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The double German transformation: Changing male employment patterns in East and West Germany

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Abstract

Before the 90s, men's employment careers in East and West Germany were quite similar, despite their widely differing institutional settings. Before reunification, employment biographies were mainly dominated by full-time employment in both East and West. After 1989 the GDR was incorporated into the Federal Republic of Germany and almost all East German institutions were supplanted by adapted West German institutions. In the present paper we use SOEP data to analyse whether the East German labour market has converged completely with that of West Germany, following the same pattern of flexibilization and de-standardization, or if East Germany has even overtaken the West in this regard. We observe evidence of inhomogenization and pluralization in employment biographies in both regions. However, these trends are more pronounced in East Germany. As a result, employment biographies of younger men are more pluralised and less homogeneous in East Germany than in the West.

Keywords

Cohort comparison; Cluster analysis; German transformation; Inhomogenization of employment biographies; Optimal matching; Pluralization of employment biographies; Sequence analysis; SOEP.

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1. Introduction

For many decades labour markets in Germany were characterized by high employment stability and low job mobility. Although there has been an extensive discussion on tendencies towards pluralization, inhomogenization and de-standardization of employment trajectories since the 1980s (Beck 1986, Widmer & Ritschard 2009), employment biographies for men in East and West Germany before the reunification in 1990 were still dominated by full-time employment.

Since then there have been important changes in men's careers in both the East and the West. Employment biographies dominated by full-time employment right from the start of a career all the way to retirement are becoming increasingly rare. To some extent at least, discontinuity and episodic changes characterize the employment biographies of younger cohorts, especially in East Germany (Diewald, Goedicke & Mayer 2006, Giesecke & Verwiebe 2010). On the one hand, individuals suffer more frequent episodes of unemployment during their careers. On the other hand, non-standard episodes of employment, characterised by fixed-term contracts, part-time employment or self-employment have also gained in importance. For career starters in particular, the trend points to increasing employment instability (Blossfeld 2006, Buchholz & Blossfeld 2009).

The question then arises whether these trends are similar in both regions; or in other words, whether the East German labour market after reunification has converged completely with its West German counterpart, following the same de-standardization pattern, or indeed if East Germany has overtaken the West in this regard. In order to explore these developments over time, three cohorts are taken into account: the cohorts born 1936-1945, as well as those born 1946-1955 and the German baby boomers born between 1956 and 1965. Men of the first of these cohorts (1936-1945) spent their employment biographies (up until age 45) in the GDR or in the FRG before reunification. The employment careers of the eldest cohort represent the more standardized careers that dominated both East and West Germany before the reunification; we investigate how the employment biographies of the younger cohorts differ from them, paying special attention to de-standardization and pluralization in their employment biographies. While baby boomers developed their careers mainly after the German reunification, men in Cohort 2 (1946-1955) were between 35 and 44 years old at the time of reunification. This fact allows us to compare changes occurring in these two cohorts in both East and West Germany and to explore to what extent diversity in employment careers has increased.

Discontinuity and flexibility in employment biographies imply new risks, such as higher income volatility, and present new challenges for the social security systems. Old age security systems will particularly need to adapt to such new trends. Individuals with discontinuous employment biographies may end up paying less old age security contributions due to repeated episodes of unemployment, part-time or fixed-term contracts. Furthermore, such episodes may have a negative effect on subsequent wages (Ehrenberg & Oaxaca 1976; Adamchik & Hyclak 2006), which would also imply lower contributions in the long run. Finally, discontinuous careers might also affect individual retirement decisions and therefore pension levels (Blekesaune, Bryan & Taylor 2008).

On the other hand, an increase in certain forms of non-standard employment is often considered desirable, as they introduce flexibility in the labour market. Schmid (2010) shows a positive relationship between non-standard employment and labour participation, indicating that non-standard employment could play an important role as a tool for providing flexibility in the context of

growing globalization and fast-developing information technologies. Thus, although security systems need to develop to cover increasing risks, they should at the same time allow for certain forms of flexibility in the labour market.

In the present paper we offer solid empirical evidence of changes in men's biographies in East and West Germany in the last few decades. Concretely, we aim to answer the following questions for both regions in order to compare the trends being felt in both labour markets: Have episodes of unemployment and part-time work gained in importance in men's employment biographies? Have employment biographies become more diverse or pluralized? Do the employment biographies of younger cohorts have a larger number of transitions between different states, becoming less homogeneous as a result of a process of de-standardization? What are the main differences in the observed trends between East and West Germany as a result of institutional factors and differing societal and economic changes?

We examine employment biographies using the German Socio-Economic Panel (SOEP), which is a nationally representative household study that allows us to observe men's employment careers and compare such employment careers for different cohorts. We compare the three cohorts by carrying out sequence analyses, which, in contrast to standard descriptive analysis, take into account the full complexity of sequences. This technique considers the whole sequence of multiple transitions between states and thus allows us to answer questions about the composition of changes occurring over all labour market states (Malo & Muñoz Bullón 2003).

Furthermore, this longitudinal approach allows us to investigate factors often differentiated as age, period, and cohort effects in the literature (Mayer and Huinink 1990, Schaie 2007). Age effects imply a life course development regardless of cohort or historical period. Period effects consist in the outcomes of social changes; affecting all cohorts. Cohort effects reflect differences between cohorts that may turn out to be motors of social changes (Sackmann 1998). In our analysis we mainly concentrate on the effects of reunification as a period effect, dealing also with cohort effects, but we also take into account the developments that emerge over life courses for members of each of the different cohorts.

2. Literature Review

a. **De-standardization, pluralization and inhomogenization of life courses**

There has been extensive discussion on changes in life courses in Western countries, which has been structured by the use of a variety of concepts and definitions.[1] The evolution of life courses is often characterised as a standardization period, followed by a phase of de-standardization and pluralization (Berger, Steinmüller, & Sopp 1993, Brückner & Mayer 2005, Widmer & Ritschard 2009). The standardization period refers to the reasonably high level of homogeneity and institutionalization that was achieved, by male life courses in particular, by the 1960s. These life courses reflected the constraints and opportunities provided by the educational system, the labour market and welfare-state bureaucracies (Berger, Steinmüller, & Sopp 1993). An essential aspect of this institutionalization was the chronological order of consecutive stages through which biographies travelled more or less in age synchrony, with a typical partition into the three phases of education, employment and retirement (Kohli 1994). Other important life events, like leaving the parental home, marriage, and the birth of one's own children also had a standardised synchrony based on this

[1] For an overview see Scherger 2007 as well as Konietzka 2010.

triple partition. This resulted in a standard biography with a standardized and institutionalized sequence of life events and phases.[2]

The tendencies towards pluralization, inhomogenization and de-standardization of work and family trajectories have often been discussed in the sociological discourse in the context of a broader societal trend towards individualization (Beck 1986, Widmer & Ritschard 2009). The underlying idea is that in a modern society binding restrictions are becoming less important, the behavioural options available are multiplying and living arrangements and life courses are diversifying.[3]

What in the 1970s and 1980s was seen as a broadening of pathways due to the emergence of new options was reinterpreted in the 1990s as difficulties in adapting to external constraints (Brückner & Mayer 2005). Since the beginning of the 1990s, globalization and changing labour market situations due to the reunification of East and West Germany have become important stimuli in the pluralization and inhomogenization of life courses. Repeated phases of unemployment became more common, as did changes of job, as well as such non-regular employment as temporary work and marginal employment. In contrast to the individualization process, which tends to increase the range of behavioural options, such developments are often seen as menace to individualization, eroding the institutional basis and leading to an increasing de-institutionalization of life trajectories (Konietzka 2010, Brose 2003). The empirical evidence of such de-institutionalization is ambiguous: While Kohli (2003) claims a high persistence of institutionalized life courses; Brose (2003) finds a strong de-institutionalization of life courses, articulated in a decline in the significance and implicit acceptance of institutionalized transitions. However, the term "de-institutionalization" alludes to norms and expectations and cannot be fully dealt with by empirical analysis of de-standardization processes (Konietzka 2010, 71), since de-standardization can come accompanied by a continuance of normative orientations toward institutionalized life courses (Scherger 2007, 96).

De-standardization refers to the evident move away from standardized life trajectories so that (a) the timing of transitions between various phases in a life course becomes less fixed (more flexible) or (b) the number of transitions between different phases increases, and the stability and clear demarcation of phases and states declines, so that life courses become increasingly composed of an accumulation of transitions between different states. The latter process can also be described as a inhomogenization of life courses, involving as it does greater inhomogeneity within individual biographies.

Pluralization describes the trend towards a greater diversity of living arrangements and trajectories and is often used in the context of family and partnership arrangements (Brückner & Mayer 2005, Huinink & Wagner 1998, Brüderl 2004). Pluralization can result from a range of process types (Motel-Klingebiel, Simonson, & Naumann, 2010): on the one hand it can emerge from de-standardization processes by which the timing of transitions between various life course phases becomes more flexible and the number of transitions between different phases increases. On the other hand, it may be a result of the increasing number of behavioural options that follow from individualization

[2] Although the terms standardization and institutionalization are often used as synonyms, there are significant differences between the two concepts: standardization refers to the empirical life course sequences, while institutionalization reflects the foundation of life courses on the basis of norms and regulations (Konietzka 2010).

