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Dudel, Christian; Loichinger, Elke; Klüsener, Sebastian; Sulak, Harun;
Myrskylä, Mikko

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The Extension of Late Working Life in Germany: Trends, Inequalities, and the East–West Divide

Christian Dudel, Elke Loichinger, Sebastian Klüsener, Harun Sulak, and Mikko Myrskylä

ABSTRACT The extension of late working life has been proposed as a potential remedy for the challenges of aging societies. For Germany, surprisingly little is known about trends and social inequalities in the length of late working life. We use data from the German Microcensus to estimate working life expectancy from age 55 onward for the 1941–1955 birth cohorts. We adjust our calculations of working life expectancy for working hours and present results for western and eastern Germany by gender, education, and occupation. While working life expectancy has increased across cohorts, we find strong regional and socioeconomic disparities. Decomposition analyses show that among males, socioeconomic differences are predominantly driven by variation in employment rates; among women, variation in both employment rates and working hours are highly relevant. Older eastern German women have longer working lives than older western German women, which is likely attributable to the German Democratic Republic legacy of high female employment.

KEYWORDS Length of working life • Working life expectancy • Germany • Inequality • Population aging

Introduction

Extending the length of working life has been proposed as a potential remedy to the effects of population aging (e.g., European Commission 2010; OECD 2018) and has led to policy reforms in many high-income countries, including Germany. The German population is, on average, among the oldest in the world, and the share of the population older than age 67—the prospective statutory retirement age by 2031—is expected to further increase from 19% in 2018 to 26% in 2040 (Statistisches Bundesamt 2019). At the same time, the size of the German workforce is expected to decrease (Fuchs et al. 2018). This will put the German pay-as-you-go pension system under strain, as the number of pension recipients relative to the number of contributors will increase. In response to this trend, several pension reforms aimed at increasing labor force participation at older ages have been implemented in Germany.

Extending the length of working life is expected to counteract the challenges of population aging in two ways: first, by reducing the lifetime spent in retirement, and

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second, by increasing the number of active individuals. At the same time, policies aimed at increasing the length of working life have raised concerns, as it has been argued that such policies might amplify existing inequalities among older workers and ignore the needs of disadvantaged groups (e.g., Fisher et al. 2015; Hess et al. 2020; Krekula and Vickerstaff 2020). For instance, early retirement used to be an alternative to unemployment for low-qualified workers who lost their job before reaching the statutory retirement age. However, retiring early has become difficult, forcing some workers into unemployment (Phillipson 2019).

Surprisingly little is known about levels, trends, and inequalities in the length of working life in Germany, especially given the political interest in extending working life. The existing literature tends to focus on employment patterns in broad age groups or on specific transitions during the life course, such as the transition from work to retirement. Analyzing patterns in broad age groups, such as the employment rate at ages 55 to 64, is problematic when studying trends, as these rates are influenced by the age composition of the population within this age range and do not reflect individual working trajectories. Focusing on specific transitions such as retirement might not accurately reflect the cumulative lifetime spent working, as factors such as unemployment before retirement and employment after reaching retirement age are not captured in this approach.

Our objective is to fill the research gap by providing evidence on levels and trends in the length of working life among older adults, focusing on inequalities by gender, region (western vs. eastern Germany), education, and occupation. Using rich data from the German Microcensus for the years 1996 to 2019, we calculate the expected number of years spent in employment between ages 55 and 64—or partial working life expectancy (WLE)—as the outcome and adjust it for working hours (adjusted WLE, or aWLE). We provide results by birth cohort for the cohorts born from 1941 to 1955. Previous literature did not adjust WLE for working hours. However, given the prominence of part-time work, particularly among women in western Germany, this adjustment is crucial to adequately capture gender inequalities. Distinguishing between western and eastern Germany acknowledges that the country was divided into West Germany and communist East Germany between 1949 and 1990. This division is still visible, including in differences in attitudes toward female employment and in women's labor force participation rates (Zoch 2021).

Our adjustment for working hours uses full-time work as a reference, and adjusts the number of years spent in employment downward on the basis of the actual working hours relative to the full-time reference; for example, working one year at 50% of a full-time schedule contributes half a year to aWLE. Our indicator thus answers the question of how many full-time equivalent years in total an average member of a certain birth cohort has worked between ages 55 and 64. aWLE captures all of the late working life course, unlike specific transitions or phases of the late working life course, such as the transition from work to retirement (Dudel and Myrskylä 2017). In the online supplementary materials, we also provide estimates of aWLE during the early retirement ages of 65 to 74.

We adopt a social stratification perspective and report aWLE by education and occupation, as well as their intersections with gender and region. aWLE allows us to measure such social disparities in cumulative working lives and to investigate whether concerns about increasing inequality are justified. In addition, we use Kitagawa's (1955) decomposition technique to assess to what extent socioeconomic differences in aWLE are driven by employment rates or by working hours, and to what extent

differences by gender and region can be explained by differences in education and occupation. Furthermore, we examine socioeconomic differentials in the lifetime spent in unemployment and in retirement or outside of the labor market.

This study contributes to the literature in several ways. We provide the first in-depth study of WLE and social inequalities in WLE in Germany. WLE is an easy-to-understand measure used to assess how labor market inequalities accumulate. Moreover, to our knowledge, we are the first to adjust WLE for working hours. Germany is an interesting case for studying WLE trends owing to the country's rapidly aging population and regional differences in labor market participation, particularly among women. Our analysis is based on a large, high-quality sample data set. Because the households included in the sample were required to respond to most of the Microcensus questions, our results are not biased by unit and item nonresponse. Overall, our analysis sheds new light on trends and inequalities in employment trajectories in late working life in Germany.

Background

The Institutional Setting in Germany

To understand individual life course trajectories, it is important to conceptualize them embedded in their institutional context (DiPrete 2002). The institutional context moderates the impact of globalization and global trends, such as technological change, and it provides and restricts options for employers and employees (Hofäcker 2010). The length of working life, defined as the cumulative number of years spent in employment, depends on the institutional setting in several ways, including through the timing of retirement, but also through the time spent working before and—potentially—after reaching retirement age. In Germany, there have been three major institutional pathways to retirement, all of which have been affected by reforms (e.g., Hess et al. 2020; Romeu-Gordo and Sarter 2020): first, retiring upon reaching the statutory retirement age or collecting enough years of public pension insurance contributions; second, retiring early, sometimes following a period spent receiving unemployment benefits between leaving work and entering retirement; and third, receiving disability pension benefits. These retirement pathways, as well as employment before and after retirement, will be discussed in the following paragraphs.

