***
Income source: Self-employment	.190	.058	.331	.272***
Income source: Property income	.006	.006	.007	.002***
Income source: Pensions& retirement benefits	.460	.856	.035	-.820***
Income source: Unemployment benefits	.000	.000	-	-
Income source: Other benefits	.003	.002	.004	.003
Household expenditure variables (in euros)				
Total expenditure	29,510.1	23,941.3	35,496.6	11,555.3***
Food & non-alcoholic beverages	5,042.9	4,587.1	5,533.0	945.9***
Alcoholic beverages, tobacco & narcotics	907.1	694.6	1,135.6	440.9***
Clothing & footwear	1,624.4	1,149.6	2,134.8	985.1***
Housing, water, electricity & fuels	7,731.4	6,934.7	8,587.8	1,653.1***
Furnishings & household equipment	1,414.5	1,105.6	1,746.8	640.9***
Health	1,768.0	1,787.3	1,747.3	-39.9***
Transport	3,143.2	2,301.2	4,048.3	1,747.1***
Communication	1,025.3	805.7	1,261.4	455.7***
Recreation & culture	1,242.4	833.8	1,681.7	847.9***
Restaurants & hotels	2,720.7	1,980.1	3,516.9	1,536.8***
Miscellaneous goods & services	1,822.3	1,413.8	2,261.6	847.8***
Observations	7,304	3,784	3,520	-

Source: Household Budget Survey, 2009-2016; Hellenic Statistical Authority (EL.STAT).
Notes: Figures in column (4) correspond to the results of differences in means *t*-tests. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

4. Empirical Strategy

4.1 Model specifications

The purpose of this paper is to identify the implications of becoming eligible for early retirement on household expenditure conditional on spouse's retirement status, i.e. we are interested in the effect of couple retirement on household expenditure. Prior evidence has demonstrated the importance of spousal retirement not only in spending behavior but also in own retirement decisions. Particularly, Stancanelli and Van Soest (2012), Lundberg et al. (2003), and more recently Moreau and Stancanelli (2015) have shown this in the context of household expenditures. Our empirical model is therefore similar in spirit to that in Moreau and Stancanelli (2015). In its simplest form our main specification is as follows

$$Y_{ht} = \alpha_0 + \beta_1 R_{mht} + \beta_2 R_{fht} + f(Age_{mht}) + f(Age_{fht}) + \delta_t + \varepsilon_{ht} \qquad (1)$$

where Y_{ht} represents total household expenditure of household *h* at time *t*. We are interested in β_1 and β_2 that represent coefficients of interest for both male (*m*) and female (*f*) partners in household *h* at time *t*. We also control for a second order polynomial in age of both partners, year dummies to account for common exogenous shocks, and for household-level control variables, i.e. household size and number of dependent children so our estimates are net of household composition effects. We also report results controlling for total household income for robustness and to see what part of the retirement effect is driven by changes in income. Last, ε_{ht} represents the disturbance term.

While β_1 and β_2 in Equation (1) provide estimates of the effect of retirement, they are clearly biased since retirement is an endogenous choice; individuals can choose to retire earlier or later depending on factors such as health and wealth. Ideally, to overcome this identification problem we would like to randomly assign retirement status to individuals. However, this is infeasible and in the absence of such a randomized experiment, we exploit the legislation on early retirement in Greece to uncover causality. Exploiting the fact that the probability of being retired increases strongly as individuals reach the early retirement age, we use an instrumental variables approach. The necessary variation required for identification comes from the exogenously set ERAs in Greece, differences in ERA for men and women, as well as from the fact that those ERAs have been increased on a couple of occasions during the period under consideration, namely in 2010 and in 2013.

We apply Two-Stage Least squares (2SLS) and instrument retirement status of both partners in the first-stage with a binary instrumental variable equal to 1 if the individual has crossed the ERA; it is 0 otherwise. Therefore, we estimate two first-stage regressions of the form

$$R_{mht} = \gamma + \gamma_1 Z_{mht} + \gamma_2 Z_{fht} + f(Age_{mht}) + f(Age_{fht}) + \delta_t + \nu_{ht} \qquad (2)$$

and

$$R_{fht} = \tau + \tau_1 Z_{fht} + \tau_2 Z_{mht} + f(Age_{fht}) + f(Age_{mht}) + \delta_t + u_{ht} \qquad (3)$$

where R_{mht} and R_{fht} represent retirement status (1=retired; 0=active in labour market) of the male and female partner in household *h* at time *t*, respectively. $f(Age_{mht})$ and $f(Age_{fht})$ are second order polynomials in age of male and female partners in order to account for non-linear life-time expenditure profiles. Year fixed effects are denoted by δ_t and ν_{ht} and u_{ht} are the respective error terms of both equations. Z_{mht} and Z_{fht} are binary instrumental variables defined as follows:

$$Z_{mht} = 1 \; if \; Age_{mht} \geq ERA_{mt}; 0 \; if \; Age_{mht} < ERA_{mt}$$
$$Z_{fht} = 1 \; if \; Age_{fht} \geq ERA_{ft}; 0 \; if \; Age_{fht} < ERA_{ft}$$

As is standard in the IV literature, we interpret the coefficients of retirement status indicators in Equation (1) as the local average treatment effects (LATE) of ERA eligibility on expenditure behaviour. In other words, we estimate average treatment effects for those who exit from the labour market into retirement given their eligibility, i.e. the ERA compliers. In order to examine how the impact of retirement on expenditure evolves throughout the crisis, we include interactions of retirement with year dummies in alternative specifications as follows:

$$Y_{ht} = \alpha_0 + \beta_1 R_{mht} + \beta_2 R_{fht} + \beta_3 R_{mht} \times \delta_t + \beta_4 R_{fht} \times \delta_t + f(Age_{mht}) + f(Age_{fht}) + \delta_t + \varepsilon_{ht} \quad (4)$$

In terms of robustness checks, we estimate models with alternative time windows around the ERA threshold and we run placebo regressions using fake ERAs defined over a range of years before the actual one.

