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Salmon migration and fertility in East Germany – An analysis of birth dynamics around German reunification

„Salmon migration“ und Fertilität in Ostdeutschland – Eine Analyse des Geburtenverhaltens nach der Wiedervereinigung

Abstract:
This paper uses rich administrative data from the Deutsche Rentenversicherung (German Pension Fund) to describe changes in the timing and the spacing of births that occurred in the period following German reunification. We examine differences in the birth dynamics of East Germans, West Germans, and women who migrated between the two parts of Germany in these years. As the pension registers provide monthly records on whether a person is living in East or West Germany, they also allow us to examine the role of regional mobility in birth behaviour. In particular, we test the “salmon hypothesis”, which suggests that migrants are likely to postpone having a child until after or around the time they return to their region of origin. Our investigation shows that a large fraction of the cohorts born in 1965-74 migrated to West Germany after reunification, but that around 50% of these migrants returned to East Germany before reaching age 40. The first birth risks of those who returned were elevated, which suggests that the salmon hypothesis explains the behaviour of a significant fraction of the East German population in the period following German reunification.

Key words: births, fertility, Germany, order-specific fertility behaviour, register data, internal migration, return migration

Zusammenfassung:
In diesem Beitrag werden die Registerdaten der deutschen Rentenversicherung verwendet, um die Übergänge zum ersten Kind und das „Spacing“ weiterer Kinder in der Zeit nach der Wiedervereinigung zu beschreiben. Wir untersuchen dabei das Geburtenverhalten von ostdeutschen und westdeutschen sowie jenen Frauen, die zwischen den beiden Landesteilen migriert sind. Da in den Rentenregistern monatsgenaue Angaben zum Wohnort enthalten sind, erlauben sie es den Zusammenhang von räumlicher Mobilität und Geburtenverhalten zu analysieren. Insbesondere untersuchen wir die „Salmon Hypothesis“ (Lachshypothese), der zufolge Geburten bis zur Rückkehr der Migrantinnen in ihre Herkunftsregion aufgeschoben werden. Unsere Analysen zeigen, dass ein erheblicher Teil der ostdeutschen Frauen der Geburtsjahrgänge 1965-74 nach Westdeutschland migrierte, jedoch bis zum Alter 40 etwa 50% von ihnen nach Ostdeutschland zurückgekehrt sind. Die Erstgeburtenraten der Rückkehrerinnen sind erhöht, was darauf hinweist, dass die „Salmon Hypothesis“ das Verhalten eines großen Teils der Ost-West-Migrantinnen beschreiben kann.

Schlüsselwörter: Geburten, Fertilität, Deutschland, ordnungsspezifisches Geburtenverhalten, Registerdaten, Binnenmigration, Rückkehrmigration

1 Alphabetical order chosen. Both authors have contributed equally to this contribution.

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1. Introduction

After the collapse of communism, annual fertility rates declined in most countries of Central and Eastern Europe (Billingsley 2009; Frejka/Sobotka 2008; Perelli-Harris 2008; Sobotka 2003; Sobotka/Zeman/Kantorova 2003; Zakharov 2008). The most radical change was in East Germany, where the period fertility rate fell to just 0.77 children per woman in 1994. This unprecedented shift in demographic behaviour in response to changes in economic and societal conditions sparked a lively debate among demographers about its causes. Some researchers focused on the adverse economic conditions that may have suppressed birth rates (Bernardi/Klärner/von der Lippe 2007; Eberstadt 1994; Witte/Wagner 1995), while others pointed to the biographical opportunities that opened up after reunification, noting that East Germans were given the option of escaping poor employment prospects in their home region by moving to the more prosperous western part of the country (Beck-Gernsheim 1997). Both of these arguments implicitly assume that births are life course decisions that can be brought forward or postponed depending on current or anticipated future conditions. As more than 25 years have passed since German reunification, we now have a sufficient time span to study to provide a conclusive answer to the question of how societal change affected birth timing and parity progression in East Germany.

In this paper, we use rich administrative data to give a nuanced account of the order-specific birth behaviour of women who were at risk of childbearing in the period around German reunification. Order-specific birth data are needed to understand the fertility behaviour of a population, allowing us to answer key questions, such as whether family formation is postponed across the life course, whether childlessness is on the rise, and whether additional births have been spaced further apart. While this type of information is readily available from the vital statistics or census data for many European countries, this has not been the case for Germany, as fertility histories have not been collected in Germany's microcensuses or in the 2011 census. While order-specific information was collected in the vital statistics of the GDR, this practice was discontinued following German reunification. In 2008, the German Statistical Office reformed its system of vital statistics, and now collects order-specific fertility. But because this is a rather recent change in documentation practices, Germany still lacks long time series of order-specific fertility data. Hence, Germany lacks the statistical data that would be needed to study order-specific fertility behaviour by female birth cohort, or to conduct an order-specific fertility analysis for the first two decades after reunification. The pension registers are the only sources of large-scale data for Germany that could be used to fill the gap in the official statistics by providing the data needed to study order-specific fertility behaviour by birth cohort. The German pension registers are also an ideal source of information for investigating East-West differences, as well as mobility between East and West Germany (see also Grunow and Müller (2012) for analysis on East-West-differences in women's employment based on pension and employment registers). Many statistical sources no longer distinguish between East and West Germany. This distinction has been retained in the German pension data because the calculation of East and West German pensions has still not been harmonised. Thus, the Pension Fund continues to keep track of whether individuals are living in East or West Germany.

This paper exploits the pension data to give a detailed account of order-specific fertility behaviour in East and West Germany, and to examine how fertility is related to migration between the two regions. The contribution of this paper to the literature is threefold. *First*, we examine the order-specific birth behaviour of women who were at risk of childbearing around the time of German reunification. While there is some existing research on order-specific birth behaviour in Germany (Goldstein/Kreyenfeld 2011; Kreyenfeld 2003; Kreyenfeld/Scholz/Peters/Wlosnewski 2010; Pötzsch 2012), there are no studies that cover the critical period of the 1990s. *Second*, we provide evidence on the birth timing of people who migrated from East to West Germany, and vice versa, in the years around the time of reunification. *Third*, we provide evidence on the birth behaviour of return migrants. Drawing an analogy to the "salmon bias hypothesis" employed in research on migration and mortality, which argues that regional differences in mortality can be affected by the tendency of migrants to return to their place of origin at later life stages, we explore the question of whether there was a pattern of East-West German migrants postponing having their first child until they had migrated back to East Germany. All our investigations are conducted from the cohort perspective. Our analysis focuses on the 1950-1974 cohorts who were of reproductive ages around the time of reunification.