The statutory retirement age of the German public pension system is a major threshold for employment of older workers in Germany. Many workers stop working upon reaching this age, often because their employment contract includes a clause that terminates the contract at this threshold (Börsch-Supan et al. 2021). Before 2000, the nominal retirement age was 65 for men and was, *de facto*, 60 for women owing to gender-specific regulations. Between 2000 and 2009, the retirement age for women was raised to 65. Between 2012 and 2031, the nominal retirement age is set to increase from 65 to 67 for both men and women. Specifically, men and women born in 1946 were the last cohort who reached retirement age at 65. For the cohorts born from 1947 to 1958, the retirement age has been successively increasing by one month, such that individuals born in 1947 reached retirement age at 65 years and one month, and individuals born in 1958 will reach it at 66 years. For later cohorts, the retirement age will increase by two months per cohort, such that individuals born in 1964 will reach retirement age at 67 years.

Early retirement has become more restrictive through a series of reforms. Currently, workers can retire early at age 64 (until 2015, at age 63) with reductions in pension benefits, or without reductions in benefits if the individual contributed to the pension system for 45 years (Hess et al. 2020). In the past, early retirement benefits were more generous. For instance, in West Germany in the 1980s, and with some restrictions until 2007, one pathway to retirement was leaving employment at age 58, receiving unemployment benefits for two years, and then retiring at age 60 (Buchholz et al. 2013).

Receiving disability pension benefits was a common pathway to retirement in the past, but it has become considerably less relevant today owing to several reforms (Börsch-Supan and Ferrari 2019; Börsch-Supan and Juerges 2011; Fasang 2010; Hagen et al. 2010). Before the enactment of major reforms in 1984 (in West Germany) and 2001, the requirements for collecting disability pension benefits were low. Moreover, it was possible to convert a disability pension into a regular old-age pension at age 60 without actuarial adjustments after 35 years of employment, making it a potential alternative to the unemployment–retirement pathway. However, the requirements for receiving disability pension benefits have become much stricter. The threshold for converting a disability pension into an old-age pension was increased from age 60 to age 63 in 2001, and to age 65 in 2012 (Hess et al. 2020).

While unemployment among older workers in Germany used to be high because of the abovementioned unemployment–retirement pipeline (Knuth and Kalina 2002), it has declined since the enactment of pension and labor market reforms in 2006, which made unemployment less attractive for older workers (Dlugosz et al. 2014). Also relevant for unemployment is that the German labor market is an insider–outsider market in which strong labor protections are tied to seniority (Bennet and Möhring 2015). Thus, dismissing older workers can be difficult. However, once older workers have been laid off, they may experience difficulties finding a new job, which can increase the length of their unemployment spells. In addition, older workers often face age discrimination (Büsch et al. 2009).

Working after reaching retirement age has become more common in recent years across high-income countries (Dingemans and Möhring 2019), including in Germany (Hofäcker and Naumann 2015). While employment levels among people older than 65 have been increasing continuously in Germany since 2000 (Larsen and Pedersen 2017), they remain low and are lower than in other countries (Dingemans et al. 2017); moreover, returning to work after retiring is uncommon (Hofäcker and Naumann 2015). In light of these findings, we focus our main analysis on late working life before retirement and provide results for employment after reaching retirement age in the online supplementary materials.

Late Working Life in Germany: Highly Gendered, Highly Stratified

Social stratification becomes visible when we look at the conditions in which individuals experience major life course transitions and the options they have for making these transitions (Radl 2013). The German labor market is highly stratified along several dimensions. Here, we focus on dimensions of social stratification that have been shown to be highly relevant for older workers (Visser et al. 2016): namely, gender,

education, and occupation. We also study how gender interacts with the latter two dimensions (Radl 2013).

The German labor market is highly gendered, and the employment rates of women are still considerably lower than those of men, despite increasing constantly since the 1970s (Bundesinstitut für Bevölkerungsforschung 2019). This gendered market is largely due to the German institutional setting favoring the male breadwinner model (Fasang 2010). The tax system incentivizes women to work part-time or to leave the labor market (Fasang et al. 2013), which particularly affects women with young children (e.g., Vlasblom and Schippers 2006). If women want to reenter the labor market after leaving to care for a child, they are confronted with the insider–outsider nature of the German labor market, which makes it difficult for them to return to work (Fasang et al. 2013).

In Germany, women retire earlier than men for several reasons. They often retire at the same time or shortly after their partner (Radl and Himmelreicher 2015; Bundesinstitut für Bevölkerungsforschung 2020), who is, on average, older. Moreover, women are more likely than men to provide informal care and to leave the labor market and retire when providing care (Backhaus and Barslund 2021; Meng 2011; Schneider et al. 2001). Finally, women are less likely than men to work after retiring (Dingemans et al. 2017; Hokema and Scherger 2016).

Educational attainment and occupation are closely linked in Germany, and the occupational system is highly standardized with specialized certificates (Buchholz 2006). Access to vocational certificates and universities is dependent on educational attainment, creating strong links between school and work (Rözer and van de Werfhorst 2020). This system greatly restricts the options of individuals with low educational attainment, who are much more likely than individuals with higher educational attainment to be unemployed (Klein 2015). This is partly because they often work in shrinking sectors and occupations, such as manufacturing. Moreover, they may find it difficult to change occupations after a job loss owing to the lack of a matching certificate (Buchholz 2006; Murphy 2014).

The educational and occupational inequalities among older workers are exacerbated by the fact that the vocational education system in Germany is aimed at younger people (Buchholz 2006; Frerichs and Naegele 1997). These conditions, in conjunction with the effects of the reforms described earlier, lead to low-qualified and low-educated individuals having higher unemployment rates before retirement than highly skilled and educated individuals (Buchholz et al. 2013). These workers also retire earlier (e.g., Himmelreicher et al. 2009) and have a higher risk of becoming disabled and receiving disability pension benefits (Hagen et al. 2010).

The Legacy of the East–West Divide

Since German reunification in 1990, there have been persistent East–West differences in labor market, retirement, and unemployment patterns (e.g., Hofäcker and Naumann 2015), as well as in gender relations (e.g., Fisher 2010; Zoch 2021) and in health (e.g., Kühn et al. 2019). After reunification, unemployment soared in eastern Germany, and it was particularly high among older workers, as there was a particular pathway from employment to retirement via unemployment that was open only to them (Buchholz et al. 2013; Ernst 1996): because these workers could retire early at

age 60 with up to five years of prior unemployment, they had a *de facto* retirement age of 55. This age was increased to 57 in 1992, and since 1995, the retirement rules have been similar in eastern and western Germany.

