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Linking internal and international migration over the life course: A sequence analysis of individual migration trajectories in Europe

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Because internal and international migration are typically conceptualized and measured separately, empirical evidence on the links between these two forms of population movement remains partial. This paper takes a step towards integration by establishing how internal and international migration precede one another in various sequenced relationships from birth to age 50 in 20 European countries. We apply sequence and cluster analysis to full retrospective migration histories collected as part of the Survey of Health, Ageing and Retirement in Europe in 2008–09 and 2017, for individuals born between 1950 and 1965. The results show that nearly all international migrants engage in internal mobility at some point in their lives. However, individual migration trajectories are delineated by the order of internal and international moves, the duration and timing of stays abroad, and the extent to which individuals engage in return international migration. Institutional and economic conditions shape the diversity of migration experiences.

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Introduction

Whereas early scholarship (Ravenstein 1889) focused on internal migration—changes of region of residence within national borders—attention turned to international migration after the wave of refugees that followed the Second World War (Castle and Miller 2003; Skeldon 2017). Despite early theoretical attempts at conceptualizing internal and international migration jointly (Thomas 1954; Zelinsky 1971; Pryor 1981), these two streams of literature have evolved in isolation from one another and, today, internal and international migration are typically conceptualized, measured, and studied separately (Skeldon 2006). As a result, scholars and policymakers have a poor understanding of the links and interactions between these two forms of population movement.

Over the last two decades, scholars have increasingly recognized that internal and international migration form part of the same continuum of population movement (Bell and Ward 2000; Hickey and Yeoh 2016; Hugo 2016;) and are interconnected at both the aggregate and individual levels. It follows that population movement needs to be studied as a holistic process occurring across space and time (Skeldon 2006). An important contribution has been the formulation of a schematic model that sets out 10 individual migration pathways that combine internal and international migration in sequenced relationships (King and Skeldon 2010). This theoretical proposition was born from the

observation that one form of movement often acts as a precursor to another. For example, rural-to-urban migration can be the first step in a chain leading to international outmigration (Ascencio 2004). Subsequently, international migrants often relocate within destination countries as their employment and housing needs change (Raymer and Baffour 2018; Laukova, Bernard, Nguyen et al. 2022). Together with subsequent studies, this body of work has laid out the challenges in rethinking and linking different forms of population movement. Yet, despite the seminal status of King and Skeldon's (2010) paper, few empirical attempts to identify, elaborate, and quantify the linkages between internal and international migration exist (Bohra and Massey 2009; Panichella 2018; Bernard and Perales 2021), and recent efforts toward integrating internal and international migration remain mainly conceptual (Hugo 2016; Skeldon 2017).

Lack of progress towards integration stems in part from the lack of adequate data. As Skeldon (2006, p. 21) put it, 'A basic problem […] remains the lack of empirical data upon which to test any relationship between internal and international migrations'. Linking internal and international movements at the individual level requires lengthy longitudinal microdata that capture migration trajectories over sustained periods of time. Population registers, such as those found in Sweden and Japan, record the movement of immigrants within national borders but do not provide their migration history before and after settlement in destination countries. Recent efforts have been made to address this limitation by combining national population registers to create a unique longitudinal microdata set linking records from Finland and Sweden (Saarela and Scott 2020), but it would be difficult to extend this approach to multiple countries. Long-standing, nationally representative longitudinal surveys—such as the Panel Study of Income Dynamics in the United States (US), Understanding Society in the United Kingdom (UK), or the Household, Income and Labour Dynamics in Australia Survey—are equally problematic for linking internal and international migration. This is because participants are no longer part of the study population once they have crossed national borders, and they are therefore not interviewed after emigrating. This problem of 'methodological nationalism' affects the collection of most data sets, because sampling frames are based on national borders (Wimmer and Glick Schiller 2002). A rare exception is the Mexican Family Life Survey, a panel household survey that follows the lives of Mexicans, including those migrating across to the US; this is possible because of the large and sustained migration flows between the two countries. Alternatively, studies can collect migration histories both prospectively and retrospectively: such studies include the Mexican Migration Project (Durand and Massey 2004; Carrión-Flores 2018) and the Migration between Africa and Europe project (Beauchemin 2018), which retrospectively collected the completed lifetime migration histories of African immigrants to selected European countries. However, empirical studies have focused mainly on return and circular international migration (Castagnone 2011), thus providing limited evidence on the links between internal and international migration.

To address this gap, this paper takes a step towards integration by: (1) analysing the lifetime migration trajectories of people born between 1950 and 1965 in 20 European countries; and (2) establishing the way in which internal mobility and international migration precede one another in various sequenced relationships from birth to age 50. Two theoretical principles underpin our approach. First, we adhere to the view already outlined that internal and international movement form part of the same continuum of population movement and should therefore be studied jointly rather than in isolation. International migration can be viewed as an extension of internal migration (Adepoju 1998, 2006), derived from similar motivations of meeting personal needs and aspirations. Depending on resources and constraints that operate at the individual, household, and contextual levels, individuals will decide to migrate internally or internationally (Carling 2002; Carling and Collins 2018). Although moves to internal vs international destinations can be viewed as competing strategies to maximize opportunities, international migration is distinctive in its legal and social implications, and thus we follow Skeldon (2006) in accepting that the distinction between internal and international migration should be maintained. Second, we argue that migration is best conceptualized as part of a long-term trajectory that unfolds over an individual's life course rather than a series of discrete events independent from one another (Halfacree and Boyle 1993; Coulter et al. 2011; Coulter and Van Ham 2013). Indeed, growing evidence suggests that past migration experiences shape the decision to migrate (Myers 1999; De Jong 2000). It follows that migration behaviour is best understood when conceptualized and analysed longitudinally.

To shed new light on the links between internal and international migration, this paper applies sequence analysis to retrospective lifetime migration histories collected in 2008–09 and 2017 as part of the Survey of Health, Ageing and Retirement in Europe

(SHARE). By retrospectively collecting complete migration histories since birth, SHARE provides a unique opportunity to explore how internal and international migration precede each other over the life course of migrants. We extend King and Skeldon's (2010) model to a broader segment of the life course by: (1) identifying how their 10 sequences can be combined from birth to age 50 to generate diverse long-term migration trajectories; and (2) taking into account the timing and duration of internal and international moves. We do so by using sequence analysis, an algorithmic, data-driven approach that permits the classification of individual trajectories based on similarities and differences in the combination of successive events (i.e. moving internally or internationally).

Since its appearance in social science research in the early 1990s (Abbott and Tsay 2000), sequence analysis has increasingly been applied to a diverse range of social issues. Despite a few applications to internal migration (Stovel and Bolan 2004; Coulter et al. 2011; Vidal and Lutz 2018; Impicciatore and Panichella 2019; Karhula et al. 2021; Bernard and Kalemba 2022) and international migration (Castagnone 2011; Toma and Castagnone 2015), sequence analysis has been comparatively underused in the migration literature, in part because of the need for longitudinal microdata. In the first joint application to internal and international migration, Zufferey et al. (2021) drew on Swiss register data to demonstrate the utility of sequence analysis by identifying diverse migration trajectories among international migrants over a five-year period since arrival in Switzerland.

We argue that sequence analysis, by providing a long-term perspective, is uniquely positioned to identify migration trajectories, and we extend Zufferey et al.'s (2021) contribution in three principal ways. First, we consider a much longer period of the life course by analysing migration trajectories from birth to age 50. Second, we theoretically ground this endeavour by quantifying the schematic migration model proposed by King and Skeldon (2010). Third, we extend the analysis to 20 European countries, thus providing evidence for countries with different migration regimes. Countries in the north and west of Europe are characterized by high levels of internal migration, while countries in the south and east show moderate to low levels of internal migration (Rees and Kupiszewski 1999; Rowe et al. 2019). European regions also vary in the timing of countries' accession to the European Union (EU) and levels of international migration (DeWaard et al. 2017).

