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Abstract

Cross-border employment in Austria has more than tripled since 2010 and accounts for roughly 4% of dependent employment in 2025, yet little is known about the careers behind these numbers. Using social-security records on all 738,000 workers employed in Austria while residing abroad in 2010–2025, this paper studies how stable and heterogeneous these careers are and how continuity has changed over time. Short attachments dominate entries but contribute little to labour supply: workers with a single episode shorter than a year make up one third of the cross-border workforce but supply only a small fraction of total employment time, whereas a similarly sized group with largely continuous careers supplies about two thirds. First-year exit hazards are sensitive to how unobserved heterogeneity is modelled, but in every specification hazards fall markedly after twelve months, and employment structure in the first year strongly predicts later durability. Continuity has increased over time, mainly through fewer interruptions; resident employees show a similar trend, coinciding with a tightening labour market, while moves of residence to Austria have become less frequent. Cross-border episodes end more often than resident episodes, but the gap is concentrated at the start and is small among episodes that have lasted a year and are matched on observables. The distinction between a short-term margin and a durable core is equally relevant for other destination regions with large cross-border inflows, such as Luxembourg, Switzerland or southern Germany. For labour-supply projections, retention beyond the first year matters more than the number of entrants.

Keywords: Cross-border employment, employment duration, duration dependence, unobserved heterogeneity, labour mobility, survival analysis

JEL Codes: J61, J63, F22, C41, R23

1. Introduction

Workers who live abroad but are employed across the border are a sizeable and growing part of European labour markets (Tsiopa et al. 2024), yet little is known about how durable these employment relationships are. Studies of East–West commuting in the Central European Region describe cross-border workers as a flexible source of labour, often employed in low-paid, unstable or seasonal jobs (Wiesböck 2016; Wiesböck and Verwiebe 2017). Whether this picture holds for cross-border employment as a whole matters for assessments of labour shortages, for integration policy and for workforce projections. The same stock of cross-border employment can result from many short attachments with high turnover or from a smaller group of workers who remain employed for long periods, and the two imply very different dynamics of labour supply. One aim of this paper is to uncover the heterogeneity behind the strong growth of cross-border employment in Austria over the past fifteen years. The results, in particular on employment persistence, interruptions and transitions, can then inform labour-supply forecasts, such as the projection and microsimulation work in Horvath et al. (2024, 2025).

Longitudinal evidence on the persistence of cross-border employment relationships is still limited. Existing work has examined the incidence and determinants of cross-border commuting (Buch et al. 2020; Broersma et al. 2022; Edzes et al. 2022), the wage and firm-level effects of cross-border labour flows (Beerli et al. 2021; Dorn and Zweimüller 2021), the willingness to commute or migrate across borders (Huber and Nowotny 2013), and the effects of institutional change on cross-border commuting (Parenti and Tealdi 2023). Longitudinal data that follow entry into, duration of and exit from cross-border employment remain scarce; existing register-based studies cover particular regions and corridors, such as Belgium–Luxembourg (Albanese et al. 2022; Albanese and Marguerit 2026).

Austria offers an informative setting for this question. In 2025, cross-border employment accounts for roughly 4% of dependent employment in Austria[1], compared with an EU-wide estimate of about 0.6% of all employed persons (European Commission 2025). Austrian administrative social-security data also make it possible to follow employment and residence trajectories for the same individuals over a sixteen-year period. The

[1] In 2025, 152,000 employees with foreign residence were recorded in Austria (AMS data), corresponding to 3.8% of the total employment stock (3,965,000); the figure differs slightly from the annual average stock reported below, which is based on the analysis data; https://www.dnet.at/amis/Datenbank/DB_Index.aspx.

analysis covers all workers residing abroad and employed in Austria between 2010 and 2025, corresponding to around 738,000 individuals and 1.52 million employment episodes.

The paper asks how stable cross-border employment is, how heterogeneous these careers are, and how continuity has changed over time. The analysis is descriptive. Short attachments make up a large share of entries, but a smaller group of longer-lasting careers supplies most of the employment volume. Whether ending risks fall within the first year depends on how unobserved heterogeneity is modelled, but after twelve months they drop in every specification. Continuity has risen over time, mainly because interruptions have become less frequent. Cross-border episodes end more often than those of resident employees, but the difference is concentrated at the start of episodes and is small among episodes that have lasted a year and are matched on observable characteristics.

The paper adds to the literature on cross-border employment in several respects. It provides evidence on longer-term employment careers for the entire cross-border workforce of one destination country, not for a particular corridor or region, and observes residence alongside employment, so that the end of an employment episode can be distinguished from a move to Austria. Where existing studies examine the incidence and determinants of cross-border commuting, it asks how long cross-border employment lasts and how much of the employment volume different groups of workers supply. The analysis distinguishes interruptions from permanent departures and complements models with different assumptions about unobserved heterogeneity with a landmark design that requires no such assumptions. Finally, it compares cross-border with resident employment, using the same episode definition for both groups and matching episodes on characteristics at their start.

Section 2 sets out the interpretive framework and clarifies what can be learned from the data used here. Section 3 describes the data and the construction of employment episodes. Section 4 documents heterogeneity in observed careers and develops a career typology. Section 5 analyses duration dependence, calendar-time change, first-year career structure, robustness, the resident-worker comparison, and the interpretation of the findings. Section 6 concludes.

2. Conceptual framework and empirical scope

This section sets out the economic perspectives that guide the analysis and identifies which of their implications the data can address.

2.1 Composition, match quality and segmentation

Dustmann and Görlach (2016) treat the duration of migration as an economic choice. Applied to cross-border employment, this shifts attention from whether such employment is temporary to how long individual attachments last and how these durations are distributed. Annual stock figures cannot answer that question: a workforce made up mostly of short stays and one with a sizeable group of long-lasting attachments can look alike in headcounts, yet the second supplies far more labour over time.

Two theories make predictions about the shape of this distribution. If match quality is revealed only gradually, poor matches end early and surviving ones become increasingly stable (Jovanovic 1979), so cross-border employment should show an unstable entry phase followed by lower exit risks, irrespective of where workers reside. Segmentation theory makes a comparative prediction instead (Doeringer and Piore 1971; Piore 1979): if cross-border workers are concentrated in the secondary segment of the labour market, their careers should contain more short and unstable attachments than those of comparable residents. Section 5.2 speaks to the first prediction, Section 5.5 to the second.

2.2 Selection and duration dependence

A declining hazard over elapsed duration is consistent with both predictions and with pure dynamic selection: workers with high separation propensities leave early, and the surviving population becomes increasingly selected even if no individual attachment stabilises. Selection and genuine duration dependence are not separately identified from a single hazard profile without further assumptions (Elbers and Ridder 1982; Heckman and Singer 1984; van den Berg 2001). Repeated spells per worker help (Honoré 1993; Abbring and van den Berg 2003; Bijwaard et al. 2014), but cross-border employees contribute only about two episodes on average, and the majority only one. Section 5 compares several specifications of unobserved heterogeneity in continuous and discrete time (Jenkins 1995) and adds a landmark design that requires no distributional assumption about it.

2.3 Cross-border employment and migration as competing destination states

Two features are specific to cross-border employment. First, an episode can end because employment in Austria ends or because the worker moves to Austria while remaining employed; the two outcomes have opposite economic meaning and are treated as competing destination states. Second, an ending need not be permanent: return and repeat migration are common (Constant and Massey 2003; Dustmann 2003; Constant and Zimmermann 2011), so a recorded ending may be an interruption followed by re-entry. The baseline models treat every episode ending as an event; Section 5.3 separates employment exit from relocation to Austria, and interruptions from permanent departures.

2.4 Frictions, demand conditions, and empirical scope

Entry into cross-border employment responds to wage differentials, distance and travel time, language, infrastructure and institutions (Mathä and Wintr 2009; Buch et al. 2009; Huber and Nowotny 2013; Chilla and Heugel 2022; Klatt 2014). This paper takes entry as given, but its determinants shape who enters and hence the population whose durability is observed. Two developments over the observation period may also have raised attachment directly. The staged opening of the Austrian labour market to workers from new EU member states (2011 for EU-8 workers, 2014 for Romanian and Bulgarian workers, 2020 for Croatian workers; on the 2011 step, see Huber and Böhs 2012) lowered mobility frictions, although easier access also brings many new and often short entries. After 2015 the labour market tightened markedly: the number of registered unemployed per registered vacancy fell from 12.1 in 2015 to 3.3 in 2024 (Aigner-Walder et al. 2025). The data cannot separate these mechanisms, but the comparison with resident workers offers some guidance: a trend confined to cross-border workers would point to mobility-specific factors, a trend shared with residents to broader labour-market conditions.

The analysis documents the composition of employment histories, the shape and level of duration profiles and calendar-time changes in episode-ending risks; it does not identify the causal sources of these patterns and covers only the stability dimension of segmentation (Section 3.1). Table 1 summarises the perspectives and the implications that the data can assess.

Table 1 Economic perspectives on cross-border employment and empirically assessable implications

Perspective	Main implication for employment stability	What the data can assess	What the data cannot assess
Durability and segmentation	Unstable entry phase separated from a more durable segment; short attachments account for a larger share than among residents	Distribution of realised histories; duration-weighted contribution of each group; resident benchmark on stability	Wages above the contribution cap, hours, occupation, career progression
Selection versus duration dependence	Observed decline may reflect dynamic sorting, genuine stabilisation, or both	Level of the hazard; discontinuity between the first year and later durations; magnitude of person-level heterogeneity in a multiple-spell design	A quantitative decomposition of the decline into dynamic sorting and genuine duration dependence
Competing destination states and re-entry	Employment exit and relocation to Austria have opposite economic meaning; an ending need not be permanent	Residence trajectories alongside employment; share of episodes ending in relocation; share of endings followed by re-entry	Dependence between the two risks, which is not identified without further assumptions; the motives behind a relocation
Frictions and demand conditions	Lower frictions and tighter labour markets raise durability	Calendar-time gradient; whether it is cross-border-worker-specific or shared with residents	Which mechanism generates the gradient; how jobs were found

Notes: The perspectives summarise interpretive frameworks rather than separately estimated models. The assessable implications refer to the stability dimension of cross-border employment: the distribution of short and longer attachments, duration dependence, and calendar-time changes in interruption risk.

3. Data and sample construction

3.1 Data sources and measurement

The analysis uses the Austrian Labour Market Database (AMDB). Its underlying employment records are provided by the Austrian Federation of Social Insurances (Dachverband der Sozialversicherungsträger; DVSV), while residence records are provided by the Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection (BMASGPK). These records cover dependent employment subject to compulsory social-security contributions and provide near-universal information on employees in Austria. For each individual, the register contains information on employment status, sex, age, sector, federal state of employment, and monthly gross earnings subject to social-security contributions.

A key advantage of the data is that residence is recorded alongside employment status[2], which makes it possible to identify workers who are employed in Austria while residing abroad. At the same time, the register is limited on several other dimensions. Earnings are top-coded at the maximum contribution base, and the data do not contain information

[2] Residence is recorded as a postal code, which is linked to NUTS regions using the TERCET correspondence tables (https://gisco-services.ec.europa.eu/tercet/flat-files).

on hours worked, occupation, education, contract type, or within-firm career progression. The analysis focuses on the stability of employment attachments; wage growth, job quality and occupational mobility are outside its scope.

One potential concern is the reliability of residence changes. Since the records are administrative and based on mandatory reporting, employment spells are measured very accurately. The main limitation is that residence changes may be registered with a delay of several weeks or months, which could affect the timing of transitions between cross-border and resident status. Section 5.3 reports robustness checks showing that the main results are not materially affected by this issue[3].