[3] However, Huinink and Wagner (1998) argue that a given set of behavioral options can lead to arbitrary levels of standardization. Despite an increasing number of options, it is possible that, under similar general conditions, rational actors come to similar decisions and therefore act in similar ways. Furthermore, in case of subgroup-specific different conditions, a highly standardized behavior can exist within the subgroups in spite of a greater diversity of actions on a higher aggregated level. Thus, individualization is neither a necessary nor sufficient precondition for pluralized life courses and living arrangements (Huinink & Wagner 1998, 92; Konietzka 2010, 65).

processes, so that individuals can choose between - or are confronted by - a growing range of alternatives. The latter process need not be accompanied by inhomogenization, as it is possible for there to be a great variety of individual life courses, with each containing a relatively very large degree of internal homogeneity. Thus, pluralization may indeed coincide with heterogenization, but need not necessarily do so.

b. **Employment biographies in East and West Germany before and after reunification**

Any analysis of employment biographies in Germany must consider the differences between the two German states before reunification in 1990 and between Eastern and Western Germany thereafter. Despite the fundamental differences in their economic systems, the pre-unification labour markets of both German states were traditionally characterized by high employment stability and low job mobility. In East Germany employment biographies for men (as for women) were normally characterized by long phases of full-time employment. In the GDR open underemployment was unknown, since everybody had a right to work, regardless of qualifications or of economic demand (Dahms & Wahse 1994). Therefore, unemployment was (by definition) practically not existent. The standard traditional employment relationship was very dominant. Full-time employment was the norm for both men and women and part-time work was relatively rare (Scheller 2005, 70). Due to guarantied occupation and small wage differentials, labour market mobility was low (Sackmann 2000).

In West Germany too, the labour market before reunification was characterized by high employment stability. Typical for the West German labour market were long-term, cooperative, and trust-based industrial relations and employment contracts (Mayer 1997). In this context, employment biographies of men were very similar to the employment biographies in East Germany, with long phases of full-time employment clearly dominating. Until the early 1980s employment biographies in West Germany were rarely interrupted by spells of unemployment. Thereafter, unemployment rates increased to above 9 percent in the mid 1980s and episodes of unemployment became more common. Due to this development, the question arose as to whether job (and earnings) stability had become an obstacle to creating more jobs (DiPrete and McManus 1996) and whether the German labour market needed to be made more flexible. According to this logic, a number of deregulation policies were carried out in West Germany during the 90s (Diewald 2006).

Diewald (2006) concludes that if we consider the increase of nonstandard employment between 1992 and 2002, there has been flexibilization in both regions, with changes in Eastern Germany almost exceeding West German developments. Fixed-term contracts, temporary work and marginal employment have become more common in both regions, with fixed-term contracts and marginal employment rates being higher for East Germany in the year 2002. In relation to labour market mobility, neither region overall has shown much dynamism. Due to the substantial delay in tertiarization of East Germany, the integration of the East German economy into the FRG's economic system was linked to a profound structural change that saw a shift from employment in agriculture and industry towards the service sector. In its initial phase at least, this structural change was facilitated by inter-firm mobility of workers as well as the staff reductions that occurred in shrinking industries. The short period from 1990 to 1992 is therefore sometimes referred to in the literature as the ‘window of opportunity’ (Diewald & Solga 1997, Rasztar 1999, Windzio & Rasztar 2000). Once this short period elapsed, labour markets closed up and mobility between and within firms declined significantly (Diewald & Pollmann-Schult 2009). In the East German case, the labour market has adopted similar low mobility patterns to the ones evident in its West German equivalent (Diewald 2006).

In relation to unemployment too, one can see somewhat parallel developments in both regions with contemporaneous ups and downs in unemployment rates as well as the fact that East Germany began outstripping West Germany in terms of unemployment levels. After 1989 unemployment rates in East Germany increased significantly, reaching their peak in 2005 with nearly 21 percent (Bundesagentur für Arbeit). Low qualified workers and, in the first decade after reunification women in particular, had an especially high unemployment risk (Sackmann 2000, 53). Since 2000, East German unemployment rates for men and women have been relatively similar. In West Germany too unemployment rates increased and showed similar dynamics, though indeed at a lower level than in the East: Peak unemployment was also reached in 2005 in West, but the figure of 11 percent left it at just roughly half the rate suffered by East Germany (Bundesagentur für Arbeit).

The question remains open as to what factors determined these developments. There is no single correct answer to this question, as there are a number of interplaying factors involved. With regard to the process of de-standardizaton and pluralization, the labour market situation is highly determinant. West German unemployment rates increased rapidly from the mid-1980s and employment biographies dominated by high employment stability became increasingly unsustainable. At the same time, and motivated by these developments, deregulation policies were introduced during the 90s, to facilitate more flexibility in the labour market. Additionally, and partially as a response to these developments, there may have been a change in the attitudes away from stable employment careers. Younger cohorts are more open to flexible careers than older cohorts (Mayer et al. 2010). In relation to the different evolution experienced in East and West Germany, the main determining factor is the labour market situation. In particular, the higher unemployment risk in East Germany has accelerated the transition from high employment stability to de-standardized employment careers.

The question then arises as to what these developments mean for individual employment biographies, and to what extent they produce what the literature describes as de-standardized and heterogeneous careers. Furthermore, it may be worth asking whether there is now a greater variety of or diversity in employment biographies. Empirical studies yield some evidence that men's employment biographies after reunification have become more heterogeneous. For example, Trischler and Kistler (2010) show that, particularly in East Germany, male employment careers are becoming increasingly discontinuous. However, they also detect a tendency towards more discontinuous careers for West German men too. Falk et al. (2000) compared the entry into the labour market of three cohorts of (university and apprenticeship) graduates in East and West Germany after reunification and found evidence of a higher risk of unemployment for East German graduates, with negative effects on the stability of their subsequent careers. However, their analysis is limited to the early stages of such careers. Analyses comparing the employment patterns in East and West Germany before and after reunification over a longer period are still scarce (Mayer & Solga 2010).

3. Empirical analysis

Although before the 90s the institutions in each region differed radically, men's employment careers were similar. Before reunification, employment biographies were mainly dominated by full-time employment in both East and West. The question remains as to what happened after 1989 and how employment careers developed in each region. With reunification, the former GDR was incorporated into the Federal Republic of Germany and almost all East German institutions were supplanted by their specially adapted West German equivalents (Diewald 2006). Therefore, the question arises as to

whether the East German labour market converged completely with the West German labour market and followed the same flexibilization and de-standardization pattern or whether indeed East Germany actually overtook West Germany in this regard.

In our empirical analysis the employment careers of the first cohort (1936-1945) can be taken to represent the more standardized careers in East and West Germany before reunification; we investigate how the employment biographies from the younger cohorts differ from them and from each other, paying special attention to de-standardization and pluralization of the employment biographies.

We thus analyze the employment biographies from age 15 to 45 of three cohorts: men born between 1936 and 1945 (Cohort 1), men born between 1946 and 1955 (Cohort 2) and men born between 1956 and 1965 (Cohort 3). Men from the first cohort (1936-45) entered the labour market between the 1950s and 1960s, a period of economic revival (at least in West Germany), and with relatively highly standardized biographies in both the West and the East. In 1990, the year of German reunification, they were between 45 and 54 years old. Thus, in the time window we observe (age 15 to 45), the careers of cohort 1 are not touched by the effects of reunification.

When the men from the second cohort (1946-55) entered the labour market between late-1960s and mid-1970s, the economic revival in West Germany had already reached its end. In the middle of the 80s, when unemployment in West Germany began to persist at a relatively high level, they were in their thirties and were therefore exposed to the risk of unemployment in the middle phase of their careers. In East Germany however, unemployment at this time was not a factor. This may lead to the assumption that before reunification unemployment plays a more important role in the careers of Cohort 2 in West Germany. In 1990, men from Cohort 2 were between 35 and 44 years old, which means that we should be able to observe some of the effects of reunification, at least for the younger men in Cohort 2.

Men from the last cohort belong to German baby boomers. The baby boomers (born between 1956 and 65) entered the labour force in the 1970s and 1980s and were affected by German reunification and the subsequent economic and labour market changes between age 25 and 34, which would seem to suggest that trends towards de-standardization and pluralization should be most pronounced for them.

a. Description of data

This analysis uses data from the SOEP (German Socio-Economic Panel), a representative, interdisciplinary, and longitudinal survey of the German population (Frick et al. 2008; SOEP-Group 2001). The panel began in 1984 and has been repeated annually since then. The SOEP employs a variety of questionnaires. The main ones are: (1) a household questionnaire, in which the head of the household provides information about the household as a whole, such as the housing situation, household formation, and information about children under 16; (2) a personal questionnaire, in which each individual in the household aged 16 or older is surveyed; and (3) a biographical questionnaire, which is normally completed by second-time respondents and includes questions on employment history, marital history, social origin, and immigration history, among other things (SOEP-Group 2001).

