Estimating the Causal Effects of Retirement via Eligibility: The Impact on Consumption and Economic Conditions of European Households

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PhD Dissertation Introduction

The world population is ageing at a fast pace, with an unprecedented and sustained change in the age structure of both developed and developing countries, driven by increasing levels of life expectancy and decreasing levels of birth rate. By 2050, the global elderly population, namely of 65 or more years of age, is expected to amount to over 1.5 billion persons, more than double of today's figure. In percentage terms, the global share of the elderly population is expected to grow from 9.3 percent in 2020, to 16 percent in 2050.

This structural change has prompted an ever-increasing number of researchers and academics to study ageing and retirement in a wide variety of scientific fields, such as psychology, mental and physical health, perceived well-being, sociology, micro and macroeconomics, to cite a few. With this PhD dissertation, I aim at contributing to the literature on the effects of retirement with respect to the household's economics field; in the first chapter, I study the relationship between the event of retirement and household's consumption, and then, in the second chapter, I analyze the relationship between retirement and the household's economic and financial conditions.

Household consumption takes up, on average, 60 percent of the world GPD; a fact that, when combined with the growing share of the elderly population mentioned earlier, makes it easy to understand why the study of elderly consumption has become increasingly relevant for macroeconomic and fiscal policy implications. Particular attention has been put by researchers on the effect of retirement on household consumption, due to a phenomenon referred to as the "Retirement-Consumption Puzzle". The Retirement-Consumption Puzzle (RCP) consists of a sharp decline in household consumption that happens at retirement; in the last three decades, it has been observed from the data of different household surveys. Researchers have dubbed this consumption decline a "puzzle" because it violates the Life-Cycle or Permanent Income Hypothesis (LC/PIH; Modigliani and Brumberg, 1957; Friedman, 1957), which, to put it simply, predicts that the retirees' consumption should remain stable at the passage from work to retirement, as the newly retired begin to use their pool of savings

to compensate for the reduction in income experienced when exiting the job market, and thus maintain a smooth level of consumption.

Most of the academic works on the RCP have been focused on understanding the possible causes behind this "puzzle", with the main objective being to reconcile it with the LC/PIH model. The first chapter of this dissertation investigates the RCP, but with a different approach with respect to the established literature. The objectives are, first, to understand if the RCP is still present in Italy using recent data, and then, to study the heterogeneity of the consumption decline at retirement, to answer the question of who is affected most by it; this is achieved by distinguishing between genders, to estimate differences in the effect of retirement based on the gender of the household head, and by estimating the consumption decline due to retirement at different parts of the wealth distribution.

From an econometric point of view, establishing the causal effect of a treatment such as retirement is particularly challenging, as the "when to retire" decision is, by nature, endogenous. To address this self-selection bias, I adopt an estimation strategy which has been proven to be reliable by researchers in different scientific fields that studied the effect of retirement on, for example, obesity risk, food consumption habits, depression risk, consumption, and subjective well-being, to name a few. These studies implement an Instrumental Variable (IV) approach, where the retirement decision is instrumented by the eligibility for retirement, which depends on exogenous rules and requirements. More precisely, for the first chapter of this dissertation, I follow the methodology devised by Battistin, Brugiavini, Rettore and Weber (2009), which estimated the effect of retirement on consumption in Italy for the period 1993-2004. Using the same survey, that is the Survey on Household Income and Wealth (SHIW), I analyze the period between 2010 and 2016, and construct the eligibility instrument by considering the Italian pension system rules, requirements, amendments, and reforms applied in the last century by the Italian governments. The resulting eligibility instrument proved to be a strong predictor of the retirement decision, with a jump of 78 percent in the share of retired household between one year before, and one year after, being eligible for retirement. This discontinuous jump is exploited to apply a regression

discontinuity design approach, where only the households that are close to the eligibility point are considered in the regression model.

The resulting estimated non-durable consumption decline is equal to 12.3 percent for the whole sample. When distinguishing between the gender of the household head, female households experience a non-durable spending decline is equal to 19.9 percent, where for male household the decline is less than half and equal to 8.2 percent. This estimated gender-based consumption gap is likely due to the gender pay-gap that females experience during their working life; the size of the pension check received at retirement is mostly based on the amount of pension contributions paid during the working life, and, due to the gender pay-gap, women on average pay a lower amount of pension contribution with respect to men; this ultimately translates into lower pension benefits, and consequently on the disposable income and related consumption at retirement. This mechanism is supported by the literature on the subject and also by the data; I estimate that the gender pay-gap before being eligible for retirement is equal to 8 percent, while the gender pension-gap after the eligibility is equal to 20 percent.

When studying the heterogeneity of the consumption drop at retirement with respect to the wealth distribution, the estimated spending decline appears to be left-skewed, where the lower part of the wealth distribution faces larger declines for non-durables than the richest part of the retiring population; the second and third wealth quintiles suffer a 29.3 and 11.7 percent spending reduction, respectively, and for the fourth and fifth quintiles there is no evidence of a statistically significant decline. While the absence of a consumption drop for the richest part of the population is expected, a similar result for the first wealth quintile, the poorest households in the sample, seems odd. This counter-intuitive results might be due to the fact that this part of the population is simply unable to reduce their consumption, as it is mostly composed of essential spending. This hypothesis is supported by the data, where the monthly income of these households is almost entirely spent to pay for essentials like food and shelter, leaving no room for more spending reduction.

These results allow to draw two main conclusions. The first is that the RCP is still present in Italy in a recent period, and that it has grown in magnitude. The previous most recent paper for the Italian population (Battistin et al., 2009) estimated a 9.8

percent non-durable expenditures reduction. The observed increase in the consumption drop, from 9.8 to 12.3 percent, might be attributed in part to the period considered, when two major economic crises led most European economies into a deflationary environment with depressed consumer spending. The second finding is that the RCP does not occur homogeneously across the population; on the contrary, the consumption decline affects much more strongly female-led households and the poorest part of the retiring population. These findings underline that there are parts of the population that suffer great economic pain once entering retirement and are therefore forced to reduce their spending.

Future research from this point could focus on two directions: the first would be to study the phenomenon with respect to other households' characteristics, with the objective of being able to pinpoint more precisely which parts of the population are most at risk of suffering from consumption inequality and, more generally, from a degraded financial condition. These characteristics could be, for instance, the geographical location (rural areas versus cities or peripheries of metropolitan areas), ethnicity of the family (first versus second generation of immigrants) or civil status history (e.g., households with divorced or widowed members). The second direction would be to expand the analysis to other European countries, which would help understand if the RCP is broadly present or if it is a phenomenon that affects only specific countries, for example because of different institutions or cultural traits; this would allow to have a more comprehensive understanding of it and its possible sources and consequences.

The second chapter of this dissertation further explores the effect of retirement by expanding the target population to fourteen European countries, and by considering the household's more general economic condition. As said earlier, due to the changing world demographic structure, a rich literature has emerged on the effects of retirement on different outcomes; however, within this literature, there exists surprisingly little knowledge on the effect of retirement on the households' financial vulnerability and general economic conditions. The second part of this dissertation aims at filling this literature gap by investigating the effect of retirement on the economic and financial conditions of the European households; the fourteen countries considered are Austria,

Belgium, Czech Republic, Finland, France, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Spain, and Sweden. The economic conditions of the households are proxied by these five outcomes considered: the ability to make ends meet, the ability to afford a 7-day vacation, the ability to eat meat or vegetarian/vegan equivalent every second day, the ability to face unexpected expenses, and if the households had any arrear payments related to mortgage/rent, bills and utilities, or other essential and compulsory expenses. The data used are from the panel component of the European Union Survey on Income and Living Conditions (EU-SILC), and the period considered goes from the beginning of the survey, that is year 2004, to year 2019, for a total of sixteen annual waves. Within this period, European countries faced two subsequent economic crises, i.e., the Global Financial Crises (GFC) in 2008 and the European Sovereign Debt Crisis (ESDC) in 2011-2012. This crisis, in particular, pushed some European governments to accelerate existing pension system reforms, and some others to apply ex-novo pension system reforms, with the common objective of reducing the burden of pension benefits on public spending to avoid potential defaults. These reforms have inevitably translated into an increase of the requirements needed to access the public pension (i.e., higher minimum age and/or higher number of years of pension contribution) and into the reduction of the pension benefits perceived by pensioners.

A series of unavailable variables in the EU-SILC, such as, individuals' years of pension contribution, work starting age, retirement age and potential unemployment spells, do not allow an estimation of the causal effects between these reforms and the retirees living conditions. In addition to that, to obtain information on country's pension system rules, requirements and related amendments, an in-depth analysis would be required. Nevertheless, it is still possible to establish the causal effect between retirement and the household economic conditions by exploiting some of the available information in the EU-SILC and the minimum legal age for retirement used as an instrument for the retirement decision, and consequently to shed a light on the relationship between the pension reforms and the potential detrimental effects that the former had on retirees' economic and financial conditions.

As for the first chapter, to deal with the endogeneity attached to the retirement decision I apply an IV approach, where the instrument is the eligibility for retirement achieved

once having reached the minimum legal age for retirement. Information on the legal minimum age for retirement are collected from a series of pension system reports produced by the OECD (named "Pension at a Glance"). The estimation of the effects of retirement is then obtained through a Fixed Effects Instrumental Variable (FEIV) regression. This type of model allows to control for time-invariant unobservable characteristics by exploiting the panel nature of the EU-SILC dataset, and for time-varying unobservable characteristics, that are at the source of the endogeneity issue related to the retirement decision, thanks to the exogenous effect of the eligibility-instrument on retirement. Additionally, to further investigate the effects of retirement on the economic conditions of the household, a second treatment is considered, specifically, the number of retirees living in the family; the effect of the latter is estimated through a Fixed Effects (FE) regression model.

The results obtained show that in eleven out of fourteen countries studied, at least one of the five outcomes considered worsen due to retirement. These negative effects appear to be more widespread in northern (Finland, Netherlands, Norway, and Sweden) and continental (Austria, Belgium, Czech Republic and France) Europe than in Mediterranean and eastern European countries. For example, the retirement of the household head causes a significant decrease in the ability to afford a 7-day vacation in Finland, Netherlands, Sweden and in the Czech Republic, where, for the latter, the reduction reaches 15 percent. The ability to face unexpected expenses falls by 6 and 4 percent in Finland and Netherlands respectively, and the probability of having arrears payments increases by 5 percent in Norway. On the other hand, Mediterranean (Greece, Italy, Portugal, and Spain) and eastern (Hungary and Poland) Europe households endure less or no deterioration in their economic condition after retirement and in some cases even an improvement. For Greece, retirement has a completely neutral effect, while Italian households see a decrease of 8 percent in their ability to afford a 7-day vacation, with no other negative effects for the remaining outcome variables considered. In Portugal, the retirement of the household head is found to have positive effects on the household economic conditions: the ability to make ends meet is estimated to increase by more than 6 points, the ability to afford a 7-day vacation by 9.4 percent, the ability to face unexpected expenses by 9 percent and the probability to have had

an arrear payment is reduced by 3 percent. In Hungary there is only an increase in the ability to make ends meet by 0.5 points when and additional retiree enters the household, with no other significant effects, neither negative nor positive. Finally, in Poland, as the household head retires the probability of arrears payments decreases by 7.5 percent but the ability to face unexpected expenses also reduces by 4 percent.

This heterogeneity is indeed expected, given the large differences in the institutional settings and pension schemes across countries. In fact, according to the IMF 2021 report on the European pension system reforms (Fouejieu et al., 2021) a major difference is the timing of the reforms of the pension systems. Northern and continental Europe countries have generally started to reform their pension systems as early as the beginning of the 1990's, and have continued to do so throughout the three subsequent decades; on the other hand, Mediterranean and eastern Europe countries have either started to reform their pension systems in the mid 2000's or only after the GFC/ESDC, and/or reversed previously applied reforms. According to the IMF, the persistence and determination of European governments in wanting to implement pension reforms, aimed at achieving the long-term sustainability of pension systems, is reflected in the so-called Proportionality Measure (PM), i.e. the ratio between the pension benefits and pension contributions. The IMF report calculates it for each 5-year cohort and find that northern and continental Europe countries have seen the largest reductions in their PMs, while Mediterranean and eastern Europe countries have seen small decreases or even increases in their PMs.

While this connection is suggestive, it cannot be interpreted as a definitive explanation to the observed heterogeneity. Still, it deserves further analysis which, together with other country-specific factors regarding structure, features, and history of the pension systems can help unveiling the reasons behind the observed heterogeneity. The final part of the second chapter of this PhD dissertation exploits EU-SILC data on the frequency of bills and utilities (heating, electricity, gas, etc.) arrears to explore the impact of the wave of energy cost increase that has hit Europe in 2021-2022. For this last piece of analysis, I consider twenty-one countries: the fourteen just used plus plus Denmark, Estonia, Lithuania, Latvia, Romania, Slovakia, and Slovenia. The increase in the cost of energy, measured between November 2019 and November 2022, has been

particularly high in eastern Europe countries (Latvia, Lithuania, Estonia, Poland, Romania) as well as in some of the most advanced EU economies, namely Italy, Austria, Germany, Belgium, Netherlands and Denmark. Among these, those with the highest share of arrears payments for bills and utilities, measured as an average for the years 2018, 2019 and 2020, are Latvia, Lithuania, Estonia, Poland and Romania; these five countries will likely endure the most economic distress due to the recent inflation surge, and consequently should be on the watchlist of EU policy makers.

On the whole, the findings of this PhD dissertation can be summarized as follows:

1. The negative effect of retirement on the Italian household consumption has increased since the first decade of the 2000's and is found to be particularly large for families with female household head and for lower wealth families.
2. Retirement has also negative effects on the household quality of life, and this is true for most of the fourteen European countries analyzed.
3. There are important heterogeneities at the micro and macro-level which deserve further investigation as they could help for the design of more equal reforms or of compensating devices.
4. The recent surge in the inflation of energy prices is likely to penalize households that are more likely to be in arrears of utilities payments. These households are located in the eastern European countries.

As said at the beginning, the world is ageing fast, and thus the issues underlined by the findings of this work will continue to persist and potentially get worse over time. More research is needed to uncover their extents, with the ultimate goal to supply European, and non-European, policy makers with as much information as possible with respect to the effects that retirement has on households, allowing them to design and enforce fiscal and monetary policy measures that can help those who are most in need.

Updating the Retirement-Consumption Puzzle in Italy: Who are the most Affected?

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Abstract

In this paper I investigate the retirement-consumption puzzle in Italy for the period 2010-2016, using SHIW data. In order to address the endogeneity of the retirement decision, I estimate the effect of retirement by exploiting the exogeneity of pension eligibility in an instrumental variable approach; the IV regression is then applied in a regression discontinuity design where only households close to the eligibility point are considered. The eligibility-instrument is found to be a strong predictor of the retirement decision, and the estimated non-durable consumption drop is equal to 12.3%. When households are distinguished according to the gender of the household head, female-led households are found to undergo a consumption decline that is more than double that estimated for households with male heads. The data and the literature on the subject indicate that this large difference is likely related to the gender pay-gap that translates into a gender pension-gap. Moreover, the consumption decline appears to be concentrated in households in the lower part of the wealth distribution. Nonetheless, households in the lowest wealth quintile, do not show a significant consumption decline. The data suggests that this might be due to the impossibility for these households to further reduce their consumption at retirement, as they are mostly composed of essential expenditures.

1 Introduction

An increasing number of research papers study the consumption behaviour of retirees and near-retirement households. The growing academic interest in the elderly's consumption habits rests on both theoretical and pragmatic reasons. By 2030 the world population over 60 years of age is projected to be more than the number of children under 10 years of age (1.41 billion versus 1.35 billion) and to be over 2.1 billion by 2050. If one takes into consideration that in modern economies consumption is the largest and steadiest component of a country GPD, it is easy to understand why retirees and elderly consumption is extremely relevant from a macroeconomic perspective and for fiscal, monetary and distributive policies in particular.

From the theoretical point of view, the topic of elderly consumption has attracted the attention of several scholars due to the divergence between the (i) general economic theory which, under the life-cycle/permanent income hypothesis (Modigliani and Brumberg, 1957; Friedman, 1957), predicts that retiree inflation-adjusted expenditure should remain stable over time, and (ii) the empirical evidence of the last decades that highlights, instead, that retirees' expenditure tends to decrease prior to and after retirement, a phenomenon named the "retirement-consumption puzzle".

This paper revisits the retirement-consumption puzzle in Italy by using recent data, between 2010 and 2016, from the Survey on Household Income and Wealth by the Bank of Italy. The period considered is in the midst of the fallout of two major economic crises: the 2008 Global Financial Crisis (GFC) originated in the US and the 2011-2012 European Sovereign Debt Crisis (ESDC). Due to the resulting economic downturn, the European governments were forced to introduce a series of pension system reforms with the objective of tackling public debt by reducing the aggregate public spending. In Italy, this was achieved through the 2012 "Fornero reform", that ultimately led to a substantial tightening in the requirement for accessing the public pension. Furthermore, the crises have led most European economies into a prolonged phase of deflation and depressed consumer spending. In light of this, I believe that establishing if the retirement-consumption puzzle has been present during this period can give a valuable point of view on the condition and the vulnerability of the retiring

population, especially after considering that the share of the European elderly population at risk of poverty[1] has been steadily increasing since 2014, from 13.3%, the lowest point since this measure started to be collected, to 16.5% in 2021.

Most of the academic papers on the subject have generally focused on estimating the size of the consumption decline and then tested different hypothesis aimed at identifying the causes behind the retirement-consumption puzzle, and how these can be reconciled with the LC/PIH models. This paper adopts a different approach: after establishing the size of the consumption drop, the main objective is to study the heterogeneity of the negative effect of retirement on consumption by assessing which parts of the retiring population are the most affected. Specifically, the focus is twofold: on the gender of the household head and on the household wealth. The consumption decline is separately estimated (i) for households having a male vs female household head, and (ii) for households at different quintile of the wealth distribution.

A usual problem in these kinds of analyses is the endogeneity of the retirement decision, as the decision of when to retire is determined by individual unobservable characteristics that are likely correlated with consumption decisions. In order to control for this endogeneity and estimate the potential causal effect of retirement on spending, I follow the methodology devised by Battistin, Brugiavini, Rettore and Weber (2009) and construct an instrument, that is the eligibility to retirement, computed by considering the requirements for accessing the public pension in Italy. I then exploit the instrument exogenous impact on the retirement decision in a regression discontinuity approach.

Using the above-mentioned estimation method, estimates a 12.3 percent decline in non-durable consumption expenditure caused by the eligibility induced retirement. This result is in line with previous findings in the literature, while however underlining an increase in the size of the negative consumption decline for the Italian population, as the most recent finding preceding this is a 9.8 percent decline estimated by Battistin, Brugiavini, Rettore and Weber (2009).

[1] Elderly population includes any individual with 65 or more year of age; households are identified as being at risk of poverty if their equivalized disposable income is less than 60 % of the national median equivalized disposable income after social transfers have been taken into account. Source: Eurostat.

Distinguishing between male and female household heads yield a non-durable expenditure decline equal to 19.9 percent for households where the head is female, which is more than double the estimated drop for the male counterparts. This large discrepancy is likely due to the gender pension-gap, as supported by a rich literature on the subject that underline the gender pay-gap as the major culprit for the lower pension-checks perceived by female retirees. The lower pay received during the working life is ultimately translated into lower pension contribution payments and then lower pension benefits, as the latter are proportional to the first. This is also supported by the analysis performed in this work, where being female is associated with a more than 20 percent lower pension check, while the pay-gap during the working life is estimated to be around 7 percent.

With respect to the wealth distribution, the differences in the consumption decline highlight a left-skewed negative effect of retirement on consumption, where the second and third wealth quintiles are the only parts of the wealth distribution with a statistically significant estimate. The second wealth quintile undergoes a 29.3 percent consumption decline, which is about three times larger than the decline of the third quintile. The counter-intuitive absence of a consumption drop for households in the first wealth quintile is possibly due to the impossibility for this part of the retiring population to further reduce their expenses; as the data suggest, the monthly income of these households is mostly spent to pay for the bare minimum essentials, like food and shelter, leaving no room for more spending reduction after retirement.

Lastly, a few qualitative questions of the SHIW are exploited, to study the subjective point of view on the quality of life of the retirees with respect to those still at work but near to the retirement threshold. The aim is to detect whether the first ones perceive to be worse-off than the latter. The results suggest that there are no significant differences between the two groups; in fact, retirees report slightly less often to have “unusually low” consumption or income than workers.

The paper is organized as follows. Section 2 reviews the literature on the retirement-consumption. Section 3 presents the estimation strategy and main assumptions. Section 4 summarizes the data and its main characteristics, describes the outcomes of interest and the construction of the instrument for retirement. Section 5

presents the main results; Section 6 presents a robustness check performed with an alternative estimation strategy and Section 7 discuss the economic interpretation of the obtained results. Finally, Section 8 concludes.

2 Literature

Different authors have estimated the expenditure changes at retirement; however, the results vary from application to application. In the following literature review I present the magnitude of the estimated consumption drop from various studies in chronological order, and the different explanations that researchers have tested as possible causes of the retirement-consumption puzzle. Table 2.1 offers a summary of the literature findings discussed below.

Banks, Blundell and Tanner (1998), using UK data, were among the first to estimate a decline of around 3% in consumption at retirement, which could not be reconciled within the life-cycle model. Later, Bernheim, Skinner and Weinberg (2001) noted a similar effect for the US using panel data on food consumption from the Panel Study of Income Dynamics (PSID); for food away from home, they measure a mean reduction in spending after retirement of about 14%, and estimate a 24% and 56% change in consumption one and two years after retirement for the lowest wealth quartile in their sample, respectively. In addition, they note that the consumption drop is present also for the other wealth quartiles, but at a diminishing rate with the increase in wealth. Similarly, again for the US, Hurd and Rohwedder (2003) using the Consumption and Activities Mail Survey (CAMS) in combination with the Health and Retirement Survey (HRS), measure a 12% and 17% reduction in spending for couples and singles, respectively, by comparing pre-post retirement mean expenditures of the head of the households. By exploiting qualitative questions on expected consumption after retirement from the CAMS, they find that 92% of the near-retirement workers anticipate a consumption drop of about 20%, for both singles and couples, which is a larger drop than the realized one. Heider and Stephens (2004) also investigate the role of expectations, using the Retirement History Survey (RHS), the Health Retirement

Study (HRS) and the Panel Study of Income Dynamics (PSID) information on food consumption; via an OLS regressions, they estimate a consumption drop between 7 to 11 percent for those workers that retired when they expected to, a result the authors suggest being incompatible with the LC/PIH model.

Fisher et. al (2008) use the United States Consumer Expenditure Survey (CEX) and compute the difference between the average expenditure of retired individuals, age between 65 and 69, and that of the same individuals when they were close to retirement, i.e. between 60 and 64. They find a consumption drop of about 6% for food expenditures and of 2.5% when including also other non-durable consumption categories; in addition, they find evidence that total non-durable expenditure continues to decline at a rate of around 1% per year in the years after retirement. Similar results are found by Battistin, Brugiavini, Ettore and Weber (2009) for Italy; they estimate a consumption drop at retirement of about 14% for food expenditures and of almost 10% when including other non-durable expenditures. Specifically, using the pension eligibility threshold as an instrument for retirement, they implement a regression discontinuity approach on the Survey on Household Income and Wealth (SHIW) data for the period 1993-2004. They also assess that the drop could not be caused by liquidity constraints arising at retirement since most Italian workers receive a lump-sum payment upon it. Instead, they show that retirement is associated with a reduction in the number of components of the households, suggesting this as a possible cause of the estimated expenditure decrease. Miniaci, Monfardini and Weber (2010), also for the Italian case, implement a cohort regression analysis to test for the presence of intercept shifts for retired households with respect to all other households for the period 1985-1996; they estimate a 5.4% consumption fall at retirement as a lower bound estimate, and produce evidence indicating that work-related expenditures are those that decrease at retirement while home production of food and other goods increase.

More recently, Li, Shi and Wu (2015) exploit China's mandatory retirement policy and using a regression discontinuity approach estimate a 19% reduction of non-durable expenditure right after retirement; specifically, they find that work-related consumption and food consumed at home decrease significantly, while leisure and entertainment expenditures do not.

In another recent paper, Olafsson e Pagel (2018) use highly detailed panel data on personal finances for the Icelandic population to monitor how spending, liquid savings and consumer debt change around retirement. They fit a fixed effect regression model and show that the overall spending decreases between 9 to 13% upon retirement, and that both work-related consumption (fuel, ready-made food and clothing) and leisure-related consumption (sports and other activities) drop substantially, while other spending categories, such as alcohol bought in store and pharmacy spending, all decrease by a similar but lower amount.

Overall, from the literature it emerges that the estimated consumption drop upon retirement ranges between 2.5 to 19% for non-durables and between 7 to 14% for food expenditures. This variability in the results is likely to be influenced by the different countries considered, the different surveys used which have each their own measures of consumption, as well as the different periods considered and estimation methods employed. For the Italian case, Battistin, Brugiavini, Rettore and Weber (2009) are able to implement an effective estimation strategy, which is the same strategy applied in this work, using the eligibility to retirement as an instrument for retirement, while Miniaci, Monfardini and Weber (2010) are able to exploit detailed household consumption information using the Italian Survey on Family Budget, but are limited by the lack of information on employment and retirement statuses.

3 Methodology

The objective of this work is to establish the causal relationship between a treatment, that is retirement, and an outcome or a set of outcomes of interest, namely the households' consumption. For this purpose, I employ a research design devised by Battistin, Brugiavini, Rettore and Weber (2009) (hereafter BBRW), explained in

Table 2.1 – Literature summary

Authors	Data and country	Empirical Strategy	Estimated change
Banks, Blundell and Tanner (1998)	FES 1968-1992 UK	Estimated a predictive consumption growth model and compare it with actual consumption growth.	Consumption after retirement (63 years of age) is 3% lower than the predicted levels.
Bernheim, Skinner and Weinberg (2001)	PSID and CEX 1978-1990 US	Estimated a consumption Euler equation accounting for fixed and time-variant households characteristics.	Consumption for food away from home decrease by 14% 1 year after retirement and the consumption drop increases as wealth decreases.
Hurd and Rohwedder (2003)	HRS and CAMS 1993-1998 US	Compared the before and after retirement expected and realized expenditure changes.	Near-retirement households expected a consumption decline of about 20% while the realized one was between 12 to 17%.
Heider and Stephens (2004)	HRS - 1992-2000 RHS - 1969-1977 US	Exploited the near-retirement individual expected retirement age as instrument for retiring.	Food expenditures decreased by 7 to 11% after retirement also for those that retired when they expected to.
Fisher et al. (2008)	CEX 1984-2003 US	Measured the mean difference in food and other non-durable expenditures for individuals of the same cohort before and after retirement.	Food expenditures decreased by 6% after retirement while other non-durable expenditures decreased by 2.5%.
Battistin et al. (2009)	SHIW 1993-2004 Italy	Exploited the eligibility for retirement as an instrument for retiring in a regression discontinuity design.	Total non-durable consumption falls by 9.8% after retirement while food expenditures fall by 14%.
Miniaci, Monfardini and Weber (2010)	SFB 1985-1996 Italy	Implemented a regression analysis to test for the presence of intercept shifts for households whose head is retired compared to all other households.	Total consumption falls at retirement by 5.44% while home production of food and other goods increases.
Li, Shi and Wu (2015)	UHS 2002-2009 China	Exploited China's mandatory retirement policy to implement a regression discontinuity design using age as an instrument.	Households' non-durable expenditures drop by 19% after mandatory retirement.
Olafsson and Pagel (2018)	Meniga 2011-2017 Iceland	Implemented a fixed effect regression model to compare individuals to themselves before and after retirement.	Total non-durable expenditures decreased between 9 to 13% after retirement and both work-related and leisure related expenses decline after retiring.

Source: author's own elaboration.

further details in what follows. In the case of a treatment such as retirement, we need to deal with the major issue of self-selection into the treatment that is induced by unobservable individual characteristics. These can be for example the health condition of the individual, an information that is not included in the SHIW, or whether the households are "ants or grasshoppers", namely the subjective perception of the savings and consumption expectations, that in turn have an influence on the consumption and the "when to retire" decisions. In order to deal with this endogeneity, I apply a regression discontinuity design, where the retirement decision is instrumented by an exogenous binary variable; this dummy takes the value of one if the individual is eligible for retirement and is equal to zero otherwise.

Let Y_1, Y_0 be respectively the expenditures levels of an individual in case of retirement or not. The causal effect of retirement on the expenditure levels is hence defined as $\beta = Y_1 - Y_0$. However, β is unobservable, since, as the individual retires, Y_1 is known while Y_0 is the unknown counterfactual.

