Retirement and healthcare utilization†

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Abstract

Pension systems and reforms thereof are often discussed in the context of financial viability. In industrialized countries, these debates grow in intensity with the aging of the population; however, an increase in the retirement age may create unintended side effects with regard to retirees' health or healthcare costs. This study empirically analyzes the effect of (early) retirement on individual inpatient and outpatient healthcare utilization in Austria. We use comprehensive labor market and retirement data from the Austrian Social Security Database, together with detailed information about individual inpatient and outpatient healthcare service utilization in the province of Upper Austria. To account for endogeneity in retirement decisions, we exploit exogenous variation in the early retirement age as induced by two Austrian pension reforms (i.e., those in 2000 and 2003). We find a significant negative effect of retirement on service utilization. For both genders, retirement reduces subsequent doctor visits and expenditure for outpatient medical attendance and hospitalization. Based on the analysis of disaggregated components of services and expenditure, we interpret the results as evidence for positive health effects and behavioral changes in the utilization of healthcare services after retirement.

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1 Introduction

Many member countries of the Organisation for Economic Co-operation and Development (OECD) have introduced reforms to encourage or enforce a longer working life for their citizens. Population aging, declining fertility, and the recent global economic crisis (2007–09) have increased the pressure to keep the pension systems financially sustainable. However, pension reforms or related policies to keep elderly workers active in the labor market for longer periods may be accompanied by adverse social and economic effects at the individual level. For example, an increase in retirement age can create unintended side effects with regard to the retiree's health or healthcare costs. From a policy perspective, it is important to analyze and quantify these spillover effects from longer employment on health and healthcare utilization: if these effects are quantitatively important, they may raise questions about the employability of older workers. Hence, understanding these spillover effects is relevant to effectively design policies that keep elderly workers employed; however, if these effects are ignored, retirement policies may be prone to failure.

Most literature on the health outcomes of retirement focus on subjective self-reported health status. Such studies can be criticized because answers to questions about mental and physical health can be expected to vindicate the retirement decision. In this study, we examine the impact of retirement on inpatient and outpatient healthcare utilization (i.e. the number of services and expenditure), using administrative register data. The advantage of using such data is that they are objective in nature. First, the effect of retirement on out-of-pocket healthcare expenditure is important in terms of financing the healthcare system; causation-related empirical evidence would allow health insurance funds to undertake an informed assessment of future healthcare costs as triggered by (early) retirement reforms. Second, different categories of healthcare utilization may reflect individual-level health to varying extents. Whereas the utilization of certain healthcare services—for example, routine dental visits or other medical examinations—has a clear preventative character; mainly, we interpret the number and length of stay in hospitals and the consumption of prescribed medicines as indicators of an individual's health status. In our empirical analysis, we identify retirement effects for the different categories of healthcare services and discuss their curative and/or preventative character.

To empirically analyze the impact of (early) retirement on individual-level inpatient and outpatient healthcare utilization, we use the labor market and retirement data from a comprehensive matched employee–employer dataset and combine this information with detailed individual-level health register data from the province of Upper Austria. To account for the endogeneity of retirement decisions, we exploit exogenous variation in the early retirement age, as induced by two Austrian pension reforms (i.e., those introduced in 2000 and 2003). With these reforms, the eligibility age for early retirement was gradually increased from 60 to 65 for men and 55 to 60 for women.

We find that retirement has a significant effect on healthcare utilization. For both genders, retirement reduces subsequent doctor visits and expenditure in relation to outpatient medical attendance and hospitalization. Retirement reduces women's (men's) expenditure on outpatient doctor visits by 26% (7.8%) of the standard deviation. The reduction in expenditure for inpatient treatment of men is 20.1% per standard deviation. The decrease in hospital expenditure for women is quantitatively important but statistically insignificant. In contrast, we find retirement to have no significant effect on medication expenditure. At the disaggregated level, we find a reduction in outpatient doctor visits and expenditure for general practitioners (GPs), ear–nose–throat (ENT) specialists, orthopedists, internists, psychiatrists and psychologists, dentists, and practitioners of diagnostic services.

Literature The empirical literature on the effect of retirement on health status provides conflicting evidence. Those who find retirement to have a positive effect tend to stress the workplace burden (both physical and mental) that gets eliminated by virtue of retirement. In contrast, negative retirement effect refers to the loss of professional responsibilities, lack of physical and mental activities after retirement, and the emergence of unhealthy lifestyles, including alcohol abuse. An assessment of the existing evidence is difficult, since the studies rely on different outcomes and identification strategies. This leads to the question of external validity of the results of any single study, especially since pension systems differ widely among countries.

Generally, cross-sectional studies show that early retirement is associated with a decline in health. Obviously, these results cannot be interpreted causally, since (many) persons who retire early can be expected to do so for health reasons. The selection to retirement is not adequately addressed in such studies. A growing body of literature addresses selection to retirement by using longitudinal data or quasi-experiments. Most of these studies—many of which are based on subjective health measures—report the positive effects of retirement on health. In their longitudinal study of civil servants in the United Kingdom (UK), Mein *et al.* (2003) find that retiring at the mandatory age of 60 (in comparison to continuing to work) has no effects on self-reported physical health, but is associated with improved mental health—particularly among the high socioeconomic status (SES) groups. Coe and Lindeboom (2008) use the offering of early retirement windows as an instrument for retirement; they find early retirement to have no detrimental health effects on men. The authors report a temporary increase in self-reported health and improvement in health among highly educated workers. The results of the GAZEL cohort study for older male workers from the French national gas and electricity company (Westerlund *et al.*, 2009) suggest that retirement brings relief in the burden of self-perceived ill health, within all groups of workers other than those with perfect working conditions.[1]

Studies utilizing the database of the Survey of Health, Aging, and Retirement in Europe (SHARE) assert the positive effects of retirement on self-reported health. For

[1] Using the same database, Vahtera *et al.* (2009) find a decrease in sleep disturbances.

example, Coe and Zamarro (2011) use country-specific early and full retirement ages as instruments for studying retirement behavior in several European countries. The authors find a reduced probability for reporting deterioration in health after retirement. Shai (2015) identifies the retirement decision by leveraging an exogenous increase in Israel's mandatory retirement age for men. The author argues that compulsory employment at an older age impairs self-reported health and the impact is stronger among the lower-SES groups. These findings are supported by data captured through the Israeli Household Expenditure and Health Surveys. In utilizing SHARE data and two other datasets (i.e., the English Longitudinal Study of Ageing [ELSA] and the United States(US) Health and Retirement Study [HRS]), Horner (2014) uses the differences in social security regimes (i.e., whether or not an individual has reached the early or normal retirement age) and finds retirement to have a large and positive effect on subjective well-being that attenuates over the subsequent years in retirement. Coe and Zamarro (2015) estimate the causal effect of retirement on healthcare utilization. Using HRS and SHARE panel data and exploiting the variation in statutory retirement ages across countries in an instrumental variable (IV) framework, they find that retirement leads to fewer doctor visits, whereas night stays in hospitals are not affected by the retirement status. Another recent study that also uses HRS panel data is Gorry *et al.* (2018). The authors instrument for retirement using age-based variation in eligibility for Social Security retirement benefits, eligibility for retirement benefits in an employer-sponsored pension, and applicability of the Social Security earnings test. They find a positive effect of retirement on reported health, mental health, and life satisfaction and no evidence that better health is driven by increased healthcare utilization.

Two studies that exploit changes in pension regulation in France and the Netherlands find positive health effects (Blake and Garrouste, 2012) and a reduction in mortality risk (Bloemen *et al.*, 2013). Hallberg *et al.* (2015) use a targeted retirement offer to Swedish military officers 55 years of age or older. Before this offer, the normal retirement age for military officers was 60 years. The authors find both a significant reduction in the number of days of inpatient care and lower mortality risk; additionally, the reduction in number of hospital days is greater for lower-SES groups. The given interpretation is that the effect may be linked to lower levels of stress and less exposure to workplace hazards. Finally, Eibich (2015) applies a fuzzy regression discontinuity design that uses discontinuous increases in the probability of retiring at ages 60 and 65 in Germany. These increases are induced by financial incentives in the pension system. The author confirms improvements in subjective health status and mental health, as well as a reduction in outpatient care utilization. He argues that relief from work-related stress or frequent physical exercise are the key mechanisms of the retirement effect.

Among the studies that identify the negative health consequences of retirement, Dave *et al.* (2008) find an increase in difficulties associated with mobility and daily activities, and in mental health. Rohwedder and Willis (2010), who exploit changes in retirement policies in the United States and in certain European countries, find a negative impact of early retirement on the cognitive abilities of people in their early 60s. The authors argue that the effect is causal by making use of comprehensive research showing that most variation in average retirement rates across countries is driven by differences in pension, tax, and disability policies. Kuhn *et al.* (2010) exploit an exogenous change in Austrian unemployment rules that allowed workers in eligible regions to withdraw from the workforce up to 3.5 years earlier than their noneligible counterparts. They find that among male workers who retire earlier, the probability of dying before the age of 67, increases by 13%; however, the authors find that an early job exit does not have any effect on the mortality of female workers. Analysis of the causes of death among men indicates a higher incidence of cardiovascular diseases. Similarly,, based on the ELSA database, Behncke (2012) finds that retirement increases the risk of cardiovascular diseases and cancer, which also reflect increased risk factors such as body mass index and blood pressure. Hernaes *et al.* (2013) exploit data from a series of changes in retirement policies in Norway. Based on administrative data that cover the Norwegian population, instrumental variable (IV) estimates show that retirement age has no effect on mortality. The study that most closely resembles our research is Hagen (2018), who studies the health consequences of a two-year increase in the normal retirement age of local government workers in Sweden. The study is limited to women working as personal care workers, nursing professionals, cleaners, and restaurant service workers. The results show that the reform had no impact on drug prescriptions, the number of hospital admissions, or on mortality. Recent evidence on the effect of retirement on healthcare utilization in China is provided by Zhang *et al.* (2018). Based on a nonparametric fuzzy regression discontinuity design exploiting the statutory retirement age in urban regions, they find an increase in healthcare utilization. The authors argue that this result contrasts with the previous findings for developed countries and can be attributed, specifically, to the reduced opportunity cost of time after retirement, which can be explained by institutional characteristics.

Summarizing the existing evidence in the literature, the results of positive or negative causal effects of retirement on health do not depend on a voluntary versus mandatory reform or whether the reform increases or decreases the retirement age. Similar complier populations may but do not necessarily trigger identical causal health effects.

The remainder of this paper is organized as follows. Section 2 briefly covers the institutional background of the Austrian pension and healthcare system. In Section 3, we describe our data (3.1), discuss the estimation strategy (3.2), and present the descriptive statistics (3.3). Section 4 presents the estimation results. Section 5 discusses the results and concludes the paper.

2 The Austrian healthcare and pension system

The Austrian healthcare system Austria has a Bismarck-type healthcare system that provides the entire population with universal access to medical services. Mandatory health insurance is offered by nine provincial health insurance funds (in German, "Gebietskrankenkassen"), depending on the occupation and place of residence. The insurance funds are earmarked for all private-sector employees, retirees from the private sector, and their dependents. The group of insured persons represents approximately 75% of the population.[2] Expenses related to doctor visits and medication are funded by the wage-related social security contributions of employers and employees. Hospitalization expenditures are co-financed by social security contributions and general tax revenues from various federal levels.

Mandatory health insurance covers all expenses for medical care in the inpatient and outpatient sector, including medication. Patients pay a prescription charge (€5.15 in 2012) for medical drugs, and a small deductible per day for inpatient treatment. Ambulatory care is provided by GPs and medical specialists. Moreover, patients can freely choose among the available GPs, however, they usually consult a so-called "family doctor" located close to their place of residence (Hackl *et al.*, 2015). A GP has a gatekeeping function as he or she provides primary care and coordinates further treatment. If the GP decides that specialist care is necessary, he or she refers the patient to a resident specialist in that field or a hospital. General practitioners are free in their selection of suitable specialists or hospitals. Admission to a hospital requires the referral of a GP or a resident medical specialist, however, patients can directly consult outpatient hospital departments in case of emergency or during weekends and night hours. Almost 90% of medical drugs are prescribed by GPs and resident medical specialists and readily reimbursed through the health insurance funds. Unlike in other countries, prescriptions include a specific medical drug and not just the active ingredient. The dispensing pharmacies in Austria are not authorized to substitute the prescribed drug (e.g., a cheaper medication for a more expensive one).