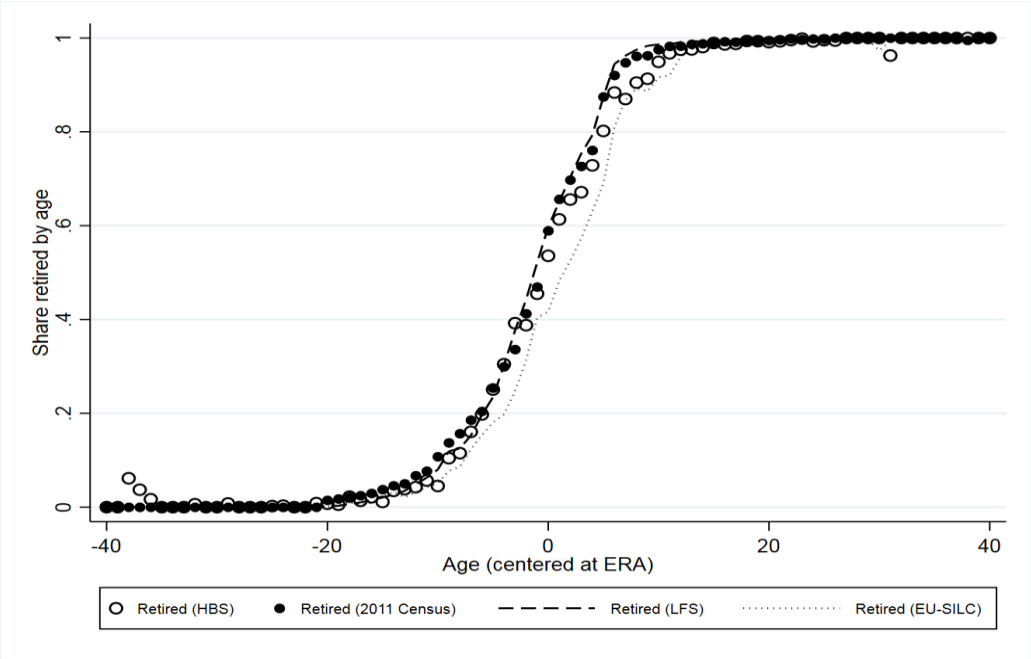
4.2 Instrument relevance and validity

A good instrument must fulfil two criteria – relevance and validity. Validity requires the instrument to be correlated with household expenditure only through retirement. While validity cannot be formally tested, given that the ERAs are exogenously set by the government, it is plausible to presume that crossing the ERA threshold relates with household expenditure only through transition from being labour market active to retirement. Nevertheless, we conduct placebo tests later on in support of the validity of the instrument. Relevance on the other hand, refers to a strong first-stage relationship between the instrument and the endogenous variable. In other words, relevance requires the observed retirement statuses for household heads and their spouses to be strongly predicted by the instruments Z_{mht} and Z_{fht}. We first present some descriptive evidence discussing the relevance of the ERA followed by the results of first-stage regressions.

Using data from various sources, we graphically observe retirement behavior around ERA. Figure 1 scatters the share of those retired by age (centered at year and gender-specific ERAs) using HBS data. It also graphs age-specific shares of retired using information from other data sources in order to provide some reassurance regarding the representativeness of our sample. More specifically, we draw data from the 2011 Census, the Survey on Income and Living Conditions (EU-SILC) for years 2009-2017 as well as from the quarterly Labour Force

Survey (LFS) for the period 2015Q1 to 2018Q2. Earlier LFS data are not suitable because age was recorded in bands before the 2015 waves. Similar to the HBS data, we classify as non-retired all those who are either employed or unemployed. Hence retirees are compared with labour market active individuals. First, the graph shows that the HBS sample is quite representative relative to other datasets. Retiree shares look nearly identical when compared to those obtained by using the 2011 Census, the LFS and the EU-SILC data. Second, it suggests that although there are people who tend to retire before reaching ERA the majority retires right on or after this age threshold.

Figure 1. Retirement shares by age.



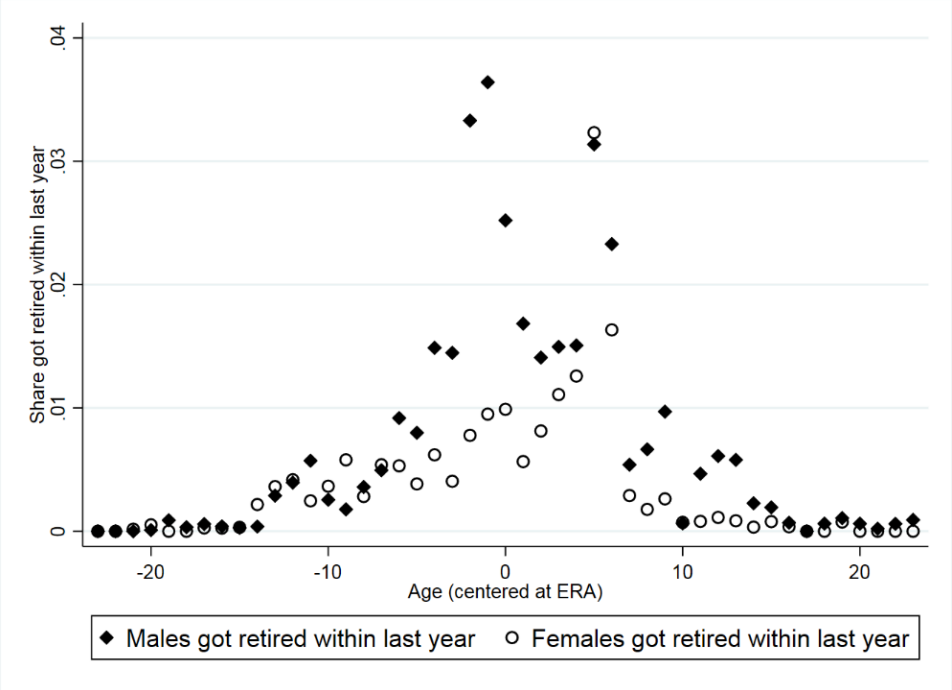
Source: Household Budget Survey (2009-2016); Greek Census (2011); Labour Force Survey (2015Q1-2018Q2); EU-SILC (2009-2017); Hellenic Statistical Authority (EL.STAT).
Notes: Shares for each survey are weighted using the respective weights. ERAs are specific to the surveys' time periods.

To address any concerns regarding the issue of retiring before reaching the ERA, we use the LFS data to construct age and gender-specific shares of those who retired over the last twelve months conditional on being active in the labour market, either as employed or unemployed, one year before they were surveyed. Figure 2 displays the results. There is a visible discrete jump at the cut-off age, especially for males, with a relatively low incidence of people retiring considerably before reaching the ERA.[5] Moreover, it seems that relative to males, females tend to retire later. Figure 3 plots monetary and total household income (left hand-side vertical axis) and total net personal income (right hand-side vertical axis) around ERA. Total household and personal incomes decline after ERA, although monetary household income starts declining a few years before. This income loss observed around ERA is expected to

[5] Moreover, individuals that tend to retire considerably before ERA come from very specific sectors of the economy. Using LFS data, those are more likely to come from sectors like Mining and Quarrying, as well as from Electricity and Water Supply which are dominated by the public sector.

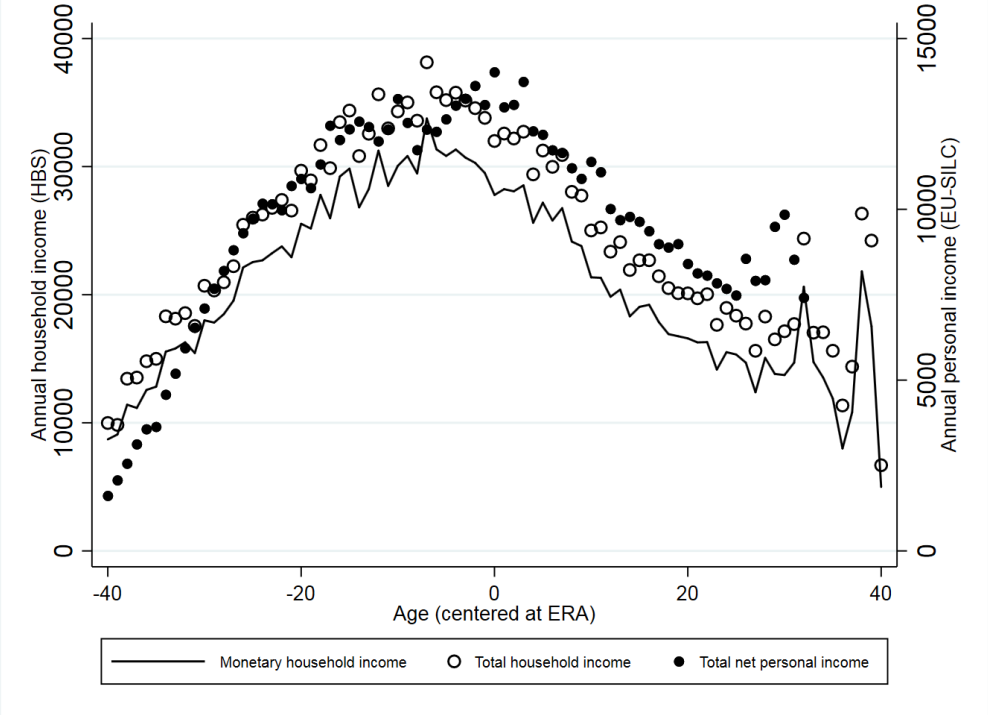
affect household expenditure behaviour as heads and their spouses are on the margin of early retirement.

