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IZA DP No. 12010

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A Cohort Analysis for Germany**

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ABSTRACT

Labour Market Participation and Atypical Employment over the Life Cycle: A Cohort Analysis for Germany*

We use data from the adult cohort of the National Education Panel Study to analyse the changes in the employment histories of cohorts born after World War II and the role of atypical employment in this context. Younger cohorts are characterised by acquiring more education, by entering into employment at a higher age, and by experiencing atypical employment more often. The latter is associated with much higher employment of women for younger cohorts. A sequence analysis of employment trajectories illustrates the opportunities and risks of atypical employment: The proportion of individuals whose entry into the labour market is almost exclusively characterised by atypical employment rises significantly across the cohorts. Moreover, a substantial part of the increase in atypical employment is due to the increased participation of women, with part-time jobs or mini-jobs playing an important role in re-entering the labour market after career breaks.

JEL Classification: J21, J42, J81

Keywords: atypical employment, regular employment, cohort differences, life cycle analysis, sequence analysis

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* This article is an extended and translated version of Bachmann et al. (2017).

1 Atypical employment in Germany: extent and importance

The recent thriving employment performance of the German labour market and its reasons have attracted considerable attention by policymakers and academics alike (Dustmann et al. 2014, Carrillo-Tudela et al. 2018). The increase of employment rates, however, went together with a considerable rise in wage inequality during the last decades (Card et al. 2013). Both the growth of employment and the rise in wage inequality are linked to the growing importance of atypical employment¹ for the German labour market. On the one hand, atypical employment has been an important driver of overall employment growth in Germany. The share of atypical employment in total employment rose from 12.8 per cent in 1991 to 20.8 per cent in 2015 (Statistisches Bundesamt 2016a). On the other hand, atypical employment is associated with a higher risk of unemployment and significant disadvantages in pay, and has contributed to rising wage inequality in Germany (Biewen et al. 2018, Brehmer and Seifert 2008, Gebel 2010, Giesecke and Groß 2002, Kvasnicka and Werwatz 2002, Paul 2016, and RWI 2016).

The welfare consequences of atypical employment depend crucially on its impact both on the labour market as a whole and at the individual level. We therefore examine the following research questions: (1) How has labour market participation evolved over the life cycle in recent decades? (2) What is the role of atypical employment, i.e. to what extent do workers pursue atypical employment over the course of their working lives and how have the corresponding employment profiles by age changed over time? (3) Which types of employment trajectories can be identified at the individual level?

The answer to the first question is the backbone for the following analyses. The importance of atypical employment in recent times can only be assessed if it is clear how the labour force participation developed over the life cycle when atypical employment played a smaller role than it does nowadays. Hence, our main empirical approach is to provide descriptive evidence on the life-cycle profile of different birth cohorts in this context (see also Section 2). This approach does not allow us to establish a counterfactual situation in the sense of a causal analysis and we thus cannot interpret it in the sense of a causal cohort effect. However, we are able to provide an encompassing portrait for different birth cohorts, which also makes it possible to make a comparison with the current situation.

The answer to the second question illustrates the importance of atypical employment for the labour market as a whole, and which subgroups of the population (by age and gender) are affected most. Combined with the first research question, we can relate general labour market participation to atypical employment, both over the life cycle and over time. This is particularly important for understanding the strong increase in female participation over time.

To answer the third question, we focus on individual employment trajectories and typical sequences of different employment forms (regular employment, atypical employment, unemployment, etc.) over the life cycle. Since periods of employment may have long-term effects on an individual's future employment trajectory, individual trajectories may deviate greatly from average behaviour. Atypical employment may therefore only be concentrated amongst certain groups of workers. We analyse these heterogeneities by depicting typical employment trajectories. This also allows us to make statements

¹The definition of atypical employment differs between studies and often depends on the underlying data source. Atypical employment is usually defined as employment in fixed-term, part-time, mini-job (marginal employment) or temporary employment. In this study, freelance work is also included (see Section 2). There are also differences between studies as to whether jobs in "large part-time" jobs, which are characterized by above-average working hours, are classified as atypical forms of employment. SVR (2008) discusses that a classification can be arbitrary to some extent and that "in reality, the dividing-line [runs] somewhere within the group of open-ended part-time contracts and [... is] probably floating and [depends] not only on the number of hours worked but also on other employment characteristics such as the level of pay". The present study follows the procedure in SVR (2008) and considers large part-time work as atypical employment and thus differs from the procedure of the Federal Statistical Office, which does not include large part-time work.

about the role and motives of atypical employment at specific points in individuals' employment histories. Atypical employment may, for example, facilitate access to the labour market at the first entry into the labour market or after career breaks, be a stepping stone to regular employment or represent the beginning of a permanent period of such employment. Which mechanism applies is controversially discussed in the literature and depends on the type of atypical employment. According to the Bundesagentur für Arbeit (2013), temporary agency work facilitates the access to the labour market for unemployed individuals. However, like fixed-term employment, it is associated with lock-in effects (Kvasnicka 2009, Brehmer and Seifert 2008). Similar lock-in effects are observed in part-time employment and marginal employment (Brehmer and Seifert 2008), although this is largely at the request of employees in order to better combine personal and family obligations with work or to gradually retire (RWI 2013, Wolf 2010).

Our analyses provide important implications for economic policy. For example, if involvement in atypical types of employment at early career stages is accompanied by a significantly reduced probability of ever achieving a stable full-time employment relationship, regulating atypical employment more strictly will be justified. Considering distributional aspects, if the increase in atypical employment is concentrated on relatively few people throughout their whole working lives, an economic policy response may be warranted. This will not be the case, if the increase is due to short periods of atypical employment for relatively many people.

We use a data set that links the survey data of the National Education Panel (NEPS) with administrative data (see Section 2) to answer the research questions. This allows us to study employment over the life cycle of individual workers. Hence, we can illustrate time spent in atypical employment throughout labour-market careers. Furthermore, we observe a wide range of birth cohorts (birth cohorts 1944 to 1986) and compare employment histories between these birth cohorts. Therefore, we provide descriptive evidence on the changing importance and role of atypical employment over time. Since we expect stark differences in employment histories of men and women, we carry out all analyses separately by gender. In order to capture longer-term developments, we mainly focus on the West German labour market.

A distinction between cohort, age and time effects is naturally difficult due to their linear dependence (e.g. Fitzenberger et al. 2004). For example, differences in the employment behaviour of cohorts can be an indication of structural changes, such as reforms of labour market institutions (time effects), but they can also be based on fundamental differences between cohorts, such as changes in educational attainment (cohort effects). This article does not seek to break down developments according to their individual causes (effects), but rather to describe and compare the different trajectories.

The most important contribution of this article to the existing literature thus lies in the life course perspective taken for different birth cohorts. This approach thus also offers a potential explanation for the rise in intragenerational inequality in lifetime earnings which has been observed in Germany already since the early 1960s (Bönke et al. 2015a). In a related vein, Bönke et al. (2015b) analyse the evolution of earnings volatility over the life course. They find an increase of earnings volatility (both permanent and transitory) across different cohorts in West Germany after 1960, particularly at labour market entry. This increase in earnings volatility is furthermore not restricted to low-income individuals, but is also observable for workers with higher earnings. The increased prevalence of atypical employment across cohorts, particularly (but not only) at labour market entry, which we document in this paper is a likely explanation for their findings.

From a methodological point of view, our analysis provides insights into the use of atypical employment in different periods of the working life and how this has changed over the past decades. We therefore

go beyond studies using (repeated) cross-sectional data, such as in SVR (2012). In comparison to causal analyses, for example those available for specific atypical employment forms such as fixed-term employment (Boockmann and Hagen 2008), temporary agency work (Kvasnicka 2009) and marginal employment, i.e. mini-jobs (Caliendo et al. 2016), this article concentrates on stages of the life cycle at which certain forms of atypical employment are dominant. In this context, the long-term analysis of employment trajectories allows us to make statements about the role these forms of employment play in the labour force participation of individual employees over the entire life cycle. To our knowledge, the only article that carries out a comparable analysis is Böhnke et al. (2015). The authors use the SOEP waves 2002 to 2011, so that different cohorts are observed in different phases of their labour-market career. However, cohorts overlap only partially, so that comparisons between the cohorts are not possible. This article, which is partly based on a research report for the BMAS for the preparation of the 5th Poverty and Wealth Report of the Federal Government (RWI 2016), is thus the first study to analyse the significance of atypical employment over the life cycle with a reliable comparison of different birth cohorts.

2 Data and definition of atypical employment

For our analyses, we use the survey data "NEPS-SC6-ADIAB". It comprises the starting cohort 6 "Adults" of the National Education Panel (NEPS),² which includes individuals born between 1944 and 1986. The survey contains, among other things, a range of information on the current living conditions of these individuals as well as their entire employment and education history (Blossfeld et al. 2011). The most recent wave that we consider for the analyses was conducted in 2012/13. A total of 17,137 individuals took part in the survey up to the corresponding wave. We link the survey data to administrative information from the Institute for Employment Research (IAB) given that the respondents agreed to a record linkage and could be identified in the Federal Labour Office's administrative data (Antoni and Eberle 2015). Overall, administrative records are available for 74 per cent of the survey respondents. The administrative data of the Federal Labour Office come from the weakly anonymous sample of integrated employment biographies of the IAB (version 1975 - 2012).³ These biographies contain, among other things, information on jobs subject to social security contributions (in West Germany from 1975, in East Germany from 1991) and cover a period up to December 31, 2012 at the latest. For the analyses, the survey and administrative data are combined, in order to distinguish atypical employment as comprehensively as possible and information on the type of employment is incomplete if the two data sources are analysed separately.⁴

² The NEPS data (doi:10.5157/NEPS:SC6:5.0.0) were collected from 2008 to 2013 as part of the Framework Programme for the Promotion of Empirical Educational Research funded by the Federal Ministry of Education and Research (BMBWF). Since 2014 NEPS has been funded by the Leibniz Institute for Educational Courses e.V. (LifBi) at the Otto-Friedrich-University Bamberg in cooperation with a Germany-wide network.

³ Access to the data was given via a guest stay at the Research Data Centre of the Federal Employment Agency at the Institute for Employment Research (FDZ) and subsequently via controlled remote data processing at the FDZ (project number: fdz872).

⁴ For the analysis, survey and administrative data had to be linked at the level of individual employment episodes. After detailed examination, a method was chosen which uses the survey data as the primary source and adds administrative information on the employment type (regular/marginal) and on the economic sector of the company. Further explanations can be found in RWI (2016). Among other things, the survey data were used as a primary source because they cover a wider range of employment episodes (e.g. self-employment, civil service and pre-1975 episodes) and a wider range of inactivity (e.g. training, other inactivity) and the chronological order of episodes was already checked for inconsistencies in the survey to minimise possible recall bias. It can be assumed that recall bias increases with the temporal distance to the interview. If this is the case and (short-term) atypical employment episodes are more likely to be affected by recall bias (and are thus under-recorded), this leads to an overestimation of the differences in cohort comparison.