With respect to the utilization of healthcare services, there is no difference determined in the system between employees and retirees. After retirement, insured persons continue to have unlimited access to healthcare services, but retirees do not pay social security contributions. However, a point referring to time costs is important to notice. Even if the Austrian labor law establishes the general principle that appointments for doctor visits should be made off the job, both blue- and white-collar workers are legally guaranteed paid leave from work for the duration of a medical consultation. Due to this incentive structure, employees' visits to a doctor take place regularly during working hours. In

[2] The rest of the population is covered by special social insurance institutions that provide farmers, civil servants, and self-employed individuals with health insurance.

contrast, retirees always bear the full-time costs of doctor visits.

The Austrian pension system The public pension system in Austria covers all private-sector workers and provides early retirement pensions,[3] old-age pensions, and disability pensions. Public pensions are by far the most important income source for retirees in Austria. The pension amount depends on the number of insurance months collected during a person's working life and the assessment base, which for most individuals in our sample is the 15 best annual earnings years.[4] With an average gross pension replacement rate of 76.6%—compared to the total OECD average of 54.4% (in 2012)—Austria has one of the most generous pension systems among the OECD countries. Austria also has one of the lowest average retirement ages: although it has a statutory retirement age of 65 (60) for men (women), the actual retirement age for men (women) in 2012 was only 61.9 (59.4) years (OECD, 2013).[5]

The low level of labor force participation rate among the elderly can be attributed partly to the disincentives provided by the Austrian pension system (Hofer and Koman, 2006). Hanappi (2012) calculates Austria's social security wealth and accrual rates and finds that social security wealth peaks at the age of 63 for men, thereby creating strong disincentives for working beyond that age. To smooth the transition to retirement, in the early 2000s, the Austrian government introduced the old-age part-time schemes for older employees, where the reduction in working time for elderly workers is subsidized. This scheme often results in early retirement (Graf *et al.*, 2011). Finally, employers also play an important role in their workers' retirement decisions. Special severance payments (i.e., "golden handshakes") that are paid to workers if they leave the job early are associated with tax advantages for the employer and employee alike. Frimmel *et al.* (2015) show that steeper seniority wage profiles in firms lead to significantly early job market exit.

During our sample period of 1998–2012, several reforms were passed in the Austrian pension system. In particular, we exploit two pension reforms—namely, those in 2000 and 2003—and use the gradual increase in early retirement age for different birth-quarter cohorts as an exogenous variation in the probability of retirement (for details, see section 3.2).

3 Research design

In this section, we present the data used in the empirical analysis and discuss the estimation strategy to identify the causal effects. This section also provides the descriptive

[3]The most common form of early retirement stems from long periods of contributions made to the pension insurance. There was an early retirement option for the long-term unemployed (until 2004) and for disabled workers (until May 2000).

[4]In 2003, the system changed to a so-called pension account, where all contributing insurance years became part of the assessment base.

[5]Note that these averages exclude disability pensions. When one considers disability pensions, the average retirement age for men (women) would fall to 59.4 (57.4) years.

statistics for our variables of interest.

3.1 Data

The empirical analysis is based on several administrative data sources for the province of Upper Austria. All labor market and information related to retirement is drawn from the Austrian Social Security Database (ASSD), which is a matched employee-employer dataset collected to verify pension claims for all Austrian private-sector workers (Zweimüller *et al.*, 2009). It contains detailed information on workers' employment and earnings histories and basic socioeconomic characteristics (e.g., age, broad occupation, experience, and tenure). The ASSD also contains information on the start of pension, as well as pathways to retirement (i.e., disability pension, early retirement, or regular old-age retirement).

We combine labor market and retirement information with outpatient and inpatient healthcare utilization data from the Upper Austrian Health Insurance Fund. The register data include detailed information on the number of visits made to a doctor and expenditure for medical attendance in the outpatient sector (for GPs and medical specialists) and for medication (number of prescriptions and drug expenses) within the "Anatomical, Therapeutic, Chemical" (ATC) classification system code.[6] Moreover, the outpatient register data include information on participation in preventive health screening examinations. Adults are eligible and recommended to participate in a general health screening program (in German, "Allgemeine Vorsorgeuntersuchung"). The program offers participants a yearly health examination, free of charge. This health examination includes a comprehensive anamnesis and a series of age and gender-specific diagnostic tests. The objectives of the program include identification of health risks, early detection of diseases, and provision of helpful information with regard to lifestyle choices. Further, we observe women's participation in gynecological (i.e., pap smear, colposcopy) and mammography screening, and men's participation in prostate-specific antigen (PSA) tests. Inpatient information covers the number of hospital days, hospital expenditure, and admission diagnoses for everyone according to the ICD-10 classification scheme.

We include all male and female private-sector workers born between 1938 and 1957 and observe their utilization of healthcare services per quarter during the period between 1998 and 2012.[7] The individuals in our data were required to retire after 1997, and we exclude individuals with special retirement regulations (i.e., workers engaged in heavy labor, workers with more than 45 insurance years, and public-sector workers). We do not exclude individuals retiring due to disability pension, even if this may indicate a health problem. However, as a robustness check, we present results for a sample not including those who retire through disability pensions. This leaves us with $1,356,552$

[6] We do not have data for over-the-counter-medicines such as headache pills.

[7] Outpatient data related to dentistry are available only since 2002, and disaggregated hospital figures only since 2005.

individual-quarter observations for men and $1,866,974$ individual-quarter observations for women; this corresponds to $48,131$ men and $76,071$ women. An important reason for the imbalance in the number of observations between men and women is the fact that we exclude workers (predominantly male) engaged in heavy labor who may be eligible for a special heavy-labor pension. The final panel is unbalanced, given that a certain number of individuals died before the end of the observation period.

3.2 Estimation strategy

To analyze the effect of retirement, we examine a series of important healthcare utilization variables (number of services and expenditure) for the inpatient and outpatient sectors, and male and female workers separately. We estimate the following empirical model:

$$utilization_{iq} = \beta_0 + \beta_1 retired_{iq} + \beta_2 age_{iq} + \beta_3 age^2_{iq} + time_q + \mu_i + \epsilon_{iq}, \tag{1}$$

where we explain the service utilization of individual i in quarter q, depending on a binary indicator if the individual retired during the same quarter ($retired$). We further control for a second-order polynomial of age in months (age, age^2) and add year-quarter fixed effects ($time$) to account for trends or time-related effects in outcomes or retirement behavior. We do not include further socioeconomic characteristics, since the longitudinal structure of our dataset allows us to estimate the individual fixed effects captured by the parameter μ_i. The individual fixed effects control for all time-invariant individual characteristics, such as occupation, industrial sector, educational attainment, ability, general health status, or genetic endowment. However, the fixed effects cannot account for the time-varying heterogeneity, which may influence an individual's utilization of services and retirement decision (e.g., unanticipated health shocks). Hence, even when including individual fixed effects, we cannot altogether rule out a remaining correlation between retirement and further time-varying confounding factors of ϵ_{iq}. To account for this potential omitted-variable bias, we suggest an IV approach where we exploit the exogenous variation in the decision to retire, deriving from two Austrian pension reforms (i.e., in 2000 and 2003).

Pension reforms To guarantee the fiscal sustainability of the public pension system, the Austrian government implemented two large pension reforms, in 2000 and 2003. An important feature of both these reforms is the gradual increase in the eligibility age for early retirement. The first reform, in 2000, increased the early retirement age by 1.5 years. This increase was conducted stepwise for different birth-quarter cohorts—more precisely, men born before October 1940 were still eligible for early retirement at the age of 60, whereas the eligibility age for men born in the fourth quarter of 1940 was increased by two months. For every subsequent birth quarter, the eligibility age was further raised, until the total increase of 1.5 years was reached. The same stepwise increase was applied to women, where women born after September 1945 had a two-month higher eligibility age than women born earlier. Overall, the 2000 pension reform aimed to increase the eligibility age for early retirement from 60 to 61.5 for men, and from 55 to 56.5 for women. The second reform, in 2003, further increased the eligibility age for early retirement, from 61.5 to 65 years for men and from 56.5 to 60 years for women, via a similar stepwise increase for each birth-quarter cohort. Figure 1 shows the development of the early retirement age over birth quarters for men and women. One should note that the introduction of the corridor pension at age 62 for men circumvented the gradual increase in early retirement age; hence, their eligibility age was practically capped at age 62. Male employees, who reached the age of 62 and contributed to the pension system at least 40 years, are eligible for the corridor pension, a special type of early retirement.

Further relevant changes on account of the reforms included a stepwise extension of the assessment base, from the best 15 earning years to lifetime earnings; increased penalties for early retirement, from 2% to 4% of the pension per year (capped at 10%); and a temporary extension for the duration of unemployment benefits for certain birth cohorts, from 52 to 78 weeks. Staubli and Zweimüller (2013) and Manoli and Weber (2016) analyze the employment effects of both pension reforms. Staubli and Zweimüller (2013) find that the increase in the early-retirement eligibility age raised employment by 9.75 percentage points for men and 11 percentage points for women. The employment outcomes were largest for the high-wage and healthy workers. While reforms had generated substantial spillovers on the unemployment insurance program, the impact on the disability insurance were reportedly small (i.e., 1.3 percentage points). Using a regression kink design and a slightly different sample of workers who are more attached to the labor market , Manoli and Weber (2016) the authors find that a one-year increase in the early retirement age increased the average job exit age by 0.4 years. They find no significant spillover effects on disability insurance.

Instrumental variable To identify the causal effect of retirement, we exploit the exogenous variation induced by the two pension reforms mentioned above. Individuals of different birth-quarter cohorts are endowed with different exogenously determined eligibility ages for early retirement. We define a binary IV as equal to 1 if the individual is below the early retirement age in quarter q, conditional on year-quarter fixed effects and a second-order polynomial of age in months. Hence, the first-stage estimation can be written as:

$$retired_{iq} = \gamma_0 + \gamma_1 \mathbf{1}[age_{iq} < era_i] + \gamma_2 age_{iq} + \gamma_3 age_{iq}^2 + time_q + \mu_i + \eta_{iq}, \qquad (2)$$

with era_i as an individual's eligibility age for early retirement. Our parameter of interest in the first stage is γ_1, which measures the impact of the individual-specific eligibility age for early retirement (with respect to the individual's birth quarter) on the probability of being retired. In a given quarter q, being younger than the early-retirement eligibility age specific to one's birth-quarter cohort is expected to lower the probability of being retired in quarter q, and so we expect γ_1 to be negative. One should note that γ_1 is identified only by the exogenous variation in the eligibility age for early retirement, as generated by the two pension reforms.

Identifying assumptions First, the validity of the instrument requires that the early retirement age has a significant effect on the probability of being retired, so $\gamma_1 \neq 0$. Second, we need to assume that the change in the early retirement age affects the outcome variables solely through the changed probability of retirement, and that there is no direct channel of the reform to healthcare service utilization. The exclusion restriction of the instrument requires that the individual-specific early retirement age does not correlate with any confounding factors included in ϵ_{iq}, conditional on covariates and individual fixed effects.

There may be some potential concerns with respect to the instrument's credibility. One objection to the instrument may be that the impact of an exogenous increase in early retirement age on service utilization not only captures the effect of retirement but also includes age effects or time trends. In response, we add to our estimation model a second-order polynomial of age measured in months and year-quarter fixed effects, to control for these potential age and time effects of the increased early retirement age.

Obviously, retirement is associated with a reduction in earnings, as pension claims are typically lower than earnings. Moreover, the pension reforms increased income penalties for retirement taken prior to the statutory retirement age. Therefore, one should consider that the reforms induce income effects that, in turn, spill over to the healthcare sector. Although these income effects should be negligible due to the small stepwise increase in the early retirement age, we cannot rule them out (Manoli and Weber, 2016). As a robustness check, additionally, we include earnings (labor income, or pension payment if already retired) in our model, to control for potential income effects.[8]

3.3 Descriptive statistics

Our sample comprises 48,131 men born between 1940 and 1955, and 76,071 women born between 1945 and 1957.[9] Aggregated data on healthcare utilization and disaggregated data on medical attendance and screening participation are available from 1998, disaggregated data on medication and hospitalization are available from 2005. Tables 1 and 2 summarize the descriptive statistics for men (Column (I)) and women (Column (II)). Overall, 77.4% of men and 73.7% of women retired by the end of our observation period in 2012. The men were more likely to be blue-collar workers, and their monthly average

[8]We refrain from including income in our baseline specification. We consider it a bad control since the variable is affected by the reform.