Our paper begins with a synthesis of prior empirical attempts at linking internal and international migration at an individual level and formulates research hypotheses. We then introduce the SHARE data set and discuss the strengths and limitations of retrospective migration data. Next we present the results of our empirical analysis based on sequence and cluster analysis that classifies individual migration trajectories based on the number, order, and timing of migration events. The second part of the results section presents results from regression analysis that seeks to explain migration trajectories based on individual- and macro-level characteristics. The paper concludes with a discussion on the importance of linking different forms of population movement to improve our theoretical understanding of the process of migration; it also identifies avenues for future research.

Linking internal and international migration over the life course

Conceptual framework

It is now widely acknowledged that one form of movement may act as a precursor to another. This section reviews the way in which internal and international movements precede one another over the life course of migrants, distinguishing between subnational movement pre and post emigration.

A large body of qualitative work has accumulated on internal movement preceding emigration. Rural dwellers in Morocco (Laghaout 1989), Mexico (Ascencio 2004), and Western Africa (Beauchemin 2018) often relocate to cities before moving abroad. This stepwise migration enables prospective migrants to gain familiarity with an urban environment, accumulate resources, and build networks, all of which are essential to the decision to migrate internationally (González-Ferrer et al. 2018). Once strong social networks between origin and destination countries have been established by previous waves of migrants, the initial rural-to-urban internal migration can be bypassed, making direct international resettlement possible (Lindstrom and Lauster 2001). Within Europe, evidence is mixed. Temporary workers from Poland are more likely to come from rural areas, whereas Polish migrants who resettle permanently in Germany, the Netherlands, the UK, and Ireland often originate from urban settings (Luthra et al. 2014). However, the absence of systematic and comparable analyses of migration trajectories that encompass internal movement pre and post emigration makes it difficult to generalize the sequence of moves leading to emigration, particularly for migrants originating from developed countries, for whom evidence is scarcer.

International migration can, in turn, lead to internal migration in destination countries. International migrants are known to be particularly mobile in the early years post settlement in destination countries as their housing needs and employment change, although disparities in internal migration patterns with the native born reduce with length of residence (Bell and Hugo 2000; Guan 2020; Laukova, Bernard, and Sigler 2022). A large quantitative literature has accumulated since the 1990s, particularly in high-immigration countries such as Australia (Bell and Hugo 2000; Raymer and Baffour 2019), Canada (Newbold 1996), and the US (Kritz and Nogle 1994) and in European countries including the UK (Simpson and Finney 2009; Darlington-Pollock et al. 2019) and Spain (Reher and Silvestre 2009). In Switzerland, for example, as many as 7 in 10 immigrants move internally or leave the country within the first five years of arrival (Zufferey et al. 2021).

These two streams of research, on pre-emigration movement on the one hand and post-emigration movement on the other hand, have evolved separately and rarely refer to each other. In an effort to synthesize these processes, King and Skeldon (2010) outlined 10 migration sequences in a schematic form by linking internal and international migration in a sequenced relationship, as shown in Figure 1. Sequence 1 represents a single internal migration, not followed by an international move, while Sequence 2 captures a single international migration. In Sequences 3–5, internal and international migration act as precursors to one another, while Sequences 6–9 incorporate return migration to the country of origin and Sequence 10 combines an onward move to a third country. In their description of this schematic model, King and Skeldon (2010) emphasized movement across the urban hierarchy, with international migrants typically originating from rural areas and settling in urban regions at destination, although patterns of settlement depend largely on the level of urbanization (Rees et al. 2017).

We argue that the sequences outlined in Figure 1 can be extended to broader life-course segments by being repeated and combined over migrants' lives, and this may result in greater diversity in migration behaviour than originally anticipated. This assumption is motivated by the circular or repeated nature of migration, which has received growing attention in the international migration literature, albeit long recognized in the internal migration literature (Goldstein 1954; Morrison 1971; DaVanzo 1981). For example, more than 60 per cent of immigrants living in Germany who came from guest worker programme countries engaged in circular or repeat migration (Constant and Zimmermann 2011). We also contend that migration pathways may be further differentiated based on the timing of internal and international moves and the duration of stays abroad, which are all known to vary between countries and over time. For example, within Europe, duration of stays abroad varies widely depending on both the origin and destination countries (DeWaard et al. 2017), in part due to differences in international migration age patterns but also reflecting differences in socio-economic characteristics (Constant and Zimmermann 2012) and the broader societal context (Van Mol 2016). In that context, this paper seeks to establish long-term migration trajectories and to identify how internal and international movement precede one another at particular times during the life course of migrants. This should, in turn, allow new light to be shed on the functional linkages between different forms of population movement.

Research hypotheses

To guide the empirical analysis, we build on King and Skeldon's model, coupled with key migration theories, to formulate research hypotheses. A starting point is the concept of 'migration-facilitating capital' (Ivlevs and King 2012; Kim 2018), whereby individuals build on their migration experience to acquire skills and networks that facilitate subsequent migration or enable them to stay immobile by choice (Kõu and Bailey 2014; Moret 2020). This approach emphasizes interactions with other forms of capital, including economic, social, and cultural capital (Bourdieu and Wacquant 1992). As a result, prospective migrants who lack the capability to migrate internationally will first migrate internally to accumulate resources and build networks before emigrating (Paul 2015). Such a migration sequence is expected to be more common among rural dwellers, who are less likely to have accumulated social and economic capital than their urban counterparts (Hypothesis 1).

The role of state actors is also central to Bourdieusian formulations of migration capital (Kim 2018; Moret 2020), whereby states, aspiring migrants, and migration brokers interact over the production, valorization, conversation, and legitimization of this capital. This is most visible in the role of migration policies in shaping migration decisions and, in turn, creating undocumented migration (Kõu and Bailey 2014). In the European context, EU membership has played a decisive role in shaping the size and composition of intra-European migration flows (Barrell et al. 2010; DeWaard et al.

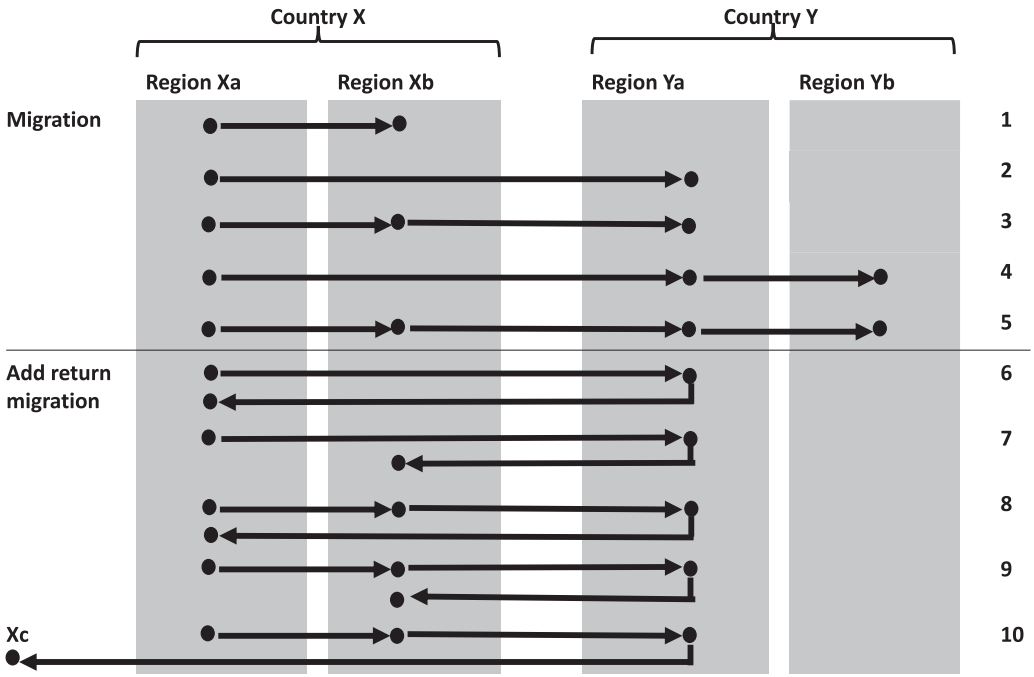


Figure 1 Theoretical migration sequences by King and Skeldon (2010)
Source: King and Skeldon (2010).