2. Institutional background and prior research

2.1 Social policies and economic constraints

After the demise of communism, new challenges emerged for comparative social policy scholars. The literature that had previously been concerned with the classification of Western European countries into conservative, liberal, and social democratic countries (Arts/Gelissen 2002; Esping-Andersen 1999; Sainsbury 1999) now grappled with the question of how Central and Eastern European (CEE) countries should be integrated into existing typologies. Scholars became increasingly aware that any attempts at classification could turn out to be premature, as the economic recession in many CEE countries curbed efforts to establish a functioning welfare state (Pascall/Lewis 2004; Thévenon 2011). Moreover, even though East Germany fell into a deep recession after the fall of the Berlin Wall, the path the welfare state system would follow in a reunited Germany was largely pre-determined. The Berlin Wall fell on 9 November 1989. Less than a year later, the former East German legal system was basically nullified by the Unification Treaty and replaced by West German regulations.

At that time, West Germany was widely seen as a prototypical conservative and familialistic welfare state. As the system of joint taxation heavily taxed the "second earner", women had strong incentives to withdraw from the labour market after childbirth. However, it would be too narrow to attribute West Germany's commitment to familialism to the system of joint taxation alone. It should also be noted that West Germany had comprehensive regulations that supported the single-earner model by buffering families from the adverse economic effects that often occur when one partner withdraws from the labour market. These measures included ex-spousal support after marital breakdown, the

coverage of non-working wives in the health care system, and a fairly generous survivor's pension. The parental leave system also fit into that logic. With a monthly payment of only DM 600 (approx. € 300), it was never meant to replace the income from full-time employment. Instead, it was intended as a benefit that would reward women for their "child-rearing efforts".

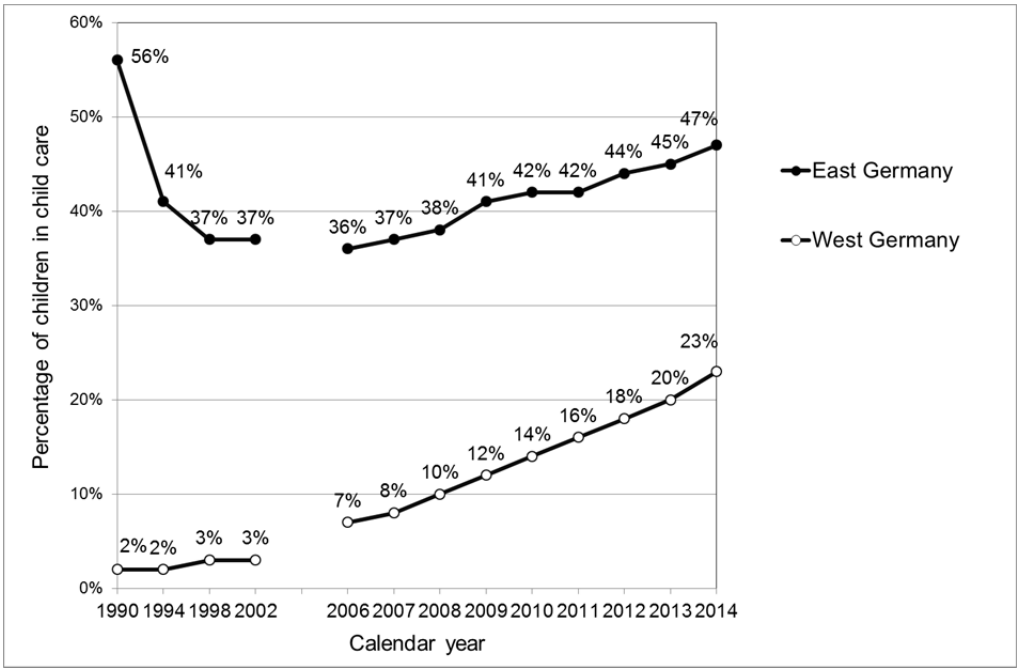
With the ratification of the Unification Treaty, the abovementioned regulations were implemented in the East German system.[2] Based on the regulations of the tax and transfer system alone, the eastern part of the newly reunited Germany would have clearly fallen into the conservative and familialistic welfare state category. However, East Germans, who had previously been exposed to a completely different system that demanded women's full integration into the labour market, did not react as expected to the incentives provided by the new system. Most women in East Germany did not withdraw from the labour market. Instead, their full-time employment rates remained high, even amid adverse economic developments. Attitudinal surveys conducted from the beginning of the 1990s through the end of the 2000s also reported large and persisting East-West differences in attitudes towards maternal employment (Bauernschuster/Rainer 2012). Last but not least, marriage rates declined and non-marital birth rates skyrocketed after reunification, which suggests that the system of joint taxation had a very limited influence on the marital behaviour of the East German population (Konietzka/Kreyenfeld 2017).

It is very difficult to tease apart the different factors that determined the specific behavioural patterns of East Germans during this period. Differences in entrenched values and attitudes may explain the East-West differences in employment and marriage patterns (Arránz Becker/Lois 2010; Bauernschuster/Rainer 2012; Grunow/Müller 2012; Kreyenfeld/Goldstein 2011). Another possible reason why the employment behaviours of East and West German women did not converge as rapidly as anticipated is that there was an ongoing East-West divide in the provision of public day care. Unlike other family policies, child care policies are the responsibility of local municipalities in Germany. Thus, child care availability varies depending on the policies and priorities of the local communities. As the provision of child care had been almost universal in the GDR, it was pared back less dramatically than expected by East German municipalities following reunification. Child care was therefore far more widely available in the East than in the West (Hank/Wagner/Tillmann 2001; Kreyenfeld/Krapf 2016). Figure 1 maps the child care situation for children ages 0-2. The data before and after 2006 are not fully comparable because they show the availability ratio before that date and the child care usage afterwards. Nevertheless, the large differences in the opportunities for parents of young children to combine work and family are very evident from these figures. In 1998, for example, 37% of East German children aged 0-2, but just 3% of their West German counterparts, had access to a place in day care. These rare places in West Germany were usually allocated based on need and reserved for disadvantaged groups, such as lone parents. In sum, in the 1990s, East Germany clearly lagged behind West Germany in terms of economic development, but the conditions for reconciling work and family were more favourable in East

2 Some East German regulations were phased out over time. For example, the paid leave benefits for the care of sick children were retained until July 1991, and the West German child benefit system was not implemented until January 1991 (Berghahn 1992; Frerich/Frey 1993).

than in West Germany. At the same time, large numbers of people of childbearing age migrated from East to West Germany.