Today, unemployment is generally higher in eastern than in western Germany, including among older workers (Steiner 2017). However, the East–West differences in unemployment rates have decreased somewhat since reunification. Compared with western Germans, eastern Germans have a higher risk of retiring early or at the statutory retirement age (Hofäcker and Naumann 2015) and of receiving disability pension benefits (Hagen et al. 2010). However, the gender gaps in work and retirement are much smaller in eastern than in western Germany. Eastern German women are more likely than their western counterparts to work full-time and are less likely to work part-time or to be a housewife (Simonson et al. 2011), partly because motherhood has a smaller negative effect on employment in the east (Matysiak and Steinmetz 2008).

Measuring the Length of Working Life

Working life expectancy allows us to assess employment over the entire late working life course. WLE is defined as the average remaining lifetime spent in employment at a certain age—for example, WLE at age 55. The concept of WLE is not new, with early references dating back at least 70 years (Wolfbein 1949). However, interest in WLE has increased in recent years (e.g., Dudel and Myrskylä 2020; Kedefors et al. 2019; Robroek et al. 2020). Alternative terms for WLE include (average) duration of working life, worklife expectancy, and labor market life expectancy (Hoem 1977; Loichinger and Weber 2016). WLE is based on a demographic perspective and is analogous to concepts such as life expectancy and healthy life expectancy. In this study, we adjust WLE for the number of hours worked and call the resulting measure aWLE, which shares most of the properties of WLE.

Because WLE captures complex trajectories and the whole of working life in a way that is easy to understand, it is a useful indicator of the state of labor markets and the sustainability of social security systems (Lorenti et al. 2018). Moreover, comparing WLE across socioeconomic groups can shed light on labor market inequalities, as it shows how labor market (dis)advantages can accumulate (Hayward and Lichter 1998). Finally, WLE is easy to understand and is a less abstract outcome than probabilities, rates, or odds ratios. Methods and data for calculating WLE are readily available (see the next section).

WLE can be studied from a cohort perspective or from a period perspective (see also Denton et al. 2010; Leinonen et al. 2018). In the period perspective, data for one or a few years can be used to construct synthetic working trajectories and to estimate the WLE arising from these synthetic trajectories. With this approach, the prevailing conditions in a given period can be summarized, and WLE can be estimated even when no complete working trajectories of actual cohorts are observed. However, the results are artificial in the sense that they do not describe the real experiences of individuals. By contrast, the cohort perspective is based on real working trajectories and thus provides a more realistic picture. The data demands are considerably higher for a cohort analysis than for the period perspective. However, the rich data used in this article allow us to study aWLE by birth cohort.

Methods

Data and Variables

We use data from the German Microcensus for the years 1996 to 2019. The Microcensus is an annual survey conducted by the German Federal Statistical Office that has been running since 1957 (until 1990 in West Germany only). It has many similarities with the American Community Survey (ACS). Both include questions on education and employment, and both sample a significant proportion of all households; in the case of the Microcensus, 1% of all German households. Because participation in the Microcensus, as in the ACS, is required by law, there is virtually no nonresponse. Moreover, there is no nonresponse for key items in the questionnaire, or it is negligible, as the participants are required to answer most questions. For an overview of the Microcensus, see Statistisches Bundesamt (2017, 2020).

The key variables that we use to construct WLE are birth year and age, employment status, and working hours. For the questions on which these indicators are based, responses are compulsory. We consider the 1941 to 1955 birth cohorts. Thus, our sample covers cohorts born during World War II and during the start of the baby boom, which began in Germany in the mid-1950s. Age is calculated for each individual as survey year minus year of birth and is thus defined as the age reached during the year. We count individuals as employed or unemployed following the conventions of the International Labor Organization. Individuals count as employed if they are working at least one hour per week; they are counted as unemployed if they are not employed, have been actively looking for work in the last four weeks, and are available to start work in the next two weeks. Individuals who are neither employed nor unemployed are classified as inactive. The working hours of an individual are captured through a question on the number of hours the respondent typically works in a week, including regular overtime (Statistisches Bundesamt 2020).

We stratify our analysis by gender (men/women) and by region (eastern Germany/western Germany), as well as by educational attainment and (former) occupation. Educational attainment is classified using a coarsened version of the International Standard Classification of Education (ISCED) of 1997 using three levels: low represents lower secondary education only (ISCED levels 0–2; e.g., *Mittlere Reife*: usually 10 years of education or less), medium represents upper or postsecondary nontertiary education (ISCED levels 3–4; e.g., vocational training, *Abitur*: usually between 12 and 13 years of education), and high represents tertiary education (ISCED levels 5–6; e.g., a university degree). While a more recent revision of the ISCED classification is available, we use the 1997 classification, as it can be consistently applied to all years we cover in the analysis, and using the more recent classification would essentially lead to the same assignment of educational levels to individuals. For occupation, we use the International Standard Classification of Occupations (ISCO) to distinguish four levels: low represents elementary occupations and unskilled labor (ISCO 9), medium low represents skilled workers (ISCO 4–8), medium high represents technicians and associate professionals (ISCO 3), and high represents professionals and managers (ISCO 1–2). For individuals who are no longer working, we assign their former job as occupation.

For additional explorative analyses, we use the German part of the Job Episodes Panel of the Survey on Health, Ageing and Retirement in Europe (SHARE). SHARE

is a longitudinal survey focusing on the population aged 50+ that has been conducted biannually since 2004/2005. The Job Episodes Panel includes retrospective data on working histories collected in the third (2008/2009) and the seventh (2017) waves of SHARE (for details, see Brugiavini et al. 2019).

Statistical Methods

To calculate WLE and to adjust it for working hours, we use a modified version of Sullivan's (1971) method, with which we can derive population-level aggregates of individual trajectories. The main components are age-specific employment rates and age-specific average working hours measured in full-time equivalents. For each year–age–cohort combination, we calculate the employment rate as the number of individuals in employment divided by the total number of individuals, whereby we weight individuals with the person-level survey weights provided with the Microcensus. The adjustment for working hours is then achieved by weighting employment rates with the ratio of average actual work hours to 40 hours; for example, if the average number of working hours is 30, the employment rate is multiplied by 0.75. Thus, assuming that a full-time work schedule is, on average, 40 hours per week, aWLE is reported in full-time equivalent years. In a few cases we combine the data of several years to estimate the average number of working hours when stratifying our analysis, because the number of working individuals is small for some socioeconomic groups shortly before retirement.

