

DISCUSSION PAPER SERIES

IZA DP No. 18163

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in Occupational Pension Coverage and  
Income Across Europe**

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## ABSTRACT

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# Exposing the Gap: Gender Inequality in Occupational Pension Coverage and Income Across Europe\*

Using data from the Survey of Health, Ageing and Retirement (SHARE), this paper examines occupational pension income and coverage gaps between men and women. The focus is on a group of countries with comparable occupational pension regulations: Germany, Sweden, the Netherlands and Switzerland. The results show that after accounting for observable characteristics, over half of the gender gap in occupational pension coverage is explained, largely driven by women's shorter labour market participation, greater part-time work, and lower wages. Factors driving this gap remain constant across birth cohorts. Conditional on receiving an occupational pension, women receive nearly 40 percent less occupational pension income than men, partly due to part-time work and industry of employment. Selection into pension receipt has only a limited impact on the gender pension gap. While pension coverage gap decomposition shows little variation across countries, this is not the case for the gender pension gap, notably with cross-country differences in part-time work.

**JEL Classification:** H75, I38, J32

**Keywords:** gender occupational pension income and coverage gaps, Oaxaca-Blinder decomposition, Yun decomposition, selection, Europe

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# 1 Introduction

In recent years, researchers and policymakers have shown increased interest in understanding gender inequality in old-age income (Betti et al., 2015; Bonnet et al., 2020; Dekkers & Van den Bosch, 2021). While the gender pay gap has received considerable attention among economists and social scientists, the gender pension gap has often been overlooked. Yet, according to the most recent report by the European Commission (2024), the gender pension gap in Europe amounts to 26%—twice the size of the gender pay gap in wages—highlighting the greater magnitude of gender disparities in retirement income compared to earnings. While the determinants of gender differences in public pensions have been studied (Betti et al., 2015; Bonnet et al., 2020; Loretto & Vickerstaff, 2013; Neels et al., 2018), much less is known about the gender gap in occupational and private pensions. This gap in knowledge limits our ability to assess the implications of pension system reforms, including the policy shift towards more privatised pension systems, in which public pension provisions are limited and workers are encouraged to invest in workplace and personal pension saving accounts (Joubert & Todd, 2024; Marcinkiewicz, 2018; Westerhout et al., 2022). This paper addresses this knowledge gap by analysing the determinants of the gender gap in occupational pensions income and coverage in a cross-country setting.

The gender pension gap raises concerns about the adequacy and equity of retirement systems for women. A substantial disparity in pensions between men and women underscores the long-term cumulative disadvantages women face in the labour market and highlights the need for targeted pension and employment policies to ensure financial security and gender equity in old age (OECD, 2021). At the same time, many European countries have started shifting from pay-as-you-go pension schemes towards privatised pension systems in response to population ageing. Workers are increasingly encouraged to contribute a percentage of their earnings to a private pension account (Joubert & Todd, 2024). For example, in the UK, Ireland, Italy and Switzerland, employers are obliged to enrol their workers into a workplace pension plan, if the worker fulfils certain entry criteria. The shift is expected to increase the gender pension gap, because it introduces a stronger link between pensions and the labour market which is characterised by persisting gender gaps (Betti et al., 2015; Doctrinal, 2023; Jefferson, 2009; Joubert & Todd, 2024).

Occupational pensions are different from public pensions because they are not universal. Occupational pensions can only be obtained through paid employment and are often limited to specific occupations, employers or hierarchical positions. This leads to differences in coverage rates among different groups in the retired population, resulting in a coverage gap. Women are often less likely to be employed in occupations or positions which offer such schemes (Bardasi & Jenkins, 2010; Betti et al., 2015; Gardiner et al., 2016; Ginn & Arber,

1993). This non-random selection into occupational pension receipt may lead to biased estimates of the gender pension gap (Betti et al., 2015; Rowold, 2024). As with the gender pay gap (Olivetti & Petrongolo, 2008), a smaller gender pension gap in occupational pensions does not necessarily mean that women had better labour market opportunities. It actually may result from a large number of women being excluded from receiving an occupational pension.

In this paper, using the Survey of Health, Ageing and Retirement in Europe (SHARE), we examine the determinants of the occupational pension income and coverage gaps between men and women, accounting for possible selection into occupational pension income receipt. We focus on a set of countries which are similar in their occupational pension rules: Germany, Sweden, the Netherlands and Switzerland. The SHARE data has the important advantage that pension income from three different pension pillars (public, occupational and private) can be distinguished. All of the countries studied only allow occupational pensions to be paid out in annuities.

We bring several contributions to the existing literature on the gender pension gap. First, we try to understand the share and significance of the occupational pension pillar for the overall gender pension gap. We show that the gender gap in occupational pensions ranges from 26 to 50% across Europe. Differences are much smaller, and almost non-existent, for public and personal private pensions. A large proportion of the overall gender pension gap is therefore due to the gender differences in occupational pension income.

Second, we analyse the determinants of occupational pension coverage and income using a series of decomposition techniques (Blinder, 1973; Oaxaca, 1973; Yun, 2004). We find that there is a substantial cross-country variation in the magnitude of the pension coverage gap between retired men and women, ranging from 3 percentage points in Sweden to 33 percentage points in the Netherlands. Similar to Bardasi and Jenkins (2010) and Gardiner et al. (2016), we show that after accounting for observable characteristics, over half of the gender gap in occupational pension *coverage* is explained, largely driven by women’s shorter labour market participation, industry of employment and lower wages. The pension coverage gap among the younger cohorts, born after 1947, is substantially smaller than among the older cohorts, with factors driving the gap remaining constant over time.

While the decomposition of the coverage gap shows little variation across countries, the factors explaining the gender pension gap differ markedly, with cross-country differences in part-time work playing an important role. Conditional on receiving an occupational pension, women receive on average 40 percent less in occupational pension income than men—revealing a substantial occupational pension gap—driven in large part by the impact of part-time work and concentration in industries offering less generous pension benefits.

Third, we make a methodological contribution by disentangling the role of selection into occupational pension coverage from differences in labour market characteristics when explaining gender gaps in pension income. While most existing studies focus on observed pension recipients, only a few account for selection into pension coverage, potentially underestimating the true extent of gender disparities. For example, Bardasi and Jenkins (2010) examine the gender gap in private pensions in the UK using a Heckman selection model (Heckman, 1979). Following a similar method, Gardiner et al. (2016) analyse whether differences in occupational pension wealth can be explained by differences in characteristics between men and women. Both studies conclude that the gender differences in occupational pensions are not due to women having different characteristics from men, but that there are differences in returns to these characteristics. The Heckman selection model is restrictive because it is challenging to find a valid instrument for which the exclusion restriction holds (Rowold, 2024). We instead estimate selection-corrected estimates of the gender pension gap using the imputation method introduced by Blau et al. (2024) for gender pay gap decomposition analysis. Imputation-based correction for sample selection reveals evidence of positive selection. Nevertheless, even after accounting for this selection, the adjusted gender pension gap remains close to the raw gap. The women who are not covered by an occupational pension, are not very different from those who are, other than their labour market participation. They do not differ much in the characteristics that determine pension income, like part-time work.

A private pension shift, towards increased occupational pension contributions, is expected to disadvantage women in the future. Women have shorter, and more fragmented careers, which reduces their opportunity to accumulate sufficient pension rights (Betti et al., 2015; Doctrinal, 2023; Jefferson, 2009; Joubert & Todd, 2024). This makes them more vulnerable to poverty in old age. Presently, women rely to a large extent on the redistributive character of public pensions to secure themselves against old-age poverty (Peeters et al., 2014). Most public pensions typically compensate for atypical career trajectories, with the typical male career being the default. Most private pension schemes do not compensate for atypical career trajectories. Increasing occupational pension savings, by introducing for instance automatic pension enrolment, might have negative consequences for women’s pension rights.

This paper is organised as follows. Section 2 discusses the possible mechanisms behind the gender gap in occupational pension coverage and income, considering each country’s policy with respect to this pillar. Section 3 discusses the Oaxaca-Blinder and Yun decomposition methods, as well as the sample selection correction. In Section 4, we describe the SHARE data, explain how we measure the gender pension gap, and discuss the sampling frame. Section 5 discusses the results, while Section 6 concludes the paper.

## 2 Theoretical background

This section provides the conceptual and institutional background for our analysis. We begin by outlining how the gender pension gap is measured, followed by a discussion of occupational pension policies in the countries under study. Finally, we explore the key mechanisms that drive gender disparities in pension outcomes, including differences in labour market participation, part-time work and earnings.

### 2.1 Measuring the gender pension gap

The Gender Pension Gap (GPG) measures the relative difference in average pension income between men and women. It is calculated as the percentage shortfall of women’s average pension compared to men’s, such that a higher GPG indicates a larger disparity, with women receiving significantly lower pension benefits than men on average:

$$GPG = \left( \frac{\text{average pension men} - \text{average pension women}}{\text{average pension men}} \right) \times 100 \quad (1)$$

Gender gaps in pension income differ substantially across countries; Figure 1 shows the distribution of pension income for retired men and women. In all countries studied except Germany, the gender gap in occupational pensions is substantially larger than in public pensions.

**Figure 1:** Distribution of public and occupational pension income, by country and gender



The gender coverage gap can be defined as the percentage point difference between the number of retired women who receive a pension income and the number of men who do. It reflects the extent of women’s access to a pension system (Betti et al., 2015).

The conventional definition of the gender pension gap (both unadjusted and adjusted) excludes individuals who do not receive a pension income (Dekkers & Van den Bosch, 2021; OECD, 2021). Only individuals with a positive pension income are considered. Consequently, pension calculations are based on a non-random sample of individuals possibly leading to selection bias (Gardiner et al., 2016).

As pointed out by Peeters et al. (2014), pension indicators that only cover a proportion of the population should be treated with care, especially in international comparisons. For example, Rowold (2024) shows that excluding non-recipients from the analysis of pension income, or other retirement indicators, excludes a substantial portion of the female population. Pension receipt is determined by life courses, and these life courses are highly gendered. Moreover, there are substantial cross-country differences with respect to the magnitude of the coverage gap. Therefore, pension inequality in countries with high coverage rates cannot be compared with inequality in countries with low coverage rates. In this paper, we try to overcome this problem by imputing pensions for individuals who are not covered, following the method by Blau et al. (2024).

## 2.2 Cross-country occupational pension policies

Pension income can be received from several sources: public pensions, occupational pensions and personal private pensions. According to the official definition of the European Commission (2016), occupational pensions are pensions derived from collective, employer-organised, retirement schemes. Occupational pensions refer to pensions that are derived from contributions made to a collective pension fund by both employees and employers throughout an individual's career. Generally, these pension schemes can be categorised as either defined benefit or defined contribution schemes. In a defined benefit scheme, occupational pension income is determined based on the final or average salary, with a collective pension fund guaranteeing the payment. The employer bears the risk (Dulebohn et al., 2009). The benefit received upon retirement is predefined. In a defined contribution scheme, contributions from employees and employers are invested in a pension fund, which is later paid out. The level of the pension income is dependent on the contributions made during the career and the returns on investment of the savings plan (Dulebohn et al., 2009; Gardiner et al., 2016).

The link between occupational pension participation and income is not one-to-one. Pension schemes may also discriminate against women. For example, in some countries, workers are enrolled automatically into an occupational pension plan, usually based on specific eligibility criteria. This process may also influence the distribution of men and women covered by such schemes, and the resulting gender gap. Some individuals may be excluded from

joining (Gardiner et al., 2016). Therefore, in order to understand where gender differentials in pensions may come from, it is important to consider how occupational pension schemes are designed and to which rules they are subject. In what follows, we will discuss the occupational pension policies of the countries studied in this paper.

To avoid underestimation of pension income in our analysis, we only consider countries in which occupational pensions are paid out as annuities. In SHARE data, only lump sum payments paid out in the reference year are recorded. Countries with a low share of retirees claiming occupational pension benefits in SHARE may have many individuals who previously received a lump sum payment but are not observed. Therefore, the focus is on a set of countries where a considerable number of retired individuals receive occupational pension annuities. This allows us to derive comparable measures of the gender pension gap. The countries for which this is the case are Germany, Sweden, the Netherlands and Switzerland.

In Switzerland, joining an occupational pension plan has been mandatory since 1947 for all employees whose wages are above a certain threshold. In 2024 this was CHF 22,680 per year. Those earning less have the option to enrol voluntarily, but are not obligated to do so. Self-employed workers, temporary workers and farmers are also exempt from this rule (Federal Social Insurance Office, 2024). Participation in an occupational pension plan in Switzerland is therefore determined by earnings, which means that if women earn, on average, less than men, it is likely that fewer women will be covered by an occupational pension.