2017). Freedom of movement between European countries not only stimulates emigration but also facilitates return migration by reducing institutional barriers to possible re-entry into the destination country or migration to a third country in the future (Barcevičius et al. 2012). Thus, return migration to Central and Eastern Europe is a relatively recent phenomenon that emerged after the accessions of these countries to the EU (Zaiceva and Zimmermann 2016). We therefore expect nationals of EU countries to be more likely to circulate between countries and consequently proportionally less likely to migrate internally. Conversely, nationals who do not benefit from such freedom of movement or who are from countries that joined the EU more recently will be more likely to emigrate permanently (Hypothesis 2). We expect them to then migrate internally at destination in response to changes in housing and employment circumstances.

Regardless of the institutional context, the decision to migrate is well established to be the result of a complex decision-making process of maximizing opportunities, meeting personal aspirations, or simply surviving hardship. The traditional neoclassical economics perspective, which views migration as a means to maximize income (Todaro 1969), has progressively been broadened to incorporate non-economic motives, including proximity to family members (Ryan 2011) and access to amenities (Albouy et al. 2021), while recognizing the role of ethnic networks (González-Ferrer et al. 2018). Yet, wage differentials between origin and destination remain an important predictor of the odds of migrating (Douglas et al. 1993), and they shape the size and direction of international migration flows within Europe (Windzio et al. 2021). We therefore expect individuals from lower-income countries to be more likely to stay and move internally in destination countries and individuals from higher-income countries to be more likely to return to their countries of origin or circulate between origin and destination countries (Hypothesis 3).

The Survey of Health, Ageing and Retirement in Europe (SHARE)

Our empirical strategy draws on retrospective migration histories which capture the repeated nature of migration over the life course. These were collected from SHARE in 2008–09 (Wave 3) and 2017 (Wave 7) for 27 European countries and Israel. Wave 3 retrospectively collected the life histories of over 20,000 respondents in 13 countries, up to their first participation in SHARE. In Wave 7, the life histories of 60,000 respondents who had not participated in Wave 3 were collected. These respondents included individuals from the 14 countries which joined SHARE after Wave 3 and respondents from Wave 3 countries who had not

been interviewed, namely new spouses and respondents from top-up samples. Note that the Netherlands and Ireland left SHARE after Wave 3.

SHARE consists of a set of nationally representative samples of the population aged 50 and over (and their partners) surveyed in each country. Complete migration histories were collected using life-history grids; this involved showing respondents a schematic form depicting the calendar years in their lives from birth to the present alongside national and international events to help recall (Blane 1996), with rows representing different life domains. This sequential, multidimensional representation of the life course has been shown to improve data quality by limiting problems of forward and backward telescoping (Gaskell et al. 2000) and event omission (Glasner and van der Vaart 2008). Despite progress in retrospective data collection, recall accuracy remains greater for recent moves than those in the distant past (Smith and Thomas 2003). Yet, evidence comparing retrospective and longitudinal data sources suggests that respondents remember salient childhood events (Smith 2009). As a result, growing use of retrospective data has been seen in the internal migration literature (Falkingham et al. 2016; Bernard 2017; Vidal and Lutz 2018; Impicciatore and Panichella 2019; Chen et al. 2022). For further information on SHARE, please refer to Börsch-Supan et al. (2013) and Börsch-Supan (2020a, 2020b).

Respondents in SHARE were asked to report the start and end dates of residence for dwellings in which they had lived for more than six months since birth (up to 30 dwellings). Thus, all changes of address were collected. For each dwelling, respondents were then asked to report the country, region, and area of residence. We define international migration as a change of country of residence and, for consistency, we remove eight countries that have experienced significant boundary changes since 1947, namely the Czech Republic and Slovakia (previously Czechoslovakia), Slovenia and Croatia (previously part of Yugoslavia), Estonia, Latvia, and Lithuania (which were nation states within the USSR), and Cyprus because parts of the island have been guarded by Turkish Armed Forces since 1974. We do not consider Israel, because its migration system differs widely from that of European countries (Rebhun 2020). This leaves us with a sample of 20 countries from each of the five geographic regions of Europe namely Eastern Europe (Bulgaria, Hungary, Poland, and Romania), German-speaking Europe (Austria, Germany, and Switzerland), Northern Europe (Denmark, Finland, and Sweden), Southern Europe (Greece, Italy, Malta, Portugal, and Spain), and Western Europe (Belgium, France, Ireland, Luxembourg, and the Netherlands).

For most countries, region of residence was collected at the NUTS 2 level for periods of residence within the survey country, but it was not collected for periods of residence outside respondents' survey country, even for periods spent in other SHARE countries. This means that we cannot define internal migration as a change in NUTS 2 of residence, which is an important shortcoming of SHARE. Our solution is to use all changes of address, independent of administrative units, which has the unique advantage of being directly comparable between countries and over time (Courgeau 1973; Courgeau et al. 2012). This means that our measure of subnational movement encompasses both residential mobility and internal migration. Despite the apparent limitation of grouping short- and long-distance moves, the distinction between residential mobility and internal migration is typically based on the distance moved (Thomas et al. 2019) or the crossing of an administrative boundary. Such distinctions are often arbitrary, invariably country specific, and at worst misleading when comparing countries (Bell et al. 2015). Although the NUTS framework identifies regions with some degree of spatial homogeneity, the number and size of NUTS regions still varies between countries, so this remains a problem in a cross-national framework (Courgeau 1973). This is most visible in the ratio of migration within and between NUTS 2 regions in each SHARE country, as shown in Table A1 in the Appendix; the ratio ranges from 3.2 in Switzerland to 6.8 in Italy. Hence, using all changes of address provides a robust solution when comparing internal migration between countries (Long 1991; Bell et al. 2015).

Because retrospective data are based on survivors only, results may be biased if migration and mortality are correlated. Although the survivor bias is expected to be small, mortality regimes differ across countries, and results should strictly be interpreted as being conditional on survival to the date of the survey. More importantly, respondents had to be residing in a European country at the time of the survey, which means that non-European migrants who had returned to their country of origin or to a third country outside Europe were not captured. For these reasons, we restrict the analysis to European-born respondents. Similarly, European emigrants who were living in non-survey countries at the time of the survey were missed. For that reason, we focus our attention on intra-European migration only.