[9]We exclude workers (predominantly male) engaged in heavy labor since they may be eligible for a special heavy-labor pension.

income was almost twice as high as that of their female counterparts.

Further, we observe significant gender-based differences in the utilization of healthcare services. Women had higher average outpatient healthcare expenditure than men: on average, they spent €114.4 per quarter for doctor visits, compared to €85.9 by men. Similarly, women's per-quarter drug expenditure of €77.5 exceeded that of men (€61.8). The gender difference in outpatient healthcare expenditure is also expressed by the higher number of doctor visits and medication prescriptions for women than for men. For hospitalization, we observe more hospital days (0.53) and a higher expenditure (€222.1) for men compared to that of women (0.49 days and €185.1). Analysis of disaggregated outpatient data reveal more number of doctor visits and higher expenditure among women in all the medical fields, and higher consumption of medicines in almost all subcategories. Men incurred twice as much hospital days and inpatient expenditure for cardiovascular treatment than women; conversely, hospital expenditure relating to the treatment of musculoskeletal and urogenital diseases were higher for women than for men.

Figures 2 and 3 depict the expenditure for healthcare utilization—controlled for calendar-time fixed effects—for men and women, before and after retirement. The graphs bear two particularities. First, inpatient and outpatient expenditure drop significantly during the retirement quarter; this decline is particularly strong for hospital expenditure for both men and women. Cost decreases for outpatient components are less pronounced, but clearly discernible—particularly for men. This pattern may be interpreted as the first descriptive evidence that healthcare expenditure decreases after retirement. Second, we observe a clear upward trend in all the expenditure categories in the quarters leading up to retirement. This indicates the selection of unhealthy individuals to retirement; it also validates the IV approach to identifying the causal effects of retirement on health expenditure.

Figures 4 and 5 show the corresponding reduced-form relationship between expenditure for healthcare utilization for men and women before and after the eligibility age of early retirement. Except for female hospital expenditure, there is a discernible drop in outpatient medical attendance expenditure and male hospital expenditure at the eligibility age of early retirement. The pattern is consistent with the descriptive evidence from Figures 2 and 3. However, since the reduced form can be given a causal interpretation, these figures suggest a causal effect of retirement on healthcare expenditure.

4 Results

This section presents our empirical findings. We provide the first stage fixed-effects estimation results in Section 4.1 and present fixed effects and fixed-effects IV results for aggregated outcomes in Section 4.2. The estimation results for disaggregated inpatient and outpatient service utilization and screening participation are shown in Section 4.3.[10] Heterogeneous treatment effects for blue- and white-collar workers and for employees from different industry sectors are presented in Section 4.4. Finally, Section 4.5 includes the results of our robustness checks.

4.1 First-stage estimation results

The first stage models the relationship between actual retirement and reaching the eligibility age of early retirement. Per definition, the relationship must be clearly positive, but partial compliance due to disability or long-time insurance, for example, 45 years for men, causes a fuzzy relationship. Figure 6 depicts the overall share of retired workers before and after the eligibility age of early retirement. Panel A is based on the full sample. There is a significant increase in the retirement share at the eligibility age of early retirement for men and women by approximately 15 percentage points. Particularly for men, the graph also reveals partial compliance with retirement shares of around 45 percent before the early retirement age. This is less surprising because, first, men most likely have a reduced working capacity and can leave the labor market through a disability pension; second, men are more likely to have collected 45 social security contribution years towards the end of their working life and can circumvent the pension reform. Panels B and C of Figure 6 replicate Panel A but exclude workers with more than 38 insurance years at age 55 (Panel B) and, additionally, exclude disabled workers (Panel C) in order to better approximate the underlying complier population of the instrumental variable estimator. As expected, the discrete jump at the eligibility age of early retirement becomes substantially more pronounced for the more compliant groups of workers.

Table 3 depicts the first-stage results of equation (2). As mentioned, the instrument is equal to 1 if the individual's age in quarter q is below the early retirement age. We find—conditional on covariates and individual fixed effects—a statistically significant negative effect of early retirement eligibility in quarter q on the probability of being retired during the same quarter. The estimated effects differ between men and women: retirement probabilities decrease by 17.2 percentage points for men and 5.8 percentage points for women. The high F-statistic of the IV indicates that it is sufficiently strong. In line with the findings of Staubli and Zweimüller (2013) and Manoli and Weber (2016), our first-stage results confirm an increase in the job exit age.

[10] We include graphical representations of the estimation results for disaggregated inpatient and outpatient number of services and expenditure in this section. The full estimation output is shown in Tables A.2, A.3, and A.4 in the appendix.

4.2 Aggregate healthcare utilization

Table 4 presents our estimates for both quarterly aggregated outpatient healthcare expenditure with respect to doctors and medication and quarterly doctor visits and drug prescriptions. Table 5 summarizes the estimates for quarterly aggregated inpatient healthcare expenditure and for hospital days. Overall, we compare estimates for a set of 61 outcome variables, so we evaluate the statistical significance based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995).

Fixed-effect estimation results The first column in each of the six healthcare measures shows the impact of retirement based on the individual fixed-effect estimation. For men, we find significant effects for all the outcomes. For instance, doctor expenditure per quarter decreased by €2.9, doctor visits per quarter declined by 0.3 visits, hospital expenditure decreased by €55.3, and hospital days also decreased slightly (0.06 days). In contrast, medication expenditure increased by €5.9 and the corresponding prescriptions slightly by 0.09 units. For women, we find similar effects, including a nonsignificant and negative effect on medication expenditure, but a significant negative effect on drug prescriptions. The results indicate a negative impact of retirement on healthcare utilization. However, it must be noted that these results could be biased due to time-varying confounders.

Fixed-effect instrumental variable estimation results The second column for each outcome shows the results of the IV estimation. Compared to the simple fixed-effect estimators, the IV results yield qualitatively similar results. There are, however, quantitative differences, which indicate that unobserved time-varying factors have an impact on healthcare utilization and the probability of retirement. For men, doctor expenditure per quarter decreased by €13.1, or 7.8% of a standard deviation of this variable. Doctor visits decline by 0.7 visits or 15.9% of a standard deviation. The causal effect of retirement on hospital expenditure increased remarkably to €-322.8, or 20.1% of the standard deviation. This highly significant and large effect is mirrored by the reduction in the length of hospitalization of 0.4 days per quarter; this is equivalent to 15% of a standard deviation. The effect on aggregate medication expenditure is no longer statistically significant, however, medication prescriptions decrease by 0.44 units or 8.6% of a standard deviation.

The estimation results for women are similar. Doctor expenditure decreased to an even greater degree—by €51.3—and also the number of doctor visits declined more strongly than that for men. The number of prescriptions decreased by 1.22 (22% of the standard deviation) whereas the impact on medication expenditure was imprecisely estimated and remained insignificant. The negative effect on hospital expenditure is large (€-254.7, or 19% of the standard deviation); however, given the high standard error, the coefficient remains insignificant. The same holds true for the negative impact on hospital days. One might argue that gender differences in the utilization of healthcare services after retirement are not least because of different retirement ages for men and women at the onset of the pension reform. We split the sample of females and estimate the retirement effects separately for those with an early retirement age above or below 57 years.[11] The estimation results are depicted in Table A.1 in the Appendix. Practically, there were no significant differences in retirement effects on the utilization of hospital services and medication between the younger and older cohorts of female retirees. However, the negative effect of retirement on the number of doctor visits and expenditure for medical attendance in the outpatient sector was larger for the younger cohorts with an early retirement age greater than or equal to 57 years than for the older cohorts with an early retirement age below 57 years. The results may indicate that at least some of the effects are stronger for the complier groups who retire at an older age.

Next, we provide a more thorough analysis of outcomes at a disaggregated level—that is, to examine whether the retirement effects vary by certain diagnoses and medical treatments.

4.3 Disaggregated healthcare utilization

Medical attendance Figures 7 and 8, and Table A.2 in the Web appendix summarize the IV estimates for different doctor expenditure and visit categories. We consider visits and outpatient expenditure for GPs, internists, diagnostic services, psychiatrists and psychologists, orthopedists, dentists, ENT specialists, and a catch-all category for the remaining specialists ("Other"). Figure 7 and Table A.2 illustrate that less doctor expenditure at the aggregate level is driven by specific categories. For men, we find expenditure reductions for GPs (−€ 4.3), diagnostic services (−€ 1.6), psychiatrists and psychologists (−€ 1.1), orthopedists (−€ 1.4), and ENT specialists (−€ 0.9). The effects are not only statistically significant but also quantitatively. For women, the negative effects on disaggregated doctor expenditure are even more pronounced, with significant expenditure reductions for GP visits (−€ 6.1), diagnostic services (−€ 4.8), internists (−€ 2.9), orthopedists (−€ 5.3), psychiatrists and psychologists (−€ 3.9), and most surprisingly, dentists (−€ 22). For both men and women, we find an identical pattern for doctor visits, as can be seen in Figure 8 and Appendix Table A.2.

Medication On an aggregate level, we did not detect significant changes in medication expenditure induced by retirement and found only small reductions in the number of medication prescriptions. This means that either there is no causal effect on drug expenditure, or the impact for different types of drugs cancels out. To test these hypotheses, we estimate the impact of retirement on different drug categories as per the ATC classification code system (i.e., anti-infectives; drugs for cardiovascular diseases, musculoskeletal disorders, respiratory diseases, or ENT diseases; anti-cancer drugs; psychotropic drugs) and use a catch-all variable for the remaining drug expenditure.

[11] A corresponding sample split among male retirees is not possible due to their eligibility for the corridor pension beyond the age of 62 years (see Section 3.2).

Figures 11 and 12 as well as Table A.4 in the Web appendix summarize the IV estimates for the different drug categories. Consistent with the estimation results for outpatient psychiatric and orthopedic healthcare services, in the case of men, we find that retirement has significantly negative causal effects on the number prescriptions for psychotropic drugs and medication for musculoskeletal disorders. For women, the estimation results also correspond with the disaggregated expenditure for medical attendance and hospitalization. Retirement reduces the number of prescription drugs for musculoskeletal disorders. The negative effect of −€ 4.4 for psychotropic drug expenditure is imprecisely estimated and, therefore, insignificant However, there is also a significant reduction in the prescription for psychotropic drugs.

Hospitalization Figures 9 and 10 and Table A.3 in the Web appendix show the impact of retirement on hospital days and inpatient expenditure, by various admission diagnoses according to the ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification) classification code system. The estimation results support the previous findings. For men, we find a reduction in hospital days and/or inpatient expenditure for the treatment of cardiovascular diseases, stroke, and "other" diseases. For women, inpatient expenditure for the treatment of musculoskeletal disorders decreased significantly. Overall, the effects for women are qualitatively similar but quantitatively smaller and imprecisely estimated.

Screening participation Finally, we provide estimation results for participating in medical screening examinations. Medical investigations represent preventive healthcare services, and their utilization is informative about health behavior. For men, we estimate participation in a basic screening program (Vorsorgeuntersuchung) and a PSA blood test; for women, we consider participation in basic screening, gynecological screening (colposcopy and pap smear test), and mammography screening. Whereas the impact of retirement on the screening behavior of women remains consistently insignificant; for men, we find significant and negative effects on screening participation (see Table 6). Retirement reduces participation in the basic screening program by 1.2 percentage points and in the PSA test by 1.5 percentage points.

4.4 Heterogeneous effects

In this section, we analyze the heterogeneous treatment effects of retirement to identify socioeconomic groups that may be differentially affected by retirement. First, we distinguish between blue- and white-collar workers because these occupation groups obviously differ in terms of physical and psychological workload (Table 7). Second, we differentiate in terms of the economic sector (Table A.5).

We find substantial differences between male blue- and white-collar workers. For blue-collar workers, doctor expenditure decreased by € 30.3 per quarter, while the effect for white-collar workers remains insignificant. Expenditure reductions for GPs and psychiatrists and medication for musculoskeletal diseases are significantly higher among blue-collar workers, while the reduction for psychotropics appears to be quite similar. Equivalently, the decrease in hospital expenditure for blue-collar workers (−€ 441.6) is substantially higher than for white-collar workers (−€ 261.5). Finally, we observe significantly lower participation in a PSA test only among blue-collar workers.