3.2 Definition of cross-border employment and analytical samples

Cross-border employees are defined as individuals in dependent employment in Austria whose registered residence is outside Austria for at least one month during employment. This administrative definition captures foreign-resident employment in a broad sense. It includes daily and weekly border crossers as well as seasonal and rotational workers, all of whom appear in the data as employed in Austria with a foreign residential address. Commuting frequency and travel mode are not recorded, so the measure captures cross-border employment attachment, not commuting behaviour in the strict sense. Related statistical and empirical work likewise identifies cross-border workers from the combination of residence and workplace location (Eurostat 2023; Buch et al. 2020; Parenti and Tealdi 2023).

The full sample includes all individuals with at least one month of foreign-resident employment in Austria between January 2010 and December 2025 (Table 2). Over the same period, cross-border employment expands markedly, from about 48,000 workers in 2010 to around 155,000 in 2025 (Table 3). Figure 1 shows cross-border employees as a share of the population aged 15–64 in their region of residence in 2025. The shares are highest in Western Hungary (Nyugat-Dunántúl, HU22; 6%) and Eastern Slovenia (Vzhodna Slovenija, SI03; 2%), and remain below 1% in all other regions.

[3] Excluding all episodes that end and are followed by Austrian-resident employment within one to three months, the cases most plausibly affected by reporting lags, leaves the duration profile and the calendar-time trend almost unchanged. Excluding single-month episodes, which are the most susceptible to misclassification at episode boundaries, also leaves the results intact.

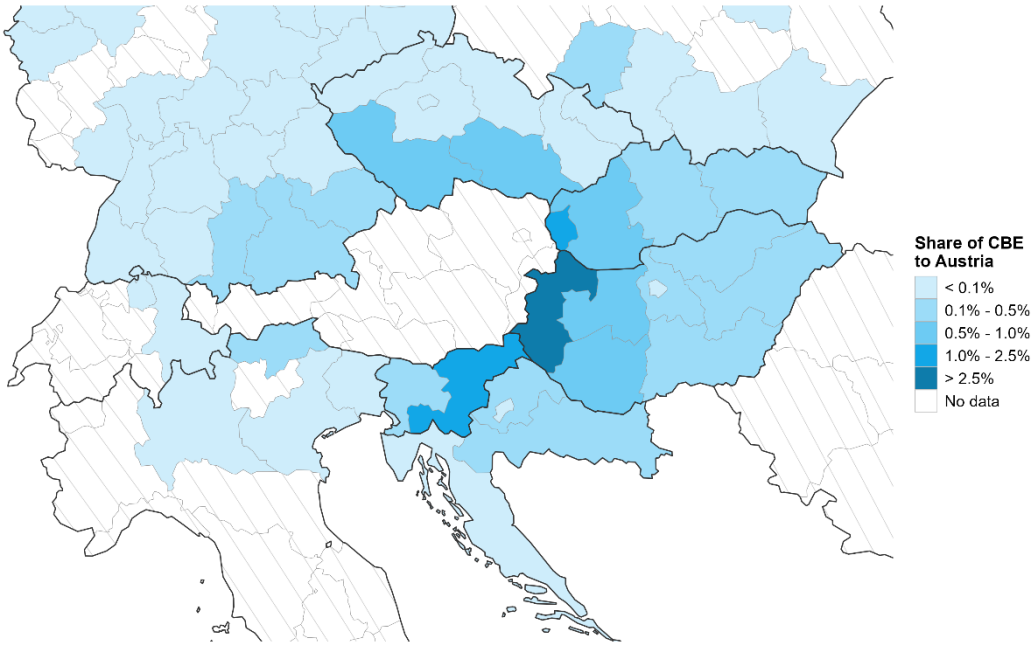


Fig. 1 ***Cross-border employees in Austria by region of residence (2025)***

Notes: Own calculations based on AMDB/BMASGPK (mon_wohnort_int) and Eurostat (demo_r_d2jan). The figure shows the share of the working-age population (15–64) employed in Austria by region of residence in 2025. It highlights the regions in which cross-border employment is most concentrated; the analytical sample also includes workers residing elsewhere.

The empirical analyses use different samples, depending on the question being studied (Table 2). Section 4 relies on the full sample to document heterogeneity in observed employment histories and to characterise the workers who appear only in aggregate form in stock statistics. This is also useful for assessing how far the marked increase in cross-border employment over recent years reflects a durable expansion rather than high turnover at the margin. The survival analysis in Section 5 uses a more restricted episode sample. To avoid left-censoring, episodes already in progress in January 2010 are excluded. Episodes are also excluded if the worker had recorded residence in Austria before first observed cross-border employment, so that return moves from prior Austrian residence do not enter. To allow sufficient follow-up, episodes beginning after December 2023 are not included in the estimation sample.

For the landmark analysis in Section 5.4, the sample is restricted to workers whose first observed cross-border employment begins between 2010 and 2022, who remain in cross-

border employment through month twelve and who have at least twenty-four months of potential observation thereafter. The comparison with resident workers in Section 5.5 uses a 20% random sample of dependent employees resident in Austria[4]. To make both groups comparable, episodes are not terminated by a change of residence, and each episode is assigned to a group by place of residence at its start (Appendix A.2).

Table 2 Analytical samples used in the paper

Analysis	Unit of analysis	Restriction	N persons	N episodes
Descriptive heterogeneity (Sec. 4)	Worker	All cross-border employees observed 2010–2025	738,247	1,520,318
Survival analysis (Sec. 5)	Episode	Episode starts 2010–2023; residence outside Austria recorded at episode start; no left-censored episodes	537,238	1,077,517
Landmark analysis (Sec. 5.4)	Worker	Entry cohorts 2010–2022; no left-censored episodes; in cross-border employment in month 12 (employed in AT and residence outside AT)	138,742	284,923
Resident benchmark (Sec. 5.5)	Episode	Episode starts 2010–2023; no left-censored episodes; no apprenticeships; group by residence at episode start; cross-border workers selected as in survival sample; residents from 20% sample	452,332 / 866,256	839,788 / 2,775,845

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. The descriptive sample includes all individuals with at least one month of cross-border employment in Austria. The survival sample includes episodes starting in 2010–2023, excludes left-censored episodes, and excludes workers with recorded Austrian residence before first observed cross-border employment. The landmark sample is limited to entry cohorts observed up to 2022. The resident benchmark uses a 20% random sample of resident dependent employees. Person and episode counts refer to the relevant unit of observation in each row. In the resident benchmark, a change of residence does not end an episode (Appendix A.2). Counts are reported as cross-border / residents.

3.3 Construction of employment episodes

To characterise the structure of cross-border employment, the analysis focuses on the number and duration of employment episodes. Employment status is measured at a monthly reference date (mid-month), and an episode is defined as a contiguous sequence of months in which an individual is in dependent employment in Austria while residing abroad. The monthly grid follows from the data: residence is recorded at monthly frequency, so cross-border status, which combines employment and residence, cannot be observed at a finer resolution. It is also the resolution of the stock statistics in Section 4 and of the person-month hazard models in Section 5.

[4] The resident benchmark is restricted to a 20% sample to limit computational burden.

Any episode definition requires a rule for which interruptions count as continued employment. A day-exact definition would need an explicit and necessarily arbitrary gap threshold. The monthly grid applies one rule uniformly: interruptions that do not span a reference date are bridged, those that do count as an ending. Employment at a reference date is almost never fleeting: the average employment month contains 29.9 days of active employment, and 95% of employment months contain at least 27 days. Jobs that begin and end between two reference dates are missed; this understates the number of very short attachments and therefore works against the paper's finding that short attachments are frequent. Alternative rules that drop one-month episodes or treat a return within twelve months as continuation are reported in Appendix Tables 13 and 17.

The episode definition follows cross-border status, not employment in Austria as such. Workers who move to Austria remain in the Austrian labour force, but they leave the foreign-resident workforce studied here and become part of the resident workforce. Ending the episode at relocation keeps the unit of analysis aligned with that distinction. Relocation accounts for about one tenth of recorded episode endings (Appendix Table 10), and the main results change little when it is treated as censoring instead (Section 5.3). Section 5.5 uses an alternative definition in which a change of residence does not end an episode, so that cross-border and resident employment can be compared on equal terms.

Apart from the resident comparison in Section 5.5, this episode definition is used throughout the paper.

4. Heterogeneity in cross-border employment careers

Aggregate stocks conceal substantial heterogeneity in cross-border employment. Some workers appear only briefly in Austrian employment, whereas others remain attached for many years and accumulate long, largely continuous careers without relocating their residence to Austria. This section documents that heterogeneity and summarises it in a career typology that serves as a point of reference for the stability analysis in Section 5.

4.1 Employment intensity, duration, and residence trajectories

Between 2010 and 2025, the average stock of cross-border employees more than tripled, from about 48,000 to 155,000 (Table 3). Most of this growth occurs at the extensive margin: the number of individuals employed at least once during the year rose by a factor of 2.9, while the average number of months each of them worked in a given year increased

from 7.3 to 8.3. Measured on a log scale, about nine tenths of the growth in the stock is due to more workers and one tenth to the intensive margin, longer employment within the year (four fifths and one fifth relative to 2011, when transition restrictions for EU-8 workers ended).

Measured within calendar years, months worked in Austria while residing abroad are concentrated at both ends of the distribution, with relatively fewer workers in the middle range. In 2025, about half of all workers with any cross-border employment are employed throughout the full year, while roughly one quarter work fewer than four months. Relative to 2010, the distribution shifts towards greater continuity, and the ratio of annual persons to average stock declines, indicating lower turnover within the year.

Table 3 Employment statistics of cross-border employees per year

	N - cross-border employees					N months employed within calendar year			
	Av. stock	N persons	Person/av. Stock	Move In	Move Out	≤3	4–5	6–11	12
2010	48232	78871	1.6	5370	10762	0.30	0.10	0.23	0.37
2011	56939	100867	1.8	9424	17488	0.34	0.11	0.24	0.31
2012	69726	115253	1.7	9217	16239	0.30	0.11	0.24	0.35
2013	77513	127364	1.6	16165	24014	0.30	0.10	0.24	0.36
2014	83063	132367	1.6	14316	21715	0.29	0.10	0.23	0.39
2015	88224	139603	1.6	13274	20416	0.28	0.10	0.22	0.40
2016	93694	144175	1.5	13770	20764	0.26	0.09	0.23	0.42
2017	102078	155551	1.5	13720	21404	0.26	0.09	0.23	0.42
2018	112457	169003	1.5	12026	21293	0.25	0.09	0.22	0.43
2019	120855	180330	1.5	16786	24716	0.25	0.09	0.22	0.44
2020	117681	176238	1.5	13328	15226	0.25	0.08	0.24	0.43
2021	125905	182520	1.4	10094	9362	0.23	0.09	0.21	0.47
2022	141151	211299	1.5	11573	10767	0.25	0.09	0.21	0.44
2023	150317	221410	1.5	13667	11324	0.24	0.09	0.22	0.45
2024	151583	220501	1.5	12218	10537	0.23	0.09	0.21	0.47
2025	154647	224942	1.5	11634	10854	0.24	0.09	0.20	0.48

Notes: Annual cross-border employment statistics based on AMDB/BMASGPK administrative records. “Av. Stock” is the average monthly stock of dependent employees in Austria with foreign residence during the year. “N persons” is the number of distinct individuals observed in cross-border employment at least once during the year. “Person/av. Stock” is the ratio of annual persons to average stock. “Move in” counts workers who change registered residence from abroad to Austria while remaining employed in Austria; “Move out” counts the reverse transition. The last four columns report the distribution of months spent in cross-border employment within the calendar year; row shares sum to one.

