WIFO ■ WORKING PAPERS
673/2024

sustainwell
Rethinking the roles of family, market & state

Co-funded by the European Union

Assessing the Labour Supply Effect of Harmonising Regular Retirement Age in Austria

Benjamin Bittschi
Thomas Horvath
Helmut Mahringer
Christine Mayrhuber
Martin Spielauer
Philipp Warum

Assessing the Labour Supply Effect of Harmonising Regular Retirement Age in Austria

Benjamin Bittschi, Thomas Horvath, Helmut Mahringer,
Christine Mayrhuber, Martin Spielauer, Philipp Warum

Research assistance: Lydia Grandner

The SUSTAINWELL project receives funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement number 101095175 and the Government of the United Kingdom.

WIFO Working Papers 673/2024
March 2024

Abstract

The aim of this study is to assess the impact of the ongoing harmonisation of the retirement age for women with that for men on women's labour supply in Austria. According to the current legal framework, the standard retirement age for women will be gradually raised from 60 to 65 years from 2024 onwards, with the retirement age being raised by 6 months each year. The impact of the pension reform on women's labour supply is quantified using the dynamic microsimulation model microDEMS. This model integrates demographic changes in line with official population projections and detailed labour market modelling. According to our projections, the labour supply of women aged 60 to 64 increases by 87,000 in 2040 compared to a scenario in which the retirement age remains unchanged. We compare our results with two alternative approaches: the more stylised microWELT simulation model and a purely data-driven approach. While all methods produce very similar results in the long run, the detailed modelling in microDEMS provides more plausible results during the transition period when the reform is gradually implemented. This is because it allows for a realistic representation of pension paths, taking into account all relevant pension types and the corresponding eligibility criteria, such as sufficient accumulated insurance periods. In contrast to a purely data-driven approach, microDEMS modelling also has the advantage of explicitly representing and quantifying the components of the change in labour supply.

E-Mail: benjamin.bittschi@wifo.ac.at, thomas.horvath@wifo.ac.at, helmut.mahringer@wifo.ac.at, christine.mayrhuber@wifo.ac.at, martin.spielauer@wifo.ac.at, philipp.warum@wifo.ac.at

2024/1/W/22018

Media owner (publisher), producer: Austrian Institute of Economic Research
1030 Vienna, Arsenal, Objekt 20 | Tel. (43 1) 798 26 01 0 | https://www.wifo.ac.at
Place of publishing and production: Vienna

Assessing the labour supply effect of harmonising regular retirement age in Austria

Benjamin Bittschi, Thomas Horvath, Helmut Mahringer, Christine Mayrhuber, Martin Spielauer, Philipp Warum

Abstract

The aim of this study is to assess the impact of the ongoing harmonisation of the retirement age for women with that for men on women's labour supply in Austria. According to the current legal framework, the standard retirement age for women will be gradually raised from 60 to 65 years from 2024 onwards, with the retirement age being raised by 6 months each year. The impact of the pension reform on women's labour supply is quantified using the dynamic microsimulation model microDEMS. This model integrates demographic changes in line with official population projections and detailed labour market modelling. According to our projections, the labour supply of women aged 60-64 increases by 87,000 in 2040 compared to a scenario in which the retirement age remains unchanged. We compare our results with two alternative approaches: the more stylised microWELT simulation model and a purely data-driven approach. While all methods produce very similar results in the long run, the detailed modelling in microDEMS provides more plausible results during the transition period when the reform is gradually implemented. This is because it allows for a realistic representation of pension paths, taking into account all relevant pension types and the corresponding eligibility criteria, such as sufficient accumulated insurance periods. In contrast to a purely data-driven approach, microDEMS modelling also has the advantage of explicitly representing and quantifying the components of the change in labour supply.

Keywords: Dynamic microsimulation, pension reform, labour force participation

JEL-Code: J26, C53, J21

Co-funded by the European Union

The SUSTAINWELL project receives funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement number 101095175 and the UK Government. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the granting authority. Neither the European Union nor the UK granting authority can be held responsible for them.

1. Introduction

In most European countries, the retirement age has been raised in the past and early retirement options have been reduced. Under current legislation, this trend will continue in most European countries in the coming years. In the first pillar of old-age provision, the different age limits for women and men are disappearing; in 2050, they will remain in place only in Poland and Romania. Overall, however, with the exception of Ireland, Cyprus, the Netherlands, and Poland, early retirement options will continue to exist in most European countries in the coming decades (Table 1). On average across all European countries, the statutory retirement age will increase by around 1.6 years for men and around 2.1 years for women by 2050, reaching 66.5 years. Specifically, in 2050, the official age of retirement will be 65 in one third of the 28 countries and higher in two thirds. Age limits for early retirement will be raised by 1.2 years for men and 1.6 years for women to reach an average of 63 years. From today's perspective, in 2050 the early retirement age of 60 will still be available in 7 countries, including Austria with its heavy labour pension; in the other countries, early retirement options will begin at a higher age.

Early retirement age has been raised in Austria in the past, with the minimum retirement age being increased from 60 to 62 for men and from 55 to 60 for women (long-term insurance pension). Based on the current legal regulations, from 2024 onwards, the retirement age for women for the regular old-age pension will gradually rise from 60 to 65, while the early retirement age (long-term insurance pension) is also being raised to 62. As a result of this increase, the eligibility requirements for early retirement pensions for women born after July 1965 will be identical to those for men. Finally, for women born after July 1968, the same eligibility requirements also apply to the old-age pension (Figure 1).

The pronounced changes in retirement age for women over the next decade will have a strong impact on female labour supply at older ages. We quantify these effects using the dynamic microsimulation model microDEMS, which integrates demographic changes in the forecast period up to 2040 in line with the population forecast of Statistics Austria and detailed labour market modelling. Most importantly, our model implements cohort-specific retirement regulations and all pension types in Austria. By accounting for the impact of personal, family and job-characteristics on future employment prospects we are able to simulate realistic employment careers. In our model, individuals accumulate insurance and contribution periods, which may make them eligible for (different types of) early retirement. Given the detailed labour market modelling in microDEMS, we are able to quantify the impact of changing the retirement age by comparing our simulation results with an alternative scenario, where the retirement age remains unchanged.

We compare the microDEMS simulation results with those of the more stylised microsimulation model microWELT. MicroWELT is a comparative model that is currently being extended and applied to 8 European countries as part of the Horizon Europe SUSTAINWELL project. While both microsimulation models use identical assumptions regarding demographic and family changes, they differ in the modelling of employment careers and pensions: microWELT is based on comparative survey data (such as LFS and SILC), while microDEMS is based on detailed longitudinal administrative data and a very detailed representation of the Austrian pension system. Comparing the simulation results between the models for Austria makes it possible to assess the impact of possible specification errors of highly stylised (too simple) models.

The next section gives a short overview of the empirical literature concerning the effect of changing retirement rules on labour market outcomes. Section 3 describes the Austrian pension system and the reforms considered. Section 4 describes our simulation model. Section 5 presents our simulation results and section 6 concludes.

2. Empirical findings from the literature

Past pension reforms in European countries have mainly concerned the age limits for early retirement, and the empirical evidence relates more to these reforms than to changes in the standard retirement age.

Evaluations of the employment effects of different reforms focus on the effects on the groups affected by the reforms. Quantifiable employment effects are less significant for women, with their often atypical employment histories with few years of pension insurance and frequent career interruptions, than for men (Berkel & Börsch-Supan, 2003; EIGE, 2015; French, 2005; Möhring & Bennett, 2015; Tinios et al., 2015). These analyses focus on the change in the average retirement age due to increasing age limits, i.e., the relationship between the legal and actual retirement age on the one hand and the employment status of those affected by the age increase on the other.

The time of retirement does not only depend on age limits and eligibility conditions. There are a number of factors that influence the timing of (early) retirement. In addition to eligibility requirements (Gillen & Heath, 2017), these include the level of the income replacement rate (Duval, 2003; Raab, 2011), labour market status (Bütler et al., 2018), educational qualifications (Pilipiec et al., 2020), family status (Bütler, 2017) and the general labour market situation. According to Axelrad and Mcnamara (2018) a lack of insurance periods due to frequent underreporting of employment are factors for a retirement date after the normal retirement age. In addition, push factors, i.e., factors that push older workers out of the labour market, operate on the part of both employees and employers (De Preter et al., 2013). Working conditions, mental and/or physical demands at work can have an impact on labour market exit (Moreira et al., 2018), as can changes in job requirements (technological and/or structural changes).

For Germany, van der Velde (2022) shows that employees with routine tasks leave the labour market earlier than those with less routine tasks, an effect that is not present in the UK.

In addition to the financial incentives in the pension system, such as the increases and reductions associated with the timing of retirement, the tax system, i.e., the implicit tax on continuing to work or retiring, also plays a role (De Preter et al., 2013). The impact of financial incentives on the timing of retirement has different effects on the insured, especially on women and men (Blossfeld et al., 2011; Duval, 2003; Manoli & Weber, 2016).

The health of workers also plays an important role. McGarry (2004) found that changes in health have a stronger impact on planned retirement than changes in income or wealth. This is particularly important in the Austrian context, which is influenced by a relatively low expectation of healthy life years by international standards. There are also findings in the literature that, at least in the United Kingdom and the United States, both the early and standard retirement age may represent an anchor that people use to orient their retirement (e.g., Cribb et al., 2016; Gruber & Wise, 2004). This effect would imply that ex-ante simulations, such as in this study, which extrapolate future retirement based on current economic circumstances, tend to underestimate ex-post realisations. A key factor influencing such a signalling effect of the statutory age limits on the effective retirement age is the existence of financial incentives to work beyond the early or statutory retirement age. Financial incentives to retire at the early or statutory retirement age would significantly reduce a possible anchoring effect of the retirement age.

2.1 International experience

The experience of other countries with increasing the early and statutory retirement age is well documented in the literature. These results, and in particular the generally underlying mechanism of employment and substitution effects, serve to categorise the expected effects of a possible increase in the retirement age in Austria.

The abolition of the early retirement pension in Finland in 2005 and the increase in the retirement age for men and women from 60 to the pension corridor of 62 and 63 to 68 years increased the retirement age by an average of 8.5 months, with most retirements still taking place at the age of 62 after the reform (Hakola & Määttänen, 2007; Kannisto, 2006). The abolition of the unemployment pension led to an increase in unemployment, but also to an increase in employment in the 55-68 age group from 47% to 54% (Hakola & Määttänen, 2007; The Finnish Centre for Pensions, 2022). Firms were also affected by the reforms: Hakola & Uusitalo (2005) show that when access to early retirement was made easier, firms were more likely to lay off workers, while when the cost of redundancies was made compulsory, unemployment was created but workers were retained longer.