For women, we find a reduction of € 45.1 and € 56.1in doctor expenditure for both blue- and white-collar workers, respectively. Moreover, a significant reduction in GP expenditure was observed among female blue-collar workers, whereas the effect for white-collar workers was insignificant. Interestingly, the observed negative coefficient for dentist expenditure is apparent only for female white-collar workers, similarly for diagnostic services, which indicates that behavioral changes in the utilization of healthcare services are more prevalent among this group; female blue-collar workers, on the other hand, tend to benefit from a positive health effect. The point estimates for hospital expenditure are negative and quantitatively relevant in both occupational groups; however, given the high standard errors, the effects are statistically insignificant.

Finally, we look at different economic sectors (i.e., the industry or service sector). The regression results are depicted in Table A.5 in the appendix. For male retirees, we find no clear pattern by economic sector. However, significant reductions in the inpatient and outpatient expenditure categories can be found in the industry and service sector. For women, the overall observed effects are driven mainly by those employed in the service sector.

4.5 Robustness checks

Our baseline sample consists of individuals who retired by taking an old-age pension or early retirement, or due to disability. Retirement on account of disability depends on the individual's health status, and it has become quite common among male blue-collar workers.[12] To determine whether and to what extent the results are driven by this less-healthy group of workers, we conduct a robustness check where we exclude all the individuals who retired with a disability pension.[13] The third and sixth columns of Table A.6 summarize the results for men and women, based on the reduced sample. We find that reductions in healthcare expenditure induced by retirement are only partially driven by the less-healthy group of disability pensioners. For both men and women, the previous estimates remain qualitatively similar, but are somewhat smaller in size.

To determine whether our estimates are influenced by potential income effects gener-

[12]Approximately one-third of male blue-collar workers retire with a disability pension (Frimmel *et al.*, 2015).

[13]Staubli and Zweimüller (2013) show that the spillover effects of an increase in early retirement age on the take-up of disability pensions are small.

ated by the retirement decision or the pension reform, we include income as a covariate and re-estimate our model for aggregate outcomes.[14] The results are shown in the second and fifth columns of Table A.6. Income plays an important role in the retirement decision but is less relevant to the utilization of healthcare services—something that can be explained by the full coverage of the Austrian healthcare system, independent of individual-level income. While comparing the estimates with our baseline model (first and fourth columns), we observe identical results. We conclude that our estimates should not be biased on account of any potential income effect.

5 Summary and concluding remarks

In this study, we examine the causal effects of retirement on healthcare expenditure. We identify the causal effects via exogenous variations induced by two pension reforms in Austria, both of which gradually increased the early retirement age for men and women. We find that retirement has a significant impact on healthcare utilization. For instance, retirement reduces the subsequent number of doctor visits and the expenditure for outpatient medical attendance and hospitalization for both genders. The quantitative effects are stronger for women in the outpatient sector and for men in the inpatient sector. The retirement of women (men) reduces their expenditure for outpatient doctor visits by 26% (7.8%) of a standard deviation. The decrease in hospital expenditure for men is 20.1% of the standard deviation. The point estimate for women's hospital expenditure is quantitatively important but statistically insignificant. Moreover, on the disaggregated level, we find reductions for men in outpatient doctor visits and expenditure for GPs, ENT specialists, orthopedists, psychiatrists and psychologists, and diagnostic services. Whereas, women's outpatient service utilization decreased for GPs, internists, dentists, orthopedists, psychiatrists and psychologists, and diagnostic services.

Our results correspond with the recent evidence from comparable studies that also analyze the causal effects of retirement on service utilization. For example, the decrease in outpatient doctor visits is documented by Coe and Zamarro (2015) and Eibich (2015), whereas the negative effect of retirement on inpatient service utilization is confirmed by Hallberg *et al.* (2015). Furthermore, Gorry *et al.* (2018) find no evidence that the positive health effects of retirement are driven by an increase in healthcare utilization. Finally, Hagen (2018) support our finding of an insignificant impact on aggregate medical drug consumption. However, in contrast to our findings, these authors do not find any causal impact on hospital admissions.

Health and healthcare utilization The utilization of certain groups of healthcare services can be expected to directly correlate with individual-level health. The number of hospital

[14] Income comprises either labor income, unemployment benefits, or pension payments for retired individuals.

days, expenditure for inpatient treatment, and consumption of medical drugs are plausible indicators of individual-level health status. Other components such as routine dental visits, GP consultations, and participation in screening exams also reflect a preventive character and indicate about individual health behavior. Even if it is not possible to unequivocally distinguish health effects from behavioral effects, we are confident that the details in our register data permit some conclusions about individual-level health status and behavior.

The reduced hospital expenditure and number of hospital days—including the negative impact of retirement on visits and expenditure for psychiatrists/psychologists and orthopedists in both genders—at least indicate a positive health effect caused by retirement. Improved mental health among retirees due to lower stress levels and reduction in joint and back pain due to lack of physical labor may reduce the need to seek medical advice from these specialists. In accordance with the estimation results for outpatient psychiatric and orthopedic healthcare services, we find significantly negative causal effects of retirement on the consumption of psychotropic drugs and medication for musculoskeletal disorders among men. Both reductions support the argument of positive health effects. For women, the estimation results for intake of medication also correspond with those on disaggregated expenditure for medical attendance and hospitalization. Retirement decreases consumption of drugs for musculoskeletal disorders. However, the health effects seem to be accompanied by changes in health behavior after retirement. Less number of doctor visits and expenditure for GPs, diagnostic services, and (for women) dentists may indicate changes in retirees' health behavior after retirement. These results are complemented by a significant decline in screening participation of men after retirement.

Three (preliminary) conclusions can be drawn from the results of our analysis. First, the Austrian government's attempt to increase the (early) retirement age of workers is likely be accompanied by negative health effects. Second, health improvements relating to early retirement are most likely due to lower levels of mental and physical stress. Third, it is important to note that retirement not only affects people's health status but may also change their health behavior. In fact, behavioral changes in the utilization of healthcare services may correlate with the availability of time, shirking work (i.e., doctor consultations during working hours), and eventually lower incentives for preventive measures after retirement.

From a policy perspective, the spillover effects of longer employment on individual health status are important, since health is a key determinant of the employability of older workers. We find evidence for spillover effects from pension reforms and longer employment; however, they are at least partially due to changes in health behavior. Yet, the latter should not affect employability adversely. From a fiscal point of view, our results do not undermine the current policies to extend the employment of older workers. Given our results, retirement reduces healthcare costs for men on average by approximately €336 per quarter. However, the federal government subsidizes pensions by more than €1,200 per capita and quarter and later retirement also implies on average higher social security contributions and tax revenues. Consequently, the savings in the healthcare sector cannot compensate for the additional public expenditure due to early retirement. Nonetheless, based on our empirical findings, it can be inferred that policies that aim to extend the employment of older workers should focus to a much larger extent on tasks that are less likely to inflict or exacerbate mental or physical health problems. In other words, any increase in the effective retirement age requires that older workers be fit enough to fulfill their workplace duties and responsibilities.

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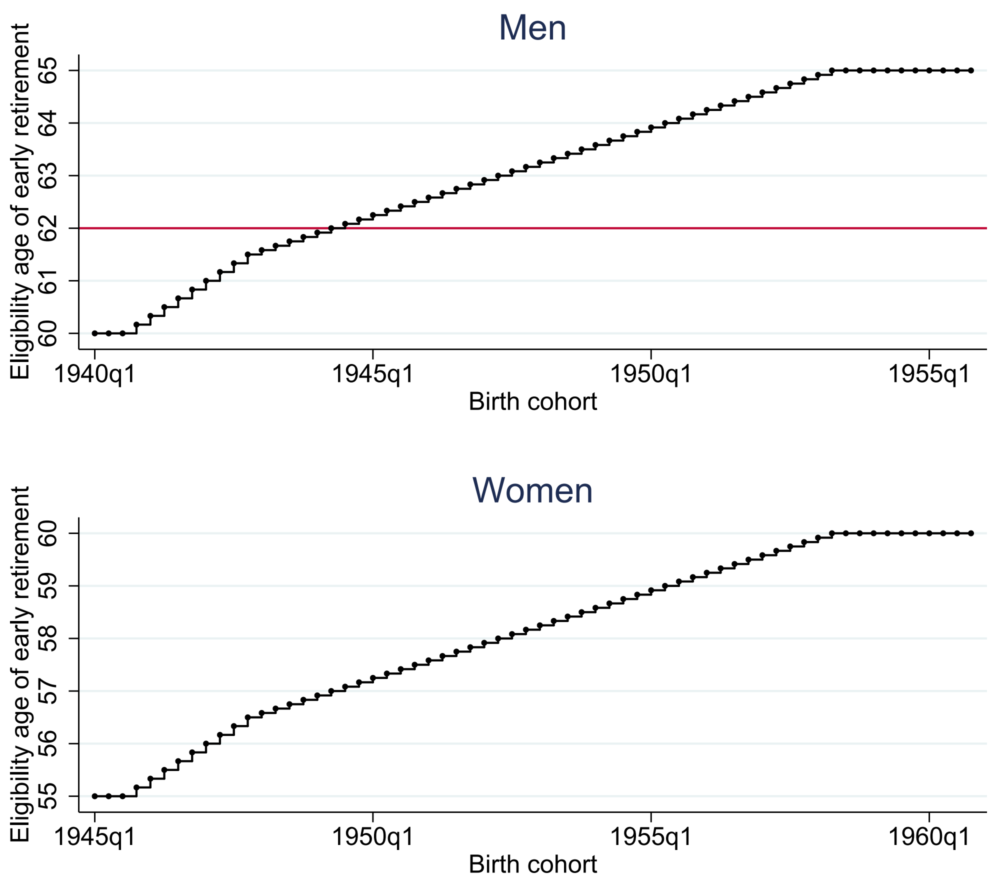
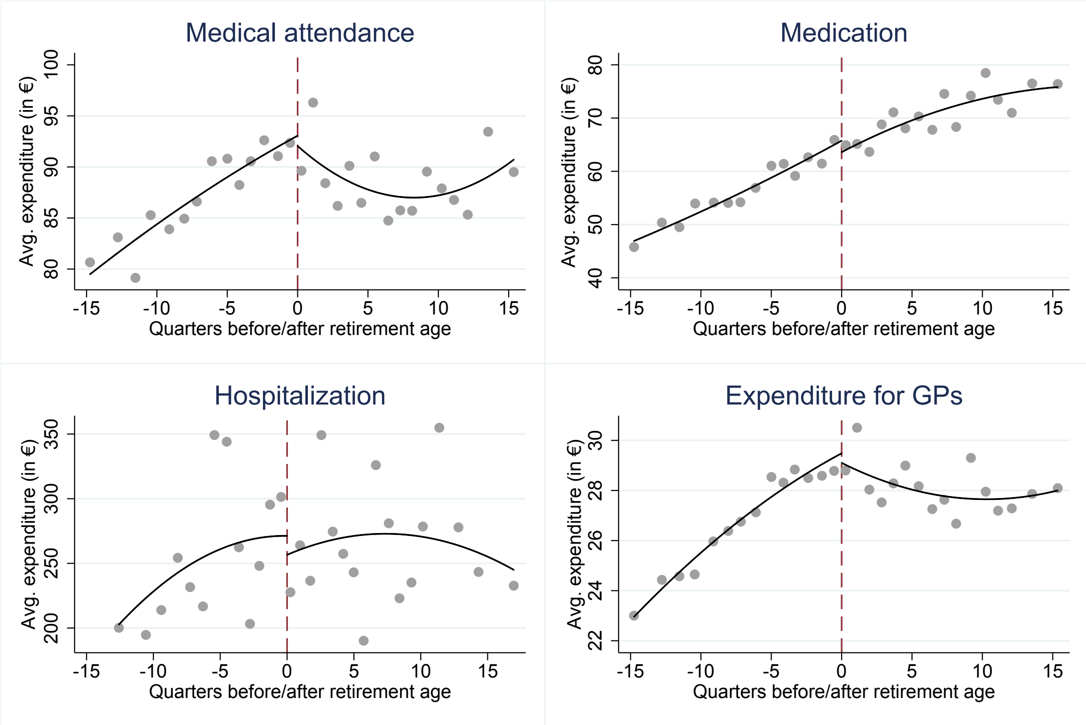
6 Figures and tables