For our analysis we use SOEP data from 1984 to 2007 relating to the 2007 SOEP sample.[4] We created the data set by using annual employment information on individuals, mainly collected by the biographical questionnaire, combining it with such further personal information as year of birth, educational status and region (West/East). Furthermore, marital status data has been also combined into employment biographies.

The states we considered relevant in the employment biography are: (1) education (school/university), (2) apprenticeship/training, (3) military/civil service, (4) full-time employment, (5) part-time employment, (6) unemployment and (7) other.[5]

In our analysis we included men born between 1936 and 1965. All biographies start at the age of 15 and at most end at the age of 45.[6] Gaps within the sequences have been filled as follows: If a gap of one element was found between two states and either the preceding or the subsequent status was military/civil service (4) or unemployment (6), the gap was coded as military/civil service or unemployment, respectively. If one of the (preceding or subsequent) states was other (7), the other status opposite that one was chosen. For all other gaps containing one element the status of the preceding element was prolonged. Any series of gaps (gaps containing more than one element) were split, so that half was coded for the preceding and half for the subsequent one. For any middle element of such a gap (where the gap consisted of an unequal number of elements) the same rule as for single gaps was used. At the end of the observation window there remain some information gaps in the biographies, mainly for those whose dates of birth indicate that they have not yet reached the age of 45.

In our data the information on the employment history is reported annually, which means that for each man in the study we have up to 31 items of information about his employment status.[7] The total number of men, or in other words, the number of biographies included in the analysis is 5,279.[8] Of these, 3,783 men live in West Germany, 1,366 in East Germany and 130 abroad.[9] The number of observations for each cohort is as follows: Cohort 1: 1,662 (West: 1,213; East: 449), Cohort 2: 1,662 (West: 1,257; East: 405) and Cohort 3: 2.955 (West: 1.443; East: 512) men. Due to the age selection we have made (biographies until the age of 45) we observe some shorter biographies for the younger cohorts, in cases where the youngest men had not reached the age 45 in the year 2007.[10]

[4] We use SOEP version 26.

[5] Other states unusual for our sample like being a pensioner or houseman have been also coded as 'other'.

[6] The limitation to the age of 45 was done for comparability reasons in relation to the baby boomer cohort.

[7] In the following we refer to these yearly status reports as 'elements'. The position a person has in one or more element is called 'status' or 'state'. A number of years spent in the same state consecutively we call a 'spell' or 'episode'. We refer to whole biographies as 'sequences'.

[8] The number of observations is not weighted.

[9] This information refers to where subjects lived in 1989. For men for whom this information was not available, we considered the region (West/East) where they were living at the time they filled out the biography questionnaire. Also worth noting is that, in the discussion below, we combine the categories "West Germany" and "Living abroad" into a single "West Germany" category.

[10] Due to the shorter length of such biographies, we observe some missing values at the end of the biographies of men belonging to cohort 3. 35 percent of biographies in this cohort are incomplete. However, the average length of the missing period is short. A maximum of 3 years are missing (over a period of 31 years), and its average length is 2 years.

In the initial dataset we found some overlapping states; i.e. there were different states reported for the same point in time.[11] For the purposes of our analysis we recoded each overlap into one of the six main states (1-6). The criteria used in this recoding were as follows: the statuses of military/civil service (3) and unemployment (6) were prioritized so as to preserve such typically short periods in the analysis. The status other (7) was overcoded, so that the other status present simultaneous with it was chosen. Where the statuses education (1) and apprenticeship/training (2) existed simultaneously, they were combined into (2), and full-time employment (4) simultaneous with part-time employment (5) were pooled into (5). Although this led to a loss of information, it remained possible do distinguish education from employment. Secondly, the remaining overlaps of two different states were coded according to the earlier status if that status formed part of the overlap; otherwise, the subsequent status was used. Series of overlapping statuses were divided in such a way that the first half of the series was coded as the first status and the second half as the second.

In order to be in a position to see whether this recoding could potentially affect our results, we present the frequencies of the main overlaps in the original dataset and the states to which they have been re-coded in Table A.1 and A.2 of the appendix. When we consider the information in these two tables, we can see that our recoding of overlaps may cause the data to slightly underestimate education and full-time status, though not dramatically so, since overlaps form only 8% of the data as a whole.

However, in Table A.1 we also observe that the percentage of overlaps over the total number of elements increases from cohort to cohort. Whereas for the biographies in Cohort 1, only 4 percent of the elements overlap, this percentage is over 11 percent for Cohort 3. This may be a first indicator of inhomogenization in life courses. At the same time, this might also be an effect of differences between cohorts in the data source. Most of the employment biography information comes, as we have already pointed out, from the biography questionnaire, which is usually completed by respondents the second time they are interviewed. However, this information is complemented with information from the annual personal questionnaire. The information collected on a monthly basis in the personal questionnaire is aggregated into annual values and combined with the information gathered from the biography questionnaire. We distinguish between three different biography types, depending on the main source of information. Sequences for men classified as data type 1 come mainly from retrospective information (at least half of the elements are reported retrospectively); information on men classified as data type 2 comes mainly from annual interviews; and information on men classified as data type 3 comes from information covered by both types of data, though we cannot ascertain what proportion comes from which.

In fact, there are some discrepancies in the proportions of overlaps depending on the data type: While in data type 1 we observe 4% to 12% overlaps and in data type 3 they make up 4% to 10%; the proportion of overlaps for the data type 2 is between 21% and 27%.

Given that these biography types are not equally represented in each cohort, we will take into account these effects in the interpretation of the results. Specifically, 42% of men of Cohort 1 belong to data type 1, while 22% of the Cohort 2 and only 12% of the Cohort 3 do so. Data type 2 is the least representative of all cohorts: only 7% of the men from Cohort 3 belong to this data type and almost no men from Cohorts 1 and 2. Data type 3 is the most common one: 57% of men in Cohort 1, 75% of men in Cohort 2 and 73% of men in Cohort 3 belong to this data type. Due to the later start of the

[11] Different states in the same period (year) do not necessarily mean that the different states apply simultaneously. It can be that in a single year the person in more than one state, though not simultaneously. However, we cannot distinguish this in our data set and we therefore define different states in one year as overlapping.

SOEP in East Germany, there are some differences in the distributions of biography types between East and West Germany. In the older cohorts the information on men in East Germany comes from retrospective questionnaires more often than in West Germany. Thus, West German baby boomers are more likely to belong to the second data type than East German ones (1 to 9 percent). It is therefore possible that we may be underestimating the inhomogeneity for the East Germans in the analysis, especially for the baby boomer cohort. These differences between East and West in relation to data types are taken into account when interpreting results.

b. Methodology: sequence analysis and optimal matching

For analyzing the biographies, we use sequence analysis and optimal matching methods, followed by a cluster analysis of the biography sequences.[12] Sequence analysis is a technique for describing and analyzing sequential data and takes into account the full complexity of the sequences being analysed. For example, it accounts for the number as well as for the order and length of the various states. Sequential data occur in many scientific fields. In the case of the social sciences, life courses, marital histories or employment biographies can all be observed as sequences and analyzed via optimal matching (Brüderl and Scherer 2006, Windzio and Grotheer 2003). A sequence is defined as an ordered list of elements (e.g. Brüderl and Scherer 2006, Brzinsky-Fay and Kohler 2010); in the present case an element is the status held by any particular individual in a specific year, as described in section 3a).[13]

The first step in sequence analysis is normally to describe the sequences, e.g. in relation to their total length and to the length and number of different states and episodes a sequence contains. This is done below (see Table 2). To describe the sequences one can also use so-called sequence index plots, which draw a horizontal line for each sequence (Brüderl and Scherer 2006, Brzinsky-Fay, Kohler and Luniak 2006). They can be very instructive, as we will see later. However, they have the disadvantage that where there are numerous observations, there is a tendency to overplot lines. This may have the effect that elements with higher category values are overrepresented. Furthermore, such plots are not independent of the order of the sequences (Brzinsky-Fay, Kohler and Luniak 2006). Therefore, sequence index plots are a graphic way of visualizing sequences, but one should be very careful about drawing any conclusions on the distribution of different types of sequences based solely on them.

Another way to gain an impression of the sequences is to look at their coefficient of concentration. This coefficient provides information on the diversification of the sequences and is calculated by dividing the number of different sequences by the number of all observed sequences, multiplied by 100. Where all sequences are unique (no concentration), the coefficient will become 100; if all sequences are identical (maximum concentration), it will reduce to zero (see Brzinsky-Fay, Kohler and Luniak 2006).

Sequences can be compared by applying the optimal matching procedure. Optimal matching uses the Levenshtein distance (Levenshtein 1966), which counts the minimum costs that are needed to transform one sequence into another using the so-called Needleman-Wunsch algorithm (Needleman and Wunsch 1970). The advantage of using the Levenshtein distance over other 'naïve' distance measures is illustrated by the examples in Table 1, which we took from Brüderl and Scherer (2006,

[12] For our analyses we used the SQ-Ado for Stata (see Brzinsky-Fay, Kohler and Luniak 2006). For general information on the method of sequence analysis see e.g. Brzinsky-Fay, Kohler and Luniak (2006), Brzinsky-Fay and Kohler (2010), Scherer & Brüderl (2010).