Figure 2. Share of people getting retired by age.



Source: Labour Force Survey (2015Q1-2018Q2); Hellenic Statistical Authority (EL.STAT).
Notes: Shares are weighted by the sampling weights.

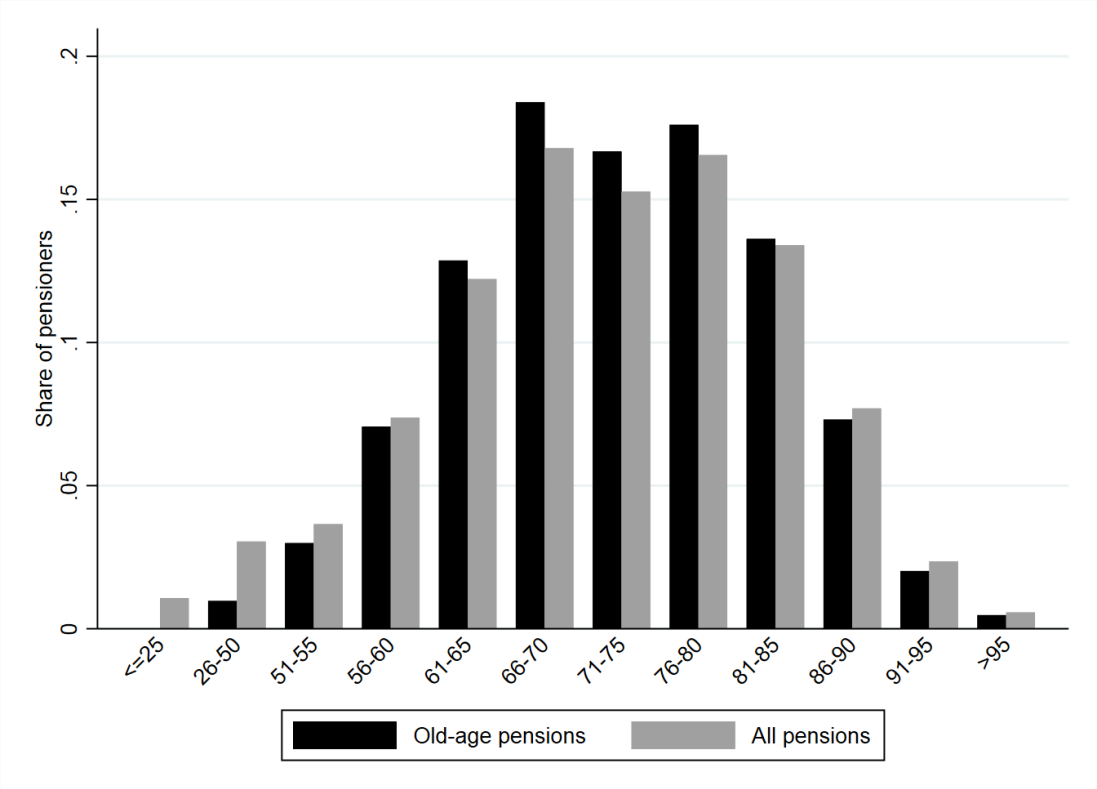
Figure 3. Income measures by age.



Source: Household Budget Survey (2009-2016); EU-SILC (2009-2017); Hellenic Statistical Authority (EL.STAT).

To provide further graphical evidence on the timing of transitions to retirement in Greece, we use publicly available information provided by the Ministry of Labour, Social Security and Welfare. From October 2013 onwards, they have been uploading online monthly reports on pensions by type (old-age, disability, death, other), age group and fund. Statistics on those reports are based on administrative information on the universe of pensioners collected through "Helios", a Unified Pension Monitoring and Payment System. This platform was created and developed under the provisions of Act 4093/2012. For the first time, data from scattered information systems belonging to 92 different pension funds were put together, identifying about 2.7 million pensioners in Greece. We used the available online data for the period between October 2013 and December 2016 to plot the share of all pensioners and the share of old-age pensioners by age group. Figure 4 displays the results. Although information by exact age or narrower age groups was not available online, it seems that the share of those receiving old-age pensions jumps discontinuously for the 56-60 age group and this is more apparent for the 61-65 age group. Moreover, it seems that pension types being claimed before reaching ERA are other than old-age ones, e.g. disability etc.

Figure 4. Total and old-age pensions by age group



Source: Ministry of Labour, Social Security and Welfare.
Notes: The data cover the period between October 2013 and December 2016. All pensions include old-age, disability, death and other pension types. Age groups are the default ones as reported in the source.

5. Results

5.1 First-stage results

The descriptive evidence provided above using various data sources shows that crossing the ERA is indeed a relevant instrument. In Table 2 we present results from first-stage regressions to demonstrate the strength of the instrument. According to them, the probability of retirement for male partners, in column 1, increases by 19.3 percentage points as they cross the ERA. The probability of retirement also increases with both the age of household heads and their spouses in a linear way. Regarding spousal retirement, in column 2, the probability increases by 11.2 percentage points when crossing the ERA, nearly 8 percentage points less than their male partners. Female partner crossing the ERA has a positive but weak impact on the male partner's retirement probability. In contrast, male partner crossing the ERA shows a negative but weak impact on spousal retirement. This finding is consistent with the fact that spouses tend to retire relatively later, as shown in Figure 2. It is also consistent with prior literature that argues that wife's labour supply decisions depend on the husband's income, although the vice-versa is not necessarily true (Hurd, 1990). Our first-stage estimates provide some confirmation on this, as household income is significant for spousal but not for own retirement. In any case, the instrument relevance condition is clearly satisfied as the excluded instruments are strong predictors of retirement status and the first-stage *F*-statistics are well above the conventional benchmark of 10. With respect to other household characteristics, the probability of household head retirement is negatively related to the number of persons and the presence of dependent children in the household, but not affected by income. On the other hand, higher household income and existence of dependent children make spousal retirement more likely.

Table 2. First stage results

Dependent variable:	Own retirement	Spouse retirement
	[1]	[2]
Own age > ERA	.193*** (.022)	-.035* (.021)
Spouse age > ERA	.031* (.019)	.112*** (.023)
Total household income (ln)	.012 (.009)	.056*** (.009)
Household size (persons)	-.014** (.006)	-.024*** (.006)
Dependent children in household	-.043*** (.016)	.051*** (.015)
F-test of excluded instruments	30.73	31.47
Individual controls	Yes	Yes
Household controls	Yes	Yes
Year fixed effects	Yes	Yes
Observations	6,883	6,883

Source: Household Budget Survey, 2009-2016; Hellenic Statistical Authority (EL.STAT).