The analysis takes into account the following forms of atypical employment: fixed-term employment, part-time employment (i.e. working less than 31 hours per week),⁵ marginal employment,⁶ temporary agency work⁷ and freelance work. Regular employment relationships are defined as dependent employment relationships with indefinite duration (employment subject to social security contributions or in civil service) on a full-time or close to full-time basis (i.e. at least 31 hours per week) outside the temporary agency employment sector. In addition to the types of atypical employment and the regular employment relationship mentioned above, "other" employment episodes constitute a residual group. The latter mainly include different types of self-employment (except self-employment which is defined as freelance work).

In order to show long-term changes in employment behaviour and the extent to which individuals are affected by atypical employment, four birth cohorts are distinguished: the birth cohorts 1944-53, 1954-63, 1964-73 and 1974-86. At the time of the last survey wave in 2012, individuals of the oldest birth cohort had in some cases already exceeded the age of 64 years, whereas individuals of the youngest birth cohort are no older than 38 years. The cohort comparison focuses primarily on individuals living in West Germany in January 1989, since the consequences of reunification for East Germans greatly impair the validity of cohort comparisons of employment profiles. Thus, we only conduct a comparison between East and West German individuals for the youngest cohort. East Germans refer to individuals who lived in East Germany (including Berlin) in January 1989.

3 Life cycle employment profiles by birth cohort and gender

In this section, we first examine, separately by gender and the four birth cohorts, when individuals are strongly and when they are rarely affected by atypical employment during their employment labour-market career. Also, we investigate which type of atypical employment occurs most frequently at different points of life. The following figures show the educational and labour force participation for individuals of the four birth cohorts from age 16 up to the current age of the interviewees (or at most up to age 64). We differentiate between the states "employment", "unemployment", "education and training" and "(other) inactivity". Thus, the state "other inactivity" does not include training periods. The state of "employment" is broken down into three types: "regular employment", "atypical employment" and "other work" (mainly self-employment). Atypical jobs are further divided into "fixed-term employment", "large part-time", "small part-time", "marginal employment", "temporary agency employment" and "freelance work".⁸ To keep the figures readable, no confidence intervals are shown.

⁵ Since in the retrospective survey data of the NEPS the number of working hours is only recorded at the beginning of each job spell, changes in working hours cannot be identified. At the same time, changes in marginal employment cannot be identified with sufficient precision by linking them to administrative data. Consequently, it is assumed for the analyses that these job characteristics do not change during the duration of an employment episode. The latter leads to some underestimation of transitions from full-time to part-time and from part-time to full-time.

⁶ The data do not allow for the identification of marginal employment relationships prior to 1999 and it is likely that in most cases these are classified as part-time before that date.

⁷ As in the previous literature for Germany, temporary agency employment is defined by the economic sector of the enterprise (cf. Kvasnicka 2009). Accordingly, a job is defined as temporary agency employment if the enterprise, according to the classification WZ 2008, belongs to the 3-digit (WZ group) "782 Temporary provision of labour" (or WZ group 745 according to WZ 2003/WZ 1993 or WZ group 865 according to WZ 1973, respectively) or, if this is missing, to the 2-digit (WZ department) "78 Placement and provision of labour".

⁸ If two or more of these states overlap within a month, the person is assigned a dominant status. The following hierarchy is used as the dominance rule: a) education and training, b) employment, c) unemployment, d) other inactivity. To the extent that individual employment relationships can be attributed to several of the atypical forms of employment, e.g. if a fixed-term part-time employment relationship exists, the forms of employment are each assigned to one of the atypical forms of employment according to a dominance rule. The following hierarchy is used for this purpose: a) freelance work, b) marginal employment, c) temporary agency employment, d) part-time work, e) fixed-term employment. If several employment

Given the sample sizes,⁹ however, it is evident that not every difference between cohorts is significantly different from zero. The confidence intervals generally comprise a range of no more than 3 percentage points for probabilities close to 10 per cent (and 90 per cent by analogy) and no more than 5 percentage points for probabilities close to 50 per cent.

The influence of the educational expansion in Germany during the 1960s and 1970s becomes visible in Figure 1, which shows the proportion of each cohort in education over its life cycle. Younger cohorts acquire considerably more and longer (formal) education and are therefore, in contrast to older cohorts, still significantly more likely to be in education in their mid-20s. This trend towards more education is somewhat more pronounced among women than among men. Acquiring more education implies that individuals enter the labour market later (see Figure 2). The proportion of employed men aged 25, for example, in the birth cohort 1974-86 is only 51 per cent compared to 66 per cent, 69 per cent and 75 per cent in the birth cohorts 1964-73, 1954-63 and 1944-53, respectively. At the age of 30 years and above, however, there are hardly any differences in the employment rates of men between the cohorts. Only the youngest cohort has a lower employment rate at the age of 30 years and older. The youngest cohort is more affected by unemployment than previous cohorts, in addition to the continuing higher rate of individuals in education.¹⁰

In the case of women, apart from the fact that younger cohorts enter the labour market later, it is particularly noticeable that (apart from the 1974-86 cohort) the employment rates of the younger cohorts are continuously above those of the older cohorts when looking at age 30 and above. For the birth cohorts 1974-86 such a development is also observable. Overall, women in younger cohorts are significantly more likely to be employed than women in earlier cohorts. The traditional role of a housewife, in which the woman takes care exclusively of the household and children without participating on the labour market, is increasingly rare amongst young women. Nevertheless, women are much less likely than men to be employed, especially in their mid-20s and mid-30s.

The importance of regular and atypical employment is displayed in Figure 3. It shows the ratio of regular employment and atypical employment to total employment.¹¹ Men and women in the youngest cohort (born 1974-86) are much less likely to be in regular employment at a young age and therefore more likely to be in atypical employment than individuals in the older cohorts. For example, while 87 per cent of men in employment born in 1944-53 and 1954-63 were in regular employment at the age of 25, this applies only to 68 per cent of men in employment born in 1974-86. For young workers, regular employment in recent years is no longer the standard, and atypical employment is no longer the exception. However, not only the youngest cohort of West German men is less likely to be in regular employment and correspondingly more likely to be in atypical employment than earlier cohorts. The cohort of 1964-73 already shows an average five to six percentage points lower rate of regular employment and three percentage points higher rate of atypical employment than the 1944-53 and 1954-

relationships are performed simultaneously, a dominant employment relationship is determined on the basis of the following dominance rule: a) regular employment, b) full-time or large part-time self-employment, c) fixed-term full-time employment, d) open-ended part-time employment, e) fixed-term part-time employment, f) temporary agency employment, g) freelance work or small part-time self-employment, h) minor employment.

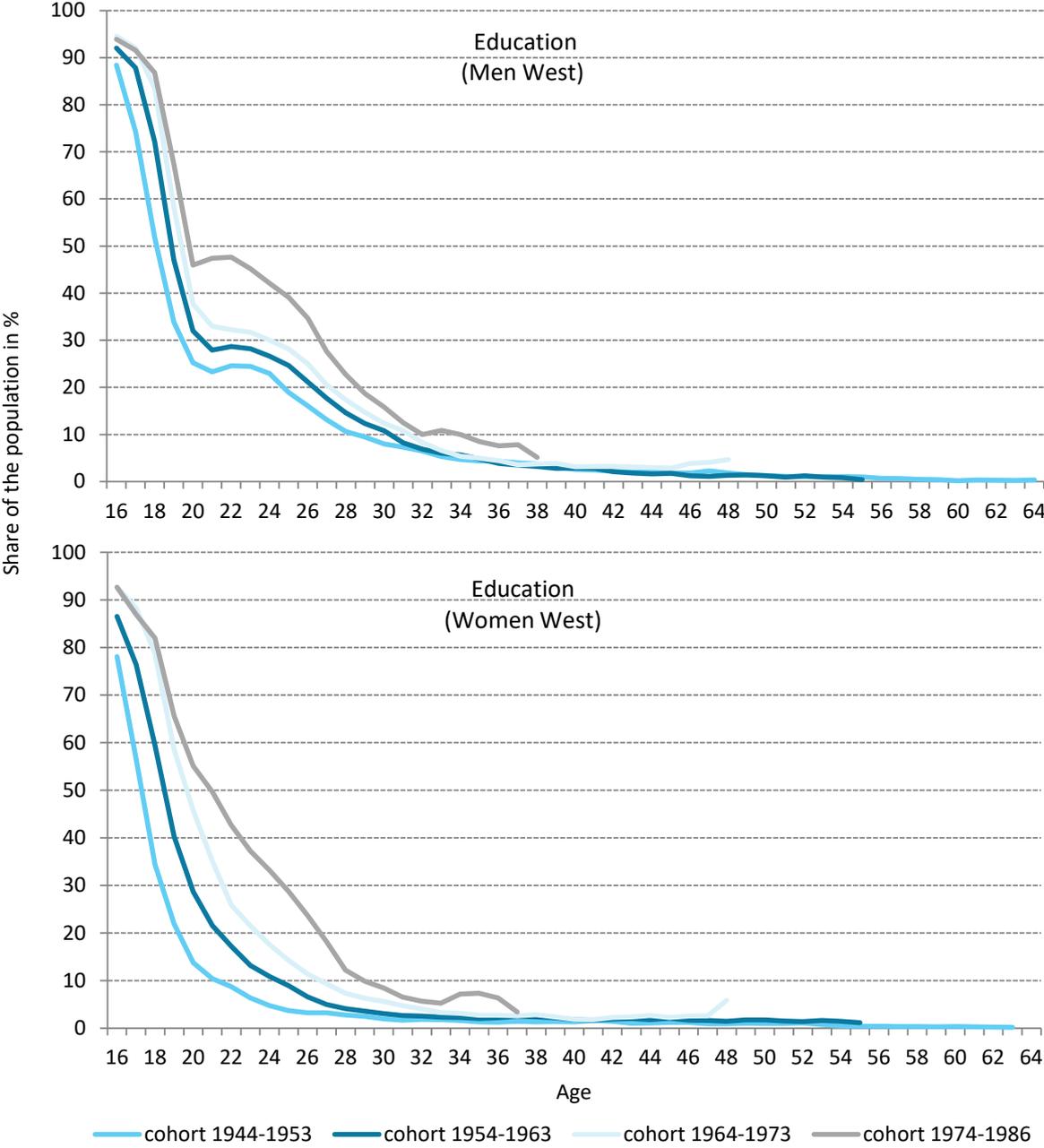
⁹ For the individual cohorts, the data include the following numbers of observation: a) 1944-53: 1458 men (West) and 1253 women (West), b) 1954-63: 1925 men (West) and 2073 women (West), c) 1964-73: 1618 men (West) and 1738 women (West), and d) 1974-86: 1307 men (West), 1283 women (West), 439 men (East), and 376 women (East).

¹⁰ In contrast, the proportion of inactive individuals who are not in education does not differ between the youngest and older cohorts of men (cf. RWI 2016). Compared to other European countries the extent of youth unemployment in Germany is low overall, even among younger cohorts (Eurofound 2012).

¹¹ See RWI (2016) for the share of other employees (i.e. in particular the self-employed). Self-employment usually increases with age and is more pronounced among men than among women. However, there are no major systematic differences between the cohorts.