Figure 1: Eligibility age for early retirement over birth-quarter cohorts



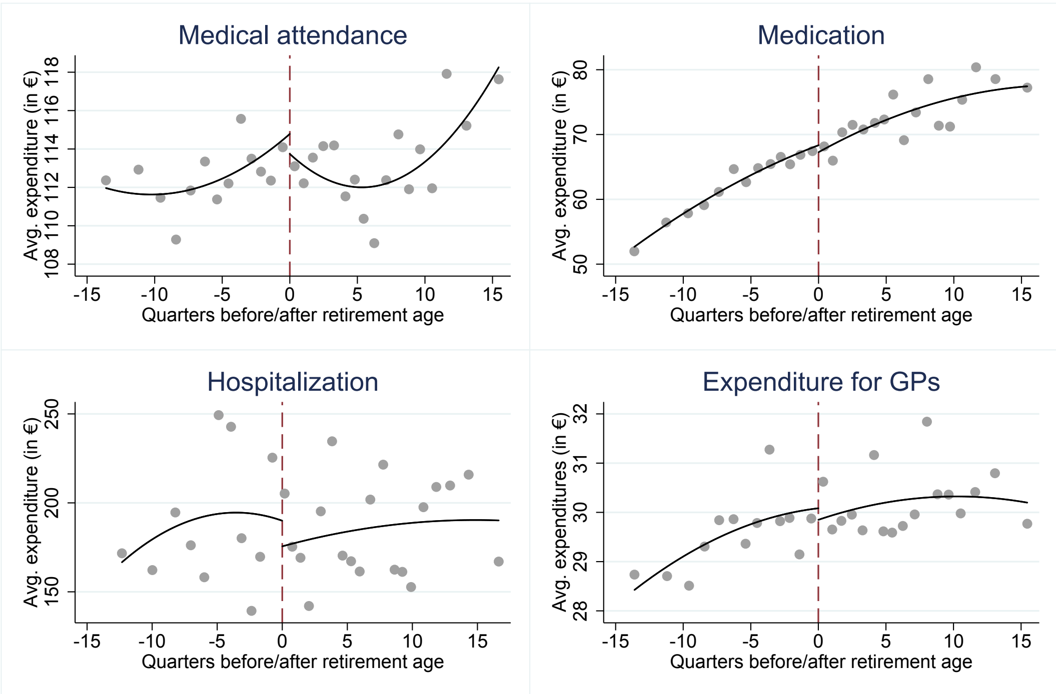
Notes: The figure shows the development of eligibility age for early retirement over birth-quarter cohorts for men and women, consistent with the 2000 and 2003 pension reforms. The red horizontal line depicts the corridor pension at age 62 for men.

Figure 2: Healthcare utilization for men: before/after retirement



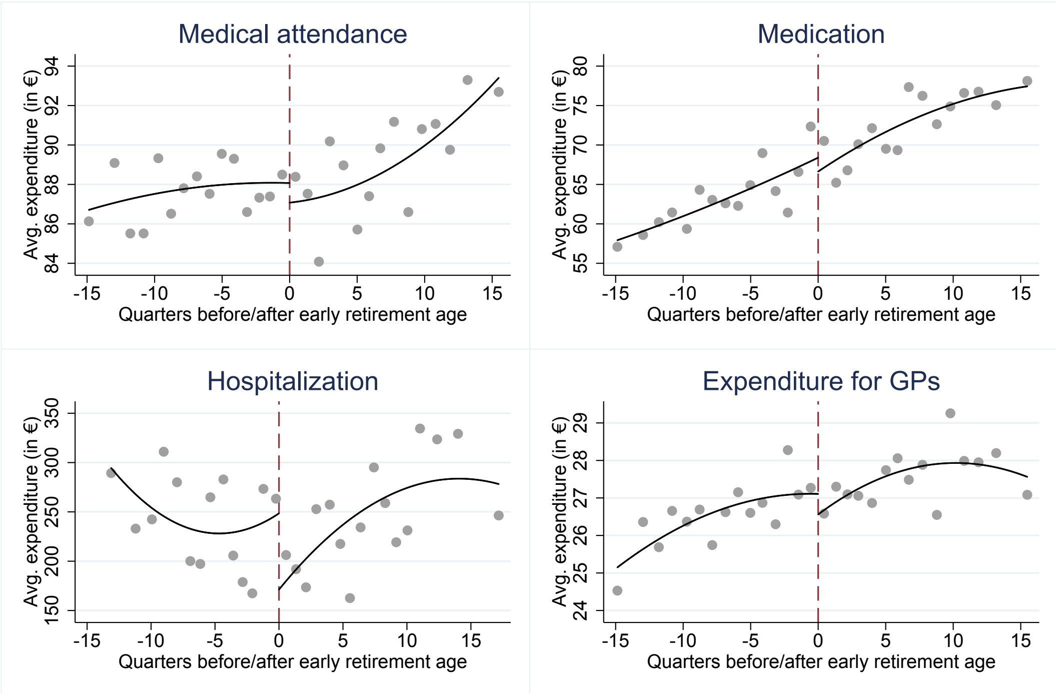
Notes: The figures show the development of various types of healthcare expenditure for men 15 quarters before and after retirement after controlling for calendar time fixed effects. The figures are based on the sample described in Section 3.1.

Figure 3: Healthcare utilization for women: before/after retirement



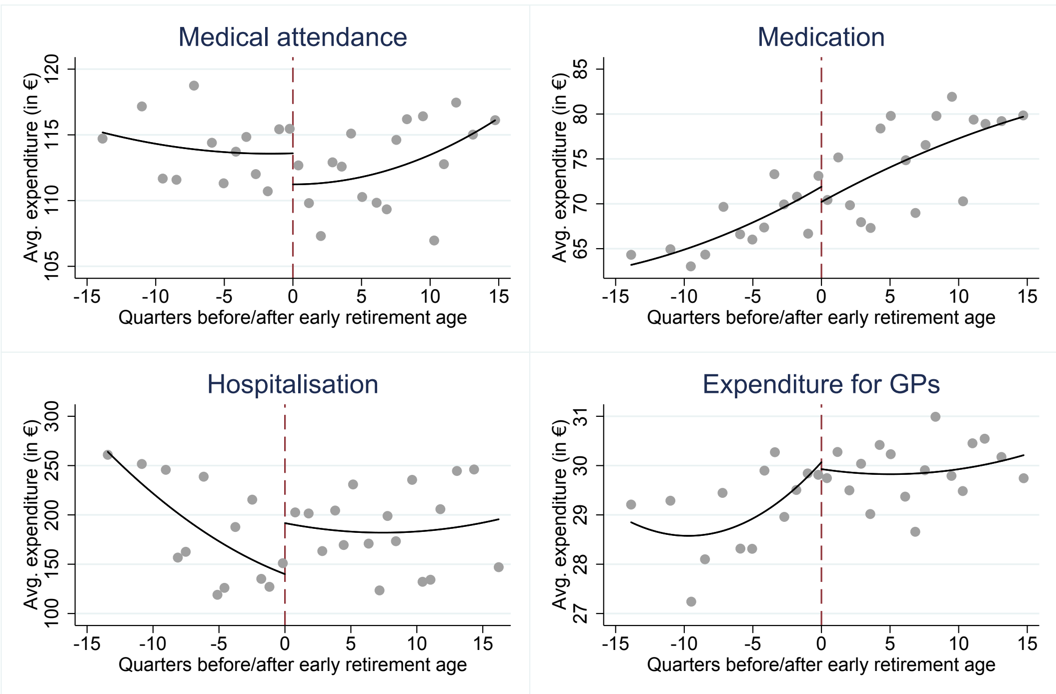
Notes: The figures show the development of various types of healthcare expenditure for women 15 quarters before and after retirement after controlling for calendar time fixed effects. The figures are based on the sample described in Section 3.1.

Figure 4: Healthcare utilization for men: before/after early retirement age



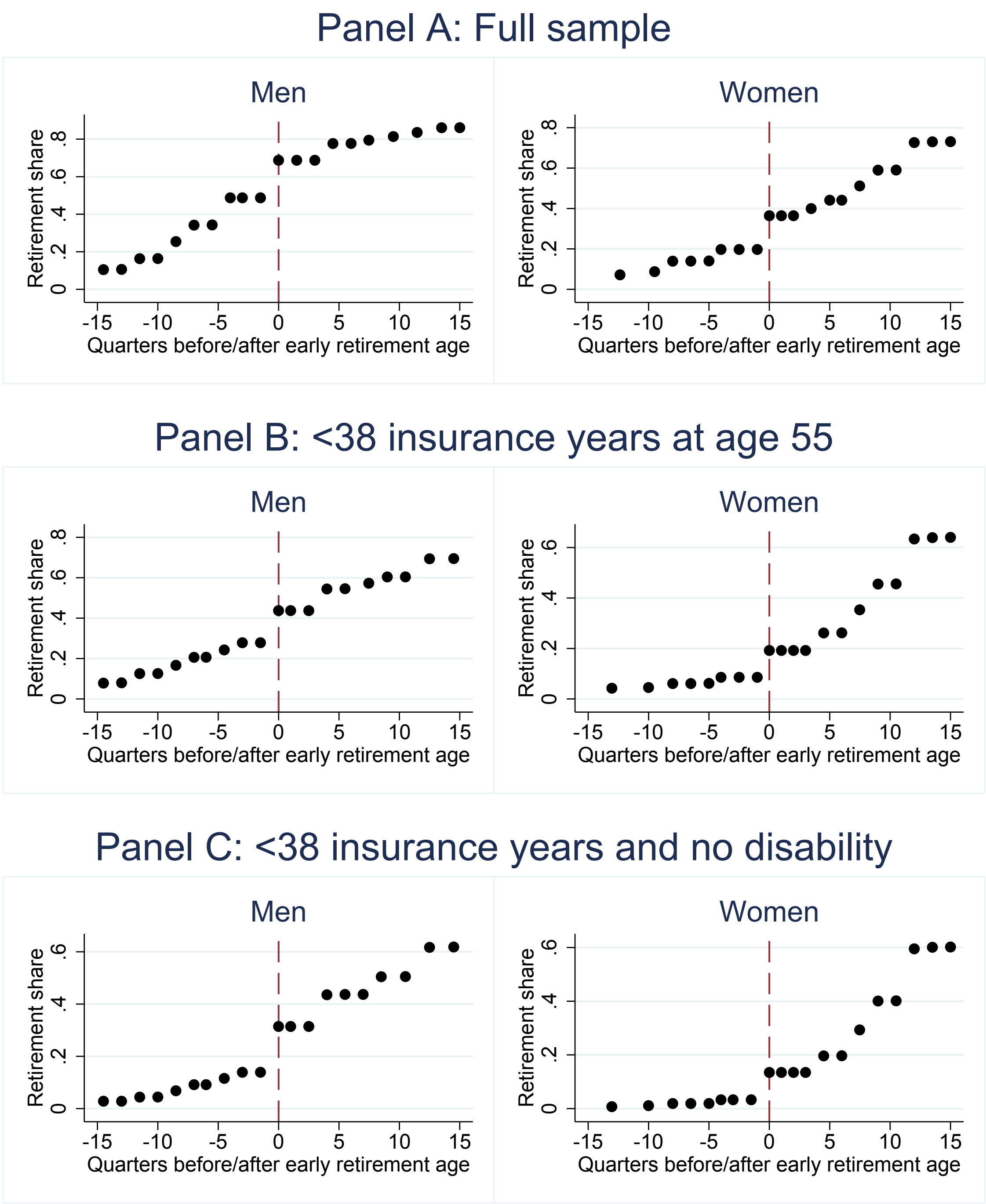
Notes: The figures show the development of various types of healthcare expenditure for men 15 quarters before and after early retirement age after controlling for calendar time fixed effects. The figures are based on the sample described in Section 3.1.