According to Karlstrom et al. (2004), the pension corridor between the ages of 61 and 68 in Sweden was mainly used at the time when there was also an entitlement to the guaranteed pension, i.e. at the age of 65. According to Johansson et al. (2014), the increase in employment rates as a result of the reforms (+20 percentage points among the age group 60-65 between 2000 and 2012) was also fuelled by income tax cuts for this age group.

In Germany, an increase in the statutory retirement age has not led to a parallel increase in the employment rate of older workers (Brussig, 2012; Brussig & Knuth, 2007). Acceptance of pension deductions is high; of the newly recognised old-age pensions in 2021, a quarter had deductions of 8.3%, equivalent to around €101 per month (Deutsche Rentenversicherung, 2022). According to Mika and Baumann (2008), the abolition of early retirement for the long-term unemployed together with the shortening of the unemployment benefit entitlement led to a prolonged unemployment spell of up to ten years for older unemployed, as the labour market opportunities for this group in particular did not improve as a result of the higher retirement age. In 1999, the so-called "old-age pension for women" was abolished for those born after 1952. This suddenly raised the earliest possible retirement age for many women from 60 to 63. The reform increased the employment rate of the women concerned by eight percentage points, but also increased the number of unemployed and inactive women in this age group by the same amount. The employment effect was driven by highly educated women; there were no changes in the re-employment of inactive and unemployed women (Geyer et al., 2019; Geyer & Welteke, 2017). A more recent analysis of this quasi-natural experiment of cohort-specific pension reform by Zwick et al. (2022) shows an increase in employment. There are no avoidance responses to unemployment, disability pensions or inactivity in the group of women with skilled occupations, but only among the low-skilled. In the context of rising age limits, Haan and Tolan (2019) show clear positive employment effects due to the possibility of a partial pension when this age limit correlates with an early pension. Access to a partial pension also reduces the unemployment rate for the cohorts concerned.

Cribb et al. (2016) analyse the effects of raising the early retirement age from 60 to 62 for women in the UK in 1995. The authors find that the employment rate of women at the previous retirement age increased by 6.3 percentage points as a result of the reform, which corresponds to an increase in the average retirement age of around two months. At the same time there were also evasive responses to the reform in the United Kingdom. The share of women registered as unemployed increased significantly by 1.2 percentage points when the early retirement age was raised. This is a significant effect, as the proportion of 60-year-old women who were unemployed before the early retirement age was raised was only 0.8%. The authors also show that the increase in the retirement age increased the probability of 60- and 61-year-old women being inactive due to illness and disability by 4 percentage points from a pre-reform baseline of 9.0%.

Atalay and Barrett (2015) also show a dual response for Australia, based on a 1993 pension reform that gradually raised the retirement age for women from 60 to 65. On the one hand, raising the retirement age by one year reduced the probability of retiring by 12 to 19 percentage points. On the other hand, the study also documented clear avoidance reactions. In particular, the use of disability pensions increased significantly. In the age groups affected by the increase, the increase in the retirement age led to an increase in the use of disability pensions of 13 to 23 percentage points, or 20 to 34 percentage points if a means test was passed.

Overall, this effect exceeds the direct impact on labour force participation of a pension reform in France in 2010 (Rabaté & Rochut, 2019). The authors' results show that raising the early retirement age in France from 60 to 61 had a significant impact on the employment rate of the age group concerned, with an increase of 21 percentage points. This is the highest value documented in the literature to date. However, this reform also led to clear substitution effects. The unemployment rate for the same age group increased by 13 percentage points, the sickness benefit rate by 1.4 percentage points, the disability rate by 6 percentage points and the inactivity rate by 6 percentage points.

Overall, the French study shows, in line with the results of other studies, that the employment effects are mainly concentrated on people who are still working when they reach retirement age. Substitution effects, on the other hand, occur mainly among people who have already left the labour force. This finding suggests that an increase in the retirement age can have employment effects especially if the employment rate of older workers is already high before the increase or if accompanying measures are taken to support the employment of older people.

2.2 Findings for Austria

Stefanits and Hollarek (2007a, 2007b) carried out a first evaluation of the changes in the age of entry into early retirement as a result of the pension reforms of 2000 to 2004. They show that between 2000 and 2005 the age of retirement for women shifted by two years to 57. As a result of the abolition of the unemployment pension, the share of women in early retirement fell more than that of men. For men, the decline in early retirement was less pronounced, as the heavy labourer's and "hackler's" (long-term insured) pensions continued to allow early retirement. The reforms of 2000, 2003 and 2004 increased the average retirement age for women aged 55 to 59 by 0.9 years to 56.8 years, and for men aged 55 to 64 by 0.6 years to 59.8 years (Stefanits & Hollarek, 2007a).

Manoli and Weber (2016) show that people affected by the 2000 and 2004 reforms stayed longer in the labour market. The calculated labour supply elasticity is around 0.4 years when the early retirement age is increased by one year. The authors show that the increase leads workers to stay longer in their existing jobs instead of moving to new ones.

Staubli and Zweimüller (2013) analysed the effects of raising the retirement age for early retirement from 55 to 58.25 for women and from 60 to 62 for men in 2000 and 2003. In the affected age groups, the employment rate increased by 11 percentage points for women and by 9.75 percentage points for men. However, the reforms also had significant side-effects on social security systems, especially unemployment insurance. The unemployment rate increased by 11.8 percentage points for women and 12.5 percentage points for men. These substitution effects are therefore stronger than the employment effects. The employment effects were strongest for healthy workers with high incomes, while less healthy workers with low incomes either received disability benefits or bridged the gap to the new early retirement age with unemployment benefits. Rising age limits are associated with both an increase in the number of registered unemployed with placement restrictions and a significant increase in the number of registered unemployed with no more than compulsory schooling (Lankmayer & Niederberger, 2021).

3. Institutional settings

The Austrian pension system distinguishes between 4 different types of pensions (additionally to disability and survivors' pensions):

- the regular old-age pension
- the long-term insured pension ("Hackler regulation")
- the corridor pension
- the heavy labour pension

To qualify for each type of pension, a number of criteria must be met. In addition to the minimum age requirement, each type of pension also defines minimum requirements for the individual's working life. Broadly speaking, the Austrian pension system distinguishes between insurance periods (time spent in employment, unemployment, sick leave or parental leave) and contribution periods (mainly time spent in employment). Qualification for (early) retirement requires the accumulation of specific minimum levels of these periods.

While the entry conditions for the corridor pension (retirement age 62, minimum of 480 insurance months) as well as the heavy labour pension (retirement age 60, 540 insurance months and at least 120 months of heavy work in the last 20 years) are the same for women and men, they currently differ for the old-age pension and the long-term insured pension. From 2024 onwards the differences in the entry conditions will be gradually removed. The adjustments will affect women from 2024 onwards:

- The retirement age for the regular old-age pension will be raised by 6 months for each half-year cohort of women born after 1.1.1964. For example, women born on April 1, 1964, will be eligible to retire on October 1, 2024, at the age of 60.5. Similarly, those born on October 1, 1964, will be able to retire on October 1, 2025, at the age of 61. This gradual increase in the retirement age for women will continue in the same way in half-yearly steps until the regular retirement age of 65 is reached.
- The final stage of the increase will apply to women born between July 1 and December 31, 1968, and all those born later, who will have the same standard retirement age of 65 as men.
- The last transitions to old-age pension for those with a standard retirement age below 65 will take place no later than January 1, 2033.
- For women born after January 1, 1962, the retirement age for the long-term insured pension is increased by 6 months for each half-year cohort. For women born after July 1, 1965, the retirement age for the long-term insured pension is 62.
- As a result of the increase in the old-age pension, women born in 1966 or later may consider claiming a corridor pension. This is because the retirement age for the old-age pension will only exceed 62 for women born after January 1, 1966 in the adjustment process.

Table 2 and Table 3 show the changes in the entry requirements for old-age and corridor pensions for women based on their date of birth. Figure 1 provides an overview of the changes in the minimum retirement age for early and old-age retirement over time. While the retirement age for men remains constant throughout the period under consideration, the retirement ages for women gradually align with those of men. For women born between 1964 and 1966, the early and old-age retirement ages coincide due to the parallel increase in old-age and long-term pension retirement age. This means that between 2024 and 2028, women will not be able to retire due to long-term insured pension. Before 2028, when the old-age retirement age starts to exceed the corridor pension age of 62 years, the only possibility for women to retire before reaching the statutory retirement age is through the heavy labour pension.

4. Method

Our simulations are based on the dynamic microsimulation model microDEMS (**D**emography, **Em**ployment and **S**ocial Security), a detailed national implementation of the comparative microWELT[1]) model (Amann et al., 2021; Spielauer et al., 2020a, 2020b). Departing from a representative cross-sectional database of the population, individual life courses are simulated over time. The approach allows the simultaneous modelling of population ageing and changes in education, labour market participation, and other aspects of individual life histories, as well as changes in institutional settings (such as retirement age).

The national implementation of microDEMS (Horvath et al., 2022) adds detail to the comparative model by distinguishing migrants by country of birth, by modelling the national institutional environment (schooling and pension system) in more detail, and by implementing longitudinally consistent labour market careers. It integrates comprehensive statistical analyses of the employment careers of people of working-age in Austria based on administrative social insurance data with detailed demographic forecasts and socio-demographic processes (such as educational careers and qualifications, partnership careers and fertility). The projections of future changes in the labour supply in Austria are thus consistent with external demographic forecasts (population forecast by Statistics Austria) but enriched by relevant aspects (education-dependent life expectancy and fertility, origin and education level of immigrants). The future employment careers of all persons in the simulation are based on estimated transition rates in which individual characteristics (age, education, gender, health status, age of the youngest child and previous employment career) determine the probability of remaining in one employment status and influence any transitions to other employment statuses. For example, deteriorating health increases the risk of exclusion from the labour market (increased probability of leaving the labour market, reduced probability of leaving unemployment), while a higher level of education increases employment stability. In this way, microDEMS simulates realistic employment careers and, as a result, a plausible accumulation of contribution and insurance periods required to qualify for an early retirement pension. The empirical analysis of the interactions between personal, family and job characteristics and individual employment careers is conducted using a combination of administrative data sources covering almost the entire Austrian population.

Given the high take-up of early retirement, an accurate assessment of the time spent in different labour market statuses and the distribution of these periods across different population groups is essential to adequately model the timing of retirement and hence labour force participation at older ages. The model therefore pays special attention to the modelling of the pension system, distinguishing between different types of pension (disability, heavy labour, long-term insurance, corridor and regular old-age pensions) and the current legal situation of pension legislation in terms of pension type-specific minimum retirement ages and required contribution and insurance periods according to year of birth.