[13] In the description of the methodology we refer to the work of Simonson, Romeu Gordo and Titova (2011).

333). Here, eight different states are possible. All sequences have a length of six elements and in each of the three comparisons all elements are different. Therefore, the 'naïve' distance in all comparisons is 6, because it needs six substitutions to transform sequence 1 into sequence 2 (and vice versa). However, this approach is not really appropriate, because obviously the sequences are different in their similarities. While the pair in Comparison 1 are completely different to each other, the sequences of comparisons 2 and 3 are more or less shifted. For example, in Comparison 3 the subsequence BCDEF is part of both sequences, simply shifted by one place. Therefore, it would not be appropriate to classify these two sequences as differing to each other to the maximum degree.

Table 1: Comparison of sequences

	Comparison	**Comparison 2**	**Comparison 3**
Sequence 1	AAABBB	AAABBB	GBCDEF
Sequence 2	CDEFGH	BBBAAA	BCDEFA
Naïve distance	6	6	6
Levenshtein distance (Subst=1, Indel=0,5)	6	3	1

Source: Brüderl & Scherer 2006, 333.

The Levenshtein distance allows the use not only of the operation 'substitution' (changing one element into another element), but also the operations 'insertion' (inserting an element at a specific position) and 'deletion' (deleting an element at a specific position) - taken together referred to as 'indel'. Hence, by using the Levenshtein distance in Comparison 3, it takes only two operations to transform sequence 1 into sequence 2: by deletion of G at the beginning of sequence 1 and insertion of A at the end of sequence 2.

In principal, the 'substitution' operation can be replaced by the 'deletion' and 'insertion' operations. Therefore, indel operations normally have half the weight of a substitution (in the example: 0.5 and 1). Also by using the Levenshtein distance, in comparison 1 the distance of both sequences is 6, which is the maximum distance value for sequences containing six elements. In Comparison 2 one can delete A at the beginning of Sequence 1 three times and insert A three times at the end of Sequence 2. The Levenshtein distance is 3. In Comparison 3, as described above, two operations are necessary. Therefore, the Levenshtein distance is 1, which much better represents the actual similarity of both sequences than the naïve distance of 6.

The optimal matching procedure requires assumptions to be made about the costs related to the transformations. The easiest - but not always the most appropriate - approach is to assume that all transformations have the same cost, as with the examples above. In our case this would mean assuming, for example, that substituting full-time employment with part-time employment is just as expensive as substituting full-time employment with education. This could obviously be misleading in many cases. However, defining costs for transitions involves the risk of pre-determining the results in one direction or another. Therefore, we use the default settings (insertion/deletion costs: 1; substitution costs: 2).

Using full optimal matching, every sequence is compared to every other sequence. A distance, calculated by the costs implied by the relevant transformation operations, is given for every pair of sequences (Windzio and Grotheer 2003). An alternative to full optimal matching is the comparison of

the sequences with a single selected sequence. This could be either the most frequent sequence in the data or an ideal or typical reference sequence.

Full optimal matching yields a distance matrix, which can be used as basis for cluster analysis. The goal of cluster analysis is to organize the sequences into groups in such a way that the degree of similarity is both maximized for the sequences within a group and minimized between groups. Here, we used the Ward's linkage clustering, which is a hierarchical method of cluster analysis. In it the linkage function specifying the distance between two clusters is computed as the increase in the error sum of squares after fusing two clusters into a single cluster. The method seeks to choose successive clustering steps so as to minimize the increase in the error sum of squares at each step. To help one decide which cluster solution is the most appropriate, one can use the so-called elbow criterion, which compares the fusion levels of different cluster solutions. The optimal number of clusters is reached at the point where the graph displays an angle, indicating the point at which the fusion level stabilizes and we lose very little information by leaving the remaining clusters together.

c. Results

In Table A.3 in the appendix some descriptive information is given in order to characterize the men across all cohorts and regions. Considering both regions together we observe that the proportion on individuals with German nationality remains relatively constant over time. Across all cohorts there are fewer low educated men, but also fewer individuals with a university degree. The latter development can be attributed to changes in East Germany: while the proportion on high educated in West Germany has remains at the same level (slightly over 21%), the number of graduates in East Germany has decreased from 35 to 18 percent. Beyond that, we observe that for all cohorts there are more single and divorced men and fewer married ones. Nevertheless, on the most recent data used, even the baby boomers remain married for the most part (about 71%, compared with 82% for Cohort 1 and 75% for Cohort 2). Especially in East Germany a major transformation can be detected in marital biographies between Cohorts 1 and 2 towards fewer marriages, more divorces and more people remaining single.

In Table 2, descriptives for the employment careers of the three cohorts are presented. Specifically, we can observe the average length of episodes and the average number of episodes and elements for both regions. By analyzing this information we can conclude that there have been changes in the biographies from cohort to cohort. The length of the full-time episodes decreased; or in other words, the younger cohorts work less full-time than the oldest cohort in both East and West Germany. Specifically, while the average length of full-time employment episodes for the oldest cohort was 24 for West Germany and 25 for East Germany, the baby boomers work an average of three years less in West Germany and five years less in East Germany. At the same time, the average length of spells in unemployment and education increased. Furthermore, there is an increase in the total number of episodes and elements (of all types) in both regions. In the case of West Germany, the increase in the number of elements is not as large as the increase in the number of episodes, indicating that, rather than introducing new elements in their biographies, individuals are experiencing shorter episodes and are changing more frequently between them. This is *prima facie* evidence of an increase in inhomogeneity in biographies.

Table 2: Average length of states and average number of episodes and elements per cohort and region

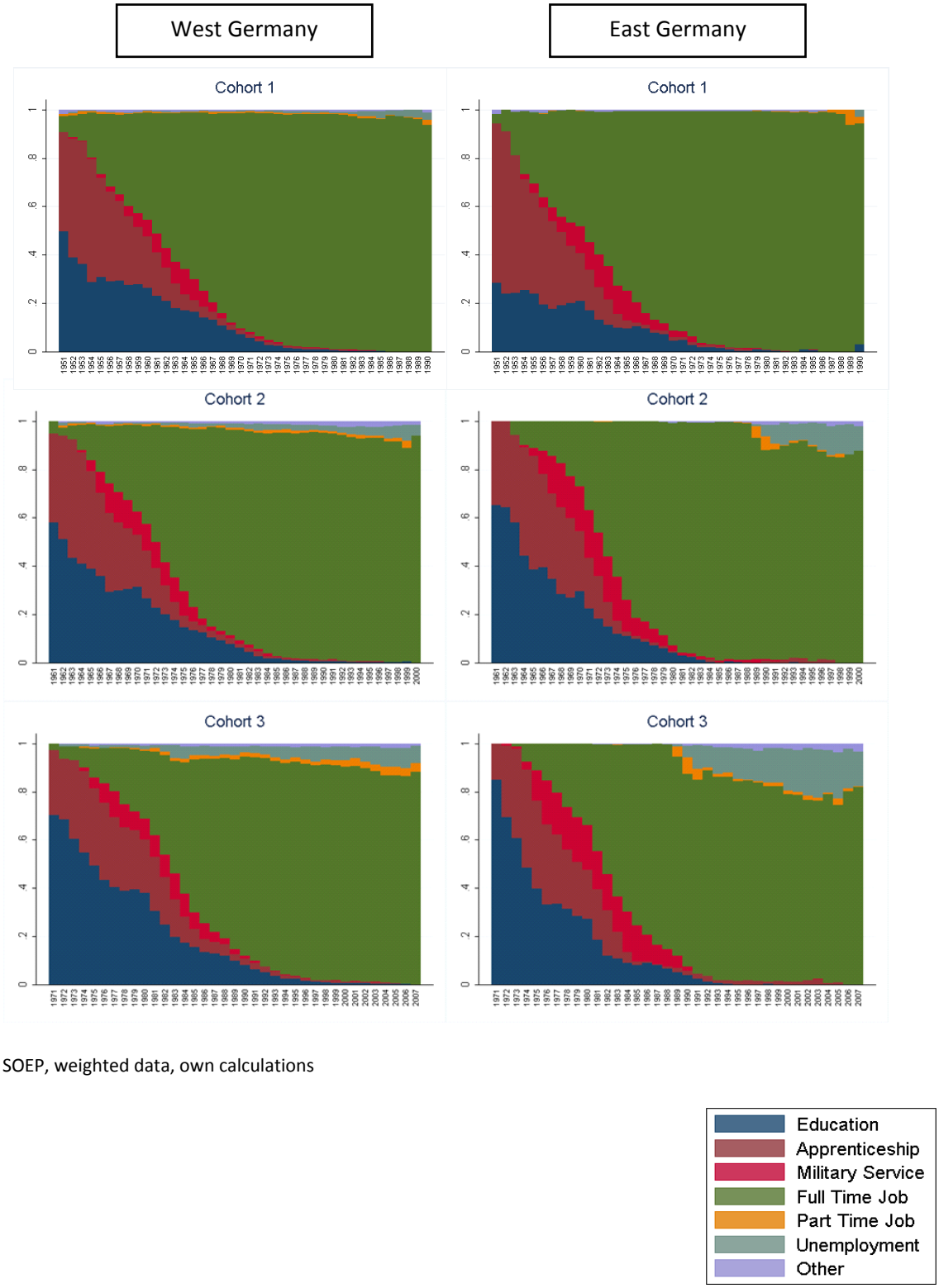
	West Germany			East Germany		
	Cohort 1: 1936-1945	**Cohort 2: 1946-1955**	**Cohort 3: 1956-1965**	**Cohort 1: 1936-1945**	**Cohort 2: 1946-1955**	**Cohort 3: 1956-1965**
Average length of the episodes:						
Education	2.6	2.8	3.7	2.1	2.6	2.7
Apprenticeship/ Training	2.7	2.7	2.6	2.7	2.4	2.5
Military service	0.9	1.2	1.0	1.2	1.9	1.9
Full-time employment	24.3	22.8	20.9	24.7	23.0	20.2
Part-time employment	0.2	0.3	0.5	0.1	0.2	0.3
Unemployment	0.2	0.8	1.4	0.2	0.8	2.5
Other	0.2	0.5	0.3	0.2	0.1	0.3
All episodes together	31.0	31.0	30.3	31.0	31.0	30.4
Average number of episodes:	3.4	4.2	5.0	3.7	5.1	6.1
Average number of diff. elements:	2.8	3.3	3.6	2.9	3.9	4.3
Number of observations:	*1213*	*1257*	*1443*	*449*	*405*	*512*