The retirement status, defined as *R,* is represented by a binary variable with $R = 1$ when the individual is retired and $R = 0$ when the individual is not retired. A regression discontinuity design occurs when R depends on an observable variable, *D,* and there exists a known point in D where the probability of being retired changes abruptly. If we define $\bar{d}$ as the discontinuity point along D, then a regression discontinuity is defined if:

$$\Pr\{R = 1 \mid \bar{d}^{+}\} \neq \Pr\{R = 1 \mid \bar{d}^{-}\} \qquad (1)$$

Where $\bar{d}^{+}$ and $\bar{d}^{-}$ are values of D marginally above and below the threshold $\bar{d}$, respectively. In the analysis presented here, D is the distance in number of years to and from the individual's eligibility for retirement. It follows that the distance to/from D can take both positive or negative values, depending on whether the individual age or number of years of public pension contributions is above or below the threshold needed to access retirement, and that individuals are allowed to retire only when $D \geq 0$.

Being eligible for retirement does not always force the individual to retire. If individuals were obliged to retire as soon as they are eligible, there would be a *sharp*

discontinuity in the probability of retirement, where the probability of retirement goes from zero to one conditional on having a certain age or number of years of contribution, or formally $\Pr(R) = 1 \mid D \geq 0$. Such environment of mandatory retirement is exactly what Li, Shi and Wu (2015) exploit to estimate the effect of retirement on consumption in the Chinese population.

In the context of this paper, being eligible implies that the probability of retirement is lower than one, given that individuals can decide to continue working even after they gain the ability to retire. This environment describes a *fuzzy* discontinuity in the probability of receiving the treatment.

Following the seminal work by Imbens and Lemieux (2008) and the empirical implementation by BBRW, the average causal effect of retirement on consumption for those individuals around $\bar{d}$ can be estimated from the ratio between (i) the difference of the average consumption of individuals marginally above and below $\bar{d}$ and (ii) the share of retired individuals marginally above $\bar{d}$:

$$E\{\beta | R = 1, \bar{d}^{+}\} = \frac{E\{Y|\bar{d}^{+}\} - E\{Y|\bar{d}^{-}\}}{E\{R|\bar{d}^{+}\}} \qquad (2)$$

In order for (2) to yield the average causal effect on consumption it is required that in the counterfactual world where there is no retirement, there is no discontinuity of consumption around $\bar{d}$.

In the SHIW dataset, the identification of β from (2) is unfortunately undermined by measurement error in *D*, as a share of individuals self-report to be retired despite having a negative value of *D*, and hence being non-eligible for retirement (this issue is further analyzed in sub-section 4.4 and 4.5). This is potentially due to both a measurement error in the retirement status *R* and/or in the distance to and from eligibility *D*. However, given the SHIW questionnaire design and the definition[2] of R, a

[2] In the SHIW questionnaire there are two survey questions that allow to assess if the respondent is retired from work; a first question asks about the respondent employment status, and a second question asks if the individual draws a job-related public pension.

measurement error in R is unlikely; therefore, all inconsistencies in the data are assumed to be due to measurement error in D.

In order to recover the causal effect of retirement on consumption described by (2), specific conditions for the error generating process in D are needed; this can be done by assuming that the observed eligibility variable is a mixture of values measured correctly and incorrectly. Formally, is assumed that:

$$D = D^t Z + D^e(1 - Z) \tag{3}$$

Where D^t and D^e are the true and error-ridden measurements of the eligibility, respectively, and Z is a dummy variable equal to one for the correct values. This model for the error generating process is known as the *contaminated sampling model*, discussed by Horowitz and Manski (1995). Under this key assumption it is possible to identify the causal effect of retirement on consumption by the following ratio:

$$E\{\beta | R = 1, \bar{d}^+\} = \frac{E\{Y | D = \bar{d}^+\} - E\{Y | D = \bar{d}^-\}}{E\{R | D = \bar{d}^+\} - E\{R | D = \bar{d}^-\}} \tag{4}$$

Which corresponds to an IV regression where the retirement status is instrumented with the eligibility variable.[3] The practical application of this estimation strategy is reported in Section 5, along with the formal equations for the first and second stage regressions.

[3] For a detailed breakdown of the conditions necessary to obtain (4) see Battistin, Brugiavini, Rettore and Weber (2009) where they deal with the same issue on the same survey but in different waves. See also Andrew and Chesher (2009) for an analysis on the impact of measurement error in the eligibility for the treatment variable.

4 Data

4.1 The Survey on Household Income and Wealth

I use four adjacent waves of the Survey on Household Income and Wealth, covering the period from 2010 to 2016[4].

The SHIW began in the 1960s with the aim of collecting data on income and wages of the Italian households; over the years, it started to include more variables to investigate a wider range of aspects of households' economic and financial behaviour, including in depth information regarding consumption, liquid and illiquid wealth, extensive demographic information, methods of payments, debts and loans.

The survey has been conducted annually on independent surveys until 1987, while from 1989 onward it became biennial; since then, 50 percent of the sample is re-interviewed every subsequent wave, in order to create a panel component. For every wave around 8,000 households are interviewed; the unit of observation is the family, defined as all the individuals living in the same dwelling, related by blood, marriage, common-law marriage or adoption.

In this analysis the retirement and eligibility statuses are related to the head, while consumption is taken at the household level. Only workers and pensioners are included, excluding household with any other occupational category (e.g., unemployed, disabled, student, etc.) and excluding any retired household head that reports to have stopped working after the year in which they retired. In addition the top and bottom 1% of the distribution of the total non-durable consumption are excluded in order to account for outliers. The panel component of the SHIW is not exploited for the main analysis, as it is not needed in this regression discontinuity framework, although it is used in the robustness check analysis in Section 6.

[4] I could not include the 2018, 2020 and 2022 waves because as of today they are not available due to the COVID-19 pandemic, which completely prevented the elaboration of the 2018 wave and hindered the information gathering of the 2020 and 2022 waves.

Table 4.1 – Sample composition and mean differences in consumption

Year	Males			Females		
	Retired, %	Δ cons., %	N. obs.	Retired, %	Δ cons., %	N. obs.
2010	41.97	-9.14	3,495	36.81	-18.96	1,842
2012	43.61	-8.41	3,522	39.48	-17.13	1,892
2014	46.17	-6.86	3,392	42.45	-11.80	1,941
2016	43.25	-5.12	2,853	40.06	-9.40	1,700

Note: the sample is composed of either workers or retirees, hence the residual share is the percentage of workers. The difference in consumption is computed by considering the total non-durable consumption. Source: author's own elaboration.

4.2 Consumption and retirement status information

The information used for the households' expenditures comes from three different variables: (i) an aggregated measure of consumption computed by the Bank of Italy, containing every household's non-durable expense, which includes any food and non-food non-durable expenditures, bills and utilities and spending for travel and holidays, and excludes purchases of jewelry or any other durable goods, extraordinary maintenance of the household main residence, mortgage payments and any insurance policies payments, (ii) spending for food at home and (iii) spending for food out of home. Note, however, that the last two spending categories for food are not separately available for the year 2010, where there is a single variable for spending for food at and outside of home. Information on the retirement status comes from two questions, the first asking the respondents their occupational status, and the second asking if they draw any public job-related pension. A household head is considered as retired if the answer to the first question is "work pensioner" and the answer to the second question is "Yes".

Summary statistics reporting the share of retired household heads and the percentage differences for the total non-durable consumption between the two groups are reported in Table 4.1, distinguishing between male and female heads. Roughly, four out of ten households in the sample are composed of retired individuals, although among female household heads the share of workers is higher that it is for men in every year. The mean difference in the total non-durable expenditures is larger for female heads than it is for male heads, and there is a noticeable decreasing trend over time for both

groups, going from a reduction of 9 percent for males in 2010, to a 5 percent reduction in 2016; for female household heads the reduction goes from 18 percent in 2010 to 9 percent in 2016. The complete sample contains 20,637 observations, of which 64.26% are male and 42.32% are retired.

4.3 The Italian pension system

In order to accurately compute *D*, the distance in years to and from being eligible for retirement, it is necessary to consider how the requirements for retiring evolved over time, starting from the very beginning of the first form of social pension for workers in Italy, in 1919.

From 1919 to 1938, the only requirement for accessing the public job-related pension was having and age of 65 years. In this period, this age requirement was well above the average life expectancy of the Italian population, which ranged between 50 to 60 years of age. As a matter of fact, this first social pension was designed as an insurance in case the individual reached such old age, and therefore would have lost its ability to work.

From 1939 the age requirements for accessing retirement were reduced and differentiated between men and women, with 60 years of age for men and 55 years of age for women. These age requirements remained unchanged until 1991, after which a series of pension system reforms started, the first being the "Amato reform"[5], with the objective of reducing the cost of the public pension system by increasing the age required to access the old-age retirement, and the number of years of pension contribution required to access early-retirement; the latter was introduced in 1970, and heavily benefited the public sector workers until 1991, as this category of workers needed only 20 years of pension contribution, against the 35 needed for private and self-employed workers[6]. In 1996 a second major reform is applied, the "Dini reform", which introduced the requirement of having both a minimum age and a minimum number of years of pension contribution to access old-age retirement. The requirements for both old-age

[5] After the name of the Italian President of the Council of Ministers at the time. The same holds true for the "Dini reform"; while for the "Fornero reform" the name is after the labour minister at the time.
[6] In some specific cases the years of contribution required were 15 (e.g. magistrates, judges or university professors).

Table 4.2-part 1/2 – Pension requirement history in Italy

Year	Public sector				Private sector				Self-employed			
	Male		Female		Male		Female		Male		Female	
	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement
1919-1938	65	/	65	/	65	/	65	/	65	/	65	/
1939-1969	60	/	55	/	60	/	55	/	60	/	55	/
1970-1991	60	20	55	20	60	35	55	35	60	35	55	35
1992	60	35	55	35	60	35	55	35	60	35	55	40
1993	60	35	55	35	60	35	55	35	60	35	55	40
1994	61	35	56	35	61	35	56	35	61	35	56	40
1995	62	35	57	35	62	35	57	35	62	35	57	40
1996	53 and 35	36	53 and 35	36	54 and 35	36	54 and 35	36	57 and 35	40	57 and 35	40
1997	53 and 35	36	53 and 35	36	54 and 35	36	54 and 35	36	57 and 35	40	57 and 35	40
1998	53 and 35	36	53 and 35	36	54 and 35	36	54 and 35	36	57 and 35	40	57 and 35	40
1999	53 and 35	37	53 and 35	37	55 and 35	37	55 and 35	37	57 and 35	40	57 and 35	40
2000	54 and 35	37	54 and 35	37	55 and 35	37	55 and 35	37	57 and 35	40	57 and 35	40
2001	55 and 35	37	55 and 35	37	56 and 35	37	56 and 35	37	58 and 35	40	58 and 35	40
2002	55 and 35	37	55 and 35	37	57 and 35	37	57 and 35	37	58 and 35	40	58 and 35	40
2003	56 and 35	37	56 and 35	37	57 and 35	37	57 and 35	37	58 and 35	40	58 and 35	40

Source: Author's own elaboration on "Variazioni su Temi di Diritto del Lavoro" – Enrico Gragnoli (2017 – No. 1).

Table 4.2-part 2/2 – Pension requirement history in Italy

Year	Public sector				Private sector				Self-employed			
	Male		Female		Male		Female		Male		Female	
	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement	Old age retirement	Early retirement
2004	57 and 35	38	57 and 35	38	57 and 35	38	57 and 35	38	58 and 35	40	58 and 35	40
2005	57 and 35	38	57 and 35	38	57 and 35	38	57 and 35	38	58 and 35	40	58 and 35	40
2006	57 and 35	39	57 and 35	39	57 and 35	39	57 and 35	39	58 and 35	40	58 and 35	40
2007	57 and 35	39	57 and 35	39	57 and 35	39	57 and 35	39	58 and 35	40	58 and 35	40
2008	57 and 35	40	57 and 35	40	57 and 35	40	57 and 35	40	58 and 35	40	58 and 35	40
2009	58 and 35	40	58 and 35	40	57 and 35	40	57 and 35	40	58 and 35	40	58 and 35	40
2010	59 and 36	40	59 and 36	40	59 and 36	40	59 and 36	40	59 and 36	40	59 and 36	40
2011	60 and 36	40	60 and 36	40	60 and 36	40	60 and 36	40	60 and 36	40	60 and 36	40
2012	66	42	66	41	66	42	62	41	66	42	63	41
2013	66	42	66	41	66	42	63	41	66	42	63	41
2014	66	42	66	41	66	42	63	41	66	42	64	41
2015	66	42	66	41	66	42	63	41	66	42	64	41
2016	66	42	66	41	66	42	65	41	66	42	66	41
2017	66	42	66	41	66	42	65	41	66	42	66	41
2018	66	42	66	41	66	42	66	41	66	42	66	41
2019	67	43	67	42	67	43	67	42	67	43	67	42
2020	67	43	67	42	67	43	67	42	67	43	67	42

Source: Author's own elaboration on "Variazioni su Temi di Diritto del Lavoro" – Enrico Gragnoli (2017 – No. 1).

and early-retirement were set to gradually increase over time, until 2011, when the European sovereign debt crisis struck Europe.

At the wake of the crisis, the Italian pension system underwent another series of changes under the Monti government. These changes are known as the "Fornero reform" and aimed at drastically reducing the pension burden on the aggregate public spending while levelling the differences in pension requirements between men and women and between public workers, private sector workers and self-employed. The result was a general tightening of the eligibility requirements for both old-age and early-retirement. For the old-age pension, the reform set in motion a gradual increase in the legal age requirement, in order to obtain parity conditions between men and women by 2018 across all sectors. These adjustments, linked to the increase in life expectancy, were applied every three years from 2012 to 2018, and are applied every two years since 2019. Moreover, the reform imposed a gradual increase in the number of required years of contributions, with the objective of having a requirement of 46 years and 45 years of contribution by 2050 for men and women, respectively. Table 4.2 summarizes the requirements for old-age pension and for early-retirement for men and women in the public and private sectors and for the self-employed in Italy over the last century.

4.4 Eligibility status and pension requirements

In order to define the distance in years to and from the retirement eligibility D, a series of variables have been used, referred to the household head: age, number of years of pension contribution, work starting age and the year in which the individual retired; all these variables are essential to apply the right set of pension requirements. The distance D is computed by considering the requirements for each year of observations (from 2010 to 2016) for the workers and considering the year in which the household head went into retirement for the retired observations; the applied requirements are the ones displayed in Table 4.2.

To clarify this process with examples, let's consider a self-employed male worker in the observation year 2014, at that point in time he is 64 years old and has 29 years of pension contribution; his distance D will be equal to -2 years when considering his age (64-66), and equal to -13 when considering the years of pension contribution (29-

42); his distance D from being eligible for retirement is therefore -2 years, the higher value between the two, as the individual will first be eligible for old-age pensions once he has at least 66 years of age. In another example, let's consider a male retired individual that previously worked as a private sector worker. In the year of observation 2016 he is 78 years old and has 38 years of pension contribution. The year in which he stopped working is 1990, and therefore the rules applied for computing D will be those in force between 1970 and 1991. His distance D from the eligibility is equal to -8 (52-60) considering the age he had when he stopped working, and equal to 3 (38-35) considering the years of pension contribution. The distance D from being eligible for retirement for this observation is 3, given that this individual has been first eligible for retirement when he reached 35 years of contribution, and is once again the higher value between the two.

Finally, the eligibility status E is simply achieved whenever the household head D is equal to or greater than zero, $E = 1 \mid D \geq 0$.

4.5 Special cases

Apart from the requirements displayed in Table 4.2, over the last half century different Italian governments introduced various exceptions or derogations for accessing the public retirement, under specific conditions. With the available information in the SHIW, I have been able to include six of these exceptions, defined here as "special cases". These special cases have been applied after having applied the general requirements of Table 4.2, and only on those observations that declared themselves as retired, despite not being eligible for retirement. The distance to and from the eligibility D is also computed according to the different requirements within these special cases.

(i) Former public sector workers

Although in the SHIW it is possible to determine whether a worker works in the public sector, or in the private sector or is self-employed, the same is not true for all retirees, who are classified either as former self-employed or former employee, the latter possibly

being as a former private sector employee or a former public sector employee[7]. To account for at least some of these observations, any retired household head that stopped working between 1970 and 1991 and has a number of years of contribution that is between 15 and 20, is considered a former public sector employee, and his or her distance from the eligibility D is computed accordingly.

(ii) Minimum old age pension – Law n. 214/2011

In 2011, together with the Fornero reform, a minimum pension was introduced, accessible to every individual with at least 70 years of age and 5 years of pension contribution. Any non-eligible but retired individual of at least 70 years of age, with 5 years of pension contribution and that reports to be retired in any year after 2010, is considered eligible under this special case.

(iii) A.PE. – Anticipo PEnsionistico – Pension Advance

Introduced in 2016 with the law n. 232/2016 the "APE" allows any individual with at least 63 years of age to access old-age retirement by receiving an advance payment of his/her pension, which shall be paid back in 20 years after the normal age requirement for old-age retirement is achieved. The pension check received through the APE cannot exceed €1,500 per month. It follows that any household head that is retired despite not being eligible but has at least 63 years of age and receives a monthly pension check lower than €1,500, is considered as eligible under this special case.

(iv) Law n. 604/1966

In 1966 the Italian government, under the second Moro government, introduced the possibility to access an anticipated old-age pension with at least 30 years of contribution under two cases: (a) the worker is unemployed following the termination of the employment relationship due to dismissal or collective dismissal, resignation for just cause or consensual termination; (b) the worker suffers a reduction in working capacity

[7] Within the "former employee" classification there is a specification for the former working sector (NACE); for those household heads that state that their former working sector is "Public administration" the rules applied are the ones of Table 4.2 and are not considered to be under any of the "special cases".

of at least 74%, or the worker assists the spouse or a first degree relative living in the household with an impairing disability. Under this special case, any worker that is retired despite not being eligible, and has at least 30 years of pension contribution and refers to be receiving a disability support allowance form a public institution, or has been unemployed, is considered eligible.

(v) Deroga Amato – Amato exception

An exception introduced in 1992 together with the Amato reform that is still active as of today, allows a worker to retire with at least 15 years of contribution and 67 years of age. The requirements are that the 15 years of contribution are placed before 1993, and that the worker received the authorization for voluntary contribution scheme before 1993. Hence, any worker that has at least 15 years of contribution paid before 1993, is 67 or older and is retired despite not being eligible as per Table 4.2 requirements, is considered as eligible under this special case.

(vi) Opzione contributiva Dini – Dini contributive option

Similarly to the previous special case, in 1996 an exception was introduced alongside the Dini reform. This exception allowed any individual with at least 15 years of pension contribution to retire, under these rules: having less than 18 years of pension contribution, having at least one year of pension contribution placed before 1996 and having at least 5 years of pension contribution from 1996 onward. Therefore, any worker that has more than 15 but less than 18 years of contribution, of which at least one is placed before 1996 and 5 after 1996, and is retired despite not being eligible, is considered as eligible under this special case.

4.6 Distance to and from eligibility

Table 4.3 shows the average share of retired heads by the distance to and from their eligibility, limited to ±5 years, for the complete sample and distinguished between males and females household heads. Figure 4.1 displays the same share of retired household

heads over the distance to and from their eligibility, limited to ±10 years, for male and female heads distinguishing for each year of observation.

From the two figures it can be observed that there is indeed a relatively small but non-negligible share of individuals that are retired though not yet eligible for retirement. However, as anticipated in Section 3, this does not prevent us to obtain the causal effect of retirement on consumption when the retirement status is instrumented by the eligibility status. Indeed, as can be seen from the discontinuous jump in the share of retired household heads as soon as their distance from the eligibility point is at or greater than zero (Table 4.3 and Figure 4.1) it is clear that the eligibility has a strong explanatory power on the retirement decision. There seems to be no significant differences between the share of retired males and females heads, and also across the different years of observation, except for the year 2010, where the share of retired heads jumps to less than 80%, instead of at/over 80% for the remaining years.

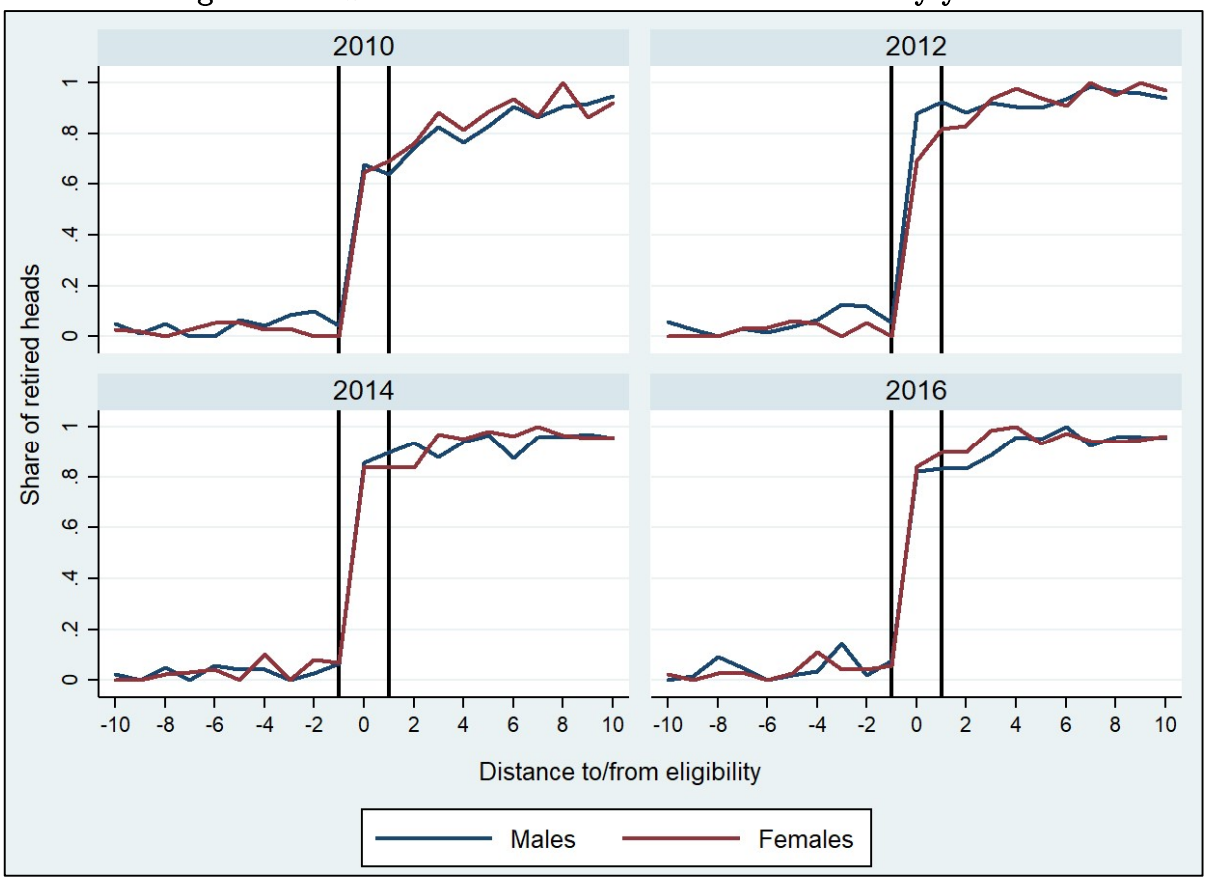
The share of retired households over the distance to and from the eligibility obtained by Battistin, Brugiavini, Rettore and Weber (2009) for the years of observation 1993-2004 also displays a significant jump in the probability of retirement at the threshold, going from 2.5% of retired individuals at $D = -1$ to 62.6% at $D = 1$. However, the discontinuous jump obtained in this work is 18% larger, from 4.8% to 82.8%. This is likely the consequence of the tightening of the requirements to access the public pension applied over the last decades, especially with the Fornero reform. More stringent requirements in terms of age and years of contribution increase the probability that a worker will work until the first are met and will retire as soon as he or she can. On the contrary, with easier requirements to access retirement, meaning a lower age and/or less years of contribution like in the pre-Fornero reform, there is a higher probability that a worker will continue to work some more years simply because is still perfectly capable to do so, physically and mentally and may still enjoy working. This is also reflected in the share of retired heads over the years: in the year 2010, before the Fornero reform, the share of retirees exactly at the eligibility point $D = 0$ is smaller, around 67%, while it is over 80% in the years after the reform.

Table 4.3 – Share of retired heads over distance to/from MRA

Distance to/from eligibility	Total	Males	Females
-5	0.0411	0.0444	0.0357
-4	0.0529	0.0453	0.0666
-3	0.0625	0.0851	0.0200
-2	0.0554	0.0606	0.0425
-1	0.0478	0.0555	0.0349
0	0.8013	0.8167	0.7612
1	0.8279	0.8300	0.8230
2	0.8466	0.8547	0.8309
3	0.9098	0.8809	0.9452
4	0.9111	0.8950	0.9409
5	0.9184	0.9093	0.9385

Notes: the distance to and from eligibility is measured in years and is computed as described in sub-section 4.4 and 4.6. Source: author's own elaboration from SHIW data.

Figure 4.1 – Share of retired male and female heads by year



Source: author's own elaboration from SHIW data.

5 Results

As discussed in Section 3, the Local Average Treatment Effect of retirement on consumption can be estimated from equation (4), which corresponds to an instrumental variable regression in which the treatment, that is retirement, is instrumented by the eligibility status, and by considering only observations that are close to the threshold point $D = 0$. The IV regression is implemented by considering cells, rather than the single observations, composed of sample averages by year of observation and distance to and from the eligibility. For the complete sample and considering only cells within ±10 years from the eligibility and excluding those exactly at the eligibility point at zero, for which the questions on consumption could refer to both pre and post retirement, the total number of observations is 8,725, with an average number of observations per cell of 109, a minimum of 38 and a maximum of 209, for a total of 80 cells[8]. Formally, the first-stage of the IV regression takes the following form:

$$R_{d,t} = \beta_0 + \beta_1 E + \beta_2 D + \beta_3 D^2 + \varepsilon_{d,t} \quad (5)$$

Where $R_{d,t}$ is share of retired heads taken as sample average by the survey year, t, and by the distance, d, to and from the eligibility. E is the dummy variable for the eligibility status, which instruments the retirement status, and is equal to one whenever the individual distance D from the eligibility point is equal or greater than zero, and is equal to zero otherwise. $\beta_2 D + \beta_3 D^2$ is a quadratic polynomial in D. The second-stage equation the is equal to:

$$Y_{d,t} = \delta_0 + \delta_1 \hat{R}_{d,t} + \delta_2 D + \delta_3 D^2 + \eta_{d,t} \quad (6)$$

Where $Y_{d,t}$ are the consumption outcomes considered, which are again taken as sample averages by the survey year, t, and by the distance, d, to and from the eligibility. $\hat{R}_{d,t}$

[8] For the year 2010 the information on spending for food at home and away from home are not separately available. Hence the year 2010 is excluded for those outcomes and the number of cells is therefore equal to 60, with an average of 108 observations per cell, a maximum of 209 and a minimum of 38.

is the estimated retirement status from the first stage regression (5), which is again indexed by t and d to stress out that is defined as sample averages by survey year and distance to/from the eligibility. Lastly, $\beta_2 D + \beta_3 D^2$ is again the same quadratic polynomial in D as in the first-stage regression (5). Both the first and second stage equations also include year dummies. The sample is restricted to values of D within -10 and 10 years, excluding those exactly at $D = 0$ since for them the information on consumption could be referred to both pre and post retirement periods.

5.1 First-stage regression

As anticipated by Figure 4.1, the instrument eligibility does have a strong predicting value on the retirement decision; the coefficient for the eligibility is equal to 0.7753 and is highly significant, with a standard error of 0.0248 and an R-squared of 0.9927, as shown in Table 5.1. This result indicates that being eligible for retirement increases the household head probability of retirement by 77.53%.

These results are similar to the one estimated by Battistin, Brugiavini, Rettore and Weber (2009): they obtain an R-squared of 0.92, and a highly significant (t-value of 11.45) eligibility coefficient, which is however smaller and equal to 0.435. This once again suggests that the increase in the requirements for accessing the public pensions has on average pushed more workers to work until they reached the necessary age or years of contribution, rather than working until they can or want to.

5.2 The effect of retirement on consumption

Results presented here are for the log of (i) non-durable expenditure, (ii) spending for food at home and (iii) spending for food out of home, and are reported in Table 5.2. The estimated coefficients show that retirement causes a drop in non-durable consumption equal to 12.27%, significant at the 1% level. Spending for food at home also shows a negative sign, although with a smaller coefficient, equal to 3.7% and not statistically significant. Lastly, spending for food out of home is the outcome that decreases the most, with a 30.58% reduction that is significantly different form zero at the 1% level. Figure 5.1 depicts the causal effect of the eligibility on the non-durable expenditures.

Table 5.1 – First-stage regression result

	Coefficient	Std. Err.	t-value	P > | t |
Eligibility	0.7753	0.0248	31.15	0.000
D	0.0090	0.0017	5.19	0.000
D^2	0.0003	0.0001	2.31	0.024
R-squared	0.9927			

Notes: results of the regression of retirement on the eligibility and a quadratic polynomial in D, as discussed in Section 5. Standard errors are heteroskedasticity-consistent. Source: author's own elaboration from SHIW data.