Table 4 Number of episodes, spell duration and total employment duration of cross-border employees

N episodes	N workers	Employment spell duration (months)				Total Employment duration (months)			
		Mean	25th pct.	Median	75th pct.	Mean	25th pct.	Median	75th pct.
1	445,340	19.4	1	4	16	19.4	1	4	16
2	132,320	15.7	2	4	14	31.3	5	11	39
3	61,446	13.2	2	4	11	39.6	8	19	56
4	33,904	11.0	2	4	10	44.0	12	25	63
5	20,244	9.4	2	4	9	47.1	16	30	67
6	13,093	8.4	2	4	9	50.4	19	35	71
7	9,065	7.7	2	4	8	54.2	24	41	75
8	6,152	7.3	2	4	8	58.5	27	46	81
9	4,517	7.0	2	4	8	62.6	32	52	86
10+	12,166	5.6	2	4	7	71.8	40	63	100

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Workers are grouped by the total number of observed cross-border employment episodes in the full descriptive sample. "Employment spell duration" reports the mean and the 25th, 50th, and 75th percentiles of episode length within each group, in months. "Total employment duration" reports the corresponding statistics for cumulative months spent in cross-border employment over the full observation window. Durations are measured in months of employment in Austria while registered as residing abroad.

Workers with a single episode form the largest group, accounting for about 60% of all individuals, but the distribution of episode length is highly skewed (Table 4). Among single-episode workers, the median episode lasts four months, whereas the mean is almost twenty. The median is the same in every group, and a quarter of episodes end within one or two months; differences in mean duration across groups arise in the upper tail, with the 75th percentile falling from 16 months among single-episode workers to 7 months among workers with ten or more episodes. This points to a large short-term segment alongside a smaller set of much longer attachments.

Accumulated over the full observation window, cross-border employment is strongly bimodal (Figure 2). About 43% of workers spend fewer than six months in cross-border employment between 2010 and 2025, and 58% no more than a year, while almost one in five accumulates more than four years. The share of workers who move their residence to Austria at some point while being employed in Austria is remarkably flat across this distribution, at just under 25%. It is lower only at the margins: among workers who accumulate fewer than six months of cross-border employment, and among those with more than four years, partly because a move ends cross-border employment and so limits how long it can accumulate. The cause-specific hazard of relocation points in the same

direction: the monthly risk of moving to Austria falls sharply as an episode lengthens (Panel B of Table 10 in the Appendix). Long cross-border careers are therefore not more likely to lead to a move to Austria than short ones.

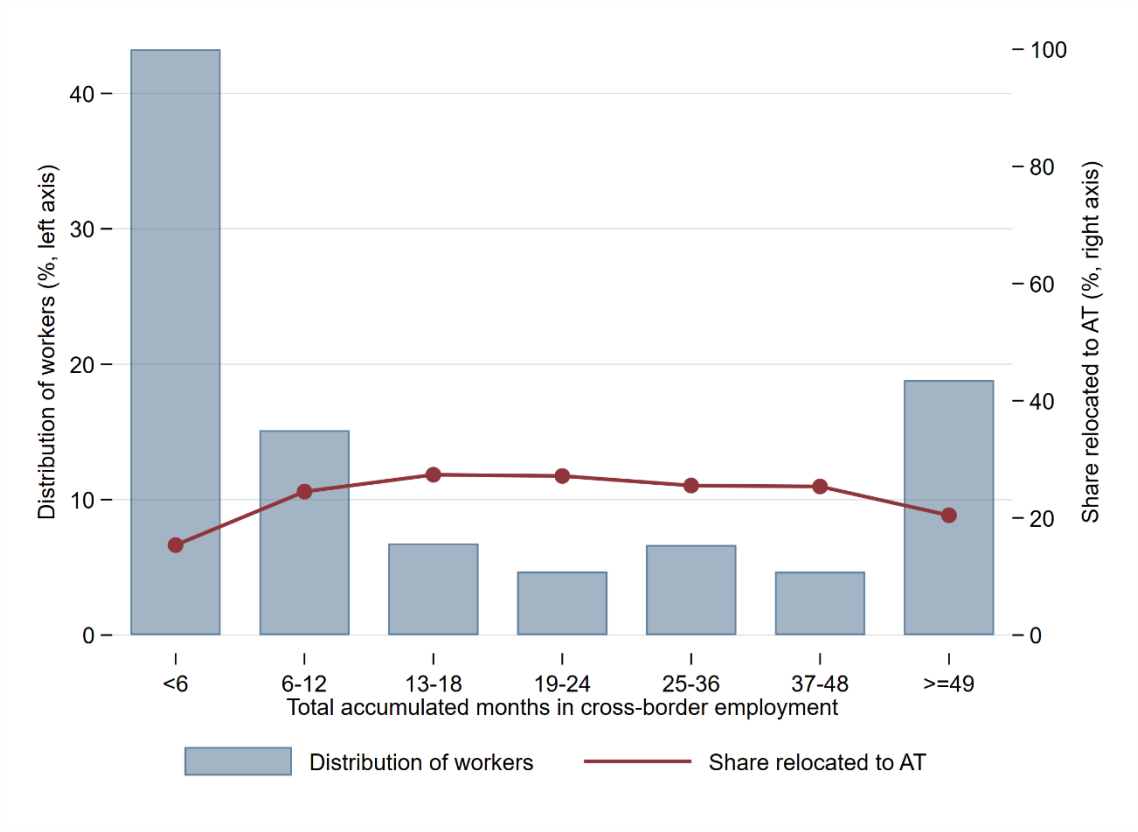


Fig. 2 Accumulated months in cross-border employment and share of workers relocating to Austria (2010–2025)

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Bars (left axis): distribution of all workers ever observed in cross-border employment by total months in cross-border employment between 2010 and 2025 (N = 738,247). Line (right axis): share of workers who move their residence to Austria at some point during Austrian employment, among workers whose first observed Austrian employment was with residence abroad (N = 563,526).

4.2 A typology of cross-border employment careers

To summarise the heterogeneity documented above, workers are grouped into five mutually exclusive career types (Appendix A.1). The typology is descriptive: it organises realised employment and residence histories over the full observation window and shows how total cross-border employment time is distributed across qualitatively different career patterns.

The five types are shown in Table 5. Trial workers have a single cross-border employment episode between 2010 and 2025 which lasts less than twelve months. They are the largest group by headcount, accounting for about 34% of all cross-border employees, but only

4% of total cross-border employment time. Established workers have few episodes, but these tend to be long and comparatively continuous. They account for around 31% of workers and roughly 67% of total employment time. Transitional workers (18% of workers and 13% of employment time) move their residence to Austria at some point while employed there, typically in a single move, and thereby leave cross-border employment status. Circular workers (8% of workers and 13% of employment time) change residence repeatedly or re-enter cross-border employment at regular intervals. They often accumulate substantial durations across recurrent employment interruptions. Flexible workers (9% of workers and 3% of employment time) form the residual category of shorter and more irregular multi-episode histories.

Table 5 Cross-border employees by career type (2010–2025)

	N Cross-border employees (2010 - 2025)			Number of episodes per cross-border employee		Employment duration per episode		Cumulative employment duration (2010–2025)	
	Total	in % of all workers	in % of total empl. dur.	mean	med.	mean	med.	mean	med.
Trial	253541	34%	4%	1.0	1	2.9	2	2.9	2
Circular	59148	8%	13%	5.7	5	7.8	4	44.5	31
Established	229089	31%	67%	2.3	2	26.2	9	59.4	40
Transitional	131075	18%	13%	1.9	1	11.0	4	20.7	7
Flexible	65394	9%	3%	2.5	2	3.9	2	9.7	6

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Career types are defined in Section 4.2 and Appendix A.1. "% of total empl. dur." denotes the share of total cross-border person-months accumulated over the observation window. Episode length is measured in consecutive months of employment in Austria with foreign residence.

The types also differ in who they include (Table 6). Established careers draw disproportionately on workers from neighbouring countries to the east, Hungary, Slovenia and the Czech Republic, and on employment in Burgenland and Lower Austria, where daily commuting across the border is feasible. These workers are older at entry and less often employed in tourism. Circular careers are concentrated among Hungarian and Slovak workers and in tourism, consistent with seasonal employment. Transitional careers are more common among workers from Germany and from countries further away, suggesting that distance makes a move to Austria more likely once employment continues. Trial and Flexible careers are more frequent among young workers and, for Trial careers, in tourism in the western federal states. Entry wages differ comparatively

little across types: in full months of employment, the median ranges from about 2,300 euros for Trial and Flexible careers to about 2,600 euros for Established and Transitional careers (in 2025 prices). Short careers thus start in somewhat lower-paid jobs, but the difference is small compared with the differences in stability.

Table 6 Characteristics at entry by career type

	Trial	Circular	Established	Transitional	Flexible	All
Country of residence (%)						
Hungary	20.2	36.3	33.3	25.5	26.7	27.1
Slovakia	9.4	14.7	11.2	11.0	9.6	10.7
Czech Republic	4.8	6.8	7.8	3.8	5.4	5.8
Slovenia	4.4	5.9	10.3	4.2	7.0	6.5
Germany	22.9	14.7	20.7	26.9	17.7	21.8
Poland	6.9	9.5	6.4	6.1	6.9	6.8
Romania	4.7	2.7	1.8	3.8	5.1	3.5
Croatia	2.1	1.6	1.8	3.3	1.8	2.2
Other or unknown	24.6	7.7	6.7	15.3	19.6	15.6
Sector of first employment (%)						
Production	18.6	17.2	19.4	13.1	25.2	18.3
Construction	8.9	10.9	10.4	7.5	6.7	9.1
Trade	6.7	5.9	9.8	7.3	6.8	7.7
Tourism	23.7	29.4	16.6	27.3	21.3	22.4
Business services	28.7	27.1	33.1	29.5	24.1	29.7
Public and social services	8.4	6.0	6.2	10.8	9.2	8.0
Other	4.1	2.5	3.0	3.6	4.7	3.6
Missing	1.0	1.1	1.5	0.9	1.9	1.2
Federal state of workplace (%)						
Vienna	14.4	10.8	11.2	16.4	9.7	13.0
Lower Austria	11.9	16.6	16.1	11.5	13.0	13.6
Burgenland	7.6	9.7	13.1	4.4	11.5	9.2
Upper Austria	11.2	11.5	14.4	14.8	9.4	12.7
Styria	14.0	11.6	15.3	9.1	18.6	13.7
Carinthia	5.0	7.6	4.8	4.6	5.1	5.1
Salzburg	11.1	9.7	8.2	13.3	9.6	10.3
Tyrol	14.9	14.3	7.9	14.2	13.3	12.4
Vorarlberg	6.0	3.4	5.0	6.0	4.8	5.4
Unknown	4.1	4.8	4.1	5.5	4.8	4.5
Demographics						
Women (%)	34.7	31.6	28.7	37.4	36.7	33.2
Median age at entry (years)	30	35	35	31	32	32
Age < 25 (%)	30.5	16.6	16.5	20.8	30.0	23.3
Age 25–44 (%)	48.3	59.0	60.4	60.6	46.3	54.9
Age ≥ 45 (%)	21.2	24.4	23.2	18.7	23.7	21.8
Entry wage						
Median monthly wage (2025 EUR)	2,310	2,520	2,560	2,610	2,280	2,490
At contribution ceiling (%)	1.2	0.4	0.3	0.4	1.3	0.7
Left-censored entry (%)	1.6	5.6	9.8	8.5	1.4	5.7
N workers	253,541	59,148	229,089	131,075	65,394	738,247

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Characteristics are measured in the first month of the first observed cross-border employment episode. Shares in % within each block. "Other" includes workers with unknown country of residence (11% of Trial and 8% of Flexible workers, fewer than 2% of the other types). Entry wages are median monthly gross earnings in months with at least 28 days of employment, deflated to 2025 prices with the Austrian consumer price index. For workers already employed in January 2010 (5.7% of all workers, 9.8% of Established workers), the first observed month is not the actual entry.