SOEP, weighted data / non-weighted number of observations, own calculations

In direct comparison between East and West Germany, the first thing that can be stated is that the employment biographies of the oldest cohorts do not considerably differ. Although the second cohort differs from the oldest one (as evidenced by their shorter full-time employment), there are no great differences between the regions. The main differences between the cohorts and regions are observed for the baby boomers. To be specific, the number of episodes and elements for the baby boomers in East Germany is higher than in West Germany. Furthermore, the average length of unemployment has increased more drastically for East Germany, especially for the third cohort. This might be seen as evidence of the differing evolution of the employment biographies East and West after German reunification.

In order to further examine the differences between the two regions, in Figure 1 we illustrate the development over time of the relative importance of each relevant state in East and in West Germany. For Cohort 1 the time axis ranges from 1951 to 1990. For this cohort we observe a similar picture in East as in West Germany, where full-time employment is the dominant state. For the younger cohorts we observe the years between 1961 and 2000 (Cohort 2) and between 1971 and 2007 (Cohort 3). For these cohorts too the picture was similar in both regions before reunification. The main difference is that in pre-unification West Germany part-time employment, unemployment and the status defined as 'other' gained slowly in importance, while in East Germany these states practically did not exist. Reunification represents a clear break point in East Germany. After 1989 the frequency of part-time employment, of the status 'other', and especially of unemployment, increases dramatically for both younger cohorts to such an extent that that East Germany overtakes West Germany.

Figure 1: Development of relative weights of the observed states in West and East Germany



SOEP, weighted data, own calculations

Furthermore, we compare diversification in sequences by analyzing the coefficient of concentration, which indicates the percentage of different sequences in the employment biography, in order to examine the tendency towards pluralization from cohort to cohort. In Table 3 we can see that the percentage of differing sequences increases in both regions of Germany. While the coefficient of concentration is 48 percent for the oldest cohort, for the baby boomers this coefficient is close to 82 percent. This indicates that the men from the youngest cohort have much more diverse biographies as compared to the relatively standardized biographies of the oldest cohort.

Table 3: Coefficient of concentration (in percent)

	West Germany	East Germany	Total
Cohort 1: 1936-1945	48	63	48
Cohort 2: 1946-1955	61	78	62
Cohort 3: 1956-1965	81	92	82

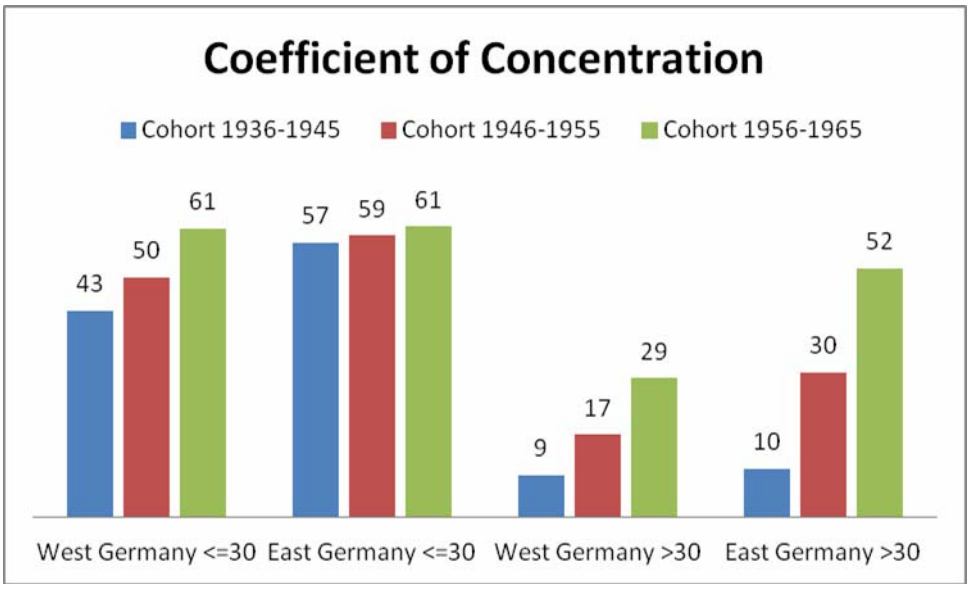
SOEP, non-weighted data, own calculations.

There are some considerable differences between the two German regions across all cohorts. Regardless of cohort, the coefficient of concentration is higher in East Germany than in the West. While this result is unsurprising for the latter two cohorts, due to the consequences of German reunification already alluded to, it is an unexpected result for the oldest cohort, as patterns of East German employment in the relevant times in particular are believed to be more stable than in the West. In order to get to the bottom of this finding, we divided employment biographies into those before and after the age of thirty in Figure 2. The idea behind this analysis was to distinguish between the period of life generally dominated by educational episodes and the age traditionally dominated by employment. Thus we can gain an insight into how the period of life dedicated to employment differs in East as compared to West Germany. Up to thirty years of age we observe an considerable adjustment in both regions over the cohorts. Particularly interesting is the fact that there is an obvious higher heterogeneity in East Germany, particularly for the first, but also for the second cohort. This indicates that the education period and early career stages in East Germany were more diverse as compared to West Germany.[14] For men over thirty we observe the following: while the coefficient of concentration for the oldest cohort is at a similar, relatively low level for both regions, for the two subsequent cohorts the number of differing sequence patterns is much higher for East Germany. Taken as a whole, the phase of life dominated by education is more diverse in East Germany at first, but converges for the baby boomers. The phase dominated by employment is quite homogeneous for the oldest cohort in both regions, but becomes increasingly diverse for the subsequent cohorts, especially in East Germany.[15]

[14] One reason might be the strongly relevance of further education and extended vocational training in the GDR (Dietrich 1991), which could be expected to result in interruptions of employment.

[15] In order to check whether differences in the coefficient of concentration between East and West Germany are due to differences in the sample size, we randomly selected biographies from West Germany. With the same sample size in East and West Germany the results did not differ substantially from those in Figure 2.

Figure 2: Coefficient of concentration for the early and later stages of employment biographies over region and cohorts (in percent)



SOEP, non weighted data, own calculations.

Summarizing, we observe changes between cohorts which indicate trends of inhomogenization and pluralization for both regions. For the second, and especially for the baby boomer cohort, we find changes to significantly more unemployment and a distinct increase in the number of sequences after the age of thirty. For East Germany these changes are much more pronounced than for the West. We can thus see that these trends are not completely identical in East and West Germany, indicating that the de-standardization processes ran at different speeds in the two regions.

As a further step, we identify typical employment patterns in East and West Germany by use of a cluster analysis and analyze changes in patterns from cohorts to cohort. In doing so we can see what employment patterns are becoming more common and what ones are losing importance. In order to build our clusters, we compare all sequences with each other (using full optimal matching) to produce a distance matrix on which to cluster the life courses. In this process, we opted to use the same cluster analysis for all the cohorts in order to make comparison possible. If we had constructed new clusters for each cohort, a comparison would have been not feasible. We also decided to use the same clusters for East and West Germany for reasons of comparability. If we had done otherwise, comparison between different clusters for regions and for cohorts would have been unclear. We do, however, take into account the regional differences in the clusters.[16]

By using the elbow criterion, which compares the fusion levels of different cluster solutions, we identify three clusters (Figure A.1). These clusters may be characterized as follows: Cluster 1 is dominated by a long education period followed by employment, Cluster 2 by shorter education and discontinuous employment biographies; and Cluster 3 by shorter education followed by a long period of stable full-time employment.