The estimated effects of retirement on the non-durable consumption are generally in line with previous findings in the literature, albeit in the upper part of the estimated consumption drops. This is possibly due to the fact that the period considered is right after a major economic recession, characterized by a deflationary environment and depressed consumer confidence, which led to larger consumption declines associated with the retirement-consumption puzzle than the ones estimated toward the end of the 19th century. To confirm this, however, more research on the retirement-consumption puzzle that focuses on recent data from other countries is needed.

Results for the food at home spending are at odds with previous findings, which often find evidence of significant declines for food expenditure after retirement. See for example Bernheim, Skinner and Weinberg (2001), Heider and Stephens (2004), Fisher et al. (2008) and BBRW; the latter estimated a 14% reduction in spending for food in Italy, in the period 1993-2004.

However, these studies, except for Bernheim, Skinner and Weinberg (2001), use aggregated measures of food expenditure that include both food at home and out of home. The issue with using aggregated food expenditures is that spending for food at home is affected by leisure time, which increases after retirement and allows pensioners to spend less for food at home while maintaining the same level of perceived utility, by cooking more at home or having more time to shop for bargains.

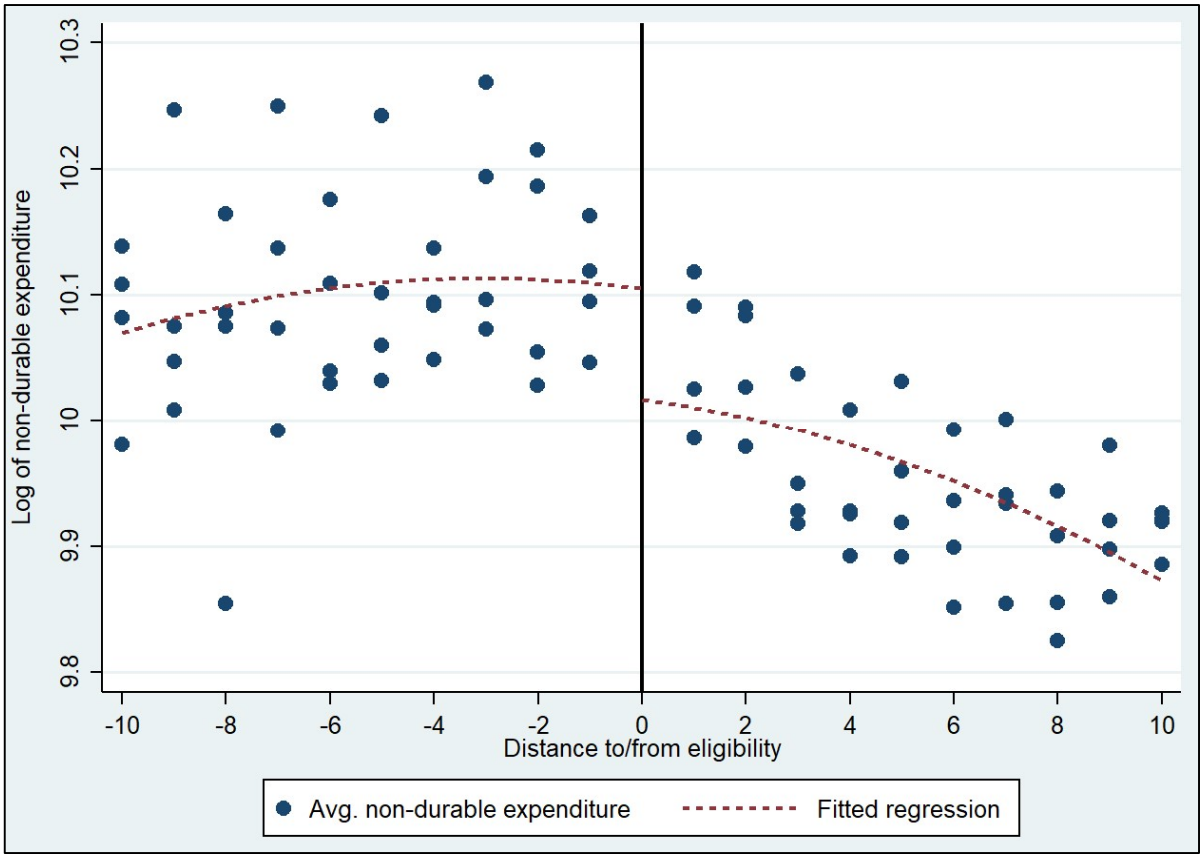
On the contrary, spending for food out of home is generally considered as a work-related expense (e.g., eating at restaurants near the workplace, or at the office/factory canteen), and is expected to decline at retirement. This work-related hypothesis is confirmed by the second-stage results, with a large and significant reduction in spending for food outside.

Table 5.2 – Second-stage regressions results

	Coefficient	Std. Err.	t-value	P > | t |
Non-durable cons.				
Retired	-0.1227	0.0348	-3.52	0.000
D	-0.0020	0.0026	-0.76	0.448
D^2	-0.0006	0.0002	-2.88	0.004
Food at home				
Retired	-0.0373	0.0514	-0.73	0.468
D	-0.0060	0.0041	-1.45	0.148
D^2	-0.0004	0.0003	-1.24	0.217
Food out of home				
Retired	-0.3058	0.0789	-3.87	0.000
D	0.0006	0.0056	0.12	0.904
D^2	-0.0008	0.0005	-1.79	0.073

Notes: non-durable consumption, spending for food at home and spending for food out of home are taken as log values. The coefficients for spending for food at home and out of home are estimated excluding the year 2010, for which the information on food expenditure is available only in aggregated form. Standard errors are heteroskedasticity-consistent. Source: author's own elaboration from SHIW data.

Figure 5.1 – Quadratic-fit regression of non-durable expenditure



Source: author's own elaboration from SHIW data.

Changing the depth of the year-band chosen affects the magnitude of the estimated coefficients while not influencing their direction, with the negative effect of retirement decreasing as the year-band also decreases. For distances of ±5, 6, 7, 8 and 9 years the drops for non-durables are equal to 6.8, 9.8, 9.7, 10.7 and 12.6 percent, significant at the 10, 5, 5, 5 and 1 percent, respectively. Over the ±10-year distance threshold the estimated coefficients remain stable, ranging between 12 to 13.3%, while the t-values increase marginally.

5.3 Male versus female household head

A dimension that has been overlooked in the literature on the retirement-consumption puzzle is the gender of the retiree. To the best of my knowledge, there has been no paper that investigated how the effect of retirement changes when the household head is female instead of male, and in the literature the households considered have exclusively been those with male head, including the work by Battistin et al. (2009), from which this paper inherits the methodological framework. While this choice is understandable for the sake of the sample homogeneity, understanding if the effect of retirement on the household's expenditure changes and how when considering male versus female retirees, is vital to assess which parts of the retiring population are most at risk of struggling to make ends meet, and in light of the ever-growing evidence on gender inequalities.

To assess the presence of a gender difference in the negative effect of retirement on consumption, the sample is divided between male and female household heads and equations (5) and (6) are estimated separately. Information on the observations that compose the cells of the two groups are reported in Table 5.3.

Table 5.3 – Cells composition for male vs. female household heads

	Male	Female
N. observations	5,739	2,276
Average	71	37
Min	19	15
Max	148	101

Notes: information on observations that compose the cells; the average, minimum and maximum values are referred to 80 cells, computed by distance to/from eligibility and calendar year, distinguishing between male and female household heads. Source: author's own elaboration from SHIW data.

The coefficients for the eligibility from the first-stage regressions are equal to 0.7564, with an R-squared of 0.9904, and 0.7986, with an R-squared of 0.9912, for men and women, respectively. From these first-stage results it appears that being eligible for retirement has a slightly stronger effect on women than on men, where the former has a higher probability to retire as soon as they are eligible than the latter.

Table 5.4 reports the effects of retirement on the non-durable consumption for men and women separately. From the estimated coefficients it appears that households with a female head experience a consumption drop caused by retirement that is more than double than the drop estimated for men: 8.22% drop for the latter, significant at the 5% level, versus 19.90% drop for female retirees, significant at the 1% level. Figure 5.2 shows the change in non-durable consumption over distance to and from the eligibility for men and women separately.

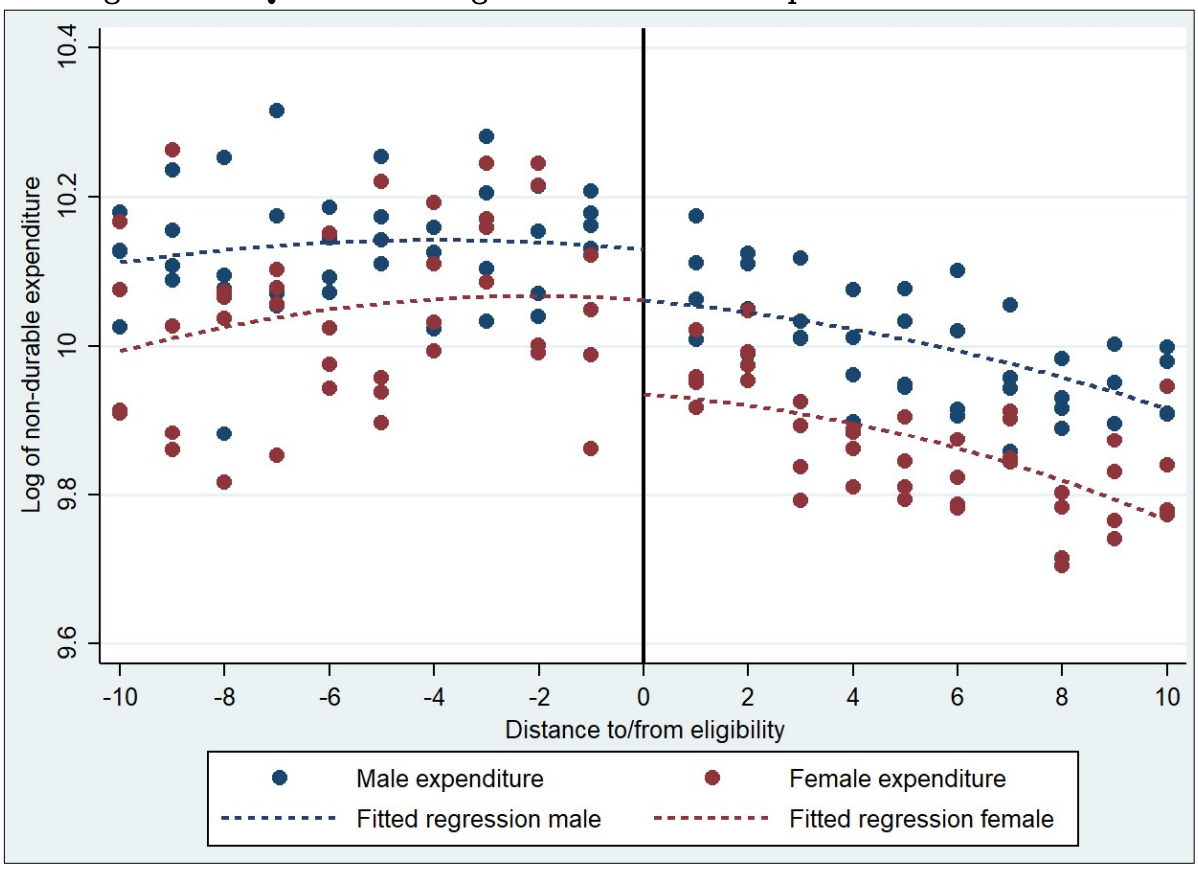
From this graph it can be observed that the difference in consumption between man and women for negative values of D is smaller than for positive values of D; the observed pre-eligibility difference between the two groups is possibly due to the gender pay-gap, which, during the working life, leads to lower pension payments for women than for men, and ultimately translates into lower pension benefits, leading to the observed wider difference in consumption for values of D above zero. This potential transmission mechanism is investigated in more details in Section 7. These results highlight that the magnitude of the negative effect of retirement on expenditures does depend on the household head gender, and that households in which the head is female endure a sharper spending decline than male heads.

Table 5.4 – Effect of retirement on consumption for male vs. female

	Coefficient	Std. Err.	t-value	P > | t |
Male				
Non-durable cons.				
Retired	-0.0822	0.0370	-2.22	0.026
D	0.0041	0.0027	-1.51	0.130
D^2	-0.0006	0.0002	-2.92	0.004
Female				
Non-durable cons.				
Retired	-0.1990	0.0542	-3.67	0.000
D	0.0007	0.0041	0.18	0.857
D^2	-0.0008	0.0003	-2.30	0.021

Notes: non-durable consumption is taken as log value. Standard errors are heteroskedasticity-consistent. Source: author's own elaboration from SHIW data.

Figure 5.2 – Quadratic-fit regression of non-dur. exp. for male vs. female



Source: author's own elaboration from SHIW data.

5.4 Differences in wealth

Another relatively overlooked dimension in the literature on the retirement-consumption puzzle is the household wealth and how the consumption decline due to retirement varies across different level of it. An exception is Bernheim, Skinner and Weinberg (2001) who observe that the average expenditure decline at retirement increases as wealth decreases. Estimating how the consumption drop caused by retirement varies with the wealth of the household allows one to assess the role played by wealth in the puzzle, and to pin down the consumption drop across wealthy and poor households.

Similarly to sub-section 5.2, to study the relationship between the wealth distribution and the consumption drop at retirement the sample is divided into five wealth quintiles[9] and equations (5) and (6) are estimated for each wealth-group. Table 5.5 reports the information on the observations that compose the cells of these five groups. Each group is composed of 1,745 observations with a mean of 21.81 observations per cell.

The five first-stage regressions resulted in a coefficient for the eligibility equal to: 0.7275, 0.8367, 0.7946, 0.7756 and 0.7175; and a R-squared equal to: 0.9780, 0.9912, 0.9854, 0.9822 and 0.9733; listed from the first to the fifth wealth quintile, respectively. The coefficients remain high, even though with some variation, especially for the fifth wealth quintile that has the lowest coefficient for the eligibility.

Table 5.6 report the second-stage regression coefficients for the effect of retirement on non-durable consumption for each wealth quintile separately. These results show that for retirees in the poorest and richest wealth quintiles there is no significant negative effect of retirement on non-durable expenditures, while there is a strong and highly significant negative effect for the second wealth quintile, with a 29.27% spending decline. The third wealth quintile also displays a spending reduction, about 11.7%, significant at the 1% level, while the second richest quintiles, that is the fourth quintile, presents a 7.5% decline that is however only weakly significant.

[9] The wealth quintiles are computed after having removed observations over the ±10-year distance and from the eligibility point and at $D = 0$, as described in Section 5.

Table 5.5 – Sample composition of wealth quantiles

	W1	W2	W3	W4	W5
Median	21	20	20	20	20
Std. Dev.	8.6	9.17	10.03	8.63	9.31
Min	6	6	5	4	8
Max	44	46	51	48	55

Notes: information on the observations that compose the cells; median, standard deviation, minimum and maximum are related to 80 cells, computed by distance to/from eligibility and by calendar year, distinguishing between wealth quintiles where W1 is the first wealth quintile and W5 is the fifth wealth quintile. Source: author's own elaboration from SHIW data.

From these results it appears that the negative effect of retirement on spending is largely concentrated in the center-bottom part of the wealth distribution, where a significative and negative sign is observed for the second and third quintiles, while also being strongly skewed toward the lower quintiles and the poorest part of the retiring population, due to the very high and highly significant coefficient estimated for the second quintile.

While not observing a consumption decline for the fifth wealth quintile can be expected, the absence of a negative effect on the first wealth quantile is instead at odds with previous findings in the literature and seems rather counter-intuitive. An explanation for this result could lie in the fact that for this part of the household population is actually rather difficult to reduce consumption, simply because most of their household spending is for essential items like food, shelter and bills and utilities[10]. This aspect is further analyzed in Section 7.

[10] A similar remark is often made to explain why poor households finds it difficult to protect themselves against rising inflation.

Table 5.6 – Effect of retirement on consumption for wealth quintiles

	Coefficient	Std. Err.	t-value	P > | t |
1st Wealth quintile				
Non-durable cons.				
Retired	-0.0546	0.0761	0.72	0.473
D	-0.0085	0.0055	-1.56	0.118
D^2	-0.0001	0.0040	-0.25	0.802
2nd Wealth quintile				
Non-durable cons.				
Retired	-0.2927	0.0515	-5.68	0.000
D	0.0037	0.0035	1.06	0.282
D^2	-0.0006	0.0003	-2.24	0.025
3rd Wealth quintile				
Non-durable cons.				
Retired	-0.1167	0.0375	-3.11	0.002
D	-0.0029	0.0027	-1.06	0.290
D^2	-0.0006	0.0002	-2.65	0.008
4th Wealth quintile				
Non-durable cons.				
Retired	-0.0753	0.0506	-1.49	0.137
D	-0.0041	0.0036	-1.13	0.256
D^2	-0.0004	0.0003	-1.51	0.130
5th Wealth quintile				
Non-durable cons.				
Retired	-0.0166	0.0652	-0.26	0.798
D	-0.0071	0.0041	-1.72	0.086
D^2	-0.0001	0.0003	-0.26	0.797

Notes: non-durable consumption is taken as log value. Standard errors are heteroskedasticity-consistent. Source: author's own elaboration from SHIW data.

6 Alternative estimation strategy

The estimation strategy presented in Section 3 does not exploit the panel component of the SHIW, as it is not necessary for the estimation of the parameters of interest. In order to exploit the time dimension that the data offers and also to provide a robustness check to the main results presented in Section 5, a novelty estimation strategy is proposed, where the treatment of interest is identified by the passage, for the household head, from being a worker in a survey year to being retired in the subsequent survey year. In other words, the household head changes status between one year of the survey and the next. A propensity score in then used, estimated from the probability of retiring giving a set of covariates, to match the treated observations with untreated observations that have similar individual characteristics. The Average Treatment Effect on the Treated is estimated by calculating the mean difference of the expenditures level, taken at the time of the treatment assignment, between the two groups. The use of a propensity score allows to tackle the endogeneity problem due to self-selection related to the retirement decision, while also exploiting the panel-data dimension of the SHIW, which gives the possibility to estimate the propensity score using covariates measured before the treatment assignment and therefore reduce any endogeneity issue between treatment and controls.

6.1 Sample selection

Nine adjacent waves of the SHIW are used, from 2000 to 2016, and as for the main analysis, the unit of observation is the head of the household. The sample is selected following the same rules applied in sub-section 4.1, with the difference that only panel observations are kept and a further selection based on the age of the household head is applied, where any individual whose age is less than 50 or more than 80 years is excluded from the analysis[11]. This is done in order to avoid comparing young individual that have

[11] From the literature no clear preferences emerge for the age selection of the sample: Banks et al. (1998) apply an arbitrary ±7 years from the official age of retirement. Hurd and Rohwedder (2003) exclude individuals below 50 and above 80 years of age. Fisher et al. (2008) excludes individuals below 50 years of age. Olafsson and Pagel (2018) exclude individuals below 60 years of age.

a very low probability of retiring with older individuals that have a high probability of retiring. The final sample contains only individuals that either went from the working status to the retirement status or that remained in the working status in two subsequent years of observations. In total we are left with 3,670 observations of which 582 are treated, resulting in 6.3 potential controls for each treated individual.

6.2 Treatment status

The treatment status is identified whenever a household head is working at time *t* and is retired at time *t+1*, where the treatment is assigned at *t+1*. On the contrary, any household head that is working at time *t* and is still working at time *t+1* is considered as a control in the period *t+1*. To fix ideas with examples, imagine there is an individual that is working in 2008 and is then retired in 2010; this individual will receive the treatment status in the year 2010. If instead, and individual is working in both 2008 and 2010, it will be considered as a control in the year 2010.

The analysis is conducted on the nine waves altogether, instead of being performed separately every two waves, due to the low number of treated observations present in each adjacent wave.

6.3 Empirical strategy and implementation

To establish the causal relationship between retirement and consumption while controlling for the the self-selection bias attached to the retirement decision, a matching score is estimated, which allows to obtain a control group with similar characteristics as the treatment group. Formally, the Average Treatment Effect on the Treated (ATT) is given by:

$$ATT = E[Y(1)|T = 1] - E[Y(0)|T = 1] \quad (7)$$

Where T is the treatment indicator that equals one if the individual goes from being a worker to being retired and zero otherwise. The second term of (7) is the mean outcome for the treated in a world where they have not received the treatment and is the unobservable counterfactual. A possible substitute for this counterfactual term is the

mean outcome of the untreated, namely $E[Y(0)|T=0]$. This can be used under the validity of one assumption, namely the Conditional Independence Assumption (CIA), which states that, conditional on a set of observed characteristics *X*, the outcomes of interest in case of treatment *Y(1)* or not-treatment *Y(0)*, are independent of the treatment status. Under this assumption, the ATT is then given by:

$$ATT \mid X = E[Y(1)|X,T=1] - E[Y(0)|X,T=1] \tag{8}$$

Where *X* is a highly dimensional vector composed of a wide range of the household head individual and family characteristics that need to be accounted for to obtain unbiased estimates of the effect of retirement on consumption. To deal with this dimensionality problem, as Rosenbaum and Rubin (1983) suggest with their Propensity Score Theorem (PST), a balancing score is used, the propensity score, that is the probability of receiving the treatment given the individual observed covariates *X*. The PST is a corollary of the CIA, which can be written as:

$$Y(0), Y(1) \perp\!\!\!\perp \mathrm{T} \mid P(X), \forall X \tag{8}$$

Where the outcomes in case of treatment and non-treatment are independent of the treatment itself if conditioned on the probability of receiving the treatment, given the set of controls *X*.

Given the above premises, the probit[12] regression model for the estimation of the propensity score is the following:

$$T_i = \gamma_0 + \gamma_1 C_i + \gamma_2 X_{i,t} + \gamma_3 Z_{i,t-1} + \tau_i \tag{9}$$

Where T_i is a binary variable that equals one if the household head went from working to being retired and equal to zero if he or she continued working. C_i is a categorical variable that marks from which coupled waves the observation *i* originates from, going from a value of 1 for the years 2000-2002 up to a value of 8 for the years 2014-2016. C_i

[12] When the treatment is binary, logit and probit models yield similar results (Caliendo and Kopeining, 2008)

is used to account for time-effect. $X_{i,t}$ is a vector of time invariant characteristics whose values are taken at time t (e.g., for the coupled years 2008-2010, time invariant characteristics of the household are taken in the year 2010) and account for gender, years of education, the area of residence, expressed as north, centre or south, the number of income perceivers in the household and a dummy variable for the ownership of the household main residence. While $Z_{i,t-1}$ is a vector of time variant characteristics whose value as taken at time *t-1* (e.g., for the couple years 2008-2010, time variant characteristics of the household are taken in the year 2008) and account for age, years of pension contribution and income.[13]

After the estimation of the propensity score, the next step is the matching between treated and control individuals. Different matching algorithm can be used; in this case, the matching algorithm chosen is the nearest neighbour (NN) matching algorithm with replacement and without oversampling. With the NN matching the individual from the control group chosen as a match for the treated individual is simply the one with the closest propensity score. With replacement means that the same untreated individual can be used more than once as a match, and without oversampling means that the treated individual will be compared to only one untreated, instead of a number n of untreated individuals. NN is the chosen matching algorithm due to it being the most straightforward and widely used matching method in the literature.

6.4 Results

Similarly to the main results presented in Section 5, the effect of retirement is estimated with respect to three dimensions: (i) for the complete sample, (ii) by distinguishing between male and female heads and (iii) by excluding the first and bottom tertile of the wealth distribution[14]. The outcome for consumption considered is the total non-durable consumption. The results for the estimated ATT are reported in table 6.1.

[13] Time variant variables are taken before the assignment of the treatment to avoid a potential endogeneity issue in which these time-varying characteristics are influenced by the treatment itself, if taken at the time of the treatment (Caliendo and Kopeinig, 2005).

[14] Due to the low number of treated observations, any further subdivision of the sample (e.g., quartiles or quintiles) would result in unbalanced treatment and control groups, yielding biased estimates.

For the complete sample the consumption drop is equal to 8.23 percent and is significant at the 5% level. When controlling for gender no significant drop is estimated for both groups, while when excluding the richest part of the sample, meaning those in the third wealth tertile, the negative effect of retirement is equal to 8.65 percent significant at the 5% level, and equal to 5.6 percent significant at the 10% level when the poorest households are excluded.

The estimated effect of retirement on consumption using the propensity score estimation strategy is overall lower than the estimates from the regression discontinuity design. This is likely due to the fact that with the PS strategy the change in expenditures due to retirement is measured right after retirement happen, while with the RDD the effect is estimated within a 10-year distance from the eligibility point. This is supported also by the estimates obtained when reducing the distance to and from the eligibility point: the negative effect of retirement increases from 6.8% with a $\pm$ 5-year distance to a 12.3% estimated drop with a $\pm$10-year distance.

The differences with respect to the gender of the household head are very low and non-significant, which is at odds with the findings in the RDD estimates; this could be due to the composition of the two sub-samples, given that, for households with a male head, household income is unbalanced between the treated and matched controls, while for the households with a female head the unbalance is for the number of income perceivers in the household, the geographic area of residence and for the years-controls, on top of a low number of treated observations. The results based on wealth are instead in line with the RDD estimates, although of a smaller magnitude for the reason explained above. The direction of the estimated effect seems to confirm the general hypothesis that households with less disposable wealth will be forced to decrease their consumption more due to retirement than richer households.

Except for the male versus female comparison, in all the other cases the groups of treated and controls are balanced for every time-variant and time-invariant controls included in (9). The tests results for the means of the controls versus treated are reported in the appendix from Table A.1 to Table A.5

Table 6.1 – PS estimation results

	Cons. drop	Std. Err.	# Treated	# Untreated
Complete sample	-0.0823**	0.0319	582	3,088
Male	-0.0316	0.0372	446	2,197
Female	-0.0384	0.0687	136	891
$>1^{st}$ tertile	-0.0560*	0.0322	425	2,095
$<3^{rd}$ tertile	-0.0865**	0.0397	353	1,961

Notes: ***1% significance level, **5% significance level and *10% significance level. The # of treated and untreated is referred to the number of treated observations and the number of potential controls. Source: author's own elaboration from SHIW data.

7 Results' economic interpretation

In Section 5 it has been estimated that the expenditure decrease associated with retirement is (i) larger for those households that have a female head relative to household with male heads, and (ii) for the lower-wealth households relative to higher-wealth households. In this section, the mechanisms behind these findings are investigated. In addition, an array of qualitative subjective questions is also exploited, with the objective of exploring how retirees perceive their overall quality of life with respect to workers. The sample considered is the same used for the RDD estimations of Section 5.

7.1 Gender pay-gap translates into gender pension-gap

A possible explanation for the gander-based difference estimated in sub-section 5.2 could lie in the gender pay-gap. During the working life, the lower salary perceived by women is translated into lower pension contribution payments, on which part of the pension check is ultimately computed, leading to lower disposable income and, ceteris paribus, lower consumption levels. This transmission mechanism is corroborated by a rich literature that studies the gender pension-gap (Zhao and Zhao, 2018; Amarante, Colacce and Manzi, 2017; Smith-Carrier, Penner, Cecala and Agòcs, 2021, among others.); this literature indicates as major culprits for the lower pension benefits received by women

(i) the lower female labour market participation, (ii) the temporary career interruptions due to pregnancies and (iii) the lower pension contribution payments related to the gender pay-gap, of which the latter is considered to be the main explanation for the gender pension-gap (Frericks and Maier, 2008; Bonnet, Meurs and Rapoport, 2020).

Within the SHIW questionnaire there are unfortunately no questions regarding the amount of pension contributions paid, an information that could have been used to investigate the first step in the above-mentioned mechanism that leads to lower pension checks for women. To investigate this hypothesis an OLS regression is run on a sub-sample of household heads that have a distance from the eligibility point between 1 and 5 years. The OLS regression has the log of the monthly pension allowance as the dependent variable, and gender (equal to one for female and zero otherwise) as the independent variable of interest, plus a lengthy list of controls[15] including demographic and economic characteristics and any variable that has an influence on the amount of the pension allowance, like the years of pension contribution, the job before retiring and the year in which the individual retired, among others.

The estimated coefficient for gender is equal to -0.2016, significant at the 0.1% level, indicating that being female is associated with a more than 20% lower pension check. If instead only households with a distance to the eligibility point between -1 and -5 and are considered, and an OLS regression with the job-income as dependent variable and gender as the independent variable of interest plus the same set of controls (except for the year in which the individual retired) is ran, the coefficient for gender is equal to 0.0775 significant at the 5% level, indicating a 7.75% gander pay-gap.

These results highlight that, after retirement, there is indeed a widening of the difference in the income perceived based on the gander of the household heads, which likely contributes to the larger consumption decline estimated for women in sub-section 5.2.