Figure 3 shows how the career types unfold over the first five years after entry. Trial careers end within a few months by construction. Established careers have the highest share in cross-border employment throughout, although this share falls from 76% in month 12 to 51% in month 60. Circular careers show a recurring seasonal pattern, with peaks one, two, three and four years after entry, and are often combined with employment after residence has moved to Austria. Transitional careers shift from cross-border employment to employment with Austrian residence, which accounts for about 40% of these workers after five years. Flexible careers also show seasonal peaks, but their employment level falls much faster and they rarely involve a move to Austria.

The typology describes employment careers ex post and is therefore not used as a regressor in the hazard models of Section 5. It serves as a point of reference in two ways. Section 5.4 asks whether the division between durable and short careers is recognisable from the first twelve months alone and maps first-year structure onto the career types (Table 9). Figure 4 and Appendix Table 12 report the calendar-time estimates separately by type, so that the aggregate trend can be traced to the Established segment. Beyond that, the typology leaves open how far the high exit rates of short careers reflect who enters rather than what happens after entry, and whether the balance between short and durable attachments has shifted over time; Section 5 addresses these questions with hazard models and a landmark design.

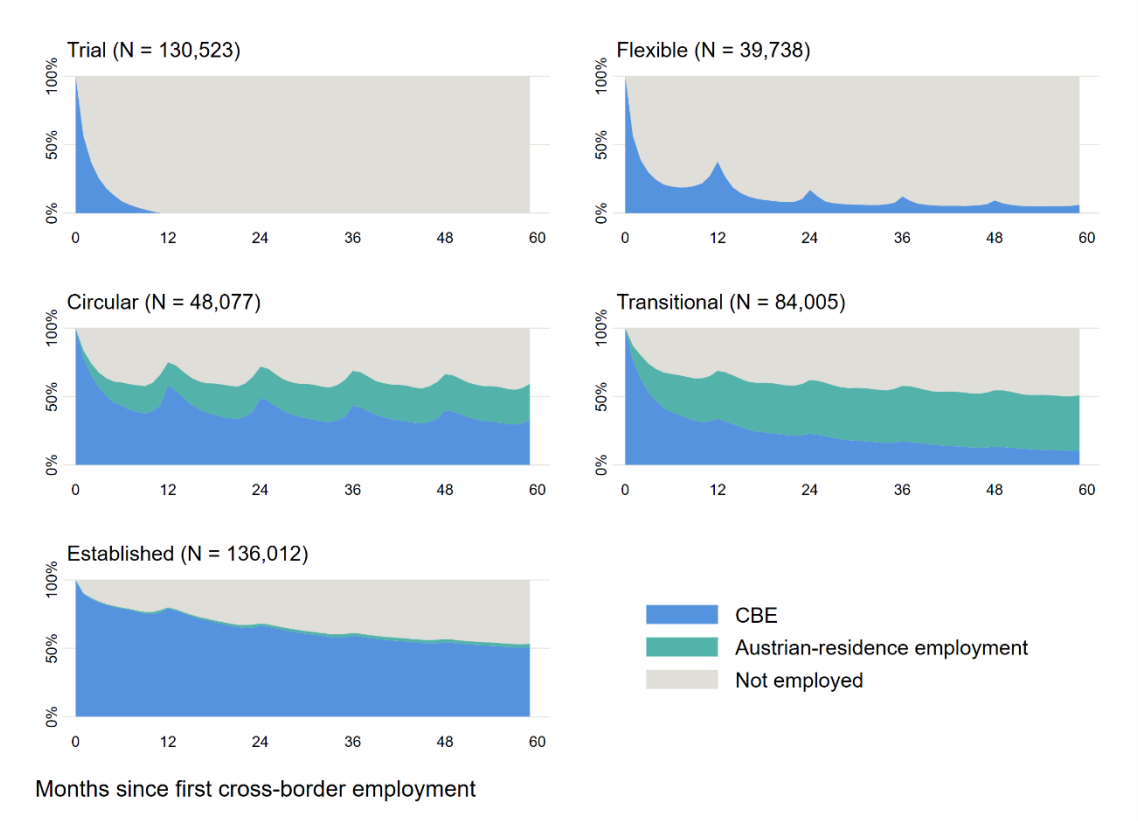


Fig. 3 Employment status in the first 60 months after first cross-border employment, by career type

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Share of workers in each state by months since the first month of cross-border employment. Workers whose first cross-border month lies between February 2010 and January 2021, so that 60 months are observed, excluding workers who reach age 60 within the window (N = 438,355). Career types are assigned from full observed histories (Appendix A.1). "Not employed" covers all months without dependent employment in Austria, including employment in the country of residence, which is not observed.

5. Employment stability, interruptions, and duration dependence

5.1 Empirical strategy

This section models the hazard that a cross-border employment episode ends. In the baseline specification, that event mainly captures employment interruption risk and not permanent withdrawal from Austrian employment. Of all recorded episode endings, 51% are followed by a return to cross-border employment within twelve months, a further 10% by a later return, and 39% are not followed by another cross-border episode within the observation window (Appendix Table 11). Section 5.3 returns to this distinction by re-estimating the main models with only endings without re-entry within twelve months counted as failures.

The unit of analysis is the cross-border employment episode defined in Section 3.3. Each episode is expanded into a spell-month panel. The main specification is a piecewise-constant proportional-hazard model with seven duration intervals: 1–2, 3–5, 6–8, 9–12, 13–24, 25–36, and more than 36 months. Standard errors are clustered at the person level throughout.

How elapsed duration is interpreted depends on how persistent worker heterogeneity is handled. Because most workers contribute only one or two episodes, separating true duration dependence from persistent unobserved heterogeneity rests largely on the assumed distribution of that heterogeneity. The paper therefore reports three specifications. The baseline is a piecewise-constant exponential model. The second adds a shared gamma frailty at the person level. The third is a discrete-time random-effects complementary log-log model, which fits the monthly structure of the data more closely and places less weight on the continuous-time approximation.

The estimation sample is the survival sample described in Section 3.2. Episodes beginning after 2023 are excluded, so each admitted episode can in principle be observed for at least two years. It contributes all observed months until termination or right-censoring in December 2025. In the baseline design, an episode is counted as ending whenever cross-border employment stops, whether because employment in Austria ceases or because residence changes to Austria, and regardless of later re-entry. Section 5.3 separates both margins: employment exit versus relocation to Austria, and interruption versus permanent departure.

The estimation sample contains 1,077,517 episodes, 1,010,139 observed endings, and 13,594,815 spell-months contributed by 537,238 individuals (Table 2). All specifications control for sex, age group, sector, federal state of employment, and country of residence. Calendar time enters at the spell-month level, so the period coefficients capture changes in the prevailing ending hazard in a given period, conditional on elapsed duration and observed composition.

The career types introduced in Section 4 are not included in the main hazard models, since they are constructed from realised histories. Heterogeneity is instead addressed through person-level unobserved effects and through the landmark design in Section 5.4, which uses only information from the first twelve months and relates it to the career types

observed afterwards (Table 9). Hazard models estimated separately by type are reported in Appendix Table 12 and, for Established workers, in Figure 4.

5.2 Duration dependence and unobserved heterogeneity

The raw duration profile shows a steep decline in episode-ending risks as cross-border employment episodes lengthen. About 21% of episodes that have lasted one to two months end in the current month. This falls to around 14% at three to five months and to 8% at nine to twelve months, before dropping sharply beyond the first year. The baseline model closely reproduces this pattern: relative to the first two months, the estimated hazard ratios are 0.750, 0.541, and 0.503 over the remainder of the first year, followed by 0.192, 0.132, and 0.079 in the 13–24, 25–36, and 36+ month intervals (Table 7, column 1). This pattern suggests strong negative duration dependence. In a population with persistent differences in separation propensities, however, the surviving risk set becomes increasingly selected towards low-risk workers even if individual risks do not decline.

Two alternative specifications explicitly model person-level heterogeneity: a shared gamma-frailty model and a discrete-time random-effects complementary log-log model. The latter is especially relevant given the high monthly ending probabilities at short durations. Accounting for heterogeneity changes the within-first-year profile, but not in the same way across specifications. Under gamma frailty, the first-year hazard ratios rise to 0.879, 0.716, and 0.723, so the decline attenuates but remains visible. In the discrete-time specification the within-year pattern reverses, with corresponding ratios of 1.148, 1.069, and 1.193, and it also reverses in the baseline model when one-month episodes are excluded (Table 13 in the Appendix).

While the first-year hazard profile thus has no stable behavioural interpretation, the break after twelve months appears in all three specifications. In the baseline model, the hazard falls by about 60% between the last interval of the first year and the first interval of the second (from 0.503 to 0.192). Beyond the first year, the estimated hazard ratios fall to 0.192, 0.132, and 0.079 in the baseline model, to 0.302, 0.225, and 0.158 under gamma frailty, and to 0.531, 0.432, and 0.355 in the discrete-time model. In every case, episodes that survive the first year face substantially lower subsequent ending risks than episodes still in the initial entry phase.

Table 7 Duration dependence and unobserved heterogeneity

	All		Gamma frailty		Discrete-time cloglog	
	Estimate	**(SE)**	**Estimate**	**(SE)**	**Estimate**	**(SE)**
Baseline	0.180***	(0.001)	0.180***	(0.001)	0.155***	(0.001)
Episode duration (base: 1–2 months)						
3–5 months	0.750***	(0.002)	0.879***	(0.002)	1.148***	(0.003)
6–8 months	0.541***	(0.002)	0.716***	(0.003)	1.069***	(0.004)
9–12 months	0.503***	(0.003)	0.723***	(0.003)	1.193***	(0.006)
13–24 months	0.192***	(0.001)	0.302***	(0.002)	0.531***	(0.003)
25–36 months	0.132***	(0.001)	0.225***	(0.002)	0.432***	(0.003)
>36 months	0.079***	(0.000)	0.158***	(0.001)	0.355***	(0.003)
Calendar period (base: 2010–2014)						
2015–2019	0.923***	(0.002)	0.891***	(0.003)	0.835***	(0.003)
2020	0.984***	(0.004)	0.964***	(0.004)	0.929***	(0.005)
2021	0.765***	(0.003)	0.719***	(0.003)	0.629***	(0.003)
2022–23	0.829***	(0.003)	0.763***	(0.003)	0.651***	(0.003)
>2023	0.757***	(0.004)	0.689***	(0.004)	0.590***	(0.004)
Heterogeneity parameters						
θ (gamma variance)	—		0.266		—	
σ_u (RE std. dev.)	—		—		1.097	
ρ (intra-class corr.)	—		—		0.423	
LR test (no frailty)	—		$p < 0.001$		$p < 0.001$	

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Cells report hazard ratios; the discrete-time column reports exp(coefficients) from a random-effects complementary log-log model. Standard errors clustered at the person level are shown in parentheses. The estimation sample includes cross-border employment episodes starting between January 2010 and December 2023, excluding episodes already in progress in January 2010, and follows them to termination or December 2025. N persons = 537,238; N episodes = 1,077,517; N failures = 1,010,139; N spell-months = 13,594,815. All specifications additionally control for country of residence, federal state, and sector of employment.

5.3 Calendar-time changes in employment stability

Employment stability increases over the observation period. Relative to 2010–2014, the estimated hazard that a cross-border employment episode ends is lower in every later period. For 2022–2023, the hazard ratios are 0.829 in the baseline model, 0.763 with gamma frailty, and 0.651 in the discrete-time specification (Table 7). The magnitude varies across specifications, but the direction is uniform.

The pandemic years look different from the broader pattern. In 2020, the estimated ending hazard remains close to its early-2010s level, whereas it falls sharply in 2021. A plausible interpretation is that 2020 combined offsetting movements in employment exit and relocation to Austria, while 2021 saw a broader decline in recorded episode endings. Estimates for 2024–2025 are not interpreted, since no new episodes enter after 2023, the risk set becomes increasingly selected, and 2025 is also affected by right-censoring.