Using adjusted employment rates, we calculate aWLE over 10-year age intervals by cohort. Thus, we compute partial aWLE for a given age range, and not full aWLE until the end of life. We focus on WLE for ages 55 to 64—that is, aWLE in late working life. aWLE is estimated using the sum of the employment rates for ages 55 to 64 for each of the birth cohorts from 1941 to 1955. We have chosen to end WLE in late working life at age 64 and not at a higher age because although the statutory retirement age has increased to more than 65 years for some of the cohorts we cover, it has not yet reached age 66 for any of them. Moreover, employment levels after age 65 are rather low in Germany. Additional results for the 65 to 74 age range are provided in the online supplementary materials (Figure A7; all tables and figures designated with an “A” are available in the online supplement).

We decompose socioeconomic differences in aWLE into two components using Kitagawa's (1955) method, and in two different applications. In the first application, the first component shows to what extent the differences between occupational and educational groups are driven by differences in employment rates, while the second component shows the relative contributions of working hours to the differences. For instance, the difference in aWLE between two groups could be two years, with the first component being 70% and the second component being 30%. This would mean that 70% of the two-year difference is due to differences in employment rates between the two groups, while only 30% is due to differences in working hours. In the second application, we decompose differences in aWLE by gender and region into the differences due to combined employment rates and working hours conditional on education or occupation (component 1) and into the differences due to differences in educational or occupational composition (component 2). For example, the difference in aWLE between two groups could be three years, with 40% of this difference being due to differences in employment and working hours—that is, to people with the same

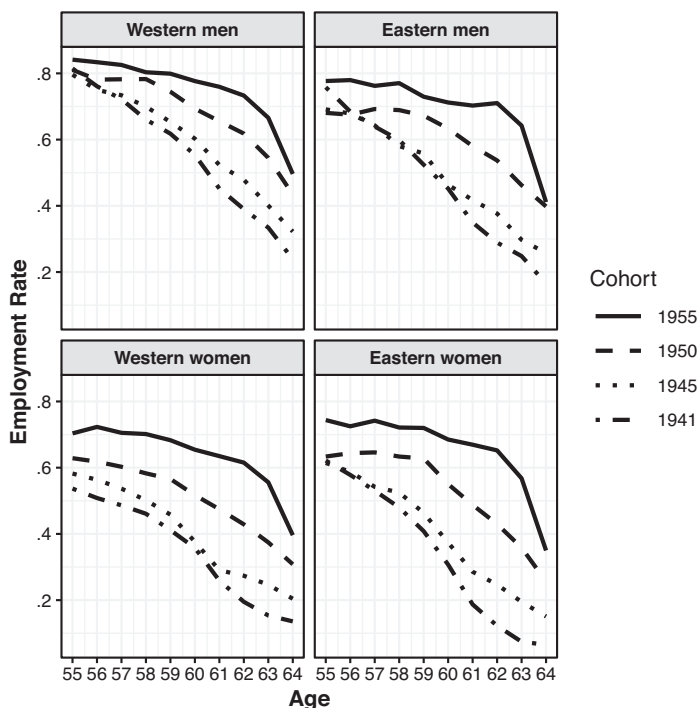


Fig. 1 Age-specific employment rates from ages 55 to 64 by gender and region (western/eastern Germany) for selected birth cohorts (1941, 1945, 1950, 1955). Source: Microcensus, authors’ calculations.

educational attainment in the two groups having different employment rates and working hours—and 60% of this difference being due to compositional differences—for example, to people with high educational attainment making up a smaller share of one group than the other.

The SAS and R code for our analysis is available online here: <https://osf.io/eb2qs/>.

Results

Sample Size and Employment Rates

For our estimates of WLE for the 55 to 64 age range, the smallest number of observations (person-waves) per cohort is for the 1945 cohort, for whom the data include 64,091 observations for men and women together. The cohort with the most observations is the 1941 cohort, with 108,306 observations. Generally, the number of observations per cohort roughly reflects the size of the cohort, with the cohorts born closest to the end of World War II being the smallest. Education and occupation by cohort are shown in the supplementary materials (Figures A1 and A2).

Before we turn to the WLE, we first show employment rates by age for the 55 to 64 age range for selected cohorts and subgroups (men and women in western and eastern Germany). The employment rate declines with age for all subgroups and cohorts and is around or below 50% for all groups and cohorts at age 64 (Figure 1). The

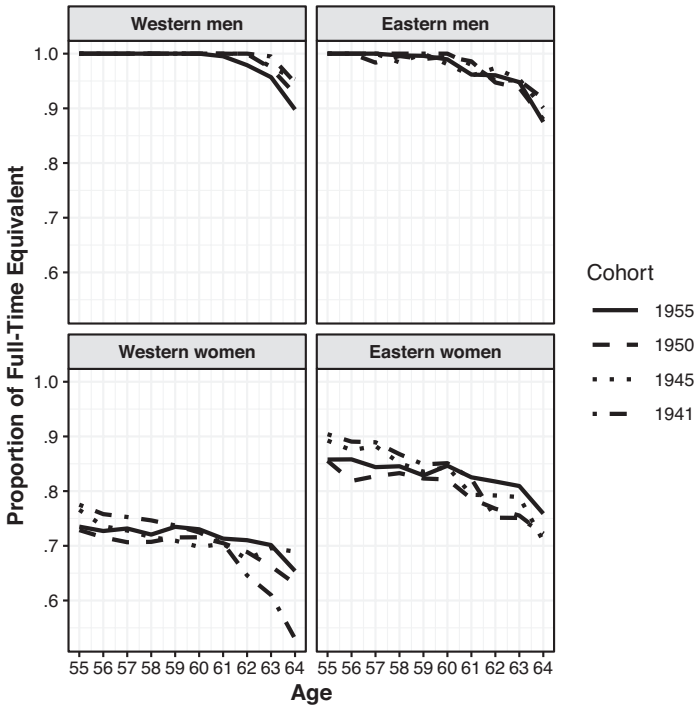


Fig. 2 Age-specific working hours as a proportion of full-time equivalent working hours (40 hours) from age 55 to age 64 by gender and region (western/eastern Germany) for selected birth cohorts (1941, 1945, 1950, 1955). *Source:* Microcensus, authors' calculations.

employment rate of the 1941 cohort declines almost linearly for all subgroups and is below 20% at age 64, except among western German men. In contrast, for the 1955 cohort, the employment rate declines at a much slower pace. While the differences between the 1941 and 1955 cohorts are comparatively small at age 55, they are largest at age 62 for all groups. At this age, the absolute difference ranges from 34 percentage points for western German men to 53 percentage points for eastern German women. The second component, which we use to calculate aWLE, is full-time equivalent working hours, which are shown in [Figure 2](#). Men in both western and eastern Germany are, on average, working full-time at ages 55 to 60, and their hours decline only slightly up to age 64. Among women, by contrast, full-time equivalent working hours are considerably lower, and the decline in working hours with age starts at the beginning of the age range. Additional results on employment rates and working hours by education and occupation are available in the supplementary materials (Figures A3–A6).