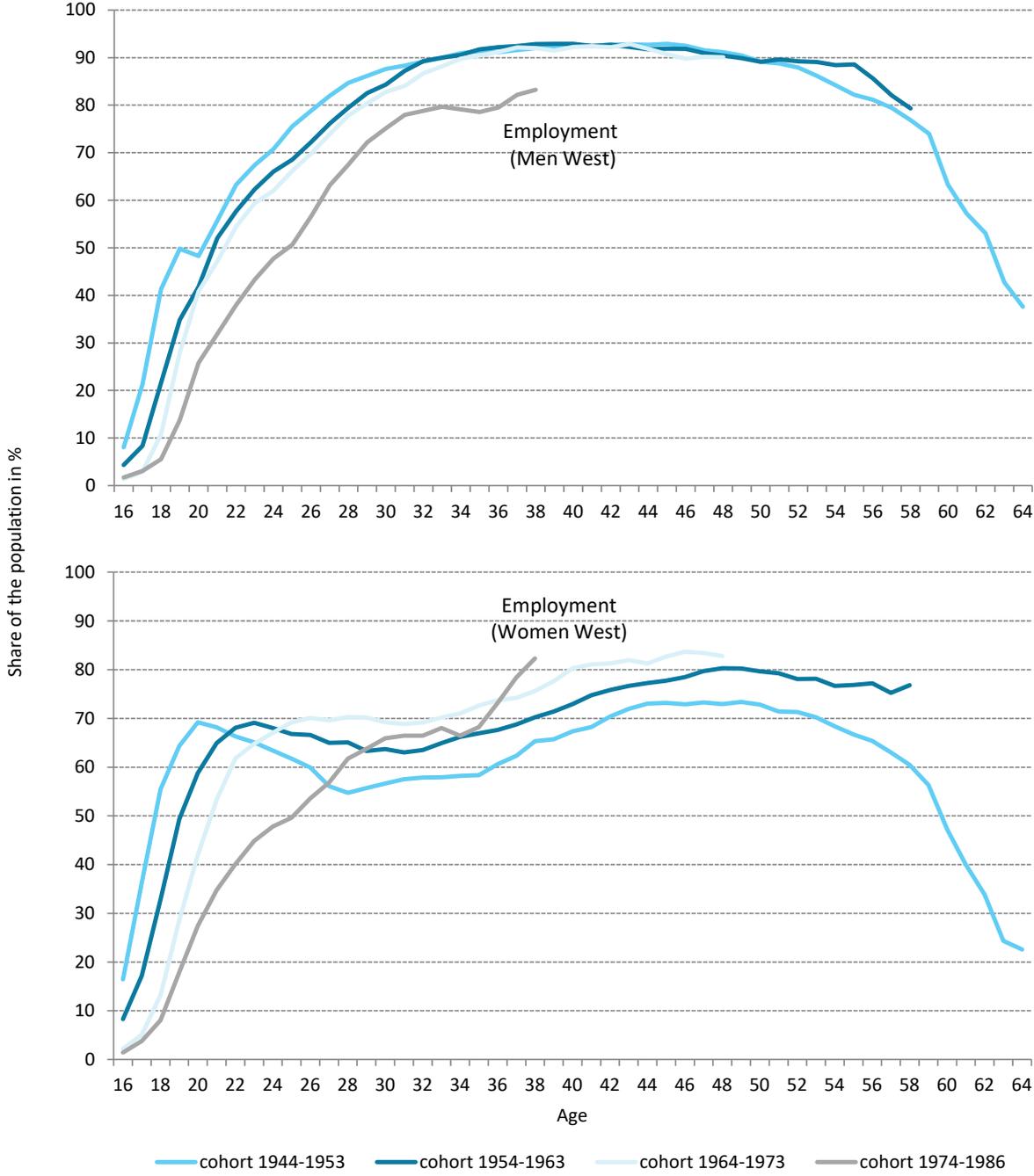
63 cohorts. Atypical employment for men is no longer concentrated exclusively on the first few years after entering the labour market, but is also increasing for middle ages. However, the vast majority of middle-aged men continue to work in regular employment and not in atypical jobs. Figure 3 also shows for men born in 1944-53 that the proportion of the atypically employed persons increases significantly towards the end of their working lives.

Figure 1: Share of persons in education by age, year of birth and sex



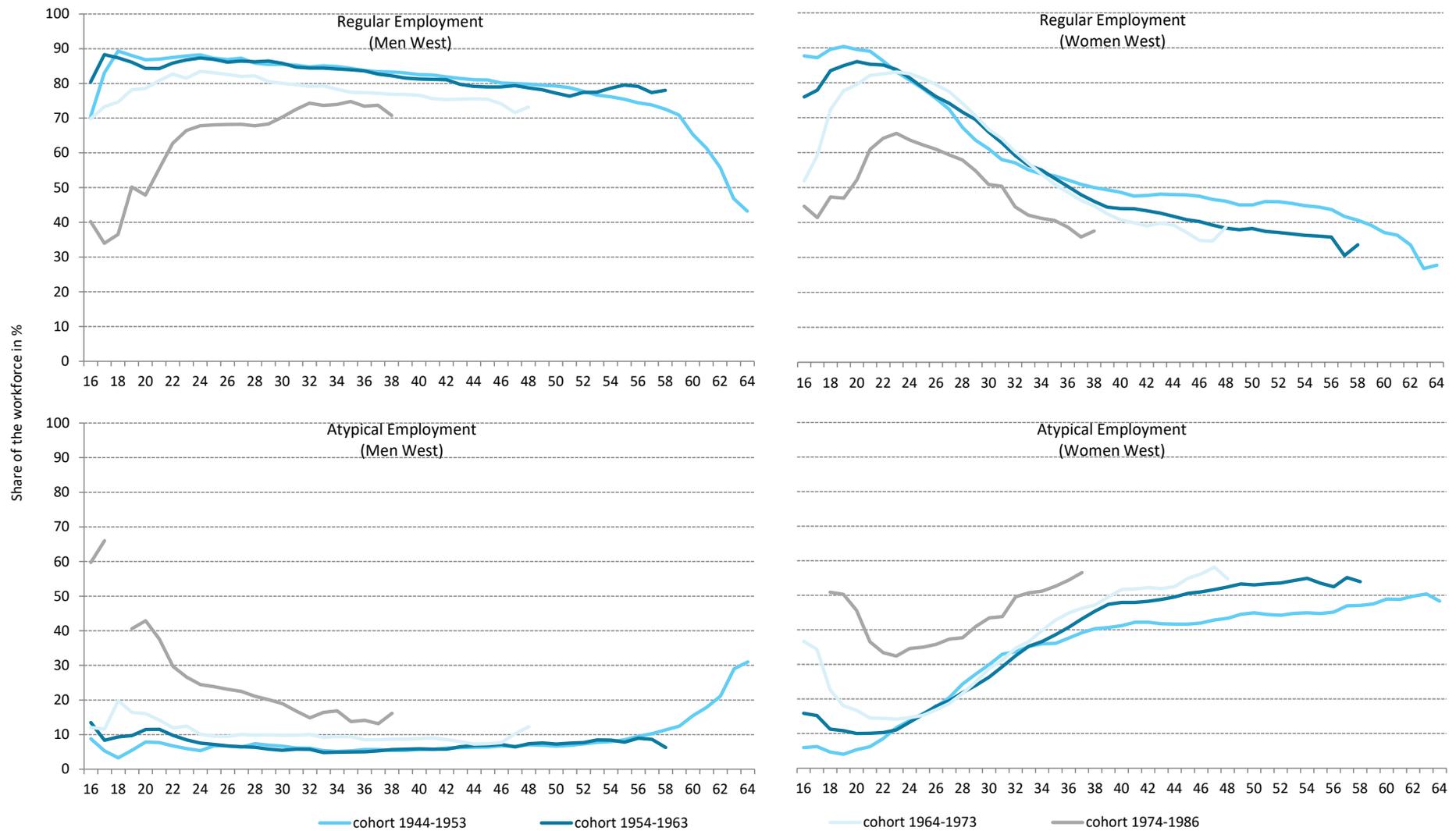
Source: NEPS-SC6-ADIAB, own calculations.

Figure 2: Employment rates by age, birth cohorts and sex



Source: NEPS-SC6-ADIAB, own calculations

Figure 3: Share of regular and atypical employees as a proportion of all employed persons by age, birth cohorts and sex



Source: NEPS-SC6-ADIAB, own calculations.

Note: Due to a small number of cases, some details are anonymised. The data series are interrupted at these points.

For women, the proportion of regular employees also fell across the cohorts, while the proportion of atypically employed persons rose (Figure 3). The decline in the ratio of regular employment to total employment across cohorts appears to be greater for women than for men. However, it should be noted that the employment rate of women has increased significantly in recent years (Figure 2). It can therefore be assumed that at least part of this development can be attributed to the increased re-entry of mothers into the labour market after childbirth, which often occurs part-time, while mothers of previous cohorts have stayed away from the labour market for longer periods or even permanently. Findings from Figure A1 in the appendix are consistent with this interpretation. It depicts employment rates relative to the total population instead of only employees. In relation to the total number of women, the drop in the share of regular employment among the middle-aged is significantly lower, and in some cases even an increase across cohorts can be observed. At the age of around 30, however, it is the youngest cohort that shows the lowest proportion of regular employees, as is the case for men. The share of atypically employed individuals in relation to the total population has increased significantly across all cohorts.