Part of the aggregate improvement reflects what counts as an ending in the baseline design. When failures are restricted to departures not followed by a return within twelve months, the 2022–2023 hazard ratio rises from 0.829 to 0.915, and the 2015–2019 ratio from 0.923 to 0.983 (Tables 13 and 17 in the Appendix). The time trend therefore reflects fewer interruptions more than a marked reduction in permanent departures, while the break after twelve months remains clearly visible.

Figure 4 shows the same development at annual frequency. Ending risks begin to fall around 2016, when the Austrian labour market tightened markedly (Aigner-Walder et al. 2025; see Section 5.6), remain broadly flat in 2020, and decline sharply in 2021. The decline is of similar size among Established workers as in the full sample, so it does not merely reflect a shift in the mix of career types (Appendix Table 12). The improvement appears somewhat earlier among men, but by 2023 the year effects for women and men are nearly identical.

The calendar-time decline is robust to the main modelling choices. Alternative duration grids, spline specifications and designs that cap exposure at fixed maxima place the 2022–2023 estimate between 0.755 and 0.838 (Appendix Table 14). Excluding person-months from 2020 and 2021 leaves it essentially unchanged (Appendix Table 13), as does excluding short episodes followed by relocation to Austria, the cases most exposed to reporting delays in residence (Appendix Table 15), or treating relocation as censoring instead of as a failure (Appendix Table 10). A fixed-horizon cohort comparison points in the same direction once entrant composition is standardised: raw twelve- and twenty-four-month survival differs only modestly across cohorts, but standardised survival is higher for later entrants (Appendix Table 16). Entry selection may still play a role, but changing observed composition does not account for the improvement.

Cross-border employment also appears to adjust to the business cycle, though mainly at the short-duration margin. Between 2014 and 2023, excluding the pandemic years (eight annual changes), annual changes in the entry rate are positively correlated with real GDP growth in Austria (0.68), as are changes in the exit rate from episodes shorter than a year (0.53)[5]. Exits from episodes that have lasted at least a year show no comparable

[5] Rates are entries and exits relative to the average stock of the survival sample. Because episodes ongoing in January 2010 are excluded, this stock builds up over the observation period and initially over-represents recent entries; levels of the rates are therefore not comparable over time, and the correlations refer to year-on-year changes.

association (−0.16). These correlations are descriptive, but they suggest that cyclical adjustment operates mainly through entry and early exits, while the more durable segment is less sensitive to ordinary business-cycle variation.

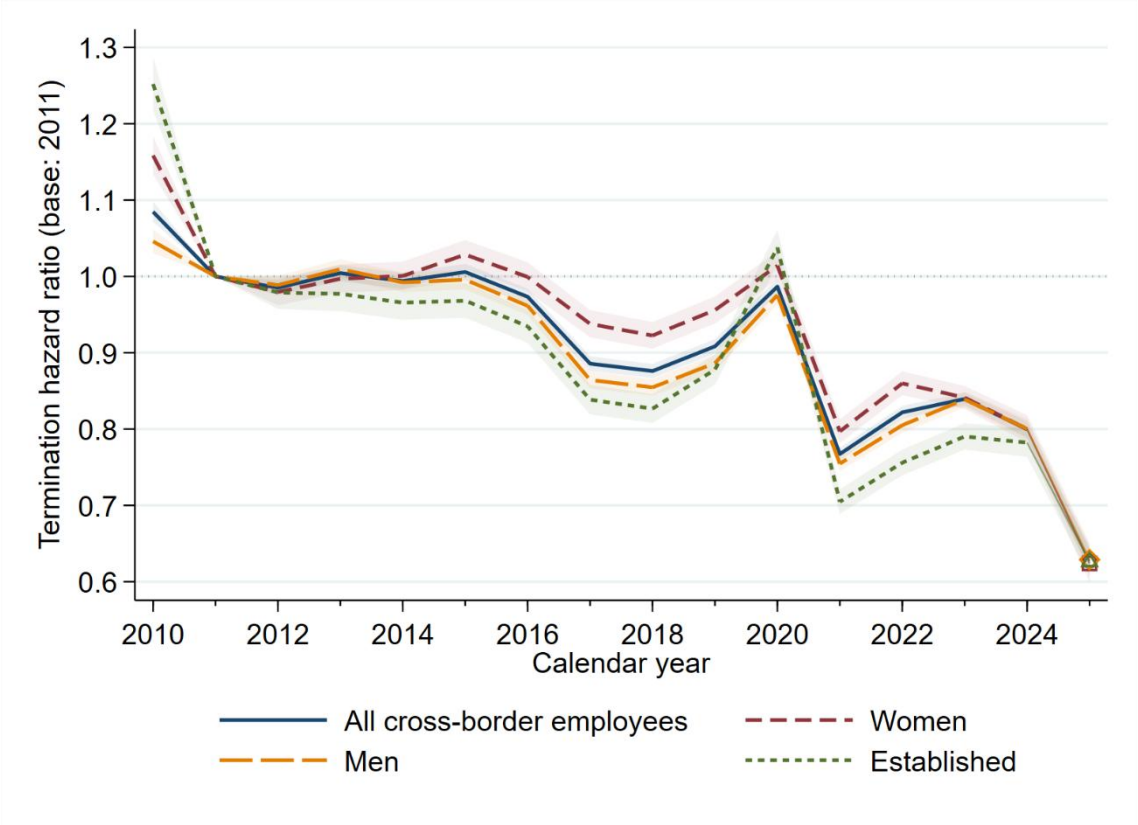


Fig. 4 Year-by-year interruption hazard ratios (base year 2011) for all cross-border employees, Established workers, women and men

Notes: Year-by-year interruption hazard ratios relative to 2011 for all cross-border employees, Established workers, women, and men, based on Tables 12 and 18 in the Appendix. Shaded bands show 95% confidence intervals with standard errors clustered at the person level. Open markers denote 2025, which is downward-biased by right-censoring at the panel end. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

5.4 First-year career structure and later durability

This section examines whether the structure of the first year of employment predicts later durability. The landmark approach used here classifies workers using only information from the first twelve months after first entry and then estimates episode-ending hazards from month thirteen onward. This implies that the sample includes only workers who are in cross-border employment in month twelve after initial entry. The landmark sample comprises 138,742 workers (Table 2). Based on employment during the first twelve months, 75.8% are classified as continuous, defined as being employed in at least eleven of the first twelve months; 20.8% are classified as intermittent, with four to ten months employed; and 3.4% as short, with three months or fewer.

First-year structure strongly predicts later durability. Relative to continuous starters, intermittent starters face a post-landmark episode-ending hazard that is 52.7% higher, and short starters a hazard nearly 2.7 times as high. Under gamma frailty, the corresponding factors rise to 2.183 and 5.366 (Table 8). Persistent worker heterogeneity does not absorb the predictive content of early structure.

The differences also appear in the post-landmark duration profile. Measured by episode duration, the hazard of continuous starters declines modestly before dropping sharply once an episode has lasted twelve months; for intermittent starters, it remains flat or increases. The break after the first year thus reappears in a design that cannot be driven by selection at entry alone. The landmark estimates also reproduce the calendar-time pattern from Section 5.3: the 2022–2023 hazard ratio is 0.785, close to the full-sample estimate of 0.829.

Table 8 Hazard ratios by first-year career shape (landmark sample)

Variable	All (landmark)		Continuous		Intermittent		Short		Gamma frailty	
	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
Episode duration (base: 1–2 months)										
3–5 months	0.804***	(0.007)	0.720***	(0.010)	0.922***	(0.013)	0.774***	(0.019)	0.912***	(0.007)
6–8 months	0.794***	(0.008)	0.670***	(0.010)	1.001	(0.015)	0.454***	(0.020)	0.987	(0.009)
9–12 months	1.071***	(0.013)	0.919***	(0.015)	1.399***	(0.024)	0.402***	(0.026)	1.462***	(0.013)
13–24 months	0.342***	(0.003)	0.350***	(0.004)	0.347***	(0.006)	0.145***	(0.008)	0.511***	(0.005)
25–36 months	0.250***	(0.003)	0.260***	(0.003)	0.237***	(0.005)	0.094***	(0.008)	0.416***	(0.005)
>36 months	0.159***	(0.002)	0.169***	(0.002)	0.135***	(0.003)	0.046***	(0.004)	0.325***	(0.004)
Calendar period (base: 2010–2014)										
2015–2019	0.856***	(0.006)	0.884***	(0.008)	0.862***	(0.009)	0.860***	(0.019)	0.845***	(0.006)
2020	1.010	(0.009)	1.090***	(0.012)	1.005	(0.014)	0.805***	(0.028)	1.039***	(0.010)
2021	0.677***	(0.006)	0.717***	(0.009)	0.675***	(0.010)	0.721***	(0.025)	0.675***	(0.007)
2022–23	0.785***	(0.006)	0.823***	(0.009)	0.803***	(0.010)	0.756***	(0.022)	0.770***	(0.006)
>2023	0.693***	(0.006)	0.727***	(0.008)	0.732***	(0.010)	0.667***	(0.022)	0.688***	(0.006)
First-year career shape (base: Continuous)										
Intermittent	1.527***	(0.009)	—	—	—	—	—	—	2.183***	(0.018)
Short	2.685***	(0.045)	—	—	—	—	—	—	5.366***	(0.096)
Controls										
Female	1.080***	(0.007)	1.073***	(0.008)	1.046***	(0.014)	1.055*	(0.026)	1.002	(0.007)
Current age (base: 35–49)										
<20	1.412***	(0.045)	0.879*	(0.047)	1.493***	(0.102)	1.666***	(0.074)	1.549***	(0.053)
20–24	1.314***	(0.012)	1.475***	(0.017)	1.155***	(0.017)	1.076**	(0.031)	1.501***	(0.016)

Variable	All (landmark)		Continuous		Intermittent		Short		Gamma frailty	
	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
25–34	1.149***	(0.006)	1.253***	(0.009)	1.029**	(0.010)	0.926**	(0.025)	1.250***	(0.008)
50–54	1.079***	(0.009)	1.060***	(0.011)	1.083***	(0.014)	1.044	(0.035)	1.078***	(0.009)
55+	1.289***	(0.011)	1.270***	(0.013)	1.247***	(0.018)	1.257***	(0.047)	1.301***	(0.013)
Baseline hazard per person-month										
Reference cell	0.084***	(0.002)	0.078***	(0.002)	0.131***	(0.004)	0.404***	(0.035)	0.064***	(0.001)
Heterogeneity parameters										
α (gamma variance)	—	—	—	—	—	—	—	—	0.443***	(0.001)
LR test (no frailty)	—	—	—	—	—	—	—	—	$p < 0.001$	
Model statistics										
Workers (landmark)	138,742		105,138		28,873		4,731		138,742	
Post-landmark person-months	6,727,646		5,506,380		1,141,092		80,174		6,727,646	

Notes: Rate ratios from piecewise-constant exponential models estimated on the spell-month panel; the final column adds a shared gamma frailty at the person level. Standard errors clustered at the person level are shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The landmark sample includes workers in entry cohorts 2010–2022 whose first observed Austrian employment was cross-border, not left-censored, and who are in cross-border employment in month twelve (N = 138,742). All estimation months are dated after month twelve; first-year shape is defined using information up to month twelve only. Columns 1–4 additionally control for sector, federal state, and country of residence; the gamma-frailty specification includes duration, calendar period, shape, sex, and age only.