Notes: Linear probability model estimates using own and spousal retirement as dependent variables. The instrument used is a binary indicator on whether own (spouse) age is greater than the Early Retirement Age (interacted with year in Panel B). Controls include a second order polynomial in age, age-treatment interactions, total household income, household size, and whether dependent children live in the household. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

5.2 Impact of retirement on expenditure

Having established a strong first-stage relationship between retirement status and early retirement eligibility for household heads and their spouses, as well as some weak evidence regarding the complementarity effects in retirement decisions in the case of spousal retirement, we now explore the impact of retirement on household expenditure. In Table 3 we report our baseline 2SLS results regarding the impact of own and spousal retirement on total expenditure. We report results using a simple model and an interacted model as in Equations (1) and (4), respectively. This will reveal whether the overall effects of own and spousal retirement vary over time, i.e. during the crisis years. Moreover, for both specifications we report results conditional and unconditional on total household income.

Table 3. Retirement and total expenditure

	Simple model		Interacted model	
	[1]	[2]	[3]	[4]
Retired	-.396*** (.128)	-.222** (.096)	-	-
Retired×Age	-.026 (.016)	-.029** (.012)	-.012 (.015)	-.016 (.012)
Spouse retired	.075 (.176)	.182 (.125)	-	-
Spouse retired×Age	-.026*** (.009)	.003 (.006)	-.027*** (.010)	.002 (.007)
Retired×2009	-	-	-.715** (.332)	-.374 (.250)
Retired×2010	-	-	-.828* (.456)	-.758** (.362)
Retired×2011	-	-	-.257 (.215)	-.118 (.152)
Retired×2012	-	-	-.347* (.204)	-.188 (.153)
Retired×2013	-	-	-.194 (.180)	-.071 (.140)
Retired×2014	-	-	-.629*** (.185)	-.367*** (.135)
Retired×2015	-	-	-.426** (.167)	-.267** (.123)
Retired×2016	-	-	-.313** (.148)	-.185* (.114)
Spouse retired×2009	-	-	.448 (.382)	.395 (.249)
Spouse retired×2010	-	-	.512 (.551)	.772* (.437)
Spouse retired×2011	-	-	-.231 (.282)	-.040 (.193)
Spouse retired×2012	-	-	-.070 (.291)	.056 (.213)
Spouse retired×2013	-	-	-.193 (.226)	-.003 (.170)
Spouse retired×2014	-	-	.190 (.218)	.246 (.159)
Spouse retired×2015	-	-	.048 (.227)	.221 (.164)
Spouse retired×2016	-	-	.022 (.183)	.110 (.134)
2010 indicator	-.063** (.026)	-.038** (.019)	-.041 (.038)	-.007 (.028)
2011 indicator	-.135*** (.039)	-.115*** (.028)	-.093** (.045)	-.076 (.033)
2012 indicator	-.189*** (.041)	-.203*** (.030)	-.165*** (.052)	-.165*** (.040)
2013 indicator	-.245*** *(.049)	-.218*** (.036)	-.245*** (.060)	-.217*** (.047)
2014 indicator	-.263*** (.050)	-.201*** (.036)	-.196*** (.062)	-.145*** (.045)
2015 indicator	-.275*** (.047)	-.123*** (.034)	-.258*** (.050)	-.115*** (.038)
2016 indicator	-.269*** (.039)	-.122*** (.029)	-.305*** (.039)	-.111*** (.031)
Total household income (ln)	-	.636*** (.013)	-	.636*** (.014)
Observations	6,883	6,883	6,883	6,883

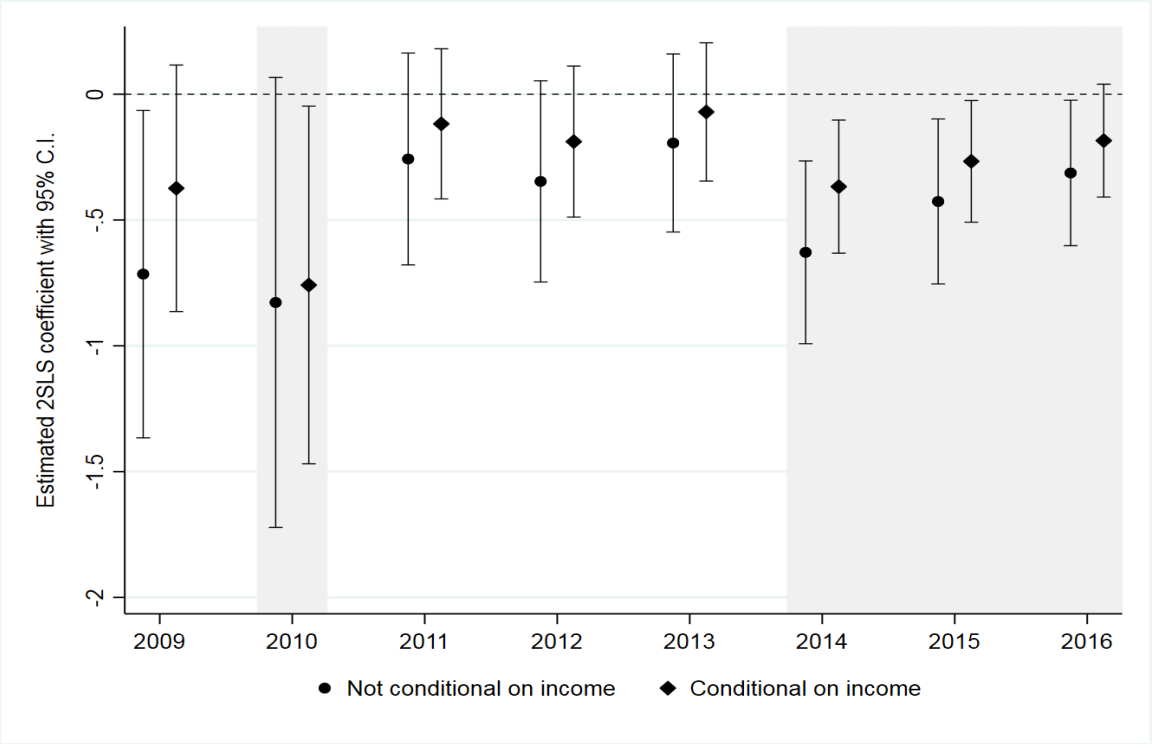
Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

According to the results in column 1, the associated coefficient of household head retirement is equal to -0.40 and statistically significant at the 1 percent level. This implies that household head retirement decreases total expenditure by around 32.7%.[6] The size of the coefficient is reasonable since the gross pension replacement rate in Greece was around 66.7% in 2014 (OECD, 2017). Spousal retirement does not have a statistically significant impact on the household expenditure. Given that during the crisis years pensioners experienced a significant drop in their income, we control for the log of the total household income, in column 2, in order to see whether our baseline estimate is driven by an income mechanism. We still observe a drop in consumption after retirement, supporting the existence of a retirement-consumption puzzle on top of the income effect during the crisis period. The estimated coefficient of household head retirement becomes -0.22 and it is statistically significant at the 5% level, indicating a post-retirement drop in total expenditure by 19.9%. Compared to the parameter in column 1, controlling for income explains about 40% of the original drop in total consumption. Moreover, the results suggest that consumption decreases, by 2.9% per year, as the household head becomes older and that it does not depend on spouse's retirement status or age.