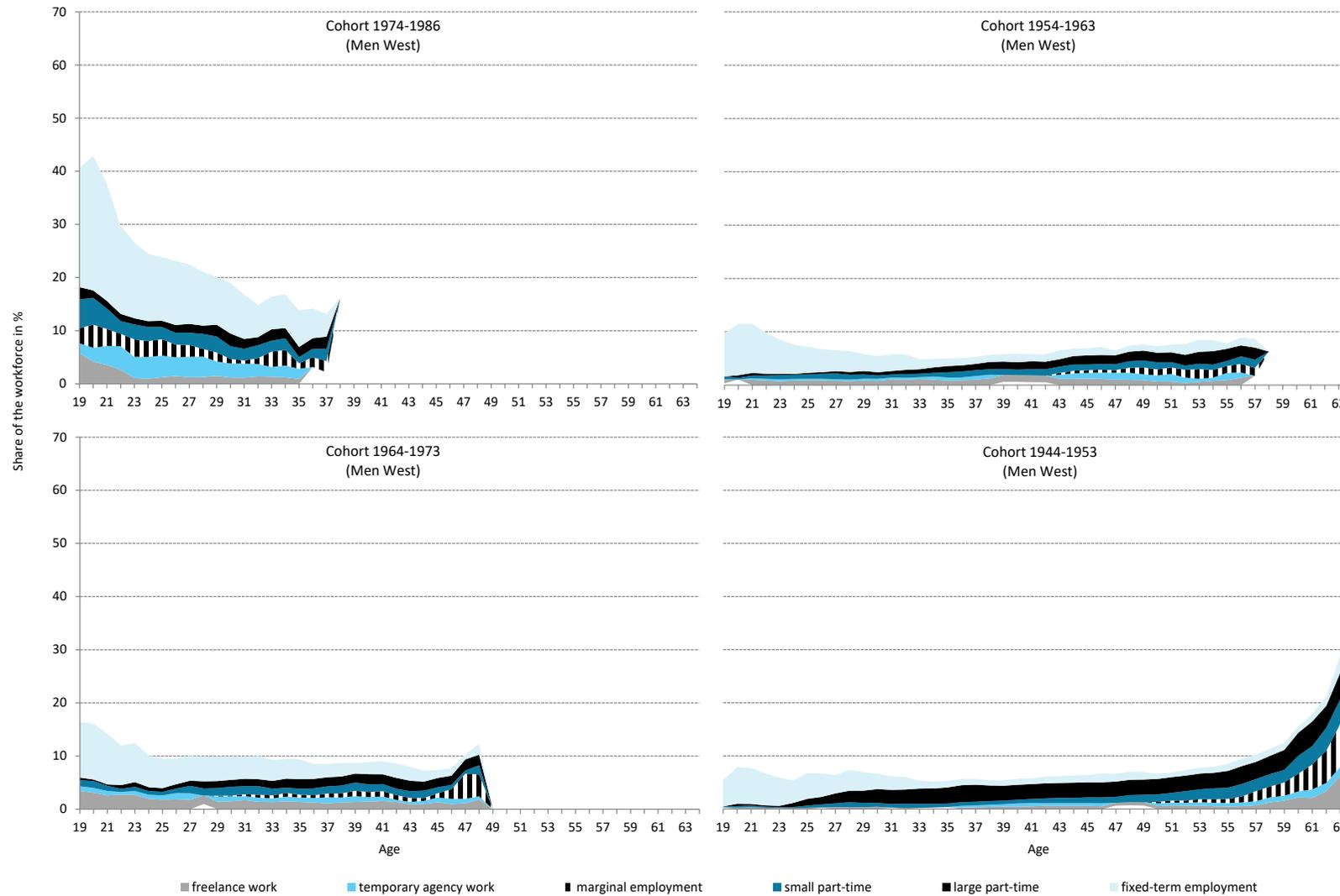
To draw a more complete picture of atypical employment, Figures 4 and 5 break down the rate of atypical employment according to its specific type. The reference for the calculation of the percentages is again the total number of employees.¹² For both men and women, fixed-term jobs are mainly performed at a young age and the proportion of fixed-term employees decreases continuously with age. Freelance work is also carried out mainly at the beginning of a career, but (by men) also particularly in the last few years before retirement. Furthermore, there are no striking differences across age in temporary agency work, with the share of the total workforce in temporary agency work being rather small in the data. Significant differences between the sexes can be observed in the proportion of part-time or marginal employees. For men, the proportion of part-time or marginal employees increases only marginally with age, whereas for women, the proportion of part-time or marginal employees increases continuously from the age of 20 onwards.

Apart from the overall increase in atypical employment among younger cohorts, no changes in the type of atypical employment are apparent across cohorts. For example, all forms of atypical employment are more common among men born between 1974 and 1986 than for the cohort born between 1964 and 1973. However, older cohorts do not record marginal employment until later in life, but younger cohorts do so at a younger age. This is partly a statistical artefact, as marginal employment can only be identified in the data from 1999 onwards and probably was recorded as small part-time jobs in the years before 1999.

The comparison of the distribution of the types of atypical employment between men and women clearly shows that the higher prevalence of atypical employment for women is rooted in significantly higher proportion of part-time and marginal employees. For women, the proportion of freelancers is also somewhat higher than for men, while the proportion of those employed in temporary agency work is lower on average. Furthermore, the share of temporary jobs for women seems to be somewhat lower than for men, but this is (at least partly) due to the fact that fixed-term part-time jobs are classified in the corresponding part-time categories and not in the temporary category (see footnote 8).

¹² For specific ages some specific forms of atypical employment cannot be reported, because the number of cases is too small. In these cases, the corresponding types of atypical employment are summarised and the difference to the total rate of atypical employment is shown (white area at the bottom of the figure). Due to too many such anonymizations at young ages, Figures 4 and 5 are restricted to age 19 onwards.

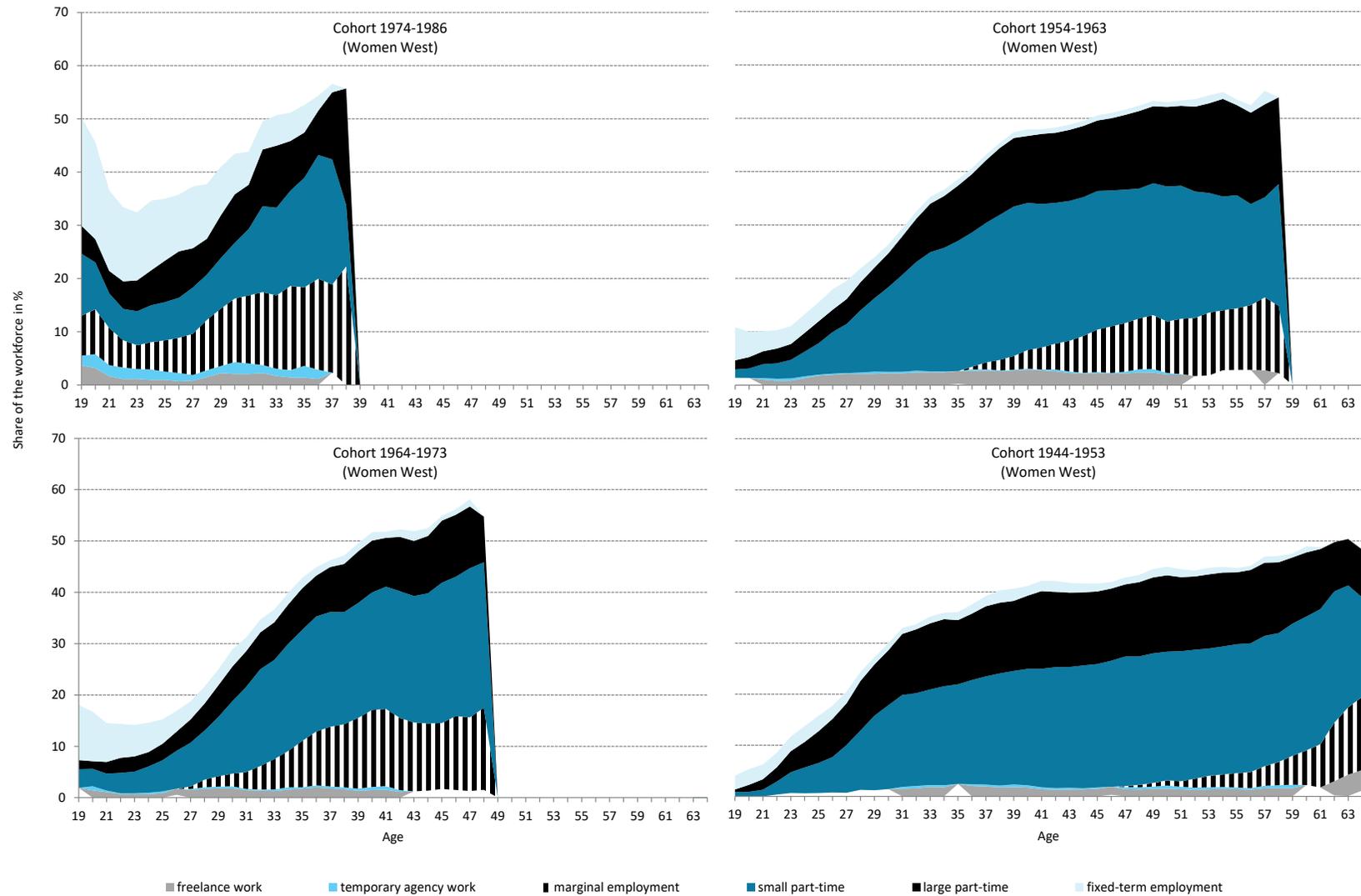
Figure 4: Type of atypical employment by age and cohort (men)



Source: NEPS-SC6-ADIAB, own calculations.

Note: Due to the small number of observations, some details are anonymised. The white area at the bottom of the figure shows the sum of the anonymized values.

Figure 5: Type of atypical employment by age and cohort (women)



Source: NEPS-SC6-ADIAB, own calculations.

Note: Due to the small number of observations, some details are anonymised. The white area at the bottom of the figure shows the sum of the anonymized values.

Differences between East and West Germany

For the youngest cohort, i.e. the birth cohorts 1974-86, the employment trajectories have largely taken place in a labour market of a market-based economy for East Germans, too, so that meaningful comparisons can be made with the corresponding Western cohort. Nevertheless, it should be noted that the situation in the labour market, especially in the first decade after the reunification, differed markedly between East and West Germany. This might have idiosyncratically shaped the employment trajectories of the cohorts. Also, the experience of their parents and their environment may lead to disparities

For men, the main differences lie in the duration of education and unemployment. The average proportion of men aged 20 to 30 in unemployment is almost 11 per cent in East Germany, which is more than one third higher than in the West (less than 7 per cent). On average, East German men are also less frequently in education or training, or for a shorter time period. By contrast, the differences in the proportion of employed individuals and in the proportion of regular and atypical employees among those employed are very small.

Overall, women in East and West Germany display very different employment histories. On the one hand, the employment rate in the East in the age range from the mid-20s to the mid-30s lies consistently above that in the West (on average by 5.4 percentage points). For example, 72 per cent of women in the East and only 67 per cent of women in the West are employed in their early to mid-30s (see Figure A2 in the appendix). West German women are much more likely to be inactive. On the other hand, employed women in East Germany in their mid-20s and early 30s are initially somewhat less likely to be in regular employment than employed women in West Germany. From the age of 30 onwards, however, they are more often regularly employed than employed women in West Germany (see Figure A3 in the appendix).¹³ At the same time, employed women in West Germany aged 30 and older are much more often in atypical employment and, in particular, more often in marginal employment or small part-time jobs (i.e. less than 21 hours per week) than women in East Germany, who are more likely to work in large part-time jobs (see Figure A4 in Annex). The differences in the share of fixed-term employees between East and West German women are rather small.

4 Typical employment trajectories: Results of a sequence analysis

The previous analysis of age employment profiles illustrated the average behaviour of the cohorts. Education and employment trajectories can deviate greatly from this average and may be very heterogeneous in terms of their sequence. This is of particular interest for labour market policy: a situation in which many people go through atypical employment at the beginning of their career, and then switch to stable full-time employment, is to be assessed differently from a situation in which atypical employment is concentrated on a certain group of individuals and has a negative influence on their entire employment histories. The aim of the following analyses is therefore to descriptively show potential heterogeneities. For this purpose, we analyse the entire employment trajectory of individuals aged 16 and above. Hence, the starting ages and duration of an individual's periods of education, atypical employment, regular employment, other gainful employment, unemployment or (other) inactivity are taken into account. From the large number of possible sequences of such episodes, similar patterns in

¹³ One reason for the higher proportion of atypically employed women among East German women in their mid-20s to early-30s could be that they are on average 1.5 to 2 years younger at the birth of their first child than West German women (cf. Statistisches Bundesamt 2016b).

employment trajectories are identified using the method of sequence analysis. From this, we derive types with similar employment trajectories, and identify differences between birth cohorts and men and women.