General Trends in the Length of Late Working Life

Trends in working life expectancy adjusted for working hours in late working life (ages 55 to 64) are shown in [Figure 3](#) by gender (men = solid line; women = dotted line) and region. Unadjusted WLE, which is more frequently reported in the literature, is shown

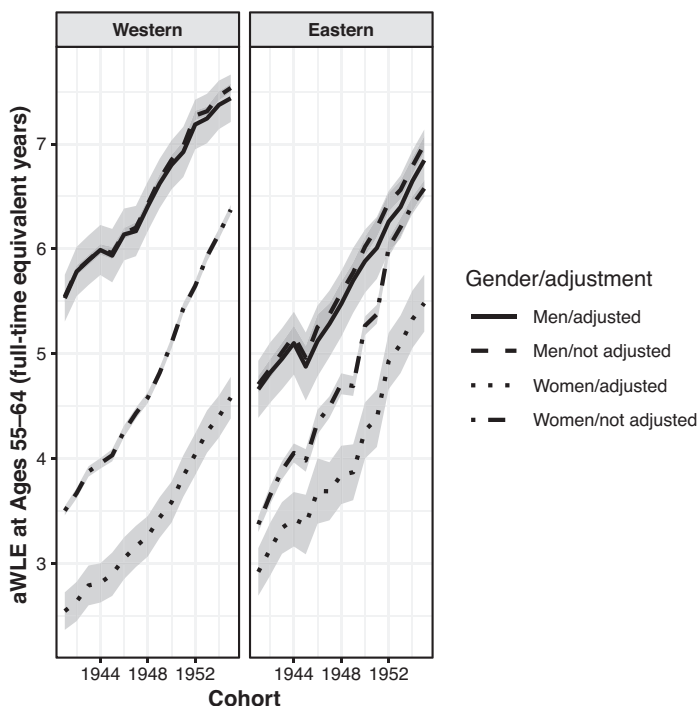


Fig. 3 Adjusted working life expectancy (aWLE; measured in full-time equivalent years) in late working life (ages 55 to 64) by birth cohort (1941–1955), region (western/eastern Germany), and gender (men = solid line; women = dotted line). 95% confidence intervals are shown as gray ribbons. Dashed and dot-dashed lines show WLE not adjusted for working hours (measured in years). *Source:* Microcensus, authors’ calculations.

as a dashed line for men and as dot-dashed for women. Both indicators can theoretically reach a maximum of 10 years for the analyzed age range. The solid line in the leftmost panel shows that men born in western Germany in 1941 could expect to work about 5.5 years in full-time equivalents during ages 55 to 64. Generally, all results for aWLE are measured in years in full-time equivalents. Western German men born in 1955 had an aWLE of 7.4 years, which implies an increase of aWLE of about 40% compared with the cohort of 1941. The 95% confidence intervals are shown as gray ribbons and are generally narrow around the point estimates owing to the large sample size for each cohort. Additional results for Germany in total and for both genders combined are provided in the supplementary materials (Tables A1 and A2).

Among the cohorts born between 1941 and 1955, the length of working life has been increasing for men and women in both eastern and western Germany. While the trend of increasing aWLE is rather consistent across subgroups, there are differences in the levels of WLE. For instance, in the most recent birth cohort covered in the analysis, aWLE is approximately 7.4 years for men in western Germany, while it is 4.6 years for women in western Germany. The gap in aWLE between men and women stays roughly constant in western Germany and declines slightly in the east, from 1.7 years for the 1941 cohort to 1.4 years for the 1955 cohort.

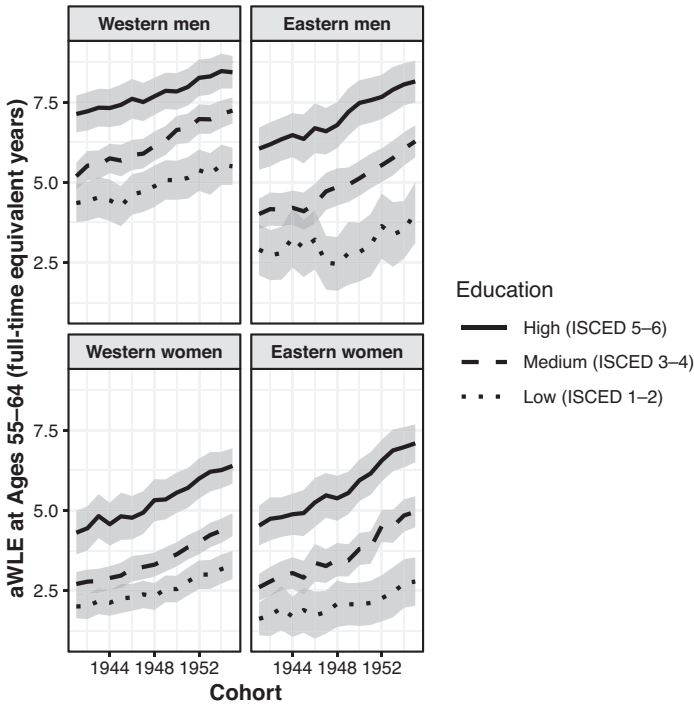


Fig. 4 Adjusted working life expectancy (aWLE; measured in full-time equivalent years) in late working life (ages 55 to 64) by birth cohort (1941–1955), region (western/eastern Germany), gender, and education according to the ISCED-97 classification. 95% confidence intervals are shown as gray ribbons, with overlapping confidence intervals shown in a darker shade. *Source:* Microcensus, authors' calculations.