The first-year classification can also be related to the career types of Section 4, which were assigned ex post from full histories (Table 9). To avoid a mechanical overlap with the first-year grouping, the post-landmark classification is based on months 13–36 after first entry only and follows the same broad logic as the typology, with categories adapted to the shorter window. Continuous starters are much more likely to move into Established careers (72%) than intermittent starters (54%) or short starters (18%). Short starters most often exit soon after the landmark (46%) or remain in recurrent employment with gaps (28%). Early structure is therefore informative, but it does not determine later careers: 15% of continuous starters leave shortly after the first year, while more than half of intermittent starters go on to established careers. Moves to residence in Austria are most frequent among intermittent starters (15%). The distribution is similar with a 36-month window and across entry periods, although early exits are somewhat more common among workers who entered in 2020–2022.

Table 9 Career patterns in months 13–36 by first-year employment structure

First-year shape	N	Early exit	Established	Transitional	Recurrent	Mean CBE months	In CBE, month 36
Continuous	102,960	14.9	72.1	10.1	2.9	18.1	63.0
Intermittent	28,138	19.3	54.3	15.2	11.2	13.0	46.3
Short	4,523	46.1	18.0	8.4	27.5	5.4	25.2
All	135,621	16.9	66.6	11.1	5.4	16.6	58.3

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Landmark sample as in Table 8, excluding 3,121 workers who reach age 60 before the end of the window. Career types are assigned from months 13–36 after first cross-border entry with the 24-month fixed-window rules of the typology (Appendix A.1); Established includes repeated episodes separated by gaps of at most four months. Early exit: a single episode of less than 12 months, or no employment in the window. Recurrent: Circular and Flexible careers, combined because the Circular criteria can rarely be met within 24 months. Row percentages except for the last two columns; mean CBE months refer to the 24-month window, and the last column gives the percentage in cross-border employment in month 36.

5.5 Comparison with resident workers

The comparison with resident workers examines how the stability of cross-border employment differs from that of resident employment once episodes are aligned on duration and observable composition. It differs from the main design in one respect: a change of residence does not end an episode. Episodes are instead defined by employment continuity alone and assigned to the cross-border or resident group according to residence in the first month. This removes relocation to Austria as an exit route that applies only to cross-border employees. The comparison proceeds in three stages: all episodes, episodes that have lasted at least three months, and episodes that have lasted at least twelve months. Each stage is estimated with and without coarsened exact matching on age group, sex, workplace region, sector, starting wage (quintiles), and start month and year. Matching uses only information observed at the start of the episode in both groups. Appendix A.2 describes the matching design, and Appendix Table 19 reports the results.

Across all episodes, the monthly ending hazard is 35% higher for cross-border than for resident employees (Figure 5). Twelve months after the start, 25% of cross-border episodes are still ongoing, compared with 35% of resident episodes. Matching reduces the hazard gap to 26%, indicating that observed composition explains a non-trivial part of the difference.

Most of the remaining gap is concentrated at the beginning of an episode. Among episodes that have already lasted three months, the hazard is 19% higher for cross-border employees and 12% higher after matching. Among episodes that have lasted at least a year, the corresponding figures fall to 15% and 8%. In survival terms, the matched

difference at that stage is modest: 24 months after the twelve-month mark, 57.5% of cross-border and 59.7% of resident episodes remain ongoing.

The year 2020 stands out in every comparison stage. After matching, the gap rises to between 22% and 31%, whereas in the surrounding years it is smaller. Outside 2020, the time pattern depends on the stage considered. Across all episodes, the matched gap narrows in the most recent period, from 26% in 2010–2014 to 14% from 2024 onwards.

Among episodes lasting at least a year, the matched difference is indistinguishable from zero in 2010–2014 and lies between 5% and 9% in later periods. Because the gap changes little over time, the decline documented in Section 5.3 is not specific to cross-border workers: ending risks fall in both groups, somewhat more for cross-border workers among shorter episodes and somewhat less among episodes lasting at least a year.

These results are not sensitive to the matching details or to the treatment of prior Austrian residence (Table 19 in the Appendix, Panel C). Coarser bins for start date, wages and age reduce the share of unmatched cross-border episodes from 8–18% to 1–3% and change the estimated gaps by at most 0.03. Retaining workers with Austrian residence before their first observed cross-border episode increases the matched gaps by up to 4.4 percentage points, most in 2020, but leaves the pattern across stages and periods unchanged.

The remaining gap cannot be attributed to residence status as such. It may reflect characteristics the data do not record, such as occupation, working hours or contract type, the selection of workers who commute instead of migrating, or outside options in the country of residence. The peak in 2020 coincides with border controls and quarantine rules during the pandemic, but the data do not allow this explanation to be tested.

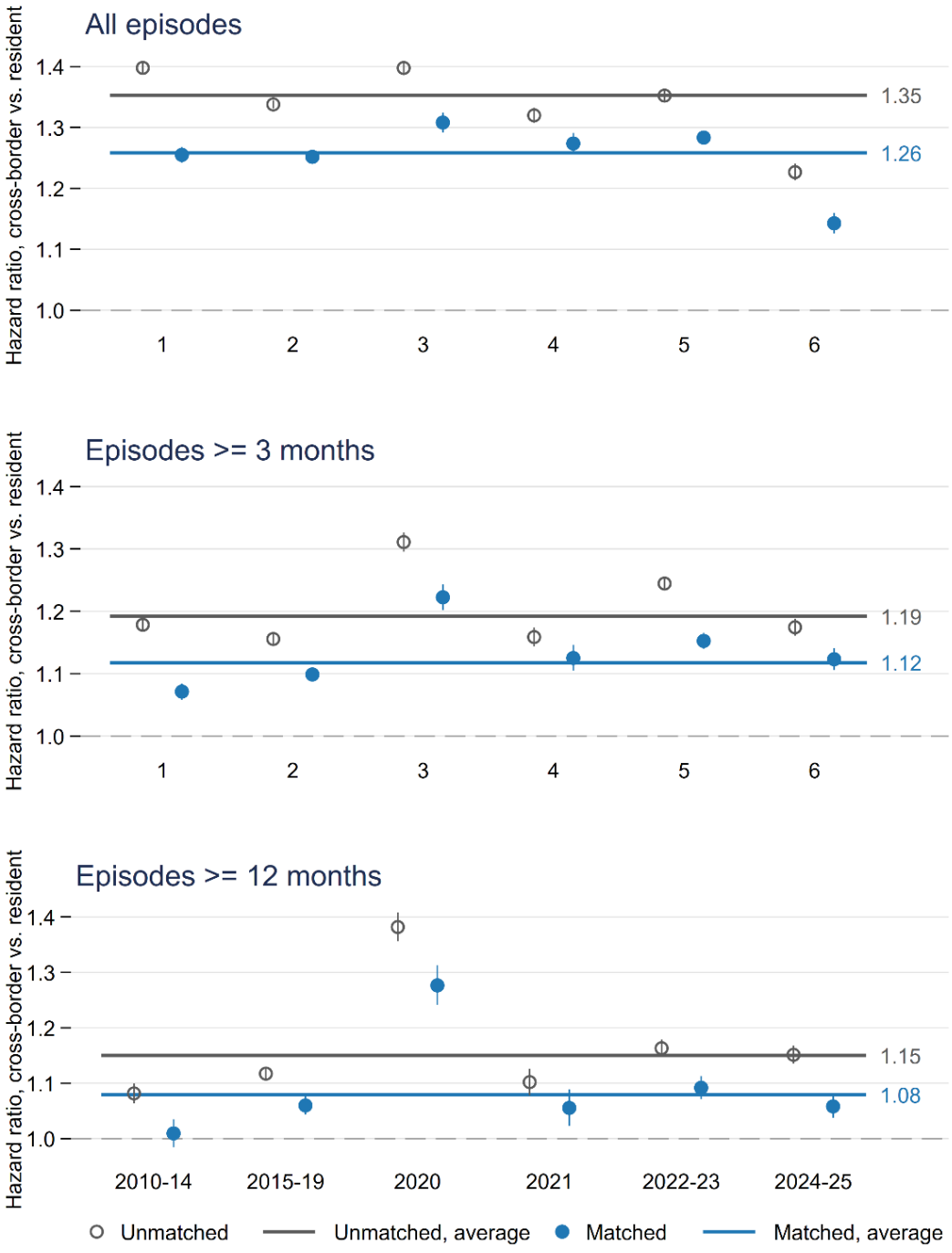


Fig. 5 Episode-ending hazard of cross-border relative to resident employees by stage, matching and calendar period

Notes: Incidence rate ratios with 95% confidence intervals from Poisson models (Appendix A.2); values above 1 indicate a higher hazard for cross-border episodes. Matched estimates use coarsened exact matching on sex, age, federal state of workplace, sector, starting wage and start month and year. Solid lines show the average ratio from a model without period interaction. Estimates are reported in Table 19 in the Appendix. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

5.6 Interpretation

The results do not provide a causal test of the mechanisms set out in Section 2, but they allow a partial assessment of each.

Composition: Employment time is highly concentrated across workers (Section 4.2), and much of this concentration is visible after the first year. Over the two years after the landmark, workers with a continuous first year are employed for 18.1 months on average, intermittent starters for 13.0 months and short starters for 5.4 months (Table 9); an entrant who remains employed through the first year thus contributes more than three times as much cross-border employment over the following two years as one whose first year is short.

Matching and selection: The sharp drop in ending risks after twelve months is consistent with a matching process in which the quality of an employment relationship becomes clearer during the first year. It is also consistent with the early exit of short seasonal or otherwise temporary attachments. The data do not show how much of the within-first-year decline reflects stabilising matches and how much reflects the exit of workers with high separation propensities (Section 2.2). The post-twelve-month break appears regardless of how persistent heterogeneity is modelled.

Segmentation: Cross-border workers are overrepresented among short attachments, which is consistent with segmentation at entry. Among episodes that survive the first year and are matched on observable characteristics, however, the remaining difference to resident employment is small (Section 5.5). On the stability margin, the segmentation interpretation fits the entry phase better than the durable part of cross-border employment.

Frictions and demand: The time patterns point to more than one mechanism. The decline in interruptions is shared with resident workers and begins around the period in which the Austrian labour market tightened (Aigner-Walder et al. 2025); employers facing recruitment difficulties have stronger incentives to retain workers or to rehire them quickly. The decline in relocation to Austria is specific to cross-border workers: between 2010–2014 and 2022–2023, the relocation hazard falls by about 40%, compared with 14% for employment exit (Appendix Table 10), so foreign-resident employment has become more persistent relative to relocation, although the data do not reveal why. As a rough benchmark, a 17% lower monthly ending hazard implies an expected duration about one fifth longer under a constant hazard; with the observed duration dependence this is only

an approximation, but it indicates the order of magnitude of the increase in employment time supplied per episode.

6. Conclusions

Cross-border labour supply in Austria is not well described by a single model of temporary, weakly attached employment. It combines a large short-term margin with a durable core, and the two differ in the respects that matter for labour supply: the first dominates entries and accounts for most of the difference to resident employment; the second dominates employment time and, once an episode has lasted a year and is compared with matched resident episodes, is nearly as stable as resident employment. The first year is the hinge between the two.

Three implications follow for labour-supply assessment. First, entrant numbers are informative only together with the distribution of entrants across first-year patterns. Because trajectories diverge within the first year, projection and microsimulation models (Horvath et al. 2024, 2025) can condition on early career structure rather than on headcounts alone. Second, the recent gain in continuity is shared with resident workers and coincides with a tight labour market; projections that extrapolate it could overstate future labour supply from abroad if labour-market conditions normalise.

Third, relocation to Austria has become less frequent relative to continued foreign residence, so a growing part of labour supply from abroad remains tied to residence outside Austria, with consequences for regional labour markets and integration policy on both sides of the border.