Survey respondents were aged 50 or older at the time of the survey, so to obtain life courses of comparable length, the analysis is restricted to migration histories up to age 50. This means that retirement migration is not considered in this paper, despite the importance of international and internal retirement migration in Europe (King et al. 1998; Tyrrell and Kraftl 2016). We come back to this limitation in the conclusion. To provide insights into contemporary migration processes, the analysis reported here is restricted to the most recent cohorts, those born between 1950 and 1965. While respondents born in 1966 and 1967 were aged 50 or above at the time of the survey, we do not include them because samples for these two birth years are very small, indicating that they might not be representative of their reference population. Thus, our respondents migrated between 1950 and 2015, a period of extensive social, economic, and political change in Europe. Most notably, the Maastricht Treaty of 1992 opened free movement between Belgium, Denmark, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, the UK, and Germany, when SHARE respondents were aged 26–42. The 1995 enlargement of the EU saw Austria, Finland, and Sweden accede to the EU. In 2004, eight Eastern European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, and Slovakia) and two Mediterranean countries (Malta and Cyprus) joined the EU, followed by Romania and Bulgaria in 2007. This means that SHARE respondents from those countries did not enjoy freedom of movement until much later in life and faced restricted mobility in young adulthood, when Eastern European countries were part of the Communist Bloc. We control for these institutional variations in a regression analysis of cluster membership. Finally, we exclude about 2 per cent of the respondents because of missing or incomplete information on their migration history. After these restrictions, our *general* sample consists of 25,592 individuals, ranging from 213 respondents in Ireland to 2,867 respondents in Poland. More information about SHARE can be found in the supplementary material. Ethics approval for this paper was waived because it uses publicly available secondary data.

As shown in Table 1, only 7.6 per cent of respondents did not move internally or migrate internationally from birth to age 50. Close to 90 per cent of respondents moved within national borders at least once but did not change country of residence. Finally, 5 per cent of the respondents (or 6.3 per cent of the unweighted sample) migrated internationally, but only 0.3 per cent migrated internationally without moving domestically. In other words, most international migrants also engaged in internal movement at some point in their migration trajectory. Results by region show that lifetime immobility was most common in Eastern Europe, where both internal and international migration were less prevalent than in other regions. Conversely, individuals from Northern Europe were the most mobile, with close to 9 per cent migrating internationally at some stage in their life. These statistics confirm a well-established spatial gradient of high mobility in Northern and Western Europe that moderates towards the south and the east.

The remainder of the analysis focuses on our *migrant* sample (n = 1,600), consisting of respondents who have migrated internationally at least once from the 20 study countries; this migrant sample represents 5 per cent of the general sample. This approach allows examination of the links between internal movement and international migration in individual trajectories. Because of the small sample size, we use a pooled data set and report results for all 20 study countries jointly and by region. All results are weighted to account for differences in population sizes among countries.

Analysis of trajectories of internal and international migration

Methods

We now exploit the life-history nature of the data to progress beyond a snapshot approach and construct a state–sequence data set spanning the lives of respondents from birth to age 50. To this end, we rearrange the respondents' residential histories into a succession of yearly subnational movement and international migration statuses. We generate a set of categorical states informed by King and Skeldon's (2010) model in order to assess its relevance empirically. Each year, individuals fall into one of five possible states, where later states overrule earlier states: (1) never moved; (2) moved internally but never migrated internationally; (3) emigrated; (4) returned to country of birth; or (5) moved internally after an international migration. We do not consider an expanded categorization including move counts, because it would result in a large number of categorical statuses that would unduly complicate the analysis. More importantly, clusters would be strongly influenced by the number of moves (which are often within countries), and this would provide

Table 1 Lifetime migration from birth to age 50 in 20 European countries, descriptive statistics (percentages)

		Internal movement (only)		International migration (only)		
	No move	One transition	Several transitions	At least one transition	Internal and international movement	Total
Eastern Europe	17.8	33.7	44.6	0.2	3.7	100
German-speaking Europe	7.4	15.0	72.4	0.2	5.0	100
Northern Europe	1.5	2.5	87.5	0.0	8.6	100
Southern Europe	6.4	30.2	59.5	0.5	3.5	100
Western Europe	2.1	4.6	86.6	0.3	6.3	100
Overall	7.6	20.6	66.8	0.3	4.7	100

Notes: Authors' calculations using weighted data from the general sample (n = 25,592). Countries included are Austria, Belgium, Bulgaria, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Spain, Sweden, and Switzerland.
Source: Data from SHARE (Waves 3 [2008–09] and 7 [2017]; weighted).

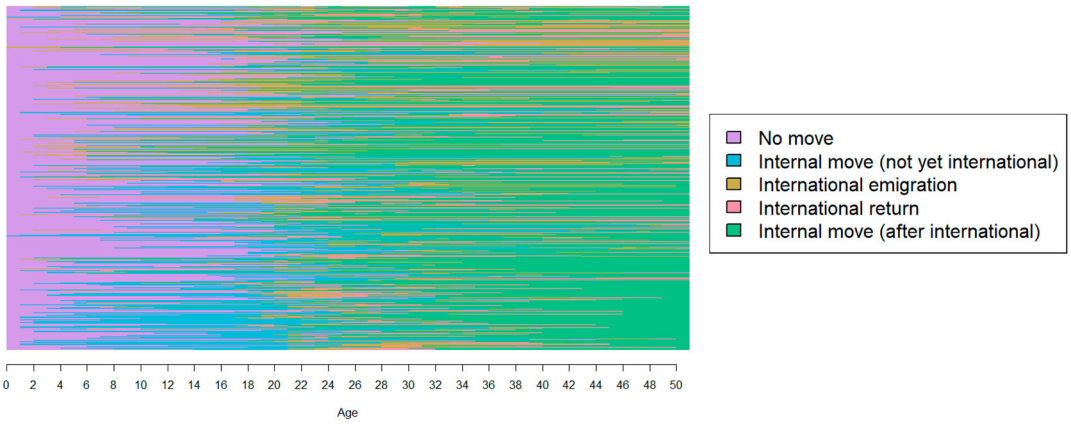
limited information about the lifetime linkages between internal and international moves. Thus, our operationalization, based on a limited number of conceptually distinct states, ensures analytical clarity and facilitates interpretation in line with King and Skeldon's (2010) model. It also has the advantage of emphasizing the relative order of successive internal and international moves, while taking into account their timing and duration.

We start with a general summary of individual trajectories in the form of graphical representations of the state sequences of respondents who have ever moved internationally (migrant sample). Panel A of Figure 2 visualizes long-term migration trajectories by representing sequences combining internal moves and international migrations from birth to age 50. Each horizontal line represents the migration trajectory of an individual since birth, and the colours represent one of the five possible states each year. This visual representation has the advantage of displaying the age at which each move occurred (on the x-axis). It is important to bear in mind that the plots represent states and not events. In other words, an individual will be represented in purple (see online version of Figure 2) up to their first move, then in blue from their first internal move until they migrate internationally, which indicates the duration between these moves. Similarly, a person that emigrates and remains abroad without moving domestically will be represented in a specific colour from the time of their first emigration. This means that we do not take into account the number of internal moves preceding or following an international move, but we focus instead on the sequence of internal and international moves, their timing, and their duration.

Panel A clearly shows diversity in individual migration trajectories, but such a representation makes it difficult to identify any common patterns. To improve readability, in panel B we show a set of 100 sequences that are largely representative of the sequences in our migrant sample. To this end, sequences are first ordered according to their similarity using scores from a multidimensional scaling factor and then divided into 100 groups (Fasang and Liao 2014). We display in panel B the medoid sequence of each group, which is the sequence with the minimum sum of dissimilarities to all other sequences in the group. The box plots on the right-hand side of panel B visualize the distance to all sequences in a frequency group to its medoid. The R^2 and F-statistics are goodness-of-fit indicators. They suggest that the medoid sequences are good representations of all the sequences in the migrant sample. Some general patterns start to emerge from this grouping. Most international migrants engage in internal movement before or after an international migration, although the timing of the emigration varies widely by medoid. Return international migration is also common and typically occurs after a short period of residence abroad. Most return international migrants engage in internal movement back in their country of birth.