In the sequence analysis, we compare individual employment sequences with each other using the optimal matching method. First of all, we assign one of the six employment statuses listed above to each year of age at the individual level, starting from the age of 16.¹⁴ Subsequently, the distances between all individual employment trajectories are determined (so-called Levenshtein distance). The distance between two sequences will be higher if the two individuals experience different types of employment and if the timing of similar employment spells differs over the life course of two individuals. Graphically, this can be thought of as two sequences being placed next to each other and elements of the sequences being exchanged or deleted to make the sequences identical. The fewer adjustments are necessary, the more similar are the sequences and the smaller is their distance. Since there is a multitude of comparison possibilities, we apply the Needleman-Wunsch algorithm to arrange the sequences in such a way that the distances between all sequences are minimized (cf. Brzinsky-Fay et al. 2006). The resulting distances are divided into groups via a cluster analysis. Following WZB (2009) and RWI (2014), we use the Ward algorithm to group similar sequences. The Ward algorithm is a hierarchical-agglomerative cluster method that generates homogeneous clusters (cf. Böhnke et al. 2015).

To compare the cohorts as accurately as possible, we carry out sequence analyses separately for different age ranges. We distinguish a total of two age ranges. The age range from 16 to 30 can be examined for all four West German birth cohorts and the youngest East German cohort, and mainly represents the period of education and training and the first entry into employment. The age range of 16 to 40 years can be considered for the three West German cohorts 1944-53, 1954-63 and 1964-73. In addition to the first entry into employment, it also represents the early part of the main employment phase. The youngest birth cohort (1974-86) cannot be taken into account here, as the majority of individuals in that cohort are still younger than 30 years at the time of the last survey or are only slightly older. For reasons of space, no further age ranges are presented, as they show only very few developments that are not already observed in the younger age ranges.

We determine the typical career paths jointly for men and women. For the subsequent analysis of the frequencies of the employment trajectory types and their change across the cohorts, we portray results separately by gender. The number of different types with similar sequences is determined such that the types created are as different as possible and the results can be interpreted as meaningful as possible. First, we present the results for the age range 16 to 30.

Education and first job entry

For this stage of life up to age 30, we distinguish eight types of employment sequences. Figure 6 shows the average number of years spent per employment state for each type. Since the order in which the average durations are presented does not have to correspond to the sequences actually realized, Figure 7 shows for each type the most prevalent employment state at each year of life. This is determined using the modal value. This representation also makes it possible to illustrate differences in the sequences. Finally, separately by gender, Figure 8 shows the proportion of the different types of employment

¹⁴ In life years in which a person has several (employment) states, a dominant state is defined. First, the criterion of maximum state duration in one year of life applies. If several statuses per year have the same duration, a rule of dominance similar to that in Section 3 is applied (see footnote 8): education dominates all other statuses, followed by regular employment, atypical employment, other employment, unemployment and finally (other) inactivity.

trajectories in each cohort. As already noted in Section 3, we point out that not every difference in the proportions between cohorts is significantly different from zero. For the available sample sizes, the confidence intervals typically include a range of no more than 1.5 percentage points for shares close to 2 per cent, no more than 3 percentage points for shares close to 10 per cent, and no more than 5 percentage points for shares close to 50 per cent.

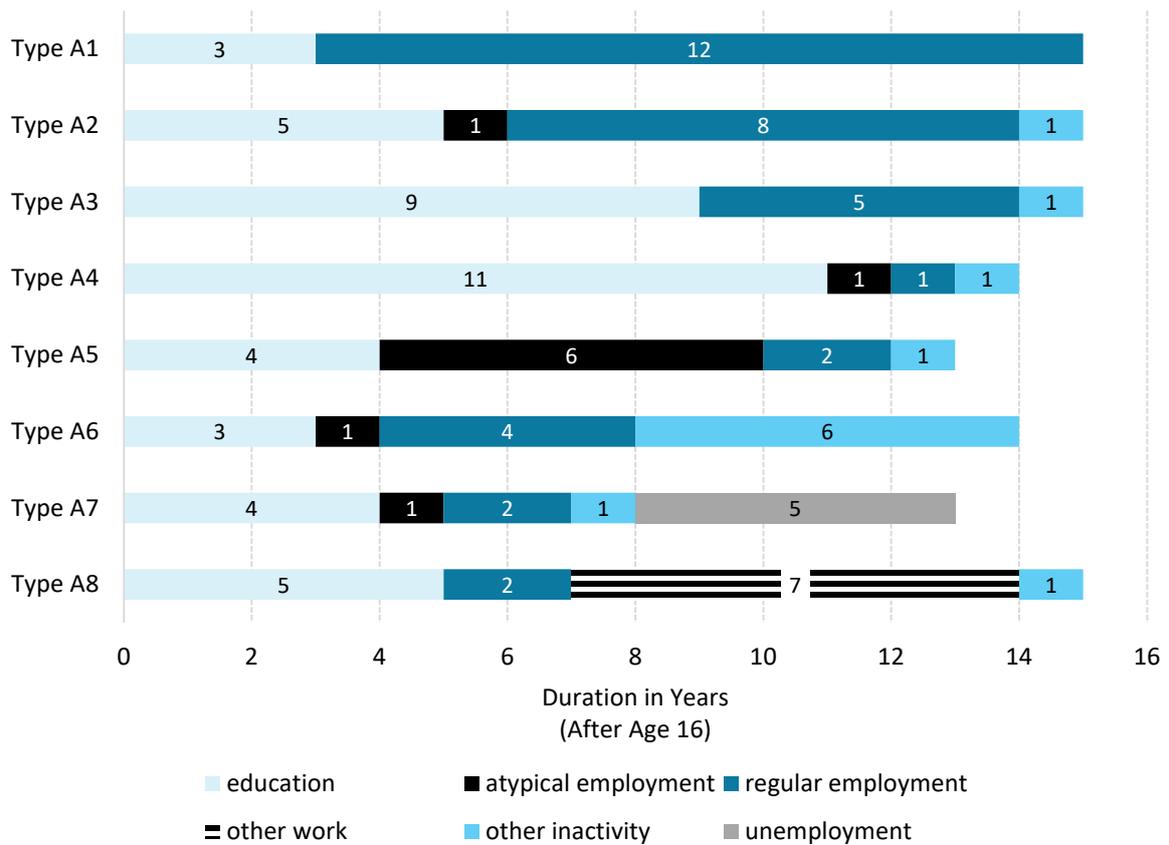
Three types can be identified that enter regular employment relatively quickly after the first entry into the labour market, and whose entry into the labour market can therefore be described as unproblematic (types A1, A2 and A3). The main difference between the types is in the duration of the preceding education and training. The shift in the importance of the respective types across the cohorts that is due to the educational expansion becomes visible in this picture, particularly for men. For example, while 42 per cent of the West German men in the 1944-53 birth cohort still had a relatively short period in education and a rapid transition to regular employment (type A1), only 8 per cent of the West German men in the 1974-86 cohort still show this pattern. Type A2 with a somewhat longer period in education shows a small decline across the male birth cohorts from 18 per cent to 14 per cent, too. On the other hand, the share of the type with a long (presumably mostly academic) education and a rapid transition to regular employment (type A3) increased from 14 per cent to 21 per cent in the corresponding cohorts. In addition, one type can be identified which is almost exclusively in the training system until the age of 30 (type A4) and whose share in the oldest cohort was 12 per cent of men in West Germany, compared to 36 per cent in the youngest cohort. Among West German women, the share of type A4 has risen from 3 per cent in the oldest to 34 per cent in the youngest cohort, too. Although starting from a lower initial value, but to a similar extent as for men, the proportion of West German women of type A1 fell from 26 per cent to 6 per cent.

Individuals with longer periods of atypical employment in the labour market entry phase are depicted in type A5. Their share is significantly higher among women than among men and has increased in both groups over time. In the youngest cohort of West German men, 9 per cent are of this type, in the corresponding cohort of West German women 14 per cent show this employment pattern. For the cohort born three decades earlier, the share of this type of employment trajectory with longer periods in atypical employment was only about half as high.

Type A6 has an employment pattern that already includes long periods of inactivity up to age 30. Between education and inactivity there are only short periods of employment, but these are usually regular instead of atypical. Type A6 occurs almost exclusively among women and represents the traditional housewife. In a comparison of cohorts, their proportion fell from 36 per cent among women born in 1944-53 to 11 per cent among women born in 1974-86. On the one hand, this decline can be attributed to the lower proportion of women who withdraw completely from the labour market over a longer period after the birth of a child, but on the other hand, in view of the comparatively short age range up to 30 years, to a shift in age at first birth (cf. Statistisches Bundesamt 2008). Many women, especially of the youngest cohort, are already older than 30 years at the time of their first birth.

Another type of employment history (A7) mainly comprises individuals with very difficult entry into the labour market. Although representatives of the group have several years of employment, unemployment is the primary state after the relatively short period in education. The share of this type is rather low overall. Among West German men, the proportion has increased across the cohorts from about 2 per cent in the oldest cohort to about 4 per cent in the youngest cohort. Among West German women, the corresponding proportion is somewhat higher, but it has increased less strongly across the cohorts.

Figure 6: Average duration of employment state by employment type (age range 16-30)



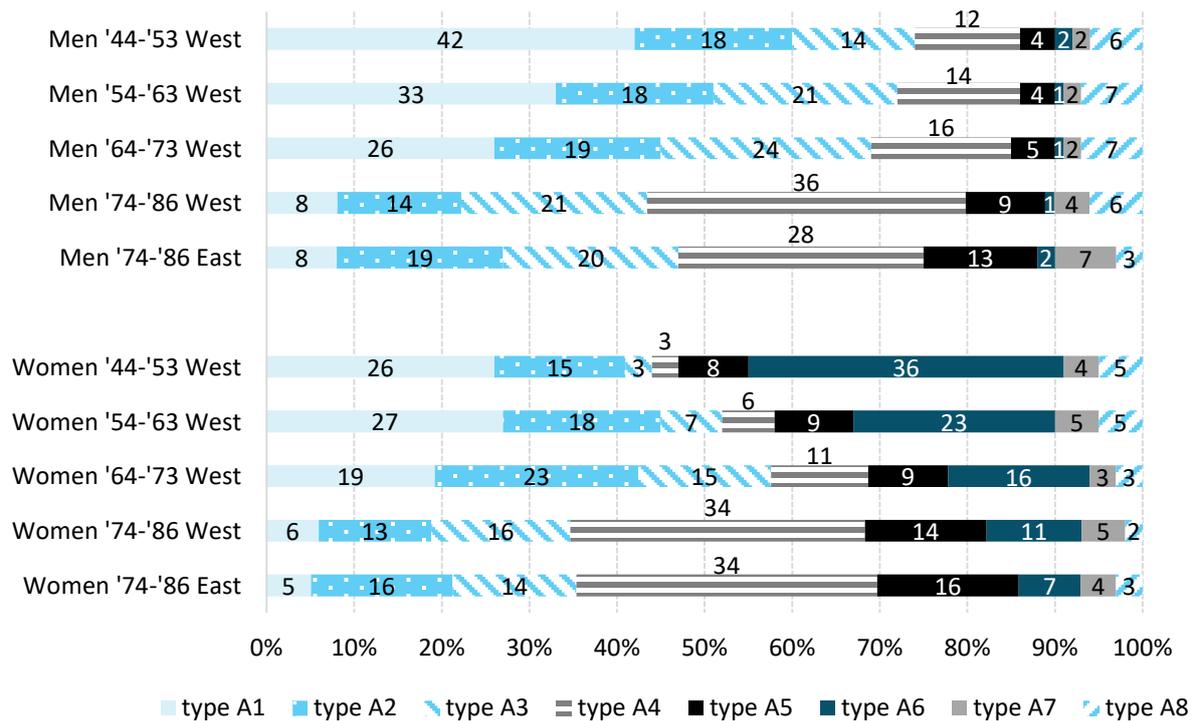
Source: NEPS-SC6-ADIAB, own calculations.