Sweden also has auto-enrolment in place, though occupational pensions are only offered by certain employers. Employees of these employers are automatically enrolled in an occupational pension plan, and there are no eligibility criteria. In Germany, occupational pension plans are also agreed upon at the sectoral level, resulting in collective agreements, but participation is voluntary rather than automatic. In these countries, the coverage gap between men and women will depend on occupational sorting in the labour market, rather than wage differences. While in Sweden participation is not compulsory (individuals can opt out), the incentives to opt out of a pension scheme are different from those to opt in, like in Germany. Therefore, we expect to see a difference in occupational pension coverage between Germany and Sweden. In addition, the extent of occupational crowding and its impact on the coverage gap may vary depending on the percentage of firms covered by collective agreements.

While most countries offer the option to opt out of the occupational pension scheme, in the Netherlands participation is mandatory when working at a firm which is covered by a collective agreement (Chen & Beetsma, 2014). Consequently, the coverage rate among employees in the Netherlands is quite high.

Apart from the opportunity, or rule, to join an occupational pension scheme, countries can also differ in their transferability of pension funds. One important explanation for women’s lower demand for occupational pensions is their labour mobility. Occupational pensions favour workers who have low quit propensities (Ippolito, 1985) as pension savings are not always transferable between jobs (Bardasi & Jenkins, 2010).

In Germany, pension savings are only transferable if the employee has been contributing to the pension plan for at least 3 years. In Switzerland, the vesting period is 3 months of employment with the same employer. By contrast, in the Netherlands, no vesting rule is put in place: occupational pension savings can be fully transferred between jobs (Cogher, 2023).

In Sweden, lump sum payments are almost non-existent. In Germany and the Netherlands, occupational pensions are exclusively paid out as annuities (Peeters et al., 2014). Switzerland, though less restrictive regarding lump sum payments (Rocha et al., 2011), still has a high percentage of respondents receiving annuities. In fact, more than 65% of Swiss pensioners receiving an occupational pension choose an annuity over a lump sum payment (Bütler & Teppa, 2007).

## **2.3 Mechanisms behind the occupational gender pension gap**

Gender inequality in occupational pension income can occur through several channels. On the demand side, occupational pensions are seen as a form of insurance for the individual. To that end, demand for pensions stems from a desire to insure against longevity risk. In addition, demand for pensions can also be explained by an individual’s desire to smooth consumption over the life course. Individuals wish to maintain a constant standard of living throughout their life (Gustman et al., 1994).

On the supply side, firms offer pension benefits to workers and use it as a sorting device to select a specific type of worker. Occupational pensions are a form of deferred compensation and will only attract workers with a low quit propensity. Occupational pensions are often not easily transferable between jobs (Bardasi & Jenkins, 2010). Workers leaving the firm early will incur capital losses (Ippolito, 1985). This potential capital loss makes occupational pensions less attractive for workers who are likely to have career breaks (Bardasi & Jenkins, 2010).

In order to receive an occupational pension, workers must be a member of an occupational plan during their career. Women are less likely to be members of such a plan. They have lower overall employment rates and they sort into different firms than men when employed (Bardasi & Jenkins, 2010; Gardiner et al., 2016; Ginn & Arber, 1993). In addition, women are more likely to work in industries and sectors which are excluded from having an occupational pension plan. Industries that employ a large share of women have a low share of workers

with an occupational pension plan, whereas industries employing a large share of men have high rates of occupational pension plan participation (OECD, 2021).

Furthermore, occupational pension participation was often also limited to full-time workers. Because women are more likely to work part-time, their eligibility for occupational pension coverage is lower (Gardiner et al., 2016). It was recent as 2012 when the EU ruled that the exclusion of part-time workers from occupational pension schemes was discriminatory (Knoops, 2021). Because women are more likely to work part-time, the eligibility for occupational pension coverage is lower among female retirees.

Occupational pension receipt may also be based on contribution requirements. Participation in an occupational pension plan may be based on an earnings floor. Because women have lower earnings, they are more likely to fall below this earnings threshold (OECD, 2021). In addition, a minimum contribution period may be put in place in order to receive an occupational pension at retirement. Because women have shorter careers and contribution periods, they may be less likely to meet these requirements and therefore not receive an occupational pension payment (OECD, 2021).

The sorting of men and women across pension and non-pension jobs is not random. Women sort into occupations and positions that either offer an occupational pension plan or do not. High-pension women will select into receiving such a pension, whereas low-pension women will not, resulting in women's average occupational pension being high in comparison to men's. This would affect the magnitude of the overall gender gap in pension income. Moreover, if selection is also present in who works, and working women have higher wage potential than non-working women, this may reinforce the selection effect (Betti et al., 2015). It should therefore be clear that any examination of the gender pension gap and its determinants needs to consider selection, similar to the mechanisms behind the gender pay gap. As discussed by Olivetti and Petrongolo (2008), countries with a high gender employment gap tend to exhibit a low gender pay gap. The same countries are also more likely to have a low gender gap in pensions.

When women participate in an occupational pension scheme, they tend to accumulate less pension savings than men (Bardasi & Jenkins, 2010; Gardiner et al., 2016; Ginn & Arber, 1993). Because women on average earn less, they will also contribute a lower amount in an occupational pension fund. Moreover, if the specific pension scheme calculates pension benefits based on earnings in the final years of the career, and women make less career progress, this will give them a disadvantage in comparison to men (Bardasi & Jenkins, 2010).

Furthermore, unlike public pensions, occupational pensions require active decision-making by individuals. Decisions need to be made whether to join the scheme or not, to accept the

default plan or to switch to a riskier one, how long to contribute, etc. These decisions are related to financial risk aversion. Men and women have been shown to differ in their financial risk taking, with women being more risk-averse than men. If women are more risk-averse, and are less likely to invest in riskier schemes, they may receive lower returns to their investment in comparison to men (OECD, 2021).

Last, the use of gendered mortality tables may have a negative effect on women’s annual occupational pension income. Occupational pension benefits are calculated using a formula which is based on past salaries and years of participation in the scheme. The calculation is gender-neutral; two similar men and women are entitled to the same annual benefits. However, women have longer life expectancy and may receive these benefits for a longer period of time. As a result, women’s occupational pension wealth will be higher. To control for this, insurance firms have used gendered mortality tables. Annual pension benefits are corrected for an individual’s life expectancy to allow for equal pension wealth (Knoops, 2021; OECD, 2021). They do so by asking a different risk premium for men and women. For individual insurances, including individual private retirement plans, the use of gendered mortality tables has been ruled to be discriminatory in the EU. However, for occupational pensions, this use is still allowed (Knoops, 2021).

In summary, gender inequality in occupational pension income arises through a combination of demand- and supply-side factors, institutional design, and individual labour market trajectories. Women are less likely to participate in occupational pension schemes due to lower employment rates, more frequent part-time work, sectoral and firm-level exclusions, and shorter contribution histories. Even when eligible, they tend to accumulate lower pension wealth because of lower earnings, interrupted careers and less career progression. Institutional features such as earnings thresholds, minimum contribution requirements, and the use of gendered mortality tables further exacerbate disparities. Additionally, women’s higher financial risk aversion and the complexity of pension decisions may lead to less favourable investment outcomes. These intertwined factors contribute to the persistent gender gap in occupational pensions. In what follows, we empirically analyse the factors behind the occupational gender pension coverage and income gap using data from SHARE, focusing on countries with comparable occupational pension regulations Germany, Sweden, the Netherlands and Switzerland. The analysis will take an individual rather than household perspective.

### 3 Methodology

We begin this section by decomposing the differences in pension coverage and income between men and women into components explained by observable characteristics and un-

explained residuals. For this, we use Oaxaca-Blinder (Blinder, 1973; Oaxaca, 1973) and Yun (Yun, 2004) decompositions, depending on whether the outcome variable is binary or continuous. Given that pension coverage is non-universal and potentially selective, we address sample selection concerns in pension income analysis using an imputation-based correction technique (Blau et al., 2024; Olivetti & Petrongolo, 2008). Specifically, we apply a probability-weighted imputation method that assigns estimated pension incomes to non-recipients based on their observable characteristics and predicted placement in the income distribution.

### 3.1 Decomposition of occupational pension coverage and income

Occupational pension coverage among retirees is not universal, and there are significant differences in characteristics between retirees who receive a pension from their past employer and those who do not. Our aim is to decompose the gap in occupational pension receipt between retired men ( $m$ ) and women ( $w$ ). Let  $C_{ig}$  be a binary variable indicating occupational pension receipt for individual  $i$  of gender  $g$ , which is a measure of occupational pension coverage. We want to decompose the gap in occupational pension receipt between men and women,  $C_m - C_w$ , into a part which can be explained by observable characteristics,  $X_g$ , and an unexplained residual. Occupational pension receipt is determined as follows:

$$C_{ig} = \beta_g X_{ig} + \varepsilon_{ig}, \quad (2)$$

with  $g = m, w$ . We can estimate this function using a linear probability model and apply the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973) to obtain detailed decomposition results. However, if we estimate occupational pension receipt using logistic or probit regressions, under the assumption that the relationship with the explanatory variables is non-linear, then the Oaxaca-Blinder decomposition cannot be used. For example, there is a clear non-linear relationship between retirees' average wage and occupational pension receipt in Switzerland (see Figure A.1 in the Appendix), because pension enrolment in a pension scheme is dependent on wage thresholds. An alternative to the linear decomposition approach is the decomposition method proposed by Yun (2004):

$$C_m - C_w = \sum_{i=1}^{i=K} W_X^i [F(X_m \beta_m) - F(X_w \beta_m)] + \sum_{i=1}^{i=K} W_\beta^i [F(X_w \beta_m) - F(X_w \beta_w)], \quad (3)$$

where  $F$  denotes the inverse logistic function and  $W_j$ , with  $j$  including  $X$  and  $\beta$ , is the weight attributed to the contribution of each variable to differences in characteristics and coefficients, while the vector of observed characteristics,  $X_{w,m}$ , includes age, retirement age, education, career length, share of part-time work, occupation, average wage, reference wage, marital

status, the total number of children and the share worked in each occupation according to the European Union’s Statistical Classification of Economic Activities (NACE).

The amount of occupational pension received,  $(P_{ig})$ , for individual  $i$  of gender  $g$  is a function of observed and unobserved characteristics:

$$P_{ig} = \mu_g X_{ig} + \delta_{ig} \quad (4)$$

$$\bar{P}_m - \bar{P}_w = (\bar{X}_m - \bar{X}_w) \hat{\mu}_m + \bar{X}_w (\hat{\mu}_m - \hat{\mu}_w), \quad (5)$$

where  $X_{w,m}$  is a vector of observable characteristics, including age, labour market participation, average wage, final wage of the last job, share of part-time work, highest level of education, marital status, the total number of contribution years to an occupational pension plan and the share worked in each occupation according to the EU’s NACE codes. To decompose mean differences in occupational pension income, we use the Oaxaca-Blinder decomposition method as the pension income function is linear. The differences in men’s and women’s average pension income,  $\bar{P}_m - \bar{P}_w$ , can be decomposed into a part due to differences in characteristics  $(\bar{X}_m - \bar{X}_w) \hat{\mu}_m$  and differences in the returns to these characteristics  $\bar{X}_w (\hat{\mu}_m - \hat{\mu}_w)$ .

Generally, in the context of pension income, differences in coefficients should not be attributed to discrimination since pension income calculations are gender-neutral. Men and women with identical characteristics should receive the same pension income. The return to characteristics should be identical by definition. Nevertheless, the specific nature of how pensions are calculated may imply a presence of an unexplained part of the decomposition. For example, some countries have a minimum and maximum pension threshold policy. Therefore, calculation of pension income might be non-linear, while the Oaxaca-Blinder decomposition assumes a linear relationship between the outcome variable and the explanatory variables. To partially account for this, similar to Bonnet et al. (2020), we turn most of our continuous variables into discrete variables to minimise the impact of non-linearities on the decomposition results.

### 3.2 Selection bias correction

In this paper we are interested in measuring the gender gap in occupational pension income. As shown in Table 1, it is clear that in most countries there is a difference in the proportion of retired men and women who receive an occupational pension. This raises the concern of potential sample selection bias if they are not missing at random: the receipt of occupational pension income is conditional on the individual having participated in an

occupational pension scheme during their working years. If selection into participation in such a scheme is not random, bias may arise.

The simplest way to account for differences in pension coverage when analysing pension income is to assign a value of zero to individuals who receive no pension. However, this leads to a zero-inflated distribution as the majority of individuals do not receive an occupational pension. Therefore, linear regression analysis is not appropriate for these types of distributions (Rowold, 2024).