In the simulation, individuals check their retirement eligibility for the different pension types on a monthly basis and – if eligible - decide whether to retire immediately or postpone retirement. The stepwise change in the statutory retirement age thus increases the number of women aged 60 and over who are not yet eligible for the various types of pension, compared to current retirement regulations. In the model, the increase in the retirement age will lead to an

[1]) http://www.microwelt.eu/

increase in the labour force participation of some women, but also to an increase in the number of retirements due to disability or to a prolongation of the inactive phase before retirement. This is reflected in the simulation by taking into account the age-related increase in health impairments and the detailed modelling of employment careers depending on health, education, previous employment history and other personal characteristics.

While microDEMS therefore explicitly models the retirement event, taking into account cohort-specific retirement rules and individual labour market careers (including accumulated insurance periods which impact the eligibility for early retirement options), the comparative model version microWELT treats labour supply and retirement in a simpler way. In microWELT, labour force participation is modelled cross-sectionally using logistic regressions estimated on EU-SILC data, controlling for age, gender, education, health status, and, for women, the presence of dependent children and the age of the youngest child. The effect of changes in the retirement age (regular or early retirement) on labour supply are incorporated indirectly by shifting the age parameter from the logistic regression models backwards as retirement age increases[2]) (see Appendix: Labour force participation and retirement in microWELT).

4.1 Assumptions in the simulation

Departing from a representative cross-sectional population database based on Austrian Microzensus data (2018), microDEMS projects individual life courses over time. The simulation of the impact of the harmonisation of the retirement age on women's labour supply is based on a number of assumptions:

- Future changes in the size and composition of the population result from births, deaths and migration. The future demographic development thus follows the main variant of the population projection by Statistics Austria (from November 2023).
- Based on the population projection, an education-specific mortality risk is modelled (Klotz, 2007).
- The individual risk of suffering a health impairment or permanent disability as a function of age, gender and level of education is assumed to remain constant over the simulation period. Thus, a 45-year-old woman with a university degree is just as likely to be affected by a health impairment in 2018 as in 2040.
- Changes in the conditions for retirement are taken into account in accordance with current legislation (in particular, the harmonisation of the standard retirement age for women with that of men in the period between 2024 and 2033).

[2]) If, for example, retirement age increases by one year from 65 to 66, the likelihood of labor force participation of a 60 year old person is determined by using the estimated coefficient for age 59 instead of age 60. If the retirement age increases to age 67, the estimated coefficient for age 58 is used to determine the probability of a 60 year old person, and so on. Thus, with a retirement age 67, our model implies that a 60 year old person has the same labor force participation rate as a 58 year old person with identical characteristics (gender, education, and health status) when the retirement age is 65.

- The influence of the various determinants of labour force participation (e.g., age, gender, education and health) remains unchanged over time, with the exception of persistent cohort trends and the cohort-specific pension eligibility requirements.

While microDEMS is fully consistent with official population projections, our simulations add realism by allowing for educational differences in mortality and fertility. The detailed modelling of health and its impact on labour force participation is highly relevant in the context of our study: given a strong age-gradient in health, increased retirement age will most likely affect invalidity pension claims.

One particular strength of microDEMS is, that it allows the calculation of various scenarios for future changes in the labour supply by adjusting individual model parameters (e.g., education, age, state of health, etc.). This enables the assessment of the sensitivity of our results to changes in the underlying model parameters. In particular, the model allows us to compare our projections with an alternative scenario, where retirement age remains constant in order to quantify the effect of increasing retirement age on labour supply.

5. Results

According to the main variant of the latest population projection, the number of women aged 60 to 64 – those affected by the ongoing increase in retirement age - will increase until 2028 (+7% compared to 2023) and decline thereafter (2040: -12.5% compared to 2023). When examining single-year age groups, the decline between 2023 and 2040 is steeper for women aged 60 or 61 compared to women aged 63 or 64 (Figure 2).

Many women are potentially affected by the increase in the standard retirement age. Figure 3 illustrates the gradual increase in the number of women impacted by the reform over time, given the legally regulated adjustment steps in the standard retirement age (Table 2) and the size of the cohorts affected. In 2024, only part of all 60-year-old women will be affected by the increasing retirement age, but by 2025, all women in this age group will be impacted. Subsequently, the reform will gradually expand to include older age groups. As the figure shows, the increase in the standard retirement age will lead to an annual increase of around 25,000 to 35,000 women over the age of 60 who have not yet reached the standard retirement age applicable in the adjustment process. This development is overlaid by demographic effects resulting from different age cohorts, which will also result in a slight decrease after 2033.

However, not all women in this group will be active in the labour market, either because they will receive an early pension, such as a disability pension, a heavy work pension or a corridor pension, or because they are inactive. Therefore, the increase in the number of women potentially affected by the increasing standard retirement age will not fully translate into an increase in the labour force. Our dynamic microsimulation model microDEMS allows us to directly account for these factors when simulating the effects of increasing retirement age on labour supply of the concerned birth cohorts. The simulations' overall effect results from demographic changes, changes in cohort composition (education and labour market attachment), as well as changing retirement rules.

Education and health are two factors that strongly impact labour force participation. With respect to education attainment, our model shows that, over time, not only the size of the cohort under consideration changes significantly, but also its educational composition. As comparatively more highly educated women move into the 60 to 64 age group over time, the proportion of women in this age group with at least a high school diploma increases from 25% to 44% between 2023 and 2040, while the proportion of women with at most a compulsory school-leaving certificate falls by 9 percentage points (Figure 4). Given the strong correlation between education and labour force participation, this implies that the labour force participation within the age-group would increase over time, even without any pension reform.

With retirement age increasing and given the strong age gradient in health, the share of women claiming invalidity pensions is likely to increase over time. Indeed, as our simulation shows, the age-specific invalidity rates of women converge towards those of their male counterparts over time (Figure 5).

In summary, due to the regulatory changes in the pension system, the types of pensions chosen by women changes significantly over time (Figure 6). While in 2023 women could only enter invalidity or old age pension, over time the different types of early retirement become more relevant for women.

Overall, compared to 2023, the number of women aged 60 to 64 in the labour force increases by 83,000 until 2028 (the year when early retirement becomes relevant for women) and by around 103,000 in 2033 (when pension regulations are harmonised between genders (Figure 8). As a result of the underlying demographic change, the total effect of the pension reform decreases slightly after 2033. By 2040, approximately 87,000 more women will be in the labour force compared to 2023. This overall change in the size of the labour force can be broken down into different components, which express how changes in the size and age structure of the population (demography), changes in the composition of the population (including migration and education and the resulting changes in health) and pension reforms (raising the minimum age or the required insurance and contribution periods) contribute to the change in the size of the future labour force. The demographic effect refers to the change in the size of the labour force assuming age-specific participation rates remain constant over time. The composition effect demonstrates how changes in the structure of the population (educational attainment, cohort trends, and migration history) affect the number of people in the labour force. The effect of pension reforms shows how, in addition to the composition effect, the size of the labour force is changed by a raising of the age for early and regular retirement.

As Figure 8 shows, the greatest part of increasing labour supply can be attributed to the retirement effect (+84,000 between 2023 and 2040). Although the population effect is initially positive, it becomes negative later in the projection period. However, even without any pension reform effect, the number of women in the age-group 60-64 would increase due to compositional effects (+10,000 between 2023 and 2040).

As a result, the labour force participation rate of women aged 60 to 64 increases steeply from 2024 onwards, converging to their male counterparts (Figure 9). Overall, the labour force participation rate of women in the age-group 60-64 is projected to increase from 20% in 2023 to

52% in 2040. Compared to a scenario, where retirement age is kept constant, this implies an overall increase of 29 percentage points by 2040.

A comparison of the labour market participation of older people and the standard retirement age in the countries of the European Union does not show a uniform picture overall (Figure 10 and Figure 11). There is no clear correlation between the employment rate in the older age groups and the standard retirement age. While the retirement age is below 65 in the Baltic states, Finland, Bulgaria, and Hungary, for example, the employment rates of 60 to 64-year-old men in 2020 were roughly the same as in Spain, Ireland, and Denmark, three countries with a standard retirement age of over 65. For women aged 60 to 64, employment rates are similar and largely independent of the standard retirement age. Their employment rate is just as high in the Baltic states as in Sweden and Norway, although the age limits differ by more than three years. In Estonia, as in Finland, the employment rate for women is even higher than that of men - despite the same retirement age.

With an increase in retirement age to 65, female labour force participation rates are projected to exceed those in countries with the same retirement age. However, they are still lower than in some countries with a lower statutory retirement age, such as Finland.

5.1 Alternative methods

To highlight the power of the detailed labour market and pension modelling incorporated in microDEMS, we compare our findings with two alternative methods.

Firstly, we perform a simple, data-driven approach, assuming that the women labour force participation rates of women will converge to those of men as pension age is harmonised. Since women from the year 2033 onwards face the same pension regulations as men today, we assume that the single-year age-group specific labour force participation rates of women will exactly match those of men observed in 2023 in the same age group from 2033 onwards. The difference between the gender-specific participation rates is then multiplied by the number of women within each single-year age group affected by the increase in the retirement age in a specific year (as shown in Figure 3) to obtain the reform-related increase in the labour force for each year.

Our second alternative assessment makes use of our international comparative model microWELT, that, while being built on the same model platform, does not reflect the Austrian pension system in as much detail as microDEMS. microWELT only distinguishes between regular and early retirement (and therefore does not account for the different types of early retirement) and cannot consider eligibility rules regarding required contribution and insurance periods for early retirement.

Figure 12 shows the effect of increasing the retirement age on women's labour supply according to these two alternative methods compared to our results based on microDEMS. As the figure shows, all methods imply a steep increase in the size of the labour force resulting from the increase in the retirement age. While this effect is smaller and more linear according to the comparative simulation model microWELT, the data-driven approach and the detailed simulation model attribute similar effects to the increase in the retirement age on labour supply.

Finally, Figure 13 compares how the total number of women in the labour force evolves over time according to the different modelling approaches. While microDEMS and the data-driven approach produce similar retirement effects, the overall increase in the labour force is larger in microDEMS. The difference can be explained by additional compositional effects captured in the detailed microsimulation model that are not reflected in the data-driven approach.

Results from our less detailed comparative model microWELT are similar to the other approaches in the long run, but fail to capture the labour force effects in the transition period. This is especially due to the fact that microWELT does not distinguish between the various types of pension and therefore cannot separate the effects of different age limits associated with different types of pension.