[16] Maintaining different cluster analyses for East and West Germany generates clusters as follows: According to the elbow criterion, we identify two clusters in West Germany and three clusters in East Germany. For both regions there is a cluster characterized by long education and full-time employment and another full-time employment cluster combined with shorter periods of education. These both clusters become more discontinuous for the younger cohorts. East Germany yields a third cluster, mainly representing those who lost their jobs after reunification.

We first analyze changes in the relative importance of these clusters in Germany. In Table 4 we observe that the percentage of people in Cluster 3 is much higher in Cohort 1 than in Cohorts 2 and 3. This indicates than the youngest cohorts include much fewer men with a biography dominated by long and stable full-time employment. Instead, the proportion of men in Cluster 2 (discontinuous cluster) is much higher for the younger cohorts. Younger cohorts, and specially baby boomers, contain a higher proportion of careers with low employment stability.

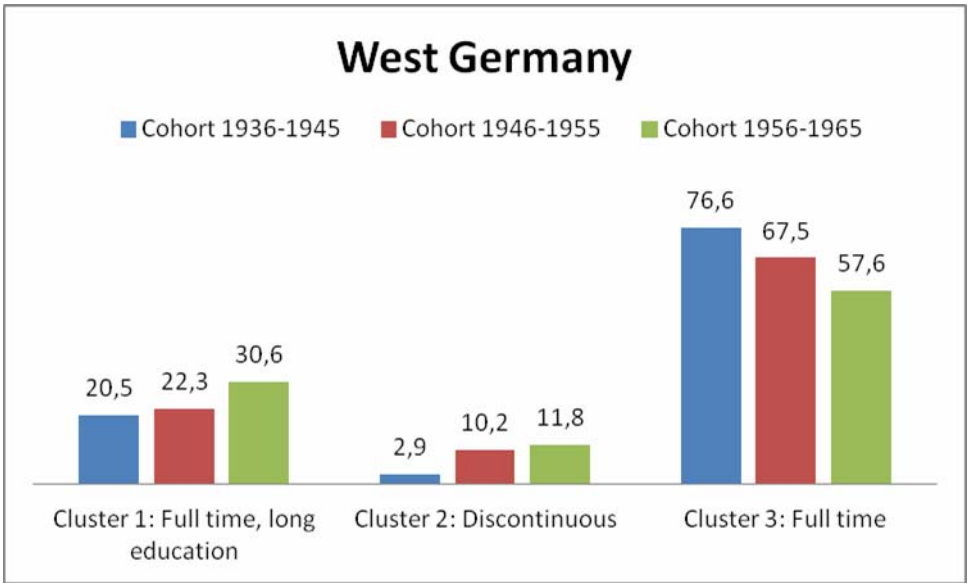
Table 4. Relative weights of the clusters across cohorts (in percent)

	Cluster 1: Full-time long educ.	**Cluster 2:** Discontinuous	**Cluster 3:** Full-time
Cohort 1: 1936-1945	20.2	2.5	77.3
Cohort 2: 1946-1955	22.9	10.5	66.6
Cohort 3: 1956-1965	27.7	16.1	56.2

SOEP, weighted data, own calculations.

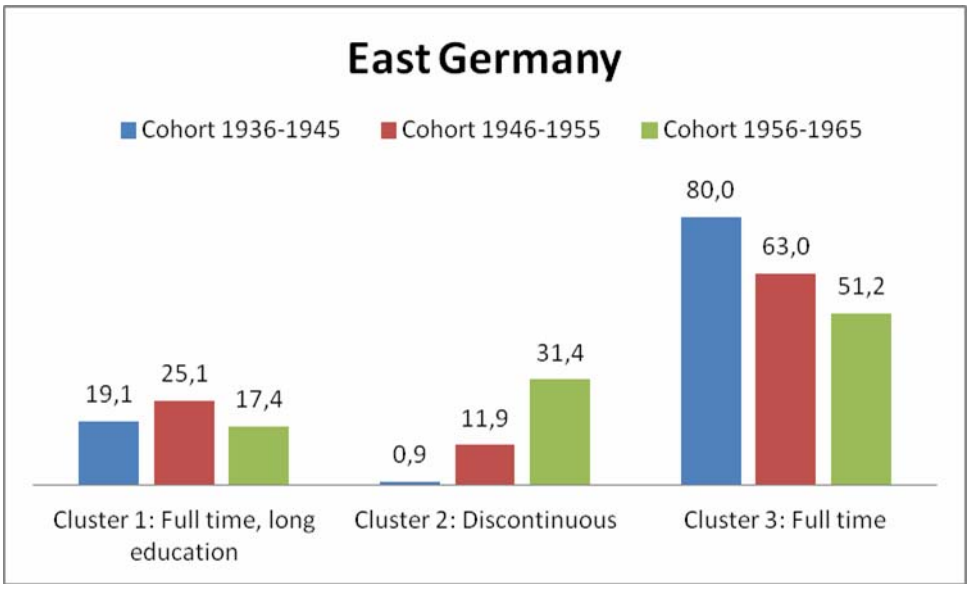
If we consider East and West Germany separately (Figures 3 and 4), we observe that this trend is mainly driven by the East German population. In East Germany, there are almost no individuals from the oldest cohort in Cluster 2. This is due to the fact that the observed employment biographies of the oldest cohort were spent in the former GDR, where after the educational period employment interruptions due to unemployment or other reasons were not common. On the other hand, 31 percent of baby boomers belong to Cluster 2 (with low employment stability), indicating a large proportion of individuals with unstable employment biographies after the German reunification.

Figure 3: Relative weights of the clusters across cohorts (West Germany)



SOEP, weighted data, own calculations.

Figure 4: Relative weights of the clusters across cohorts (East Germany)



SOEP, weighted data, own calculations.

In West Germany, although there are also fewer people in the younger cohorts with biographies dominated by long and stable full-time employment (Cluster 3), the proportion of individuals in Cluster 2 (low employment stability) does not change so dramatically between cohorts as in East-Germany.

We can conclude that while inhomogenization of employment biographies is a real trend in both West and East Germany, the German reunification had a strong accelerating effect on diversification in East Germany.

Together with changes in the relative importance of clusters, it is also necessary to analyze if the clusters change over time considering demographic factors (see Table A.4 in the appendix). In Cluster 1 (full-time, long education) we observe mainly highly educated men, although the percentage of individuals with college education for both East and West Germany decreases across all cohorts (West: from 74% to 62%; East: from 88% to 73%). For Cluster 2 (discontinuous biographies) an interesting trend in West Germany is that non German men are increasingly represented in this cluster. While for Cohort 1 only 12 percent of men are non-German, this percentage rises to 25 percent in the baby boomer cohort. The number of those with a lower educational level is relatively high in comparison to other clusters. The majority of men in Cohort 3 (full-time) are married and have the most “traditional” marital biographies, although the percentage of single and divorced men increases from cohort to cohort for both East and West Germany. By contrasting the men from the third, but also the first cluster against the discontinuous one we see some major differences in marital biographies: for baby boomers in Clusters 1 and 3 we observe 70 to 78% married men, but for the discontinuous cluster only 62% of Eastern men are married, and only 49% for West Germany.

Table 5: Average length of states and average number of episodes and elements per cohort and region

	West Germany			East Germany		
	Cluster 1 Full t/educ.	**Cluster 2** Discontinuous	**Cluster 3** Full time	**Cluster 1** Full t/educ.	**Cluster 2** Discontinuous	**Cluster 3** Full-time
Cohort 1: 1936-1945						
Average length of the episodes:						
Education	9.3	0.9	0.8	7.4	-	0.8
Apprenticeship/ Training	2.1	2.9	2.8	2.5	-	2.8
Military service	0.5	0.5	1.0	1.1	-	1.3
Full-time employment	18.7	17.0	26.0	20	-	26.0
Part-time employment	0.1	3.9	0.1	0.0	-	0.0
Unemployment	0.2	3.7	0.1	0.0	-	0.0
Other	0.1	2.1	0.1	0.0	-	0.0
All episodes together	31.0	31.0	31.0	31.0	-	31.0
Average number of episodes:	3.6	4.7	3.2	4.3		3.6
Average number of diff. elements:	2.9	3.5	2.7	3.1	-	2.8
Number of observations:	335	37	841	96	4	349
Cohort 2: 1946-1955						
Average length of the episodes:						
Education	8.8	1.5	1.0	6.4	1.0	1.3
Apprenticeship/ Training	1.8	2.3	3.0	1.6	2.8	2.6
Military service	0.9	0.8	1.3	1.8	1.8	2.0
Full-time employment	18.4	16.7	25.1	20.4	20.8	24.5
Part-time employment	0.4	1.7	0.1	0.2	0.2	0.1
Unemployment	0.6	4.9	0.3	0.5	3.8	0.3
Other	0.1	3.0	0.2	0.1	0.6	0.0
All episodes together	31.0	31.0	31.0	31.0	31.0	31.0
Average number of episodes:	4.5	5.6	3.8	5.2	6.4	4.7
Average number of diff. elements:	3.4	4.0	3.2	3.7	4.6	3.8
Number of observations:	379	82	796	118	41	246
Cohort 3: 1956-1965						
Average length of the episodes:						
Education	8.3	1.7	1.6	6.6	1.8	1.9
Apprenticeship/ Training	1.8	2.4	3.1	1.8	2.9	2.6
Military service	1.0	0.7	1.0	2.0	1.5	2.1
Full-time employment	17.5	16.6	23.6	18.7	16.9	22.8
Part-time employment	0.7	1.2	0.2	0.3	0.5	0.2
Unemployment	0.8	6.3	0.7	1.0	6.0	0.7
Other	0.1	1.1	0.2	0.1	0.9	0.0
All episodes together	30.2	30.1	30.4	30.6	30.4	30.3
Average number of episodes:	5.2	6.8	4.5	6.0	7.3	5.5
Average number of diff. elements:	3.7	4.1	3.5	4.0	4.6	4.1
Number of observations:	505	153	785	106	144	262

SOEP, weighted data / non weighted number of observations, own calculations. The results for Cohort 1, Cluster 2 in East Germany are not displayed due to the small number of observations.