The patterns are likely to be relevant beyond Austria. Other destination countries with large cross-border inflows, such as Luxembourg, Switzerland or Germany, face the same question of how much of this labour supply is lasting. In regions of origin such as Western Hungary, where about 6% of the population aged 15–64 works in Austria, the durability of these jobs is itself a labour-market issue.

The analysis is descriptive, and the data do not record commuting frequency, employment in the countries of residence, or job characteristics beyond employment stability. Whether the break after the first year reflects matches that stabilise or workers who differ from the start cannot be settled here; it would require richer information on job characteristics or multiple-spell designs. Further work could follow workers' labour-market trajectories

outside Austria, extend the analysis to job quality, and use the staged opening of the Austrian labour market to assess how institutional and labour-market conditions shape the changes observed over time.

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Appendix

A.1 Career-type classification

Cross-border employees are classified into five mutually exclusive types using the number and duration of employment episodes, the length of gaps between episodes, the share of observed employment time spent in cross-border status, and the residence trajectory. Types are assigned sequentially in the following order:

1. Transitional: at least one Austrian-residence employment episode begins after the first cross-border episode, and the total number of residence transitions between Austria and abroad is below three.

2. Trial: one cross-border episode lasting less than twelve months.

3. Established: near-continuous attachment, defined by any of the following:

(i) one cross-border episode lasting at least 24 months;

(ii) multiple episodes with a maximum inter-episode gap of at most four months; or

(iii) at least 90% of all observed employment months spent in cross-border status, combined with more than twelve months of total cross-border employment.

4. Circular:

(i) at least three residence transitions between Austria and abroad,

(ii) or at least four substantive gaps between episodes with a mean gap length between three and ten months,

(iii) or at least two substantive gaps with a coefficient of variation of gap length not exceeding 0.35 and a mean gap length between two and nine months.

5. Flexible: all remaining workers, i.e. multi-episode histories with irregular gaps that meet none of the above conditions.

The coefficient of variation in 4 (iii) separates a recurring interruption rhythm from irregular re-entry: at a threshold of 0.35 and with two gaps, the two gap lengths may differ by at most about half their mean, so gaps of four and six months qualify while gaps of two and four do not. The dispersion is computed with the sample standard deviation, which makes the criterion stricter for workers with exactly two gaps than for those with more. Varying the threshold between 0.20 and 0.75 changes the Circular share only between 7.9% and 8.4% and leaves the Established share unchanged (Appendix Table 20). The table also reports other sensitivity checks of the classification: threshold variations, fixed classification windows and alternative assignment orders.

A.2 Resident benchmark: episodes, matching and estimation

Episodes and groups. For the comparison in Section 5.5, an employment episode is a sequence of consecutive months of dependent employment in Austria; a month without employment ends the episode. Unlike in the main survival analysis, a change of residence does not end an episode. Each episode is assigned to the cross-border or resident group according to residence in its first month, and the assignment is not revised later. Relocation to Austria is thus not an exit route, and no exit route applies to one group only. An episode fails in its last month of employment if this month lies before December 2025; episodes still ongoing in December 2025 are right-censored, and all episodes are censored when the worker reaches age 60 to exclude transitions into retirement.

Samples. The cross-border group consists of episodes that begin with residence abroad among workers with at least one month of cross-border employment. As in the main survival sample, workers with recorded residence in Austria before their first cross-border episode are excluded. The resident group consists of episodes that begin with residence in Austria in a 20% random sample of dependent employees. In both groups, episodes already ongoing in January 2010 (left-censored) and episodes starting after December 2023 are excluded, as are episodes whose first month is an apprenticeship, since apprenticeships follow a fixed contract duration and are rare among cross-border workers. The exclusion of apprenticeships removes 112,471 resident and 2,869 cross-border episodes.

Stages. The comparison is made at three stages: all episodes; episodes that have lasted at least three months; and episodes that have lasted at least twelve months. At each stage, only months after the landmark (from month 1, 4 or 13 of the episode) enter the analysis. An episode belongs to a stage if it has at least one month at risk after that stage's landmark. Survival is measured from the landmark.

Matching. Within each stage, cross-border and resident episodes are matched by coarsened exact matching on characteristics measured in the first month of the episode: sex; age (below 25, 25–34, 35–44, 45–54, 55 and over); federal state of the workplace (nine states and a category for unknown); sector (production, NACE 01–39; construction, 41–43; retail, 45–47; tourism, 55–56; business services, 49–53 and 58–82; public and social services, 84–88; other services, 90–99; and a category for missing); quintile of the monthly gross wage, computed on the pooled stage sample, with a separate category for

missing wages; and calendar month and year of the episode start. Strata that contain episodes of only one group are dropped. This affects 7.9%, 10.0% and 17.8% of cross-border episodes at the three stages. In the remaining strata, cross-border episodes receive a weight of one and resident episodes a weight of $(m_{c,s} / m_{r,s}) \times (M_r / M_c)$, where $m_{c,s}$ and $m_{r,s}$ are the numbers of cross-border and resident episodes in stratum s and M_c and M_r the corresponding totals across matched strata. After weighting, the resident distribution over strata equals that of the matched cross-border episodes. Table 21 in the Appendix reports the distribution of all matching variables by group before matching.

Employment history before the episode is not used for matching. Employment abroad is not recorded in the data, so a commuter with long foreign work experience and a resident labour-market entrant would both appear to have no prior employment. Matching on this variable would compare very different workers.

Estimation. For each stage, with and without matching weights, a Poisson model is estimated for the monthly indicator that an episode ends, pooling both groups. The model includes an indicator for cross-border episodes interacted with calendar period (2010–2014, 2015–2019, 2020, 2021, 2022–2023, 2024–2025), piecewise-constant duration intervals whose first interval starts at the stage's landmark, sex, six groups of current age, federal state of workplace and sector. The cross-border main effect gives the gap in 2010–2014; gaps in later periods are obtained as linear combinations of the main effect and the respective interaction. A second model without the interaction gives the average gap. Standard errors are clustered at the person level. Kaplan–Meier survival is computed as a life-table estimate from the person-month data, weighted in the matched samples.

Robustness. Two variants are estimated. The first uses coarser matching bins: start quarter instead of start month, wage terciles and four age groups. It reduces the share of unmatched cross-border episodes to 1.1%, 1.3% and 3.2%, and changes the estimated gaps by at most 0.03. The second retains workers with Austrian residence before their first cross-border episode. The matched gaps are up to 4.5 percentage points larger (most in 2020), the unmatched gaps up to 10 points; the pattern across stages and periods is unchanged. In the matched sample of episodes lasting at least a year, the gap in 2010–2014 is 1.024 (s.e. 0.013).

A.3 Appendix tables

Table 10 Competing destination states — exit from Austrian employment versus relocation to Austria

	Employment exit	Relocation to Austria	Still employed in AT
Panel A: cumulative incidence by elapsed duration			
After 1 month	0.224	0.024	0.752
After 3 months	0.422	0.045	0.533
After 6 months	0.590	0.062	0.348
After 12 months	0.720	0.078	0.202
After 24 months	0.775	0.088	0.137
After 36 months	0.801	0.093	0.106
After 60 months	0.829	0.098	0.073
Share of all episode endings	89.4%	10.6%	—
Panel B: cause-specific hazard ratios			
	Pooled	Employment exit	Relocation to Austria
Duration 3–5 months	0.750	0.759	0.676
Duration 6–8 months	0.541	0.533	0.617
Duration 9–12 months	0.503	0.505	0.488
Duration 13–24 months	0.192	0.179	0.310
Duration 25–36 months	0.132	0.122	0.231
Duration >36 months	0.079	0.072	0.151
Calendar 2015–2019	0.923	0.936	0.831
Calendar 2020	0.984	1.032	0.653
Calendar 2021	0.765	0.781	0.660
Calendar 2022–23	0.829	0.862	0.610
Calendar >2023	0.757	0.816	0.434
Baseline hazard per person-month	0.180	0.145	0.032

Notes: Panel A reports Aalen–Johansen cumulative incidence for employment exit, relocation to Austria, and continued employment in Austria. An episode ending is classified as relocation if Austrian-resident employment begins within one empty month after the cross-border episode ends. Panel B reports piecewise-constant exponential models on the same spell-month panel, with controls as in Table 7; in the cause-specific columns, the alternative destination is treated as censoring. Standard errors are clustered at the person level and are 0.006 or smaller throughout. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

Table 11 Re-entry into cross-border employment – employment gaps and shares of permanent endings

	Share of endings	N
Panel A: gap between an ending and the next cross-border episode		
1 month	14.6%	147,184
2–3 months	15.7%	158,171
4–6 months	9.3%	93,932
7–12 months	11.3%	113,908
13–24 months	4.8%	48,229
More than 24 months	5.5%	55,309
No return at all	38.9%	393,406
All endings	100.0%	1,010,139
Panel B: share of endings that are permanent, by episode length		
1–2 months	56.9%	403,576
3–5 months	44.2%	253,235
6–8 months	39.6%	110,269
9–12 months	31.1%	92,653
13–24 months	52.2%	70,157
25–36 months	55.6%	32,169
More than 36 months	59.1%	48,080
Panel C: share of endings that are permanent, by calendar period of the ending		
2010–2014	48.3%	248,083
2015–2019	48.9%	352,832
2020	46.8%	86,899
2021	49.9%	73,553
2022–2023	50.5%	203,379
2024 onwards	53.9%	45,393
Panel D: share of endings that are permanent, by destination state		
Exit from Austrian employment	46.4%	903,107
Relocation to Austria	72.6%	107,032

Notes: An ending is classified as permanent if no further cross-border episode begins within twelve months; otherwise it is treated as an interruption. Gaps are measured across all cross-border episodes of a worker, including episodes beginning after 2023, so the admission window in Table 2 affects which episodes enter the analysis but not which count as returns. In Panel B, episode length refers to the realised length of the episode that ends. Destination states in Panel D are defined as in Table 10. The final row of Panel C is based on relatively few endings. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

Table 12 Year-by-year interruption hazard ratios (base year 2011), by career type

	Trial		Circ.		Estab.		Trans.		Flex.	
	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
Episode duration (base: 1–2 months)										
3–5 months	0.821***	(0.004)	0.968***	(0.007)	0.786***	(0.005)	0.944***	(0.007)	0.792***	(0.006)
6–8 months	0.904***	(0.007)	0.928***	(0.008)	0.573***	(0.004)	0.661***	(0.006)	0.468***	(0.007)
9–12 months	1.494***	(0.010)	1.080***	(0.012)	0.618***	(0.006)	0.599***	(0.007)	0.411***	(0.006)
13–24 months	-	-	0.327***	(0.004)	0.304***	(0.002)	0.302***	(0.003)	0.136***	(0.004)
25–36 months	-	-	0.241***	(0.004)	0.218***	(0.002)	0.225***	(0.003)	0.075***	(0.004)
>36 months	-	-	0.173***	(0.003)	0.135***	(0.001)	0.172***	(0.002)	0.047***	(0.002)
Year (base: 2011)										
2010	0.942***	(0.012)	1.098***	(0.014)	1.253***	(0.018)	1.091***	(0.016)	0.976	(0.013)
2011	1.000	-	1.000	-	1.000	-	1.000	-	1.000	-
2012	0.973*	(0.011)	1.004	(0.010)	0.979	(0.011)	0.973*	(0.012)	1.024*	(0.012)
2013	0.989	(0.011)	1.014	(0.011)	0.978	(0.012)	1.027*	(0.013)	0.998	(0.011)
2014	0.957***	(0.011)	1.027*	(0.011)	0.966**	(0.012)	1.022	(0.013)	0.974*	(0.011)
2015	0.998	(0.011)	1.011	(0.011)	0.969**	(0.012)	1.043***	(0.013)	0.998	(0.011)
2016	0.967**	(0.011)	0.958***	(0.011)	0.936***	(0.011)	1.052***	(0.013)	0.969**	(0.012)
2017	0.923***	(0.011)	0.881***	(0.010)	0.839***	(0.010)	0.968*	(0.012)	0.889***	(0.011)
2018	0.918***	(0.010)	0.858***	(0.010)	0.827***	(0.010)	0.957***	(0.012)	0.867***	(0.010)
2019	0.917***	(0.010)	0.935***	(0.010)	0.878***	(0.010)	0.924***	(0.012)	0.873***	(0.010)
2020	0.981	(0.011)	1.010	(0.011)	1.038***	(0.011)	1.108***	(0.014)	0.899***	(0.011)
2021	0.836***	(0.009)	0.754***	(0.009)	0.705***	(0.008)	0.904***	(0.012)	0.773***	(0.010)
2022	0.863***	(0.009)	0.830***	(0.009)	0.756***	(0.009)	0.933***	(0.011)	0.829***	(0.009)
2023	0.837***	(0.008)	0.867***	(0.010)	0.791***	(0.009)	1.026*	(0.012)	0.826***	(0.009)
2024	0.844***	(0.012)	0.724***	(0.011)	0.783***	(0.010)	1.106***	(0.017)	0.761***	(0.014)
2025	-	-	0.430***	(0.016)	0.626***	(0.010)	1.036	(0.029)	0.472***	(0.039)
Observations										
N-Episodes	163,921		237,702		373,597		181,813		120,484	
N-Failures	163,921		233,787		314,227		178,672		119,532	
N-Employees	163,921		47,805		176,065		95,567		53,880	
N-Spellmonths	450,374		1,715,779		9,291,759		1,742,850		394,053	