Figure 7: Dominant employment state by age and type of employment (age range 16-30)



Source: NEPS-SC6-ADIAB, own calculations.

Figure 8: Share of employment types by cohort and sex (age range 16-30)



Source: NEPS-SC6-ADIAB, own calculations.

Finally, type A8 represents the labour market entry of self-employed individuals. For men, the proportion is about 6 to 7 per cent and there is no clear trend across the cohorts; for women, the proportion is somewhat lower and falls across the cohorts from about 5 to only 2 per cent in the youngest cohort.

A comparison of East and West for the youngest cohort shows that self-employed careers (type A8) are pursued only half as often by East German men up to 30 years of age and that problematic entry into the labour market is more frequent than in the West. The proportion of type A7 with long unemployment periods is almost twice as high for East German men as for West German men, and type A5 with longer periods of atypical employment is also much more common for men in the East than in the West. Longer periods in atypical employment (type A5) are also slightly more common among East German women than among West German women. On the other hand, East German women are much less likely to show an employment pattern with a long period of inactivity (type A6). Extremely long periods in education without labour force participation before the age of 30 (type A4) are also much rarer among East German men than among West German men.

In summary, for the first period of entry into employment, changes in educational attainment and the general increase in the proportion of working women have led to significant shifts in employment patterns. At the same time, especially for type A5, it becomes apparent that it is increasingly difficult for men and women in the younger cohorts to enter the labour market and that they work in atypical employment for longer periods of time. If instead of using 8 types of trajectories we differentiate a larger number of types, it is not only for type A5 that there is a marked increase in the proportion of individuals who are severely affected by atypical employment. A subgroup of type A4, i.e. individuals with a long phase in education, also shows a strong involvement in atypical employment when entering the labour market. The importance of this subgroup also increases significantly across the cohorts, for example

from 4 per cent in the oldest to 9 per cent in the youngest cohort for men and from 1 to 13 per cent for women, respectively.

Early main employment period

For the age range from 16 to 40, which covers not only the first labour market entry but also the early main employment period, we distinguish between eight types of employment trajectories. The average number of years per employment state is shown in Figure 9, the most prevalent employment state at each year of age is shown in Figure 10, and the proportion of the different types of employment trajectories in each cohort are shown in Figure 11.

In the age range from 16 to 40, two types of employment can be observed which after leaving education are mainly active in regular employment and which differ primarily in the duration of education and training (types B1 and B2). In the case of men, the educational expansion and the associated shift from type B1 to type B2 is visible. In addition, the sum of the shares of the two types with long periods in regular employment decreases slightly over the birth cohorts. In the oldest cohort these two types of trajectories account for 73 per cent, in the cohort 1954-63 about 74 per cent and in the cohort 1964-73 about 69 per cent. In the case of women, however, the proportion of the two types with long periods in regular employment increases from a total of about 28 per cent in the 1944-53 cohorts, over 32 per cent in the 1954-63 cohort, to about 35 per cent in the 1964-73 cohort.

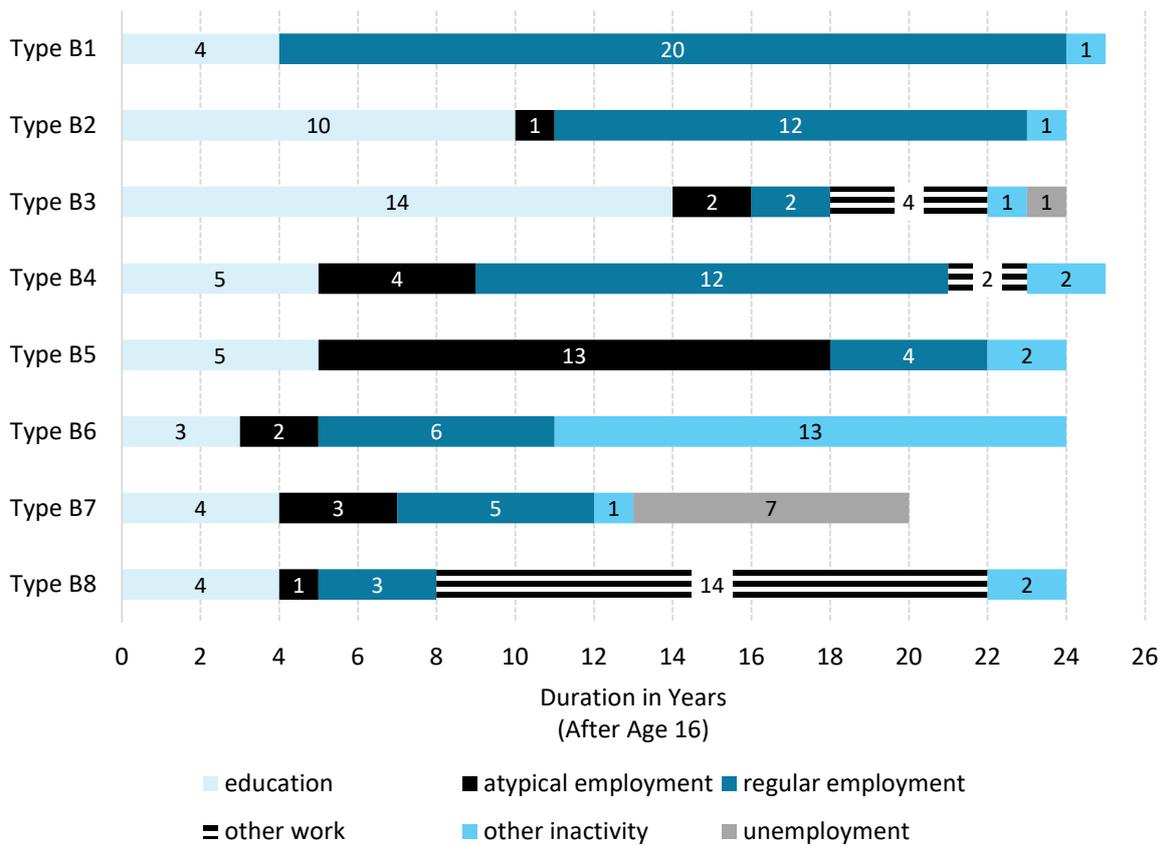
Substantially longer periods in education with quite heterogeneous entry into employment can be observed for type B3. Periods in atypical and regular employment as well as in self-employment are distinctive of this highly educated group. Compared with employment types B1 and B2, however, entry into the labour market is clearly less smooth. The share of type B3 is significantly higher for both men and women for younger cohorts than for older cohorts.

Employment trajectory type B4 is characterised by long periods spent in regular employment and shorter periods in atypical employment, self-employment or inactivity. Figure 10 suggests that atypical employment follows rather than precedes regular employment, suggesting late parenthood with rapid re-entry into the labour market (initially via atypical or self-employment). However, the proportion of type B4 among men, especially in the oldest cohort, is no smaller than among women (6 per cent each). Comparing the cohorts, the share of this type of employment is constant among men, but it has almost doubled among women until cohort 1964-73 (to 11 per cent).

Type B5 enters atypical employment much earlier and remains there longer, and is very prevalent among women in particular. Representatives of this employment pattern up to the age of 40 spend an average of 13 years in atypical employment. These are mainly mothers who take only short breaks from work after childbirth and then return quickly to the labour market, mainly part-time or in mini-jobs. In the oldest cohort of West German women (born 1944-53), this type of employment trajectory accounts for 19 per cent; in the 1964-73 cohort, a significant share of 26 per cent of women return to work quickly. In contrast, the proportion of women who are not employed in the long term (type B6) decreases across the cohorts from 33 per cent in the 1944-53 birth cohort to 14 per cent in the 1964-73 birth cohort.¹⁵

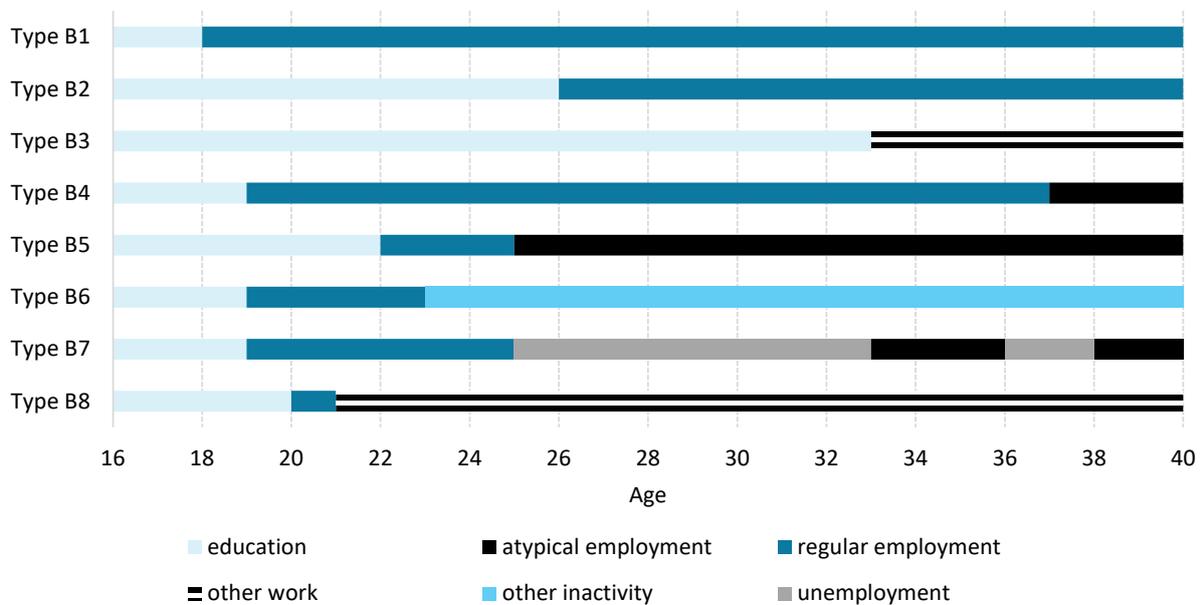
¹⁵ Looking at the age range from 16 to 50, it can be seen that the group of women with a long period of inactivity after the birth of a child (type B6) appears to be divided into two subtypes. One of these types remains largely absent from the labour market even in the fifth decade of life. The other type returns to the labour market primarily via atypical employment during the fifth decade of life after a long period of inactivity which on average lasts 12 years. Here, too, a change towards a stronger labour market orientation of women can be observed for subsequent birth cohorts; in the oldest cohort, 16 per cent leave the labour market permanently, while in the subsequent cohort it is only half that share.