While aWLE and WLE are rather similar for men, there are marked differences for women, with aWLE being considerably lower than WLE owing to the high prevalence of part-time work among German women, particularly in western Germany. This latter finding highlights the importance of accounting for working hours.

Comparing regional differences in aWLE by gender reveals that for men, the differences between western and eastern Germany have been relatively stable for most cohorts, with western German men generally having an advantage of between 0.8 and 0.9 years, which has, however, decreased to 0.6 years for recent cohorts. For women, the differences between the areas are reversed and have increased over time: compared with their western German counterparts, eastern German women born in 1941 could expect to work 0.4 more years, while those born in 1955 could expect to work 0.9 more years.

Educational Inequalities

Figure 4 shows aWLE in late working life by education. Overall, aWLE has been increasing for all educational groups, at least when the 1941 and 1955 cohorts are compared. For instance, the aWLE of western German men with high educational

attainment (ISCED 5–6) has increased by 1.3 years, from 7.1 years (1941 cohort) to 8.4 years (1955 cohort). For most other groups, the increase has been similar or higher, although there are some exceptions (see below). However, the levels of aWLE differ considerably between groups and display a clear positive social gradient. For the 1955 cohort, the group with the highest aWLE are western German men with high educational attainment (8.4 years), while the group with the lowest aWLE are eastern German women with low educational attainment (2.8 years). This means that measured in full-time equivalents, highly educated western German men work more than three times as long as eastern German women with low educational attainment.

Comparison of the aWLE by educational level within the regional and gender groups reveals that the differences are larger in eastern than in western Germany, and that the differences between the high- and the low-educated groups have been increasing in the former but changing little or not at all in the latter. This finding could at least partly be driven by the fact that in eastern Germany, the lowest educational group is smaller and more selective; the difference in aWLE between the highest and the lowest educated men has increased from 3.2 years for the 1941 cohort to 4.1 years for the 1955 cohort. Among eastern German women, this difference has developed roughly similarly, from 2.9 years (1941) to 4.3 years (1955), respectively. Among eastern German men, the increase in this difference is mostly due to a decline in aWLE of 0.7 years among low-educated men from the 1945 and 1946 cohorts to the 1947 and 1948 cohorts. Among the younger cohorts, aWLE has also steadily increased for the less educated.

Comparison of individuals with high education to individuals with medium education shows that the difference in aWLE declined, particularly among men in western Germany. For western German men, the difference in aWLE between high- and medium-educated individuals was 1.9 years for the 1941 cohort, while it was 1.2 years for the 1955 cohort.

Occupational Inequalities

The results for aWLE by occupation are shown in [Figure 5](#), where we distinguish four occupational levels based on the ISCO classification. aWLE has been increasing for all occupational groups in western and eastern Germany, and for both men and women. For example, the aWLE of eastern German women with a medium low occupational level has doubled from 2.4 years (1941 cohort) to 5.0 years (1955 cohort). Several other groups have experienced a similarly steep increase in aWLE. However, the differences between occupational levels are again rather large. For the 1955 cohort, western German men with a high occupational level have the highest aWLE, at 8.5 years, while eastern German women with a low occupational level have the lowest aWLE, at 3.2 years.

The occupational differences by gender and region are also marked and have been increasing among men: while the difference between the low and the medium low occupational level was 0.8 years for western German men of the 1941 cohort, it has increased to 1.9 years for the 1955 cohort. For eastern German men, these differences are 0.3 years (1941) and 2.0 years (1955), respectively.

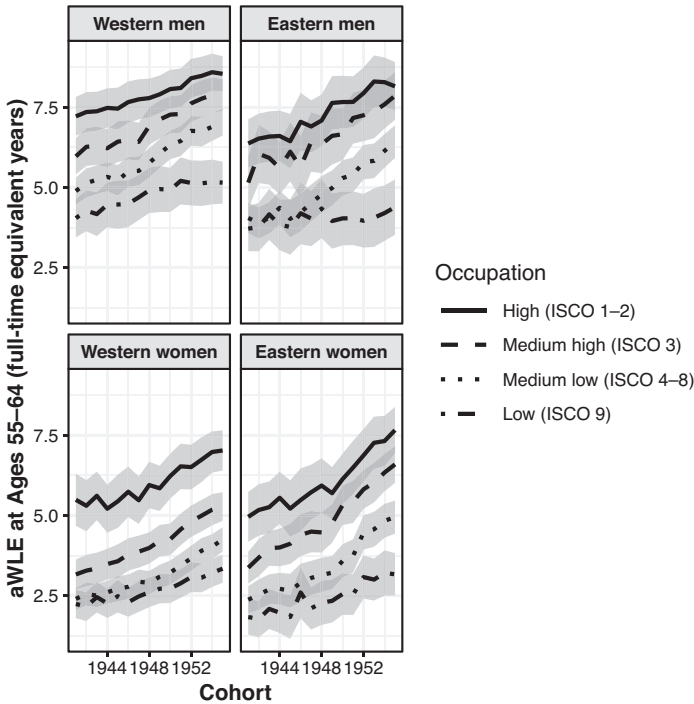


Fig. 5 Adjusted working life expectancy (aWLE; measured in full-time equivalent years) in late working life (ages 55 to 64) by birth cohort (1941–1955), region (western/eastern Germany), gender, and occupation according to the ISCO classification. 95% confidence intervals are shown as gray ribbons, with overlapping confidence intervals shown in a darker shade. *Source:* Microcensus, authors' calculations.

Where Do the Inequalities Come From?

The results of the decomposition analyses are presented in detail in the supplementary materials (Tables A3–A5). Here, we provide a summary of the key insights derived from these analyses. First, the differences in aWLE between men and women are largely due to differences in working hours, while the differences in aWLE between western and eastern German men are mainly attributable to differences in employment rates. Second, educational and occupational inequalities among men are largely driven by employment rates. Among women, by contrast, educational and occupational inequalities are affected by both employment rates and working hours. Finally, differences in group composition with respect to education and occupation cannot explain inequalities by gender and region, as individuals who have the same educational attainment or occupation, but belong to different groups (gender/region), have different employment rates and working hours.

Table 1 shows the proportion of lifetime from ages 55 to 64 spent in employment, unemployment, and retirement or out of the labor market (economically inactive). These results are again based on the 1955 cohort, and the outcomes are presented by gender, region, and education. The findings by occupation are available in the supplementary materials and are qualitatively similar (Table A6).