To address sample selection bias in pension income, similar to research on the gender pay gap, previous research has used a Heckman selection model (see for example Bardasi and Jenkins (2010) and Gardiner et al. (2016)). We do not use this method, because it is challenging to find a suitable instrument that explains selection into receiving a pension income which also satisfies the exclusion restriction (Rowold, 2023). Alternatively, the identification at infinity approach can be used to overcome sample selection problems. This approach typically relies on a highly selective sample of career men and women for the analysis, i.e. individuals who have a high probability of being employed (Blau et al., 2024). In the context of pensions, we could limit our analysis to men and women who have never been married and have never had children (Bardasi & Jenkins, 2010). They would be most likely to have uninterrupted careers. However, this approach uses a sample of individuals who are not representative of the entire population. In addition, even if it were internally valid, cell sizes are too small for this group of individuals in SHARE so empirical estimation is not possible.<sup>1</sup> Another approach would be matching, where individuals who do not receive a pension income are matched to those that do with similar characteristics. As a result, those who are not covered would be assigned the pension income of someone with matching characteristics (see for example Juhn (2003)).

In this study, we impute pension income of individuals who are not covered by making an assumption about their position along the income distribution based on their observable characteristics. We adopt the ‘probability-weighted imputation approach used for the gender wage gap by Blau et al. (2024). The method is similar to that by Olivetti and Petrongolo (2008), where assumptions are made on the position of the missing wage with respect to the median wage based on observable characteristics. In Blau et al. (2024), assumptions are made on the position within the income distribution. The latter method allows for imputation at the mean (Blau et al., 2024). Using this method, individuals without an occupational pension are assigned imputed pensions based on the probability of falling within a certain pension income decile given their observed characteristics. In practice, each individual will receive a set of ten probabilities. Each probability belongs to a certain pension decile. We then

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<sup>1</sup>A similar problem is faced by Bardasi and Jenkins (2010), which highlights the selectivity of this group of individuals.

assign each individual to the midpoint of each decile as their fictitious wage. This results in each individual being included 10 times in the sample. We reweight each observation by the probability of being included in the corresponding income decile. We include the following characteristics in our imputations: labour market participation, average wage, final wage, share of part-time work, year of birth, retirement age, marital status, highest level of education, number of children and main sector of work.

Consider the following linear model:

$$p_{ij} = X_i' \beta + \varepsilon_{it}, \quad (6)$$

where we assume that  $p_{ij}$  is pension income for individual  $i$  in pension pillar  $j$ ,  $X_i$  is a vector of personal characteristics which influence this pension income,  $\beta$  is the effect of these characteristics on the resulting pension income, and  $\varepsilon_{it}$  is a random error term. Pensions are only observed for those who are covered, while for some individuals these will be missing. We can estimate the value of  $\beta$  for those individuals for whom we observe a pension income. We can transform  $p_{ij}$  into  $y_{ij}$ , an imputed value, for those who are not observed. Based on these estimates we can predict pension income for individuals without a pension receipt. First, we predict the probability of belonging within an income decile among the existing income distribution of pensions, conditional on  $X_i$ . Using this model, we assign everyone who is not covered by an occupational pension with an estimated probability of belonging within each pension decile. Next, we calculate the midpoint for each income decile by country and assign that midpoint as a fictitious pension income for individuals who are not covered. Doing so, everyone is included 10 times (equal to the number of income deciles). We then re-estimate the gender pension gap using the imputed pensions, and the predicted probabilities as weights.

## 4 Data and descriptive analysis

This section begins by describing the data sources and construction of the analytical sample, based on multiple waves of the SHARE for Germany, Sweden, the Netherlands and Switzerland. We explain how retrospective and regular panel data are merged to obtain a rich dataset of retirees aged 60 and over, and we detail the steps taken to define retirement status. Next, we outline the key variables used in the analysis, with a focus on occupational pension income and coverage, including how income brackets are treated and how outliers are handled. Finally, we present descriptive statistics that compare male and female retirees with and without occupational pensions, highlighting notable gender differences in labour market history, family characteristics and pension coverage.

## 4.1 Sample composition

For the empirical analysis, we use several waves of cross-sectional and retrospective data from the SHARE. The SHARE data has been collected biannually since 2001, with each wave consisting of several modules. Currently, nine waves are available, covering the period from 2001 to 2022.<sup>2</sup> Waves 3 and 7 are retrospective surveys, which were collected using a Life History Calendar (Börsch-Supan et al., 2013).

To ensure an adequate sample size for the empirical analysis, multiple waves are pooled. For each individual we use the most recent wave in which they are observed. This approach was necessary because not all countries are covered in each wave, and some have limited observations depending on the time of data collection. Retrospective data for wave 3 or wave 7 is added to each individual’s most recent wave. By combining multiple waves, and using the most recent observations for each individual, we obtain a sufficiently large sample for the analysis. The countries included in the final analysis are: Germany, Sweden, the Netherlands and Switzerland. We exclude individuals without retrospective data and those with inconsistent information (for example, changing birthdays or timing of retirement) across waves. After pooling waves and retaining only the most recent observation per individual, 38 percent of respondents—those lacking any retrospective data—must be excluded from the analysis. This reduces the number of observations from 30935 to 17345 for the selected countries in our analysis. The majority of respondents (54 percent) are observed in wave 9.

Our sample is further restricted to individuals over 60 who are reported as retired and not engaged in paid employment at the time of the survey. We use the age threshold of 60 to account for early retirement. Individuals who received an income from multiple sources, such as an occupational pension and income from paid employment, are considered as retired if their retirement income exceeds their income from employment. By doing this we account for retirees who may be involved in flexible, part-time or mini-jobs or voluntary work.

It is important to note that in SHARE data, respondents who receive a first pillar survivor pension but do not receive a pension of their own right (from employment or built-up rights) are not considered to be retired. This rule primarily affects women. To account for this, respondents claiming survivor’s benefits but who are not coded as retired will be labelled as retired if they are above the age of 60, do not receive an income from any other source and are not in paid employment.

Similarly, individuals who do not report as being retired are included if they are above the age of 60, are receiving a pension income (from any pillar) and have “homemaker” as their main occupation. Many women who have never worked, or who only worked at the beginning of their life course, do not consider themselves as retired even though they are

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<sup>2</sup>See Börsch-Supan (2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g, 2022h).

above the legal retirement age and are receiving a pension income (Loretto & Vickerstaff, 2013). Before including homemakers, 61 percent of individuals in the full sample are reclassified as retired; after their inclusion, this share rises to 73 percent.<sup>3</sup>

The distribution of occupational pension income is highly skewed (see Appendix Figure A.2). Individuals whose pension income falls in the top or the bottom 5 percent of the country-specific income distribution are excluded from the analysis, following Betti et al. (2015).<sup>4</sup> Further, we make a clear distinction between respondents who claim not to receive a pension income from a specific pillar, and those that are missing due to different reasons.

## 4.2 Definition of pension income and the control variables

Total pension income is defined as the sum of all annual (regular) old-age pension income received during the reference year, including public pension income, occupational pensions and private pensions. Our main focus is on annual occupational pension coverage and income.

Because not all respondents in the survey are willing to (or were able) to give a monetary amount for their pension income, some respondents are assigned to unfolding brackets. For respondents who placed themselves within an income bracket, their pension income was calculated by assigning the midpoint of that bracket as their pension income. SHARE uses three different bracket sequences, where respondents indicate whether they earn more, less or approximately the same as the entry point, and proceed to the next bracket if required. The bounds of the brackets are country-specific, taking into account cross-country differences in purchasing power.

In addition to pension income, the analysis incorporates a broad set of demographic, employment and educational variables that may influence occupational pension coverage and income. Key labour market indicators include whether the respondent ever engaged in paid work, overall labour market participation between ages 18 and 60, average and final (log) wages, the share of time spent in part-time work, retirement age, and total years of contributions. Demographic variables include age, marital status (including indicators for being married, in a registered partnership, never married, divorced or widowed), and the number of children. Educational attainment is captured through three levels: primary, secondary and higher education. Employment characteristics include the share of time worked in the public sector, private sector, and as self-employed. Finally, the analysis accounts for sectoral composition by considering the share of time individuals spent working in 14 industry categories (e.g., manufacturing, education, health and social work) based on the EU's NACE. These variables help to capture key drivers of gender differences in occupational pension

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<sup>3</sup>Excluding homemakers from our final sample does not change any of the decomposition results in Section 5.

<sup>4</sup>Including individuals within the tails of the pension distribution does not change the interpretation of our results in Section 5, but does increase the reported gender pension gaps.

coverage and benefit levels. More detailed description of variables construction is available in Appendix A.1.

### 4.3 Descriptive analysis

Table 1 presents the sample means for retired men and women, both with and without an occupational pension. The proportion of retired women receiving an occupational pension is smaller than the number of men.

When comparing the characteristics of occupational pension recipients and non-recipients in Table 1, differences in characteristics seem to be larger among women than among men. This finding is similar to Bardasi and Jenkins (2010). Our analysis of occupational pension income considers retirement age, total time spent in the labour market, average wage, final wage, marital status, number of children and the highest level of education. We also account for the proportion of time spent in part-time employment, as well as differences across sectors and industries.

Retired women receiving an occupational pension differ substantially from the average retired woman, a pattern not observed among men. Differences in labour market participation are clear. Women with an occupational pension spent 77 percent of their time in the labour market, whereas women who are not covered have only spent 58 percent of their time in the labour market between the ages of 18 and 60: a difference of almost 20 percentage points. Only a small percentage of individuals have never worked between the ages of 18 to 60: among men this is only 1 percent of the population, while among women this is 3 percent.

The differences in labour market history between women with different pension receipt might be driven by having children. For men, there are hardly any differences in occupational pension receipt depending on having children. Among retired women, those with an occupational pension tend to have fewer children than those without. Having children limits women's labour market participation both in terms of employment and hours worked (Kleven et al., 2019), and this also reduced women's likelihood of receiving an occupational pension (Bardasi & Jenkins, 2010).

Women are more likely to be widowed during retirement, and Table 1 suggests that widowhood status affects their pension income to some extent. These differences in marital status arise due to women's higher life expectancy. Across the OECD, the life expectancy difference between men and women is on average 4 to 6 years. Combined with age differences within couples, with men being older within a relationship, this results in a higher widowhood probability for women.

In summary, Table 1 highlights notable gender differences in occupational pension cov-

**Table 1:** Sample means by gender and occupational pension receipt

|                                                                  | Men       |           | Women     |           |
|------------------------------------------------------------------|-----------|-----------|-----------|-----------|
|                                                                  | No OP     | OP        | No OP     | OP        |
| Total pension (€)                                                | 16,482.94 | 28,888.95 | 13,032.57 | 21,619.12 |
| Public pension (€)                                               | 19,012.48 | 18,573.94 | 15,947.75 | 16,040.35 |
| Occupational pension (€)                                         |           | 11,094.06 |           | 6,497.08  |
| Ever done paid work                                              | 0.99      | 1.00      | 0.96      | 0.99      |
| LaboUr market participation                                      | 86.20     | 89.10     | 58.80     | 77.27     |
| Avg. wage (log)                                                  | 7.14      | 7.51      | 6.58      | 7.25      |
| Final wage (log)                                                 | 7.10      | 7.53      | 6.48      | 7.10      |
| % part-time work                                                 | 1.69      | 1.87      | 22.11     | 22.43     |
| Retirement age                                                   | 62.57     | 62.78     | 61.97     | 62.62     |
| Age                                                              | 75.82     | 75.31     | 75.70     | 74.43     |
| Married                                                          | 0.71      | 0.75      | 0.58      | 0.54      |
| Registered partnership                                           | 0.01      | 0.02      | 0.01      | 0.02      |
| Never married                                                    | 0.07      | 0.05      | 0.03      | 0.06      |
| Divorced                                                         | 0.09      | 0.08      | 0.10      | 0.14      |
| Widowed                                                          | 0.12      | 0.10      | 0.27      | 0.24      |
| Primary education                                                | 0.22      | 0.21      | 0.34      | 0.23      |
| Secondary education                                              | 0.49      | 0.46      | 0.45      | 0.39      |
| Higher education                                                 | 0.30      | 0.34      | 0.20      | 0.38      |
| Number of children                                               | 2.12      | 2.17      | 2.22      | 2.05      |
| % public sector                                                  | 14.34     | 22.02     | 14.70     | 28.84     |
| % private sector                                                 | 71.60     | 73.62     | 78.44     | 68.66     |
| % self-employed                                                  | 13.76     | 4.07      | 6.60      | 2.31      |
| Contribution years                                               | 10.60     | 23.06     | 7.95      | 20.36     |
| <i>% in each industry</i>                                        |           |           |           |           |
| Agriculture, forestry and fishing                                | 10.74     | 3.19      | 4.71      | 1.17      |
| Mining and quarrying                                             | 0.93      | 0.72      | 0.27      | 0.18      |
| Manufacturing                                                    | 21.48     | 21.33     | 14.60     | 8.03      |
| Electricity, gas and water supply                                | 2.24      | 3.36      | 0.65      | 0.51      |
| Construction                                                     | 13.42     | 11.04     | 2.21      | 1.41      |
| Wholesale and retail trade                                       | 10.79     | 8.80      | 16.01     | 7.94      |
| Hotels and restaurants                                           | 1.89      | 0.88      | 3.94      | 2.10      |
| Transport, storage and communication                             | 7.64      | 8.58      | 2.49      | 2.33      |
| Financial intermediation                                         | 2.01      | 4.73      | 2.65      | 4.84      |
| Real estate, renting and business activities                     | 1.34      | 1.29      | 1.28      | 0.71      |
| Public administration and defence,<br>compulsory social security | 7.85      | 12.58     | 6.69      | 13.40     |
| Education                                                        | 5.44      | 9.19      | 10.00     | 15.80     |
| Health and social work                                           | 3.50      | 4.56      | 18.55     | 29.07     |
| Other community, social and personal activities                  | 10.67     | 9.88      | 16.05     | 12.22     |
| Number of observations                                           | 2,499     | 2,161     | 3,352     | 2,028     |
| % of observations (No OP/OP)                                     | 54%       | 46%       | 62%       | 38%       |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations.