6. Summary and conclusion

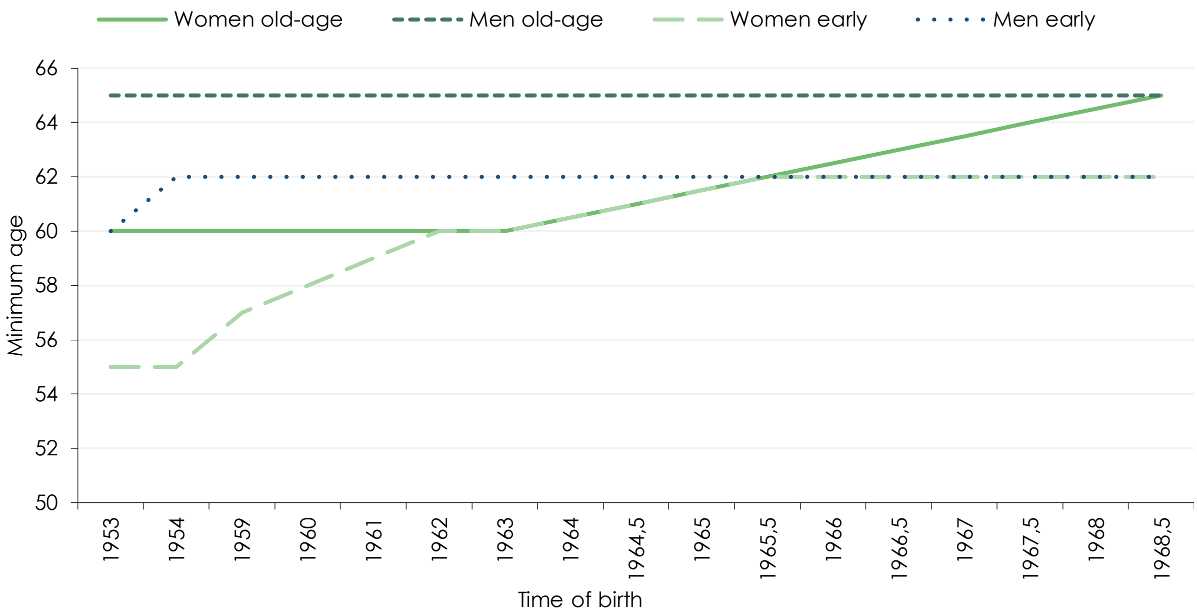
Increasing the retirement age will considerably increase the labour supply of women aged 60-64 in the coming years. While there is no doubt that raising the retirement age will have an impact on the number of people in the labour force, a more precise quantification of the concrete effect on the number of people in the labour force is complex. On the one hand, the pension system distinguishes between different types of pensions, which in turn differ in their access requirements; on the other hand, labour force participation itself depends on various factors (age, gender, education, health, and general propensity to work). It is therefore not trivial to calculate the extent to which an increase in the retirement age will affect the labour force.

With the dynamic microsimulation model microDEMS, all aspects mentioned can be mapped in a consistent modelling framework allowing us to assess the effect of increasing the retirement age on women's labour supply consistently.

As we show, raising the retirement age for women contributes substantially to increasing the supply of labour in Austria in a phase in which labour supply development is likely to be weak for demographic reasons and will significantly improve Austria's position with regard to the previously low employment rates of older workers by European standards. The effectiveness of raising the retirement age in addressing potential labour market shortages and its impact on public social security's fiscal health will depend on the ability to maintain this increased labour supply in active employment.

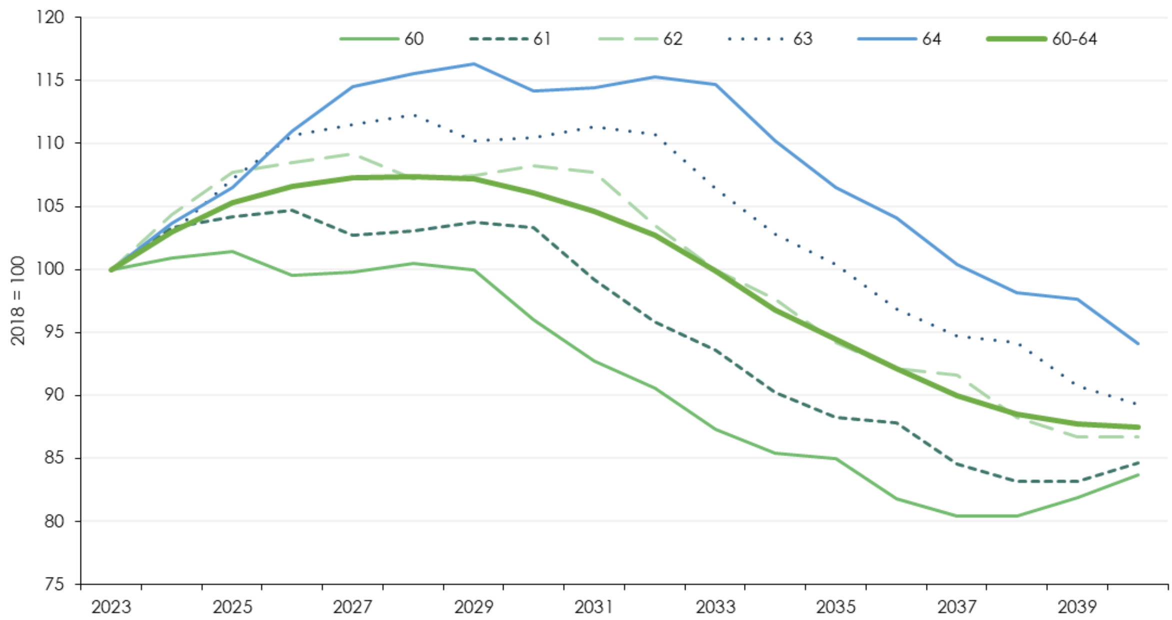
7. Tables and Graphs

Figure 1: **Schematic representation of the change with minimum access age to regular and early retirement pensions**



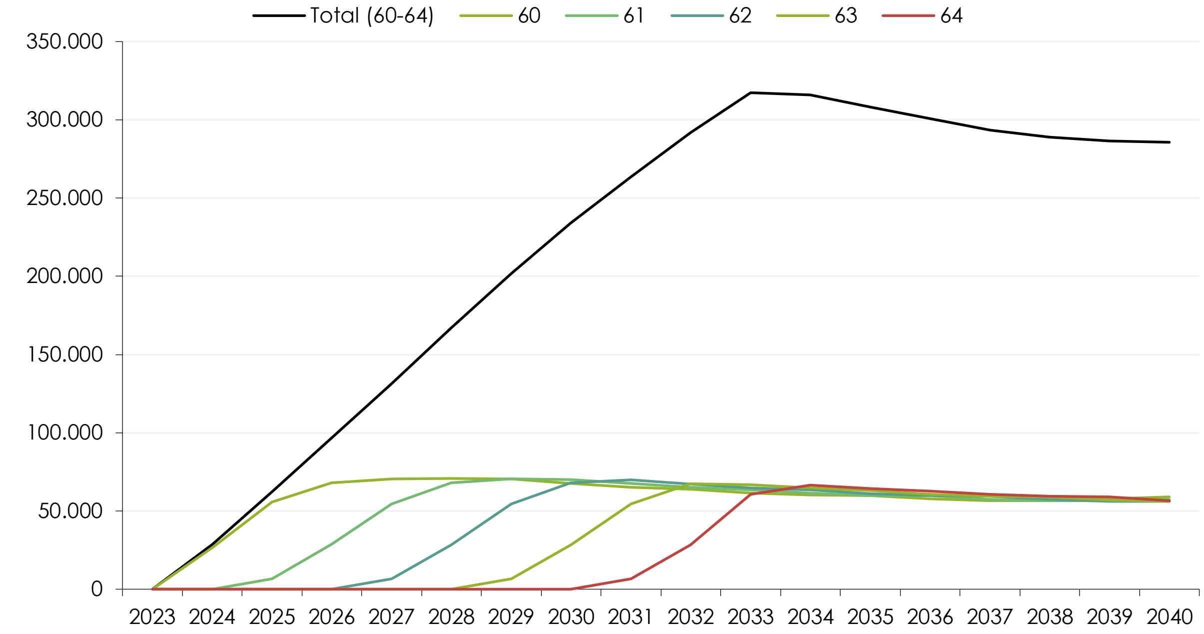
S: Own illustration.

Figure 2: **Female population age 60-64 by one-year age group**



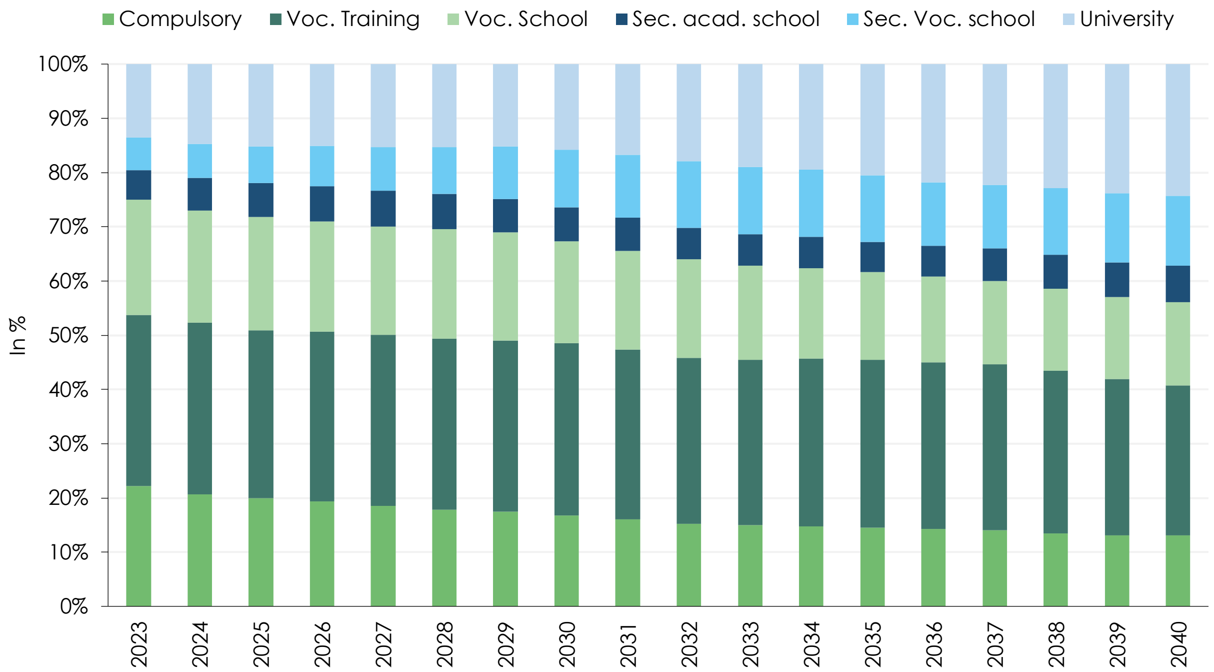
S: Own calculations based on Statistics Austria Population Projection (Main Variant, November 2023).