To deepen our understanding of how internal mobility and international migration precede one another, we next proceed to identify empirically relevant trajectory groups, first by comparing each respondent's sequence of states with all other respondents' sequences using an Optimal Matching (OM) algorithm (Studer and Ritschard 2016). OM algorithms measure the dissimilarity between two sequences as the minimum (i.e. optimal) cost of transforming one sequence into the other sequence by means of edit operations (i.e. substitutions; insertions and deletions), where each operation is

Panel A: Sequence index plot



Panel B: Relative frequency sequence plots

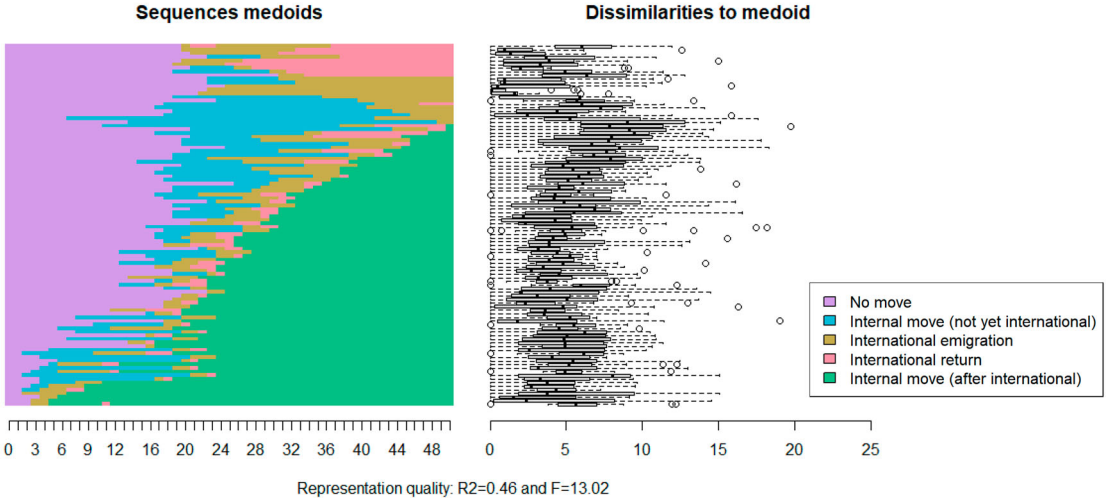


Figure 2 Graphical representations of individual migration trajectories from birth to age 50, among those who have ever moved internationally, in 20 European countries.

Notes: Figures are best viewed in colour online. The sequence index plot (panel A) displays horizontal stacked bars that depict all sequences in the sample. In panel B, the relative frequency sequence plot (left-hand side) displays sequence medoids that depict 100 representative sequences, and the distance-to-medoid box plots (right-hand side) visualize the distance of all sequences in a frequency group to their respective medoid. The R^2 and *F*-statistic are overall indicators of how well the selected medoids represent a given set of sequences. Sequences are residential states over successive years from age 0 to age 50. Statistics are based on the migrant sample ($N = 1{,}600$).

Source: Data from SHARE (Waves 3 [2008–09] and 7 [2017]; weighted).

assigned a cost. We use an OM algorithm between sequences of spells or episodes (OMspell), instead of a regular OM algorithm (between sequences of states) to emphasize that two sequences with the same order of migration episodes are more similar. We also account for the temporality of residential episodes when comparing two sequences. We consider the square root of the episode duration in the OMspell algorithm.

Using Ward's method, we then apply cluster analysis to the resulting matrix of dissimilarities to generate an empirical typology of migration trajectories. We select the number of clusters with the support of cluster cut-off criteria (see Figure A1 in the Appendix) on the sample size of clusters to assess statistical fit. We choose a seven-cluster solution, because it boasts an optimal empirical fit while providing sufficient cluster sizes for statistical

inferences. In the next subsection, the description of these empirically relevant migration trajectories is supported with sequence visualization tools, as presented in Figure 3. We discuss the diversity in trajectory patterns based on tabulations of average features of the cluster sequences (relating to the occurrence, ordering, and timing of migration events) in Table 2. In the last subsection, socio-demographic profiles of these migration patterns are discussed based on logistic regressions for each migration pattern in Table 3. We use calibrated weights provided in the SHARE data release to obtain results representative of the target populations of the results. For the analysis of sequences, we use the TraMineR package (Gabadinho et al. 2011) in the R environment (version 4.0.3). For other data preparation and analyses, we use Stata (version 16.0).

Migration sequences

Figure 3 shows that only 7.0 per cent of the sample migrated internationally without ever moving internally (Cluster 1). About half the members of this cluster emigrated permanently, while the other half returned to their country of birth after a few years of residence abroad. Table 2 shows that for this group, the median age at first international migration sits at 22 years, and the duration of stays abroad is 18.5 years on average, although it is much longer for permanent emigrants than for return migrants.

Cluster 2, which accounts for 19.5 per cent of the sample, brings together individuals who moved internally shortly after an international migration but typically not before. Members of these clusters moved internally on average 3.3 times, with a median age at first internal movement of 22 years compared with 13 years for international migration. Members of this cluster reported the second lowest average number of international migrations (1.3) and the highest average time spent abroad, 34.4 years (compared with 15.4 years for the whole sample). This cluster corresponds to King and Skeldon's Sequence 4 in Figure 1.

Conversely, individuals in Cluster 3 (15.1 per cent of the sample) moved internally before emigration although the majority also moved internally afterwards, bringing the average number of internal moves to 4.3. This cluster is characterized by a median age at first internal move of 16 years and international migration of 29 years, which is the oldest median age at first international migration of all clusters. With the lowest average number of international migrations (1.2) and the second highest duration of residence abroad (20.3 years), this migration trajectory corresponds to the stereotypical permanent emigration preceded and followed by internal movement. This cluster corresponds to the internal–international–internal sequence, that is, Sequence 5 in King and Skeldon's model in Figure 1.

The remaining four clusters include return international migration to the country of birth as suggested in Sequences 6–9 in King and Skeldon's classification. Members of Cluster 4 (15.2 per cent of the sample) moved internally only after returning from a stay abroad and were thus less mobile internally than members of other clusters, with an average of 2.8 internal moves but 2.5 international migrations. This cluster is characterized by much shorter stays abroad, with an average duration of 8.3 years.

Members of Cluster 5 followed the same pattern, except that emigration was preceded by an internal move in the country of birth. This is the largest cluster (29.1 per cent) and is characterized by short stays abroad (4.0 years on average) and no internal movement while abroad but internal movement afterwards, when back in the country of birth. This cluster displays a high average number of internal moves (5.3).

Cluster 6 includes internal moves made while abroad; these were often followed by internal moves back in the country of birth and were typically preceded by an internal move in the country of birth at an early stage of the individual's mobility trajectory. With an average of 5.8 internal moves, this highly mobile group represents only 5.0 per cent of the sample.

Cluster 7, which accounts for 9.1 per cent of the sample, brings together individuals who have emigrated multiple times and engaged in circular migration, with an average of 4.5 international migrations compared with 2.0 for the whole sample. These repeat international migrants are also highly mobile internally, with an average of 5.3 internal migrations compared with 4.1 for the whole sample.