Notes: OP = Occupational Pension. Sample includes retired individuals aged 60 and older. Labour force participation, part-time work, sector and industry of work reflect the proportion of time spent in these situations between the ages of 18 and 60.

erage among retirees. A smaller share of retired women receive an occupational pension compared to men, and the variation in characteristics between recipients and non-recipients is more pronounced among women. Retired women with occupational pensions have significantly higher labour market participation—77 percent versus 58 percent—than those without. This difference is largely absent among men. Parenthood appears to contribute to these gaps, with women who have fewer children more likely to receive a pension, while

children have little impact on men’s pension outcomes. Additionally, women are more likely to be widowed, which may influence pension income due to their longer life expectancy and typical age differences within couples. These patterns underscore the gendered nature of pension access and accumulation. We will analyse these differences further in the empirical results section.

## 5 Empirical results

This section begins with a decomposition of occupational pension coverage, using the Yun (2004) decomposition approach and identifying the relative importance of various explanatory variables. The next subsection examines differences in pension income using an Oaxaca-Blinder (Blinder, 1973; Oaxaca, 1973) decomposition. To address potential bias due to non-random coverage, the third subsection implements a selection correction through imputation and re-weighting (Blau et al., 2024; Olivetti & Petrongolo, 2008). Finally, a set of robustness checks is conducted to assess the sensitivity of the results to different modelling assumptions and sample definitions.

### 5.1 Occupational pension coverage decomposition

Table 2 presents the results of a Yun (2004) decomposition of the gender gap in occupational pension coverage. First stage regressions can be found in Appendix Table A.3. The first two columns of Table 2 show the overall decomposition results, while columns (3)-(4), (5)-(6) and (7)-(8) show the decompositions for Germany, the Netherlands and Switzerland, respectively. We exclude Sweden from the analysis because the gender coverage gap is almost non-existent. Percentages in columns (2), (4), (6) and (8) represent the part of the total gender gap that can be explained by the respective variable.

Overall, the results show that retired women in selected countries are on average 18 percentage points less likely than men to receive an occupational pension. After controlling for observable characteristics, the gap narrows to 10 percentage points. Observable characteristics account for approximately 55 percent of the gender gap in occupational pension receipt. In the Netherlands and Germany, more than 70 percent of the gap can be explained by differences in observed characteristics.

Most of the gender gap in occupational pension coverage is driven by women’s time spent in the labour market and lower wages. Lower rates of labour market participation account for 50 percent of the gender gap in occupational pension coverage. Spending less time in employment reduces the opportunity to contribute to an occupational pension scheme. Moreover, in a defined benefit occupational pension plan, pension receipt may be conditional

on the number of years worked. Average and final wages are the second largest contributors to the occupational pension coverage gap. The eligibility threshold to join a pension scheme is sometimes based on a full-time equivalent wage. Consequently, lower annual wages reduce opportunities to contribute to a pension plan. Industry of employment accounts for an average of 4 percent of the coverage gap. In the Netherlands, industry of employment accounts for 20 percent of the coverage gap, which aligns with its industry-based pension system. In Switzerland, the industry of employment explains only 2 percent of the gap as pension scheme enrolment is primarily based on annual wages.

**Table 2:** Yun decomposition of the gender gap in occupational pension coverage

|                             | Pooled |     | Germany |     | Netherlands |       | Switzerland |     |
|-----------------------------|--------|-----|---------|-----|-------------|-------|-------------|-----|
|                             | (1)    | (2) | (3)     | (4) | (5)         | (6)   | (7)         | (8) |
| Pension coverage: Men       | 0.54   |     | 0.34    |     | 0.88        |       | 0.70        |     |
| Pension coverage: Women     | 0.36   |     | 0.25    |     | 0.59        |       | 0.42        |     |
| Coverage gap                | 0.18   | 100 | 0.10    | 100 | 0.29        | 100   | 0.28        | 100 |
| Explained                   | 0.10   | 55  | 0.08    | 88  | 0.20        | 71    | 0.09        | 31  |
| Unexplained                 | 0.08   | 45  | 0.01    | 12  | 0.09        | 29    | 0.19        | 69  |
| Age                         | 0.00   | 0   | 0.00    | 1   | 0.01        | 2     | 0.00        | 0   |
| Retirement age              | -0.00  | 0   | 0.00    | 0   | -0.00       | 0     | -0.01       | -2  |
| % part-time work            | 0.00   | 1   | -0.00   | -3  | 0.00        | 1     | -0.00       | -1  |
| Labour market participation | 0.09   | 50  | 0.06    | 63  | 0.11        | 39    | 0.08        | 29  |
| Avg. wage (log)             | 0.01   | 3   | 0.01    | 10  | 0.03        | 9     | -0.00       | -1  |
| Final wage (log)            | 0.01   | 6   | 0.01    | 10  | -0.01       | -3    | 0.01        | 5   |
| Education                   | 0.01   | 4   | -0.00   | -4  | 0.02        | 6     | 0.02        | 7   |
| Marital status              | -0.01  | -5  | 0.00    | 0   | -0.01       | -3    | -0.03       | -9  |
| Industry                    | 0.01   | 4   | 0.01    | 11  | 0.06        | 20    | 0.01        | 2   |
| Number of children          | 0.00   | 0   | 0.00    | 1   | 0.00        | -0.00 | 0           |     |
| Wave                        | -0.00  | -1  | -0.00   | -1  | -0.00       | -0    | 0.00        | 1   |
| Country                     | -0.01  | -7  |         |     |             |       |             |     |
| Total                       | 0.10   | 55  | 0.08    | 88  | 0.20        | 71    | 0.09        | 31  |
| N: Men                      | 2,210  |     | 1,183   |     | 320         |       | 671         |     |
| N: Women                    | 2,194  |     | 1,092   |     | 372         |       | 726         |     |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations. Notes: Sample includes retired individuals aged 60 and older. Percentages in the second column for each country represent the part of the total gender gap that can be explained by the respective variable.

Given improvements in women’s labour market prospects over time, it might be the case that the results regarding labour market participation are largely driven by the oldest group of retirees. Therefore, we re-estimate the decomposition analysis for individuals aged 60–75 and those aged 75+ in 2022. The decomposition results are presented in Table 3, while Tables A.1 and A.2 in the Appendix present the sample means for these two groups. For women aged 60 to 75, 73% of the time aged 18 to 60 was spent in the labour market, whereas for the group aged 75+, this is only 64%. As shown in Table 3, the coverage gap among the younger cohort is substantially smaller than it is among the older cohort, at 11 and 21 percentage points, respectively. The main factor driving the gap remains consistent over time. Labour market participation explains 60% of the coverage gap for the younger cohort. Women’s higher prevalence of part-time work explains 12% of the gap, whereas for the older

cohort very little is explained by differences in part-time work.

**Table 3:** Yun decomposition of occupational pension coverage by age cohort

|                             | Born after 1947 |     | Born before 1947 |     |
|-----------------------------|-----------------|-----|------------------|-----|
|                             | (1)             | (2) | (3)              | (4) |
| Pension coverage: Men       | 0.53            |     | 0.54             |     |
| Pension coverage: Women     | 0.42            |     | 0.33             |     |
| Coverage gap                | 0.11            | 100 | 0.21             | 100 |
| Explained                   | 0.07            | 67  | 0.09             | 44  |
| Unexplained                 | 0.04            | 33  | 0.12             | 56  |
| Age                         | -0.00           | -3  | -0.00            | 0   |
| Retirement age              | 0.00            | 3   | -0.00            | -1  |
| % part-time work            | 0.01            | 12  | -0.01            | -3  |
| Labour market participation | 0.07            | 60  | 0.09             | 42  |
| Avg. wage (log)             | 0.01            | 8   | 0.00             | 2   |
| Final wage (log)            | -0.01           | -7  | 0.02             | 9   |
| Education                   | 0.01            | 9   | 0.00             | 1   |
| Marital status              | 0.00            | 0   | -0.02            | -7  |
| Industry                    | 0.00            | 4   | 0.01             | 5   |
| Number of children          | 0.00            | 1   | 0.00             | 0   |
| Wave                        | -0.00           | -2  | 0.00             | 0   |
| Country                     | -0.02           | -17 | -0.01            | -5  |
| Total                       | 0.07            | 67  | 0.09             | 44  |
| N: Men                      | 715             |     | 1,491            |     |
| N: Women                    | 869             |     | 1,325            |     |

Source: Survey of Health, Ageing and Retirement (2011-2022), own calculations

Notes: Sample includes retired individuals aged 60 and older. Percentages in the second column for each country represent the part of the total gender gap that can be explained by the respective variable.

## 5.2 Occupational pension income decomposition

Table 4 presents the results of the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973) of occupational pension income. The first stage regressions can be found in Table A.4. On average, retired women in Europe receive an occupational pension which is 0.77 log points lower than men's. This translates into a pension gap of approximately 45 percent. There appears to be large cross-country variation in the explanation of the occupational pension income gap. The contribution of the country indicators amounts to 30 percent of the overall gender pension gap. This suggests that some countries have a disproportionately high share of men with large pensions in the sample. For example, Switzerland stands out with both a large gender gap in occupational pension coverage and comparatively high pension levels. The sample includes a disproportionate number of Swiss men with substantial pensions, contributing significantly to the overall gender pension gap observed in the data.

Conditional on receiving an occupational pension, part-time work is the largest contributor to occupational pension inequality in all countries studied. This stems from the impact that part-time work has on wage levels and wage growth, which significantly influences pension income. Indeed, wages also explain a substantial proportion of the gender pension gap. Furthermore, in a defined benefit scheme, the pension which is paid out may be based on

the number of hours worked in a job. Part-time workers would be at a disadvantage in this case.

The industry of employment also plays an important role in explaining the gender gap in occupational pensions. Different industries are characterised by different occupational pension plans and might offer more or less pension benefits given observable characteristics. Furthermore, because the share of work in each industry is measured as a share of the total career length, a large share worked in a non-pension industry might imply lower benefits even if someone has worked a share in a pension job as well.

Last, we see that the total number of years someone contributed to an occupational pension plan explains, to varying degrees across countries, why women receive less pension benefits than men. The total number of contribution years is particularly important in a defined contribution schemes. In these schemes, the total amount of pension received depends on how many contributions were made during the career (Dulebohn et al., 2009). In the Netherlands and Switzerland, contribution years explain a larger share of the pension gap compared to Germany and Sweden.