Figure 3: **Number of women affected by increasing retirement age**
By age group



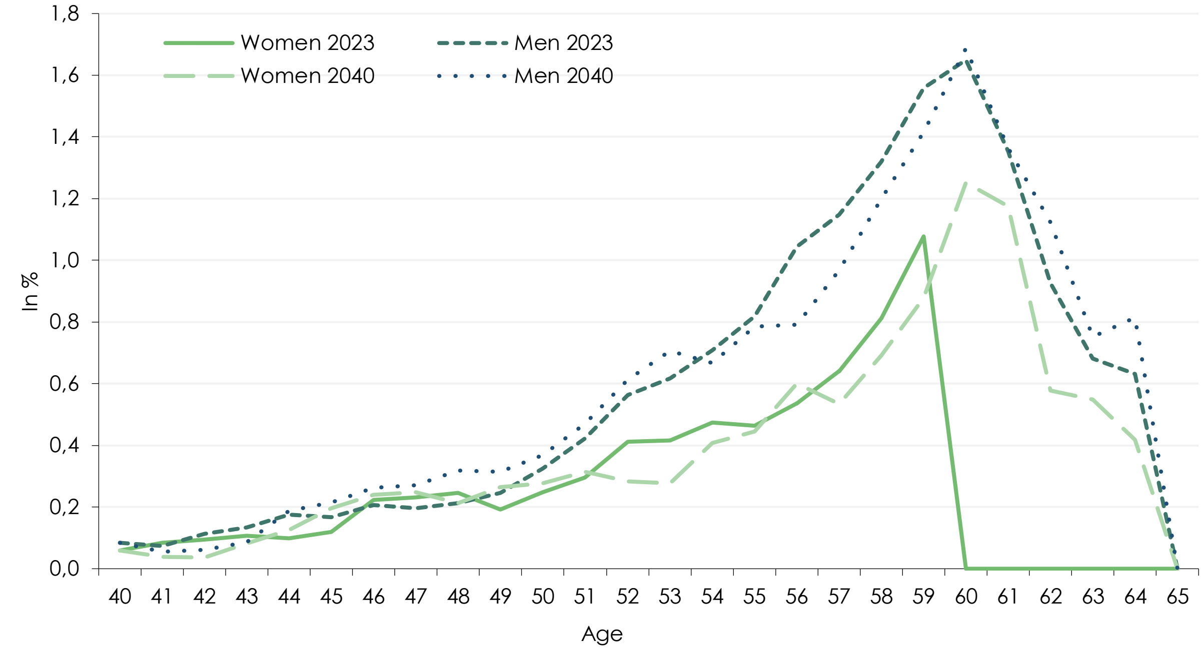
S: own calculations on Statistics Austria Population Projection (Main Variant, November 2023).

Figure 4: **Education composition of women aged 60-64**



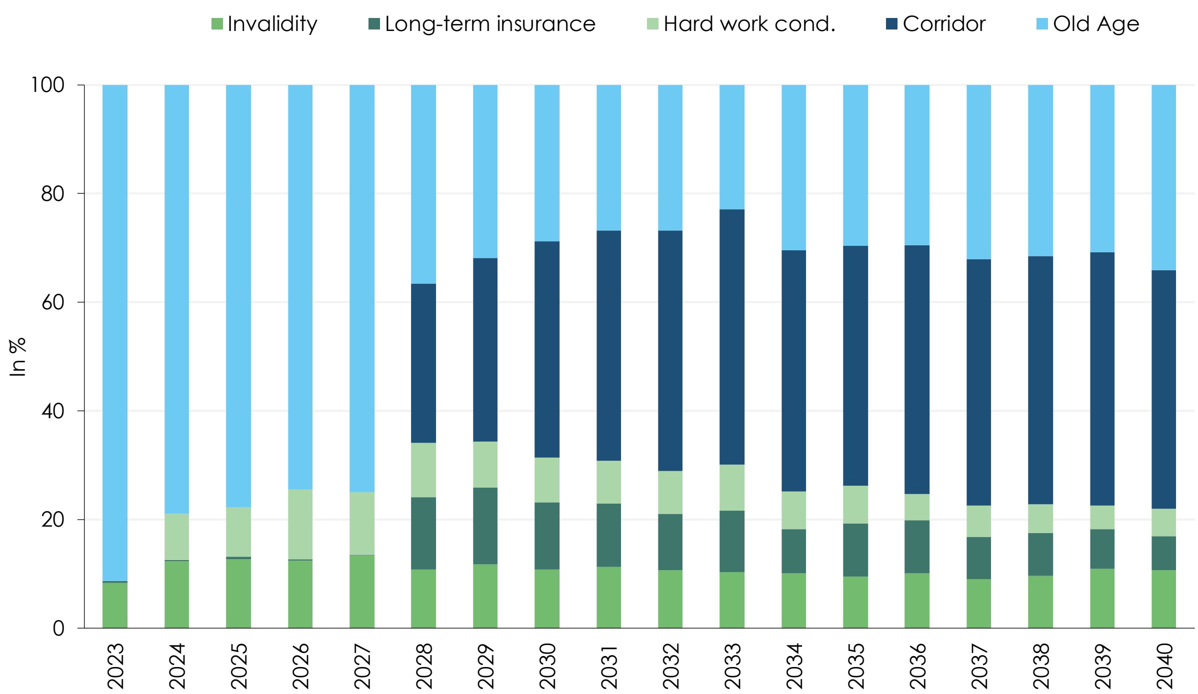
S: microDEMS.

Figure 5: **Invalidity rates by age and gender, 2023 and 2040**



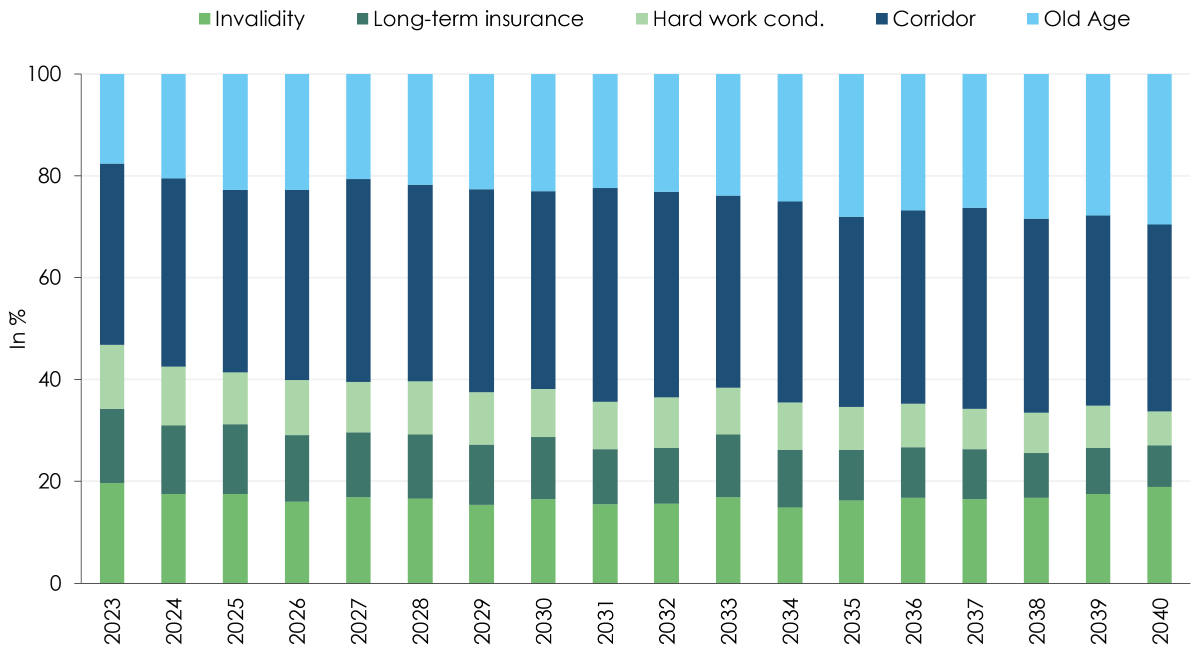
S: microDEMS. Invalidity rates: people entering invalidity pension as a share of population of the age group.

Figure 6: **Share of pension types 2023 to 2040, women**



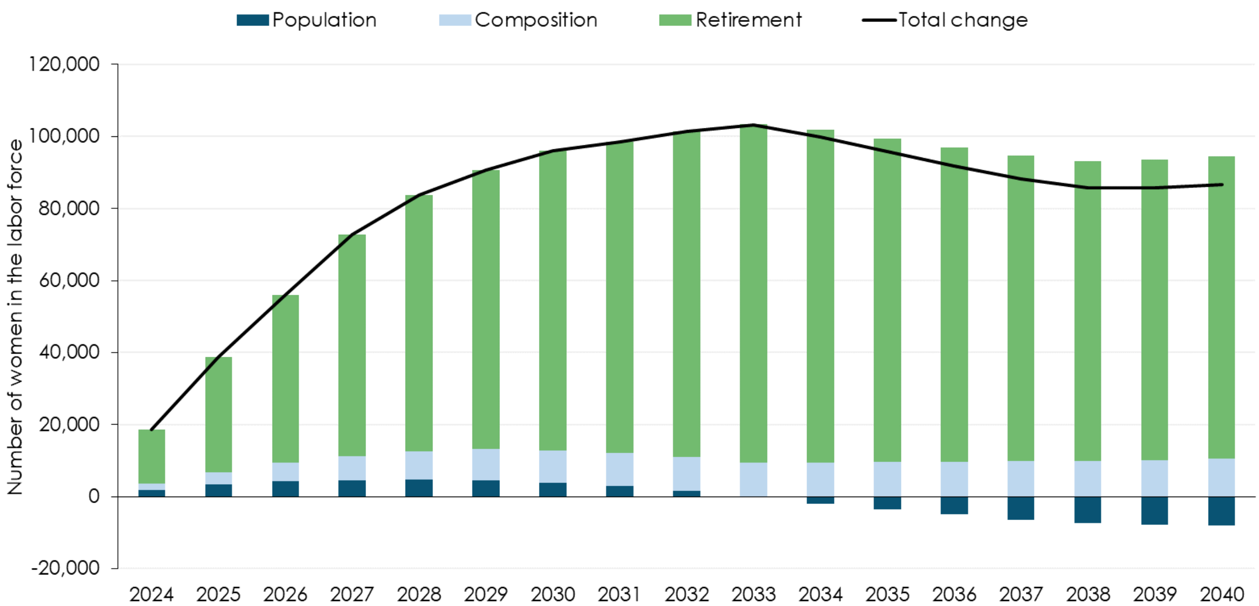
S: microDEMS.