Figure 1: Child care for children ages 0-2, East and West Germany 1990-2014



Note: 1990-2002: provision ratios for *Krippe* (child care for children below age 3); 2006-2014: percent of children ages 0-2 in child care; until 2002: East Berlin is included in East Germany.

Source: Kreyenfeld and Krapf (2016) based on data provided by the Statistisches Bundesamt

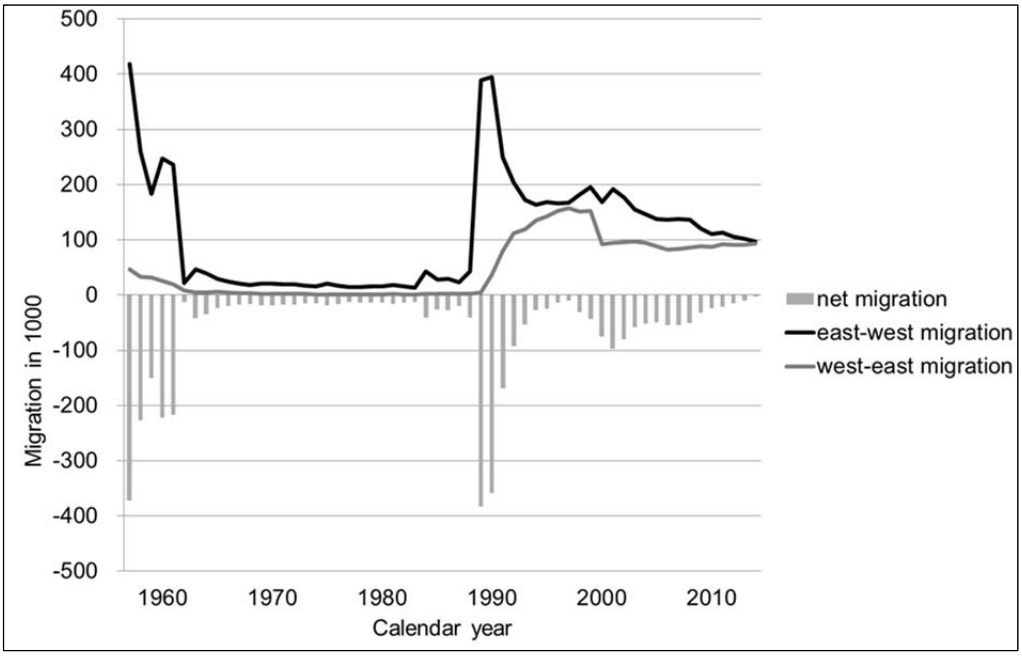
2.2 Migration patterns between East and West Germany

The conditions in East Germany in the 1990s differed from those of the other post-communist countries of Central and Eastern Europe (CEE) in a number of ways. First, the economic transformation in East Germany was more rapid and radical than it was in other post-communist countries. Second, the fall of the Berlin Wall unleashed a massive wave of internal migration in Germany. Third, while migration levels have been high in the other post-communist countries as well (Wallace 2002), the options for long-term migration between CEE and Western European countries have been heavily restricted, at least until the Eastern Enlargement of the European Union. Obviously, there were no equivalent restrictions for East-West German migration.

Figure 2, which displays the migration flows between East and West Germany, illustrates how the construction of the Berlin Wall had blocked migration. In 1988, with the gradual easing of the political situation, increasing numbers of East Germans fled to the Federal Republic of Germany through Czechoslovakia and Hungary. After the Berlin

Wall fell in 1989, East-West migration skyrocketed. In the years 1989/90 alone about 800,000 East Germans migrated to West Germany – almost 5% of the East German population at the time, and more than had migrated in the 28 years the Wall had been in place. In the subsequent years, the number of people migrating from East to West dropped to about 200,000 per year. Figure 2 also shows that West-East migration gradually increased over time after reunification. Due to the decrease in East-West migration and the increase in West-East migration, net migration had declined substantially by the end of the 1990s. However, the official statistics record migration moves without connecting them to individuals. Thus, by looking at the official statistics we cannot tell whether a particular move was of shorter or longer duration, or whether a particular person had moved consecutively. Therefore, no information about the share of return or circular migration is available from the official statistics. Studies on the motives and the socio-demographic characteristics of East-West migrants indicate that the main motive for migration is to pursue (better) employment (Stauder 2018). It has also been shown that in line with typical migration patterns, young people were more likely than older people to migrate, and the migrants were better educated and more qualified than the non-migrants (Fuchs-Schündeln/Schündeln 2009).

Figure 2: Migration between East and West Germany, calendar years 1957-2014, in thousands



Note: From 2000 onwards Berlin is excluded.

Source: Statistisches Bundesamt (2004, 2017)

2.3 Prior research on East German fertility and migration after reunification

In the period immediately after the fall of the Berlin Wall, German birth rates declined to record low levels. Since then, scholars have been debating the question of how this development should be interpreted (Adler 1997; Beck-Gernsheim 1997; Eberstadt 1994; Witte/Wagner 1995). A great barrier to fully understanding the birth dynamics in the period after reunification was that no order-specific fertility data were available that could be used to study the timing of first birth and spacing of higher-order fertility. East Germany had collected order-specific fertility data, but this practice was discontinued with the ratification of the Unification Treaty that harmonised East and West German statistics. The collection of order-specific data was (re-)introduced in 2008. However, for the critical period after reunification, there are no official statistics that would provide us with a comprehensive understanding of order-specific fertility behaviour in East and West Germany. Many of the gaps in knowledge that resulted from the lack of comprehensive official birth statistics have been filled by survey data research (Arránz Becker/Lois/Nauck 2010; Huinink 2005; Huinink/ Kreyenfeld/Trappe 2012; Kreyenfeld 2003). A consistent finding of this research is that the median age at first birth among women in East Germany increased rapidly after reunification, but remained below the high West German levels. It has also been shown that after reunification, the transition rates to the second and the third birth in East Germany fell well below Western German levels. Huinink (2005) even spoke of the emergence of a "crisis" of the second child in East Germany after reunification.

There was a lack of clarity not only about the role of East-West migration in fertility, but about how return migration tied into the overall fertility development in East Germany. While the exact magnitude of this effect was difficult to measure, several estimates suggest that return migration occurred on a massive scale. For example, Fuchs-Schündeln and Schündeln (2009) found that 20% of East-West migrants returned within five years of their initial migration, while Beck (2011) estimated that 32% of East Germans who moved to the West after 1990 had moved back to the East by 2005. When asked about their reasons for returning to East Germany, the desire to be close to friends and family usually topped the list (Glorius 2010; Lang/Hämmerling/Keil 2012; Scheffel 2013; Schmelz 2002; Schmithals 2010).