**Table 4:** Oaxaca-Blinder decomposition of the gender gap in occupational pension income

|                             | Pooled |     | Germany |     | Sweden |     | Netherlands |     | Switzerland |      |
|-----------------------------|--------|-----|---------|-----|--------|-----|-------------|-----|-------------|------|
|                             | (1)    | (2) | (3)     | (4) | (5)    | (6) | (7)         | (8) | (9)         | (10) |
| Pension: Men                | 8.27   |     | 6.71    |     | 7.19   |     | 8.82        |     | 10.04       |      |
| Pension: Women              | 7.50   |     | 6.25    |     | 6.61   |     | 8.21        |     | 9.50        |      |
| Pension gap                 | 0.77   | 100 | 0.46    | 100 | 0.58   | 100 | 0.61        | 100 | 0.54        | 100  |
| Explained                   | 0.45   | 59  | 0.16    | 35  | 0.15   | 27  | 0.52        | 84  | 0.10        | 18   |
| Unexplained                 | 0.32   | 41  | 0.30    | 65  | 0.42   | 73  | 0.10        | 16  | 0.44        | 82   |
| Age                         | -0.00  | 0   | 0.03    | 6   | 0.00   | 0   | -0.03       | -5  | 0.00        | 1    |
| Retirement age              | 0.00   | 0   | 0.00    | 0   | -0.00  | 0   | -0.00       | 0   | -0.01       | -1   |
| Labour market participation | 0.03   | 3   | -0.01   | -3  | 0.03   | 5   | 0.16        | 26  | -0.05       | -10  |
| % part-time work            | 0.12   | 15  | 0.18    | 40  | 0.04   | 7   | 0.29        | 47  | 0.10        | 19   |
| Avg. wage (log)             | 0.02   | 2   | 0.05    | 10  | 0.04   | 7   | 0.02        | 3   | 0.01        | 3    |
| Final wage (log)            | 0.00   | 0   | -0.04   | -9  | 0.01   | 2   | 0.01        | 1   | -0.02       | -4   |
| Education                   | 0.02   | 3   | 0.03    | 7   | 0.00   | 1   | 0.00        | 0   | 0.03        | 6    |
| Marital status              | -0.00  | -1  | 0.02    | 5   | 0.00   | 0   | -0.04       | -7  | -0.01       | -2   |
| Industry                    | 0.01   | 2   | -0.06   | -13 | 0.01   | 2   | 0.05        | 8   | 0.06        | 11   |
| Number of children          | -0.00  | 0   | 0.01    | 1   | 0.00   | 0   | -0.01       | -1  | -0.02       | -4   |
| Contribution years          | 0.03   | 4   | 0.02    | 5   | 0.02   | 4   | 0.05        | 8   | 0.03        | 6    |
| Wave                        | -0.02  | -2  | -0.07   | -14 | -0.00  | -1  | 0.02        | 3   | -0.03       | -6   |
| Country                     | 0.24   | 31  |         |     |        |     |             |     |             |      |
| Total                       | 0.45   | 59  | 0.16    | 35  | 0.15   | 27  | 0.52        | 84  | 0.10        | 18   |
| N: Men                      | 1,124  |     | 288     |     | 274    |     | 206         |     | 356         |      |
| N: Women                    | 916    |     | 227     |     | 308    |     | 161         |     | 220         |      |

Source: Survey of Health, Ageing and Retirement (2011–2020), own calculations Notes: Sample includes retired individuals aged 60 and older. Percentages in the second column for each country represent the part of the total gender gap that can be explained by the respective variable.

### 5.3 Sample selection correction

Occupational pension coverage is not universal. In all countries studied, a larger proportion of retired men receive an occupational pension compared to women (see Table 1). In addition, the group of individuals who receive an occupational pension is different from those who do not. Workers self-select into occupations, jobs or positions that do or do not offer an occupational pension plan. This introduces selection bias in the estimates of the gender pension gap. As shown in Table 1, individuals receiving an occupational pension are characterised by different marital status, educational level, career length, and wage. Determinants of these characteristics might also explain why they are covered by an occupational pension and how much they might receive in the future. The empirical literature has been aware that this may introduce sample selection bias (Bardasi & Jenkins, 2010; Gardiner et al., 2016; Rowold, 2024).

To assess the importance of selection bias in this context, we ran a series of regression imputations and re-weighting exercises as shown in Table 5. Our imputations follow the method of Blau et al. (2024), where we impute pension income for those individuals who do not receive an occupational pension. The imputations are based on predictions made among the sample of retirees who do receive an occupational pension. The first regression imputation includes every individual 10 times (for each decile), using the midpoint of each income decile as an imputed value and the probability of belonging in that decile as a weight. The second regression imputation includes every individual 10 times, using a random value within each income decile as an imputed pension value.

First, we test for the presence of positive or negative selection. We compare the imputed pensions with the pensions of the sample of respondents who do receive an occupational pension. Our results suggest that positive selection is at play. We obtain lower average occupational pensions among the group of individuals with imputed pensions compared to those with their own pension. Individuals who do not receive an occupational pension also seem to have a higher likelihood of receiving low pension benefits. This suggests that the selection into receiving an occupational pension is not random, and high-pension individuals select to receive an occupational pension.

Next, we recalculate the gender pension gap including the imputed pensions in our estimation. The majority of imputed pension gaps are larger than the baseline gap, though differences are small. This suggests that the gender gap in occupational pensions would neither decrease nor increase if occupational pension coverage for women improves. Moreover, the size of the coverage gap does not appear to influence the extent of selection bias.

**Table 5:** Unadjusted gender gaps in occupational pension income using alternative sample selection criteria

|                 | (1)          | (2)         | (3)          | (4)          |
|-----------------|--------------|-------------|--------------|--------------|
|                 | Coverage gap | Pension gap | Imputation 1 | Imputation 2 |
| Germany         | 8.8%         | 24.1%       | 24.1%        | 23.9%        |
| Imputed pension |              |             |              |              |
| Without OP      |              |             | 1,433.9      | 1,436.9      |
| With OP         |              |             | 1,652.3      | 1,652.3      |
| Sweden          | 2.2%         | 39.8%       | 39.8%        | 39.5%        |
| Imputed pension |              |             |              |              |
| Without OP      |              |             | 2,237.2      | 2,207.8      |
| With OP         |              |             | 2,341.9      | 2,341.6      |
| Netherlands     | 32.6%        | 41.7%       | 42.9%        | 42.8%        |
| Imputed pension |              |             |              |              |
| Without OP      |              |             | 4,341.3      | 4,265.9      |
| With OP         |              |             | 9,032.2      | 9,032.4      |
| Switzerland     | 23.8%        | 35.3%       | 34.2%        | 34.4%        |
| Imputed pension |              |             |              |              |
| Without OP      |              |             | 21,275.4     | 21,233.9     |
| With OP         |              |             | 26,697.5     | 26,696.3     |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations. Notes: OP = Occupational Pension. The first regression imputation includes every individual 10 times (for each decile), using the midpoint of each income decile as an imputed value and the probability of belonging in that decile as a weight. The second regression imputation includes every individual 10 times, using a random value within each income decile as an imputed pension value.

## 5.4 Robustness checks

We perform a series of robustness checks to assess the sensitivity of our estimation. First, we reproduce Tables 2 and 4 without including wage information. We do so because wage information is missing for individuals who have never worked. As a result, individuals who have never been in paid employment are excluded from the main analysis. Results of the robustness checks are shown in Tables 6 and 7. The results indicate that the inclusion of retirees with no work experience has little to no effect on our estimates. The magnitude of both the coverage gap (Table 6, columns (3)–(4)) and the gender pension gap (Table 7, columns (3)–(4)) has not changed substantially after including individuals who have never worked. While the explained proportion of the coverage gap has reduced from 55 to 49 percent after excluding wage information, the explanatory power of the other variables has not changed substantially. Labour market participation remains the most important explanatory variable, explaining 53 percent of the coverage gap. Similarly, few changes are observed in Table 7 for the gender pension gap, after excluding wage information.

Next, we test for possible multicollinearity between the average wage and the final wage. If individuals have only held one job during their career, then their average and final wage might be equal. The explanations for the coverage and pension gap remain the same. Average and final wages explain very little of the coverage gap in occupational pensions (Table 6, column (5)–(8)). Exclusion or inclusion of these variables changes very little of the explanatory power of the other variables, suggesting that multicollinearity issues are limited.

In addition, we check for multicollinearity between the share of part-time work and the average wage. Higher shares of part-time work imply lower average wages, as these are reported annually and not as an hourly wage. If they are collinear, then excluding wage information in columns (3)–(4) of Tables 6 and 7 should increase the explanatory power of part-time work. However, we do not observe substantial changes in the explained proportion of both the coverage gap and the pension gap.

**Table 6:** Robustness checks for the Yun decomposition of the coverage gap

|                             | Baseline |     | Excluding wage info |     | Excluding final wage |     | Excluding average wage |     |
|-----------------------------|----------|-----|---------------------|-----|----------------------|-----|------------------------|-----|
|                             | (1)      | (2) | (3)                 | (4) | (5)                  | (6) | (7)                    | (8) |
| Pension coverage: Men       | 0.54     |     | 0.53                |     | 0.54                 |     | 0.54                   |     |
| Pension coverage: Women     | 0.36     |     | 0.36                |     | 0.36                 |     | 0.36                   |     |
| Coverage gap                | 0.18     | 100 | 0.17                | 100 | 0.17                 | 100 | 0.18                   | 100 |
| Explained                   | 0.10     | 55  | 0.08                | 49  | 0.09                 | 55  | 0.10                   | 55  |
| Unexplained                 | 0.08     | 45  | 0.09                | 51  | 0.08                 | 45  | 0.08                   | 45  |
| Age                         | 0.00     | 0   | -0.00               | 0   | 0.00                 | 0   | 0.00                   | 0   |
| Retirement age              | -0.00    | -1  | -0.00               | 0   | -0.00                | 0   | -0.00                  | 0   |
| % part-time work            | 0.00     | 1   | -0.00               | -1  | 0.00                 | 2   | 0.00                   | 1   |
| Labour market participation | 0.09     | 50  | 0.09                | 55  | 0.09                 | 50  | 0.09                   | 50  |
| Education                   | 0.01     | 4   | 0.01                | 7   | 0.01                 | 4   | 0.01                   | 4   |
| Marital status              | -0.01    | -5  | -0.01               | -6  | -0.01                | -5  | -0.01                  | -5  |
| Industry                    | 0.01     | 4   | 0.01                | 4   | 0.01                 | 4   | 0.01                   | 4   |
| Number of children          | 0.00     | 0   | 0.00                | 0   | 0.00                 | 0   | 0.00                   | 0   |
| Wave                        | -0.00    | -1  | -0.00               | -1  | -0.00                | -1  | -0.00                  | -1  |
| Country                     | -0.01    | 3   |                     |     |                      |     |                        |     |
| Avg. wage (log)             | 0.01     | 3   |                     |     | 0.01                 | 7   |                        |     |
| Final wage (log)            | 0.01     | 6   |                     |     |                      |     | 0.01                   | 8   |
| Total                       | 0.10     | 55  | 0.08                | 49  | 0.09                 | 55  | 0.10                   | 55  |
| N: Men                      | 2210     |     | 2546                |     | 2214                 |     | 2210                   |     |
| N: Women                    | 2,194    |     | 2,812               |     | 2,203                |     | 2,194                  |     |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations. Notes: Sample includes retired individuals aged 60 and older. Percentages in the second column for each country represent the part of the total gender gap that can be explained by the respective variable.

**Table 7:** Robustness checks for the Oaxaca-Blinder decomposition of the gender gap in occupational pension income

|                             | Baseline |     | Excluding wage info |     | Excluding final wage |     | Excluding average wage |     |
|-----------------------------|----------|-----|---------------------|-----|----------------------|-----|------------------------|-----|
|                             | (1)      | (2) | (3)                 | (4) | (5)                  | (6) | (7)                    | (8) |
| Pension: Men                | 8.27     |     | 8.18                |     | 8.27                 |     | 8.27                   |     |
| Pension: Women              | 7.50     |     | 7.38                |     | 7.50                 |     | 7.50                   |     |
| Pension gap:                | 0.77     | 100 | 0.79                | 100 | 0.77                 | 100 | 0.77                   | 100 |
| Explained                   | 0.45     | 59  | 0.46                | 58  | 0.45                 | 58  | 0.45                   | 59  |
| Unexplained                 | 0.32     | 41  | 0.33                | 42  | 0.32                 | 42  | 0.32                   | 41  |
| Age                         | -0.00    | 0   | -0.01               | -1  | -0.00                | 0   | -0.00                  | -1  |
| Retirement age              | 0.00     | 0   | 0.00                | 0   | 0.00                 | 0   | 0.00                   | 0   |
| Labour market participation | 0.03     | 3   | 0.01                | 2   | 0.03                 | 3   | 0.03                   | 3   |
| % part-time                 | 0.12     | 15  | 0.14                | 18  | 0.12                 | 16  | 0.12                   | 15  |
| Education                   | 0.02     | 3   | 0.02                | 2   | 0.03                 | 3   | 0.03                   | 3   |
| Marital status              | -0.00    | -1  | -0.00               | 0   | -0.00                | 0   | -0.00                  | 0   |
| Industry                    | 0.01     | 2   | 0.02                | 3   | 0.02                 | 2   | 0.01                   | 2   |
| Number of children          | -0.00    | 0   | -0.00               | 0   | -0.00                | 0   | -0.00                  | 0   |
| Contribution years          | 0.03     | 4   | 0.03                | 3   | 0.03                 | 4   | 0.03                   | 4   |
| Wave                        | -0.02    | -2  | -0.01               | -2  | -0.02                | -3  | -0.02                  | -2  |
| Country                     | 0.24     | 31  | 0.26                | 33  | 0.24                 | 31  | 0.24                   | 31  |
| Avg. wage (log)             | 0.02     | 2   |                     |     | 0.02                 | 2   |                        |     |
| Final wage (log)            | 0.00     | 0   |                     |     |                      |     | 0.03                   | 3   |
| Total                       | 0.45     | 59  | 0.46                | 58  | 0.45                 | 58  | 0.45                   | 59  |
| N: Men                      | 1,124    |     | 1,351               |     | 1,127                |     | 1,124                  |     |
| N: Women                    | 916      |     | 1,252               |     | 922                  |     | 916                    |     |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations. Notes: Sample includes retired individuals aged 60 and older. Percentages in the second column for each country represent the part of the total gender gap that can be explained by the respective variable.