Figure 7: **Share of pension types 2023 to 2040, men**



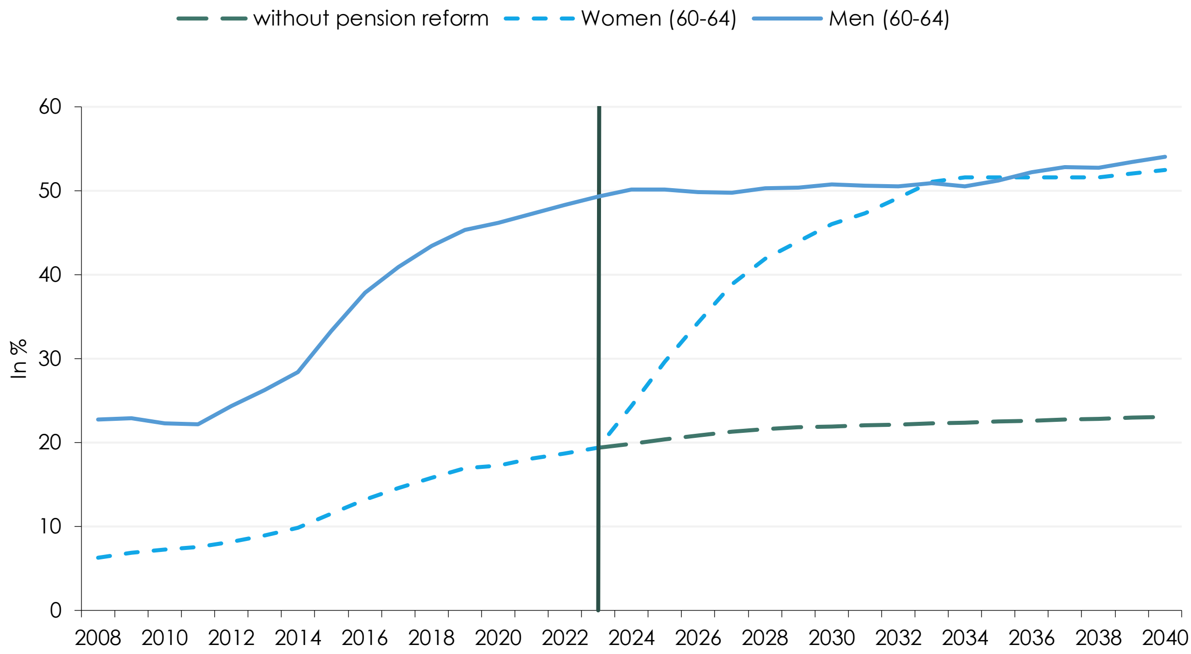
S: microDEMS.

Figure 8: **Change in the number of women aged 60-64 in the labour force, 2023 to 2040**
Total change and decomposition into population, composition, and retirement effects



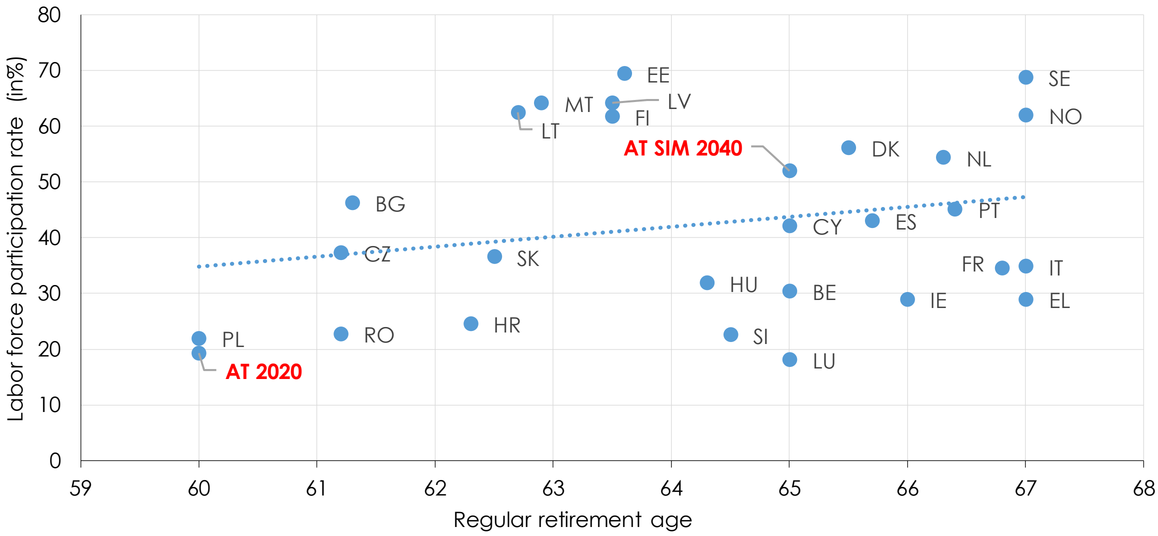
S: microDEMS.

Figure 9: **Labour force participation rates 2008 to 2023 and simulation to 2040**
Women (age 60 to 64) compared to a scenario with constant retirement age



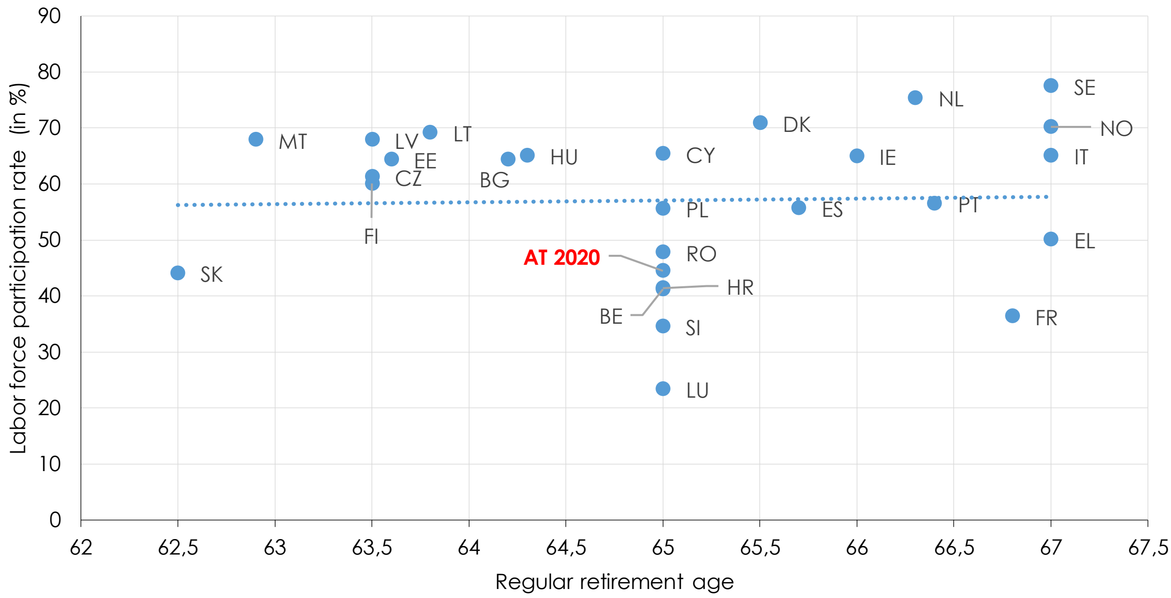
S: own calculations, labour force participation rates based on amis Arbeitsmarktinformationssystem. Simulation by microDEMS.

Figure 10: **Labour force participation rates and regular retirement age across European countries, women**



S: Standard retirement age according to European Commission, Directorate General for Economic and Financial Affairs (2020). Labour force participation rates for Austria according to WIFO, AT-Sim 2040: simulated values in 2040 according to the pension scenario. Labour force participation rates for other EU countries: EUROSTAT.

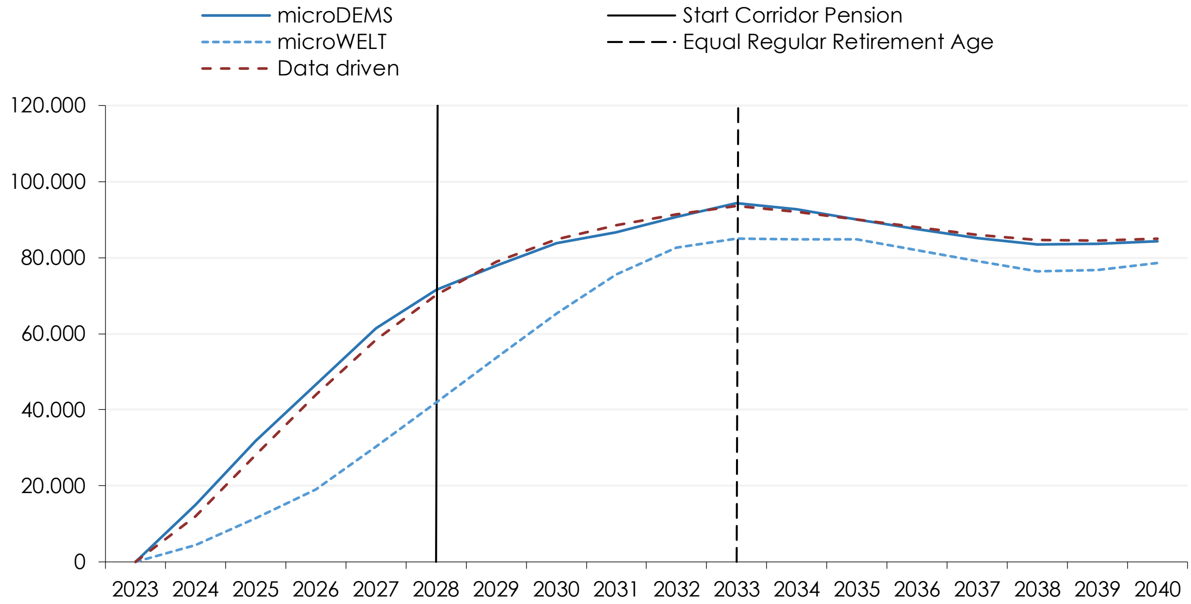
Figure 11: **Labour force participation rates and regular retirement age across European countries, men**



S: Standard retirement age according to European Commission, Directorate General for Economic and Financial Affairs (2020). Labour force participation rates for Austria according to WIFO, AT-Sim 2040: simulated values in 2040 according to the pension scenario. Labour force participation rates for other EU countries: EUROSTAT.