[15] The complete set of controls includes: the education level, age, the geographic area of residence, number of family components, number of income perceivers, income, wealth, ownership of the household main residence, job had before retiring, years of pension contribution, year in which the individual retired, calendar year and the distance from the eligibility point.

7.2 Essential spending and negative buffer-stock

The magnitude of the expenditure drop caused by retirement is inversely correlated with wealth, where the poorer the household, the larger the consumption decline, as discussed in sub-section 5-3. This is also what Bernheim, Skinner and Weinberg (2001) find for the US, where the consumption drop after retirement increases as the pre-retirement disposable wealth decreases. However, the findings in this analysis highlight a large discontinuity in the consumption decline between the first and second wealth quintile, where for the first quintile there is a non-significant 5.4% reduction and for the second quintile the reduction is around 29% and is highly significant.

The explanation for this counter-intuitive discrepancy could lie in the fact that the first wealth quantile households are unable to further reduce their spending simply because their consumption is mostly composed of essential expenses, like spending for food, bills and utilities and debt repayments.

To explore this hypothesis three measures are computed; the first is the share of essential consumption over total non-durable consumption, where essential consumption is defined as the sum of spending for food at home, spending for food out of home, spending for bills and utilities, mortgage payments and rent and other annexed fees[16], and the total non-durable is the same used throughout this paper, defined in sub-section 4.2. The second measure makes use of a qualitative question present in the SHIW, which asks to the household head the following: “In your opinion, how much does it take a month for a family like yours to live without luxuries but without depriving yourselves of the essential?”. This information can be interpreted as a subjective poverty line and is used to compute the buffer-stock of the household[17]. The third measure also makes use of a qualitative question in the SHIW, that asks to the household head if, in the last year, there have been any delays of ninety days or more in the payment of the household bills. Table 7.1 presents these three measures for those households that have a distance from the eligibility between 1 and 10, divided with respect to the wealth quintile.

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[16] This measure of essential consumption it is not intended as complete, as there are other essential expenses that are unfortunately not included in the SHIW, such as spending for health and medicines.

[17] The “buffer stock” measure is computed using the following equation: buffer stock = (monthly income ÷ subjective essential income)-1; the result is then multiplied by 100 to express it as a percentage.

Table 7.1 – Comparison between wealth quintiles

	Essential share (%)	Buffer-stock (%)	Arrears bills (%)
1st Wealth quintile	65.01	-3.20	6.99
2nd Wealth quintile	52.38	17.35	1.71
3rd Wealth quintile	46.42	35.84	1.71
4th Wealth quintile	43.81	52.49	0.60
5th Wealth quintile	41.99	102.78	0.59

Notes: The wealth quintiles are defined after having excluded any household over a ±10-year distance to and from the eligibility point and after having excluded those exactly at zero. Source: author's own elaboration from SHIW data.

From the three measures it can be observed that the first quintile has the largest share of essential consumption, equal to 65 percent of the total non-durable consumption, and that there is a substantial gap between the latter and the remaining four wealth quintiles. This could indicate that for these households their consumption is already close to the minimum necessary for living, and hence cannot be reduced further. This is also supported by the buffer-stock measure, where the first wealth quantile is the only part of the household population that has a negative buffer-stock, meaning that their perceived income is lower than the self-reported amount of income needed to live without luxuries but with all the essentials. Lastly, the third measure indicates that for households in the first wealth quintile it is more than four times more likely to be at least ninety days late in paying bills than households in the second wealth quintile; this again indicates an increased likelihood for the first wealth quantile households of having inadequate disposable resources to sustain even the essential expenses.

7.3 Subjective measures

In this last sub-section, a series of subjective qualitative questions is taken into consideration, in order to assess if there are any changes in the perception of the disposable resources and general quality of life of retirees with respect to workers. The questions used are six in total and are shown and discussed below.

(Question 1 – Make end meets)

Question: "The monthly income available to your family allows you to make end meets…"

Possible answers:

1 – With much difficulty

2 – With difficulty

3 – With some difficulty

4 – Easily enough

5 – Quite easily

6 – Very easily

From this question a dummy variable is computed, which is equal to one whenever the household answer is equal to three or lower, and equal to zero otherwise.

(Question 2 – Unusual low consumption)

Question: "You told me that the average household monthly expenditure in [current year of observation] for all consumption was equal to [total non-durable consumption]. Would you say that this level of spending in [current year of observation] was unusually high, unusually low, or normal compared to what you would have thought of spending in a 'normal' year?"

Possible answers:

1 – Unusually high

2 – Normal

3 – Unusually low

From this second question another dummy variable is computed, equal to one whenever the household answer is equal to three and equal to zero otherwise.

(Question 3 – Unusual low income)

Question: "By taking into consideration your overall household income in [current year of observation], would you say that it was unusually high, unusually low or in line with the annual income you thought you would have in a 'normal' year?"

Possible answers:
1 – Unusually high
2 – Normal
3 – Unusually low

Similarly to question number two, a dummy variable is computed that is equal to one whenever the household answer is three and equal to zero otherwise.

(Question 4 – Not saved)

Question: "Think about all the sources of income of your family. Could you tell me if in [current year of observation] your family…"

Possible answers:
1 – Has spent less than the annual income, managing to increase savings
2 – Has spent all the available income, without being able to save
3 – Has spent more than the annual income, having to liquidate savings or get into debt

From this question a dummy variable is computed, equal to one when the household answer is equal to two or three, and equal to zero otherwise.

(Question 5 – Windfall lottery saved)

Question: "Suppose you suddenly receive a refund equal to what your family earns in a month. Of this sum, how much would you save and how much would you spend? Please indicate the percentage that would be saved and the percentage that would be spent".

From this question the percentage saved by the household is used as the measure of interest. This question has been asked only in the 2016 and 2010 wave, hence the reported value will be with respect to those two years of observation only.

(Question 6 - Happy)

Question: "Taking into consideration all aspect of your life, how happy do you feel? Answer by giving me a grade from 1 to 10, where 1 means 'extremely unhappy' and 10 means 'extremely happy' and the intermediate values serve to grade your answers". From this question the average score is used as the measure of interest.

Table 7.2 report the resulting measures from the qualitative questions just described, distinguishing between workers and retirees, and considering only households in which the head is within a ± 10-year distance to and from the eligibility point and excluding those household exactly at zero.

Overall, between workers and retirees it appears that there aren't any particularly large differences in the answers to the qualitative subjective questions considered. However, even if by small margins, some differences do emerge; with respect to workers, retirees report slightly less often to struggle to make ends meets and to have an unusual low consumption or income. This is in a way in contrast to the results obtained in Section 5 and 6, suggesting that the consumption drop do exist and can be measured objectively, but that retirees may not experience it from a subjective point of view.

The share of households that report to not being able to increase their savings is instead essentially the same between the two groups, and the same can be said for the 'happy' score. Lastly, retirees report a slightly higher share of windfall lottery saved than workers, although again the difference between the two groups is relatively small.

Table 7.2 – Responses to subjective questions for workers vs retirees

	Retired	Worker
Can't make ends meets (%)	51.92	53.87
Unusual low consumption (%)	1.94	3.26
Unusual low income (%)	9.01	15.39
Not saved (%)	63.15	63.38
Windfall lottery saved (%)	57.45	53.59
Happy (1-10)	7.06	7.14

Source: author's own elaboration from SHIW data.

8 Conclusions

This paper analyses the reduction in consumption that is caused by retirement in Italy, with a particular focus on the heterogeneity of this latter with respect to the gender of the household head, and the household wealth. The data exploited are four waves from 2010 to 2016 of the Survey on Households Income and Wealth (SHIW), which collects micro data on households spending and other demographic and wealth information. In order to tackle the endogeneity related to the retirement decision, this work follows the estimation strategy devised by Battistin et al. (2009), where the exogeneity of the eligibility for retirement is used as an instrument for the retirement decision. This instrumental variable strategy is then applied in a regression discontinuity design approach, where only households close to the eligibility threshold are considered. A substantial share of the household heads retires as soon as they are eligible, with the fraction of pensioners jumping from 4.8% one year before being eligible, to 82.8% one year after being eligible.

The estimated eligibility-induced retirement consumption drop is equal to 12.3%, when considering non-durable consumption, equal to 3.7% for food at home expenditures, albeit non statistically significant, and equal to 30.6% for food out-of-home spending. These results highlight that, first a consumption decline associated with retirement is still present in a more recent period in Italy, and second, that there is an increase in the magnitude of the negative effect of retirement on consumption, since the

previous study (Battistin et al., 2009) that analyzed the Italian population for the period 1993-2004 using the same data source and estimation strategy, found a 9.8% decline in non-durables expenses.

The small and non-significant decline in food at home spending and the large and highly significant decline for food out-of-home expenditures also highlight that some of the previous findings in the literature related to the estimated food spending decline (e.g., Heider and Stephens, 2004; Fisher et al., 2008; Battistin et al., 2009) were possibly due to the food out-of-home component, rather than the food at-home component, as the distinction between the two is a feature that has been introduced relatively recently in households surveys. Out-of-home food spending is generally considered a work-related expense, which consequently falls once the individual stops working; an explanation that is in line with the sharp reduction estimated in this work for this spending category.

When considering the gender of the household heads separately, a wide gap in the negative effect of retirement is found. Households with female heads decrease their non-durable consumption by almost 20%, while for the male counterparts the reduction is more than a half, around 8.2%. This gender pension-gap is likely due to the gender pay-gap: the amount of pension contributions paid during the working life is what ultimately determines the size of the pension check received after retiring; as female workers generally have lower wages, due to the gender pay-gap, this translates in a lower total amount of pension contributions paid with respect to male workers, which then leads to a lower pension-income. This mechanism is underlined as one of the major culprit of the gender pension-gap by recent literature on the subject (Frericks and Maier, 2008; Bonnet, Meurs and Rapoport, 2020). The present work also corroborates this explanation: the gender-pay gap estimated for workers not eligible for retirement is around 7%, while the gender gap in the perceived pension check after being eligible for retirement is estimated to be almost three times larger and equal to 20%.

When considering the wealth distribution and dividing the households sample into five wealth quintiles, the estimated non-durable consumption drops due to retirement turn out to be skewed towards the lower wealth quintiles, and heavily present in the second and third quintiles, with consumption declines of 29.3% and 11.7% respectively; whereas for the first, fourth and fifth wealth quintile no statistically

significant spending decline is estimated. While it is reasonable and expected to not have a consumption drop in the richest part of the population, namely the fourth and fifth wealth quintile, this does not hold true for the poorest part of the population in the first wealth quintile. This counterintuitive finding could be explained by the fact that the poorest part of the retiring population simply has no room for further spending reduction, as its expenses are almost entirely composed of essential expenditures like food, shelter (rent and/or mortgage), bills and utilities. This is confirmed by the data, where, for the first wealth quantile households, (i) spending for essentials is made up of 64% of the total non-durable expenditures, (ii) they display a negative "buffer-stock"[18] and (iii) they are four times more likely to have had arrears payments for bills and utilities with respect to the second wealth quantile households.

The analysis from this work confirms that the retirement-consumption puzzle is very much still alive, at least in Italy. Future research on the phenomenon should put particular attention on the heterogeneity of the effect of retirement on consumption, with respect to gender and wealth, but possibly also with respect to other individual or households' characteristics such as ethnicity or civil status history (e.g., households with divorced or widowed members). These differences can help understand which parts of the population are more at risk of suffering from consumption inequality and, more generally, from deteriorated financial and economic condition once entering retirement. The final aim is that on the basis of these results, policy makers can design and enforce measures to effectively target those in need. Expanding this research to other countries, especially in Europe, where the share of the elderly population is growing relatively faster than in other parts of the world, would also provide a more comprehensive understanding of this phenomenon and of its possible sources and consequences.

[18] Computed using the following equation: buffer stock = (monthly income ÷ subjective essential income)-1; see sub-section 7.2 for more details.

Appendix

Table A.1 – PS mean tests for treated vs. controls – complete sample

Variable	Treated mean	Control mean	t-value
Year 00-02	0.0828	0.1001	-1.49
Year 02-04	0.1082	0.0996	0.48
Year 04-06	0.1477	0.1494	-0.08
Year 06-08	0.1271	0.1254	0.09
Year 08-10	0.1443	0.1580	-0.65
Year 10-12	0.1374	0.1288	0.43
Year 12-14	0.1202	0.1030	0.93
Year 14-16	0.1323	0.1357	-0.17
Gender (female)	0.2336	0.2302	0.14
Years of education	10.13	10.53	-1.57
North	0.5173	0.5551	-1.59
Center	0.2388	0.2405	-0.07
South	0.2439	0.2044	1.62
N. income perceivers	1.90	1.93	-0.63
Homeowner	0.8367	0.8178	0.85
Age	60.27	60.35	-0.26
Years of pension contribution	29.31	29.79	-0.53
Income	48520	51311	-1.35

Notes: tests for differences in the mean of the control variables for the treated versus control group; related to the complete sample, in Table 6.1. Source: author's own elaboration from SHIW data.

Table A.2 - PS mean tests for treated vs. controls – males only

Variable	Treated mean	Control mean	t-value
Year 00-02	0.0764	0.0720	0.11
Year 02-04	0.0919	0.0919	0.00
Year 04-06	0.1345	0.1367	-0.10
Year 06-08	0.1188	0.0964	1.08
Year 08-10	0.1524	0.1502	0.09
Year 10-12	0.1435	0.1681	-1.01
Year 12-14	0.1278	0.1435	-0.68
Year 14-16	0.1547	0.1412	0.57
Years of education	9.94	9.84	0.34
North	0.5248	0.5180	0.21
Center	0.2264	0.2197	0.24
South	0.2488	0.2623	-0.46
N. income perceivers	1.93	1.87	1.32
Homeowner	0.8430	0.8430	0.00
Age	60.22	60.02	0.49
Years of pension contribution	29.41	30.132	-0.89
Income	49214	45391	2.22

Notes: tests for differences in the mean of the control variables for the treated versus control group; related to the males-only sample, in Table 6.1. Source: author's own elaboration from SHIW data.

Table A.3 - PS mean tests for treated vs. controls – females only

Variable	Treated mean	Control mean	t-value
Year 00-02	0.1029	0.0809	0.71
Year 02-04	0.1617	0.1250	0.86
Year 04-06	0.1911	0.1617	0.63
Year 06-08	0.1544	0.2352	-1.69
Year 08-10	0.1176	0.0514	1.97
Year 10-12	0.1176	0.2058	-1.98
Year 12-14	0.0955	0.1029	-0.20
Year 14-16	0.0588	0.0367	0.85
Years of education	10.75	10.90	-0.28
North	0.4927	0.5810	-1.78
Center	0.2794	0.1838	1.87
South	0.2279	0.2352	-0.14
N. income perceivers	1.78	1.63	1.70
Homeowner	0.8161	0.7573	1.18
Age	60.43	60.26	0.28
Years of pension contribution	29.50	30.52	-0.79
Income	46244	44029	0.59

Notes: tests for differences in the mean of the control variables for the treated versus control group; related to the males-only sample, in Table 6.1. Source: author's own elaboration from SHIW data.

Table A.4 - PS mean tests for treated vs. controls – >1 st tertile

Variable	Treated mean	Control mean	t-value
Year 00-02	0.0870	0.0565	1.59
Year 02-04	0.1129	0.1294	-0.74
Year 04-06	0.1623	0.1623	0.00
Year 06-08	0.1317	0.1505	-0.79
Year 08-10	0.1388	0.1482	-0.39
Year 10-12	0.1341	0.1152	0.83
Year 12-14	0.1058	0.1129	-0.33
Year 14-16	0.1270	0.1247	0.10
Years of education	10.67	10.75	-0.24
North	0.5225	0.4704	0.99
Center	0.2658	0.2352	1.03
South	0.2117	0.2352	-0.82
N. income perceivers	2.02	1.99	0.52
Homeowner	0.9741	0.9741	0
Age	60.37	60.41	-0.10
Years of pension contribution	29.27	30.12	-1.03
Income	54485	55505	-0.41

Notes: tests for differences in the mean of the control variables for the treated versus control group; related to the households above the first wealth tertile, in Table 6.1. Source: author's own elaboration from SHIW data.

Table A.5 - PS mean tests for treated vs. controls – <3 rd tertile

Variable	Treated mean	Control mean	t-value
Year 00-02	0.0849	0.0849	0.00
Year 02-04	0.1189	0.1218	-0.12
Year 04-06	0.1303	0.1473	-0.65
Year 06-08	0.1218	0.1189	0.12
Year 08-10	0.1303	0.1076	0.93
Year 10-12	0.1246	0.1614	-1.40
Year 12-14	0.1359	0.1161	0.79
Year 14-16	0.1529	0.1416	0.42
Years of education	9.23	9.56	-1.10
North	0.4930	0.4930	0.00
Center	0.2181	0.1926	0.84
South	0.2889	0.3144	-0.74
N. income perceivers	1.80	1.85	-0.93
Homeowner	0.7450	0.7535	-0.26
Age	59.95	59.93	0.06
Years of pension contribution	29.83	30.06	-0.28
Income	41229	43179	-0.90

Notes: tests for differences in the mean of the control variables for the treated versus control group; related to the households below the third wealth tertile, in Table 6.1. Source: author's own elaboration from SHIW data.

References

Amarante Verónica, Colacce Maria and Manzi Pilar (2017), "The gender gap in pensions in Latin America", *International Social Security Review, Vol. 70, N. 2.*

Banks James, Richard Blundell and Sarah Tanner (1998), "Is There a Retirement-Savings Puzzle?", *The American Economic Review, Vol. 88, No. 4, pp. 769-788.*

Baser Onur (2006), "Too Much Ado about Propensity Score Models? Comparing Methods of Propensity Score Matching", *Value in Health, Vol. 9, N. 6.*

Battistin Erich, Brugiavini Agar, Rettore Enrico and Weber Guglielmo (2009), "The Retirement Consumption Puzzle: Evidence from a Regression Discontinuity Approach", *American Economic Review, Vol. 99, N. 5, pp. 2209-2226.*

Bernheim Douglas B, Skinner Jonathan and Weinberg Steven (2001), "What Accounts for the Variation in Retirement Wealth Among U.S. Households?", *The American Economic Review, Vol. 91, N. 4, pp. 832-857.*

Blanchett David (2014), "Exploring the Retirement Consumption Puzzle", *Journal of Financial Planning, May 2014.*

Caliendo Marco and Kopeinig Sabine (2005), "Some Practical Guidance for the Implementation of Propensity Score Matching", *IZA Institute for Labor Economics, Discussion Paper No. 1588.*

Callawau Brantly and Sant'Anna Pedro H. C. (2019), "Difference-in-Differences with Multiple Time Periods", *Journal of Econometrics, Vol. 225, N. 2, pp. 200-230.*

Davey Judith (2008), "What Influences Retirement Decisions?", *Social Policy Journal of New Zealand, Issue 33.*

Fisher Jonathan, Johnson David S., Marchand Joseph, Smeeding Timothy M. and Boyle Torrey Barbara (2005), "The Retirement Consumption Conundrum: Evidence from A Consumption Survey", *Centre for Retirement Research¸ Working Paper 14.*

Freicks Patrichia R. H. and Maier Robert M. (2008), "Pension norms and pension reforms in Europe – the effects on gender pension gaps", *Community, Work & Family, Vol. 11, N. 3, pp. 253-271.*

Frericks Patricie, Knijn Trudie and Maier Robert (2009), "Pension Reforms, Working Patterns and Gender Pension Gaps in Europe", *Gender, Work and Organization, Vol. 16, N. 6.*

Fugazza Carolina and Teppa Federica (2005), "An Empirical Assessment of the Italian Severance Payment (TFR)", *Center for Research on Pension and Welfare Policies, Working Paper 38.*

Hahn Jinyong, Todd Petra and Van der Klaauw Wilbert (2001), "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design", *Econometrica, Vol. 69, N. 1, pp. 201-209.*

Haider J. Steven and Stephens Melvin Jr. (2004), "Is There a Retirement Consumption Puzzle? Evidence Using Subjective Retirement Expectations", *NBER Working Paper 10257.*

Hamermesh Daniel S. (1982), "Consumption During Retirement: The Missing Link in The Life Cycle", *NBER, Working paper N. 930.*

Hurd Michael D. and Rohwedder Susann (2006), "Some Answers to the Retirement-Consumption Puzzle", *NBER, Working Paper 12057.*

Hurd Michael D. and Rohwedder Susann (2008), "The Retirement Consumption Puzzle: Actual Spending Change in Panel Data", *NBER, Working Paper 13929.*

Hurd Micheal and Rohwedder Susann (2003), "The Retirement Consumption Puzzle: Anticipated and Actual Declines in Spending at Retirement", *NBER Working Paper 9586.*

Hurst Erik (2008), "The Retirement of a Consumption Puzzle", *NBER, Working Paper 13789.*

Lee David S. and Lemieux Thomas (2010), "Regression Discuntinuity Designs in Economics", *Journal of Economic Literature, Vol. 48, pp. 281-355.*

Li Hongbin, Shi Xinzheng and Wu Binzhen (2016), "The retirement consumption puzzle revisited: Evidence from the mandatory retirement policy in China", *Journal of Comparative Economics, Vol. 44., pp. 623-637.*

McGregor Judy and Gray Lance (2003), "Older Worker Employment Transition", *Massey University (Palmerston North) internal publication.*

Miniaci Raffaele, Monfardini Chiara and Weber Guglielmo (2003), "Is There a Retirement Consumption Puzzle in Italy?", *The Institute For Fiscal Studies, Working paper N. 03/14.*

Miniaci Raffaele, Monfardini Chiara and Weber Guglielmo, "How does Consumption Change upon Retirement?" (2010), *Empirical Economics, Vol. 38, pp. 257-280.*

Nguyen Viet Cuong (2010), "A Matching Mehod with Panel Data", *Munich Personal RePEc Archive, Paper N. 36756.*

Olafsson Arna and Pagel Michaela (2018), "The Retirement-Consumption Puzzle: New Evidence from Personal Finances", *NBER, Working Paper 24405.*

Petev Ivaylo D. and Pistaferri Luigi (2012), "Consumption in the Great Recession", *The Russel Sage Foundation and the Standford Center on Poverty and Inequality, A Great Recession Brief.*

Pienta Amy Mehraban and Hayward Mark D. (2002), "Who Expects to Continue Working After Age 62? The Retirement Plans of Couples", *Journal of Gerontology: SOCIAL SCIENCES, Vol. 57B, N. 4, pp. S199-S208.*

Rosenbaum Paul R. and Rubin Donald B. (1983), "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika, Vol. 70, Issue 1, pp. 45-55.*

Smith-Carrier Tracy, Penner Marcie, Cecala Aaron L and Agócs Carol (2021), "It's not just a Pay Gap: Quantifying the Gender Wage and Pension Gap at a Post-Secondary Institution in Canada", *Canadian Journal of Higher Education, Vol. 51, N. 2.*

Stuart Elizabeth A. (2010), "Matching methods for causal inference: A review and a look forward", *Statistical Science, Vol. 25, N. 1, pp. 1-21.*

Suari-Andreu Eduard, Alessie Rob and Angelini Viola (2019), "The Retirement-Savings Puzzle Reviewed: the Role of Housing and Bequests", *Journal of Economic Surveys, Vol. 33, N. 1, pp. 195-225.*

Weagley Robert O. and Huh Eunjeong (2004), "Leisure Expenditures of Retired and Near-Retired Households", *Journal of Leisure Research, Vol. 36, N. 1, pp. 101-127.*

Zhao Rui and Zhao Yaohui (2018), "The Gender Pension Gap in China", *Feminist Economics, Vol 24, N. 2, pp. 218-239.*

Effects of Retirement on European Households Economic Conditions

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Abstract

In this paper I study the impact of retirement on the European households' economic conditions. The countries considered are fourteen and the period considered is between 2004 and 2019; the data is from the panel component of the EU-SILC. Five outcome variables are used to proxy the financial and economic conditions of the households: the ability to make ends meet, the ability to afford a 7-day vacation, the ability to eat meat every second day, the ability to face unexpected expenses, and if the household had any arrears payments due to financial difficulties. To establish a causal relationship between the latter and retirement, I implement a Fixed Effects Instrumental Variable (FEIV) regression model, where the endogenous nature of the retirement decision is addressed by the eligibility achieved once the individual has the legal minimum age for retiring. Results shows that for eleven out of the fourteen countries there is a deterioration in at least one of the outcome variables. What emerges is also a substantial heterogeneity of the negative effects of retirement across Europe, where the northern and continental Europe households endure more economic distress due to retirement than eastern and Mediterranean Europe households. This heterogeneity might be explained by the different approaches and methods that EU governments have adopted in reforming their pension systems in the last three decades to achieve the long-term sustainability of the same systems.

1 Introduction

European countries have been reforming their pension systems since the beginning of the 1990's, and, albeit with different paces and methods, they all shared the same intent: decrease the weight of pension benefits on the aggregate spending, to put a lid on the growing sovereign debt, and achieve the long-term sustainability of their pension systems, a vital objective, given the demographic transformation of European populations, characterized by decreasing birth rates and increasing longevity of the population.

In the last decades, following these demographic changes, a rich literature has emerged in the socio-economic and psychological fields of studies, on the effect of retirement on the perceived well-being, on the physical and mental health, and on the quality of life of the elderly and retiring population. These studies have generally proved that retirement does have a detrimental effect on the perceived well-being of the newly retired, negatively impacting on the retiree's life satisfaction, and increasing the risk of diseases such as depression or obesity. However, if one excludes the "retirement-consumption puzzle", there exists surprisingly little knowledge of the effect of retirement on the household financial vulnerability and general economic conditions.

This paper aims at filling this literature gap by investigating the effect of retirement on a set of variables that proxy the households' economic conditions, considering fourteen EU countries, namely Austria, Belgium, Czech Republic, Finland, France, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Spain, and Sweden. The data used in this work is from the panel component of the European Union Survey on Income and Living Conditions (EU-SILC); the period considered stretches from the beginning of the survey, that is the year 2004, to the year 2019, for a total of sixteen annual waves. During this phase, EU countries have faced two subsequent economic crises, the Global Financial Crises (GFC) in 2008 and the European Sovereign Debt Crisis (ESDC) in 2011-2012. The latter in particular pushed some European governments to accelerate existing pension system reforms, and some other European governments to apply ex-novo pension system reforms, with the common objective of reducing the cost of the public sovereign debt and avoid potential defaults. These

reforms have inevitably translated into an increase of the requirements needed to access the public pension (i.e. higher minimum age and/or higher number of years of pension contribution) and in the reduction of the pension benefits obtained by pensioners.

Given these premises, with this work I investigate the causal effect of retirement on the following five economic indicators: (i) the ability to make ends meet, (ii) the ability to afford a 7-day vacation, (iii) the ability to eat meat or vegetarian/vegan equivalent every second day, (iv) the ability to face unexpected expenses and (v) if the household had any arrear payments related to mortgage/rent, bills and households utilities, or other essential compulsory expenses. Understanding whether retirement impacts negatively the economic and living conditions of the European households, and how whether there is evidence of heterogeneity across Europe is, allows one to shed a light on role that the pension reforms enforced in the last three decades had on retirees' economic vulnerability. Given the ageing of the European population and the yet to come further reduction of public spending allocated to pension benefits, is set to become increasingly relevant to understand the effects of retirement on the economics of the households in order for European policy makers to design efficient and equality-preserving measures.

As in the first chapter of this dissertation, when trying to establish the causal effect of a treatment such as retirement one has to deal with the endogenous nature of the "when to retire" decision. To control for this endogeneity, the eligibility for retirement that is achieved once a person has reached the minimum legal age for retirement, is used as an exogenous instrument for the retirement decision. The estimation of the effect of retirement on the outcome of interest is obtained through a Fixed Effects Instrumental Variable (FEIV) regression, which allows to control for time-invariant unobservable characteristics, thanks to the panel nature of the dataset, and time-varying unobservable characteristics, thanks to the exogenous effect of the eligibility-instrument on retirement. A second treatment, specifically, the number of retirees living in the household, is also employed to further investigate and corroborate the effects of retirement on the economic conditions of the households; the latter is estimated through a Fixed Effects (FE) regression model.

The results obtained show that in eleven out of fourteen countries studied, at least one of the five outcomes considered worsen due to retirement, with Greece, Hungary and Portugal being the only three exceptions with no statistically significant estimated negative effects. Moreover, the deterioration of the households economic conditions caused by retirement appear to be more widespread in northern (Finland, Netherlands, Norway, and Sweden) and continental (Austria, Belgium, Czech Republic and France) Europe than in Mediterranean and eastern European countries.