## 6 Conclusions and discussion

Using data from the Survey of Health, Ageing and Retirement (SHARE), we analysed the gender pension gap in occupational pensions. The focus on occupational pensions is driven by the increasing pension privatisation across OECD countries, with occupational and personal private pensions becoming more important.

The gender gap in occupational pensions is substantial and exceeds the gender gap in public pensions. Women’s occupational pensions are 26 to 50 percent lower than men’s. Gender gaps in public pensions are much smaller, ranging from -5 to 38 percent. In addition, the likelihood of receiving an occupational pension is much lower for women than for men.

Our results highlight that gender differences in occupational pension coverage can be explained by the different labour market positions men and women hold during their lifetime. Cross-country variations in these explanations are small. The most important drivers of the coverage gap are time spent in the labour market and time spent in full-time employment. Fifty percent of the gap can be explained by women’s lower labour market participation. Both aspects are driven by the different roles men and women take up in the labour market, as a result of childcare responsibilities (Kleven et al., 2019). Indeed, women with an occupational pension have fewer children than women who do not. Moreover, among the sample of younger retirees born after 1947, these differences are less pronounced. We expect that in the future, the coverage gap will narrow, as women’s labour market participation has increased substantially in recent decades.

Conditional on receiving an occupational pension, women still receive an occupational pension that is almost 40 percent lower than men’s. Contrary to the gender gap in occupational pension coverage, there is large cross-country variation in the explanation of the gender pension gap. Part-time work is the largest contributor in all countries studied, explaining around 14 percent of the gap on average. However, in the Netherlands where part-time work rates among women are high, this explains almost 43 percent of the gap, whereas in Sweden this is only 10 percent. In the Netherlands and Switzerland, the number of contribution years explains around 10 percent of the gender pension gap. This is most likely a result of the higher share of defined contribution plans compared to Germany and Sweden.

While some proportion of the gender pension gap in occupational pensions can be explained by observable characteristics, an unexplained gap remains, despite gender-neutral calculation rules. Reasons for the existence of the unexplained gap could include omitted variables and measurement error.

Taking into account the possible sample selection bias that the gender coverage gap may introduce, we estimated selection-corrected estimates of the gender gap in occupational pensions using imputation techniques. While we found evidence of positive selection, the

corrected gender pension gaps differ only slightly from the baseline estimates. However, there are sizeable differences in characteristics between those who have an occupational pension and those who do not. These differences are larger within women than between men and women. In addition, there was no clear relationship between the size of the gender coverage gap and the size of the gender pension gap. A limitation of the decomposition and selection correction results is that these methods assume there is no unobserved heterogeneity and rely on estimates that should be interpreted as correlations.

The findings of our study point to several key policy implications for mitigating poverty risks among elderly women through reforms in occupational pension systems. First, the large role of women’s interrupted and part-time employment histories in explaining both coverage and income gaps underscores the need for more inclusive pension scheme designs that better accommodate non-linear career paths. Policies that facilitate entry, such as lower earnings thresholds or contribution requirements, can help improve women’s access to occupational pensions. Similarly, recognising caregiving periods in pension calculations or providing per-child pension credits (Joubert & Todd, 2024) can help narrow the gender pension gap and enhance retirement security. Our findings also suggest that industry-specific pension inequalities play a role, particularly in countries with sector-based schemes like the Netherlands. Strengthening occupational pension entitlements in sectors with high female employment—such as health, education and social care—could thus be an effective lever for reducing disparities. While selection into occupational pension receipt appears to play only a limited role in our context, addressing structural differences in labour market participation and earnings trajectories remains essential. In sum, policy efforts targeting the inclusivity and redistributive capacity of occupational pension schemes could be central to reducing gendered pension inequalities and, by extension, the risk of old-age poverty among women.

Future research should consider aspects of the occupational pension formation not considered in this paper, such as the use of gendered mortality tables and the introduction of auto-enrolment, and go beyond analysing pension annuities and start considering pension wealth.

One reason for the existence of the pension gap, conditional on observed characteristics, could be the use of gendered mortality tables. These tables ensure an actuarially fair premium in pension schemes, based on the individual’s life expectancy (Chen & Beetsma, 2014). In the past, a distinction in life expectancy between men and women was considered when calculating death cover and annuity premiums (Knoops, 2021). Recently, the EU Gender Directive ruled that differentiation in insurance based on gender, and the use of gendered mortality tables is considered discriminatory (European Commission, 2024). This partly falls under the EU’s equal pay act, which considers occupational pensions to be a fringe ben-

efit. Until now, it is unclear how this directive changed gender differences in occupational pension coverage and contributions. While the EU has ruled that the use is discriminatory, for second pillar pensions this is technically still allowed as it is not specifically considered in the ruling (Knoops, 2021). In Switzerland however gendered mortality tables may still explain inequality in occupational pension income between men and women, as they are not affected by the EU directive.

Next, it would be beneficial to assess whether the introduction of auto-enrolment, in several countries, has improved women’s savings in occupational pension plans over their career. This would improve our understanding of the hypothesis that increasing coverage in occupational pensions for women would only have a small effect on the difference in occupational pension benefits. To do so, the focus should be on current workers. The definition of occupational pension coverage in this paper is based on the comparison between individuals who have contributed to an occupational pension scheme at least once during their career, and individuals who have never done so or have run out of funds. The introduction of automatic enrolment would, in principle, imply coverage for the full career, which might have entirely different implications.

Furthermore, research should go beyond analysing pension annuities and start considering pension wealth. In a large number of countries, occupational pensions are paid out as lump sums at the start of retirement. Therefore, analysing annual occupational pension income is not possible. Similarly, the idea behind gendered mortality tables is that, over the lifecycle, men and women should receive equal pension wealth for equal contributions, rather than equal annual pension annuities. Annuities may therefore not be a good measure of occupational pension equality between men and women. The use of administrative data, which has information on both lump sums and annuities, may help in this aspect. Related to this, it would be interesting to compare gender inequality in personal private pensions with occupational pensions. While they are based on similar premises, there appears to be little difference in personal private pension coverage between retired men and women. In addition, according to OECD (2021), the coverage gaps among current working individuals also appear to be small. One reason for this could be that women compensate for their lack of access to an occupational pension plan by contributing to a personal private pension instead.

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# A Appendix

## A.1 Data appendix

### A.1.1 Construction of variables included in the analysis

In this section we describe how we constructed the variables we use to describe respondents' career and demographic history, using the Survey of Health, Ageing and Retirement data. We combine retrospective data from waves 3 and 7, with current data from waves 1 to 9. We include the following variables: retirement status, year of retirement, highest level of education, marital status, total number of years worked in the labour market, reference wage, share of part-time work, share of the career worked in either the public or the private sector, contributions made to occupational pension plans during the career and financial risk aversion.

1. **Retirement status.** In SHARE, retirement status is self-reported. Nonetheless, we record everyone above the age of 60 who receive a pension income from any one of the three pension pillars as retired, if they do not report as being retired themselves. If they earn income through employment as well as a pension income, they are recorded as retired if their retirement income exceeds the income received through employment.
2. **Retirement year.** In SHARE, respondents who self-identify as retired at the time of taking the survey are asked in which year they retired. For most respondents in our dataset, we use this response as their retirement year. However, the year of retirement is only recorded for those who self-report to be retired. For some respondents in the dataset, their self-reported situation does not match with their actual situation. While they receive a retirement income, they are still reported to be a homemaker, reflecting the situation they were in after their last job ended. To address this, we include the year in which someone ended their last job as their estimated retirement year if they do not report to be retired at the time of taking the interview.
3. **Highest level of education.** We use the highest level of education obtained, according to the International Standard Classification of Education (ISCED), a respondent's level of education. ISCED codes are country-specific, but are harmonised in the survey. In addition, we impute values for respondents between waves if the value is missing in one wave but not in the following. In doing so, we always use the most recent reported value.
4. **Marital status.** We record marital status in five categories: married, registered partnership, never married, divorced and widowed.
5. **Reference wage.** We use two measures of reference wages in our analysis. First, we estimate what the wage was in the respondent's main job. A respondent's main job is "the job which took up most of the working life", as per the SHARE design. Among respondents with retrospective data, 58% have missing data for the wage during their main job. Only 6% of those with missing data had never worked during their life. Second, we calculate the average wage earned during the total length of time spent in the labour market. The average wage is recorded using information about the start and end date of each job held during the career, and the first wage someone earned in each job. The sum of all wages is divided by the number of jobs held during the career. If respondents worked part-time during a job episode, the wage is reported as part-time.

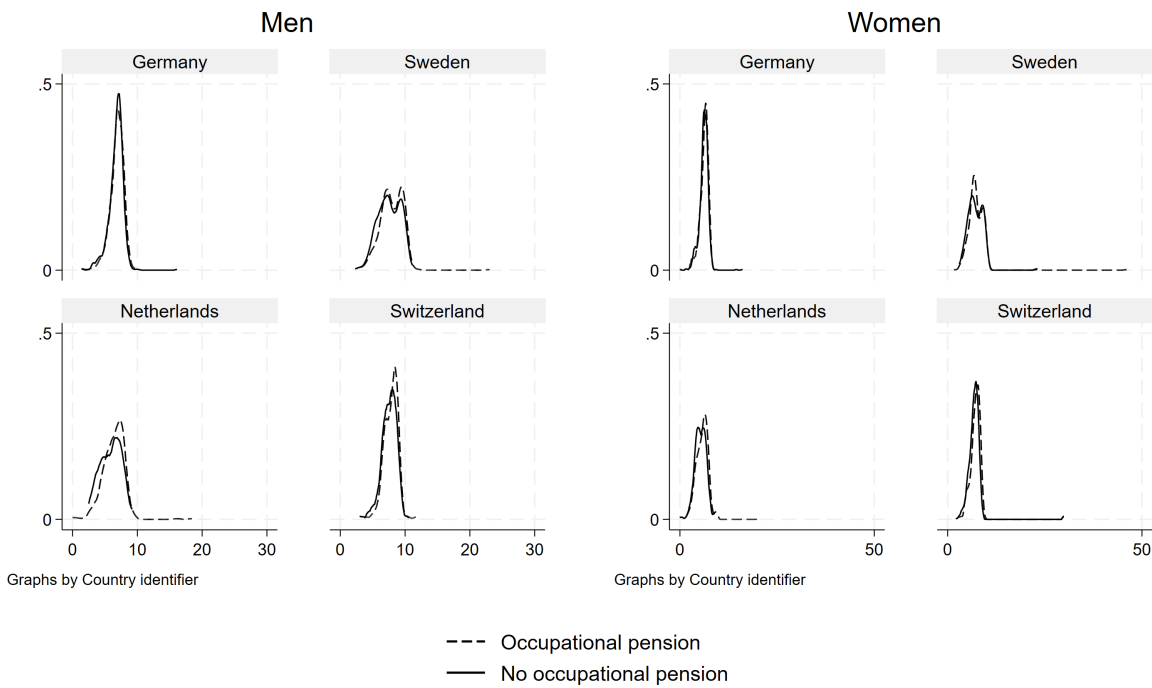
6. **Number of years worked (career length).** We calculate the total number of years worked (career length) using information on the year in which respondents ended their first/second/third/... job, and on the year in which they started this respective job. We subtract the end and start year of each job to obtain the length of each job episode in years. The sum of all job episodes is the total calculated career length. Periods of maternity leave were not included in start and end dates of jobs. Because we do not have information about the exact start and end date, there could be measurement error in the variable of up to 1 year. If someone has not worked at all during their lifetime, we include total career length as zero years worked.
7. **Share of part-time work.** The share of part-time work is calculated using the length of each job period, and whether the respondent reported to have worked part-time during this job. Someone either worked part-time for the entire job episode length, or only partially. If they only worked part-time for a fraction of the job episode, we have no way to determine for how long this was. Respondents were never asked when they switched from full- to part-time work or vice versa. Therefore, only full periods of part-time work are taken into account. As a result, some respondents have missing information for this variable. We sum up each job episode in which a respondent worked part-time to obtain the full period of part-time work during the career. The share of part-time work is expressed as a percentage of the full career.
8. **Main sector of work.** For each job episode, we record whether a respondent was a public or private sector employee, or whether they were self-employed. We multiply this binary variable with the total number of years spent in this specific job. The share of sector work is the time spent in each sector, divided by the total number of years worked during the total career.
9. **Share of work in each industry.** Because occupational pensions are often industry dependent, we record for all respondents the share of time spent in each industry during their career. Industries are recorded according to the EU NACE classification. We have information about 14 industries: agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas and water supply; construction; wholesale and retail trade, repair of motor vehicles; hotels and restaurants; transport, storage and communication; financial intermediation; real estate, renting and business activities; public administration and defence, compulsory social security; education; health and social work; other community, social and personal service activities. The share of work in each industry is calculated by dividing the total number of years worked in each industry, by the total career length.
10. **Contributions made to pension plans.** For each job worked, the SHARE data records whether contributions to an occupational pension plan were made. We multiply this binary variable by the time spent in this respective job, to obtain a measure of the total number of contribution years.
11. **Public pension receipt- and income.** In waves 1–5 of SHARE, public pension receipt is surveyed in the following manner: "Have you received income from any of these sources in the year (last year)? a) public old age pension, b) public old age supplementary pension, c) public early retirement pension or pre-retirement pension, d) main public disability insurance pension or sickness benefits, e) public unemployment benefit or insurance, f) main public survivor pension from your spouse or partner, g) public war pension, h) public long-term care insurance, i) none of these." In waves 6–9, several other categories are included as well: "Have you received income from any of these sources in the year (last year)? a) public old age pension, b) public old age supplementary pension or public old age second pension, c) public early retirement or pre-retirement pension, d) main public sickness