Columns 3 and 4 display the results from the models where retirement status is interacted with year dummies. Figure 5 plots the respective results for household heads, for which we find significant estimates, along with their 95% confidence intervals. Controlling for income always reduces the magnitude of retirement-year interactions, suggesting that a part of the drop in consumption was income-driven during all the crisis years. The significant 2009 decrease reduces by nearly 48 percent and becomes statistically insignificant when the model controls for income, suggesting that the observed drop at the beginning of the crisis was solely an income effect. Controlling for income, also indicates that the most significant results are obtained in 2010 and after 2014, shaded areas in Figure 5. As explained in the institutional setting section, 2010 was the year the first wave of austerity measures were announced, among which a series of plans affecting pensioners, while in 2014 for the first time the government implemented a 5.2% horizontal cut across all pensions.

[6] As we use semilogarithmic models, we follow Halvorsen and Palmquist (1980) and interpret the binary variables coefficients using the formula $100 \times [e^{\beta} - 1]$, where β are the estimated effects from Equations (1) and (4).

Figure 5. Household head retirement and expenditure during the crisis.



Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. 95% confidence intervals are based on robust standard errors. All parameters are obtained from models that include individual and household controls and year fixed effects.

In Table 4 we report results regarding the relationship between retirement and the following expenditure categories: food and non-alcoholic beverages, alcohol and tobacco, clothing and footwear, housing and housing-related expenses, household equipment, health, transport, communications, recreation and culture, and restaurants and hotels. These estimates correspond to Equation (3) where the impact of retirement is assumed to be homogeneous over the crisis. There is a negative impact for expenses on clothing and footwear and for communications. Expenses on alcohol and tobacco also decrease as the household head become older. The relationship with household income is always positive and very significant. Controlling for income is crucial in explaining part or all of what would have been uncovered otherwise. For example, not conditional on income, the estimated head retirement coefficient for clothing and footwear is -1.83 (standard error = 0.65) and for communications is -0.54 (standard error = 0.17). Not conditional on income, head retirement is also associated with significant drops in housing and transportation expenditures.[7] Again, there do not seem to be any negative effects associated with spousal retirement. There is only a positive and significant effect for clothing and footwear and a weaker one for transportation expenditures. There is also a positive, but weak, effect of head retirement on health expenditures. In models not controlling for income this coefficient was lower and not significant (0.83 with a standard error of 0.57) indicating a negative relationship between income and health expenditures around retirement age.

[7] Full results are available from the authors upon request.

Table 4. Retirement and expenditure categories: Estimates from the simple model

	Retired	Retired×Age	Spouse retired	Spouse retired×Age	Household income
Expenditure category:	[1]	[2]	[3]	[4]	[6]
Food & alcoholic beverages	.044 (.098)	-.017 (.013)	.219 (.143)	.011 (.007)	.242*** (.012)
Alcohol & tobacco	-.460 (.594)	-.178** (.077)	.787 (.922)	.013 (.047)	.641*** (.076)
Clothing & footwear	-1.453** (.623)	.006 (.082)	1.933** (.915)	.001 (.046)	1.379*** (.075)
Housing, water, electricity	-.107 (.096)	-.014 (.012)	.234* (.134)	-.010 (.007)	.567*** (.014)
Household equipment	-.285 (.393)	-.089* (.052)	1.015* (.563)	.018 (.028)	1.056*** (.051)
Health	1.078* (.568)	-.032 (.072)	-.580 (.757)	-.013 (.039)	.913*** (.074)
Transport	-.595 (.437)	-.111* (.057)	1.314* (.689)	.013 (.037)	1.391*** (.063)
Communications	-.365** (.142)	-.024 (.020)	.106 (.217)	-.015 (.011)	.643*** (.022)
Recreation & culture	-.211 (.356)	.005 (.046)	-.152 (.504)	-.030 (.025)	1.340*** (.043)
Restaurants & hotels	-.0242 (.441)	.031 (.057)	.515 (.669)	.008 (.032)	1.193*** (.058)

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Sample size is 6,883 observations. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table 5 presents the 2SLS results regarding the impact of own retirement on various expenditure categories using Equation (4). This will allow us to see whether the effects of household head retirement vary over the crisis period.[8] Expenses for food and non-alcoholic beverages (column 2) do not seem to be affected; there is only a significant relationship for 2013. All significant estimates are observed during the more recent crisis years, e.g. in 2014 for alcohol and tobacco, in 2015 for clothing and footwear, after 2015 for communications and in 2014 for recreation and culture. The positive retirement effect uncovered for health expenditures comes mainly from 2014 although there are significant parameters in 2011 and in 2015. Regarding the relationship between age and income with expenditures in the interacted models, these are practically identical as in the case of the simple model presented in Table 4.

[8] Estimates for spousal retirement are not reported as those were mainly not statistically significant, as can be seen in the non-interacted model estimates.

Table 5. Head of household retirement and expenditure categories during the crisis

	Food & non-alcoholic beverages	Alcohol & tobacco	Clothing & footwear	Housing, water, electricity	Household equipment	Health	Transport	Communications	Recreation & culture	Restaurants & hotels
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Retired×2009	.159(.241)	-.279(1.504)	-1.138(1.371)	-.185(.268)	.408(.827)	-.324(1.272)	-.415(1.095)	-.683*(.366)	.124(.807)	.488(.960)
Retired×2010	-.157(.331)	-1.446(2.091)	-4.171*(2.386)	-.552(.377)	-.624(1.148)	2.536(2.045)	-3.087(1.943)	-.504(.463)	-1.411(1.102)	.583(1.128)
Retired×2011	.009(.160)	.287(.892)	-1.287(1.024)	-.144(.147)	.166(.592)	1.685*(1.013)	-1.236(.823)	-.394(.282)	-.341(.543)	.392(.597)
Retired×2012	.088(.156)	-.471(.921)	-1.627(1.027)	-.065(.125)	-.700(.645)	1.369(.863)	-1.526*(.878)	.039(.207)	-.130(.504)	-.919(.681)
Retired×2013	.309**(.143)	.040(.870)	-1.901*(.974)	.040(.129)	.559(.504)	.991(.851)	.404(.619)	-.192(.195)	.213(.669)	.474(.538)
Retired×2014	-.183(.142)	-1.702**(.854)	-1.089(.843)	-.144(.122)	-.399(.581)	1.811**(.759)	-.857(.643)	-.233(.180)	-.947*(.564)	-.763(.633)
Retired×2015	-.067(.132)	-.832(.824)	-2.008**(.922)	-.091(.125)	-1.096*(.603)	1.327*(.767)	-.889(.616)	-.433**(.179)	-.531(.458)	-.619(.670)
Retired×2016	.047(.121)	-.260(.769)	-1.140(.798)	-.135(.113)	-.017(.485)	1.064(.677)	-.118(.494)	-.550***(.193)	.147(.415)	-.086(.583)
Observations	6,883	6,883	6,883	6,883	6,883	6,883	6,883	6,883	6,883	6,883

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Given our rich dataset, we proceeded with a more in depth analysis of further types of expenditure within each subcategory. The results are displayed in appendix Table A1. As the household head retires (or gets older) there are significant reductions in expenditures for coffee, soft drinks, spirits and cigarettes. A shift towards fish and protein rich food and away from soft drinks and tobacco may indicate a trend towards a healthy lifestyle, a result often purported in the health economics literature that assesses the impact of retirement on health (Müller and Shaikh, 2018). We also observe an increase in expenses for corrective eye-glasses and games and hobbies upon retirement. Moreover, a significant decrease in expenses for canteens also support the hypothesis of adopting a healthier lifestyle and a shift to home produced goods.