There is also a small body of research based on the German Socio-Economic Panel (GSOEP) data that sheds light on the demographic behaviour of East-West migrants. Vatterrott (2015) found that East-West migrants' birth rates lie between those of non-mobile Eastern and Western Germans. However, this analysis considered first-time migrants only, while disregarding return migrant episodes due to a lack of sufficient information on this phenomenon in the GSOEP dataset. Thus, it has been shown that East-West migrants are comparable to non-mobile East Germans in terms of the timing of the first birth, but progress more quickly to the second birth. Moreover, after controlling for socio-demographic characteristics, the differences between the mobile and the non-mobile populations of Eastern German origin have been found to decrease for the second birth and increase for the first birth. The paper discusses the effect of a possible planned return migration on the birth risks of East-West migrants while in West Germany, especially in light of the large shares of couples made up of East-West migrants. To the best of our knowledge, there is no single study that has investigated the fertility behaviour of return

migrants. The present study seeks to close parts of this gap by providing a comprehensive overview of the order-specific fertility behaviour in East and West Germany, with a special focus on the fertility behaviour of the East-West migrant population.

Our main guiding hypothesis is that migration is a disruptive life course event, especially if it is expected to be temporary. Migration can therefore lead to delays in other life course events, and especially in the entry into long-term commitments like parenthood. If we followed this hypothesis and disregarded all other cultural and institutional factors that might influence behaviour, we would expect to find that East-West migrants had a lower birth rate than the non-mobile population in the East (*Hypothesis 1a*). Obviously, there are many intervening factors. For example, if migrants are exposed to more advantageous labour market conditions after migration, they could be more likely to transition to higher-order births. East-West migration might also be related to partnership behaviour. If people are migrating because they want to unite with a partner, the birth rates of the migrant population would be expected to accelerate. The alternative hypothesis would therefore be that the birth rates of East-West migrants are likely to be higher than those of the non-mobile Eastern Germans (*Hypothesis 1b*). It might also be assumed that the behaviour of the East-West migrants is likely to converge with the behaviour of the West Germans, as they are exposed to the same institutional context after migration (*Hypothesis 1c*). This would suggest a postponement of first and an acceleration of higher order birth. Thus, hypotheses 1a and 1c are no competing hypotheses in respect to first birth behaviour. Both predict a postponement of first birth among the mobile population.

For the return migrants, we assume that they accelerate childbearing after returning to their region of origin. Here we refer to the "salmon hypothesis" from migrant mortality research (Andersson/Drefahl 2017; Pablos-Mendez 1994; Wallace/Kulu 2018) in suggesting that migrants may postpone having a (first) child until after or around the time of their re-migration to their region of origin (see, e.g., Lindstrom/Giorguli Saucedo 2007). This hypothesis is supported by the better compatibility of work and family in East Germany, at both an institutional and a personal level, as return migrants can often better rely on help from family and other personal networks in their region of origin (*Hypothesis 2).*

3. Data

Data for this investigation comes from the German pension registers. We do not have access to the full registers, but only to an extract that contains a subsample of the pension registers. We use the "Versichertenkontenstichprobe 2015" (VSKT 2015, i.e., Insurance Account Sample), which includes women and men of the 1948-1985 birth cohorts who ever had a record in the employment registers as of 31 December 2015. The great potential of this dataset is that it contains complete birth histories as well as detailed information on East-West residence patterns (see below). A shortcoming of the dataset is that certain populations, like civil servants and farmers, are not included in the registers. However, for the women of the cohorts of interest, the coverage is nearly universal (Kreyenfeld/Mika 2008).

Analytical sample

We excluded foreigners and ethnic German immigrants from our analysis because the birth behaviour of international migrants would need to be investigated separately. Moreover, the birth histories of the foreign population are incomplete in the register data (for details, see Kreyenfeld/Mika 2008). We also excluded men because births are assigned to women in the registers. Only in rare circumstances (e.g., the death of the mother shortly after childbirth) is a birth assigned to the father. We also restricted the analysis to the 1950-1974 cohorts. This is partly because we are mainly interested in examining birth behaviour during the 1990s. The excluded cases were either too old or too young to have been at risk of childbearing at that time. Another reason for this restriction is that the pension authorities regularly check consistencies in the pension records. The "clearance" (*Kontenklärung*) procedure in which the fertility information is updated and corrected usually does not occur before a cohort reaches age 30. Therefore, the younger cohorts cannot be included because their birth histories may be incomplete. We further limit the investigation to ages 15-40 so that the cohort differences cannot be attributed to differences in the age at censoring. The total sample includes 82,491 women; of whom 20% are East Germans, 73% are West Germans, and 6% East-West or West-East migrants (see Tables A1 and A2 in the appendix for further details).

Variables

Our goal is to provide clear-cut indicators by age and duration since last birth. Since the size of the sample drawn from the pension registers was still too small to allow us to generate fertility rates for single ages, we had to organise the data into the following age groups: 15-19, 20-21, 22-23, 24-25, 26-27, 28-29, 30-33, and 34-39. We also established the following time intervals since the previous birth: 0-1, 2-3, 4-5, 6-7, 8-9, and 10 or more years. All of the analyses are conducted from the cohort perspective based on the following cohort groups: 1950-54, 1955-59, 1960-64, 1965-69, and 1970-74. All of these cohorts were at risk of childbearing around the time of unification.

The main variable of interest is a time-varying covariate for the *place of residence*, which distinguishes East Germany from West Germany. This information is drawn from the employment histories, which include a variable that indicates whether an individual's pension system points were earned from employment in East or West Germany. But because these histories do not show in which region individuals spent periods of non- or unemployment, we had to impute this information from their previous employment records. For the episodes before an individual entered the labour market, we impute backwards by drawing on information about the region where the person was first employed. Thus, a person who was born in East Germany and had never worked or participated in any vocational training there, but who migrated to West Germany immediately after completing his or her school or university education, will be misclassified as a West German (and vice versa). We should also note that our data do not indicate whether a person was working and living in the same place. Thus, East-West commuters cannot be identified in our data. However, previous studies have shown that East-West commuting is far more transitory than East-West migration and can be a stepping stone to migration (Hunt 2000).