benefits, e) main public disability insurance pension, f) secondary public disability insurance pension, g) secondary public sickness benefits, h) public unemployment benefit or insurance, i) main public survivor pension from your spouse or partner, j) secondary public survivor pension from your spouse or partner, k) public war pension, l) public long-term care insurance, m) social assistance, n) none of these.” We include as our measure of public pension receipt the following categories: public old age pension, public old age supplementary pension or public old age second pension, public early retirement or pre-retirement pension, main public survivor pension from your spouse or partner, secondary public survivor pension from your spouse or partner, public war pension.

12. **Occupational pension receipt and income.** In waves 1–5 of SHARE, occupational pension receipt is defined as follows: “In addition to public pension benefits, pensions can also be provided through your employer. Please look at card 30. Have you received income from any of these sources in the year (last year): a) occupational old age pension from your last job, b) occupational old age pension from a second job, c) occupational old age pension from a third job, d) occupational early retirement pension, e) occupational disability or invalidity insurance, f) occupational survivor pension from your spouse or partner’s job, g) none of these.” In waves 6–9 of SHARE, occupational pension receipt is questioned differently: “In addition to public pension benefits, pensions can also be provided through your employer. Have you received income from any occupational pension in the year (last year)?” To ensure comparability of variables across waves, we include all categories in waves 2 to 5 in our measure of occupational pension receipt. This includes disability and survivor insurance occupational pensions. The proportion of individuals who receive a disability pension in our final sample is 0.7%. The proportion of individuals who receive a survivor occupational pension is 0.4%. Occupational pension income is measured annually by summing up all occupational pension categories.

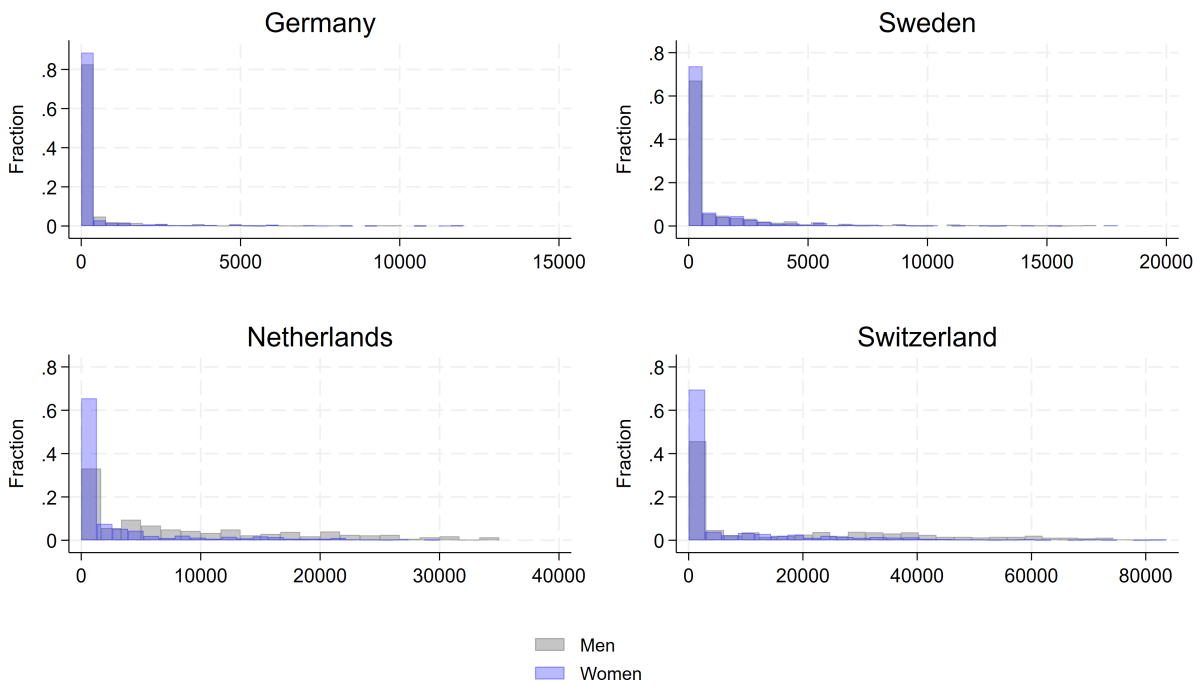
A.2 Figures

**Figure A.1:** Distribution of last log(wages) of retired individuals, by occupational pension receipt and gender



Notes: Own calculations based on the Survey of Health, Ageing and Retirement (2011–2022)

**Figure A.2:** Distribution of occupational pension income of retired individuals, by country and gender



Notes: Own calculations based on the Survey of Health, Ageing and Retirement (2011–2022)

A.3 Appendix tables

Table A.1: Sample means by gender and occupational pension receipt for retirees born after 1947

|                                                 | Men      |          | Women    |          |
|-------------------------------------------------|----------|----------|----------|----------|
|                                                 | 0        | 1        | 0        | 1        |
| Total pension                                   | 13811.85 | 26918.56 | 11200.35 | 20930.64 |
| Public pension                                  | 20301.07 | 19029.65 | 16896.22 | 16589.33 |
| Occupational pension                            | 0.00     | 12217.39 | 0.00     | 7303.46  |
| Ever done paid work                             | 0.99     | 1.00     | 0.98     | 1.00     |
| Labour market participation                     | 83.33    | 90.06    | 64.85    | 82.62    |
| Avg. wage (log)                                 | 7.53     | 7.99     | 7.16     | 7.69     |
| Final wage (log)                                | 7.51     | 7.98     | 7.04     | 7.45     |
| % part-time                                     | 2.58     | 2.73     | 23.90    | 22.62    |
| Retirement age                                  | 62.45    | 63.03    | 62.31    | 63.00    |
| Age                                             | 67.46    | 69.38    | 67.51    | 69.18    |
| Married                                         | 0.71     | 0.78     | 0.69     | 0.65     |
| Registered partnership                          | 0.01     | 0.02     | 0.02     | 0.02     |
| Never married                                   | 0.10     | 0.06     | 0.05     | 0.06     |
| Divorced                                        | 0.13     | 0.10     | 0.11     | 0.15     |
| Widowed                                         | 0.05     | 0.04     | 0.13     | 0.11     |
| Primary education                               | 0.15     | 0.14     | 0.23     | 0.14     |
| Secondary education                             | 0.55     | 0.48     | 0.51     | 0.44     |
| Higher education                                | 0.30     | 0.38     | 0.26     | 0.42     |
| Number of children                              | 1.97     | 2.14     | 2.14     | 2.09     |
| % public sector                                 | 14.65    | 22.43    | 16.66    | 30.58    |
| % private sector                                | 73.85    | 73.44    | 75.27    | 66.54    |
| % self-employed                                 | 10.40    | 3.87     | 5.98     | 2.23     |
| Contribution years                              | 11.37    | 25.61    | 10.21    | 23.19    |
| % in each industry                              |          |          |          |          |
| Agriculture, forestry and fishing               | 6.69     | 2.80     | 2.42     | 0.99     |
| Mining and quarrying                            | 1.21     | 0.88     | 0.17     | 0.18     |
| Manufacturing                                   | 21.76    | 19.42    | 13.52    | 7.44     |
| Electricity, gas and water supply               | 1.82     | 3.35     | 0.60     | 0.56     |
| Construction                                    | 12.58    | 10.08    | 2.61     | 1.24     |
| Wholesale and retail trade                      | 10.97    | 7.63     | 14.91    | 5.90     |
| Hotels and restaurants                          | 2.15     | 0.81     | 3.61     | 2.02     |
| Transport, storage and communication            | 8.06     | 9.06     | 2.28     | 2.42     |
| Financial intermediation                        | 2.63     | 5.13     | 3.18     | 5.08     |
| Real estate, renting and business activities    | 1.57     | 2.23     | 1.26     | 0.73     |
| Public administration and defence               | 8.81     | 13.17    | 6.00     | 13.33    |
| Education                                       | 5.46     | 9.27     | 11.18    | 15.09    |
| Health and social work                          | 4.58     | 5.82     | 21.11    | 32.68    |
| Other community, social and personal activities | 11.39    | 10.11    | 16.37    | 11.76    |
| Number of observations                          | 942      | 1,039    | 1,382    | 1,184    |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations.  
Notes: Sample includes retired individuals aged 60 and older. Labour force participation, part-time work, sector and industry of work reflect the proportion of time spent in these situations between the ages of 18 to 60.