This heterogeneity is, at least in part, expected, given the large institutional and pension system differences across European countries. In fact, according to the IMF 2021 report on the European pension system reforms (Fouejieu et al., 2021) a major difference is the timing of the reforms of the pension systems. Putting this paper results in the context of the IMF report findings, shows that the countries which persistently reformed their pension systems and reduced pension benefits since the beginning of the 1990's are the ones with the most estimated negative impact of retirement on households' economic conditions (i.e. northern a continental Europe), while those countries that only recently (right before or after the GFC/ESDC) have started to apply structural pension system reforms and/or reversed previously applied ones, are the ones with a relatively low or no estimated negative effects of retirement on the households economic conditions (Mediterranean and eastern Europe). This connection is reflected in the so-called Proportionality Measure (PM), i.e. the ratio between the pension benefits and pension contributions, which is computed by the IMF in their report. The PMs are calculated for each 5-year cohort, and what emerges is that northern and continental Europe countries have seen the largest reductions in their PMs, while Mediterranean and eastern Europe countries have seen small decreases or even increases in their PMs.

Lastly, given the availability in the EU-SILC of information on the households ability to sustain the main residence-related expenses (bills and utilities), a section of this work focuses on understanding which EU countries are most at risk of facing severe economic difficulties due to the record breaking inflation in the energy prices that started at the beginning of 2021 and still persists at the time of writing, end of 2022.

The paper is organized as follows. Section 2 reviews the extant literature. Most research comes from the psychology, physical health, and socio-economic fields; there are relatively fewer studies that focus on the effect of retirement on the risk of poverty and economic vulnerability of the household after retirement. These are those closer to this paper. Section 3 presents the estimation strategies for the first and main treatment, and for the secondary treatment of interest. Section 4 summarizes the data used and its structure, describes the outcomes of interest and the treatment variables considered. Section 5 presents the main results and the relationship between the latter and the IMF findings. Section 6 investigate the ability of the European households to sustain the recent wave of inflation in the cost of energy, and Section 7 concludes.

2 Literature

The effect of retirement is a topic that stretches among different academic fields and is increasingly becoming of interest due to the fast-paced ageing of the world population.

Several studies investigate how the individual well-being changes with retirement. Solinge and Henkens (2008) perform a psychometric analysis on a sample of 778 Dutch employees and study the main drivers of life satisfaction after retirement. The data used in their study is collected via two mail questionnaires, where the first one was sent in 1995 to the employees of 55 years of age or more of two large Dutch multinational companies; the second one was sent in 2001 to the same individuals. With this data, the authors implement a first-difference multivariate regression and find that post-retirement satisfaction is primarily positively related to three main dimensions: finances, health and marital relationship. Wang (2007) uses five waves of the US Health and Retirement Survey (HRS), from 1992 to 2000, and concludes that the perceived well-being of the newly retired individual is affected by both individual experiences (e.g., unemployment experiences, type of job) and contextual variables (e.g., marital status, number of close family members). Bender (2010) uses the 2000 wave of the same HRS dataset, and studies the determinants of subjective well-being of the retirees, measured

via qualitative question asking the respondents how much satisfied they felt about their retirement. Via OLS regression, he finds that the two strongest determinants of high satisfaction are the voluntariness of entering retirement and the health status, whereas income, though positive, plays only a smaller role in the well-being of the newly retired. The role of income is also examined by Bonsang and Klein (2012). They use data from the German Socio-Economic Panel (GSOEP) and implement a Fixed Effect regression model to study the impact of retirement on the retirees self-reported well-being, as measured by a qualitative question on the 'happiness level' from zero to ten. They conclude that the increased leisure time has a strong and positive effect on the well-being of the retiree, while the decrease in income associated with retirement has a negative but relatively weak effect on the happiness score. Similar results are found by Kesavayuth et al. (2016) for the United Kingdom, using the British Household Panel Study (BHPS) data; they employ an estimation strategy that is very similar to the one applied in this work, namely a Fixed Effect Instrumental Variable (FEIV) regression, where the legal minimum age for retirement is used as an instrument for the retirement decision. Hershey et al. (2010) study the worry for future retirement income of close-to-retirement individuals for 23 European countries. By using the European Social Survey (ESS) data, the authors estimate a multivariate regression and find that worries about the retirement income, while uncorrelated to pension reforms, are more severe in countries with a projected higher aging population and in countries with a higher degree of income inequality. Regarding the associations between retirement, on the one hand, and poverty risk and depression, on the other, Fonseca et al. (2014), use data of the 2004, 2006 and 2010 waves of the Survey of Health Ageing and Retirement in Europe (SHARE) and also apply an Instrumental Variable approach, where the retirement decision is instrumented by the eligibility for retirement, similarly to the analysis performed in this work. They find that, for the newly retired, retirement is indeed associated with an increased risk of poverty and depression. However, individuals that are male, with higher perceived health, higher education levels, and that are married, have a higher probability of exiting poverty or depression in the years following retirement, while female individuals and individuals with lower perceived health, lower

education levels and that are not-married, tend to remain poor and have a higher risk of suffering from depression.

While the investigation on retirement and individual well-being is well developed, there exists surprisingly little evidence on the association between retirement and the economic fragility and sustainability of the household. A rich economic literature studies the relationship between retirement and household consumption, as discussed in the first chapter of this dissertation, but there is relatively little academic research on how retirement impacts, more generally, on household finances, on household ability to make ends meet and maintain the quality of life experienced before retirement.

These key aspects became particularly relevant after the wave of pension system reforms that began in most European countries in the early 1990s, aimed at achieving long-term sustainability by gradually reducing pension benefits and increasing the requirement stringency. Since then, such aspects have grown in importance, as European governments swiftly accelerated their pension reforms in the effort to make public debts solvent, following the Global Financial Crisis (GFC) and the European Sovereign Debt Crisis (ESDC). Foster and D'Ercole (2005) and Grech (2015) analyze, respectively, the impact of the early 1990s reforms and of the post-ESDC European pension system reforms concluding that such reforms played the largest role in increasing poverty risks among the elderly population in OECD countries (Foster and D'Ercole, 2005) and that this negative effect is felt disproportionally more in the lower part of the income distribution and when the household head is female (Grech, 2015). Moreover, as reported by Eurostat (2015), Labour Force Survey (LSF) data show that 16% of the EU-28 population continues working after being retired and while receiving pension benefits, and of these, 63% continues working for financial and income reasons, a fact which signals a potential household economic fragility that arise once entering retirement. Note, however, that for some of these newly retired but still working individuals, the reason behind the choice to continue to work after retirement might be, along the need of additional income for financial reasons, simply because they prefer a smoother passage from work to retirement, with, for example, part-time work or reduced hours, instead of going from full-time work, to complete leisure, as documented by Trucchi et al. (2018).

3 Methodology

This analysis follows two separates, albeit similar, estimation strategies, depending on the two independent variables considered. The first treatment is related to the employment status of the household head, where the household, which is the unit of observations throughout this analysis, is considered treated when the household head is retired. To address the endogenous nature of the retirement decision, the latter is instrumented by the eligibility for retirement, where the eligibility is achieved once the household head has at the minimum legal age for retirement. However, for some countries the explanatory power of the eligibility-instrument is not particularly high, as workers are able to retire according to other eligibility rules that cannot be controlled for with the information included in the EU-SILC. For this reason, a second independent variable is exploited as an alternative treatment, which is the number of retirees living in the household. The methodologies are discussed in detail in what follows.

3.1 Retirement

As explained in the first chapter of this dissertation, when trying to estimate the effect of retirement, the issue is the self-selection into the treatment. Unobservable individual characteristics or experiences that the individual has undergone may affect both the outcomes of interest, which in the present case are a set of financial and living conditions indicators that are laid out and discussed in Section 4, and the treatment, namely the "when to retire" decision. For example, since unemployment benefits are not counted as earnings, social security contributions stop during periods of unemployment, which implies that a job loss event, especially if close to retirement, could force an individual to retire later than expected. For example, because he or she cannot use the early retirement as it is dependent on the number of years of contribution paid. The job loss then affects both the decision about retirement (in this case by postponing the retirement) and the financial conditions of the household. The same could hold true in the opposite direction; a positive income shock, for example an unexpected inheritance, could translate into both an improved financial condition of the household, and an

anticipated retirement, but of course the positive effect on the finances and living conditions of the household cannot be attributed to the retirement decision.

These unobservable variables can be both time-varying, like the ones just described, and time-invariant, like for example specific skills learned throughout the working life or the level of financial literacy. Given the panel nature of the EU-SILC dataset, it is possible to control for the time-invariant unobservable characteristics by employing a Fixed Effects (FE) model, which would take the following form:

$$H_{it} = \alpha + \beta_1 R_{it} + \beta_2 X_{it} + \delta_t + \lambda_i + \varepsilon_{it} \quad (1)$$

Where H_{it} are the different measures of financial health of the household i at time t (from hereafter, i always denotes the household i and t always denotes the year t), R_{it} is a dummy variable equal to 1 when the household head is retired, and equal to 0 otherwise; X_{it} is a vector of time-varying households characteristics, that includes the age of the head, the number of family members in the household, the education level of the head (defined as a discrete continuous variable that goes from zero to eight, following the ISCED classification), the self-reported health status of the head, measured with a scale that goes from 1 as very good to 5 as very bad, a dummy variable equal to 1 if the family owns the household main residence and equal to 0 otherwise and a dummy variable equal to 1 if the family lives in the household main residence as renters, and equal to 0 otherwise; δ_t are year fixed effects, λ_i are the household fixed effects and ε_{it} is the residual error term. The parameter of interest is β_1, namely the effect of retirement of the household head on the outcomes of interest.

To control for time-varying unobservable household characteristics, such as job-loss[1] near retirement or an unexpected inheritance, a further step needs to be taken. Similarly to the estimation strategy implemented in the first chapter of this dissertation, the eligibility for retirement is used as an instrument for retirement, and a Fixed Effect Instrumental Variable (FEIV) model is implemented. The minimum legal retirement

[1] Information on household members potential unemployment spells, as well as the number of years of pension contribution paid, the work starting age and the retirement age, unfortunately are not included in the EU-SILC data.

age has already been used in different studies and proved to be a reliable instrument. One of the first is by Diamond and Gruber (1999), where the authors study the impact of retirement, instrumented using the minimum age for old-age pension, on the sustainability of the US social security program in the long-run. More recently, Godard (2015) uses the same instrument to study the effect of retirement on the Body Mass Index and obesity risk using SHARE data, following the work of Goldman et al. (2008) Chung et al. (2009) who also study the effect of retirement on health and obesity risk exploiting the eligibility as in instrument; Olivier et al. (2020) also use the same instrument to study changes in food purchasing habits after retirement in France and the same instrument is used by Kesavayuth et al. (2016), and Fonseca et al. (2013).

The FEIV estimates are obtained from a two-stage least square estimation, where the retirement decision, R_{it}, is instrumented by a binary variable, E_{it}, that is equal to 1 if the household head's age is equal or above the minimum legal age for retirement, and equal to 0 otherwise. Formally, the first stage equation is a FE regression of the retirement status on the instrument and the vector of controls X_{it}, and takes the following form:

$$R_{it} = \alpha + \gamma E_{it} + \delta X_{it} + \delta_t + \lambda_i + \eta_{it} \tag{2}$$

and the second stage equation is:

$$H_{it} = \alpha + \beta_1 \hat{R}_{it} + \beta_2 X_{it} + \delta_t + \lambda_i + \varepsilon_{it} \tag{3}$$

Where R_{it}, X_{it}, δ_t, λ_i are the same variables presented for model (1), E_{it} is the eligibility for old-age pension and $\hat{R}_{it}$ is the estimated retirement status obtained from the first stage regression (2). As it is for equation (1), the coefficient of interest is β_1 in equation (3), which identifies the Average Treatment Effect (ATE) of retirement on those households whose head retired once she/he achieved the minimum legal age for retirement and would have not done so had they not achieved this minimum age.

Information on the minimum age required to access public pension and define the eligibility requirement is collected by OECD in the reports "OECD Pension at a

Glance". The quality and robustness of the estimated effects of retirement on H_{it} in equation (3) depends on the validity of the instrument, i.e. how strong a predictor for retirement the instrument is. This can be assessed from the estimation results of the first-stage regression. This information is provided in the analysis Section 5, alongside the results and findings of this study. The structures and the differences in the pension requirements of the different pension systems across the countries analyzed are discussed in Section 4.

3.2 Number of retirees

The second treatment variable considered is the number of retirees and is therefore a categorical variable that ranges from 0 to N, where N is the maximum number of retirees per household that can be found in the data and varies depending on the country considered. This variable and its distribution are further discussed in the data Section 4.

To the best of my knowledge, this variable has never been used as a treatment variable in the literature that study households' finances, nor any similar treatment, like for example the number of unemployed individuals in a household. In this work, the number of pensioners per household is employed to estimate the average effect of the transition from work to retirement of an additional household member[2]. As for the first treatment, the panel nature of the data is exploited by implementing a FE model to controls for time-invariant unobserved household characteristics; the model takes the following form:

$$H_{it} = \alpha + \theta_1 P_{it} + \theta_2 X_{it} + \lambda_i + \varepsilon_{it} \qquad (4)$$

Where the terms included are the same specified in (1), except for P_{it}, which is the number of pensioners in the household i at time t. The parameter of interest is θ_1, which

[2] The average effect of the transition from work to retirement estimated from this treatment consist of the averaged effect of a household that goes from zero to one retiree, from one to two retiree, from two to three, etc.

is the Average Treatment Effect of an additional pensioner that switches from being a worker to being retired.

This treatment is employed in order to corroborate the findings derived from the first treatment and to further investigate the causal effect of retirement, especially for some countries where the eligibility for old-age retirement has relatively low explanatory power on the retirement decision.

4 Data

4.1 The European Union Statistics on Income and Living Conditions

EU-SILC is an annual rotating-panel survey administered by Eurostat, containing household and individual level data on a considerable range of social and economic indicators[3]. The main objective of EU-SILC is to collect and provide comparable cross-sectional and longitudinal data on income, poverty, social exclusion and living conditions for European countries. The first wave of the survey has been conducted in the year 2005, collecting information for the prior calendar year, and includes information on twelve EU Member States (Austria, Belgium, Estonia, Finland, France, Greece, Ireland, Italy, Luxembourg, Portugal, Spain and Sweden) plus two non-EU Member States (Norway and Iceland). Between 2006 and 2009 more EU Member States were included (Bulgaria, Cyprus, Czech Republic, Denmark, Hungary, Latvia, Lithuania, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia and United Kingdom) plus Croatia in 2012; Switzerland and Serbia were also added in 2015 as non-Member State and lastly Germany was added in 2019 as a Member State. As of today, EU-SILC covers a total of 32 countries (28 EU Members and 4 non-EU Members) from the year 2004 to the year 2020.

EU-SILC is considered as an output-harmonized survey, rather than an input-harmonized one, meaning that the data are collected by each state individually, through

[3]As with most household surveys, the target population are the private households only, excluding individuals living in institutional settings such as hospitals, residential homes for the elderly, detention facilities and student residences.

their respective national statistical institutes, following a common questionnaire and list of variables. Hence, each country has some degree of freedom on how the data is collected; for example, some countries (Denmark, Finland, Hungary, Netherlands, Norway and the United Kingdom) have recorded data on the household total disposable income and some of its components, while other components such as income from financial investments (e.g. dividends, income from rent) and state welfare-related income sources (e.g. unemployment benefits, housing benefits) are not disclosed. Other differences arise with respect to the reference period considered for the income variables, where for Ireland and the United Kingdom the reference period is the twelve months prior to the interview, while for all the other countries the reference period is the calendar year preceding the interview. Another difference is with respect to the length of the rotational panel component; whereas for most countries the length is four years, as indicated by the Eurostat guidelines, some countries follow the same household for longer periods: nine years for France and eight years for Norway. And lastly, there is a difference also on how the data are collected: unlike most longitudinal household surveys, the panel and cross-sectional components of EU-SILC are collected and released separately, and the two datasets are not linkable.

For this work, only the longitudinal panel data is used, as it is not possible to apply the research design devised in Section 3 on cross-sectional data.

4.2 Countries selection

Of the 32 countries included in EU-SILC, 14 are selected and employed for this analysis. The selected countries are Austria, Belgium, Czech Republic, Finland, France, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Spain, and Sweden. These countries have been selected following three criteria: (i) they have the longest period of observation starting from 2004 or 2005; (ii) they share a common reference period, i.e. the calendar year preceding the interview; (iii) they are the most populous. Then the excluded countries either have too few years available as they had only recently joined the survey (e.g., Germany and Romania) or they use a different reference period (Ireland and United Kingdom) or they have a low population (e.g., Estonia, Latvia, Lithuania);

in some cases (Cyprus, Iceland, Luxembourg, Malta), the number of observations is insufficient for a robust inferential analysis.

4.3 Sample selection

Sixteen waves of the EU-SILC, from the year 2004 to the year 2019, are employed for this analysis, except for some countries where the first year of observation is 2005. The year 2020 is excluded being a heavily influenced by a one in a lifetime event, namely the COVID-19 pandemic. However, the 2020 wave is used in Section 6 in order to assess the European households' financial conditions, and more specifically their ability to sustain household energy costs, right before they entered a rising inflation environment that started in 2021 and persisted throughout 2022.

For this analysis, only workers and pensioners are considered, excluding households whose head self-reports to be in any other occupational category (i.e., unemployed, disabled, student, compulsory military or community service and househusband/housewife).

Table 4.1 – Number of observations by country

	N. obs.	Age-band	N. obs. with age bands	Share of male heads (%)
Austria	74,408	55-65	16,148	49.54
Belgium	72,020	55-65	13,530	61.99
Czech Republic	108,042	55-65	24,544	40.21
Finland	109,544	60-70	23,886	51.06
France	133,443	55-65	27,050	43.54
Greece	124,243	55-70	36,478	65.06
Hungary	99,842	55-65	23,964	26.01
Italy	241,958	55-65	47,965	60.45
Netherlands	98,487	60-70	16,938	51.86
Norway	72,540	60-70	11,888	54.34
Poland	167,926	55-65	39,403	32.12
Portugal	99,629	55-70	30,538	51.54
Spain	142,807	55-67	30,870	54.94
Sweden	57,259	60-70	10,793	52.75

Notes: number of observations by countries, considering the complete and age-restricted samples. Source: author's own elaboration from EU-SILC data.

As explained in Section 3, a further selection is applied when the number of retirees is used as the treatment of interest, by restricting the sample to specific age-bands[4] of the household head. As it will be explained below, these bands are defined depending on the distribution of the share of pensioners over age. The latter restriction is applied in order to have a more homogeneous sample, by excluding households with very young or very old household heads. Table 4.1 provides information on the number of observations for each country after excluding non-workers or non-retirees, and when the sample is restricted to specific age-bands, along with the share of male heads when considering the complete sample. Figure 4.1 illustrates, for each country, the average distribution of the share of retirees over age for the whole period (2004-5 to 2019), and for three time intervals (2004-5 to 2007, 2008 to 2013, and 2014 to 2019). From Figure 4.1 it is possible to observe the heterogeneity of the distribution of retirees over age among the European countries considered and, within each country, across time. Countries can be categorized into three groups; the first and largest group consists of Austria, Belgium, Czech Republic, France, Hungary, Italy, Netherlands, Poland and Spain. For these countries the share of retirees starts to increase sharply from around 55 years of age and is close to the maximum at around 65 years of age. The second group contains the northern European countries Finland, Netherlands, Norway and Sweden, for which the increase in the share of retirees starts from around 60 years of age and reaches the peak around 70 years of age. Lastly, the third group is composed of Portugal and Greece, which show the widest retirees over age profiles, with household heads that start retiring at 50 years of age up to 65 years of age, when the near maximum share of retirees is reached. The age-bands for each country are defined according to these retirees share distributions, with the aim of considering only those households that have the higher likelihood of having a member of the family moving from work to retirement.

[4] From the literature (either on the retirement-consumption puzzle or on the subjective well-being) no specific rule emerges for the selection of age-bands when studying retirement and pensioners, as they depend on the research design, sample, and data structure.

Figure 4.1 part 1/2 – Share of retired over age and time by country

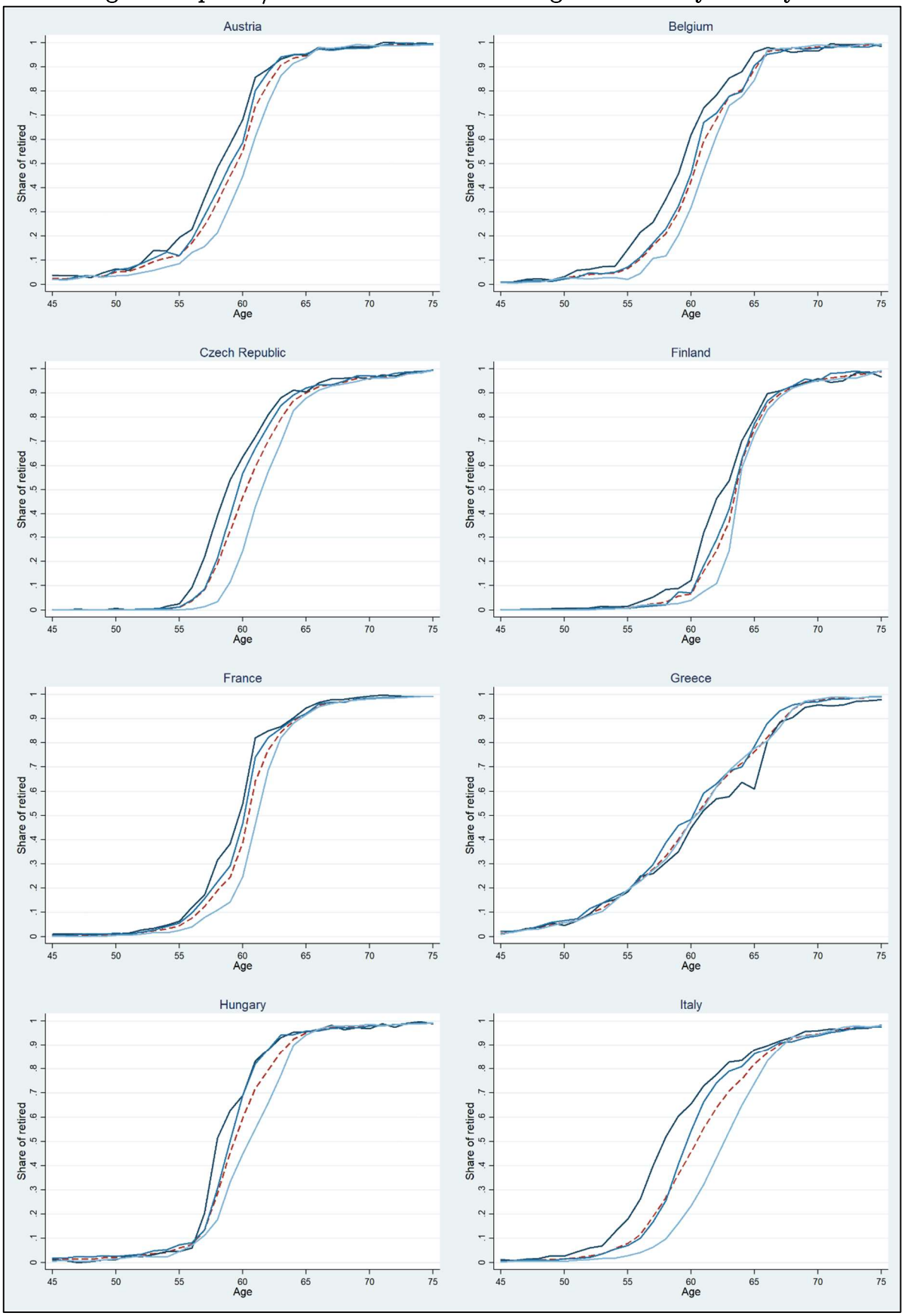
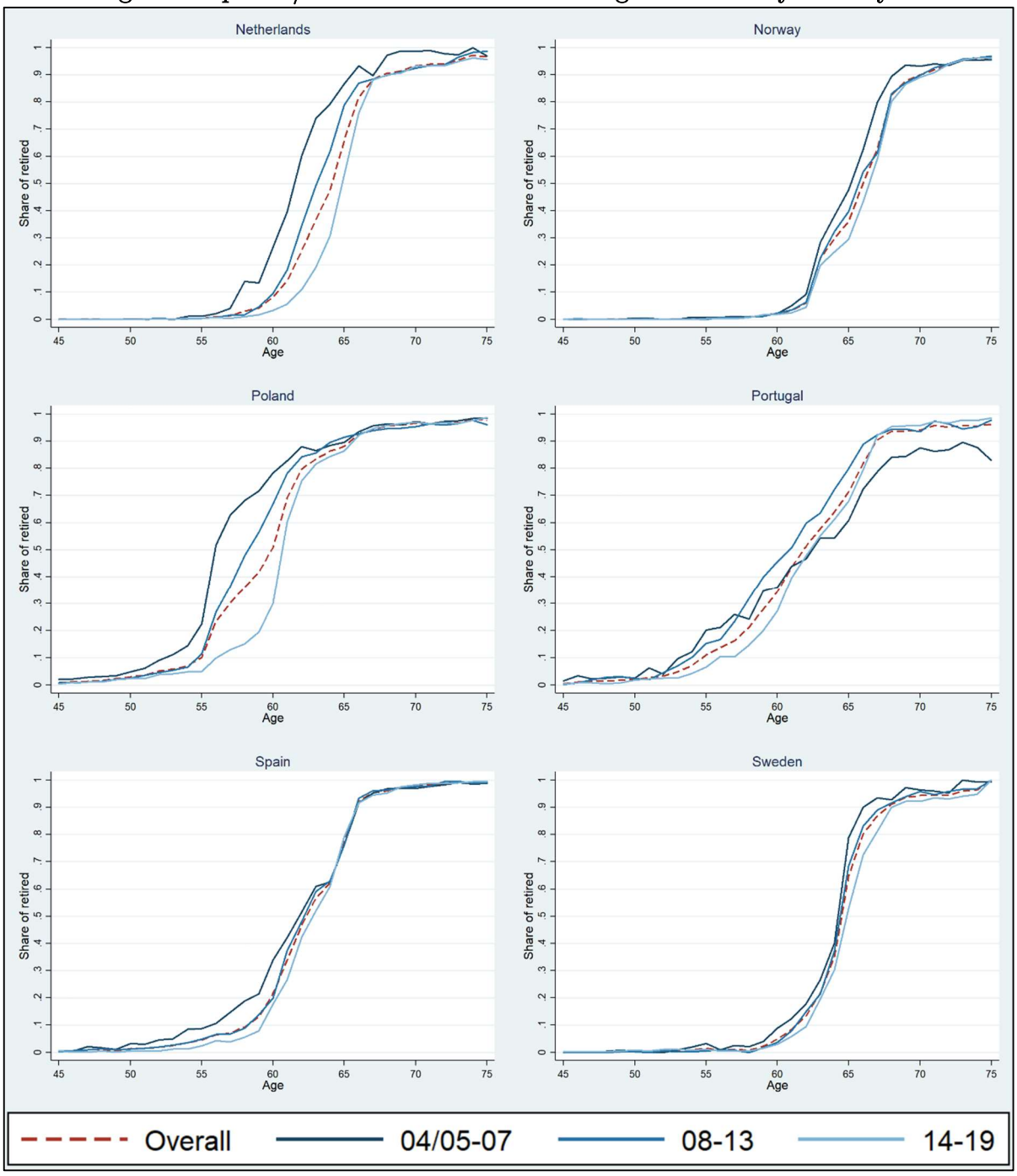


Figure 4.1 part 2/2 – Share of retired over age and time by country



Notes: the graphs show the share of retired household heads over age for each country. The dashed line is the share over alle the observation years, while the 04/05-07 line is the share of retirees considering the years from 2004/2005 to 2007, the 08-13 line is the share of retirees considering the years from 2008 to 2013, and the 14-19 line is the share of retirees considering the years from 2014 to 2019. Source: author's own elaboration from EU-SILC data.

The three lines in Figure 4.1, the dark blue, blue, and light blue line, show the share of retirees for the periods 2004/05-2007[5], 2008-2013, and 2014-2019, respectively.

[5] The first year, 2004 or 2005, depends on when the country entered the EU-SILC.

The three periods are chosen based on the average Euro Area macroeconomic environment: (i) the pre-GFC/ESDC period going from the first year of observation (2004 or 2005) to 2007; it is characterized by stable inflation around the ECB 2% target rate and tightening labour markets with EU unemployment dropping from 10% in 2004 to 7% in 2007; (ii) the crises period from 2008 to 2013 characterized by a disinflationary economic environment and rising unemployment rate that peaked around 12% in 2013; and lastly (iii) the post-crises period from 2014 to 2019 characterized by an inflation rate below the ECB 2% target and tightening labour markets as the unemployment rate went from 12% in 2014 to 6% in 2019.

During the entire period considered, the distribution of retirees by age show a general shift to the right; this is due to the pension system reforms that started at the beginning of the 1990's throughout the European countries, and that greatly accelerated during the years of the GFC/ESDC. However, some major differences between countries can be observed. Specifically, the three Nordic countries, namely Finland, Norway and Sweden, and Spain, all show distributions that are very close across the time periods, indicating that workers entered retirement roughly at the same age throughout the period considered. On the opposite side, countries like Italy, Netherlands and Poland show the largest outward shift of the distributions, signalling that during the sixteen years considered, public pension requirements, in terms of age and or years of contributions, highly increased for these countries. The pension system reforms for each country are discussed in more detail in the sub-section 4.5.