Figure 3 visualises 50 randomly selected life courses of individuals who ever migrated by groups of birth cohorts. The sequence index plots give an account of how migration

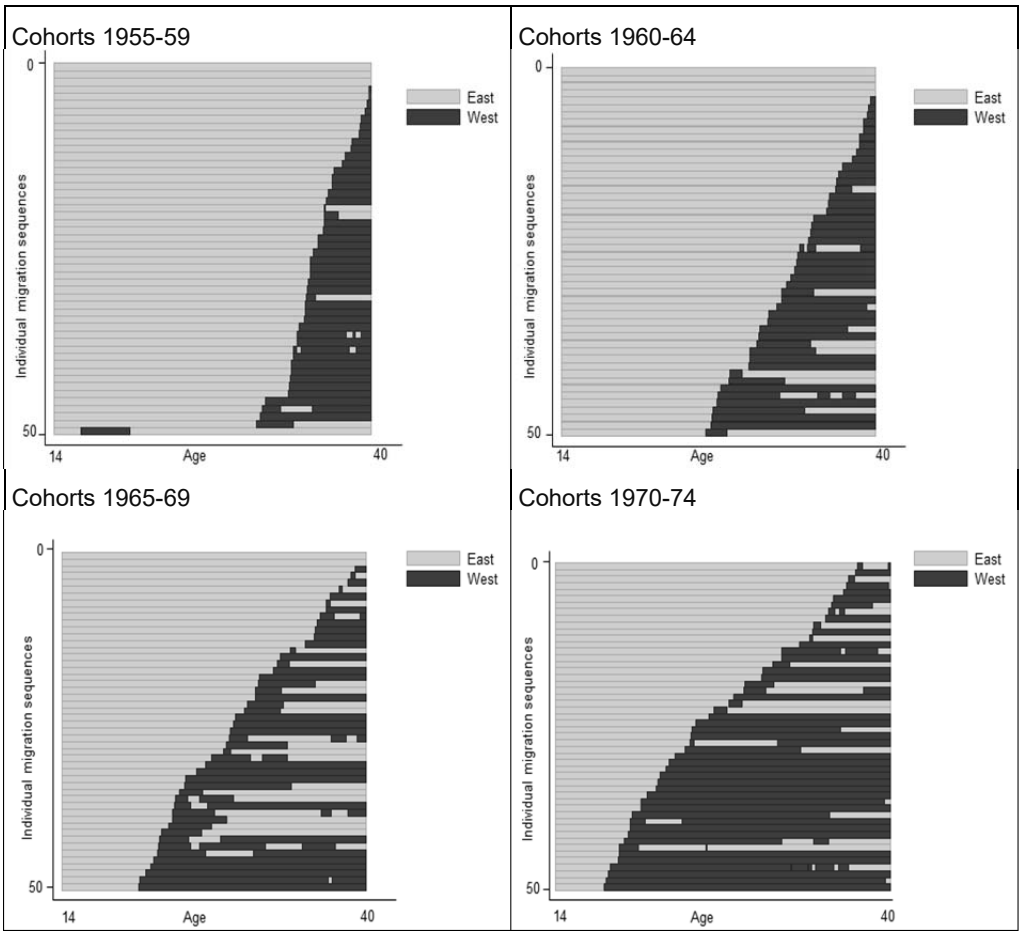
is situated in the individual life courses. Due to their small contributions to East-West migration during their fertile years, the oldest cohorts (i.e., those born in 1950-54) are not shown. As the younger cohorts were relatively young at the time of reunification, they also migrated at earlier points in the life course than the older cohorts. For example, the 1955-59 cohorts did not start migrating until after age 30, whereas the 1960-64 cohorts started migrating while in their mid-twenties, and the two youngest cohorts started migrating in their early twenties. In all of these cohorts, there were individuals who returned to the East or migrated to the West multiple times before returning to their region of origin. However, members of the older cohorts were less likely to engage in return migration, as most of these individuals migrated once and then stayed in the West until age 40. However, the younger the cohort was, the more dynamic their migration patterns were, as the time span between their first migration and reaching age 40 was longer. The migration patterns seem the most dynamic for the 1965-69 cohort, who experienced reunification while in their early twenties, and were thus probably in the best position to profit from the opportunities migration to the West could offer. However, the youngest cohorts were the most mobile. Among the cohorts born in 1970-74, 40% of the East Germans had ever migrated to West Germany between the ages of 15 and 40. Out of this group, 53% returned to East Germany at least once before reaching age 40 (for more details, see Tables A1-A2 in the appendix). Note, that the stay of East Germans in West Germany was often of short duration. About 10% of the mobile East Germans spent a year or less in West Germany. Note also that a move from East to West Berlin is considered as a migration from East to West Germany which also explains the high share of East-to-West migrants among this cohort.

Given that migration was in some cases a recurring event, particularly among the younger cohorts, we generated a variable that indicates the *sequence of migration*. We distinguish here the following time-varying categories:

- West German (has never migrated to East Germany)
- East German (has never migrated to West Germany)
- East-West migrant (East German, has migrated to West Germany)
- West-East migrant (West German, has migrated to East Germany)
- Return East migrant (East German, has returned to the East after migrating to West Germany)
- Return West migrant (West German, has returned to the West after migrating to East Germany).

Those who migrated again after returning are classed depending on their current region. East Germans migrating West after having returned to the East are East-West migrants. If they return again, they are return East migrants and so on.

Figure 3: Migration biographies of selected East-West German migrants, sequence index (plot of 50 randomly selected persons per cohort)



Note: The 1950-55 birth cohorts were disregarded in this representation.

Source: VSKT 2015-FDZ-RV

Method and structure of the analysis

The first step of our analysis includes a very general description of order-specific fertility behaviour. We display the survival functions generated by the life table method to provide an overview of the differences and the similarities between the East and the West in the timing of first, second and third birth. For this part of the analysis, we have excluded the mobile population. This means that we disregarded all individuals who had ever been an East-West or West-East German migrant. In the second part of the analysis, we test the previously formulated hypotheses by focusing more narrowly on the mobile population. In an event history model, we examine how migrant status relates to the first, second, and third birth rates. As a baseline function, we use a piecewise constant model.

4. Empirical investigation

4.1 Birth timing and parity progression in East and West Germany

In a first step, we have estimated the survival functions by region, cohort group, and birth parity in order to provide an overview of the changes in birth patterns across time. For this part of the investigation, East-West German and West-East German migrants were omitted from the analysis. As the first row of Figure 4 shows, there was a continuous process of first birth postponement in West Germany starting with the cohorts born around the 1950s. While the median age at first birth was around 23 for the cohorts born in 1950-54, it had shifted to 30 for the cohorts born in 1970-74. In this latter cohort, childlessness at age 40 is estimated at about 25%. This share is slightly higher than the share that was reported based on analyses of micro-census data (Bujard 2015); largely because of the low shares of childlessness among foreign nationals, who are not included in our investigations.