Figure 9: Average duration of employment state by type of employment (age range 16-40)



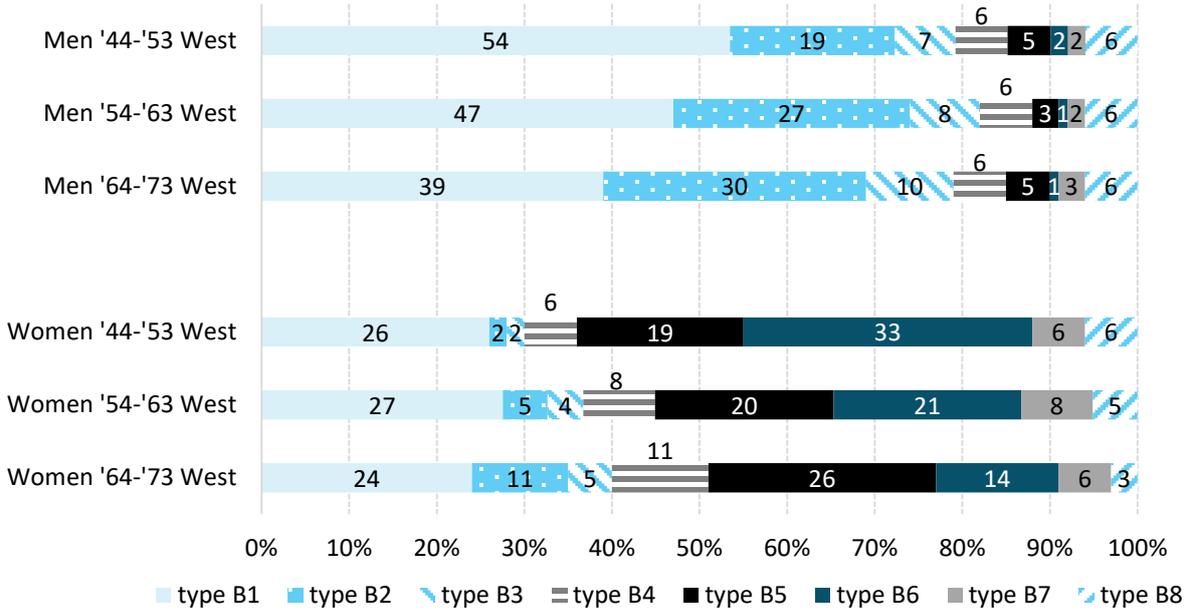
Source: NEPS-SC6-ADIAB, own calculations.

Figure 10: Dominant employment state by age and employment type (age range 16-40)



Source: NEPS-SC6-ADIAB, own calculations.

Figure 11: Share of employment types by cohort and sex (age range 16-40)



Source: NEPS-SC6-ADIAB, own calculations.

For the proportion of self-employed (type B8) and the proportion of individuals affected by permanent unemployment (type B7) only minor changes can be observed between the cohorts. Type B7 has relatively short periods of regular employment (most likely at the beginning of employment) and longer periods of unemployment, sometimes alternating with shorter periods of atypical employment. Moreover, for some life stages, no concrete information is available on the employment state, which is why the average durations shown in Figure 9 are lower in total than for the other types of employment trajectories.

5 Summary and Conclusion

The recent growth in employment in Germany, but also the increase in atypical employment and income inequality has attracted considerable attention recently (e.g. Card et al. 2013, Dustmann et al. 2014). Taking a life-cycle perspective, we therefore examine three closely related issues which are highly relevant in this context: the development of labour force participation over the life cycle, the role of atypical employment in this context and, finally, the identification of typical employment trajectories at the individual level. All three topics deal with differences between birth cohorts, so that developments over time become visible, which are informative about welfare consequences at the individual level and about related economic policies. Our results can be summarized as follows.

First, employment patterns across the cohorts born since WWII have changed significantly. To start with, younger cohorts are characterized by a longer period in education and a corresponding later entry into the labour market, which can be attributed to the educational expansion. There has also been a fundamental change in the employment behaviour of women. After the birth of a child, women are less likely to leave the labour market for extended periods of time and are more likely to return to work relatively quickly.

Second, atypical employment plays a crucial role in this context. In general, the importance of atypical employment is increasing across cohorts. For women, the growing prevalence of atypical employment

is closely linked to the development of labour market participation, as much of the increase in employment takes place in the form of atypical employment, mainly part-time and mini-jobs. The proportion of women in permanent and predominantly regular employment in the age range 25 to 40 is rising in part across cohorts, but appears to have changed little in the age group 40 and above.

Third, looking at individual employment trajectories over the life cycle, various distinct patterns can be identified. A comparison of the different cohorts for women shows a relatively strong departure from the model of the traditional housewife and thus a stronger focus on labour market participation, albeit with a reduced number of hours. As the sequence analysis of the period in education and training and the first entry into employment shows, entry into the labour market is increasingly more difficult for men from younger than from older cohorts and is characterised by longer periods of atypical employment. This phenomenon can also be observed among formally well-trained persons.

Overall, atypical employment has increased in Germany, especially in the form of two patterns across cohorts; firstly as an opportunity for women to enter the labour market despite childcare obligations, and secondly in the form of increasingly insecure entry into employment. The latter pattern could be a potential explanation for the rise in both the intragenerational earnings inequality and the rise in earnings volatility over the life cycle which have been documented for Germany since the 1960s (Bönke et al. 2015a, 2015b). It should however be pointed out that the present paper, due to its primarily descriptive approach, cannot clarify whether insecure entry into employment serves as a stepping stone or rather leads to a dead end. The causal literature partly questions the stepping-stone function or attests it only to a small extent (Caliendo et al. 2016, Kvasnicka 2009).

Given the descriptive nature of this analysis, economic policy conclusions should be drawn with caution. Nevertheless, some relevant evidence emerges in this context. First, the close link between the increase in women's employment and the importance of atypical employment – especially as a way of re-entering the labour market after a career break – shows that increased regulation of atypical employment could have negative side effects on women's participation in the labour market. In a labour market characterised by a labour surplus, for example, this would be the case when the attractiveness of part-time work for employers decreases. On the other hand, the stricter regulation could also lead to an increase in labour supply, which could mean higher labour market participation in a labour market characterised by skills shortages. Secondly, the importance of atypical employment for women indicates that the reconciliation of family and working life remains problematic, at least if a quick return to full-time employment is considered desirable. Further efforts should therefore be made in this area, in particular with regard to the availability of childcare (e.g. Schober and Spieß 2014), so that families seeking full-time employment for both partners can achieve it. Thirdly, the development of atypical employment and its effects should be studied further in the light of previous findings on negative wage effects, employment probabilities, and uncertainty about a possible stepping-stone function, which are also relevant for men, for whom the corresponding employment histories now occur frequently, too.

In addition to the latter point, some open questions remain for future analysis. The cohort being very strongly affected by atypical employment when it first enters the labour market has not yet entered the main employment period in a sufficient number. The future must show whether a possible transition to regular employment only takes place later than was the case for earlier cohorts or whether careers in persistently insecure or otherwise (unintentionally) atypical employment relationships arise to a relevant extent. It also remains to be seen when and how the decline in atypical employment reported in SVR (2015) in the period from 2010 to 2014 will be reflected in long-term employment patterns.

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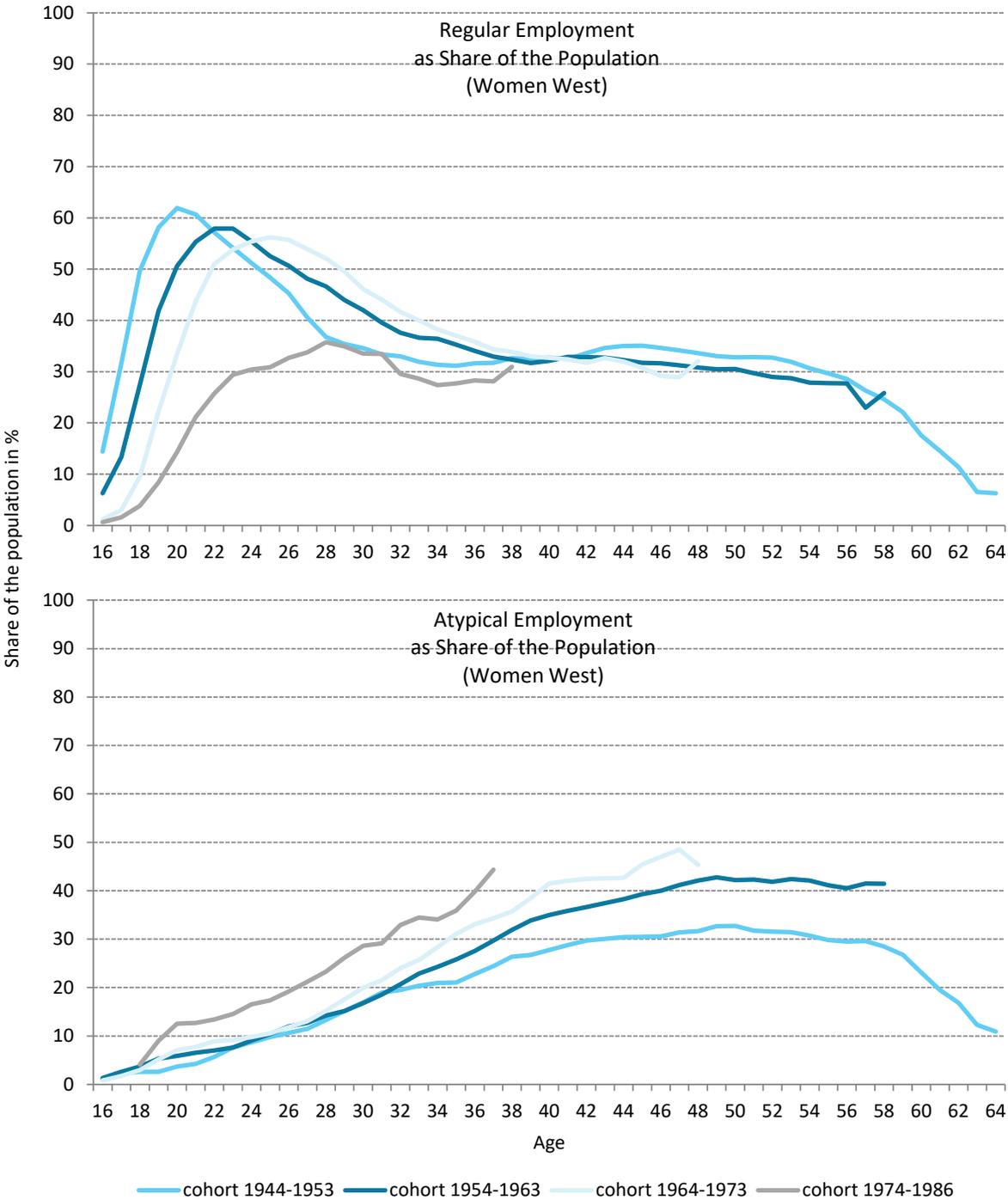
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Appendix