Figure 5: Healthcare utilization for women: before/after early retirement age



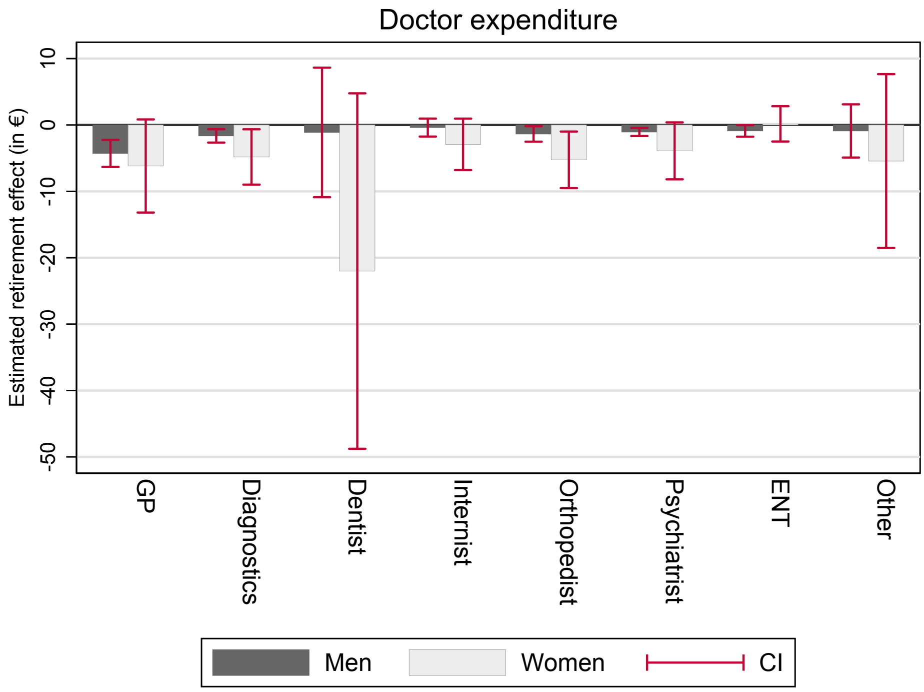
Notes: The figures show the development of various types of healthcare expenditure for women 15 quarters before and after early retirement age after controlling for calendar time fixed effects. The figures are based on the sample described in Section 3.1.

Figure 6: First-stage representation: Retirement share before/after early retirement age



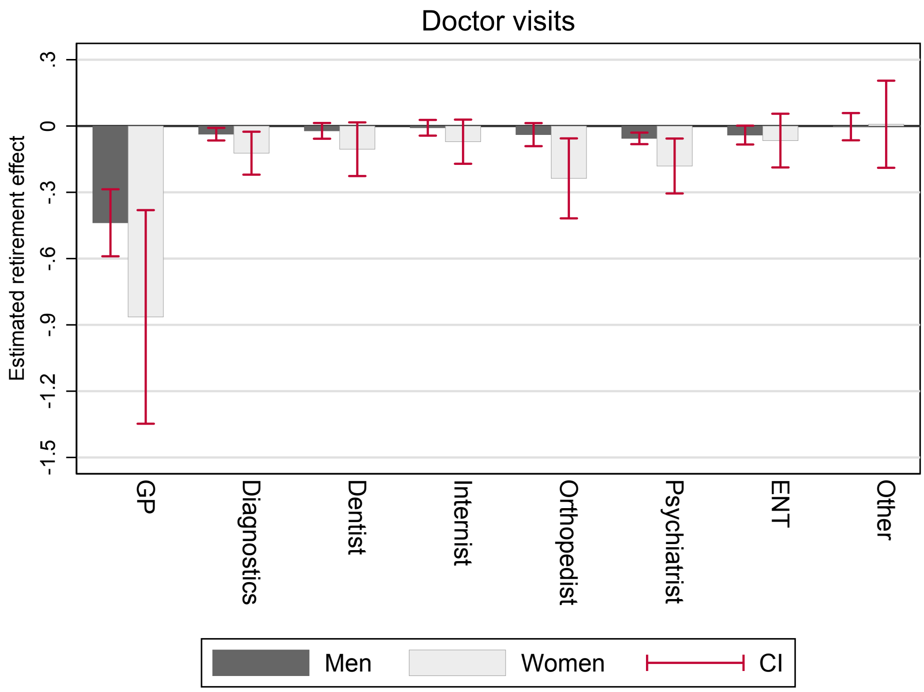
Notes: The figures show retirement shares 15 quarters before and after early retirement age for men (left) and women (right). Panel A is based on the full sample described in Section 3.1. Panel B reduces the sample for individuals with less than 38 social security contribution years at age 55. Panel C further reduces the sample by excluding individuals with disabilities.

Figure 7: Disaggregated outpatient expenditure for medical attendance per quarter



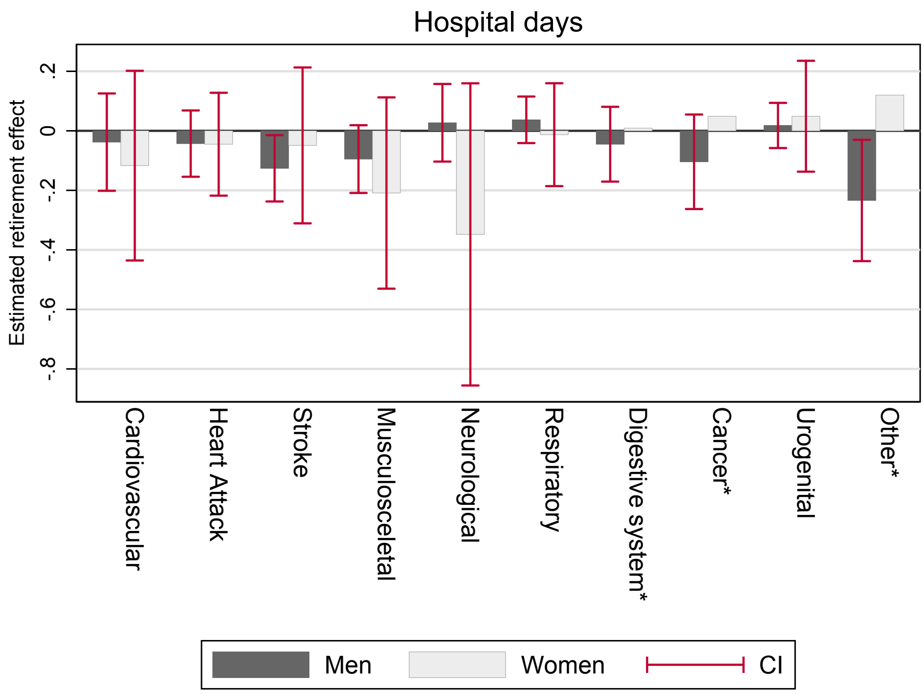
Notes: The figure summarizes retirement effects on expenditure categories of medical attendance for both men and women. The bars represent the coefficients of the standard specification presented in Table A.2 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women.

Figure 8: Disaggregated outpatient doctor visits per quarter



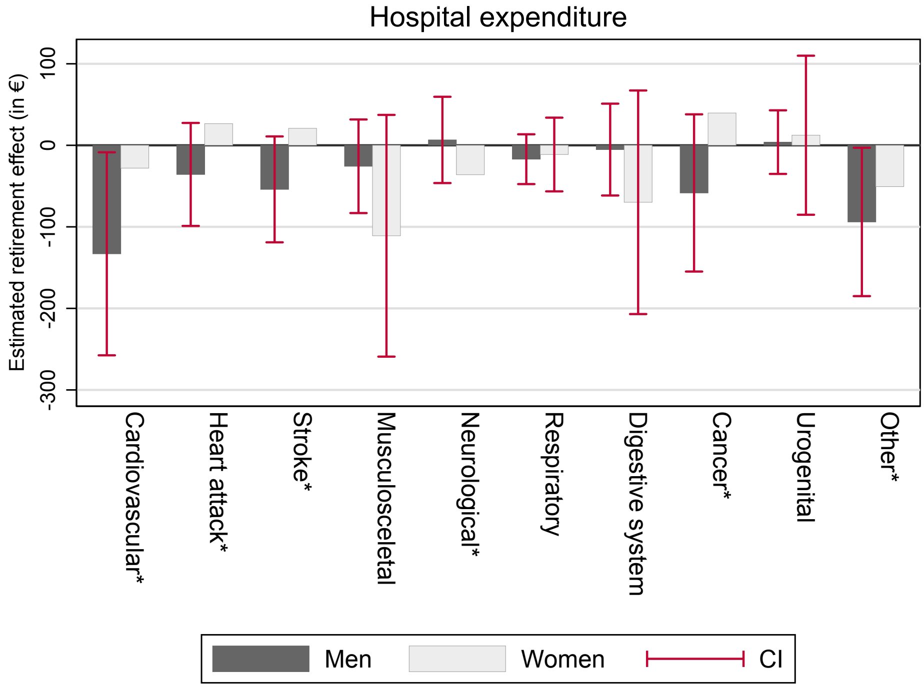
Notes: The figure summarizes the impact of retirement on outpatient doctor visits for both men and women. The bars represent the coefficients of the standard specification presented in Table A.2 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women.

Figure 9: Disaggregated hospital days per quarter



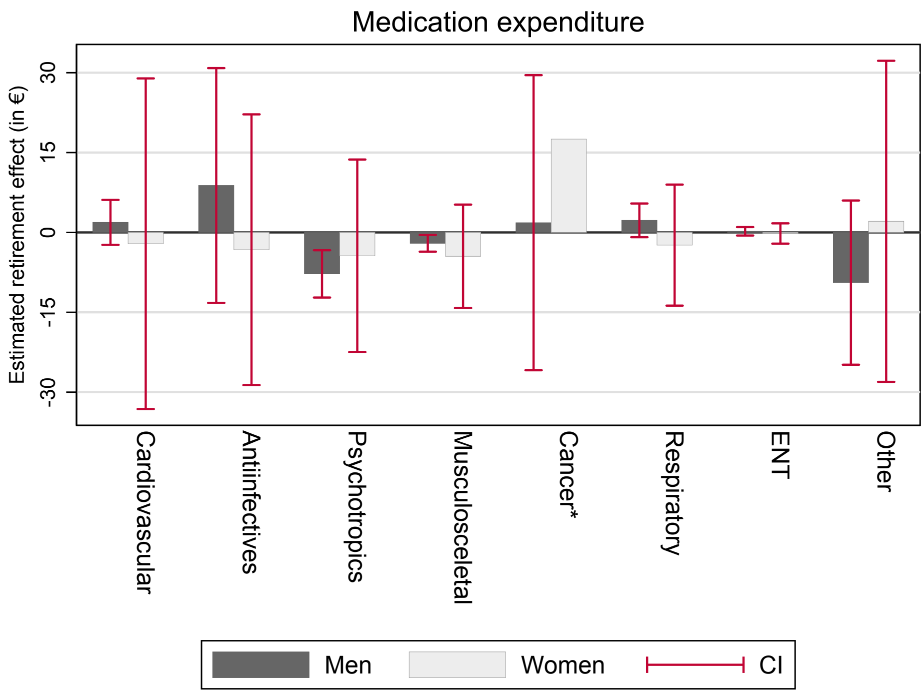
Notes: The figure summarizes the retirement effects on hospital days for different types of diseases for both men and women. The bars represent the coefficients of the standard specification presented in Table Table A.3 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women. The * indicates excluded large confidence intervals for visualization purposes.

Figure 10: Disaggregated inpatient expenditure per quarter



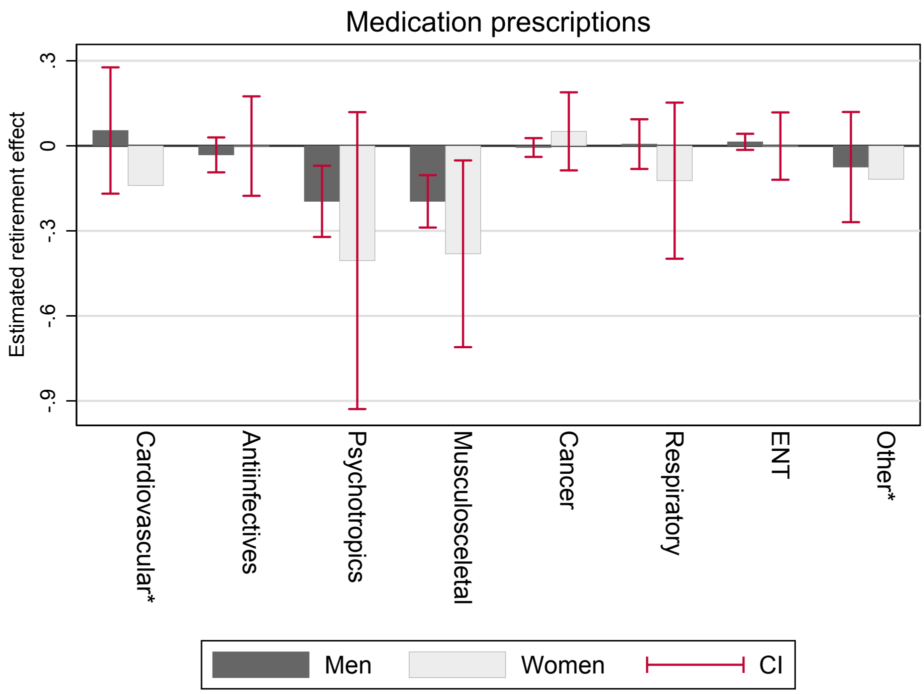
Notes: The figure summarizes retirement effects on hospital expenditure for different types of diseases for men and women. The bars represent the coefficients of the standard specification presented in Table A.3 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women. The * indicates excluded large confidence intervals for visualization purposes.