5.3 Robustness checks

5.3.1 Placebo tests

The results are robust to a number of placebo tests we have done. In Table 6, we report a series of results obtained after estimating Equation (1) but replacing the actual ERA, in column 6, with fake ones ranging between 1 to 5 years back (columns 1-5). In this way we test whether: (a) our results are biased from anticipation effects of retirement on household expenditure behaviour and (b) our identification strategy is threatened by the fact that people in Greece might make systematic use of exception rules in order to claim pensions even sooner than their official ERA. Column 6 reproduces the results from column 2 of Table 3 where the actual ERA threshold was used. With respect to columns 1 to 5, we see that own retirement status is not significant when using fake ERAs, and the associated coefficients tend to zero and become noisier as we move away from the actual eligibility threshold. At the same time, the impact of household income is remarkably stable across models.

Moreover, in models not controlling for income, fake ERAs were significant for up to two years before the actual one.[9] However, once controlling for income the effect disappears, suggesting that the drop in consumption before retirement is purely an income effect that starts declining slightly before retirement. This pattern is also visible in Figure 3. These placebo tests provide reassurance regarding any threats imposed by the fact that some people in Greece retire before the actual ERA. To further explore this issue, we looked at individual-level data drawn from the Survey on Transition from Work to Retirement, which is an *ad hoc* module of the Labour Force Survey. In 2012, they interviewed LFS respondents aged 50-69 years old in order to analyse the way and the reasons behind their transitions from labour market to retirement. From the sample of individuals who established a right for early retirement, 76% of them got retired after they reached 60 years old. This is exactly the ERA threshold that we have been using for 2012 respondents in HBS following the recommendations made in OECD and National Actuarial Authority reports. Therefore, our results do not seem to be seriously threatened by people claiming pensions before they reach the ERA threshold.

[9] Results are not shown here but they are available upon request from the authors.

Table 6. Impact of retirement on expenditure: Falsification tests

ERA specified at:	t-5	t-4	t-3	t-2	t-1	t = Actual ERA
	[1]	[2]	[3]	[4]	[5]	[6]
Retired	.035 (.120)	.031 (.126)	-.083 (.103)	-.104 (.106)	-.112 (.094)	-.222** (.096)
Retired×Age	-.038** (.017)	-.041** (.017)	-.030** (.014)	-.029** (.014)	-.031** (.013)	-.029** (.012)
Spouse retired	.166* (.097)	.106 (.096)	.128 (.093)	.076 (.103)	.066 (.101)	.182 (.125)
Spouse retired×Age	.001 (.005)	.003 (.005)	.001 (.005)	-.000 (.005)	-.000 (.005)	.003 (.006)
Total household income (ln)	.634*** (.013)	.637*** (.013)	.638*** (.013)	.641*** (.013)	.641*** (.013)	.636*** (.013)
Observations	6,883	6,883	6,883	6,883	6,883	6,883

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

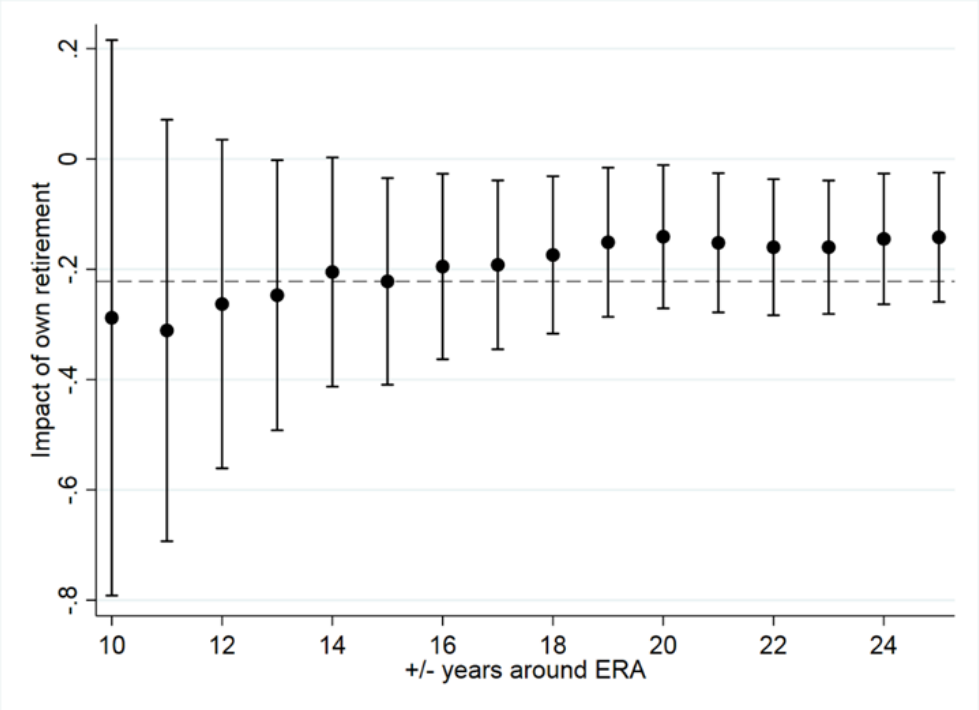
5.3.2 Changing window width

So far, we have been estimating our model specifications using a bandwidth of 15 years around both sides of the ERA cut-off. To check whether our 2SLS coefficients are sensitive to bandwidth choice we estimate a baseline model using a range of alternative bandwidths. The results are displayed in Figure 6. For sake of exposition we do not report estimates of the interacted-with-years model that allows the effect of retirement on expenditure to vary as a function of time, i.e. Equation (4). The baseline model from Equation (1) was estimated instead. However, the results using the fully interacted model lead to similar conclusions. All models control for the usual set of observable individual and household characteristics, including income, as well as for time fixed effects.

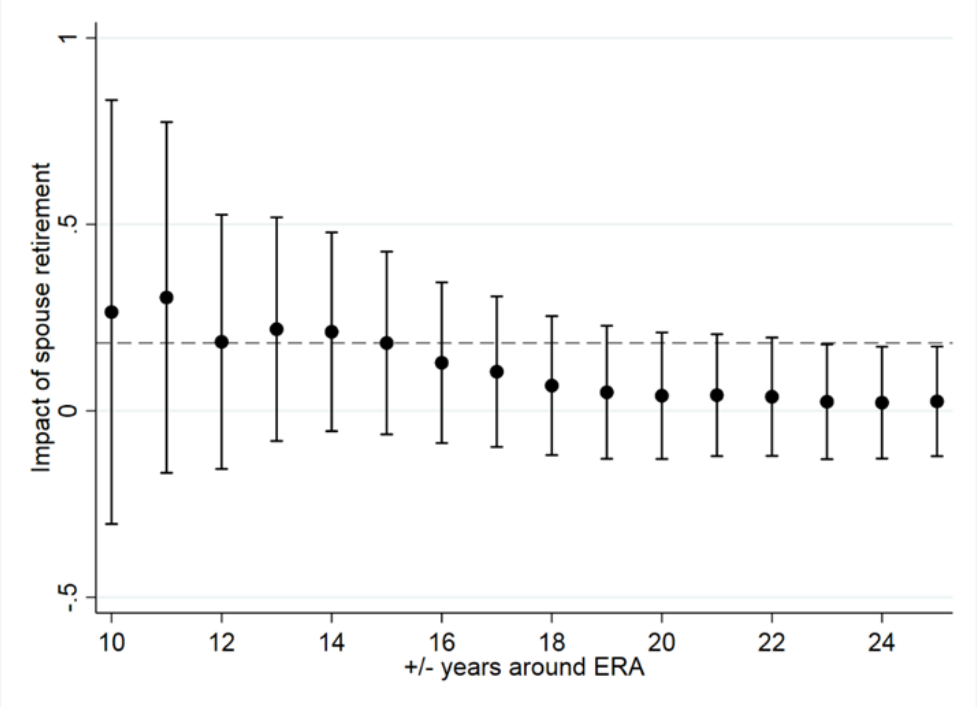
Figure 6 reports those 2SLS estimated coefficients with their 95% confidence intervals. Dashed lines represent the baseline effect when models are conditioned on the usual 15-year bandwidth and correspond to those reported in Table 3 (column 2). Regarding the impact of own retirement (Panel A) this is -0.22 and statistically significant at the 1% level; the associated standard error is 0.09. This result is robust to both wider and narrower bandwidths around ERA. Using bandwidths that are narrower than 10 years around the cut-off still returns larger coefficients, in absolute terms, but those are not precisely estimated due to considerably smaller sample sizes. With respect to the impact of spouse retirement on total expenditure, in Panel B, the estimated parameters are small and not statistically different from zero. The baseline effect using the +/- 15 year bandwidth around ERA is 0.18 and its standard error is 0.13. Regardless of the bandwidth choice the 95% confidence intervals always cross zero providing further evidence against the existence of a link between spouse retirement and total expenditure.