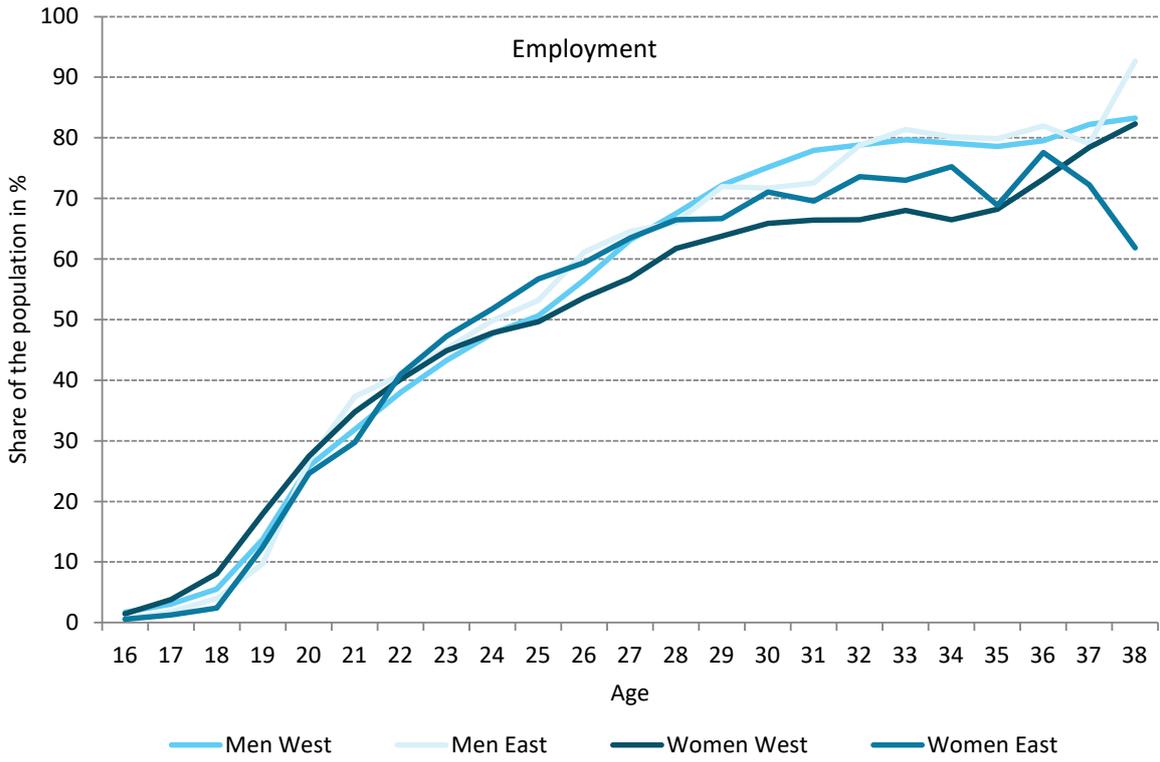
Figure A1: Share of regular and atypical employees as a proportion of the total population by age (women)



Source: NEPS-SC6-ADIAB, own calculations.

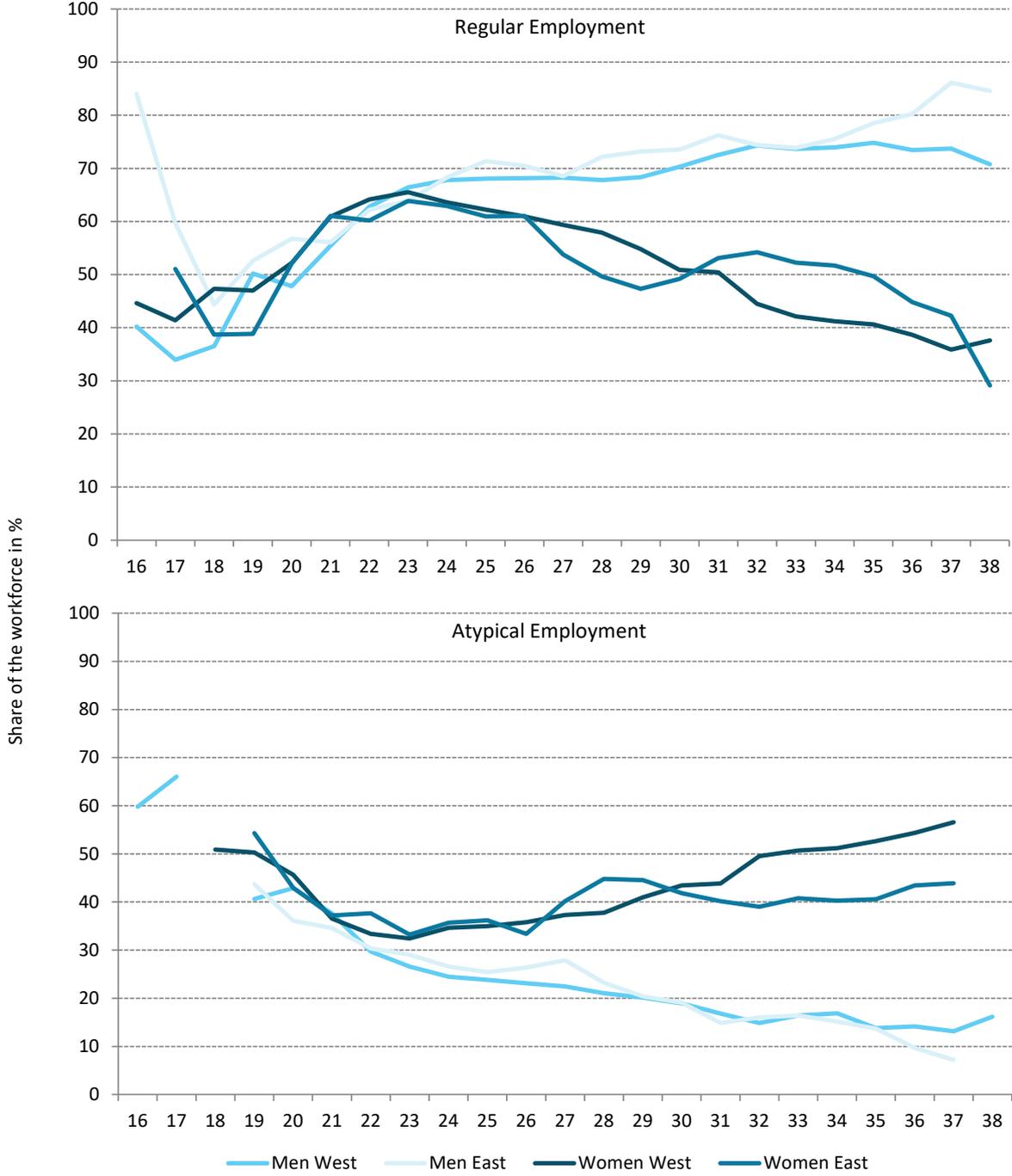
Note: Due to the small number of observations, some details are anonymised. The data series are interrupted at the respective points.

Figure A2: Employment rates by age, sex and region (age group 1974-86)



Source: NEPS-SC6-ADIAB, own calculations.

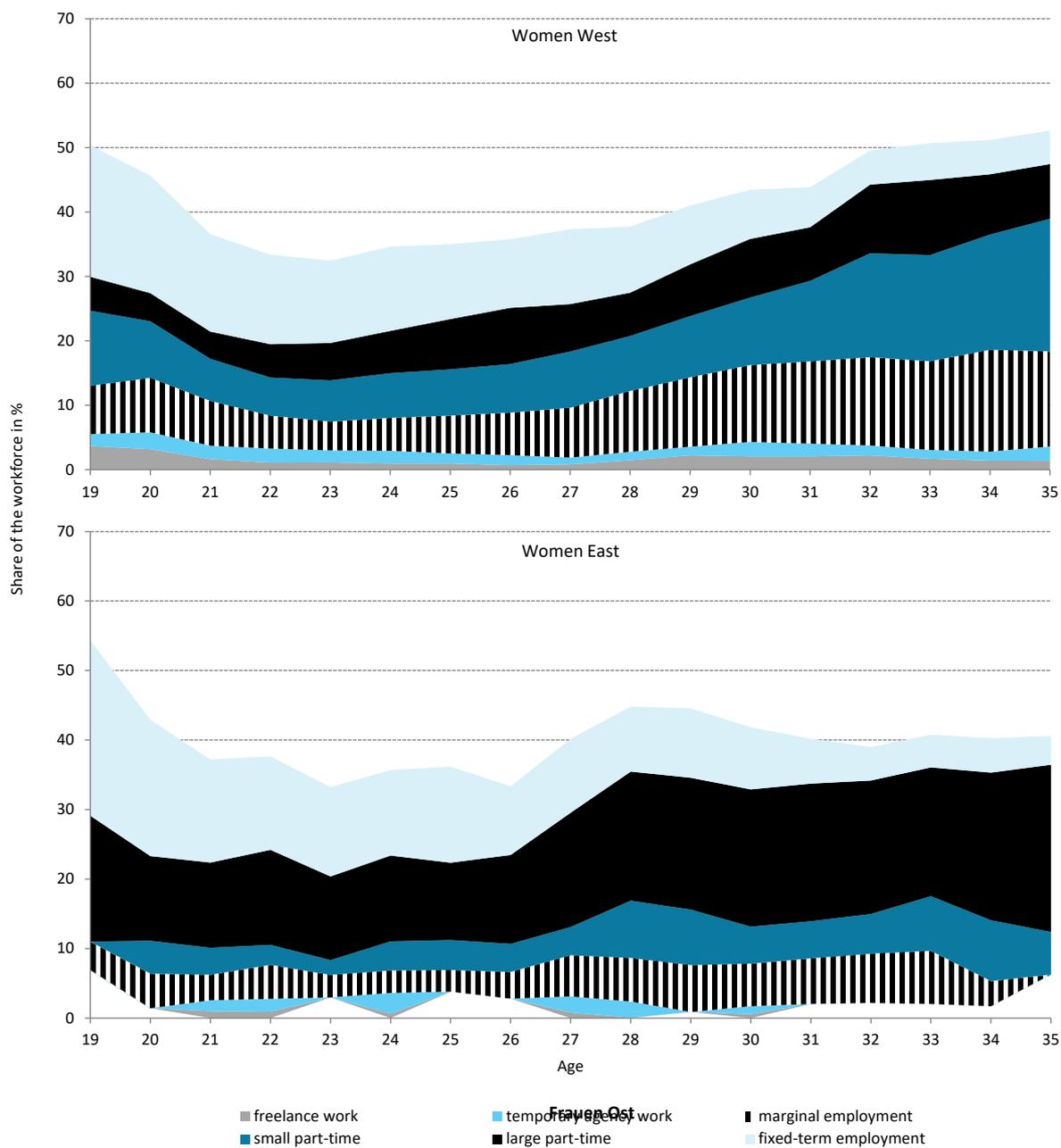
Figure A3: Share of regular and atypical employees as a proportion of total employment by age, sex and region (born 1974-86)



Source: NEPS-SC6-ADIAB, own calculations.

Note: Due to the small number of observations, some details are anonymised. The data series are interrupted at the respective points.

Figure A4: Type of atypical employment by age and region (women, age group 1974-86)



Source: NEPS-SC6-ADIAB, own calculations.

Note: Due to the small number of observations, some details are anonymised. The white area at the bottom of the figure shows the sum of the anonymized values.