**Table A.2:** Sample means by gender and occupational pension receipt, for retirees born before 1947

|                                                 | Men      |          | Women    |          |
|-------------------------------------------------|----------|----------|----------|----------|
|                                                 | 0        | 1        | 0        | 1        |
| Total pension                                   | 20074.68 | 26646.36 | 15498.14 | 21055.54 |
| Public pension                                  | 21224.08 | 18751.22 | 17460.78 | 17461.27 |
| Occupational pension                            | –        | 11737.30 | –        | 6411.87  |
| Ever done paid work                             | 1.00     | 1.00     | 0.96     | 0.99     |
| Labour market participation                     | 88.94    | 88.47    | 57.07    | 71.14    |
| Avg. wage (log)                                 | 7.03     | 7.31     | 6.43     | 6.86     |
| Final wage (log)                                | 7.03     | 7.41     | 6.30     | 6.73     |
| % part-time                                     | 1.05     | 1.58     | 19.92    | 21.18    |
| Retirement age                                  | 62.89    | 62.64    | 61.82    | 62.28    |
| Age                                             | 81.79    | 81.18    | 82.63    | 81.49    |
| Married                                         | 0.72     | 0.71     | 0.49     | 0.42     |
| Registered partnership                          | 0.01     | 0.01     | 0.01     | 0.01     |
| Never married                                   | 0.05     | 0.04     | 0.02     | 0.06     |
| Divorced                                        | 0.06     | 0.07     | 0.10     | 0.12     |
| Widowed                                         | 0.17     | 0.17     | 0.38     | 0.39     |
| Primary education                               | 0.22     | 0.22     | 0.36     | 0.31     |
| Secondary education                             | 0.46     | 0.41     | 0.44     | 0.37     |
| Higher education                                | 0.32     | 0.38     | 0.20     | 0.32     |
| Number of children                              | 2.14     | 2.24     | 2.33     | 2.06     |
| % public sector                                 | 17.25    | 22.67    | 14.64    | 29.84    |
| % private sector                                | 67.84    | 71.61    | 75.53    | 66.33    |
| % self-employed                                 | 14.36    | 5.23     | 5.26     | 2.72     |
| Contribution years                              | 10.73    | 22.38    | 7.41     | 17.47    |
| <b>% in each industry</b>                       |          |          |          |          |
| Agriculture, forestry and fishing               | 11.82    | 3.76     | 5.65     | 0.98     |
| Mining and quarrying                            | 0.35     | 0.73     | 0.17     | 0.01     |
| Manufacturing                                   | 19.16    | 23.02    | 14.30    | 8.92     |
| Electricity, gas and water supply               | 1.83     | 4.28     | 0.59     | 0.22     |
| Construction                                    | 13.40    | 9.19     | 2.27     | 1.56     |
| Wholesale and retail trade                      | 10.52    | 8.55     | 14.82    | 9.27     |
| Hotels and restaurants                          | 1.71     | 0.94     | 3.30     | 2.11     |
| Transport, storage and communication            | 7.60     | 7.58     | 2.72     | 2.18     |
| Financial intermediation                        | 1.66     | 5.59     | 2.33     | 5.67     |
| Real estate, renting and business activities    | 1.56     | 1.27     | 1.25     | 0.58     |
| Public administration and defence               | 7.56     | 11.50    | 7.07     | 12.60    |
| Education                                       | 7.27     | 9.11     | 9.14     | 16.74    |
| Health and social work                          | 3.69     | 4.31     | 17.79    | 26.09    |
| Other community, social and personal activities | 11.11    | 10.13    | 14.55    | 11.86    |
| Number of observations                          | 697      | 743      | 926      | 686      |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations.

Notes: Sample includes retired individuals aged 60 and older. Labour market participation, part-time work, sector and industry of work reflect the proportion of time spent in these situations between the ages of 18 to 60.

**Table A.3:** Logistic regression of occupational pension coverage (pooled sample)

|                                                 | (1)<br>Pooled      | (2)<br>Germany    | (3)<br>Sweden      | (4)<br>Netherlands | (5)<br>Switzerland |
|-------------------------------------------------|--------------------|-------------------|--------------------|--------------------|--------------------|
| Woman                                           | -0.08***<br>(0.01) | -0.01<br>(0.02)   | -0.08***<br>(0.03) | -0.14***<br>(0.04) | -0.19***<br>(0.03) |
| Age                                             | -0.00*<br>(0.00)   | 0.00<br>(0.00)    | -0.00***<br>(0.00) | 0.01**<br>(0.00)   | -0.00*<br>(0.00)   |
| Retirement age                                  | -0.00***<br>(0.00) | -0.00**<br>(0.00) | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.01***<br>(0.00) |
| Labor force participation                       | 0.01***<br>(0.00)  | 0.01***<br>(0.00) | 0.00*<br>(0.00)    | 0.00**<br>(0.00)   | 0.00***<br>(0.00)  |
| % part-time                                     | -0.00<br>(0.00)    | -0.00<br>(0.00)   | -0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     |
| Avg. wage (log)                                 | 0.01***<br>(0.01)  | 0.02<br>(0.02)    | 0.02**<br>(0.01)   | 0.05***<br>(0.02)  | -0.01<br>(0.01)    |
| Final wage (log)                                | 0.01<br>(0.01)     | 0.02<br>(0.02)    | -0.01<br>(0.01)    | -0.01<br>(0.02)    | 0.03**<br>(0.01)   |
| Secondary education                             | 0.05***<br>(0.01)  | -0.02<br>(0.03)   | 0.07**<br>(0.03)   | 0.02<br>(0.03)     | 0.05*<br>(0.03)    |
| Higher education                                | 0.07***<br>(0.02)  | -0.03<br>(0.04)   | 0.10***<br>(0.03)  | 0.11***<br>(0.04)  | 0.13***<br>(0.04)  |
| Registered partnership                          | 0.01<br>(0.04)     |                   | 0.01<br>(0.06)     | 0.01<br>(0.07)     | 0.08<br>(0.15)     |
| Never married                                   | 0.03<br>(0.03)     | -0.05<br>(0.05)   | 0.05<br>(0.05)     | 0.03<br>(0.09)     | 0.12**<br>(0.05)   |
| Divorced                                        | 0.05**<br>(0.02)   | -0.03<br>(0.04)   | 0.07*<br>(0.04)    | -0.01<br>(0.05)    | 0.13***<br>(0.04)  |
| Widowed                                         | 0.04***<br>(0.02)  | 0.00<br>(0.03)    | 0.02<br>(0.03)     | 0.08***<br>(0.03)  | 0.11***<br>(0.03)  |
| Number of children                              | -0.01***<br>(0.00) | -0.01*<br>(0.01)  | -0.01<br>(0.01)    | -0.02**<br>(0.01)  | -0.01<br>(0.01)    |
| Agriculture, forestry and fishing               | -0.00***<br>(0.00) | -0.00*<br>(0.00)  | -0.00**<br>(0.00)  | 0.00<br>(0.00)     | -0.01***<br>(0.00) |
| Manufacturing                                   | 0.00<br>(0.00)     | 0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00*<br>(0.00)   |
| Electricity, gas and water supply               | 0.00<br>(0.00)     | 0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     | 0.00<br>(0.00)     |
| Construction                                    | -0.00<br>(0.00)    | -0.00<br>(0.00)   | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00*<br>(0.00)   |
| Wholesale and retail trade                      | -0.00<br>(0.00)    | -0.00<br>(0.00)   | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00***<br>(0.00) |
| Hotels and restaurants                          | -0.00**<br>(0.00)  | -0.00**<br>(0.00) | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Transport, storage and communication            | 0.00<br>(0.00)     | 0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Financial intermediation                        | 0.00***<br>(0.00)  | 0.00***<br>(0.00) | 0.00*<br>(0.00)    | 0.00**<br>(0.00)   | -0.00<br>(0.00)    |
| Real estate, renting and business activities    | -0.00<br>(0.00)    | -0.00<br>(0.00)   | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Public administration and defense               | 0.00<br>(0.00)     | 0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Education                                       | 0.00<br>(0.00)     | -0.00<br>(0.00)   | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Health and social work                          | 0.00<br>(0.00)     | 0.00<br>(0.00)    | 0.00<br>(0.00)     | 0.00<br>(0.00)     | 0.00<br>(0.00)     |
| Other community, social and personal activities | -0.00<br>(0.00)    | -0.00<br>(0.00)   | 0.00<br>(0.00)     | 0.00<br>(0.00)     | -0.00<br>(0.00)    |
| Time fixed effects                              | Yes                | Yes               | Yes                | Yes                | Yes                |
| Country fixed effects                           | Yes                | Yes               | Yes                | Yes                | Yes                |
| Observations                                    | 5,908              | 2,275             | 1,504              | 729                | 1,398              |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations.

Notes: Sample includes retired individuals aged 60 and older. Standard errors in parentheses. The reference category for education is primary education; reference category for marital status are single individuals.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table A.4:** OLS regression of occupational pension income (pooled sample)

|                                                 | (1)                | (2)                | (3)                | (4)                | (5)                |
|-------------------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                                 | Pooled             | Germany            | Sweden             | Netherlands        | Switzerland        |
| Woman                                           | -0.41***<br>(0.07) | -0.44***<br>(0.17) | -0.44***<br>(0.13) | -0.24<br>(0.16)    | -0.47***<br>(0.11) |
| Age                                             | -0.01**<br>(0.00)  | 0.01<br>(0.01)     | -0.02*<br>(0.01)   | -0.02**<br>(0.01)  | -0.01<br>(0.01)    |
| Retirement age                                  | -0.01<br>(0.01)    | -0.02<br>(0.02)    | -0.01<br>(0.01)    | -0.01<br>(0.01)    | -0.01<br>(0.01)    |
| Career length                                   | 0.00<br>(0.00)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     | 0.01*<br>(0.00)    | -0.01<br>(0.00)    |
| % part-time                                     | -0.00***<br>(0.00) | -0.01***<br>(0.00) | -0.00<br>(0.00)    | -0.01***<br>(0.00) | -0.00**<br>(0.00)  |
| Avg. Wage (log)                                 | 0.03<br>(0.03)     | 0.18<br>(0.11)     | 0.01<br>(0.04)     | 0.04<br>(0.05)     | 0.03<br>(0.05)     |
| Final wage (log)                                | 0.01<br>(0.02)     | -0.08<br>(0.10)    | 0.01<br>(0.04)     | 0.08<br>(0.05)     | -0.01<br>(0.05)    |
| Secondary education                             | 0.11<br>(0.07)     | 0.05<br>(0.23)     | 0.09<br>(0.13)     | 0.18<br>(0.12)     | 0.00<br>(0.11)     |
| Higher education                                | 0.47***<br>(0.08)  | 0.37<br>(0.25)     | 0.43***<br>(0.15)  | 0.46***<br>(0.14)  | 0.38**<br>(0.15)   |
| Registered partnership                          | -0.18<br>(0.17)    |                    | -0.35<br>(0.24)    | 0.11<br>(0.30)     | -0.31<br>(0.45)    |
| Never married                                   | 0.09<br>(0.12)     | -0.34<br>(0.32)    | 0.14<br>(0.22)     | 0.41<br>(0.28)     | 0.07<br>(0.17)     |
| Divorced                                        | -0.02<br>(0.09)    | -0.11<br>(0.25)    | 0.26<br>(0.17)     | -0.59***<br>(0.20) | -0.05<br>(0.12)    |
| Widowed                                         | 0.03<br>(0.08)     | -0.05<br>(0.16)    | -0.13<br>(0.16)    | 0.28*<br>(0.14)    | 0.05<br>(0.13)     |
| Number of children                              | -0.02<br>(0.02)    | -0.00<br>(0.05)    | 0.00<br>(0.05)     | -0.05<br>(0.04)    | -0.08**<br>(0.03)  |
| Agriculture, forestry and fishing               | 0.00<br>(0.00)     | 0.01*<br>(0.01)    | 0.01<br>(0.01)     | -0.02<br>(0.01)    | -0.00<br>(0.01)    |
| Manufacturing                                   | 0.01**<br>(0.00)   | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     |
| Electricity, gas and water supply               | 0.01*<br>(0.00)    | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.00<br>(0.01)     |
| Construction                                    | 0.01<br>(0.00)     | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.00<br>(0.01)     |
| Wholesale and retail trade                      | 0.01<br>(0.00)     | 0.01*<br>(0.01)    | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.00<br>(0.01)     |
| Hotels and restaurants                          | 0.01*<br>(0.00)    | 0.01<br>(0.01)     | 0.02*<br>(0.01)    | -0.03*<br>(0.01)   | 0.01<br>(0.01)     |
| Transport, storage and communication            | 0.00<br>(0.00)     | 0.00<br>(0.01)     | 0.01<br>(0.01)     | -0.02<br>(0.01)    | 0.00<br>(0.01)     |
| Financial intermediation                        | 0.01***<br>(0.00)  | 0.02**<br>(0.01)   | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     |
| Real estate, renting and business activities    | 0.01***<br>(0.00)  | 0.02*<br>(0.01)    | 0.01<br>(0.01)     | 0.00<br>(0.01)     | 0.01*<br>(0.01)    |
| Public administration and defense               | 0.01**<br>(0.00)   | 0.01*<br>(0.01)    | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01**<br>(0.01)   |
| Education                                       | 0.01**<br>(0.00)   | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     |
| Health and social work                          | 0.01**<br>(0.00)   | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     |
| Other community, social and personal activities | 0.01*<br>(0.00)    | 0.01<br>(0.01)     | 0.01<br>(0.01)     | -0.01<br>(0.01)    | 0.01<br>(0.01)     |
| Contribution years                              | 0.01***<br>(0.00)  | 0.01**<br>(0.00)   | 0.01***<br>(0.00)  | 0.01**<br>(0.00)   | 0.00<br>(0.00)     |
| Time fixed effects                              | Yes                | Yes                | Yes                | Yes                | Yes                |
| Country fixed effects                           | Yes                | Yes                | Yes                | Yes                | Yes                |
| Observations                                    | 2,040              | 570                | 709                | 464                | 645                |

Source: Survey of Health, Ageing and Retirement (2011–2022), own calculations.  
Notes: Sample includes retired individuals aged 60 and older. Standard errors in parentheses.  
The reference category for education is primary education; reference category for marital status is single individuals.  
\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$