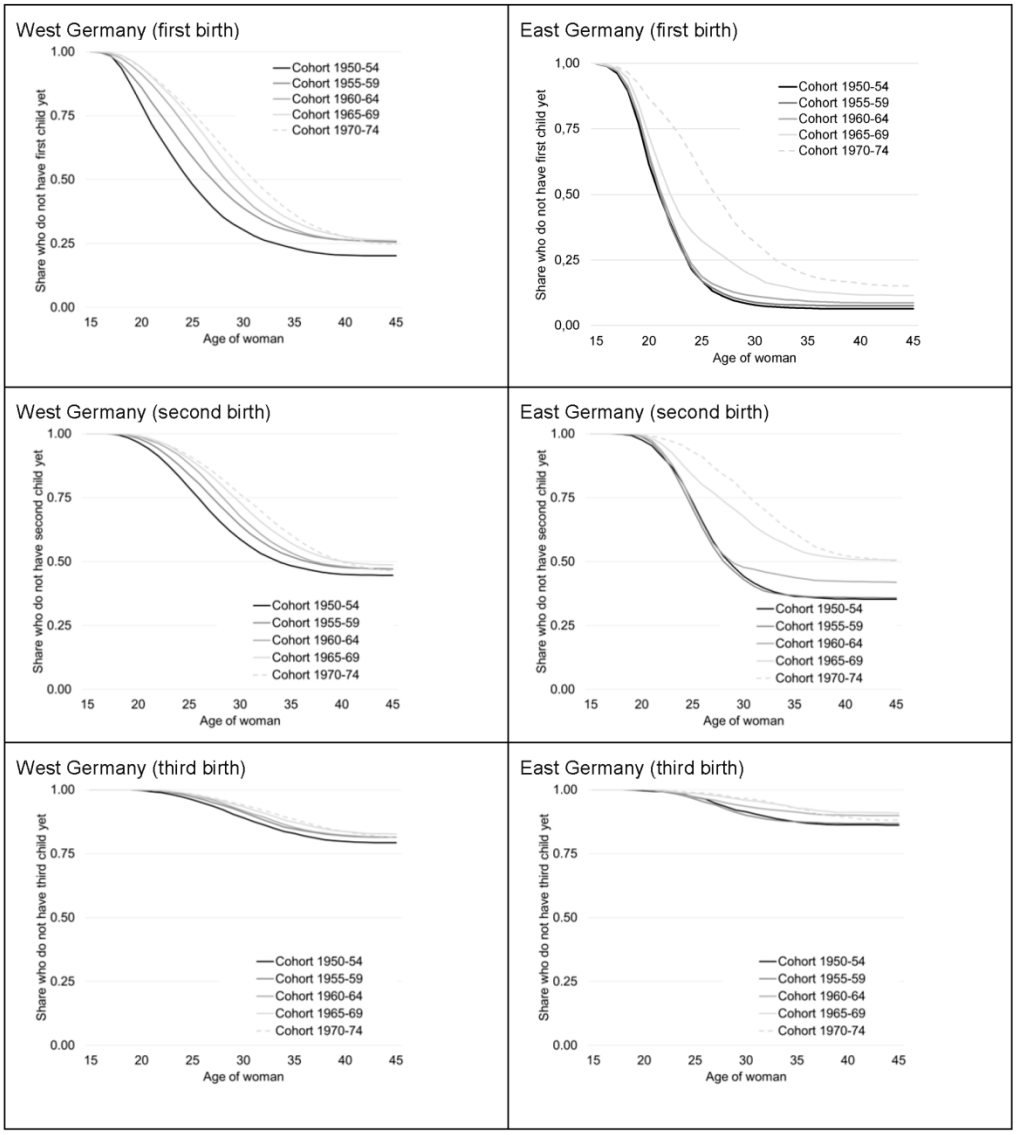
Overall, the birth patterns of the East Germans in our study sample differ markedly from those of the West Germans. Among the cohorts born in 1950-1964, the median age at first birth was 23, and the share of childlessness was around 5-10%. For the 1960-64 cohorts, there was a shift in the survival probability starting around age 25, which marks the time when these cohorts experienced the fall of the Berlin Wall. Among the younger cohorts born in 1970-74, who basically entered their childbearing years after reunification, the first birth schedule shifted rapidly relative to that of previous cohorts. For the 1970-74 cohorts, the median age at first childbearing was nearly 30, and was thus close to West German levels. Moreover, for these cohorts, the shares of childlessness at age 40 exceeded 10%. Despite a massive postponement of the first childbirth relative to their predecessors, East Germans of these cohorts did not reach West German levels of childlessness.

The subsequent rows of Figure 4 show the higher-order fertility patterns. For higher-order births, the age of the woman and the duration since the previous birth are the main determining factors. The figures display the transition probability by age of the woman. The risk set includes all women. Thus, included in the second birth probabilities are also women who had not yet had a first child, and were thus not exposed to the risk of having a second child. These "measures of the second kind" (Calot 2002) do not properly relate events to the population at risk. However, they match the parity-specific birth rates that are provided by the statistical offices, and thus provide insight into the overall probability of giving birth to a second or third child based on the woman's age. The second row of the figure shows that for West German women, when the first birth was postponed, the second birth also shifted in the life course. The share of West German women who had ever given birth to a second child was remarkably stable across the cohorts, at about 50%. Conversely, for East German women, the probability of having a second child declined rapidly: whereas about 65% of the older East German women had at least two children, this was the case for only 50% of the women born in 1965-74. For the younger cohorts, the overall probability of ever having a second child was fairly similar in East and West Germany, at about 50%. There were, however, large differences in the likelihood of having a third birth, as the third row of Figure 4 indicates. With little variation across the

birth cohorts, about 20% of the West German women had ever given birth to a third child. In East Germany, by contrast, the third birth probabilities were lower than in West Germany starting with the older cohorts. This finding is in line with prior evidence suggesting that the efforts of the former East German government to promote higher-order fertility by offering extra days off, reduced working hours, and access to larger apartments were not effective in incentivising couples to have a third child (Obertreis 1986). For the cohorts born in 1960-69, the birth probabilities were even lower than those of their predecessors. It is only among the youngest cohorts (1970-74) that we can observe a small increase in the probability of having a third child.