Taken all in all, the composition of the clusters in relation to demographics has changed only slightly. The question remains open whether the composition of the biographies for each cluster changes from cohort to cohort. This is what we analyze in Table 5, where we present the composition of the biographies for each cluster and cohort for both regions. Starting with Cluster 3 (biographies dominated by full-time employment), we observe that the average length of full-time employment is 3 years shorter for the baby boomers as compared to the oldest cohort for both East and West Germany. On the other hand, the average lengths of episodes of education and unemployment are slightly longer. The average number both of episodes and elements is larger for the younger cohorts, indicating that Cluster 3 biographies of the younger cohorts are less stable than those of the oldest cohort in both regions.

We also observe some differences in the composition of Cluster 2 biographies from cohort to cohort. In West Germany the length of full-time employment does not change much and unemployment duration increases by almost three years. Baby boomers in West Germany with this type of biography are on average three years longer in unemployment than individuals of the oldest cohort. At the same time, the duration of education increases by almost one year, indicating again that individuals in this cluster belonging to younger cohorts may have a obtained higher level of education than individuals belonging to the oldest cohort. In East Germany, the number of observations in the oldest cohort belonging to Cluster 2 is not sufficient to draw conclusions. However, by comparing Cohort 2 and 3 what we can observe is a decrease in the length of full-time employment and an increase in the length of unemployment.

Cluster 1 is the most stable one in relation to length of episodes in both regions. However, even if the average length of the episodes is similar from cohort to cohort, the total number of episodes is higher for the baby boomers than for the oldest cohort. This shows evidence of higher rate of change of episodes, even if the episodes end up having similar average lengths.

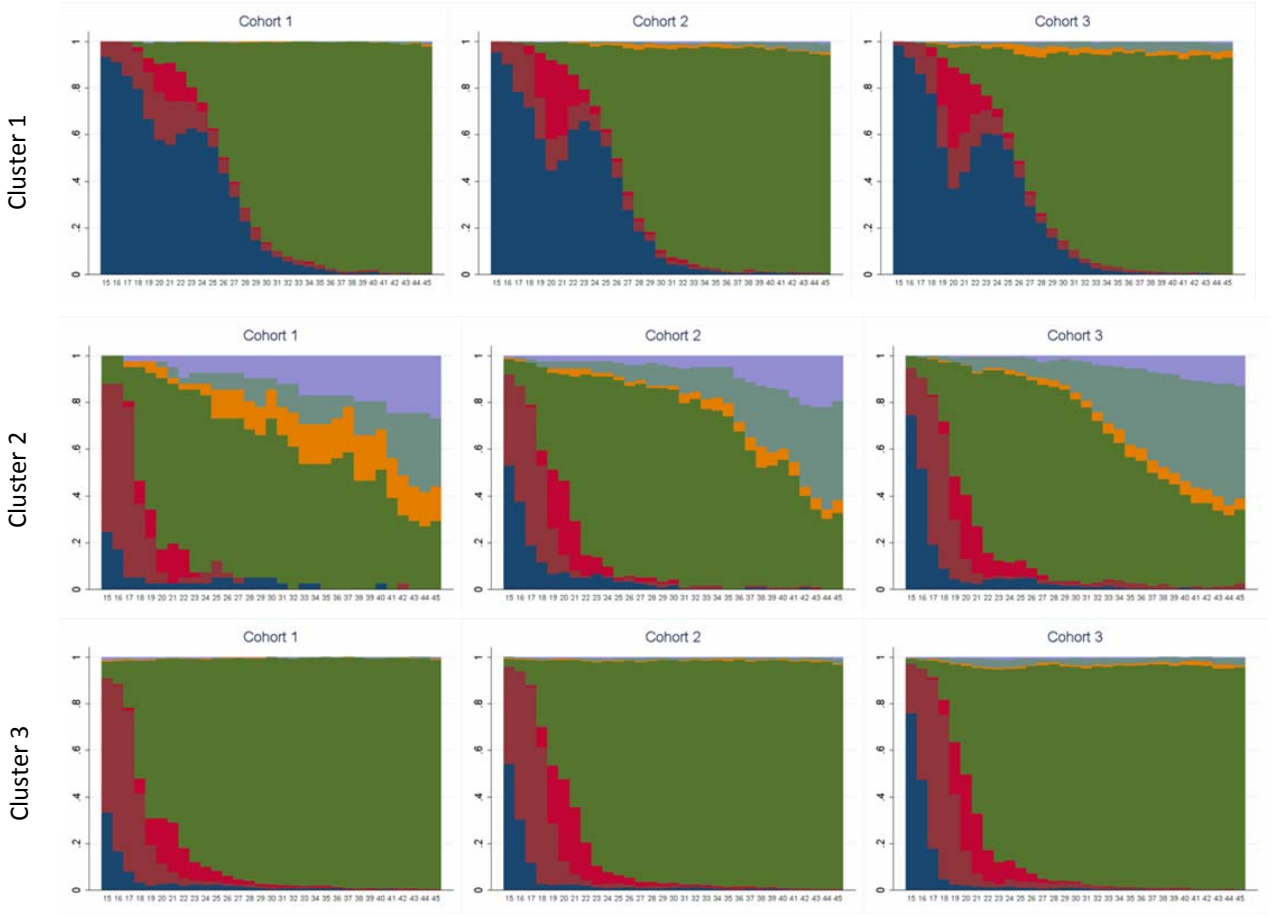
Another way to analyze how clusters change over time is by observing the relative weight of each relevant state at each age for every cluster and cohort (Figure 5).[17] In Clusters 1 and 3, the dominance of full-time employment decreases from cohort to cohort and employment biographies become more inhomogeneous. Considering the first cluster, we observe that after education and military service there was a heavy dominance of full-time employment, which was rarely combined with other states. However, we see that for the younger cohorts, although full-time employment remains the dominant state, part-time employment and unemployment gain in relevance.

Cluster 2 develops differently. In this more heterogeneous cluster we observe that part-time employment and the states classified as 'other' are less in evidence. Education, full-time employment and unemployment gain more weight in such biographies. Unemployment becomes a common state for the men in Cluster 2, especially in the later stages of biographies.

Finally, in Cluster 3 we observe a similar pattern of development as in Cluster 1. We see that education becomes more relevant and we observe how both unemployment and part-time employment also gains in importance, even if, after the educational period, full-time employment remains dominant in these biographies.

[17] The results are not displayed separately for East and West-Germany because they do not differ systematically. The graphics for each region are available on request.

Figure 5: Cluster evolution across cohorts



SOEP, weighted data, own calculations.

Finally, on Table 6 we observe how the coefficient of concentration for each cluster differs from cohort to cohort for the two regions. Thus we can examine whether clusters are changing over time in relation to plurality and whether any changes differ between East and West Germany. The coefficient of concentration remains stable for Cluster 2 for both East and West Germany. This is not surprising if one takes into account that this cluster is characterised by employment biographies with low stability and high discontinuity. However, in considering Clusters 1 and 3 we observe much more diversity in the younger cohorts. This means that even for the clusters with more employment stability we observe more diversification in both East and West Germany. By comparing the two regions we observe that the Clusters 1 and 3 were already more diverse for East Germany than for West Germany in Cohort 1. This might be due to the higher diversity of the biographies in the education period (as shown in Figure 2). For the baby boomers too, the employment biographies of the Clusters 1 and 3 are more plural for East than for West Germany.

Table 6: Coefficient of concentration over the clusters and regions (in percent)

	West Germany			East Germany		
	Cluster 1: Full t/educ.	**Cluster 2:** Discontinuous	**Cluster 3:** Full-time	**Cluster 1:** Full t/educ.	**Cluster 2:** Discontinuous	**Cluster 3:** Full-time
Cohort 1: 1936-1945	63	100	40	83	100	57
Cohort 2: 1946-1955	76	100	49	91	95	69
Cohort 3: 1956-1965	90	100	71	99	100	85

SOEP, non weighted data, own calculations.

Summarizing, we have observed that the relative weight of each cluster changes across cohorts. Especially in East Germany less stable employment biographies with a larger number of episodes and transitions have gained in relevance, which implies an inhomogenization and de-standardization trend in biographies. On the other hand, there are diversification trends in the different employment biography groups. The percentage of diverse employment patterns increases with time in East and West Germany, allowing one to conclude that there is a trend towards pluralization in men's employment patterns.