Figure 11: Disaggregated outpatient medication expenditure per quarter



Notes: The figure summarizes the retirement effects on several categories of medication expenditure for both men and women. The bars represent the coefficients of the standard specification presented in Table A.4 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women. The * indicates excluded large confidence intervals for visualization purposes.

Figure 12: Disaggregated outpatient medication prescriptions per quarter



Notes: The figure summarizes the retirement effects on several categories of medication expenditure for both men and women. The bars represent the coefficients of the standard specifications presented in Table A.4 in the Web appendix. The confidence intervals are based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995) and correspond to the corrected significance levels of $\alpha = 0.018$ for men and $\alpha = 0.007$ for women. The * indicates excluded large confidence intervals for visualization purposes.

Table 1: Descriptive statistics: Sample 1998-2015

	(I) Men		(II) Women	
Retired until 2012	0.774		0.737	
Early retirement for long-time insured	0.493		0.385	
Disability retirement	0.222		0.081	
Old-age pension	0.024		0.234	
Other retirement	0.036		0.037	
Legal early retirement age	61.63	(0.663)	56.70	(1.351)
Individual characteristics				
Age in years	59.68	(3.02)	58.93	(2.99)
Income per month	2,542.49	(1,060.32)	1,346.12	(830.91)
Blue-collar worker	0.409		0.277	
Work experience (in years)	28.15	(8.193)	19.53	(10.29)
Tenure (in years)	14.236	(11.107)	11.62	(8.66)
Insurance months	458.59	(123.31)	358.74	(144.74)
Aggregated healthcare expenditure				
Medical attendance	85.91	(167.24)	114.36	(196.93)
Medication	61.79	(244.77)	77.51	(289.81)
Hospitalization	222.12	(1,609.27)	185.11	(1,354.44)
Aggregated healthcare utilization				
Doctor visits	3.445	(4.24)	4.379	(4.94)
Medication prescriptions	2.927	(4.67)	3.750	(5.47)
Hospital days	0.526	(2.90)	0.493	(2.86)
Disaggregated healthcare expenditure: medical attendance				
GP (general practitioner)	26.20	(39.02)	30.65	(44.67)
Internist	4.83	(25.53)	5.20	(26.20)
Diagnostic services	5.97	(20.23)	11.06	(29.11)
Psychiatrist/psychologist	1.20	(11.28)	2.20	(17.83)
Orthopedist	2.46	(20.02)	3.50	(23.90)
ENT specialist	4.35	(15.63)	5.39	(17.55)
Dentist	21.62	(122.18)	25.17	(139.08)
Other doctor	8.93	(32.54)	13.59	(37.67)
Disaggregated healthcare utilization: doctor visits				
GP (general practitioner)	1.950	(2.90)	2.297	(3.115)
Internist	0.126	(0.624)	0.135	(0.642)
Diagnostic services	0.243	(0.587)	0.317	(0.684)
Psychiatrist/psychologist	0.050	(0.471)	0.081	(0.610)
Orthopedist	0.119	(0.874)	0.171	(1.038)
ENT specialist	0.224	(0.756)	0.262	(0.807)
Dentist	0.191	(0.621)	0.258	(0.758)
Other doctor	0.337	(1.081)	0.505	(1.255)
Screening participation				
Basic screening	0.055		0.056	
Gynecological screening			0.121	
Mammography screening			0.059	
PSA–test	0.104			
No. of observations	1,356,552		1,866,974	
No. of individuals	48,131		76,071	

Notes: Expenditure, doctor visits, and medication prescriptions per quarter and category. Expenditure and income figures are in €. Standard deviations in parentheses.

Table 2: Descriptive statistics: Sample 2005-2015

	(I) Men		(II) Women	
Disaggregated healthcare expenditure: medication (ATC)				
Cardiovascular diseases	22.38	(48.22)	19.11	(112.80)
Anti-infectives	3.59	(100.12)	3.54	(61.29)
Psychotropics	5.94	(43.11)	11.12	(55.75)
Musculoskeletal diseases	2.81	(13.07)	6.04	(24.59)
Cancer	7.42	(182.67)	14.98	(246.65)
Respiratory diseases	6.34	(35.92)	5.36	(32.81)
Sensory organ diseases	0.77	(8.19)	0.76	(7.62)
Other drugs	18.87	(93.20)	19.27	(74.56)
Disaggregated healthcare utilization: medication prescriptions(ATC)				
Cardiovascular diseases	0.986	(2.260)	0.980	(2.100)
Anti-infectives	0.02	(0.438)	0.141	(0.487)
Psychotropics	0.197	(1.062)	0.450	(1.580)
Musculoskeletal diseases	0.217	(0.738)	0.326	(0.925)
Cancer	0.014	(0.227)	0.037	(0.342)
Respiratory diseases	0.165	(0.938)	0.190	(0.966)
Sensory organ diseases	0.031	(0.319)	0.042	(0.361)
Other drugs	0.658	(1.693)	0.971	(2.031)
Disaggregated healthcare expenditure: hospitalization (ICD)				
Cardiovascular diseases	58.70	(923.15)	26.33	(594.97)
Heart attack	22.45	(519.98)	5.78	(282.87)
Strokes	9.73	(442.64)	5.82	(376.91)
Musculoskeletal diseases	29.79	(438.51)	33.07	(469.57)
Psychological diseases	16.42	(423.03)	18.00	(380.38)
Respiratory diseases	7.81	(236.31)	5.39	(182.36)
Digestive system diseases	21.69	(391.72)	16.31	(371.62)
Cancer	28.74	(648.54)	26.04	(592.57)
Urogenital diseases	9.64	(248.45)	12.41	(262.18)
Other diseases	49.34	(638.69)	47.55	(585.49)
Disaggregated hospital days				
Cardiovascular diseases	0.101	(1.174)	0.059	(0.886)
Heart attack	0.048	(0.905)	0.013	(0.427)
Strokes	0.028	(0.914)	0.016	(0.664)
Musculoskeletal diseases	0.069	(0.881)	0.083	(0.980)
Psychological diseases	0.054	(1.080)	0.071	(1.339)
Respiratory diseases	0.027	(0.571)	0.021	(0.514)
Digestive system diseases	0.056	(0.771)	0.046	(0.762)
Cancer	0.054	(0.980)	0.047	(0.899)
Urogenital diseases	0.027	(0.571)	0.030	(0.520)
Other diseases	0.139	(1.350)	0.137	(1.292)
No. of observations	830,951		1,487,355	
No. of individuals	41,677		73,546	

Notes: Expenditure, hospital days, and medication prescriptions per quarter and category. Expenditure and income figures are in €. Standard deviations in parentheses.

Table 3: First-stage regression of retirement eligibility age for early retirement

	(I)	(II)
	Men	**Women**
Eligibility for early retirement	−0.172***	−0.058***
	(0.002)	(0.002)
Quadratic age in months	yes	yes
Calendar time fixed effects	yes	yes
Mean of dep. variable	0.43	0.53
F-statistic of IV	4,993.76	701.60
No. of observations	1,356,552	1,866,974

Notes: This table summarizes the first stage, fixed-effect estimation results for the effect of eligibility age for early retirement on being retired for both men and women. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors (in parentheses) are clustered at the individual level.

Table 4: Aggregate healthcare outcomes per quarter: outpatient sector

	Men				Women			
	FE		FE-IV		FE		FE-IV	
Medical attendance								
Expenditure (in €)	−2.872**	(0.624)	−13.087**	(3.997)	−2.283**	(0.619)	−51.356**	(11.442)
Mean of dependent variable	85.89		85.89		114.37		114.37	
Standard deviation of dep. variable	167.24		167.24		196.93		196.93	
Doctor visits	−0.289**	(0.018)	−0.704**	(0.099)	−0.228**	(0.018)	−1.798***	(0.279)
Mean of dependent variable	3.45		3.45		4.38		4.38	
Standard deviation of dep. variable	4.24		4.24		4.94		4.94	
Medication								
Expenditure (in €)	5.857**	(1.366)	2.164	(7.294)	−0.500	(1.375)	−1.374	(16.968)
Mean of dependent variable	61.79		61.79		77.51		77.51	
Standard deviation of dep. variable	244.77		244.77		289.81		289.81	
Prescriptions	0.090**	(0.020)	−0.444*	(0.191)	−0.089**	(0.022)	−1.219*	(0.561)
Mean of dependent variable	2.93		2.93		3.75		3.75	
Standard deviation of dep. variable	4.67		4.67		5.47		5.47	
F-statistic of IV			4,993.88				701.60	
No. of observations	1,356,552		1,356,552		1,866,974		1,866,974	

Notes: This table summarizes the estimation results for the effect of being retired on aggregated healthcare utilization in the outpatient sector for both men and women. Two estimation methods are used. The first column of each gender report estimates from a simple fixed-effect estimation, and the second column reports estimates from a fixed-effect IV approach. The latter uses as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Each coefficient is from a separate estimation. All the regressions include a quadratic age in months trend and calendar time fixed effects. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table 5: Aggregate healthcare outcomes per quarter: inpatient sector

	Men				**Women**			
	FE		FE-IV		FE		FE-IV	
Inpatient expenditure (in €)	−55.301**	(11.411)	−322.777**	(99.021)	−19.674**	(7.158)	−254.690	(215.479)
Mean of dependent variable	220.86		220.86		180.61		180.61	
Standard deviation of dep. variable	1,609.27		1,609.27		1,354.44		1,354.44	
Hospital days	−0.057**	(0.028)	−0.434**	(0.183)	−0.050**	(0.015)	−0.458	(0.403)
Mean of dependent variable	0.53		0.53		0.49		0.49	
Standard deviation of dep. variable	2.90		2.90		2.86		2.86	
F-statistic of IV			1746.80				198.58	
No. of observations	830,951		830,951		1,487,355		1,487,355	

Notes: This table summarizes the estimation results for the effect of being retired on aggregated healthcare utilization in the inpatient sector for both men and women. Two estimation methods are used. The first column of each gender reports estimates from a simple fixed-effect estimation, and the second column reports estimates from a fixed-effect IV approach. The latter uses as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Each coefficient is from a separate estimation. All the regressions include a quadratic age in months trend and calendar time fixed effects. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table 6: Screening participation

	Men		Women	
Basic screening	−0.012**	(0.004)	0.009	(0.012)
Mean of dep. variable	0.06		0.06	
Gynecological screening			0.019	(0.016)
Mean of dep. variable			0.12	
Mammography screening			−0.000	(0.011)
Mean of dep. variable			0.06	
PSA–test	−0.015**	(0.006)		
Mean of dep. variable	0.10			
F-statistic of IV	4,993.76		701.60	
No. of observations	1,356,552		1,866,974	

Notes: This table summarizes estimation results for the effect of being retired on screening participation for both men and women. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women.