The survival curves of Figure 4 suggest that the probability of having two children declined substantially in East Germany starting with the cohorts born in 1960-64. The figure includes all women, regardless of whether they were at risk of having a second or a third birth. However, the results of an analysis of the parity progression ratios (Table 1a) confirm that the conditional probability of giving birth to a second child declined sharply for the East German cohorts born in 1965-69, and only recovered among the cohorts born in 1970-74. The overwhelming majority of the women of the 1960s cohorts had given birth to their first child before reunification. For a woman who had just started her family at the end of the 1980s, reunification basically cut into her fertility career. Thus, many women of these cohorts never progressed to a second child, and those who did often spaced their first two children far apart. This pattern is discernable when we see that the median interval between the first and the second birth for the East German cohorts born in 1965-1969 was five years (Table 1b).

Figure 4: Progression to the first, second, and third child by groups of birth cohorts, survival functions by age (probability of ever having a second or third child by age of the woman, all women included in the risk set)



Source: VSKT 2015-FDZ-RV

This broad comparison has implications for the subsequent analysis of the mobile population. It suggests, for example, that to "converge" to West German behaviour, East-West migrants would have to postpone the first birth. For higher-order births, the pattern is reversed: to "converge" to West German behaviour, the East-West migrants would have to accelerate their transition to the second and the third birth.

Table 1a: Parity progression ratio for second and third births, by birth cohort and region

	West Germans		East Germans	
	Second	Third	Second	Third
1950-54	0.71	0.39	0.70	0.22
1955-59	0.72	0.35	0.70	0.21
1960-64	0.72	0.35	0.64	0.18
1965-69	0.71	0.34	0.57	0.18
1970-74	0.75	0.38	0.60	0.26

Note: Cases are censored at age 40.

Source: VSKT 2015-FDZ-RV

Table 1b: Average duration since last birth, by birth cohort and region

	West Germans		East Germans	
	Second	Third	Second	Third
1950-54	3.9	4.5	4.5	5.6
1955-59	3.9	4.2	4.1	4.9
1960-64	3.6	4.0	4.1	5.1
1965-69	3.5	4.0	5.0	4.7
1970-74	3.6	4.1	5.0	4.8

Note: Cases are censored at age 40.

Source: VSKT 2015-FDZ-RV

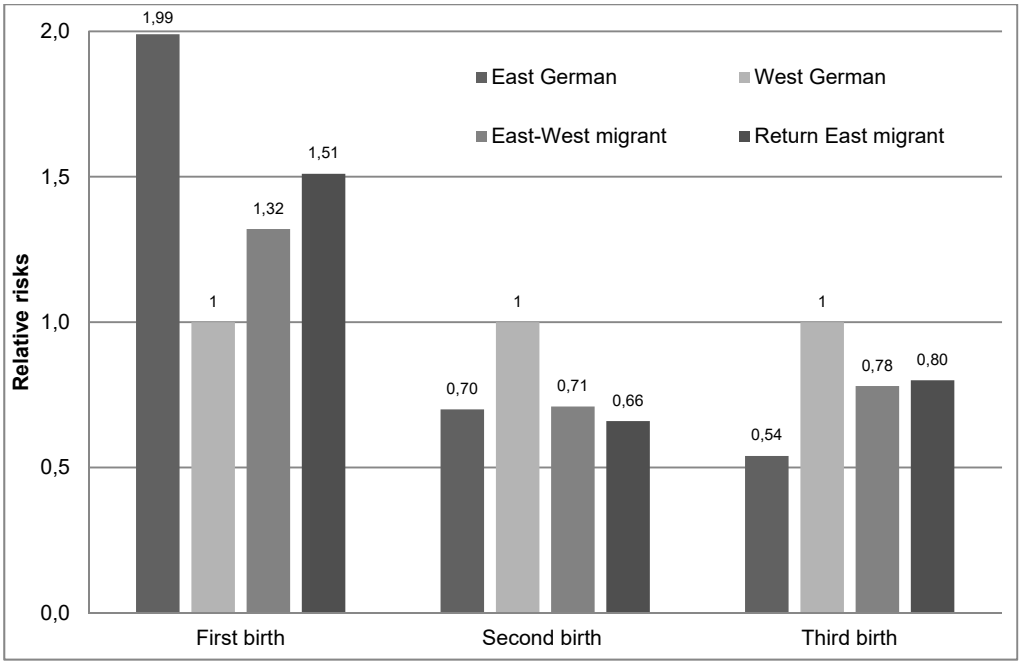
4.2 Differences in birth risks by order and migration status

Migration status is a trait that can change over the course of an individual's life. For that reason, providing easily accessible summary indicators for the birth behaviour of the migrant population is a challenge. We have therefore turned to an event history model for the analysis of the birth behaviour of the migrant population. Migration status is inserted into these investigations as a time-varying covariate. We have estimated separate models for the three birth parities. Figure 5 visualises the predicted relative birth risks that were obtained from the models (see also Table A3 in the appendix for the full model). The main variable of interest is the time-varying covariate of region in relation to origin. The model results suggest that the first birth risks of the East Germans are about 100% higher than those of the West Germans. This finding matches previous descriptive statistics showing that all East German cohorts had their first child earlier in life than their West German counterparts. Moreover, the East-West migrants' first birth risks were 30% to 50% higher than those of West Germans, but lower than those of East Germans. The most pronounced differences between the migrant groups can be observed between the East-West migrants and the return East migrants, with the return migrants having higher first birth risks than those of the East Germans currently living in West Germany. As this result shows that East German migrants accelerated their transition to the first birth after returning to their region of origin, it supports the salmon migration hypothesis.

As we have already shown in the descriptive analysis, the East Germans had lower second and third birth risks than the West Germans. This East-West pattern, which contrasts with that for first births, can also be seen in the migrant groups. The East-West migrants and the return East migrants had comparable second and third birth risks, which

suggests that the salmon hypothesis adequately describes first birth, but not second or third birth behaviour.

Figure 5: Relative first, second, and third birth risks by region



Note: For the full model, see Table A3 in the appendix.

Source: VSKT 2015-FDZ-RV

5. Discussion

This paper has used data from the German Pension Fund to examine order-specific fertility behaviour around the time of German reunification. The findings of the analysis of the register data confirm earlier results showing that the first birth timing of East Germans has rapidly converged to West German patterns. Nevertheless, the median ages at first birth and the ultimate childlessness levels have remained lower in the East than in the West. This was also the case for the 1970-74 cohorts who entered their childbearing years during the economic and social upheavals of the early 1990s. Our analysis also corroborates prior findings based on small-scale survey data (Arránz Becker/Lois/Nauck 2010; Huinink 2005; Huinink/Kreyenfeld/Trappe 2012; Kreyenfeld 2003) showing that East Germans are reluctant to have a second or a third child. In particular, the women born in 1965-69, many of whom had a first child just before reunification, were particularly unlikely to have a second child. The women of these cohorts who had a second child experienced unusually long birth intervals of five years between the first and the second birth.