Figure 6. Retirement and expenditure using alternative time windows around ERA

Panel A: Impact of own retirement on total expenditure



Panel B: Impact of spouse retirement on total expenditure



5.3.3 Further sensitivity tests

One concern could be that our results are driven by compositional changes within the household. Although our models do control for household composition, we empirically test for links between household composition and the retirement-consumption puzzle. Table 7 presents the results. Column 1 shows that, conditional on income, retirement is associated with a 23% drop in total expenditure. In column 2 we control for household size, i.e. number of people in the household, and a binary variable indicating whether the household consists of adults only or adults with dependent children. These are the results that have been reported elsewhere in the paper. Controlling for household composition explains part of the drop in consumption given the total income. Household composition controls have the expected sign, suggesting that expenditure increases with the number of people and the presence of dependent children in the household. An association between household consumption and household size was shown in previous studies (Battistin et al., 2009).

However, as the unemployment rate increased dramatically during the period covered by our data, there might be changes in household composition because of the crisis, e.g. children moving back in with their parents due to unemployment, job loss or lower pay. Or it could be the case that adult children choose not to move out their parents' household because of financial constraints. Our data are cross-sectional, hence we cannot observe someone losing their job and moving back to their parents' household. However, we constructed a variable indicating the existence of unemployed children in the household and included it as a control in column 3. The results suggest that there is a positive effect of unemployed children in the household, which explains a small part of the drop in post-retirement consumption. Controlling additionally for a variable indicating whether there are adult children in the household, in column 5, does not seem to explain much of the retirement-consumption relationship. The original household composition variables seem to capture all the composition-related effects while adult and unemployed children have a positive and negative, but weak, relationship to total expenditure, respectively.

Table 7. Retirement and total expenditure: Changes in household composition

	[1]	[2]	[3]	[4]	[5]
Retired	-.257*** (.096)	-.222** (.096)	-.243** (.096)	-.226** (.095)	-.215** (.097)
Spouse retired	.148 (.126)	.182 (.125)	.150 (.125)	.182 (.125)	.198 (.129)
Total household income (ln)	.674*** (.013)	.636*** (.013)	.674*** (.013)	.635*** (.013)	.634*** (.013)
Household size	-	.063*** (.007)	-	.065*** (.007)	.058*** (.008)
Presence of dependent children	-	.088*** (.019)	-	.087*** (.019)	.090*** (.019)
Unemployed children in household	-	-	.050*** (.012)	-.013 (.012)	-.032* (.017)
Adult children in household	-	-	-	-	.027* (.016)

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Apart from household composition, household consumption can be affected by the level of education as the latter is considered a proxy for access to economic resources (Battistin et al., 2009). Normally, the level of educational attainment is determined considerably before eligibility for early retirement, therefore there should not be significant differences for those at the margins of the ERA cut-off. Otherwise, the observed drop in consumption might be driven by endogenous sorting of individuals into retirement that is related to their educational decisions. For example, low educated individuals might retire earlier as they are more likely to sort themselves into low-paying and health-hazardous occupations or because labour market opportunities are scarcer for them, especially in high unemployment times.

On the other hand, high-educated individuals might choose to stay longer in the labour market due to higher returns or better working environments. Hence we test whether there are significant differences in educational attainment between retirees and non-retirees. To do this, we use a variable containing the broad level of education for each individual. Table 8 reports the associated 2SLS parameters for three educational outcomes as well for total expenditure once educational level is included in our list of covariates. Significant differences between retirees and retirees are uncovered only in the probability of being low educated, i.e. primary schooling or less, in column 1. Low educated males are more likely to be retires and low educated females are less likely to be retired, conditional on all other characteristics. No significant differences are observed for higher educational outcomes. Moreover, our results on the retirement-consumption puzzle survive once the level of educational attainment is being controlled for, in column 4. There is a drop in total consumption by 17.6%, the income coefficient is highly significant but lower as compared to previous tables and education is positively related to the expenditure level.

Table 8. Retirement and total expenditure: Controlling for education

Outcome:	Primary or less education	Secondary education	Tertiary education	Total expenditure
	[1]	[2]	[3]	[4]
Retired	.261** (.107)	-.064 (.117)	-.196* (.105)	-.194** (.094)
Spouse retired	-.322** (.153)	.239 (.156)	.084 (.140)	.163 (.126)
Total household income (ln)	-.345*** (.014)	-.017 (.014)	.362*** (.013)	.593*** (.013)
Primary or less education	-	-	-	(base)
Secondary education	-	-	-	.043*** (.015)
Tertiary education	-	-	-	.121*** (.017)

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Another issue is the absence of an effect regarding spousal retirement. This could be either due to the fact that females contribute less to the household than men or due to the fact that they tend to retire later, as seen in Figure 2. In this case, the household has already adapted to changes from male retirement, hence there is no effect when spouse retires. If later female retirement is due to the age difference of the couple, then we should expect the result to be driven from couples with high age difference relative to those closer in terms of age. The mean age difference within couples is nearly 4.5 years in our estimation sample so we test the above hypothesis in the following way. We split the sample to couples with small age difference, i.e. 5 years or less, and with high age difference, i.e. more than 5 years. Table 9 presents the results. The first thing to notice is that, all the effect of head retirement comes from couples with age difference less than 5 years. Conditional on income, in columns 3 and 4, we see that spousal retirement is still not statistically significant.