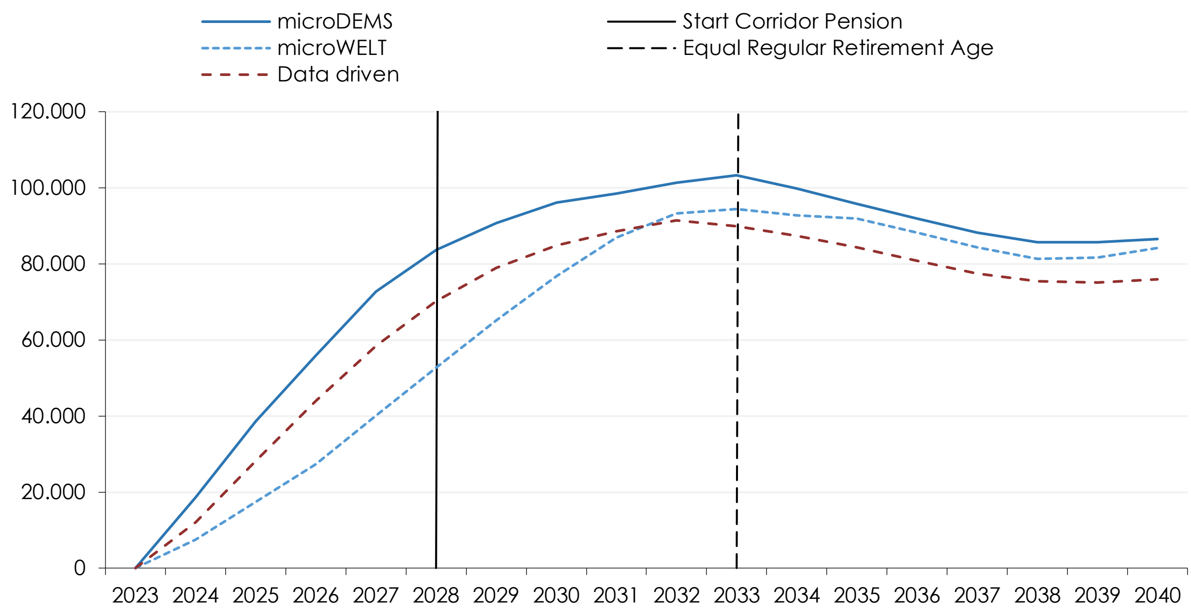
Figure 12: **Estimated retirement effect by projection method**

Difference in the number of women in the labour force compared to a scenario with constant retirement age



S: microDEMS.

Figure 13: **Number of women (60-64) in the labour force by projection method**
Absolute difference to 2023



S: microDEMS.

Table 1: **Age limits for regular and early retirement pensions in Europe, 1st pillar only**

	Male						Female					
	2019		2030		2050		2019		2030		2050	
	Reg.	Early	Reg.	Early	Reg.	Early	Reg.	Early	Reg.	Early	Reg.	Early
	In Years											
Belgium	65	63	67	63	67	63	65	63	67	63	67	63
Bulgaria	64,4	63,4	65	64	65	64	61,3	60,3	63,3	62,3	65	64
Czech Republic	63,9	60	65	62	65	62	61,2	58,2	65	60	65	60
Denmark*	67	63.5	68	65	71.5	68.5	65,5	63	68	65	72	69
Germany	65,9	63	66.9	63	67	63	65,7	63	67	63	67	63
Estonia*	63,6	60,6	65,5	60,5	67,7	62,7	63,6	60,6	65,5	60,5	67,7	62,7
Ireland	66	66	68	68	68	68	66	66	68	68	68	68
Greece	67	62	68,8	63,8	70,8	65,8	67	62	68,8	63,8	70,8	65,8
Spain	65,7	63,7	67	65	67	65	65,7	63,7	67	65	67	65
France	66,8	61,8	67	62	67	62	66,8	61,8	67	62	67	62
Croatia	65	60	65	60	65	60	62,3	57,3	65	60	65	60
Italy*	67	64	67,7	64,7	69,3	66,3	67	64	67,7	64,7	69,3	66,3
Cyprus*	65	65	66,5	66,5	68,3	68,3	65	65	66,5	66,5	68,3	68,3
Latvia	63,5	61,5	65	63	65	63	63,5	61,5	65	63	65	63
Lithuania	63,8	58,8	65	60	65	60	62,7	57,7	65	60	65	60
Luxembourg	65	57	65	57	65	57	65	57	65	57	65	57
Hungary	64	64,3	65	65	65	65	64	64,3	65	65	65	65
Malta	62,9	61	65	61	65	61	62,9	61	65	61	65	61
Netherlands*	66,3	66,3	67,3	67,3	68,5	68,5	66,3	66,3	67,3	67,3	68,5	68,5
Austria	65	60	65	60	65	60	60	58	63,5	60	65	60
Poland	65	65	65	65	65	65	60	60	60	60	60	60
Portugal*	66,4	60	67	60	68,3	60	66,4	60	67	60	68,3	60
Romania	65	60	65	60	65	60	61,2	56,2	63	58	63	58
Slovenia	65	60	65	60	65	60	64,5	60	65	60	65	60
Slovakia	62,5	60,5	64	62	64	62	62,5	60,5	64	62	64	62
Finland*	63,5	61	65,1	62,3	66,5	63,7	63,5	61	65,1	62,3	66,5	63,7
Sweden	67	61	67	62	67	62	67	61	67	62	67	62
Norway	67	62	67	62	67	62	67	62	67	62	67	62

S: European Commission, Directorate General for Economic and Financial Affairs (2020), MISSOC-Database. – Reg. = regular retirement age, Early = Early retirement age. – * Countries in which the retirement age is linked to a life expectancy factor or is being introduced.

Table 2: **Retirement age by date of birth and date of retirement for old age pension, women.**

Date of birth	Retirement age	Retirement date
Before 31.12.1963	60,0	before 2024
01.01.1964 to 30.06.1964	60,5	2024
01.07.1964 to 31.12.1964	61,0	2025
01.01.1965 to 30.06.1965	61,5	2026
01.07.1965 to 31.12.1965	62,0	2027
01.01.1966 to 30.06.1966	62,5	2028
01.07.1966 to 31.12.1966	63,0	2029
01.01.1967 to 30.06.1967	63,5	2030
01.07.1967 to 31.12.1967	64,0	2031
01.01.1968 to 30.6.1968	64,5	2032
From 01.07.1968	65,0	2033

S: Ministry of social affairs, health, care and consumer protection.

Table 3: **Retirement age by date of birth and required contributions months for long-term insurance pension, women.**

Date of birth	Age	Contribution months
Before 1958	55	480
1959	57	504
1960	58	516
1961	59	528
1962/1963	60	540
01.01.1964 to 30.06.1964	60.5	540
01.07.1964 to 31.12.1964	61	540
01.01.1965 to 30.06.1965	61.5	540
From 01.07.1965	62	540

S: Ministry of social affairs, health, care and consumer protection.

Appendix: Labour force participation and retirement in microWELT

Labour force participation is modelled with logistic regressions based on age, gender, education, health status, and - in the case of women – the presence of dependent children and the age of the youngest child. The estimations are based on EU-SILC data. For men, our estimations take the form

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_{e1}x_{e1} + \beta_{e2}x_{e2} + \beta_{e3}x_{e3} + \beta_{edu}x_{edu} + \beta_h x_h + \sum_{i=1}^{m} \beta_{ai}x_{ai} + e \quad (1)$$

where *p* is the probability of labour force participation. The parameters to be estimated are (β_0,..) and are estimated by maximum likelihood. x_{e1} to x_{e3} are binary variables which indicate the highest level of education according to our classification of education (with base category 0 corresponding to the lowest level of education, e_1 denotes ISCED level 3, e_2 indicates ISCED level 4, and e_3 indicates ISCED levels 5+), x_{edu} is an indicator for current education participation. x_h is a binary health indicator where the value 1 indicates impaired health and 0 no health problems, and x_a is a set of *m* age-group binary single year age indicators. For women, additional controls x_y for the age of the youngest child are added in the form of 4 age-group binary indicators which indicate the age of the youngest child in the family in one of four age categories (0-2, 3-4, 5-9, 10-14, 15 and older). For women our estimation then takes the form

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_{e1}x_{e1} + \beta_{e2}x_{e2} + \beta_{e3}x_{e3} + \beta_{edu}x_{edu} + \beta_h x_h + \sum_{i=1}^{m} \beta_{ai}x_{ai} + \sum_{j}^{4} \beta_{yj}x_{yj} + e \quad (2)$$

Based on the coefficients obtained from these logistic regressions, we calculate individual probabilities of labour force participation. Predicted probabilities, $\hat{p}_i$, are calculated by $\hat{p} = \exp(\hat{X}'(\beta))/(1 + \exp(\hat{X}'(\beta))$. The age parameters of our estimations are smoothed automatically applying median smoothing for each gender group to achieve a smooth path of the age-dependent change in labour force participation. Each individual is then assigned their labour force participation status randomly by drawing a random number between 0 and 1. If this number exceeds the estimated probability, labour force status is set to zero, and to one otherwise. We update the labour force status monthly for each individual based on the estimation results from these regressions. As individuals age over time and possibly change their education or health status, their labour force participation probability is updated throughout the simulation.

For the oldest age group, possible changes in retirement age legislation are incorporated by shifting the age parameter from our logistic regression models backwards as retirement age increases: If, for example, retirement age increases by one year from 65 to 66, the likelihood of labour force participation of a 60-year-old person is determined by using the estimated coefficient for age 59 instead of age 60. If retirement age increases to age 67, the estimated coefficient for age 58 is used to determine the probability of a 60-year-old person, and so on. Thus, with retirement age 67 our model implies that a 60-year-old person has the same labour force participation rate as a 58-year-old person with identical characteristics (gender, education, and health status) when retirement age is 65. By explicitly taking health status into account, the effect of raising the retirement age on labour force participation is thus dampened. In this way, we account for non-linear effects of increases in retirement age on labour force participation as sickness-related withdrawals from the labour force partly counteract such an increase.

Literatur

Amann, J., Böheim, R., Horvath, T., Leoni, T., & Spielauer, M. (2021). The microWELT-US microsimulation model for projections of the U.S. labour force participation accounting for education and health [Technical Report - Project NB21–17,]. Austrian Institute of Economic Research.