An important focus of our investigation has been on understanding the impact of migration on the birth behaviour of the East-West German migrants. We show that the East-West migrants were more likely than the non-mobile East Germans to postpone having their first child. However, they progressed to the first birth more rapidly than their West German counterparts. From the East German perspective, it seems that migration is a disruptive event that delays childbearing. But from the West German perspective, it appears that East-West migrants have their first child at a relatively young age. It is possible that entrenched norms of having children early in life explain the differences in first birth timing between West Germans and East-West migrants.

We also examined the behaviour of return migrants, and thus of East Germans who moved from East to West Germany, and later returned to the East. The behaviour of this population is of particular interest because it allowed us to study the salmon hypothesis, or the assumption that people are more likely to have a first birth after they return to their region of origin. As balancing work and family is easier in East than in West Germany, it seems likely that many East German women would spend short periods of time in West Germany, but then return to their region of origin to form a family. Our findings support this notion. We show that large shares of those who migrated eventually returned, and that these return migrants had strongly elevated first birth rates.

Our analysis of the pension data has closed some research gaps by improving our understanding of the birth behaviour of the mobile population in East Germany. However, some caveats need to be pointed out. First, we adopted a cohort perspective. While the choice of this approach seems reasonable given that we were tracing people's mobility and fertility patterns across their life courses, it did not enable us to provide a clear-cut answer to the question of how the birth behaviour of the mobile population affected East German period fertility. It is very likely that part of the increase in East German period fertility can be attributed to the birth behaviour of the East-West return migrants, but our estimates do not quantify the effect. Furthermore, using large-scale register data comes at a cost. We had no information on the migrants' partnership status, household income, or reasons for moving to the West or returning to the East. A lack of this information is certainly a shortcoming of our analysis. Data from surveys such as the German Socio-Economic Panel collect this type of information, but do not include a sufficiently large number of return migrants to allow for a meaningful statistical analysis of fertility. An oversample of return migrants would be needed to fill that gap. Moreover, qualitative research could help to further elucidate the motivations for return migration, especially in relation to family formation and fertility.

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Appendix

Table A1: Cases by region, row %

	Always West German	Always East German	Ever East-West migrant	Ever West-East-migrant	N
1950-54	70%	28%	1%	0%	13319
1955-59	72%	25%	3%	0%	14119
1960-64	73%	22%	4%	1%	16679
1965-69	75%	18%	6%	2%	17820
1970-74	76%	12%	9%	3%	20554

Table A2: Births by region and birth order, row %

First birth

	Always West German	Always East German	Ever East-West migrant	Ever West-East-migrant	N
1950-54	67%	32%	1%	0%	11133
1955-59	68%	29%	3%	0%	11064
1960-64	69%	26%	4%	1%	13043
1965-69	72%	20%	6%	1%	13631
1970-74	75%	13%	9%	3%	16975

Second births

	Always West German	Always East German	Ever East-West migrant	Ever West-East-migrant	N
1950-54	67%	32%	1%	0%	7557
1955-59	68%	29%	3%	0%	7600
1960-64	71%	25%	4%	0%	8577
1965-69	75%	18%	5%	1%	8500
1970-74	76%	13%	8%	3%	10783

Third births

	Always West German	Always East German	Ever East-West migrant	Ever West-East-migrant	N
1950-54	75%	24%	1%	0%	2417
1955-59	75%	23%	2%	0%	2334
1960-64	79%	18%	3%	0%	2596
1965-69	81%	13%	4%	1%	2608
1970-74	80%	11%	7%	2%	4777

Table A3: Results from piecewise constant model, relative risks

	First Birth			Second Birth			Third Birth		
	exp(b)	p	95% ci	exp(b)	p	95% ci	exp(b)	p	95% ci
Age									
15-19	0.29	***	(0.277-0.293)	1.01		(0.948-1.086)	1.01		(1.000-1.674)
20-21	0.90	***	(0.876-0.927)	0.99		(0.946-1.037)	1.23	**	(1.076-1.398)
22-23	1			1			1		
24-25	1.06	***	(1.031-1.093)	1.07	***	(1.027-1.107)	0.79	***	(0.727-0.869)
26-27	1.16	***	(1.121-1.192)	1.07	***	(1.028-1.108)	0.69	***	(0.634-0.753)
28-29	1.10	***	(1.062-1.133)	1.00		(0.961-1.033)	0.60	***	(0.546-0.649)
30-33	1.01		(0.984-1.043)	0.89	***	(0.861-0.926)	0.49	***	(0.450-0.530)
34-39	0.78	***	(0.753-0.801)	0.71	***	(0.683-0.739)	0.40	***	(0.372-0.439)
Cohort									
1950-54	1			1			1		
1955-59	0.82	***	(0.800-0.843)	1.07	***	(1.040-1.107)	1.01		(0.951-1.064)
1960-64	0.75	***	(0.730-0.768)	1.08	***	(1.046-1.112)	1.05		(0.997-1.112)
1965-69	0.65	***	(0.636-0.668)	1.05	***	(1.019-1.085)	1.16	***	(1.097-1.224)
1970-74	0.64	***	(0.626-0.657)	1.28	***	(1.239-1.316)	2.13	***	(2.028-2.239)
Migrant status									
East German	1.99	***	(1.956-2.026)	0.70	***	(0.682-0.712)	0.54	***	(0.522-0.568)
West German	1			1			1		
East-West migrant	1.32	***	(1.236-1.404)	0.71	***	(0.654-0.761)	0.78	***	(0.693-0.874)
West-East migrant	1.42	***	(1.271-1.588)	0.91		(0.797-1.040)	0.93		(0.742-1.160)
Return East migrant	1.51	***	(1.349-1.686)	0.66	***	(0.583-0.742)	0.80		(0.670-0.950)
Return West migrant	1.37	***	(1.183-1.590)	1.06		(0.884-1.269)	1.02		(0.755-1.376)
Years since last birth									
0-1				0.22	***	(0.210-0.225)	0.48	***	(0.376-0.619)
2-3				1			1		
4-5				0.94	***	(0.916-0.970)	1.65	***	(1.524-1.779)
6-7				0.63	***	(0.613-0.646)	1.71	***	(1.602-1.836)
8-9				0.37	***	(0.354-0.387)	1.53	***	(1.420-1.653)
10+				0.22	***	(0.207-0.225)	1.25	***	(1.161-1.347)

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.