By observing the share of male heads, it is also possible to classify countries in three groups; most countries (Austria, Finland, Netherlands, Norway, Portugal, Spain and Sweden) display a more or less equal share of male and female heads, around 50%. A second group (Belgium, Greece and Italy) have a predominance of male heads, around 60/65%. The last group (Czech Republic, France, Hungary and Poland) displays a larger share of female household heads, ranging from 26 to 40%.

4.4 Outcomes of interest: household financial and economic well-being

The objective of this paper is to study the effect of retirement on the financial and economic condition of households, and estimate the causal effect of retiring and of the

increase in the number of retirees per household, on a set of economic indicators. These indicators are five in total: (i) the ability to make ends meet, (ii) the ability to afford at least a 7-day vacation away from home, (iii) the ability to consume meat or any vegetarian/vegan alternative every second day, (iv) the ability to face unexpected expenses and (v) if there has been any arrears payment; all these indicators refer to the reference period considered, which is the calendar year preceding the interview. The five indicators are further described and discussed in what follows.

(i) Ability to make ends meet

This first indicator is relatively common in surveys within the European continent; it can be found also in the Household Finance and Consumption Survey (HFCS) and the SHARE. It derives from a qualitative question that takes the following form: *"A household may have different sources of income and more than one household member may contribute to it. Thinking of your household's total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses?"*. To which the possible answers are six: (1) with great difficulty, (2) with difficulty, (3) with some difficulty, (4) fairly easily, (5) easily and (6) very easily.

As stated by Eurostat in their guidelines for the EU-SILC questionnaire, the objective of this variable is to assess the respondents' perception about the level of difficulty experienced by the household in making ends meet, defined as paying the usual necessary expenses of the household, which include any housing related costs (e.g., bills and utilities, food, ordinary maintenance, etc.), and considering the net total disposable income of the household. To be easier to understand and compare, this variable has been re-scaled in a score that goes from 0 to 100[6], where 50 can be considered the cut-off point above which the household is more able than not to make ends meet, and otherwise when it is below 50.

(ii) Ability to afford at least a 7-day vacation

This variable assesses if the households have the economic ability to afford at least a 7-day vacation away from home. It is a binary variable equal to one if the household can

[6] The formula used to re-scale the variable is the following: 0-100 Score = (0-6 Score ÷ 6) × 100

afford a 7-day vacation away from home[7], regardless of whether the family has gone on vacation or not, and equal to zero otherwise. This indicator can be seen as a measure of both the economic health of the household, where richer households should have a higher probability of being able to afford a 7-day vacation, as well as a measure of the availability of leisure time, which is positively impacted by retirement.

(iii) Ability to consume meat or vegetarian/vegan equivalent every second day

This variable stems from a qualitative question that asks the following to the household: *"Can your household afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day?"*, to which the answers can be yes or no; the outcome of interest is then a binary variable equal to one if the household response is "yes" and equal to zero otherwise.

Within the retirement-consumption puzzle literature, most works study the effect of retirement on food expenditures, among other consumption measures, finding that these do decrease at retirement, although much of this decrease in food spending is due to spending for food out of home, which is a work-related expense. However, unlike the latter measures of spending, this indicator allows to observe the effect of retirement on food consumption habits from a different perspective: if retirement has a significant negative effect on the economic well-being of the household, the latter can change the composition of their shopping cart by substituting costly higher quality food (like animal protein) for cheaper alternatives (e.g., flour-based food, diary food, etc.). This would result in a reduced quality of the food consumed by the family, an effect that can be picked up by this indicator.

(iv) Ability to face unexpected expenses

Similarly to the previous indicator, this variable derives from a qualitative question that asks the household the following: *"Can your household afford an unexpected required expense and pay through its own resources?"*, with the possible answers being yes or no; the indicator and outcome of interest is then a binary variable equal to one when the household response is "yes" and equal to zero otherwise. The Eurostat EU-SILC

[7] Including a 7-day vacation spent at a second dwelling or at another family's or friends' house.

guidelines for this question state that "unexpected required expenses" include, but is not limited to, surgery, a funeral, extraordinary maintenance of the house, replacement of durables goods like a washing machine or car. As for "own resources" it means that the household does not have to ask for financial help from anybody, or that it can obtain the needed resources through debt within the period in which the latter are needed, and without deteriorating other debts situations.

This indicator can be used to assess if the household has a "buffer stock" of financial resources in case of emergency. Households that face a deteriorated financial health after retirement should be more likely to answer "no" to this qualitative question.

(v) Arrears payment on rent, mortgage, utility bills, other debt, or other due expenses

This last indicator derives from three qualitative questions included in the EU-SILC, for which the answers to all three of them can either be "yes" or "no". The questions are the following:

-First question: *"In the [year of observation], has the household been in arrears, i.e., has been unable to pay on time due to financial difficulties, rent/mortgage repayments for the main dwelling?"*

-Second question: *"In the [year of observation], has the household been in arrears, i.e., has been unable to pay the utility bills (heating, electricity, gas, water, etc.) of the main dwelling on time due to financial difficulties?"*

-Third question: *"In the [year of observation], has the household been in arrears on hire purchase instalments or other loan payments, i.e., has been unable to pay these on time due to financial difficulties?"*

From these three qualitative question an indicator is computed that is equal to one if the household answers "yes" to any of these questions and is equal to zero otherwise. This outcome allows to understand if the household is having "financial difficulties" and is therefore unable to pay mandatory and essential expenses on time and is instead forced to delay the payments due to difficulties in gathering the required economic resources.

The averages of these five indicators are presented for each country considered for workers versus retirees in Table 4.4; the sample considered is the one with the applied age restrictions of Table 4.1.

Overall, it can be observed the indicators tend to be worst[8] for retirees than they are for workers for all countries in at least one measure; the only two countries that sees only one of the indicators degrading at retirement are Greece, with a lower ability for retirees to face unexpected expenses, and Italy, with a lower score for retirees in the make ends meet ability. At the opposite side, there are only three countries where retiree averages are lower for all five indicators, and these are Austria, the Czech Republic, and Sweden. The remaining countries, excluding the five just mentioned, all share the same pattern: indicators from (i) to (iv) are lower at retirement, while the share of households that had any arrears payment decreases at retirement.

Figure 4.2 shows the ability to make ends meet scores for workers versus retirees for each of the considered countries over time, with the age restrictions of table 4.1 applied. From the graphs emerges a large degree of heterogeneity of the evolution of this measure over time, with only a few common characteristics observable for (almost) all countries: (i) the negative impact of the GFC and/or the ESDC, (i) that workers have on average higher scores, and (iii) that workers and retirees scores tend to follow the same trend over time. Aside these common characteristics, there are some interesting country-specific peculiarities and unique behaviours.

In 2019, only four countries (Czech Republic, Italy, Poland and Portugal) have a score for both workers and retirees that is higher than the peaks reached before the GFC/ESDC; most countries either have the workers score only above the pre-crisis peak (Austria, Finland, Sweden), or the retirees score only (Hungary, Spain) or both below the pre-crisis peak (Belgium, France, Greece, Netherlands, Norway). Of particular interest is the case of Austria, where it is observable how the GFC in 2008/2009 and then the ESDC in 2013/2014 have hit both groups, however in different measure: the score for retirees has on average remained the same (around 62/66), while for workers there is an upward trend over time, creating a clear divergence.

[8] For the indicators (i), (ii), (iii) and (iv) higher is better, while for indicator/outcome variable (v) lower is better.

Table 4.4 – Workers vs. retirees differences in the outcomes of interest

	Make ends meet (0-100)		7-day vacation (%)		Quality food (%)		Unexpected expenses (%)		Had arrears payments (%)	
	W	R	W	R	W	R	W	R	W	R
AT	70.45	64.01	89.89	81.21	95.91	89.51	86.77	77.96	2.55	2.94
BE	69.20	64.37	85.26	78.28	97.79	97.12	85.97	83.46	2.71	2.25
CZ	57.89	52.20	78.80	62.11	92.97	86.93	76.98	62.80	2.22	2.50
FI	79.11	76.26	95.11	91.09	99.11	98.07	91.01	86.32	3.92	2.55
FR	59.21	57.87	80.73	78.54	94.07	93.94	76.89	78.03	5.27	3.64
GR	37.24	37.87	52.55	58.84	91.11	93.51	61.98	59.79	35.48	28.97
HU	44.28	42.92	48.74	38.21	78.67	73.20	45.31	40.70	14.21	11.27
IT	51.83	51.22	66.91	66.97	92.84	93.23	75.02	77.65	7.71	4.89
NL	78.41	76.37	93.13	88.88	99.05	98.71	90.04	88.51	1.56	1.00
NO	83.59	81.46	98.76	97.09	99.57	99.35	94.11	92.47	1.74	1.23
PL	54.07	48.65	58.23	44.18	91.45	84.85	65.09	49.28	9.86	9.27
PT	48.15	47.50	49.09	44.21	97.01	95.74	70.07	68.53	5.68	3.86
ES	58.67	57.37	72.12	68.84	98.62	97.83	77.52	72.80	4.78	3.36
SE	81.36	77.42	96.86	92.54	98.91	97.93	93.94	90.11	1.73	2.36

Notes: the table report the averages of the five outcomes considered in the inferential analysis, which are described in detail in sub-section 4.6. The "W" stands and refers to workers, while the "R" stands and refers to retirees. The outcomes are reported as percentages (except for the "Make ends meet" which is a score from 0 to 100) and represent the share of retirees/workers that can afford a 7-day vacation, share of workers/retirees that are able to consume meat every second day, etc. Source: author's own elaboration from EU-SILC data.

Figure 4.2 part 1/2 – Make ends meet score for workers vs. retirees

Figure 4.2 part 2/2 - Make ends meet score for workers vs. retirees

Notes: the graphs show the average score of the ability to make ends meet indicator for retirees and workers over time for each country. Source: author's own elaboration from EU-SILC data.

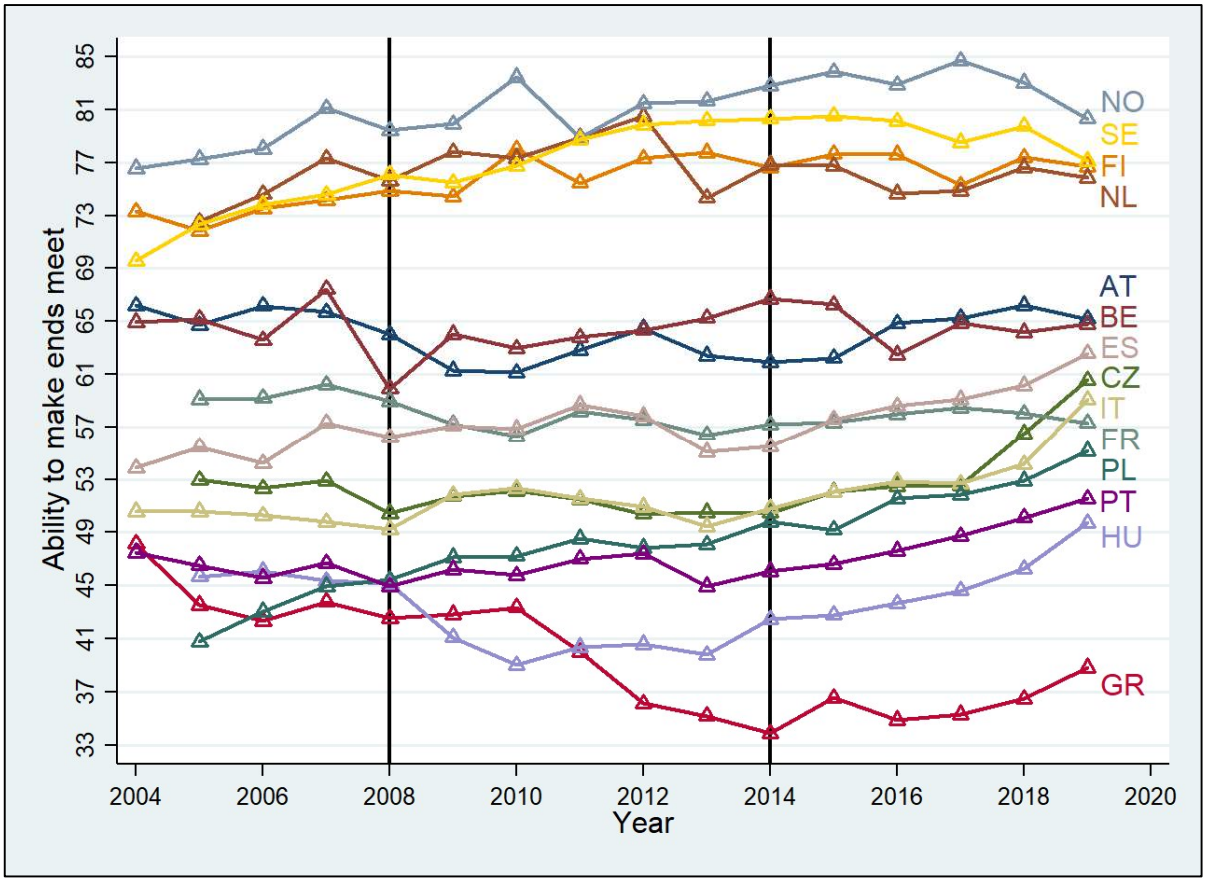
The Czech Republic, Italy, Portugal and Spain all share a sharp turn and a huge increase in the ability to make ends meet score after 2013/2014 for both workers and retirees.

Poland shows the most linear positive trend for both workers and retirees, interrupted only by small reductions at the GFC and the ESDC, with a progressively reducing gap between the two groups.

The three Scandi states, Finland, Norway and Sweden, also share a common characteristic: they all three have very high scores compared to the rest of the countries but show a non-increasing trend after the EDSC (Finland) and/or decreasing scores after 2014/2015 (Norway and Sweden).

By far, Greece has the lowest scores for both workers and retirees, and strongly downward trend since the first observation period, with a bottom score reached for retirees in 2014 and for workers in 2015, after which there seems to have been a reversal with a new upward trend.

Figure 4.3 – Retirees' make ends meet scores for all countries over time



Notes: the graph shows the average score of the ability to make ends meet indicator for retirees only, over time and by countries; Vertical lines in 2008 and 2014 are added to frame the beginning and end of the GFC/ESDC, respectively. Source: author's own elaboration from EU-SILC data.

Figure 4.3 depicts the ability to make ends meet scores for retirees only, and puts the differences between countries into perspective, with the Scandinavian states and Netherlands having the highest scores, followed, after a gap of about 7 points, by a tight group of countries with very similar scores (Austria, Belgium, Spain, Czech Republic, Italy, France and Poland), then Portugal and Hungary with a bit lower scores, although still above 50, and lastly Greece with scores consistently below 40 from 2011 onward.

4.5 OECD Pension at Glance

The OECD "Pension at a Glance" is a biennial report on the pension systems of OECD countries that started in 2005; as of today, there are nine reports in total (2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019 and 2021) each giving an overview of the pension systems across the OECD countries and providing information on each country pension system and their most recent reforms. The information included in the "Pension at a Glance" reports allowed for the creation of the pension-eligibility variable, which is used as an instrument for the retirement decision. The reports include information on old-age retirement, which is usually dependent on having a certain demographic age, and early-retirement requirements, which generally dependent on having a certain number of years of contribution[9]. Unfortunately, in the EU-SILC data there are no information on the years of public pension contribution, which would have allowed the creation of a more precise eligibility instrumental variable, similar to the one used in the first chapter of this dissertation for Italy. In what follows the pension system requirements for each country considered are discussed as well as their relative minimum legal age for retirement; the latter are summarized in Table 4.2.

Austria

The age requirements for old-age pension in Austria remained the same throughout the period studied, with 65 years of age for men and 60 years of age for women. Access to old-age pension is however achievable only if the worker has at least 15 years of

[9] Most countries distinguish between old-age retirement and early-retirement, and their own separate requirements. However, some countries do not have such distinctions and provide only one form of public pension that can be withdrawn upon achieving a minimum combination of years of age and years of contribution.

Table 4.2 – Legal minimum age for retirement by country over years of observation

	AT	BE	CZ	FI	FR	GR	HU	IT	NL	NO	PL	PT	ES	SE
2004	65y M	65y M	65y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	63y F	65y F	65y F	60y F		60y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2005	65y M	65y M	65y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	63y F	65y F	65y F	60y F		60y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2006	65y M	65y M	65y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	64y F	65y F	65y F	60y F		60y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2007	65y M	65y M	65y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	64y F	65y F	65y F	60y F		61y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2008	65y M	65y M	61y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	64y F	60y F	65y F	60y F		61y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2009	65y M	65y M	61y M	65y M	60y M	N/A	62y M	57y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	65y F	60y F	65y F	60y F		62y F	57y F	65y F	67y F	60y F	55y F	65y F	61y F
2010	65y M	65y M	61y M	65y M	60y M	N/A	62y M	59y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	65y F	60y F	65y F	60y F		62y F	59y F	65y F	67y F	60y F	55y F	65y F	61y F
2011	65y M	65y M	61y M	65y M	60y M	N/A	62y M	60y M	65y M	67y M	65y M	55y M	65y M	61y M
	60y F	65y F	60y F	65y F	60y F		62y F	60y F	65y F	67y F	60y F	55y F	65y F	61y F
2012	65y M	65y M	61y M	65y M	60y M	N/A	62y M	66y M	65y M	67y M	65y M	65y M	65y M	61y M
	60y F	65y F	60y F	65y F	60y F		62y F	62y F	65y F	67y F	60y F	65y F	65y F	61y F
2013	65y M	65y M	61y M	65y M	60y M	62y M	62y M	66y M	65y M	67y M	65y M	65y M	65y M	61y M
	60y F	65y F	60y F	65y F	60y F	62y F	62y F	63y F	65y F	67y F	60y F	65y F	65y F	61y F
2014	65y M	65y M	62y M	65y M	61y M	62y M	62y M	66y M	65y M	67y M	65y M	66y M	65y M	61y M
	60y F	65y F	61y F	65y F	61y F	62y F	62y F	63y F	65y F	67y F	60y F	66y F	65y F	61y F
2015	65y M	65y M	62y M	65y M	61y M	62y M	63y M	66y M	65y M	67y M	65y M	66y M	65y M	61y M
	60y F	65y F	61y F	65y F	61y F	62y F	63y F	63y F	65y F	67y F	60y F	66y F	65y F	61y F
2016	65y M	60y M	62y M	65y M	61y M	62y M	63y M	66y M	65y M	67y M	66y M	66y M	65y M	61y M
	60y F	60y F	61y F	65y F	61y F	62y F	63y F	65y F	65y F	67y F	61y F	66y F	65y F	61y F
2017	65y M	60y M	63y M	65y M	62y M	62y M	63y M	66y M	65y M	67y M	66y M	66y M	65y M	61y M
	60y F	60y F	62y F	65y F	62y F	62y F	63y F	65y F	65y F	67y F	61y F	66y F	65y F	61y F
2018	65y M	60y M	63y M	65y M	62y M	62y M	63y M	66y M	66y M	67y M	66y M	66y M	65y M	61y M
	60y F	60y F	62y F	65y F	62y F	62y F	63y F	66y F	66y F	67y F	61y F	66y F	65y F	61y F
2019	65y M	60y M	63y M	65y M	62y M	62y M	63y M	67y M	66y M	67y M	66y M	66y M	65y M	61y M
	60y F	60y F	62y F	65y F	62y F	62y F	63y F	67y F	66y F	67y F	61y F	66y F	65y F	61y F

Notes: the table reports the minimum legal age required to access public pension, regardless of the type of pension (old-age, early-retirement, or others). Information on the legal minimum age for retiring are obtained from OECD "Pension at a Glance" reports, from the first 2005 report to the 2021 report. In the table, "y" stands for years of age, "M" stands for male and "F" stands for female. Source: author's own elaboration from OECD "Pension at a Glance" reports.

contribution in the previous 30 years or at least 25 years of pension contribution in total.

For Austria, the legal minimum age used as eligibility-instrument for retirement is 65 years for men and 60 for women for all the years considered.

Belgium

The age required for old-age pension for men in Belgium is 65 for all the sixteen years considered, while for women the age required is 63 in 2004 and 2005, 64 in 2006, 2007 and 2008, and reached parity with the men at 65 years of age from 2009 to 2019. For early-retirement, 34 years of contribution are required in 2004 and 35 in 2005. From 2006, the number of years of pension contribution has been increased sharply to 45 years for men and 44 years for women, and subsequently increased to 45 to reach parity with men from 2009 onward. In 2016 an alternative way to obtain early-retirement has been added: having at least 61 years of age and 39 of contribution, or 60 years of age and 40 years of contribution; these requirements have been further increased in 2018 with 63 years of age and 41 of contributions, or 61 of age and 42 of contribution, or 60 of age and 43 of contribution.

For Belgium, the legal minimum age for men used as eligibility-instrument for retirement is 65 years from 2004 to 2015 and 60 years from 2016 to 2019; for women, the age is 63 in 2004 and 2005, 64 from 2006 to 2008 and 65 from 2009 to 2015. From 2016 to 2019 the legal minimum age is the same as for men.

Czech Republic

From 2004 to 2010, In the Czech Republic, old-age pension can be achieved, for both men and women, with at least 65 years of age and 15 years of pension contribution. From 2010, the latter years of contribution have been increased by one year each year until the maximum of 20 which has been achieved in 2015. From 2011, the age required for old-age pension is set to be 5 years higher than the age required for early retirement; this means that from 2011 to 2015 the required age for old-age pension is 67 for men and 66 for women, increased to 68 for men and 67 for women from 2016 to 2019. Early-retirement can be achieved with at least 25 years of pension contribution, increased

gradually one year each year from 2010 until having reached 35 years in 2020. The age required to access early-retirement is introduced from 2008 onward, and it is 61 years for men and 60 years for women from 2008 to 2013, 62 years for men and 61 years for women from 2014 to 2016, and 63 years for men and 62 years for women from 2016 to 2019.

For the Czech Republic, the legal minimum age for retirement is then 65 years from 2004 to 2007, for both men and women. After the introduction of age requirements also for early-retirement in 2008, the minimum legal age is then 61 years for men and 60 for women from 2008 to 2013, 62 years for men and 61 years for women from 2014 to 2016, and 63 years for men and 62 years for women from 2016 to 2019

Finland

Old-age pension requirements in Finland are straightforward, do not change based on sex, and have not been subject to any major reform within the period considered. Old-age pension can be withdrawn from 65 years of age and the retirement allowance is composed of a basic state pension, which is adjusted periodically according to the income distribution of pension-income in the country, plus an earnings-related pension. The requirement for receiving the basic state pension component is to have at least 40 years of residence as an adult (from 18 years of age onward). In Finland there is no early-retirement pension.

For Finland, the legal minimum age for retirement is 65 years of age for the whole period considered without distinctions based on sex.

France

Access to public pension in France do not vary between sex. Old-age pension (named "minimum contributif") can be achieved with at least 65 years of age. Early-retirement can be achieved with at least 40 years of contribution and 60 years of age from 2004 to 2013, with 41 years of contribution and 61 years of age from 2014 to 2016 and with 41 years of contribution and 62 years of age from 2017 to 2019.

For France, the legal minimum age for retirement is then, for both men and women, 60 years of age between 2004 and 2013, 61 years of age between 2014 and 2016, and 62 years of age between 2017 and 2019.

Greece

Within the OECD reports, information on the Greece pension system and the requirements for accessing public pension are reported, for the years between 2004 and 2012, only for those workers that started working after 1993. These requirements are to have at least 65 years of age and at least 37 years of contribution; however, given that these rules apply only to young workers that started their working life after 1993, they are not useful for the creation of the eligibility-instrument. In 2013, following the ESDC, a major pension system reform is applied, imposing a minimum age for accessing any type of public pension of 67 years of age, for both men and women, except for those workers with at least 40 years of contribution, which can retire from age 62.

For Greece, the legal minimum age for retirement is then 62 for both men and women. However, given the missing information regarding the age requirements before 2013, the years considered for this country are only those from 2013 to 2019.

Hungary

The age required to access the public pension in Hungary is 62 for men between 2004 and 2014, and 63 from 2015 to 2019. For women, the age required has been gradually increased with the aim of achieving equality with men by the end of 2008; it is 60 years from 2004 to 2006, 61 years in 2007 and 2008, 62 years from 2009 to 2014, and 63 years from 2015 to 2019. For the whole period considered, access to public pension is possible only with at least 20 years of contribution.

For Hungary, the legal minimum age for retirement is, for men, 62 between 2004 and 2014 and 63 from 2015 to 2019; for women, it is 60 years between 2004 and 2006, 61 in 2007 and 2008, and it is the same as it is for men from 2009 onward.

Italy

The requirements for either old-age or early-retirement pension in Italy have been thoroughly discussed in the first chapter of this dissertation. The age required for old-age pension for men is 57 years from 2004 to 2009, 59 in 2010, 60 in 2011, and then, following the ESDC and the "Fornero" reform, have been increased sharply to 66 in 2012 and remained so until 2019 when increased to 67 years of age. Early-retirement is based solely on the number of years of pension contribution; these are 38 in 2004 and 2005, 39 in 2006 and 2007, 40 from 2008 to 2011, 42 from 2012 to 2018 and 43 in 2019. For women, the age required for old-age pension is the same as it is for men between 2004 and 2011, it is then increased to 62 in 2012, to 63 from 2013 to 2015, to 65 in 2016 and 2017, 66 in 2018 and 67 in 2019. Early-retirement requirements in terms of years of contribution for women are the same as for men from 2004 to 2011, and they then differ from 2012 to 2019 being one year lower than the men's requirements[10].

For Italy, the legal minimum age for retirement is, for both men and women, 57 years of age between 2004 and 2009, 59 in 2010, 60 in 2011. From 2012 to 2018 is 66 years for men and then 67 years in 2019. For women, it is 62 in 2012, 63 from 2013 to 2015, 65 in 2016 and 2017, and is then the same as for men in 2018 and 2019.

Netherlands

Retirement requirements in Netherlands do not change between sexes and have been almost identical from throughout the period considered. Old-age pension is payable after age 65 from 2004 to 2017 and is increased to 66 in 2018 and 2019.

For Netherlands, the legal minimum age for retirement is therefore 65 between 2004 and 2017, and 66 from 2018 onward, without distinctions based on sex.

Norway

Similarly to Finland, the Norwegian public pension requirements are simple and did not change throughout the period considered. The minimum age for receiving public pension is 67 for both men and women. The pension allowance is composed of a basic state

[10] For a more detailed breakdown of the requirements for accessing public pension in Italy see the sub-sections 4.3 and 4.5 of the first chapter of this dissertation.

pension and an earnings-related pension. The maximum years of contribution that can be counted to increase the earning-related component is 40. There are requirements based on residence, where to receive any form of public-retirement pension at least 3 years of residence and 3 years of contribution are required.

For Norway, the legal minimum age for retirement is then 67 years for all the observation years and for both men and women.

Poland

Poland pension requirements are distinguished based on sex, where for man the minimum age for accessing retirement is 65 and for women is 60, from 2004 to 2015. From 2016 onward the required age has been increased to 66 and 61 for men and women respectively. The number of years of contribution to access the public pension is 25 and 20 years for men and women, respectively.

For Poland, the legal minimum age for retirement is 65 for men, between 2004 and 2015, and 66 from 2016 onward. For women, it is 60 years from 2004 to 2015, and 61 from 2016 onward.

Portugal

Portugal public pension requirements do not distinguish based on sex and can be divided into two periods, before the ESDC and the implementation of the Economic Adjustment Programme for Portugal (PAEF), and after the PAEF guidelines and pension system reforms, adopted in 2012. From 2004 to 2011, the requirements for accessing the public pension were either having at least 65 years of age and 15 years of contribution, or 55 years of age and 30 years of contribution. In 2012 and 2013, the retirement age has been set to be 65 year and has been increased to 66 years from 2014 to 2019.

For Portugal, the legal minimum age for retirement is 55 for both men and women between 2004 and 2011, is 65 in 2012 and 2013, and 66 from 2014 onward.

Spain

Spanish pension requirements are very similar to those in the Nordic countries, meaning that they have been the same throughout the period analysed with no significant

changes. Public pension is achievable with at least 65 years of age and 15 years of pension contribution, and the pension allowance is mostly earnings-based, with no differences between man and women.

For Spain, the legal minimum age for retirement is 65 for both men and women and for all the years of observation.

Sweden

In a similar fashion to Finland and Norway, the Swedish public pension is composed by a basic state pension plus an earnings-related pension. However, unlike the Nordic neighbouring countries, the two public pension components can be withdrawn at different ages. The basic state pension can be received from 65 years of age onward, provided the worker has at least three years of residency. The income-related pension can be withdrawn from age 61. The earnings-related pension has a cap of 40 years of pension contribution. These rules apply to all the years of observation considered.