Atalay, K., & Barrett, G. F. (2015). The Impact of Age Pension Eligibility Age on Retirement and Program Dependence: Evidence from an Australian Experiment. *The Review of Economics and Statistics*, *97*(1), 71–87. https://doi.org/10.1162/REST_a_00443

Axelrad, H., & Mcnamara, T. K. (2018). Gates to retirement and gender differences: Macroeconomic conditions, job satisfaction, and age. *Journal of Women & Aging*, *30*(6), 503–519. https://doi.org/10.1080/08952841.2017.1358978

Berkel, B., & Börsch-Supan, A. (2003). Renteneintrittsentscheidungen in Deutschland: Langfristige Auswirkungen verschiedener Reformoptionen. *MAE*, *31*.

Blossfeld, H.-P., Buchholz, S., & Kurz, K. (Hrsg.). (2011). *Aging populations, globalization and the labor market: Comparing late working life and retirement in modern societies*. Edward Elgar.

Brussig, M. (2012). *Weiter steigendes Rentenalter, mehr Renteneintritte aus stabiler Beschäftigung, aber zunehmend geringere Altersrenten bei Langzeitarbeitslosen: Aktuelle Entwicklungen beim Rentenzugang.* Universität Duisburg: Institut für Arbeit und Qualifikation. http://www.iaq.uni-due.de/auem-report/2012/2012-02/auem2012-02.pdf

Brussig, M., & Knuth, M. (2007). *Raising the Statutory Pension Age: Extending Careers or Unemployment of the Elderly?* [5th International Research Conference on Social Security]. International Social Security Associati. http://hussonet.free.fr/2brussig.pdf

Bütler, M. (2017). Alterssicherung zwischen Zwang, Paternalismus und Wahlfreiheit. *Perspektiven der Wirtschaftspolitik*, *18*(4), 368–377. https://doi.org/10.1515/pwp-2017-0055

Bütler, M., Mitchell, O. S., & Orszag, M. (2018). Advances in understanding pension decisions. *Journal of Pension Economics & Finance*, *17*(3), 251–253. https://doi.org/10.1017/S147474721800015X

Cribb, J., Emmerson, C., & Tetlow, G. (2016). Signals matter? Large retirement responses to limited financial incentives. *Labour Economics*, *42*, 203–212. https://doi.org/10.1016/j.labeco.2016.09.005

De Preter, H., Looy, D., & Mortelmans, D. (2013). Individual and institutional push and pull factors as predictors of retirement timing in Europe: A multilevel analysis. *Journal of Aging Studies*, *27*, 299–307.

Deutsche Rentenversicherung. (2022). *Rentenversicherung in Zahlen 2022* [Statistik der Deutschen Rentenversicherung]. Deutsche Rentenversicherung. https://www.deutsche-rentenversicherung.de/SharedDocs/Downloads/DE/Statistiken-und-Berichte/statistikpublikationen/rv_in_zahlen.pdf?__blob=publicationFile&v=2

Duval, R. (2003). *The Retirement Effects of Old-Age Pension and Early Retirement Schemes in OECD Countries* (Working Paper Nr. 370). OECD. https://doi.org/10.1787/308728704511

EIGE. (2015). *Gender gap in pensions in the EU*. European Institute for Gender Equality.

European Commission. Directorate General for Economic and Financial Affairs. (2020). *Ageing Report 2019*. European Commission. Directorate General for Economic and Financial Affairs.

French, E. (2005). The Effects of Health, Wealth, and Wages on Labour Supply and Retirement Behaviour. *The Review of Economic Studies*, *72*(2), 395–427.

Geyer, J., Haan, P., Hammerschmid, A., & Welteke, C. (2019). Erhöhung des Renteneintrittsalters für Frauen: Mehr Beschäftigung, aber höheres sozialpolitisches Risiko. *DIW Wochenbericht*. https://doi.org/10.18723/DIW_WB:2019-14-1

Geyer, J., & Welteke, C. (2017). *Closing Routes to Retirement: How Do People Respond?* (DIW Discussion Paper Nr. 1653).

Gillen, M., & Heath, C. (2017). Effects of receipt of Social Security retirement benefits on older women's employment: *Journal of Women & Aging*, *29*(5), 448–459.

Gruber, J., & Wise, D. A. (Hrsg.). (2004). *Social Security Programs and Retirement around the World: Micro-Estimation*. University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/S/bo3638486.html

Haan, P., & Tolan, S. (2019). Labor supply and fiscal effects of partial retirement – The role of entry age and the timing of pension benefits. *The Journal of the Economics of Ageing*, *14*, 100187. https://doi.org/10.1016/j.jeoa.2019.01.001

Hakola, T., & Määttänen, N. (2007). *The Effect of the Pension Reform on Retirement Age and Income Distribution, Estimates from a dynamic Programming Model* [Discussion Paper]. Tinbergen Institute.

Hakola, T., & Uusitalo, R. (2005). Not so voluntary retirement decisions? Evidence from a pension reform. *Journal of Public Economics*, *89*(11–12), 2121–2136. https://doi.org/10.1016/j.jpubeco.2004.12.001

Horvath, T., Hyll, W., Mahringer, H., Lutz, H., & Spielauer, M. (2022). *Ältere am Arbeitsmarkt: Eine Vorausschau bis 2040 als Grundlage für wirtschaftspolitische Maßnahmen*. http://www.wifo.ac.at/wwa/pubid/69701

Johansson, P., Laun, L., & Palme, M. (2014). *Johansson, P., Laun, L., Palme, M., "Pathways to retirement and the role of financial incentives in Sweden", NBER Working Paper Series, Working Paper, Cambridge, May 2014 (20123).* http://www.nber.org/papers/w20123

Kannisto, J. (2006). *Effective retirement age in the Finnish earnings-related pension scheme* (Bd. 6). Finnish Center for Pensions.

Karlstrom, A., Palme, M., & Svensson, I. (2004). A Dynamic Programming Approach to Model the Retirement Behaviour of Blue-Collar Workers in Sweden. *Journal of Applied Econometrics*, *19*(6), 795–807.

Klotz, J. (2007). Soziale Unterschiede in der Sterblichkeit. Bildungsspezifische Sterbetafeln 2001/2002. *Statistische Nachrichten*, *4*, 296–311.

Lankmayer, T., & Niederberger, K. (2021). *Auswirkungen der Maßnahmen zur Erhöhung des Pensionsantrittsalters auf beim AMS OÖ vorgemerkte Personen*. AMS. https://ams-forschungsnetzwerk.at/downloadpub/2021_AMS_OOE_IBE_studie-pensionsantritt.pdf

Manoli, D., & Weber, A. (2016). *The Effects of the Early Retirement Age on Retirement Decisions* (Nr. w22561). National Bureau of Economic Research. https://doi.org/10.3386/w22561

McGarry, K. (2004). Health and Retirement Do Changes in Health Affect Retirement Expectations? *Journal of Human Resources*, *XXXIX*(3), 624–648. https://doi.org/10.3368/jhr.XXXIX.3.624

Mika, T., & Baumann, J. (2008). Soziale Konsequenzen der Abschaffung des Vorruhestands für Langzeitarbeitslose. In *Die WSI-Mitteilungen veröffentlichen Ergebnisse von Forschungsarbeiten im Spannungsfeld von Wissenschaft und arbeitnehmerorientierter Politik.* (Bde. 11–12, S. 605–611). https://www.wsi.de/de/wsi-mitteilungen-soziale-konsequenzen-der-abschaffung-des-vorruhestands-fuer-langzeitarbeitslose-12431.htm

Möhring, K., & Bennett, J. (2015). Arbeitslosigkeit und Frührente älterer Personen in Europa – Die Rolle von Arbeitsmarkt- und Rentenpolitik aus der Lebenslaufperspektive. *Zeitschrift für Sozialreform*, *61*(4), 379–402. https://doi.org/10.1515/zsr-2015-0403

Moreira, A., Azevedo, A. B., & Manso, L. P. (2018). Reducing Early Retirement in Europe: Do Working Conditions Matter? *Journal of Population Ageing*, *11*(3), 265–284. https://doi.org/10.1007/s12062-017-9186-2

Pilipiec, P., Groot, W., & Pavlova, M. (2020). The Analysis of Predictors of Retirement Preferences over Time. *Journal of Population Ageing*, 9, 425–452. https://doi.org/10.1007/s12062-020-09305-3

Raab, R. (2011). Financial incentives in the Austrian PAYG-pension system: Micro-estimation. *Empirica*, *38*(2), 231–257.

Rabaté, S., & Rochut, J.. (2019). Employment and substitution effects of raising the statutory retirement age in France. Journal of Pension Economics and Finance. 19. 1-16. 10.1017/S1474747218000392.

Spielauer, M., Horvath, T., & Fink, M. (2020a). microWELT - A Dynamic Microsimulation Model for the Study of Welfare Transfer Flows in Ageing Societies from a Comparative Welfare State Perspective.

Spielauer, M., Horvath, T., Hyll, W., & Fink, M. (2020b). microWELT: Socio-Demographic Parameters and Projections for Austria, Spain, Finland, and the UK. WIFO Working Paper.

Staubli, S., & Zweimüller, J. (2013). Does raising the early retirement age increase employment of older workers? *Journal of Public Economics*, *108*, 17–32. https://doi.org/10.1016/j.jpubeco.2013.09.003

Stefanits, H., & Hollarek, F. (2007a). Die Pensionsreformen der Jahre 2000, 2003, und 2004: Auswirkungen auf das Antrittsverhalten. In *Soziale Sicherheit* (Bd. 3, S. 110–132).

Stefanits, H., & Hollarek, F. (2007b). Die Pensionsreformen der Jahre 2000, 2003, und 2004: Auswirkungen auf das Antrittsverhalten. In *Soziale Sicherheit* (Bd. 9, S. 404–417).

The Finnish Centre for Pensions. (2022). *Finnish Centre for Pensions Pocket Statistics 2021* [Statistics]. https://www.julkari.fi/bitstream/handle/10024/142802/pocket-statistics-2021.pdf

Tinios, P., Bettio, F., & Betti, G. (2015). *Men, Women and Pensions*. European Commission.

van der Velde, L. (2022). Phasing out: Routine tasks and retirement. *Journal of Comparative Economics*, *50*(3), 784–803. https://doi.org/10.1016/j.jce.2022.01.004

Zwick, T., Bruns, M., Geyer, J., & Lorenz, S. (2022). Early retirement of employees in demanding jobs: Evidence from a German pension reform. *The Journal of the Economics of Ageing*, *22*, 100387. https://doi.org/10.1016/j.jeoa.2022.100387