Despite these broad commonalities within each trajectory type, the timing and duration of migration events varies, particularly among repeat migrants with the highest numbers of internal movements (Cluster 6) and international migrations (Cluster 7). As Figure 3 shows, these clusters are less homogeneous than the others, which highlights the diverse and complex trajectories of repeat migrants.

Socio-demographic characteristics

We conclude this section with a characterization of the socio-demographic profile of respondents from each migration trajectory type. To this end, we run logistic regressions predicting cluster membership

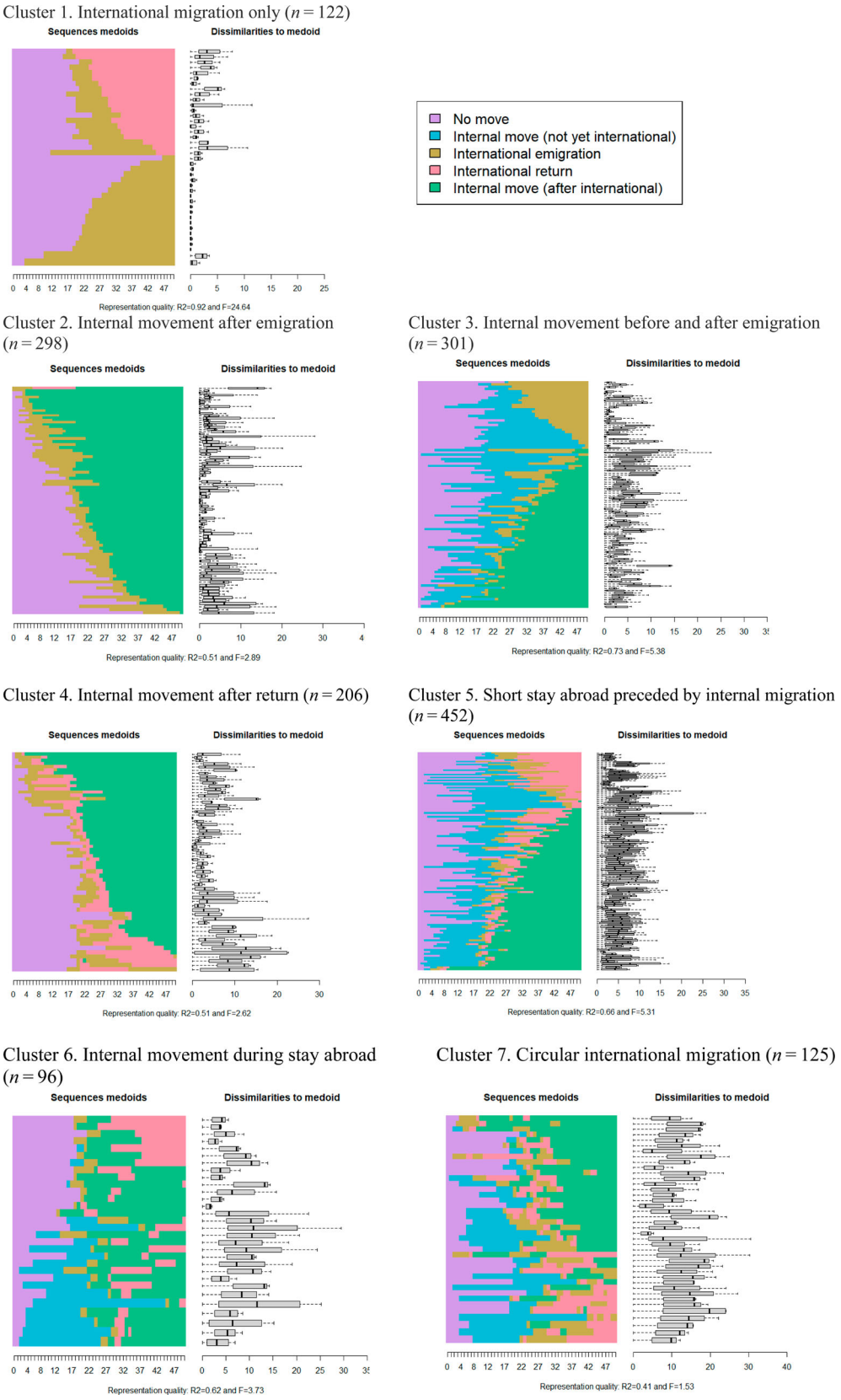


Figure 3 Migration trajectories, among those who have ever moved internationally, in 20 European countries
Notes: Figures are best viewed in colour online. Relative frequency sequence plots display sequence medoids (left-hand panel) that depict representative sequences for each 3–4 sequences, and distance-to-medoid box plots (right-hand panel) visualize the distance of all sequences in a frequency group to their respective medoid. The R^2 and F-statistic are overall indicators of how well the selected medoids represent a given set of sequences. Sequences are residential states over successive years from age 0 to age 50. Statistics are based on the migrant sample ($N = 1{,}600$).
Source: As for Figure 2.

Table 2 Characteristics of each migration trajectory type from birth to age 50 in 20 European countries

	Migration trajectory patterns from cluster analysis in Figure 3							
	1. International migration only	2. Internal movement after emigration	3. Internal movement before and after emigration	4. Internal movement after return	5. Short stay abroad preceded by internal migration	6. Internal movement during stay abroad	7. Circular international migration	Overall
N respondents	122	298	301	206	452	96	125	1,600
Percentage of respondents (unweighted)	7.6	18.6	18.8	12.9	28.3	6.0	7.8	100.0
Percentage of respondents (weighted)	7.0	19.5	15.1	15.2	29.1	5.0	9.1	100.0
Frequency: Average number of transitions (count)								
Internal mobility	0.3	3.3	4.3	2.8	5.3	5.8	5.3	4.1
International migration	1.7	1.3	1.2	2.5	2.2	2.1	4.5	2.0
All moves	2.0	4.6	5.5	5.3	7.5	7.9	9.8	6.1
Timing: Median age at first move (years)								
Internal mobility	31	22	16	21	12	14	10	17
International migration	22	13	29	18	24	20	21	21
Duration: Average duration (years)								
Stays abroad	18.5	34.4	20.3	8.3	4.0	11.3	11.8	15.4

Notes: Authors' calculations using weighted data from the migrant sample (N = 1,600). Migrant sample comprises respondents who have experienced at least one international migration from birth to age 50 (see section on the Survey of Health, Ageing and Retirement in Europe).
Source: As for Table 1.

Table 3 Predictors of migration trajectory patterns from birth to age 50 in 20 European countries

	Migration trajectory patterns from cluster analysis in Figure 3						
	1. International migration only	2. Internal movement after emigration	3. Internal movement before and after emigration	4. Internal movement after return	5. Short stay abroad preceded by internal migration	6. Internal movement during stay abroad	7. Circular international migration
Individual-level variables							
Birth year	−0.002	0.004	0.007*	−0.001	−0.001	−0.004*	−0.004
	(0.002)	(0.005)	(0.003)	(0.004)	(0.006)	(0.002)	(0.004)
Female	0.012	−0.038	0.030+	0.004	−0.020	0.040*	−0.034
	(0.021)	(0.026)	(0.016)	(0.015)	(0.020)	(0.016)	(0.040)
Upper secondary education	−0.117**	0.028	0.012	−0.026	0.135+	−0.007	−0.066
	(0.043)	(0.053)	(0.033)	(0.066)	(0.072)	(0.012)	(0.054)
University degree	−0.119*	−0.042	0.036	−0.108+	0.183***	0.017	−0.010
	(0.050)	(0.038)	(0.040)	(0.056)	(0.048)	(0.018)	(0.050)
Rural origin	−0.049	−0.073	0.016	0.111+	0.008	0.007	0.006
	(0.030)	(0.050)	(0.029)	(0.058)	(0.035)	(0.010)	(0.021)
Country-level variables							
Year first benefited from free movement within the EU	0.000	−0.001	0.003	−0.003**	−0.001	−0.001*	−0.002**
	(0.000)	(0.002)	(0.002)	(0.001)	(0.003)	(0.000)	(0.001)
Gross Domestic Product (log) (average 1970–2017)	−0.023	−0.133**	−0.110**	0.072*	0.229***	0.019	0.138***
	(0.021)	(0.042)	(0.037)	(0.035)	(0.066)	(0.017)	(0.023)

$+p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Notes: Results are from logistic regressions for each migration cluster shown in Figure 3 and are presented as average marginal effects (B). Standard errors (SE) in parentheses are cluster robust, accounting for observations nested in countries. Reference categories of model covariates are males, less than upper secondary education, and urban origin. Authors' calculations use weighted data from the migrant sample (N = 1,600).