Table 1 Percentage of lifetime spent in each of three states (employed, unemployed, retired/inactive) from age 55 to age 64 for the 1955 cohort, by gender, region (western/eastern Germany), and education

Gender	Region	Education	Employed	Unemployed	Retired/Inactive
Men	Western	High (ISCED 5–6)	84.7	1.9	13.4
		Medium (ISCED 3–4)	74.1	3.5	22.5
		Low (ISCED 0–2)	59.1	6.5	34.4
	Eastern	High (ISCED 5–6)	82.2	3.9	13.9
		Medium (ISCED 3–4)	66.1	8.2	25.7
		Low (ISCED 0–2)	45.2	11.3	43.5
Women	Western	High (ISCED 5–6)	77.0	1.6	21.4
		Medium (ISCED 3–4)	64.5	2.3	33.2
		Low (ISCED 0–2)	50.3	3.4	46.3
	Eastern	High (ISCED 5–6)	78.9	3.0	18.0
		Medium (ISCED 3–4)	61.6	7.7	30.7
		Low (ISCED 0–2)	39.0	7.8	53.2

Source: Microcensus, own calculations.

Almost all groups spend at least 50% of their late working life in employment, except eastern German men and women with low educational attainment. For these groups, a large share is spent in retirement or inactivity, while the smallest share is spent in unemployment. However, the share spent in unemployment is larger for these groups than for other groups; for example, eastern German men with low educational attainment spent more than five times as long in unemployment as western German men with high educational attainment. More generally, for all groups, most of the lifetime not spent in employment is spent in retirement or inactivity, and only a small part is spent in unemployment.

Discussion

Main Findings

Using data from the German Microcensus for the years 1996 to 2019 and studying the 1941–1955 birth cohorts, we analyzed inequalities in the length of working life at the population level. Expanding on previous literature, we adjusted working life expectancy for working hours, which we called aWLE. Our findings showed that aWLE by birth cohort has been increasing steadily in Germany across educational and occupational groups, for both men and women, and in eastern and western Germany. However, the differences in the aWLE levels found between socioeconomic groups are very large. Individuals in the group with the highest aWLE (western German men with high educational attainment) work, on average, three times as many years as individuals in the least advantaged group (eastern German women with low educational attainment). Moreover, while aWLE has been increasing for all groups, some have experienced slower growth than others and are at risk of falling behind. This is particularly the case for men and women in eastern Germany with low educational attainment, and for men in both parts of the country working in elementary and unskilled jobs.

The steady increase in aWLE that we found is consistent with trends in employment rates at older ages, which have risen steadily in Germany since 2000 (e.g., Buchholz et al. 2013). This steady increase was likely caused, first, by the relatively strong performance of the German labor market in most of the years we covered and, second, by pension and labor market reforms (Hess et al. 2020). However, it is difficult to attribute this increase to specific reforms, as there have been many overlapping changes (Steiner 2017). While changes in the composition of cohorts, such as increasing educational attainment, likely also contributed to these trends, other factors have played a role as well. For instance, while western German men, like the other groups, have seen a steady increase in aWLE, their educational attainment has changed only slightly for the cohorts we studied (see the online supplementary materials). Interestingly, job changes are relatively rare: the SHARE Job Episodes Panel indicates that only about 5% of men and women change jobs while between ages 55 and 64. This means that the increase in aWLE is mainly due to individuals extending the time they spend in their final job before retirement, potentially explained by the high levels of labor protection and the insider–outsider nature of the German labor market. The share of working life contributed at ages 65 to 74 has also been increasing, but at a low level, which shows that work at these ages is still not the norm, although it is becoming more common (see the supplementary materials).

The gender gaps in aWLE that we observed are as expected: men work more years than women, and differences in education or occupation are not major drivers of gender differentials. Generally, women's employment rates have been considerably lower than men's for several reasons. First, the German tax system favors the male breadwinner model. Second, women face difficulties reentering the labor market after leaving work to raise children (Fasang et al. 2013). Moreover, while men usually work full-time, women often work part-time. Considering our additional analyses using SHARE data, we found that women are much more likely than men to transition from full-time to part-time work during late working life. Overall, most of the reasons for the gender gap in WLE at older working ages also apply at prime working ages. Thus, the differences we observe in late working life are at least partly a continuation of preexisting differences established at prime working ages.

The aWLE of men is lower in eastern Germany than in western Germany because in the former, unemployment is higher and there is less demand for older workers (Hess 2016). However, the gender gap in aWLE is lower in eastern than in western Germany, because eastern German women are more likely to work than their western counterparts (Simonson et al. 2011). In addition, eastern German women work more hours. Notably, differences in aWLE between the two regions have been decreasing slightly over the cohorts we studied, as labor market conditions have been improving in eastern Germany after a period of high unemployment in the 1990s (Schneider and Rinne 2019). For these reasons, aWLE (without distinguishing between gender) has been slightly higher in eastern Germany than in western Germany for recent cohorts (6.1 years vs. 6.0 years; see the supplementary materials). This suggests that to increase the length of working life, women must be more integrated into the labor market. Nevertheless, eastern–western differences persist and could be interpreted as a legacy of the division of Germany: the youngest birth cohorts we observed were 35 years old at the time of the reunification, which means that all of the cohorts we

studied were socialized in the German Democratic Republic, where female full-time employment was much more common than it was in West Germany.

Our findings on educational and occupational differentials in aWLE in late working life indicate that higher educational attainment and higher occupational status are associated with higher aWLE. Thus, for several reasons, the higher risk of unemployment that low-qualified individuals face in their late working life is not offset by staying in the labor market longer. First, the insider–outsider nature of the German labor market makes it difficult for unemployed older workers to find a job (Bennet and Möhring 2015). Second, it is still common for work contracts to terminate at the statutory retirement age (Börsch-Supan et al. 2021), which makes it difficult for some older people to work longer in the same job to compensate for past unemployment. Third, older people are often unable to continue working in physically demanding jobs. While our findings uncovered large socioeconomic differentials in unemployment, they also showed that the lifetime that disadvantaged groups do not spend in employment is mostly spent in retirement or out of the labor market. Moreover, a substantial fraction of the socioeconomic differences in aWLE we observed among women are driven by differences in working hours.

Both education and occupation interact with gender and region not just in the level of aWLE, but also in its changes over time. For instance, compared with other groups, eastern German men and women with low education have low levels of aWLE that are increasing at a slower pace. Moreover, men in low-skilled occupations in both eastern and western Germany have low aWLE and are at risk of falling behind other groups if the trends we identified continue. The latter is likely due to structural and technological changes, which are affecting men in low-skilled production occupations in particular (e.g., Oesch and Piccitto 2019), while the former is likely partly due to selection effects, as the group of individuals with low education has been shrinking, at least among women (see results in the supplementary materials).