Table 9. Retirement and total expenditure: Age difference

	Couples with low age difference (less than 5 years)	Couples with high age difference (more than 5 years)	Couples with low age difference (less than 5 years)	Couples with high age difference (more than 5 years)
	[1]	[2]	[3]	[4]
Retired	-.673** (.304)	-.285 (.460)	-.394* (.244)	-.284 (.348)
Retired×Age	-.071** (.031)	-.011 (.025)	-.044** (.022)	-.037* (.019)
Spouse retired	.622 (.591)	.579 (1.033)	.433 (.458)	-.190 (.897)
Spouse retired×Age	.032 (.033)	-.037 (.023)	.037 (.024)	-.017 (.017)
Control for income	No	No	Yes	Yes

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).
Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

6. Conclusion

Despite the predictions of the standard life-cycle model, there is ample microeconometric evidence suggesting a sharp decline in consumption expenditure at retirement. However, little is known about expenditure behaviour at retirement during economically turbulent periods. In this paper we attempted to fill this gap. Using Greek data for the period 2009-2016, we find strong evidence that household expenditure drops significantly during a financial crisis that was signified not only from an economic downturn but also from the implementation of significant pension reforms. This provides us an ideal setting to evaluate the effect of retirement on household consumption because unexpected pension shocks might lead to revisions of expected future pension wealth. To address the endogeneity of retirement we exploit the retirement legislation in Greece in an instrumental variables

framework where the retirement probability is higher for individuals close to the early retirement age threshold. Within this estimation framework we use the early retirement eligibility threshold to predict individual retirement status.

Our 2SLS results suggest that head of household retirement of is associated with a drop of 33% in total household consumption, on average. Although part of the drop is explained by a reduction in income, which is the result of the crisis, we show that the decrease in household expenditure remains and it is strong even after we control for income. Our estimates are higher than previous studies have found (Moreau and Stancanelli, 2015). The drop in expenditure is stronger in 2010, the year the first wave of severe austerity measures is announced, and after 2014, when horizontal pension cuts were implemented. This suggests a possible adjustment to the initial reaction to unanticipated changes in retirement plans.

Finally, our results suggest a gender asymmetry; total household expenditure drops significantly when the husband retires and as he grows older, but there are no level or age-related effects regarding wife's retirement. One possible explanation, discussed in the literature is that that the wife is often the second earner in the household therefore her retirement affects the household less than her husband's (Moreau and Stancanelli, 2015) or because she is usually younger than the husband, so by the time she reaches retirement age, the household has adjusted to income changes.

Overall, our study highlights that pensioners have suffered a more significant drop in their household expenditure than the Greek working population. As seen in previous studies, those above 65 years of age are also those who were affected the most in terms of mortality and health outcomes in the onset of the financial crisis in Greece (Laliotis et al., 2016; Laliotis and Stavropoulou, 2018). Considering that household consumption expenditures form a substantial proportion of the overall GDP of a country, these findings have policy implications concerning pension reforms that are planned during financial crises, as these have an impact not only on retirees themselves but also the household expenditure in total.

Appendix

Table A1. Retirement impact on detailed expenditure categories

	Retired		Retired×Age		Spouse retired		Spouse retired×Age	
	[1]		[2]		[3]		[4]	
Bread & cereals	-.231	(.148)	-.008	(.019)	.552***	(.211)	.017	(.011)
Beef & veal	.041	(.499)	-.039	(.062)	1.603**	(.728)	.054	(.038)
Fresh, chilled or frozen fish	1.700***	(.659)	-.034	(.083)	1.039	(.913)	.041	(.047)
Preserved milk	1.044**	(.498)	-.065	(.063)	.373	(.692)	.013	(.035)
Eggs	.116	(.541)	-.179***	(.070)	.429	(.772)	.055	(.038)
Vegetables	.139	(.164)	-.039*	(.021)	.283	(.239)	.011	(.013)
Sugar	-.715	(.460)	-.105*	(.059)	.988	(.659)	.040	(.034)
Salt, spices & culinary herbs	-.791	(.490)	-.197***	(.063)	-.059	(.696)	-.006	(.035)
Coffee	.032	(.517)	-.175***	(.066)	.557	(.740)	.045	(.041)
Mineral or spring waters	-.598	(.508)	-.074	(.064)	-.323	(.699)	-.023	(.036)
Soft drinks	-1.556***	(.565)	-.071	(.072)	.772	(.813)	.003	(.041)
Spirits & liqueurs	-.521	(.658)	-.146*	(.083)	1.118	(.879)	.029	(.048)
Cigarettes	-1.506*	(.858)	-.051	(.108)	-.711	(1.168)	-.080	(.060)
Clothing	-1.510**	(.737)	-.002	(.095)	1.127	(1.065)	-.028	(.053)
Water supply	.130	(.150)	-.041**	(.019)	.467**	(.215)	.015	(.011)
Electricity, gas & other fuels	-.272**	(.134)	.003	(.017)	.049	(.190)	-.004	(.010)
Carpets & other floor coverings	-.000	(.341)	-.100**	(.043)	-.114	(.467)	-.028	(.024)
Non-durable household goods	-.031	(.430)	-.127**	(.057)	.658	(.630)	.043	(.034)
Cleaning & maintenance products	-.322	(.522)	-.066	(.069)	.649	(.758)	.047	(.039)
Domestic services & household services	-.772	(.621)	-.136*	(.078)	2.204***	(.845)	.066	(.041)
Medical products, appliances & equipment	.658	(.695)	.043	(.089)	.323	(.919)	-.021	(.047)
Pharmaceutical products	.598	(.714)	.119	(.091)	.220	(.964)	-.037	(.050)
Other medical products	.039	(.398)	-.058	(.051)	.505	(.580)	-.008	(.031)
Corrective eye-glasses & contact lenses	.924**	(.458)	.032	(.055)	-1.020*	(.568)	-.027	(.033)
Dental services	-.663	(.755)	-.196**	(.095)	-.423	(1.054)	-.010	(.054)
Medical laboratories & X-ray centres	.447	(.625)	.135*	(.080)	-.314	(.872)	.033	(.044)
Purchase of new motorcars	-.269	(.459)	-.133**	(.059)	.163	(.535)	.038	(.029)
Bicycles	-.423**	(.186)	.005	(.024)	.085	(.228)	-.005	(.014)
Operation of personal transport equipment	-.415	(.547)	-.098	(.072)	1.776**	(.860)	.011	(.044)
Passenger transport by road	-1.667**	(.678)	.048	(.086)	-.634	(.939)	-.067	(.049)
Telephone & telefax equipment	-.315	(.297)	.037	(.036)	-.814**	(.363)	-.014	(.020)
Recording media	-.525**	(.251)	.015	(.033)	-.050	(.292)	-.001	(.016)
Major durables for outdoor recreation	-.245	(.237)	.008	(.030)	.185	(.268)	.015	(.015)
Musical instruments etc.	.206	(.134)	-.011	(.016)	-.242**	(.111)	-.001	(.008)
Games, toys & hobbies	1.672***	(.460)	.035	(.058)	-.609	(.617)	-.013	(.033)
Gardens, plants & flowers	.793	(.549)	-.053	(.068)	-1.664**	(.773)	-.060	(.040)
Recreational & sporting services	-1.025**	(.483)	.129**	(.061)	-.699	(.606)	-.051	(.032)
Cinemas, theatres, concerts	-.721	(.552)	-.134*	(.069)	.554	(.725)	.002	(.037)
Museums, zoological gardens etc.	.007	(.150)	-.012	(.017)	-.383**	(.183)	-.014	(.010)
Games of chance	-1.148*	(.678)	-.174**	(.084)	1.269	(.920)	.061	(.046)
Package holidays	-.645	(.444)	.118**	(.057)	.446	(.670)	-.008	(.034)
Canteens	-1.925***	(.591)	.010	(.074)	.122	(.714)	.045	(.039)
Accommodation services	-1.092*	(.625)	.191**	(.078)	-.494	(.793)	-.045	(.043)

Source: Household Budget Survey (2009-2016); Hellenic Statistical Authority (EL.STAT).

Notes: 2SLS estimates. Robust standard errors in parentheses. All models include individual and household controls and year fixed effects. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

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