Source: As for Table 1.

on a set of covariates including respondents' birth year, sex (man (*ref.*); woman), and level of education (less than upper secondary education (*ref.*), upper secondary, or university degree). To test our research hypotheses, we also control for the rural/urban status of respondents' place of birth, the level of economic development of each country as measured by the logarithm of the gross domestic product (GDP) averaged from 1970 to 2017 (SHARE respondents migrated between 1950 and 2017, but for many countries data on GDP are not available prior to 1970), and the year each country joined the EU and benefited from freedom of movement. Results are reported as regression coefficients in Table 3. Because country-level variables are strongly corrected with geographical regions, we do not control for region in our model but instead report cluster distribution by region in Table 4.

Results in Table 4 show that migrants from Eastern Europe were least likely to engage in circular international migration (Cluster 7) and in short stays abroad (Cluster 5), but they were more likely to emigrate permanently (Clusters 1 and 3) than individuals from other European regions. In contrast, migrants from Northern Europe are over-represented in the 'short stay abroad' (Cluster 5) and circular international migration (Cluster 7) trajectories. This spatial gradient reflects to some extent the specific institutional context in which the life of the 1950–65 birth cohorts was embedded. Opportunities for international migration were severely limited in Eastern Europe in the first decades of our observation period, and this may explain the preference for permanent emigration over return and repeat international migration in Eastern European countries. There is indeed a negative and statistically significant association in Table 3 between EU membership and the circular international migration sequence (Cluster 7) and migration internally after return to the origin country (Cluster 4). We also observe that GDP is positively associated with membership of Clusters 5 and 7, but it displays a negative association with Clusters 2 and 3, which contain permanent emigrants. This finding aligns with Hypothesis 3, according to which individuals from lower-income countries are more likely to stay in destination countries, while individuals from higher-income countries are more likely to return to their countries of origin or circulate between origin and destination countries.

Contrary to Hypothesis 1, we find no systematic association between rural status of region of birth and subsequent migration sequences (Table 3). In particular, we find no evidence of rural dwellers being more likely to migrate internally first. However, we observe that temporary emigrants who migrate internally on return to their origin countries (Cluster 4) are more likely to come from rural regions. Luthra et al. (2014) noted that temporary workers from Poland were more likely to come from rural areas, whereas Polish migrants who settled permanently in other EU countries often originated from an urban setting. It may be the case that rural dwellers are more likely to emigrate temporarily but then engage in internal migration on their return, thanks perhaps to the resources they accumulated while abroad.

Overlaid onto these macro variations are differences in the level of educational attainment. Compared with individuals who have not completed secondary education, secondary- and tertiary-educated migrants are less likely to emigrate permanently without engaging in internal movement (Cluster 1) but are more likely to engage in short stays abroad (Cluster 5). Such migration patterns are likely to be linked to educational motivations or short employment-related stays. Finally, no evidence of migration trajectories being substantively gendered is visible.

Discussion and conclusion

Despite increasingly louder calls to conceptualize and analyse migration as a trajectory in time and space (Bell and Ward 2000; Skeldon 2006; Coulter et al. 2016), most studies still examine migration behaviour at one point in time and focus solely on one type of population movement. By deploying cluster and sequence analysis to retrospective individual mobility histories from birth to age 50 in 20 European countries, our analysis has revealed heterogeneity across individuals' mobility trajectories that is missed in year-to-year analysis. Our results provide one of the first systematic empirical accounts of how internal and international movements precede one another over an extended segment of the life course of migrants, while also considering the timing and duration of stays abroad. Retrospective survey data inevitably involve healthy lags to ensure that respondents have completed most of their migration career, but they are invaluable in capturing the repeated nature of migration. Our empirical typology of migration trajectories undoubtedly reflects the characteristics of a sample of the native-born European population and the social, economic, and institutional contexts of the lives of the baby boomers who were surveyed. Yet, theory-relevant insights about migration behaviour can be drawn from this exercise.

Table 4 Percentage distribution of migration pathways by European region

	1. International migration only	2. Internal movement after emigration	3. Internal movement before and after emigration	4. Internal movement after return	5. Short stay abroad preceded by internal migration	6. Internal movement during stay abroad	7. Circular international migration	Total
Eastern Europe ($N = 133$)	12.8	25.6	46.6	2.2	11.3	0.8	0.8	100.0
German-speaking Europe ($N = 336$)	4.8	18.8	22.4	10.4	30.7	2.7	10.4	100.0
Northern Europe ($N = 310$)	1.3	4.9	9.7	9.4	53.4	8.7	13.2	100.0
Southern Europe ($N = 387$)	14.2	32.6	13.7	17.6	12.9	6.0	3.1	100.0
Western Europe ($N = 434$)	6.9	13.8	18.7	16.4	27.7	8.3	8.3	100.0
Overall ($N = 1{,}600$)	7.6	18.6	18.8	12.9	28.3	6.0	7.8	100.0

Notes: Authors' calculations use weighted data from the migrant sample (N = 1,600). Percentages are unweighted.
Source: As for Table 1.

International migration is a rare event. Only 5 per cent of the population born in Europe between 1950 and 1965, and who resided in Europe at the time of the survey, had migrated internationally at least once. However, international migrants are likely to engage in repeat international migration, with an average of 2.0 lifetime international migrations per migrant. This is driven mainly by return international migration, although some respondents in our sample migrated to a third country at least twice. The incidence of repeat and return migration certainly depends on the country and the period of interest, but recent evidence suggests that return migration accounts for as much as 25 per cent of global international migration flows (Azose and Raftery 2019). This reinforces the importance of moving beyond a snapshot approach to migration, by conceptualizing and analysing migration as a long-term trajectory rather than a series of discrete events in order to capture onward and return international migration.

Perhaps our most important finding is that the majority of international migrants also engage in internal movement at some point in their migration career. Only 7.0 per cent of international migrants in our sample had never moved internally, similar to the 7.6 per cent of the general population. The vast majority of international migrants had moved internally before and/or after an international migration. This finding lends support to the notion that international migration is part of a wider migration trajectory in time and space that starts earlier in life, often in childhood.

Although data driven, our sequence-based classification has delineated migration trajectories along two dimensions that are central to King and Skeldon's (2010) model: (1) whether an internal migration occurs before or after an international migration; and (2) whether migrants engage in repeat international migration. As a result, our typology broadly mirrors King and Skeldon's (2010) migration sequences, showing that their general framework provides a useful and pliable prism through which to explore how internal and international migration precede one another in sequenced relationships.