4. Summary and conclusions

In the present paper we have analyzed how male employment biographies (from age 15 to 45) have changed in the last few decades in East and West Germany. Concretely we compare the three birth cohorts (1936-1945), (1946-1955) and (1956-1965) in order to see whether employment biographies have become more de-standardized and plural. The main motivation of the analysis was to investigate how the de-standardization and pluralization trends in employment biographies after the reunification differ between East and West Germany.

According to the results, the employment biographies of men belonging to the first cohort did not differ much between East and West Germany. Full-time employment was the dominant status and unemployment was rare in both regions, as were other statuses such as part-time employment. For the younger cohorts, other statuses, and especially unemployment, gained in importance, though at different speeds in East as compared with West Germany. While in West Germany the increase in unemployment was progressive over the period studied, in East Germany there was a break point in 1989 after which rates of unemployment overtook those of West Germany.

The employment careers of men have become more discontinuous across the cohorts. This trend can be seen in both regions but is more pronounced in East Germany. In the East, 31 percent of the baby boomer men have had a discontinuous employment trajectory, characterized by a higher number of transitions between episodes. Meanwhile, this is the case for only 12 percent of men from the same cohort in the West. We also observe that, even in more continuous careers, the number of transitions has increased, in such a way that, even if full-time employment remains the dominant status, those full-time jobs are more often combined with other episodes in the younger cohorts. This trend is also more pronounced in the East than in the West.

Additionally, the diversity of employment patterns has increased in both regions. The coefficient of concentration shows us that the percentages of different sequences has increased in both East and West Germany, the employment biographies of the baby boomers being more pluralised in East than in West Germany.

All in all, we can conclude that in both regions there is a trend towards inhomogenization in employment careers in the sense that the number of transitions between episodes is increasing. We also observe that employment biographies have become more pluralised as expressed by a trend towards a greater diversity of employment patterns. Both these trends occur in both regions but they are more pronounced in East Germany. As a result, employment biographies of younger men are more pluralised and more inhomogeneous in East than in West Germany.

As pointed out in the introduction, higher levels of discontinuity and plurality imply new challenges for social security systems. Individuals with discontinuous employment biographies may be expected to pay less old age security contributions as a result of repeated episodes of unemployment, or due to part-time or fixed-term contracts. Furthermore, these episodes may have a negative effect on subsequent wages (Ehrenberg & Oaxaca 1976; Adamchik & Hyclak 2006), which would also imply lower contributions in the long run. Finally, discontinuous careers might affect also retirement decisions and therefore the pension level of the individuals (Blekesaune, Bryan & Taylor 2008). Our results represent a further challenge for the German social security system, which will have to take into account the divergent evolution of the labour market in East and West Germany in order to avoid inheriting significant regional differences in social security outcomes in the future.

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Appendix

Table A.1: Average percentage of overlaps over the total number of elements per cohort

	Cohort 1: 1936-1945	Cohort 2: 1946-1955	Cohort 3: 1956-1965
Average percentage of overlaps containing:			
Education	1.7	1.9	2.8
Apprenticeship/ Training	1.7	2.3	3.5
Military/Civil service	0.6	1.0	1.4
Full-time employment	3.0	4.6	7.6
Part-time employment	0.2	0.8	1.6
Unemployment	0.3	1.5	3.6
Other	1.3	2.4	3.1
Average percentage of overlaps(*):	4.2	7.1	11.4

SOEP, weighted data, own calculations. (*) The sum of the average percentage of overlaps containing the different states considered in the table differs from the total average percentage of overlaps. This is due to the fact that the overlaps contain 2 or more of the states considered.

Table A.2: Average percentage of recoded overlaps over the total number of elements per cohort

	Cohort 1: 1936-1945	Cohort 2: 1946-1955	Cohort 3: 1956-1965
Average percentage of overlaps recoded to:			
Education	0.6	0.6	0.9
Apprenticeship/ Training	1.3	1.5	1.9
Military/Civil service	0.6	1.0	1.4
Full-time employment	1.2	1.6	2.5
Part-time employment	0.1	0.5	0.8
Unemployment	0.3	1.5	3.6
Other	0.1	0.1	0.2

SOEP, weighted data, own calculations

Table A.3: Demographic descriptive indicators of the cohorts (in percent)

	West Germany	East Germany	Total
Cohort 1: 1936-1945			
Demographics:			
West Germany	-	-	79.1
German nationality	88.1	99.9	90.6
Education (*):			
Low school education	63.5	60.0	62.8
Intermediate school education	16.4	20.7	17.3
High school education	20.0	19.3	19.8
Apprenticeship	73.5	84.0	75.7
University degree	21.5	34.6	24.2
Marital Status at the last observation point(**):			
Single	8.9	4.9	8.1
Married	82.1	86.4	83.0
Divorced	8.4	8.2	8.3
Cohort 2: 1946-1955			
Demographics:			
West Germany	-	-	80.1
German nationality	88.2	98.9	90.4
Education (*):			
Low school education	57.0	24.6	50.5
Intermediate school education	22.2	58.0	29.4
High school education	20.8	17.5	20.2
Apprenticeship	75.1	83.1	76.7
University degree	21.2	24.0	21.8
Marital Status at the last observation point(**):			
Single	13.2	11.1	12.8
Married	75.1	69.5	74.0
Divorced	11.4	18.8	12.9
Cohort 3: 1956-1965			
Demographics:			
West Germany	-	-	78.1
German nationality	88.7	100.0	91.2
Education (*):			
Low school education	46.0	14.7	39.1
Intermediate school education	27.4	70.6	37.0
High school education	26.5	14.7	24.0
Apprenticeship	72.7	88.0	76.0
University degree	21.5	18.2	20.8
Marital Status at the last observation point(**):			
Single	17.3	16.2	17.0
Married	71.3	64.0	69.7
Divorced	11.0	19.8	12.9

SOEP, weighted data, own calculations. (*) Low school education: no school degree or *Hauptschulabschluss*; Intermediate school education: *Realschulabschluss* or other school degree; High school education: *Abitur* or *Fachhochschulreife.* (**) The status "widowed" is not indicated since being widowed is not typical for the observed population.

Table A.4: Demographic descriptive indicators of the cohorts across clusters (in percent)

	West Germany			East Germany		
	Cluster 1 Full t/educ.	**Cluster 2** Discontinuous	**Cluster 3** Full-time	**Cluster 1** Full t/educ.	**Cluster 2** Discontinuous	**Cluster 3** Full-time
Cohort 1: 1936-1945						
Demographics:						
German nationality	89.0	88.4	87.9	100.0	-	99.8
Education (*):						
Low school education	7.8	84.9	77.9	12.9	-	70.9
Intermediate school education	25.6	8.8	14.2	18.0	-	21.1
High school education	66.5	6.2	7.7	69.1	-	8.0
Apprenticeship	41.7	67.3	82.2	52.7	-	91.3
University degree	73.8	1.7	8.2	88.1	-	22.1
Marital Status at the last observation point(**):						
Single	13.7	22.4	7.1	2.3	-	5.6
Married	79.6	67.5	83.3	85.4	-	86.5
Divorced	6.5	8.1	8.9	10.	-	7.6
Cohort 2: 1946-1955						
Demographics:						
German nationality	86.8	85.5	89.1	100.0	100.0	98.3
Education (*):						
Low school education	8.0	67.9	71.7	1.2	43.9	30.6
Intermediate school education	21.2	23.2	22.5	39.7	55.4	65.8
High school education	70.8	8.9	5.8	59.1	0.1	3.6
Apprenticeship	46.9	62.4	86.3	57.7	88.2	92.3
University degree	70.2	10.8	6.5	84.8	0.1	4.2
Marital Status at the last observation point(**):						
Single	15.6	20.8	11.2	11.6	15.9	10.0
Married	74.6	60.5	77.5	62.3	52.0	75.6
Divorced	9.7	18.7	10.9	25.3	31.2	13.9
Cohort 3: 1956-1965						
Demographics:						
German nationality	91.6	75.5	90.0	99.6	100.0	100.0
Education (*):						
Low school education	9.4	71.5	60.6	0.0	27.1	11.8
Intermediate school education	17.8	16.4	34.8	45.5	69.5	79.5
High school education	72.8	12.1	4.7	54.4	3.3	8.7
Apprenticeship	47.9	72.3	85.9	65.9	92.7	92.6
University degree	61.6	3.9	3.7	72.8	3.4	8.7
Marital Status at the last observation point(**):						
Single	22.6	22.0	13.5	13.7	27.7	9.9
Married	70.0	61.8	74.1	74.2	49.2	69.5
Divorced	7.6	15.8	11.8	12.1	23.0	20.5

SOEP, weighted data, own calculations. (*) Low school education: no school degree or *Hauptschulabschluss*; Intermediate school education: *Realschulabschluss* or other school degree; High school education: *Abitur* or *Fachhochschulreife.* (**) The status "widowed" is not indicated since being widowed is not typical for the observed population. The results for cohort 1, cluster 2 in East Germany are not displayed, given the small number of observations.

Figure A.1: Elbow-Criterion: Decision about the number of clusters