For Sweden, the legal minimum age for retirement is therefore 61, for both men and women, from 2004 to 2019. Note, however, that given that from age 65 the workers can also withdraw the basic state pension, most Swedish workers work until 65 years of age. This is highlighted both from the share of retired over age in Sweden in Figure 4.1, where a surge in the share of retirees can be observed after age 65, and by the first-stage regression coefficients: if the instrument is set to be equal to one when the individual age is 61 or more, the instrument has little explanatory power over the retirement decision. On the contrary, if the instrument is set to be equal to one when the individual age is 65 or more, the instrument has a relatively large explanatory power over the retirement decision. For this reason, the eligibility-instrument for Sweden is set to be equal to one when the household head's age is 65 or more, and equal to zero otherwise.

4.6 Treatment variables

This sub-section discusses the two treatments employed for the inferential analysis. The first treatment refers to the activity status of the household head and is a binary variable equal to one when the household head reports to be retired, and equal to zero

otherwise. As explained in Section 3, the retirement status by itself is not recommended to be used as the treatment of interest, given the endogeneity and self-selection attached to the retirement decision (Battistin et al. (2009), Fonseca et al. (2013), Kesavayuth et al. (2015) and Allais et al. (2020). As laid out in the methodology Section 3, one way to tackle this issue is to employ an exogenous instrumental variable to be used as an instrument for retirement in a two stage least square equation.

The second treatment of interest is the number of retirees per household, with the objective of estimating the average effect on the outcomes of interest of an additional retiree in the household members composition. Table 4.3 provides, for all the observation years combined, for each country and considering the age restrictions of Table 4.1, the breakdown of the composition of the sample for households with no retirees, with one retiree, with two retirees, with three retirees and with more than three retirees.

For half the countries there are more families with at least one retiree than families with no retirees, which comes to no surprise given that the sample analysed contains individuals whose age are where the passage from work to retirement happens. There are however some extremes; Spain, Norway and Italy are the three countries with the greatest number of households with no retirees (or in other words, with workers only), well above 50%. On the opposite side, Finland and Poland have the lowest share of workers, around 37% and 43%, respectively. The general common trend across all countries is that households with a relatively high number of retirees are less and less common, with little to no households with at least three or more than three retirees per household. However, also with respect to this general trend, there are a few extremes: Finland has the most homogeneous distribution of retirees per household, with roughly the same number of households having one and two retirees, followed in a similar fashion by the Czech Republic and Sweden.

Overall, the distribution of retirees is fairly heterogeneous among the countries considered, with the only characteristic in common being that households with three or more retirees are rare, and households with one retiree are more common that households with two retirees.

Table 4.3 – Households retirees' composition

	No retirees (%)	One retiree (%)	Two retirees (%)	Three retirees (%)	More than three retirees (%)
AT	43.17	37.37	19.07	0.37	0.02
BE	54.21	32.98	12.54	0.27	0.00
CZ	50.42	27.81	21.23	0.53	0.01
FI	37.49	30.83	31.42	0.23	0.03
FR	51.18	31.18	17.24	0.21	0.19
GR	54.21	32.97	12.53	0.27	0.00
HU	44.07	33.74	21.38	0.78	0.03
IT	55.04	31.69	12.81	0.43	0.03
NL	45.36	36.21	18.41	0.02	0.00
NO	57.01	24.01	18.98	0.00	0.00
PL	42.97	36.37	19.97	0.65	0.04
PT	43.57	31.34	23.66	1.33	0.10
ES	58.64	31.84	9.21	0.31	0.00
SE	44.28	28.59	27.10	0.03	0.00

Notes: the table report the percentage share of households with no retirees, with one retiree, two retirees, three retirees and more than three retirees; the samples considered are with age-restrictions applied, which are reported in Table 4.1. The years considered are all the years of observation combined. Source: author's own elaboration from EU-SILC data.

5 Results

Given the relatively high number of countries analysed, and given that two separate treatments are considered, this section presents the results by grouping countries together in order to be easier to read and interpret the findings. The groups are four in total and have been determined based on geography, which also reflects differences in institutional settings. The first group contains the northernmost countries, and is composed by Finland, Netherlands, Norway and Sweden. The second group collects the

Mediterranean countries, and is composed by Greece, Italy, Portugal and Spain. The third group comprises continental European countries, and is composed by Austria, Belgium, Czech Republic and France. The last and fourth group contains eastern European countries and is composed by Hungary and Poland.

Results are presented by first showing and discussing the first stage regression coefficient of the effect of the instrument on the retirement decision, namely γ from equation (2), for all countries. Then the coefficients of interest β_1 from equation (3), that is the effect of retirement instrumented by the legal minimum retirement age, and θ_1 from equation (4), namely the effect of an additional retiree in the household composition, are presented for the four groups of countries.

5.1 First-stage regression results

The first stage regression results for all countries are shown in Table 5.1. The estimated coefficient for the eligibility varies between 0.1421 being the lowest for Belgium, and 0.5088 being the highest for Spain. With respect to the eligibility coefficients estimated in the first chapter of this dissertation, the one estimated here are substantially smaller and have a lower explanatory power on the retirement decision. This due to the fact that the instrument employed in this second chapter is based solely on the minimum legal retirement age, while the one estimated in the first chapter of this dissertation for Italy is based on much more information, like the years of pension contribution, the type of employment, the work starting age and the retirement starting age; data that is unfortunately not available in EU-SILC. To obtain more precise eligibility-instruments would entail an in-depth analysis of each country's pension system rules, requirements and related amendments and potential "special cases", which is beyond the scope of this analysis. Countries with more straightforward retirement requirements (e.g., Finland, France and Spain) tend to display higher estimated coefficients, while countries with frequent reforms and amendments, a perfect example of which is Italy, as shown in the first chapter, tend to display lower estimated coefficients.

Table 5.1 – First stage regression results

	Coefficient	Std. Err.	t-value	R-squared
Austria	0.1531	0.0044	34.74	0.7072
Belgium	0.1421	0.0041	34.76	0.7167
Czech Republic	0.2032	0.0030	66.54	0.7574
Finland	0.5080	0.0034	148.65	0.7758
France	0.4012	0.0031	129.33	0.8118
Greece	0.1435	0.0041	34.90	0.7022
Hungary	0.2243	0.0041	54.85	0.7486
Italy	0.1663	0.0028	59.33	0.7283
Netherlands	0.4461	0.0044	101.74	0.7445
Norway	0.2478	0.0048	51.21	0.7010
Poland	0.3709	0.0029	125.81	0.7442
Portugal	0.3834	0.0036	104.82	0.6999
Spain	0.5088	0.0030	168.36	0.7963
Sweden	0.3425	0.0057	60.02	0.7692

Notes: the table reports the coefficient of the effect of the eligibility-instrument on the retirement decision, namely γ from equation (2), as discussed in Section 3. Standard errors are heteroskedastic-consistent. Results for Greece are estimated considering only the years from 2013 to 2019. Source: author's own elaboration from EU-SILC data.

Nevertheless, the R-squared are still sufficiently high to consider the eligibility for retirement via the legal minimum retirement age a good instrument for the retirement decision; similar results are found for the first stage regression also by Fonseca et al. (2014) which uses the very same instrument on European countries employing the SHARE data.

5.2 Northern Europe (NE)

Table 5.2 presents the results for the northern Europe (NE) countries; with respect to the effect of retirement, the ability to make ends meet decreases only in Sweden by almost 4 points, while instead the negative effect on the ability to go on a 7-day

Table 5.2 – Effect of retirement and of an additional retiree - NE

	Finland	Netherlands	Norway	Sweden
	Retirement			
Make ends meet	0.5359	-0.8388	-0.9884	-3.8525**
	(0.5774)	(0.9988)	(1.8486)	(1.7931)
7-day vacation	-0.0192**	-0.0303**	0.0173	-0.0521**
	(0.0097)	(0.0154)	(0.0208)	(0.0250)
Consume meat	-0.0074	-0.0046	-0.0195	-0.0098
	(0.0048)	(0.0067)	(0.0133)	(0.0149)
Unexpected expenses	-0.0611***	-0.0409**	-0.0030	-0.0203
	(0.0124)	(0.0182)	(0.0384)	(0.0286)
Arrears payments	-0.0247**	-0.0001	0.0473*	0.0298
	(0.0089)	(0.009)	(0.0271)	(0.0215)
	Additional retiree			
Make ends meet	-0.5615**	-1.1647**	-1.3846***	-1.5505***
	(0.2595)	(0.3931)	(0.3324)	(0.3777)
7-day vacation	-0.0019	-0.0084	-0.0039	-0.0020
	(0.0042)	(0.0062)	(0.0028)	(0.0046)
Quality food	0.0020	0.0009	-0.0025	0.0048
	(0.0024)	(0.0029)	(0.0017)	(0.0035)
Unexpected expenses	-0.0045	0.0028	-0.0007	-0.0007
	(0.0048)	(0.0065)	(0.0058)	(0.0052)
Arrears payments	-0.0045	0.0023	-0.0001	-0.0011
	(0.0028)	(0.0027)	(0.0028)	(0.0037)

Notes: the table presents the coefficients β_1 of equation (3), under the "Retirement" section of the table, and θ_1 of equation (4), under the "Additional retiree" section of the table, considering the five indicators discussed in sub-section 4.6. *** stands for 1% significance level, ** for 5% significance level and * for 10% significance level. Standard errors are reported in parathesis and are heteroskedastic-consistent. Source: author's own elaboration from EU-SILC data.

vacation is more widespread, with statistically significant negative coefficients estimated for Finland, Netherlands and Sweden, decreasing by 1.92, 3.03 and 5.21%, respectively. The ability to consume meat every second day is not affected by retirement in any of the countries; facing unexpected expenses is instead more difficult for those household whose head retired in Finland, with a coefficient of -6.11%, and in Netherlands, with a

coefficient of -4.09%. Lastly, the probability of having any arrears payment decreases with retirement in Finland, by 2.47%, and it increases instead in Norway, by 4.73%.

The second treatment of interest, namely the effect of an additional retiree in the family composition, does not affect any of the outcomes considered except for the ability to make ends meet for all the four northern countries, with a decrease of more than one point in Netherlands, Norway and Sweden, and around half a point in Finland.

These results show that retirement does reduce the economic and financial health of the NE households, with most coefficients being negative, albeit not all are statistically significant. The ability to go on a 7-day vacation is the most common negative effect of retirement, although it is also a type of expense that can hardly be considered as essential. More worrying is instead the decrease in the ability to face unexpected expenses, in Finland and Netherland, and the increase in the probability of having arrears payments in Norway. The general negative effect of retirement on financial conditions can be better observed with the second treatment, where an additional retiree causes a statistically significant reduction in the ability to make ends meet in all four countries.

5.3 Mediterranean Europe (ME)

Table 5.3 presents the results for the Mediterranean European (ME) countries; the retirement decision has a completely neutral effect on the Greek households, where all coefficients are non-significant. For the Italian households there is a similar situation, where retirement has a neutral effect on all the indicators considered except the ability to go on a 7-day vacation, which decreases by 8.16% and is significant at the 95% level. Spain is the only country, out of all the 14 considered in this analysis, for which a statistically significant reduction in the ability to consume meat every second day is estimated due to retirement, although the effect is small being -0.82%; Spanish households also see their ability to go on a 7-day vacation and their ability to face unexpected expenses reduced once the household head retire, by 2.34 and 3.05%, respectively. A positive effect is instead estimated for the probability of having any arrears payment, which is reduced by 2.02% when the household head retire, at the 1% significance level. For the last Mediterranean country, Portugal, retirement has a strong

Table 5.3 – Effect of retirement and of an additional retiree - ME

	Greece	Italy	Portugal	Spain
	Retirement			
Make ends meet	2.5181	0.9954	6.1365***	-0.5416
	(2.4458)	(1.4195)	(0.6255)	(0.5798)
7-day vacation	0.0485	-0.0816**	0.09414***	-0.0234*
	(0.0656)	(0.04195)	(0.0160)	(0.0142)
Consume meat	0.0315	-0.0132	-0.0047	-0.0082*
	(0.0403)	(0.0277)	(0.0062)	(0.0049)
Unexpected expenses	-0.0131	-0.0304	0.0887***	-0.0305**
	(0.0751)	(0.0416)	(0.0154)	(0.0139)
Arrears payments	0.0721	0.0389	-0.0336***	-0.0202***
	(0.0732)	(0.0250)	(0.0079)	(0.0074)
	Additional retiree			
Make ends meet	0.5455	-0.0783	1.2288***	0.9110**
	(0.3607)	(0.2251)	(0.1994)	(0.3242)
7-day vacation	0.0216**	-0.0017	0.0229***	0.0054
	(0.0095)	(0.0065)	(0.0051)	(0.0078)
Quality food	0.0083	-0.0027	-0.0007	-0.0017
	(0.0055)	(0.0043)	(0.0020)	(0.0027)
Unexpected expenses	0.0083	0.0066	0.0225***	0.0090
	(0.0105)	(0.0062)	(0.0048)	(0.0075)
Arrears payments	-0.0183	-0.0018	-0.0112***	-0.0050
	(0.0114)	(0.0038)	(0.0018)	(0.0038)

Notes: the table presents the coefficients β_1 of equation (3), under the "Retirement" section of the table, and θ_1 of equation (4), under the "Additional retiree" section of the table, considering the five indicators discussed in subsection 4.6. Results for Greece are estimated considering only the years from 2013 to 2019. *** stands for 1% significance level, ** for 5% significance level and * for 10% significance level. Standard errors are reported in parathesis and are heteroskedastic-consistent. Source: author's own elaboration from EU-SILC data.

and highly significant positive effect on all the economic indicators, except the ability to consume meat: the ability to make ends meet score increases by 6.14, the ability to go on a 7-day vacation increases by 9.14%, the ability to face unexpected expenses increases by 8.87% and the probability of having any arrears payments decreases by 3.36%; with all the estimated coefficients being significant at the 1% level. The latter

results for Portugal are confirmed also by the second treatment, where an additional retiree increases the ability to make ends meet by 1.23 points, to go on a 7-day vacation by 2.29%, to face unexpected expenses by 2.25% and decreases the probability of having any arrears payments by 1.12%. Out of the 14 countries analysed, Portugal is the only country with such a markedly positive effect of retirement. For the second treatment, Greek household experience a higher ability to go on a 7-day vacation, by 2.16%, while for Italian households an additional retiree has neither a positive nor a negative effect on all the indicators. For Spain and additional retiree in the family composition increases the ability to make ends meet by almost 1 point, with no other significant effects.

Overall, the ME countries show a neutral, or even positive in the case of Portugal, effect of retirement on the financial and economic health of the household. Spain is the country with the most deterioration in the considered economic indicators, although there is still a beneficial effect on the arrears payments when the head retire, and a positive effect on the ability to make ends meet score with an additional retiree in the household.

5.4 Continental Europe (CE)

Table 5.4 presents the results for the continental Europe (CE) countries; with respect to the first treatment variable there are no significant effects for the five economic indicators in Austria, Belgium and France, while for the Czech Republic the retirement of the household head reduces the make ends meet score by almost two points, an effect that is, however, weakly statistically significant at the 10% level, and the ability to afford a 7-day vacation by 15.44%, which is the largest decrease estimated for this indicator among all the 14 countries analysed, and is also highly significant with a t-value of 4.50. Similarly to the NE countries, the effect of an additional retiree in the household composition on the make ends meet score is statistically significant for all four countries, with an average decrease of 1 point, varying between 0.8 for France and and 1.2 for Belgium. The effect on the ability to afford a 7-day vacation for the Czech households is significant also for this second treatment, with a 1.6% reduction. Lastly, France is the only country, out of the 14 considered, to show a significant reduction in the ability to consume meat every second day when an additional retiree enters the

Table 5.4 – Effect of retirement and of an additional retiree - CE

	Austria	Belgium	Czech Rep.	France
	Retirement			
Make ends meet	4.3277	-2.1923	-1.9871*	-0.5962
	(2.8986)	(3.0596)	(1.1772)	(0.5764)
7-day vacation	-0.0599	0.08838	-0.1544***	-0.0157
	(0.0594)	(0.0637)	(0.0343)	(0.0167)
Consume meat	-0.0366	0.0081	-0.0160	0.0081
	(0.0489)	(0.0331)	(0.0251)	(0.0109)
Unexpected expenses	-0.1031	0.0478	-0.0533	-0.0208
	(0.0649)	(0.0578)	(0.0344)	(0.0168)
Arrears payments	-0.0087	-0.0193	-0.003	0.0027
	(0.0340)	(0.0352)	(0.0153)	(0.0105)
	Additional retiree			
Make ends meet	-1.0327**	-1.1821**	-0.9674***	-0.7909***
	(0.3810)	(0.4758)	(0.2345)	(0.1898)
7-day vacation	-0.0010	-0.0074	-0.0162**	0.0007
	(0.0075)	(0.0090)	(0.0067)	(0.0052)
Quality food	-0.0082	0.0039	-0.0021	-0.0089**
	(0.0067)	(0.0047)	(0.0050)	(0.0036)
Unexpected expenses	0.0035	0.0011	0.0019	-0.0081
	(0.0082)	(0.0079)	(0.0066)	(0.0052)
Arrears payments	0.0029	-0.0045	-0.0026	-0.0018
	(0.0043)	(0.0045)	(0.0029)	(0.0032)

Notes: the table presents the coefficients β_1 of equation (3), under the "Retirement" section of the table, and θ_1 of equation (4), under the "Additional retiree" section of the table, considering the five indicators discussed in subsection 4.6. *** stands for 1% significance level, ** for 5% significance level and * for 10% significance level. Standard errors are reported in parathesis and are heteroskedastic-consistent. Source: author's own elaboration from EU-SILC data.

household composition; the effect is relatively small, equal to -0.89% and significant at the 5% level.

The results for the CE countries show that the retirement of the head have an overall neutral effect on the financial and economic health of the household, similarly to what has been estimated for Italy and Greece in the ME countries group. Only

exception being the Czech Republic, which shows a significant decrease in the ability to afford a 7-day vacation which, despite being a non-essential expenditure, still show a deterioration in the economic health of the household, given the large and highly significant reduction. On the other hand, an additional retiree in the family composition brings out a more general negative effect linked to retirement that is observable in all four countries via the ability to make ends meet score, and also confirms the negative effect on the ability to afford a vacation for Czech household.

5.5 Eastern Europe (EE)

Table 5.5 presents the results for the eastern Europe (EE) countries; the last two countries considered, Hungary and Poland, differ slightly in the effect of retirement on households' economic health. For Hungary, the entry into retirement of the household head has neither negative nor positive effect on all the economic indicators, while an additional retiree increases the ability to make ends meet score by half a point, leaving the other indicators unaffected. Poland households, on the other hand, suffer from a decrease in the ability to face unexpected expenses once the household head retire by 4.33%. However, there is also a statistically significant beneficial effect related the to first treatment, namely a relatively substantial decrease in the probability of having any arrears payments by 7.45%. Adding a retiree to the household composition has instead no significant effect on any of the outcomes considered for Poland.

The two eastern Europe countries seems to be generally unaffected by retirement, except for a small beneficial effect in Hungary for the make ends meet score when the household gain a retiree, and two statistically significant, albeit in contradiction to each other, effects for Poland, one that signal a deterioration of the economic health, namely a reduction in the ability to face unexpected expenses, and the second that signal economic health improvement, namely a reduction in arrears payments.

Table 5.5 – Effect of retirement and of an additional retiree - EE

	Hungary	Poland
	Retirement	
Make ends meet	1.5117 (1.2628)	0.7901 (0.5948)
7-day vacation	-0.0167 (0.0396)	-0.0246 (0.0160)
Consume meat	0.0065 (0.0387)	0.0033 (0.0121)
Unexpected expenses	0.0380 (0.0430)	-0.0433** (0.0165)
Arrears payments	-0.0269 (0.0304)	-0.0745*** (0.0123)
	Additional retiree	
Make ends meet	0.4878** (0.2283)	0.1295 (.2126)
7-day vacation	0.0066 (0.0072)	-0.0069 (0.0060)
Quality food	0.0072 (0.0069)	-0.0037 (0.0044)
Unexpected expenses	-0.0044 0.0078	-0.0025 (0.0061)
Arrears payments	-0.0066 (0.0054)	-0.0030 (0.0044)

Notes: the table presents the coefficients β_1 of equation (3), under the "Retirement" section of the table, and θ_1 of equation (4), under the "Additional retiree" section of the table, considering the five indicators discussed in sub-section 4.6. *** stands for 1% significance level, ** for 5% significance level and * for 10% significance level. Standard errors are reported in parathesis and are heteroskedastic-consistent. Source: author's own elaboration from EU-SILC data.

5.6 Pension reforms and Proportionality Measure (PM)

The results show that, on average, and considering both the treatments, the highest number of estimated negative effects of retirement on the outcomes of interests are found in northern and continental European countries, while Mediterranean and eastern European countries tend to have little to no statistically significant estimated negative

effects. This heterogeneity might be related to the different institutional settings and in particular it could be explained by the different ways in which European countries have managed and tackled the problem of the sustainability of their pension systems. In light of the increasingly aging populations, some countries started to reform their pension systems at the beginning of the 1990's (for example the Scandinavian countries and Italy), some only after the GFC/ESDC with no reforms prior to these crises (e.g., Greece) and some others started to reverse these reforms in recent years (e.g., Italy, Poland).

On this matter, in 2021, the International Monetary Fund (IMF) published an extensive report on the pension reforms in European countries, with the aim of assessing the sustainability of European pension system into the future (Fouejieu, Kangur, Martinez and Soto, 2021). In the report, the authors discuss the type of pension system reforms that European countries have adopted after the GFC/ESDC in order to reduce the public spending associated with public pensions and move closer to full sustainability[11]. To measure the sustainability of a pensions system, they implement a measure defined as Proportionality Measure (PM). The PM is computed for each 5-year cohort and is defined as the ratio between the sum of pension benefits, i.e., the pension check received from the beginning to the end of the retirement period, and the sum of the pension contributions paid during the working life. A fair and sustainable pension system would have a PM equal to 1, while a PM greater than 1 indicates that retirees withdraw more pension benefits than the contributions they paid, resulting in a pension system that is unsustainable in the long-term; likewise, a PM lower than 1 indicates that pensioners are receiving pension benefits that are lower than the contributions paid during the working life, which would be unfair but sustainable in the long-run. Table 5.6 provides the PM computed by the IMF report for the cohorts 1930 and 1950[12], which are the two cohorts that include the vast majority of the retirees in the sample used in this analysis. The table also reports the difference between the two PMs, with countries

[11] The conclusion of the report is that, on average, the European pension system are still far from achieving full sustainability, with the need to further reduce spending for public pension by 50% to achieve it.

[12] The 1930 cohort includes individuals born between 1930 and 1934, while the 1950 cohort includes individuals born between 1950 and 1954.

Table 5.6 – PM and estimated negative effects of retirement

Country	Group	N. of negative effects	PM for 1930 cohort	PM for 1950 cohort	Δ 1930-1950
Portugal	ME	0	1.73	2.00	0.27
Greece	ME	0	3.62	4.47	0.85
Poland	EE	0	N/A	N/A	N/A
Hungary	EE	1	N/A	N/A	N/A
Norway	NE	1	2.10	1.28	-0.82
Italy	ME	1	2.00	1.83	-0.17
Austria	CE	1	1.99	1.93	-0.06
Belgium	CE	1	N/A	N/A	N/A
France	CE	2	1.64†	1.44	N/A
Spain	ME	3	1.43	1.38	-0.05
Finland	NE	3	1.92†	1.74	-0.18
Netherlands	NE	3	1.71	1.44	-0.27
Sweden	NE	3	3.43	1.47	-1.96
Czech Republic	CE	4	N/A	N/A	N/A

Notes: countries are ordered based on the number of negative effects estimated, for both the treatments considered, in sub-section 5.2, 5.3, 5.4 and 5.5. Data for the PMs are from the "Pension Reforms in Europe – How Far Have We Come and Gone?" IMF report (2021). PM for Poland, Hungary, Belgium and the Czech Republic are not available. † data for France and Finland are available only for the 1940 cohort, hence for the latter two countries the reported PMs are related to the 1940 cohort. Source: author's own elaboration from EU-SILC data.

ordered according to the number of negative effects estimated in sub-sections 5.2 through 5.5, from the lowest to the highest number of estimated negative effects.

The change in the PM between the 1930 and 1950 cohorts can be interpreted as a proxy for the persistency and determination of governments in continuing to reform their pension systems towards a more sustainable level. The lower the difference between PM for the 1930 cohort and PM for the 1950 cohort, the more the pension benefits have been cut or reduced and/or the paid contributions have been increased. From Table 5.6 it can be observed that there is tendency for countries with lower PM differences between cohorts to also have a higher count in the number of negative effects estimated in this analysis, possibly indicating that the negative effects estimated are, at least partially, due to pension system reforms.

This is far from being taken as a definitive conclusion to explain the heterogeneity of the estimated negative effects among the European countries analysed, as many other

factors and country specific characteristics might also contribute to explain it[13]; however, it is reasonable to expect that countries which persistently reformed their pension systems by reducing pension benefits or increasing the requirements or the contributions paid with the aim of long-term sustainability, are more likely to impact negatively on economic and financial conditions of their retired households.

5.7 Post-retirement income

To further explore the heterogeneity in the estimated negative effects of retirement on the European households' economic conditions, I study how the disposable income of the households changes at retirement. To do this, a FEIV regression analysis is implemented; equation (3) is estimated once more, with the only difference being that the outcome of interest H_{it} is the logarithm of the household's monthly disposable income. Table 5.7 presents the estimated coefficients for this outcome.

Out of the fourteen countries analyzed, eleven show a significative reduction in the disposable monthly income due to retirement. The three countries with no statistically significant coefficients are Greece, Hungary, and Italy. For the remaining countries, the disposable income drop varies between 42.4% in Finland, and 8.2% in Poland. The NE and CE countries show, on average, the highest coefficients (28.6% for NE and 17.7% for CE), while ME and EE countries show the lowest coefficients (average of 10.6% for ME and 4.1% for EE). Portugal once again stands out as an outlier, where despite the Portuguese households suffer from a 22.6% reduction in income once the household head retire, four out of the five coefficients of the economic indicators signal an improvement of the economic conditions. The same can be said for Sweden, where, despite a 24.5% reduction in the monthly disposable income, only one economic indicator has a negative and significant estimated coefficient. Overall, Table 5.7 shows that retirement has more often than not a negative effect on the household's disposable income, with an average income decline for the eleven countries that have a statistically significant coefficient that is around 22.5%.

[13] For example, two outliers emerge from Table 5.6: Norway, which despite the large reduction in the PM with respect to other countries, shows only one estimated negative effect, while on the other side, Spain, with the smaller reduction in the PM between the 1930 and 1950 cohort, still shows three statistically significant negative effects of retirement on the economic indicators considered.

Table 5.7 – Effects of retirement on log. of monthly disposable income

Country	Group	# Negative effects	Coefficients	Std. Err.	t-value
Portugal	ME	0	-0.2261	0.0179	-12.62
Greece	ME	0	-0.0159	0.0561	-0.28
Poland	EE	0	-0.0825	0.0143	-5.76
Hungary	EE	1	0.0036	0.0248	0.15
Norway	NE	1	-0.2449	0.0297	-8.24
Italy	ME	1	0.0095	0.0297	0.32
Austria	CE	1	-0.1950	0.0499	-3.91
Belgium	CE	1	-0.2365	0.04722	-5.01
France	CE	2	-0.0988	0.0124	-7.91
Spain	ME	3	-0.2001	0.0131	-15.20
Finland	NE	3	-0.4242	0.0110	-38.48
Netherlands	NE	3	-0.2873	0.0145	-19.73
Sweden	NE	3	-0.1879	0.0220	-8.53
Czech Republic	CE	4	-0.1781	0.0184	-9.66

Notes: the table reports the coefficients β_1 of equation (3), where the outcome of interest is the logarithm of the household's monthly disposable income. Standard errors are heteroskedastic consistent. Source: author's own elaboration from EU-SILC data.