At the same time, by extending the analysis to a broader segment of the life course, and accounting for temporality (i.e. timing and duration of residential episodes), our sequence analysis has revealed additional complexities and subtle variations that cannot be encompassed in a universal model. We have shown that migration trajectories can be further differentiated based on the duration of stays abroad, the timing of the first move, and the frequency of repeat international migration, and these result in greater diversity in migration trajectories than anticipated. For example, Cluster 5 featured a short stay abroad of average duration 4.0 years (compared with 15.4 years for the whole sample), with no internal migration while abroad. By contrast, migrants in Cluster 2 migrated internationally first at age 13—compared with the average age of 21 for the whole sample—and resided abroad for an average of 34.4 years, moving internally in the destination country. This suggests that internal mobility in a foreign country is part of a long-term adaptation strategy for immigrants who reside in destination countries for longer periods. A distinctive migration trajectory can also be seen among individuals who circulated repeatedly between their country of birth and foreign countries (Cluster 7); this corresponds to King and Skeldon's 10th migration sequence repeating over the life course of migrants, with an average of 4.5 lifetime international migrations.

By confirming that internal and international migration precede one another in a sequenced relationship over the life course of migrants, these results show that the decision to migrate at one point in time is embedded in a wider migration trajectory, lending support to the notion of migration being a continuum in time and space (Bell and Ward 2000). This reinforces the need to move beyond a snapshot approach to migration and highlights the importance of conceptualizing and analysing internal and international migration jointly. So, where to from here?

The analysis presented here encompassed all domestic changes of address, thus it permitted neither the distinction between short- and long-distance internal migration nor between return and onward internal migration to a new region of residence. Future research should endeavour to address this data limitation, to provide a more detailed account of migration trajectories. Another area that deserves further attention is the rural–urban gradient of migration trajectories. We found that individuals born in rural areas were more likely to migrate internally on return to their origin country. Although a rich literature on the internal migration of emigrants in destination countries exists (Raymer and Baffour 2018), very little is known about the internal migration of return emigrants and the potential role of resources accumulated abroad in shaping subsequent internal migration behaviour. Finally, another avenue for future research is an extension of sequence analysis to

longer segments of the life course, including retirement migration. Despite growing evidence of European citizens engaging in international (King et al. 1998) and internal retirement migration (Tyrrell and Kraftl 2016), it remains unclear how retirement migration fits within broader individual migration trajectories.

A finding of particular interest was that migrants from Eastern Europe were more likely to emigrate permanently than migrants from Western and Northern Europe. Conversely, we found that they were less likely to engage in circular international migration and in short stays abroad. Given that most respondents from Eastern Europe migrated before their country's accession to the EU in 2004 or 2007, we interpret freedom of movement within Europe as an enabler of return migration by reducing institutional barriers to possible re-entry into the destination country or migration to a third country in the future. This was validated by our regression model, which also showed that emigrants from wealthier countries were less likely to emigrate permanently. We therefore expect recent cohorts from Eastern Europe to follow more diverse migration sequences than the baby boomers observed in this paper.

This finding suggests that internal and international movements not only precede one another over the life course of migrants but may also act as a substitute for each other in response to the broader institutional context, particularly freedom of movement and the level of economic development. As freedom of movement deepens within Europe, it is therefore possible that European nationals will migrate internationally in lieu of migrating internally, and this is likely to put a downward pressure on internal migration. This mechanism may have contributed to the decline in levels of internal migration observed in some European countries (Champion et al. 2018; Shuttleworth et al. 2019; Alvarez et al. 2021).

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Appendix

Table A1 NUTS 2 regions in SHARE countries: numbers, population density, land size, and migration within and between NUTS 2 regions

	Number of NUTS 2 regions	Average population density per NUTS 2 region (persons/ km^2)	Average land size per NUTS 2 region (km^2)	Average ratio of intra-NUTS 2 migration and inter-NUTS 2 migration
Eastern Europe				
Bulgaria	6	64	18,395	6.5
Hungary	8	515	13,287	5.1
Poland	17	147	19,542	4.2
Romania	8	229	29,799	5.0
German-speaking Europe				
Austria	9	608	9,320	4.8
Germany	19	465	9,404	4.8
Switzerland	7	330	5,899	3.2
Northern Europe				
Denmark	5	229	8,585	4.5
Sweden	8	77	54,821	4.6
Southern Europe				
Greece	13	128	10,158	3.3
Italy	21	181	14,384	6.8
Portugal	7	256	13,175	5.0
Spain	19	693	26,629	5.1
Western Europe				
Netherlands	12	509	3,462	6.7

Notes: Results are not reported for Belgium, France, and Ireland, because NUTS 1 regions are used in those countries, or for Finland, Luxembourg, and Malta, for which only all changes of address are recorded. Note that for Denmark, overseas territories of Greenland and Faroe Islands are considered as an additional region. For Finland, information on regions is not available. For Hungary information is combined in seven regions. For Ireland information is based on NUTS 2 classification of 2013 (two regions). For Italy, the regions of Trentino and South Tyrol are combined. For the Netherlands, information is only available for five combined regions. For Spain, the autonomous cities of Ceuta and Melilla are combined.

Source: Average population density and land size were measured for 2017 and were calculated using information from the World Bank (retrieved from https://data.worldbank.org/indicator). The ratio of intra-regional and inter-regional migrations averaged at the population level was calculated for moves between ages 0 and 50 reported by respondents born between 1950 and 1965 from the SHARE survey for each country (Waves 3 [2008–09] and 7 [2017]; weighted).

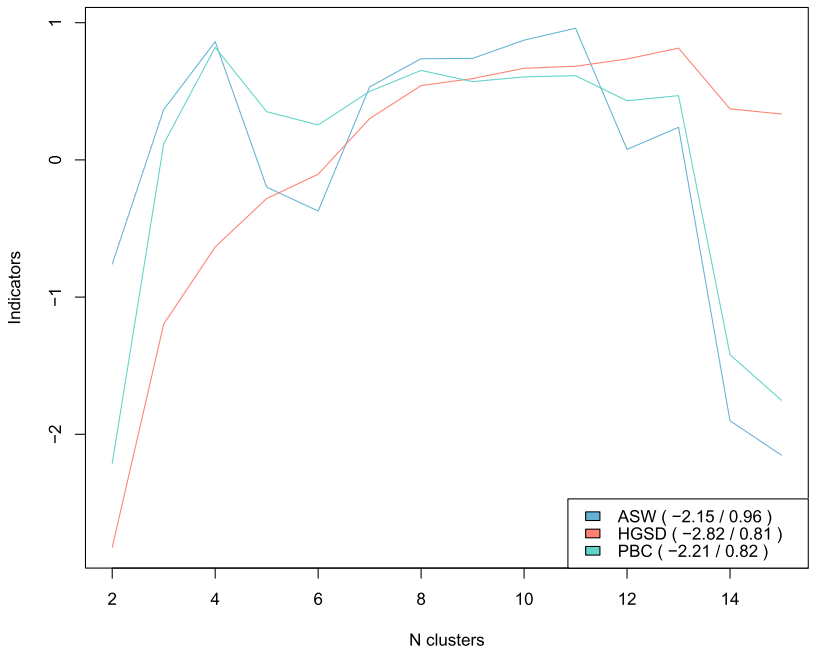

Figure A1 Cut-off criteria for cluster solutions (normalized scores)
Notes: Figures are best viewed in colour online. ASW = Average silhouette width; HGSD = Hubert's Gamma Somers' D; PBC = Point-biserial correlation. For ease of comparisons across indicators, their scores have been normalized.
Source: Data from SHARE (Waves 3 [2008–09] and 7 [2017]; weighted).