Comparison of our findings to those of other studies of WLE is difficult, as many studies often use the period perspective, different age ranges, and different definitions of WLE. In particular, WLE is usually not adjusted for working hours. After restricting the calculations of unadjusted WLE to ages 55 and older for the United States, Dudel and Myrskylä (2020) found that men born in 1945 had a WLE of 7.3 years, while their female counterparts had a WLE of 6.4 years. Combining unadjusted WLE at ages 55 to 64 with unadjusted WLE at ages 65 to 74 for the 1945 cohort for all of Germany results in an unadjusted WLE of 7.0 years for men and 4.7 years for women. Thus, German men, but not German women, born in 1945 worked roughly as much as their U.S. counterparts. This implies that the gender gap in WLE for the 1945 cohort was considerably larger in Germany than it was in the United States, mainly owing to the comparatively low labor market integration of German women. However, socioeconomic differences do not seem to be much larger in Germany than they are in other countries, although the comparability of the available results is limited. Leinonen et al. (2018) reported for Finland that the difference in unadjusted WLE at age 50 between manual workers and upper nonmanual workers was four years, irrespective of gender. We found that unadjusted WLE at age 55 for German men born in 1945 was 9.2 years for those in professional and managerial positions (ISCO 1–2) and was about seven years for skilled workers (ISCO 4–8), resulting in

a difference of roughly two years. Finally, the trends in German WLE that we found are also roughly consistent with the trends reported in other countries, as WLE was generally increasing among the cohorts we observed. However, because these studies applied different age ranges and definitions, the levels they reported differed and are not directly comparable (Dudel and Myrskylä 2020; Leinonen et al. 2018).

Our findings also show that bridge jobs, phased retirement, and reentry into the labor market are much less common in Germany, and particularly among German men, than they are in other countries, such as the United States (Cahill et al. 2015; Calvo et al. 2018). These differences might be attributable to the high levels of labor protection in Germany. Moreover, while the financial crisis in 2007/2008 had a strong impact on WLE (Dudel and Myrskylä 2020) and amplified the destandardization of retirement trajectories in the United States, it had very little effect on WLE among older adults in Germany.

Methodological Considerations

Our findings showed that adjusting the length of working life for working hours (aWLE) leads to drastically different results for women than those previously reported in the literature (WLE), at least in terms of levels. However, both aWLE and WLE focus on paid work. This ignores many other ways in which jobs differ, and it leaves out unpaid labor. Only very recent projects on WLE have started to explore how these aspects can be taken into account, including unpaid work (Ophir 2022), in-work poverty (Hale et al. 2021), and precarious employment (Lozano and Rentería 2019).

While our analysis has provided evidence on inequalities in aWLE at the population level, we did not study the mechanisms that cause these inequalities, and there are many other dimensions along which WLE could be (further) stratified. For instance, we did not further disaggregate occupations, and we did not examine the self-employed and public servants, two groups that are distinct from the rest of the workforce, as different rules and laws apply to them (e.g., Schils 2008). Moreover, because aWLE aggregates many related but distinct processes, such as employment, unemployment, and retirement, assessing which process is causing inequalities in aWLE or changes over time is not straightforward. However, we provide additional results on the lifetime spent in unemployment and retirement, which can be used to disentangle these different processes at least to some extent (see Tables 1 and A6).

Finally, our application of Sullivan's method is not without assumptions. We do not adjust for mortality differences between groups, as we lack data on mortality by education or occupation. However, additional results (Figure A8) indicate that while accounting for mortality affects the results for men somewhat more than for women, it does not change our substantive findings. Thus, aWLE without mortality adjustment is biased, but not to a critical extent. Moreover, the socioeconomic mortality differentials are in the same direction as the differences in employment (Luy et al. 2015). This means that accounting for mortality would not reverse the group differences we find but would, instead, likely exacerbate them, making our estimates lower bounds of the actual group differences.

Conclusions

The length of late working life has been increasing in Germany. At the same time, however, there are substantial inequalities in the length of working life, and some socioeconomic groups are at risk of falling behind. This is partly because recent labor market reforms have focused mainly on pull factors that make leaving the labor market attractive and less on push factors that cause individuals to lose their employment and leave the labor market involuntarily (Buchholz et al. 2013). These reforms were mostly aimed at high-performing men who could choose whether to work. Such a one-size-fits-all approach ignores the different experiences of other groups (Krekula and Vickerstaff 2020; Wildman 2020). It will likely be challenging to design policies that extend working life while not putting an uneven burden on vulnerable groups. The pressure for additional reforms will increase as large birth cohorts are reaching retirement age. This pressure might be mitigated to some extent by further increases in WLE for cohorts born after 1955, as they have higher educational attainment than previous cohorts. However, forecasts for other countries indicate that improvements in WLE might stall in the near future, and that increases are not automatic (Dudel and Myrskylä 2020). Moreover, the COVID-19 pandemic may have increased the inequalities between socioeconomic groups, which could make implementing additional reforms more challenging in the years to come. ■

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Christian Dudel (corresponding author)

dudel@demogr.mpg.de

Dudel • Max Planck Institute for Demographic Research, Rostock, Germany; Federal Institute for Population Research (BiB), Wiesbaden, Germany; Max Planck–University of Helsinki Center for Social Inequalities in Population Health, Rostock, Germany, and Helsinki, Finland; <https://orcid.org/0000-0002-2985-6684>

Loichinger • Federal Institute for Population Research (BiB), Wiesbaden, Germany; <https://orcid.org/0000-0003-2538-5042>

Klüsener • Federal Institute for Population Research (BiB), Wiesbaden, Germany; University of Cologne, Cologne, Germany; Vytautas Magnus University, Kaunas, Lithuania; <https://orcid.org/0000-0003-0436-3565>

Sulak • Federal Institute for Population Research (BiB), Wiesbaden, Germany; <https://orcid.org/0000-0003-0425-8642>

Myrskylä • Max Planck Institute for Demographic Research, Rostock, Germany; Population Research Unit, University of Helsinki, Helsinki, Finland; Max Planck–University of Helsinki Center for Social Inequalities in Population Health, Rostock, Germany, and Helsinki, Finland; <http://orcid.org/0000-0003-4995-027X>