6 Post-pandemic energy inflation cost in Europe

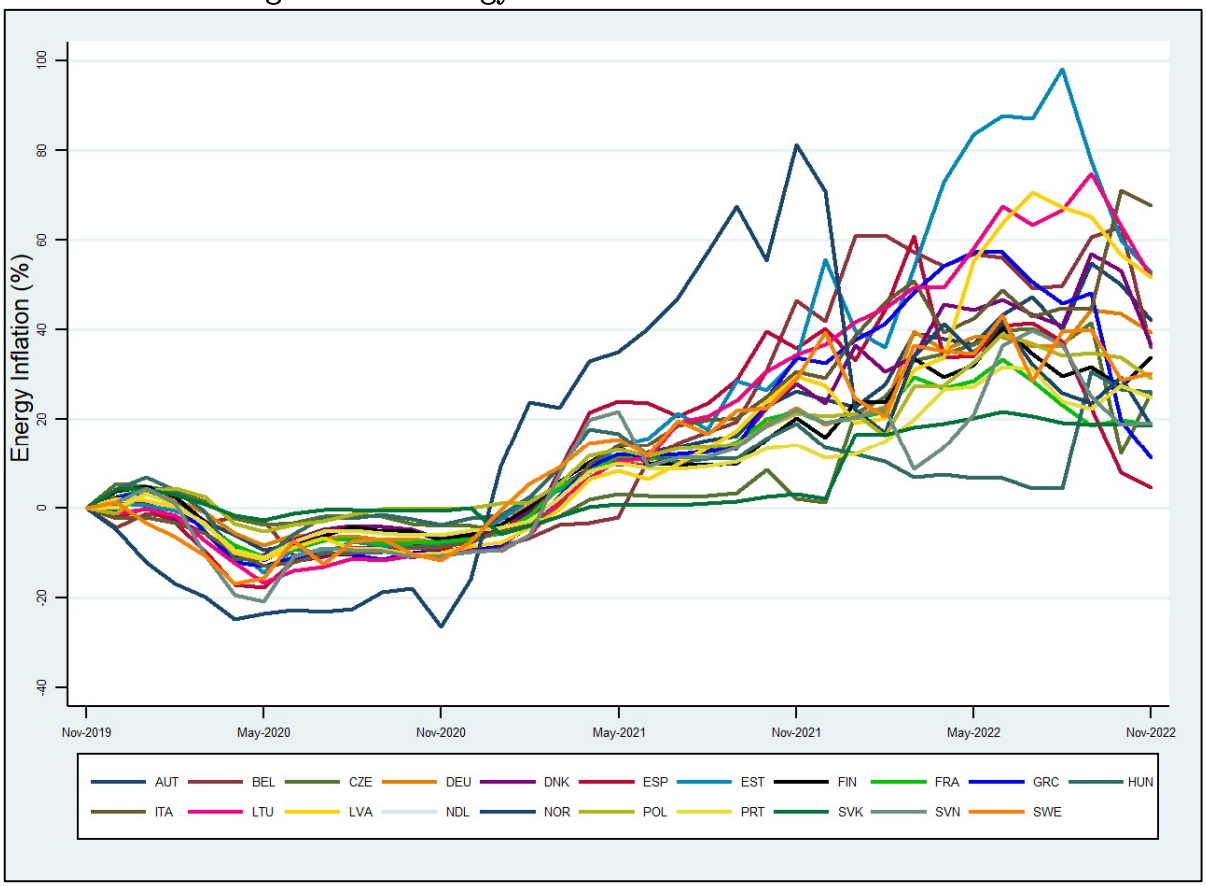
In this section one specific variable of the EU-SILC is taken into consideration and exploited to assess the vulnerability of European households to the wave of rising energy costs that started to hit Europe at the beginning of 2021 and continued throughout the rest of 2021 and 2022. The variable of interest is one of the three used for the construction of the economic indicator (v), laid out in sub-section 4.4. The qualitative question is the one regarding the ability of the household to pay for bills and utilities; more precisely, the question asks the following: *"In the [year of observation], has the household been in arrears, i.e., has been unable to pay the utility bills (heating,*

electricity, gas, water, etc.) of the main dwelling on time due to financial difficulties?", to which the household can answer either "yes" or "no". The countries considered are the same 14 analysed up to now, plus 7 more for a total of 21; the countries added are: Denmark, Estonia, Lithuania, Latvia, Romania, Slovakia, and Slovenia.

6.1 Energy inflation

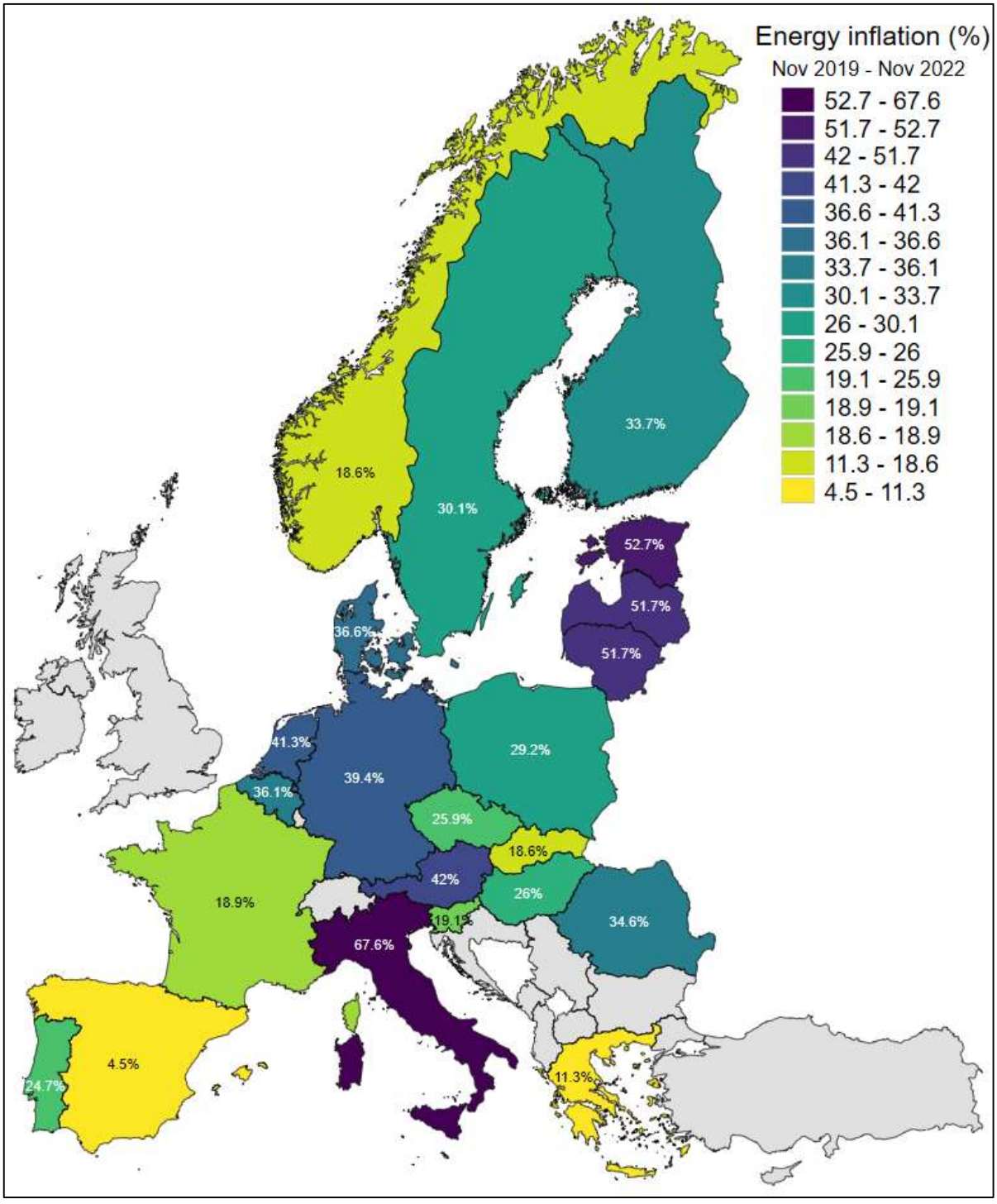
Figure 6.1 shows the energy price inflation between November 2019 and November 2022, where November 2019 is considered the baseline. The figure shows how the cost of energy has gone into deflationary territory up until the end of 2020 and started rising at the beginning of 2021 and continued to rise at least up to mid-2022 for most countries, reversing only afterwards. One of the few countries that has seen energy prices continuing rising also during the second half of 2022 is Italy, as clearly illustrated by Figure 6.2, which shows the energy inflation rate between Nov. 2019 and Nov. 2022.

Figure 6.1 – Energy inflation Nov. 2019-Nov. 2022



Notes: data from OECD inflation reports. Monthly frequency between November 2019 and November 2022, baseline is November 2019 and equal to zero. Data on Romania is not provided by the OECD on monthly frequency and is therefore not included. Source: author's own elaboration from OECD inflation reports.

Figure 6.2 – Energy inflation in Europe between Nov. 2019 and Nov. 2022



Notes: data from OECD inflation reports. Energy inflation rate between Nov. 2019 and Nov. 2022. Source: author's own elaboration from OECD inflation reports.

From Figure 6.2 it can be observed that most European nations have seen an energy costs inflation of over 25% between November 2019 and November 2022, with the few exceptions being Spain, Greece, Slovakia, Norway, France, Slovenia and Portugal, thanks to their lower dependency on Russian natural gas and high usage of oil-based

power plants, renewable energy sources and nuclear power reactors[14]. Italy, the central Europe countries (Germany, Netherlands, Belgium, Denmark, Austria) and the Baltic states (Latvia, Estonia, Lithuania) are those that suffered the recent wave of inflation the most, mainly due to their high reliance on natural gas imported from Russia, a dependency that has become a heavy liability after the Russian invasion of Ukraine in February 2022 and the consequent ban on Russian natural gas imports.

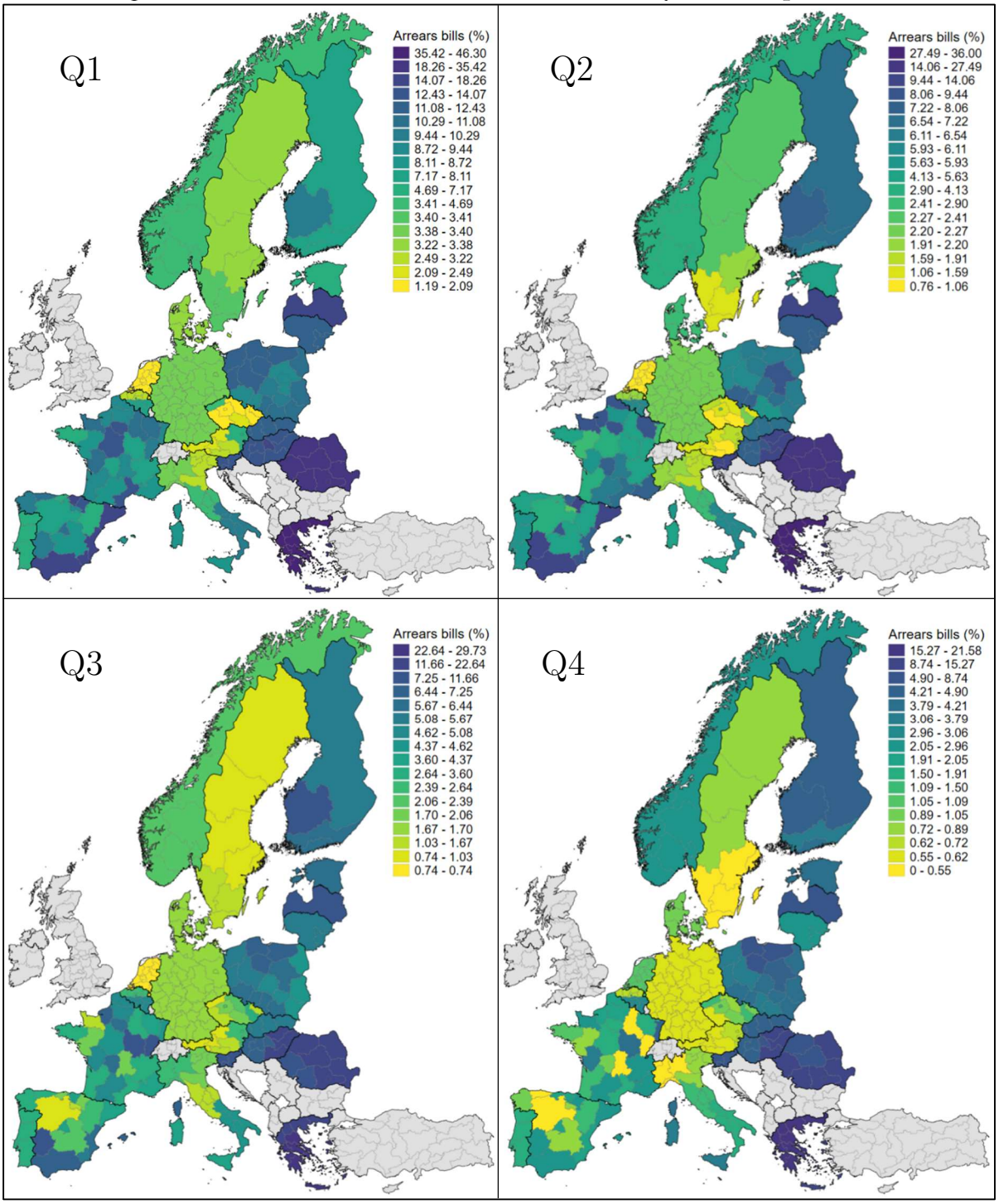
6.2 Arrears on bills and utilities payments

Figure 6.3 shows the distribution of the "yes" answers to the "arrears bills" question, subdivided into the four income quartiles, for the 21 EU countries considered. The percentages showed are averages over the years 2018, 2019 and 2020. Table 6.1 reports the same values for each country distinguishing by income quartiles only, without considering the geographical subdivision.

From this figure it can be observed that the eastern Europe countries (Latvia, Estonia, Lithuania, Poland, Slovakia, Slovenia, Hungary and Romania) and Greece, among all the 21 countries analysed, have the highest share of arrears bills payments for all the four income quartiles. Apart from Greece, the eastern Europe countries are also the ones with the highest level of energy inflation, as shown in Figure 6.2, particularly so for Estonia, Latvia, Lithuania, Poland, and Romania. The four largest EU economies, namely Germany, France, Italy and Spain, show instead less and less share of households with arrears bills payments as income increases, relative to the other EU countries included. The opposite happens instead to Finland, Norway, and the Czech Republic, moving from the yellow-green colour code to the blue-purple as the income quartile increases, indicating that, relative to the other countries included, the share of households with arrears bills payments is higher for the fourth income quartile than it is for the first.

[14] France heavily relies on nuclear energy; Spain also rely partially on nuclear energy and renewable sources (mainly hydroelectric) and mostly imports oil, which has seen a lower inflation rate with respect to natural gas, and its price began to fall as early as the beginning of 2022; Portugal, similarly to Spain, rely strongly on energy from oil but has no nuclear energy production; Greece mostly rely on renewable energy sources and oil; Norway heavily relies on hydroelectric power plants and oil; Slovakia and Slovenia rely strongly on nuclear energy and oil.

Figure 6.3 – % of households with arrears bills by income quartile



Notes: the figure shows the "yes" answers to the question "[…] has the household been unable to pay utility bills […] due to financial reasons?" as average percentages considering the years 2018, 2019 and 2020, subdivided into four income quartiles (Q1, Q2, Q3 and Q4). Values are subdivided into 17 classes, from the colour yellow (lowest) to purple (highest). The geographical areas follow the NUTS-1 and NUTS-2 classification. The map layout is based on NUTS-2 classification; however, some countries provide data based only on NUTS-1 classification (Austria, Italy, Greece, Sweden) and others provide no classification at all based on NUTS regions (Germany, Norway, Denmark, Netherlands, Slovakia, Slovenia, Portugal). Source: author's own elaboration from EU-SILC data.

Table 6.1 – % of household with arrears bills/utilities by income quartile

Households with arrears bills payments (%)					
	Q1	Q2	Q3	Q4	Energy inflation
Austria	4.65	1.61	1.63	0.64	42.0
Belgium	6.17	4.29	3.64	1.55	36.1
Czech Republic	1.90	1.42	1.88	0.97	25.9
Denmark	3.23	2.88	1.70	0.91	36.6
Estonia	7.16	5.48	6.05	3.38	52.7
Finland	8.32	6.96	6.40	4.05	33.7
France	9.63	6.08	4.27	2.01	18.9
Germany	3.40	2.27	1.17	0.62	39.4
Greece	39.14	30.51	26.55	18.32	11.3
Hungary	14.37	10.52	10.74	7.53	26.0
Italy	5.73	3.20	2.56	1.16	67.6
Latvia	14.38	9.92	9.33	6.63	51.7
Lithuania	11.11	8.00	5.17	2.29	51.7
Netherlands	2.09	1.06	0.74	0.94	41.3
Norway	4.68	3.40	2.09	1.09	18.6
Poland	10.48	6.70	5.71	4.25	29.2
Portugal	7.17	5.89	3.61	1.56	24.7
Romania	20.27	18.10	14.91	9.94	34.6
Slovakia	12.43	7.21	5.59	4.84	18.6
Slovenia	13.62	12.43	11.01	6.82	19.1
Spain	13.18	8.14	4.21	1.82	4.5
Sweden	3.37	1.79	1.06	0.39	30.1

Notes: share of households that responded "yes" to the question "[…] has the household been unable to pay utility bills […] due to financial reasons?" as average percentages considering the years 2018, 2019, 2020, subdivided into four income quartiles (Q1, Q2, Q3 and Q4). Energy inflation stands for the and cost of energy inflation between November 2019 and November 2020, expressed in percentage. Source: author's own elaboration from EU-SILC data (for the arrears payments) and from OECD inflation reports (for energy inflation).

Table 6.1 provides a general overview of the most and the least vulnerable countries in Europe with respect to the recent energy inflation wave; Looking at the first income quartile, Greece takes the first place with the highest share of arrears bills payments for all four income quartiles, followed after a considerable margin by some eastern Europe countries (Romania, Hungary, Latvia, Lithuania, Slovakia, Slovenia and Poland) and Spain. Countries with share of households with arrears payments below 10% are Belgium, Estonia, Finland, France, Italy, Portugal while the remaining countries all have share of households with arrears bills payments under 5% (Austria, Czech Republic, Denmark, Germany, Netherlands, Norway and Sweden). On the opposite side, looking at the richest households in the fourth income quartile, only four countries have a share of households with arrears bills payments above 5%, namely Greece, Latvia, Romania and Slovenia, indicating that these countries, especially the last three given the energy cost inflation of Figure 6.2, are the ones that will likely suffer the most the surge in energy prices, especially if the latter will continue to persist beyond 2022.

7 Conclusions

The analysis conducted in this work focused on the effect of retirement on an array of five outcomes that proxy the household's financial fragility and economic condition, namely the ability to make ends meet, the ability to afford a 7-day vacation, the ability to eat meat or vegetarian/vegan equivalent every second day, the ability to face unexpected expenses, and if the household had any arrears payments related to essential needs (bills and utilities, rent/mortgage, other mandatory essential expenses). The data used is from the panel component of the European Union Survey on Income and Living Conditions (EU-SILC), a European level annual survey organized by Eurostat and administered by each member state national statistical institute or central bank. The countries analysed in this work are fourteen (Austria, Belgium, Czech Republic, Finland, France, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Spain, and Sweden) and the years of observation employed are sixteen, from the beginning of the EU-SILC survey, year 2004, to the year 2019. To solve the endogeneity

issue that comes with retirement, namely the ability for the individual to self-select herself or himself into the treatment by ultimately deciding when to retire, an instrumental variable approach is employed. The exogenous instrument exploited for the retirement decision is the eligibility for retirement that is achieved once the individual reaches the legal minimum retirement age for retirement; this type of eligibility-instrument has been used, and proved to be reliable, in several other studies that estimated the effect of retirement on physical health (Goldman et al., 2008; Chung et al., 2009; Godard, 2015), mental health and well-being (Kesavayuth et al., 2016; Fonseca et al., 2014), consumption (Battistin et al., 2009; Li et al., 2015) and food consumption behaviour (Allais et al., 2020). To exploit the panel dimension of the dataset, the regression model implemented is a Fixed Effects Instrumental Variable (FEIV) regression, which allows to control for both time-invariant unobservable characteristics (thanks to the panel dimension) and time-varying unobservable characteristics (thanks to the eligibility-instrument). The number of retirees residing in the household is also considered as a secondary treatment to further corroborate the findings of the first one, whose effect on the outcomes of interest is estimated through a Fixed Effect regression.

The results show that for eleven out of the fourteen countries considered, at least one of the five measures of economic conditions have worsened due to retirement. The negative effects appear to be more widespread in northern (Finland, Netherlands, Norway, and Sweden) and continental (Austria, Belgium, Czech Republic, and France) Europe households. For example, the retirement of the household head causes the ability to afford a 7-day vacation to decrease by 2, 3 and 5% in Finland, Netherlands and Sweden, respectively, and causes a decrease of 15% in the Czech Republic. The ability to face unexpected expenses falls by 6% in Finland and by 4% in Netherlands, while the probability of having had arrears payments increases by almost 5% in Norway. An additional retiree in the household decreases the ability to make ends mees by around 1 point in each continental Europe countries, and by almost 1% the ability to afford meat every second day in France. On the other hand, Mediterranean (Greece, Italy, Portugal, and Spain) and eastern (Hungary and Poland) Europe households endure less if no at all economic condition deterioration after retirement. For Greece, retirement

has a completely neutral effect, with not significant estimated effects for all the five outcomes considered and for both the treatments. Italian households see a 8% decrease of their ability to afford a 7-day vacation, with no significant effect estimated on the other outcomes considered. Portugal finds itself in a unique position, as the retirement of the household head causes an increase in the ability to make ends meet by more than 6 points, in the ability to afford a 7-day vacation by 9.4%, in the ability to face unexpected expenses by 9% and a reduction in the probability to have had an arrear payment by 3%. Lastly, for Hungary there are no negative effect of retirement, but an increase of 0.5 points of the ability to make ends meet when an additional retiree enters the household composition; Polish households experience a decrease in the ability to face unexpected expenses by around 4% when the household head retire, but at the same time the probability of having had any arrears payment decreases by 7.5%.

Following the findings and conclusion of the 2021 International Monetary Fund (IMF) report on the European pension systems and reforms (Fouejieu et al., 2021), that studied the state of pension reforms and pension systems' long-term sustainability in Europe, can help shed a light on the heterogeneity of the estimated negative effects of retirement on the households' economic conditions; from the report emerges that northern and continental Europe countries have started to reform their pension systems as early as at the beginning of the 1990's, and continued to do so throughout the three subsequent decades, while on the other hand, eastern and Mediterranean Europe countries have either started to reform their pension system in the mid 2000's or only after the GFC/EUSC, and/or reversed previously applied pension reforms. This persistence in wanting to implement pension reforms aimed at achieving the long-term sustainability of pension systems, is in a way reflected in the Proportionality Measure (PM) computed by the IMF, which is the ratio between the pension benefits and pension contribution and is calculated for each 5-year cohort. Northern and continental Europe countries are the ones that have seen the largest reduction in their PMs, while eastern and Mediterranean Europe countries have seen small decreases or even increases in their PMs. This is however not to be considered as definitive answer to the observed heterogeneity, other factors and country specific characteristics might also explain it; future research could move in this direction, with an in-depth analysis of EU countries

pension system structure, features, and reform history, aimed at uncovering potential mechanism that might explain the observed heterogeneity.

Lastly, this paper uses the information on the frequency of arrears bills and utilities (heating, electricity, gas, etc.) payments available in the EU-SILC, to analyse the impact of the wave of energy cost inflation that has hit European households in 2021-2022, considering the fourteen previously analysed countries plus seven more (Denmark, Estonia, Lithuania, Latvia, Romania, Slovakia, and Slovenia). What emerges from this piece of analysis is that most eastern Europe countries (Latvia, Lithuania, Estonia, Poland, Romania) and Italy, Austria, Germany, Belgium, Netherlands, and Denmark are the ones with the highest energy inflation rate measured between November 2019 and November 2022. However, of these, the ones with the highest share of arrears payments for bills and utilities are Latvia, Lithuania, Estonia, Poland, and Romania, five countries that will likely have to endure the most economic pain due to the recent inflation surge, and consequently should be on the watchlist of EU policy makers. Future research could exploit this inflationary shock to study how households reacted to it in terms of resources allocation and consumption behaviour, once households survey data for the years 2021 and 2022 is available.

References

Allais Olivier, Leroy Pascal and Mink Julia (2020), "Changes in food purchases at retirement in France", *Food Policy, Vol. 90, N. 101806.*

Bender Keith A. (2012), "An analysis of well-being in retirement: The role of pensions, health, and 'voluntariness' of retirement", *The Journal of Socio-Economics, Vol. 41, pp. 424-433.*

Bonsang Eric and Klein Tobias J. (2012), "Retirement and subjective well-being", *Journal of Economic Behaviour & Organization, Vol. 83, pp. 311-329.*

Chung Sukyung, Domino Marisa E. and Stearns Sally C. (2009), "The Effect of Retirement on Weight", *Journal of Gerontology: Social Sciences, Vol. 64B, pp. 656-665.*

Diamond Peter and Gruber Jonathan (1999), "Social Security and Retirement in the Unites States", *Social Security and Retirement around the World, NBER, pp. 437-473.*

Diener Ed and Suh Eunkook (1997), "Measuring Quality of Life: Economic, Social, and Subjective Indicators", *Social Indicators Research, Vol. 40, N. 1/2, pp. 189-216.*

Fonseca Raquel, Kapteyn Arie, Lee Jinkook, Zamarro Gema and Feeney Kevin (2014), "A Longitudinal Study of Well-Being of Older Europeans: Does Retirement Matter?", *Journal of Population Ageing, Vol. 7, pp. 21-41.*

Fouejieu Armand, Kangur Alvar, Romero Martinez Samuel, Soto Mauricio (2021), "Pension Reforms in Europe – How Far Have We Come and Gone?", *International Monetary Fund - European and Fiscal Affairs Departments, Departmental Paper DP/2021/016.*

Godard Mathilde (2016), "Gaining weight through retirement? Results from the SHARE survey", *Journal of Health Economics, Vol. 45, pp. 27-46.*

Goldman Dana, Lakdawalla Darius and Zheng Yuhui (2008), "Retirement and Weight", *RAND Corporation Working Paper 15096.*

Grable John E., Cupples Sam, Fernatt Fred and Anderson NaRita (2013), "Evaluating the Link Between Perceived Income Adequacy and Financial Satisfaction: A Resource Deficit Hypothesis Approach", *Social Indicators Research, Vol. 114, N. 3, pp. 1109-1124.*

Grech Aaron (2015), "Evaluating Possible Impact of Pension Reforms on Elderly Poverty in Europe", *Social Policy & Administration, Vol 49, N. 1, pp. 68-87.*

Grete Tøge Anne and Blekesaune Morten (2015), "Unemployment transition and self-rated health in Europe: A longitudinal analysis of EU-SILC from 2008 to 2011", *Social Science & Medicine, Vol. 143, pp. 171-178.*

Hershey Douglas A., Henkens Kène and Van Dalen Hendrik P. (2010), "What drive retirement income worries in Europe? A multilevel analysis", *European Journal of Ageing, Vol. 7, pp. 301-311.*

Horner Mokyr Elizabeth (2014), "Subjective Well-Being and Retirement: Analysis and Policy Recommendations", *Journal of Happiness Studies, Vol. 15, pp. 125-144.*

Hsieh Chang-Ming (2003), "Income, Age and Financial Satisfaction", *Journal of Aging and Human Development, Vol. 56, N. 2, pp. 89-112.*

Hunrichs Karl (2013), "Sovereign Debt Crises and Pension Reforms in European Countries", *Centre for Social Policy Research – University of Bremen.*

Iacovou Maria, Kaminska Olena and Levy Horacio (2012), "Using EU-SILC data for cross-national analysis: Strengths, problems and recommendations", *ISER Working Paper Series, No. 2012-03.*

Kesavayuth Dusanee, Rosenman Robert E. and Zikos Vasileios (2016), *Economic Inquiry, Vol. 54, N. 2, pp. 733-750.*

Klotz Johanness, Göllner Tobias and Gärtner Kathrin (2018), "Case study: The Impact of Retirement on Subjective Well-Being in Austria: An Analysis of National EU-SILC Data", *Austrian Federal Ministry of Education, Science and Research.*

Monticone Chiara, Trucchi Serena and Elsa Fornero (2008), "Flexibility in Retirement – A framework for the analysis and a survey of European countries", *Center for Research on Pension and Welfare Policies.*

Palomäki Liisa-Maria (2018), "Does It Metter How You Retire? Old-Age Retirement Routes and Subjective Economic Well-Being", *Social Indicators Research, Vol. 142, pp. 733-751.*

Trucchi Sara, Fornero Elsa and Rossi Mariacristina (2018), "Retirement rigidities and the gap between effective and desired labour supply by older workers", *IZA Journal of Labor Policy, Vol. 7, N. 10.*

Van Solinge Hanna and Henkens Kène (2008), "Adjustment to and Satisfaction With Retirement: Two of a Kind?", *Journal of Psychology and Aging, Vol. 23, N. 2, pp 422-434.*

Wang Mo (2007), "Profiling Retirees in the Retirement Transition and Adjustment Process: Examining the Longitudinal Change Patterns of Retirees' Psychological Well-Being", *Journal of Applied Psychology, Vol. 92, N. 2, pp 455-474.*

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