Table 7: Treatment heterogeneity: occupation

	Men		Women	
	Blue-collar	**White-collar**	**Blue-collar**	**White-collar**
Expenditure: medical attendance	−30.328**	−6.114	−45.105**	−56.118**
	(9.968)	(4.045)	(16.993)	(15.697)
GP	−8.627**	−2.409**	−10.860**	−3.071
	(2.021)	(0.903)	(3.841)	(3.565)
Dentist	−7.686	1.549	−6.702	−34.410*
	(9.424)	(4.432)	(13.702)	(14.565)
Diagnostic services	−1.794	−1.557**	−2.900	−6.098**
	(0.980)	(0.451)	(2.158)	(2.175)
Psychiatrist/psychologist	−2.114**	−0.682**	−4.666*	−3.678
	(0.615)	(0.267)	(1.958)	(2.323)
Orthopedist	−2.241	−0.982	−1.199	−7.892**
	(1.154)	(0.513)	(2.202)	(2.263)
Expenditure: medication	1.479	5.485	29.633	−17.851
	(7.708)	(16.728)	(22.065)	(23.922)
Psychotropics	−7.096*	−8.030**	−4.176	−5.378
	(3.410)	(2.227)	(5.401)	(13.898)
Musculoskeletal disease drugs	−3.293**	−1.397	−2.548	−7.132
	(1.182)	(0.796)	(2.900)	(7.500)
Screening participation	−0.018	−0.008	0.047**	−0.014
	(0.010)	(0.004)	(0.017)	(0.016)
Gynecological screening			0.040	0.007
			(0.022)	(0.022)
Mammography screening			−0.018	0.011
			(0.016)	(0.015)
PSA–test	−0.036**	−0.006		
	(0.014)	(0.006)		
F-statistic of IV	1005.04	4409.73	318.70	376.82
No. of observations	554304	802248	517260	1349714
Expenditure: hospitalization	−441.575*	−261.492**	−273.761	−232.600
	(202.828)	(108.747)	(182.674)	(440.814)
Inpatient cardiovascular diseases	−209.966	−95.208	−78.933	40.913
	(111.462)	(55.876)	(61.309)	(234.455)
Inpatient musculoskeletal diseases	15.485	−46.036	−91.723	−135.943
	(49.556)	(26.608)	(61.309)	(100.469)
Hospital days	−0.913**	−0.198	−0.385	−0.578
	(0.196)	(0.351)	(0.348)	(0.818)
F-statistic of IV	488.08	1304.28	192.88	54.78
No. of observations	345613	485338	410289	1077066

Notes: This table summarizes the estimation results for the effect of being retired on different outcomes, both for men and women and by occupation status. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Web Appendix

This Web Appendix (not for publication) provides additional material discussed in the manuscript 'Retirement and healthcare utilization' by Wolfgang Frimmel and Gerald J. Pruckner.

Table A.1: Sample split for females by early retirement age (ERA)

	(I) ERA $<$ 57		(II) ERA $\geq$ 57	
Expenditure: medical attendance	−49.86**	(19.93)	−166.26**	(49.02)
Doctor visits	−1.62**	(0.55)	−4.87**	(1.14)
Expenditure: medication	12.95	(26.42)	−11.08	(70.35)
Medication prescriptions	−0.046	(0.48)	−1.59	(0.86)
Expenditure: hospitalization	−411.17	(526.68)	−236.05	(381.54)
Hospital days	−0.837	(1.12)	−1.00	(0.71)
F-statistic of weak instrument	199.98		73.72	
No. of observations	1,108,528		799,109	
No. of individuals	27,727		45,335	

Notes: Expenditure, prescriptions, doctor visits and hospital days per quarter and category. Expenditure and income figures are in €. Standard deviations in parentheses. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 0.7%.

Table A.2: Disaggregated expenditure: medical attendance

	Men		Women	
GP				
Expenditure	−4.289**	(0.859)	−6.174*	(2.598)
Doctor visits	−0.438**	(0.064)	−0.864**	(0.179)
Diagnostic services				
Expenditure	−1.645**	(0.425)	−4.816**	(1.545)
Doctor visits	−0.037**	(0.013)	−0.123**	(0.036)
Dentist				
Expenditure	−1.125	(4.125)	−22.005*	(9.916)
Doctor visits	−0.022	(0.015)	−0.105*	(0.045)
Internist				
Expenditure	−0.390	(0.571)	−2.921*	(1.436)
Doctor visits	−0.008	(0.015)	−0.071	(0.036)
Orthopedist				
Expenditure	−1.356**	(0.490)	−5.251**	(1.579)
Doctor visits	−0.039	(0.022)	−0.237**	(0.067)
Psychiatrist/psychologist				
Expenditure	−1.056**	(0.257)	−3.897*	(1.589)
Doctor visits	−0.056**	(0.011)	−0.181**	(0.046)
ENT				
Expenditure	−0.894**	(0.368)	0.169	(0.985)
Doctor visits	−0.041*	(0.018)	−0.066	(0.045)
Other				
Expenditure	−0.897	(1.691)	−5.435	(4.848)
Doctor visits	−0.003	(0.026)	0.008	(0.073)
F-statistic of IV	4,993.76		701.60	
No. of observations	1,356,552		1,866,974	

Notes: This table summarizes the estimation results for the effect of being retired on disaggregated doctor expenditure, both for men and women. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table A.3: Disaggregated hospital expenditure and days

	Men		Women	
Cardiovascular diseases				
Expenditure	−133.048**	(52.538)	−27.967	(106.754)
Hospital days	−0.038	(0.069)	−0.117	(0.118)
Heart attack				
Expenditure	−35.710	(26.653)	26.567	(60.481)
Hospital days	−0.043	(0.047)	−0.045	(0.064)
Stroke				
Expenditure	−54.032*	(27.408)	20.833	(77.230)
Hospital days	−0.126**	(0.047)	−0.049	(0.097)
Musculoskeletal diseases				
Expenditure	−25.695	(24.213)	−110.919*	(54.903)
Hospital days	−0.095	(0.048)	−0.209	(0.119)
Psychological/Neurological diseases				
Expenditure	6.639	(22.325)	−36.058	(55.747)
Hospital days	0.027	(0.055)	−0.348	(0.188)
Respiratory diseases				
Expenditure	−17.002	(12.881)	−11.260	(26.743)
Hospital days	0.037	(0.033)	−0.013	(0.064)
Digestive system diseases				
Expenditure	−5.226	(23.765)	−69.875	(50.783)
Hospital days	−0.447	(0.053)	0.009	(0.099)
Cancer				
Expenditure	−58.403	(40.684)	39.642	(98.205)
Hospital days	−0.104	(0.067)	0.049	(0.140)
Urogenital diseases				
Expenditure	3.917	(16.464)	12.389	(36.126)
Hospital days	0.018	(0.032)	0.049	(0.069)
Other diseases				
Expenditure	−93.958**	(38.390)	−50.643	(88.260)
Hospital days	−0.234**	(0.086)	0.120	(0.180)
F-statistic of IV	1,746.79		198.58	
No. of observations	830,951		1,487,355	

Notes: This table summarizes estimation results for the effect of being retired on disaggregated hospital expenditure and hospital days, both for men and women. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table A.4: Disaggregated expenditure: medication

	Men		Women	
Cardiovascular diseases				
Expenditure	1.891	(1.782)	−2.122	(11.501)
Prescriptions	0.054	(0.094)	−0.140	(0.220)
Anti-infectives				
Expenditure	8.815	(9.302)	−3.250	(9.418)
Prescriptions	−0.032	(0.026)	−0.001	(0.065)
Psychotropics				
Expenditure	−7.787**	(1.874)	−4.390	(6.698)
Prescriptions	−0.196**	(0.053)	−0.405*	(0.194)
Musculoskeletal diseases				
Expenditure	−2.037**	(0.662)	−4.484	(3.598)
Prescriptions	−0.184**	(0.039)	−0.381**	(0.122)
Cancer				
Expenditure	1.827	(11.693)	17.524	(35.298)
Prescriptions	−0.006	(0.014)	0.051	(0.051)
Respiratory diseases				
Expenditure	2.269	(1.336)	−2.378	(4.210)
Prescriptions	0.006	(0.037)	−0.123	(0.102)
ENT diseases				
Expenditure	0.212	(0.334)	−0.196	(0.705)
Prescriptions	0.014	(0.017)	−0.001	(0.043)
Other medical drugs				
Expenditure	−9.422	(6.506)	2.088	(11.167)
Prescriptions	−0.075	(0.082)	−0.118	(0.228)
F-statistic of IV	1,748.69		198.54	
No. of observations	830,597		1,487,186	

Notes: This table summarizes estimation results for the effect of being retired on disaggregated medication expenditure and prescriptions, both for men and women. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table A.5: Treatment heterogeneity: economic sectors

	Men		Women	
	Industrial	Service	Industrial	Service
Expenditure: medical attendance	−20.729**	−6.968	21.141	−56.434**
	(6.228)	(5.237)	(19.844)	(11.941)
GP	−4.708**	−4.461**	−4.319	−6.016*
	(1.249)	(1.151)	(4.700)	(2.697)
Dentist	0.164	−3.538	27.786	−26.368**
	(6.382)	(5.645)	(17.080)	(9.486)
Diagnostic services	−1.917**	−1.415**	0.901	−4.638**
	(0.662)	(0.562)	(2.713)	(1.593)
Psychiatrist/psychologist	−1.621**	−0.821**	−0.530	−4.664**
	(0.386)	(0.337)	(2.453)	(1.635)
Orthopedist	−1.681*	−0.780	−3.774	−1.488
	(0.772)	(0.624)	(2.760)	(1.553)
Expenditure: medication	−4.077	11.765	22.198	9.802
	(10.380)	(11.057)	(26.091)	(17.962)
Psychotropics	−8.319**	−5.763*	−2.318	−8.378*
	(2.941)	(2.403)	(4.091)	(4.134)
Musculoskeletal disease drugs	−1.510	−2.538**	1.596	−0.010
	(1.179)	(0.745)	(6.922)	(2.604)
Screening participation	−0.013*	−0.008	0.010	0.012
	(0.006)	(0.005)	(0.020)	(0.012)
Gynecological screening			0.021	0.019
			(0.029)	(0.016)
Mammography screening			0.005	−0.001
			(0.020)	(0.011)
PSA–Test	−0.027**	−0.007		
	(0.009)	(0.008)		
F-statistic of IV	2198.13	2732.36	195.49	611.89
No. of observations	694774	568559	281855	1024305
Expenditure: hospitalization	−280.244	−386.877**	−497.932	−122.617
	(150.252)	(138.419)	(310.001)	(149.120)
Inpatient cardiovascular diseases	9.623	−254.614**	−213.646	−36.342
	(88.718)	(68.649)	(112.050)	(57.204)
Inpatient musculoskeletal diseases	−9.816	−46.293	−8.355	−97.951*
	(37.552)	(31.433)	(104.369)	(43.814)
Hospital days	−0.380	−0.618*	−0.853	−0.067
	(0.257)	(0.269)	(0.689)	(0.287)
F-statistic of IV	760.74	916.47	54.87	281.77
No. of observations	410772	359026	220890	816710

Notes: This table summarizes estimation results for the effect of being retired on different outcomes, both for men and women and by occupation status. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.

Table A.6: Aggregate healthcare expenditure: robustness checks

	Men			**Women**		
	Baseline	**include income**	**w/o disabled**	**Baseline**	**include income**	**w/o disabled**
Expenditure: medical attendance	−13.087**	−14.691**	−6.780*	−51.356**	−61.084**	−50.155**
	(3.997)	(5.263)	(3.167)	(11.442)	(13.511)	(11.827)
Expenditure: medication	2.164	2.642	3.487	−1.374	−0.177	2.528
	(7.294)	(9.800)	(5.111)	(16.968)	(19.080)	(16.117)
F-statistic of IV	4993.88	3199.37	7110.44	701.60	287.45	706.35
No. of observations	1356552	1322807	1058449	1866974	1645453	1754171
Expenditure: hospitalization	−322.777**	−349.341**	−203.781**	−254.690	−375.158	−151.079
	(97.021)	(129.550)	(75.015)	(215.479)	(250.268)	(233.216)
Hospital days	−0.434**	−0.431	−0.250	−0.458	−0.466	−0.225
	(0.183)	(0.238)	(0.144)	(0.403)	(0.504)	(0.425)
F-statistic of IV	1746.80	1209.79	2294.52	198.58	112.19	139.63
No. of observations	830951	799989	669365	1487355	1258065	1364570

Notes: This table summarizes the estimation results for the effect of being retired on different outcomes, both for men and women and for different samples. The baseline estimates summarize the results for the complete sample, the second column includes quarterly income as an additional covariate, and the third column excludes all the individuals who retired through a disability pension. Income could not be calculated for every individual, due to data unavailability. Each coefficient is from a separate estimation and reports estimates from a fixed-effect IV approach. All the regressions include a quadratic age in months trend and calendar time fixed effects. We use as an IV the gradual increase in early retirement age for different birth-quarter cohorts. Standard errors (in parentheses) are clustered at the individual level. Significance is evaluated based on corrected p-values for multiple hypothesis testing following Benjamini and Hochberg (1995). ** indicates statistical significance at the corrected significance level for multiple hypothesis testing of 1.8% for men and 0.7% for women, * indicates statistical significance between the corrected and uncorrected significance level of 5%, respectively.