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Cells report hazard ratios from piecewise-constant exponential models estimated separately by career type; standard errors clustered at the person level are shown in parentheses. Subsamples are defined by realised employment histories. Entries marked — are not identified by construction.

Table 13 Hazard ratios from proportional hazard rate estimations — all cross-border employees, alternative specifications

Variable	All		Episodes ≥ 2 months		Excl. 2020–2021		Change duration base		No re-entry within 12 months	
	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)	Estimate	(SE)
Episode duration (base: 1–2 months)										
3–5 mon.	0.750***	(0.002)	1.847***	(0.007)	0.746***	(0.002)	0.811***	(0.003)	0.597***	(0.002)
6–8 mon.	0.541***	(0.002)	1.380***	(0.007)	0.538***	(0.002)	0.581***	(0.002)	0.388***	(0.002)
9–12 mon.	0.503***	(0.003)	1.293***	(0.008)	0.505***	(0.003)	0.540***	(0.003)	0.278***	(0.002)
13–24 mon.	0.192***	(0.001)	0.499***	(0.003)	0.186***	(0.001)	0.206***	(0.001)	0.177***	(0.001)
25–36 mon.	0.132***	(0.001)	0.347***	(0.002)	0.127***	(0.001)	0.142***	(0.001)	0.130***	(0.001)
>36 mon.	0.079***	(0.000)	0.210***	(0.001)	0.074***	(0.000)	0.085***	(0.001)	0.084***	(0.001)
Calendar period (base: 2010–2014)										
2015–2019	0.923***	(0.002)	0.922***	(0.003)	0.927***	(0.002)	0.921***	(0.002)	0.983***	(0.004)
2020	0.984***	(0.004)	1.053***	(0.005)			0.980***	(0.004)	1.016***	(0.006)
2021	0.765***	(0.003)	0.770***	(0.004)			0.763***	(0.003)	0.850***	(0.005)
2022–23	0.829***	(0.003)	0.842***	(0.003)	0.833***	(0.003)	0.826***	(0.003)	0.915***	(0.004)
>2023	0.757***	(0.004)	0.772***	(0.004)	0.776***	(0.004)	0.748***	(0.004)	0.898***	(0.007)
Controls										
Female (base: male)	1.069***	(0.003)	1.038***	(0.003)	1.068***	(0.003)	1.071***	(0.003)	1.136***	(0.004)
Current age (base: 35–49)										
<20	2.036***	(0.014)	1.765***	(0.019)	2.009***	(0.014)	2.082***	(0.014)	2.470***	(0.021)
20–24	1.315***	(0.004)	1.315***	(0.005)	1.312***	(0.005)	1.321***	(0.005)	1.642***	(0.008)
25–34	1.067***	(0.003)	1.097***	(0.003)	1.062***	(0.003)	1.067***	(0.003)	1.249***	(0.005)
50–54	1.113***	(0.004)	1.101***	(0.005)	1.117***	(0.005)	1.114***	(0.004)	1.017***	(0.006)
55+	1.368***	(0.006)	1.320***	(0.006)	1.365***	(0.006)	1.372***	(0.006)	1.332***	(0.008)
Baseline hazard per person-month										
_cons	0.180***	(0.001)	0.057***	(0.000)	0.184***	(0.001)	0.168***	(0.001)	0.133***	(0.001)
Model statistics										
N-Employees	537,238		428,530		502,578		537,238		537,238	
N-Failures	1,010,139		743,027		849,687		1,010,139		496,944	

Notes: Piecewise-constant exponential models with standard errors clustered at the person level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column 1 repeats the baseline specification of Table 7. Column 2 excludes one-month episodes. Column 3 excludes person-months in 2020–2021. Column 4 widens the duration reference category from 1–2 to 1–3 months, so the first reported interval is 4–5 months. Column 5 counts only departures without a return to cross-border employment within twelve months as failures; earlier returns are censored at episode end. Additional controls are as in Table 7.

Table 14 Calendar-time estimates under alternative specifications

Specification	2015–2019	2020	2021	2022–23	>2023	Person-months
Panel A: duration grid						
Seven intervals (as in Table 6)	0.923	0.984	0.765	0.829	0.757	13,594,815
Single months to 24, grouped thereafter	0.925	0.995	0.772	0.838	0.798	13,594,815
Open-ended interval split into five	0.922	0.987	0.768	0.834	0.780	13,594,815
Restricted cubic spline, five knots	0.924	0.987	0.771	0.838	0.795	13,594,815
Panel B: closed duration range						
Exposure capped at 24 months	0.925	0.951	0.767	0.832	0.785	8,024,538
Exposure capped at 36 months	0.924	0.963	0.767	0.816	0.833	8,689,256
Exposure capped at 48 months	0.923	0.973	0.766	0.755	0.782	8,700,856
Exposure capped at 60 months	0.921	0.977	0.597	0.756	0.734	8,405,044

Notes: Hazard ratios relative to 2010–2014 from piecewise-constant exponential models on the spell-month panel. Controls are as in Table 7. Panel A varies the representation of elapsed duration. Panel B truncates exposure at the stated maximum duration and includes only episodes that could in principle reach that duration; truncation is treated as censoring. Standard errors are clustered at the person level and are 0.006 or smaller except in the post-2023 column. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

Table 15 Robustness to reporting delays — excluding episodes that end in a rapid relocation to Austria

Specification	3–5 m	13–24 m	>36 m	2015–19	2020	2021	2022–23	Failures
Panel A: main specification (Table 6, column 1)								
Baseline	0.750	0.192	0.079	0.923	0.984	0.765	0.829	1,010,139
Panel B: excluding episodes that end in a rapid relocation to Austria								
No relocation within 1 month	0.766	0.185	0.072	0.904	0.975	0.738	0.801	911,275
No relocation within 2 months	0.764	0.184	0.072	0.903	0.975	0.738	0.801	903,107
No relocation within 3 months	0.759	0.183	0.071	0.902	0.975	0.737	0.800	895,696
No relocation at all	0.751	0.181	0.071	0.900	0.974	0.737	0.801	863,597

Notes: Piecewise-constant exponential models with standard errors clustered at the person level. Hazard ratios are relative to the 1–2 month duration interval and to 2010–2014. Panel A reproduces the baseline model from Table 7. In Panel B, episodes are excluded if Austrian-resident employment begins within the stated number of months after the episode ends, removing cases in which a recorded residence change may reflect reporting delay rather than a genuine transition out of cross-border status. The threshold varies from one to three months; the final row excludes all episodes followed by any Austrian-resident spell. Controls are as in Table 7.

Table 16 Survival of entry cohorts at fixed horizons, raw and standardised for composition

Entry cohort	Episodes	Raw	Duration and cohort only	+ sex and age	+ country of residence	+ sector and state
Panel A: still in cross-border employment after 12 months						
2010	37,070	0.174	0.177	0.178	0.176	0.175
2011	56,045	0.211	0.203	0.201	0.195	0.196
2012	63,141	0.194	0.193	0.190	0.181	0.181
2013	67,558	0.191	0.188	0.186	0.178	0.178
2014	67,940	0.189	0.185	0.182	0.181	0.180
2015	71,072	0.183	0.177	0.175	0.174	0.175
2016	70,874	0.202	0.202	0.199	0.189	0.188
2017	77,625	0.237	0.237	0.235	0.227	0.224
2018	81,942	0.225	0.227	0.226	0.221	0.219
2019	88,443	0.186	0.192	0.193	0.192	0.191
2020	85,178	0.264	0.250	0.247	0.245	0.240
2021	88,482	0.247	0.251	0.253	0.260	0.259
2022	110,699	0.214	0.220	0.225	0.237	0.242
2023	111,448	0.205	0.212	0.219	0.232	0.237
Panel B: still in cross-border employment after 24 months						
2010	37,070	0.113	0.113	0.114	0.113	0.112
2011	56,045	0.142	0.135	0.134	0.129	0.129
2012	63,141	0.129	0.127	0.125	0.117	0.117
2013	67,558	0.128	0.123	0.121	0.115	0.114
2014	67,940	0.127	0.121	0.119	0.117	0.116
2015	71,072	0.124	0.116	0.114	0.113	0.113
2016	70,874	0.141	0.136	0.134	0.126	0.125
2017	77,625	0.165	0.164	0.162	0.156	0.153
2018	81,942	0.140	0.149	0.147	0.144	0.142
2019	88,443	0.119	0.123	0.124	0.123	0.122
2020	85,178	0.186	0.174	0.173	0.171	0.168
2021	88,482	0.165	0.171	0.173	0.178	0.179
2022	110,699	0.136	0.144	0.149	0.158	0.163
2023	111,448	0.133	0.140	0.144	0.155	0.160
Panel C: still in cross-border employment after 36 months						
2010	37,070	0.083	0.085	0.086	0.085	0.084
2011	56,045	0.110	0.104	0.103	0.100	0.100
2012	63,141	0.099	0.097	0.095	0.090	0.090
2013	67,558	0.098	0.094	0.093	0.088	0.088
2014	67,940	0.099	0.092	0.091	0.091	0.090
2015	71,072	0.097	0.088	0.087	0.087	0.087
2016	70,874	0.111	0.106	0.104	0.098	0.097
2017	77,625	0.121	0.126	0.125	0.121	0.118
2018	81,942	0.106	0.114	0.114	0.112	0.110
2019	88,443	0.094	0.095	0.095	0.096	0.095
2020	85,178	0.145	0.137	0.136	0.136	0.134
2021	88,482	0.123	0.132	0.134	0.140	0.141

Entry cohort	Episodes	Raw	Duration and cohort only	+ sex and age	+ country of residence	+ sector and state
2022	110,699	0.103	0.111	0.115	0.124	0.129

Notes: Share of entering episodes still in cross-border employment at the stated horizon. Only cohorts able to reach the horizon are included. The Raw column reports the non-parametric survivor function. The remaining columns report survival standardised by g-computation from a discrete-time hazard model with single-month duration indicators, cohort indicators, and the listed covariates; each cohort's survival is recomputed under the pooled covariate distribution. Covariate blocks are cumulative from left to right. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

Table 17 Hazard ratios when only permanent departures count as failures

Duration cap and failure definition	3–5 m	6–8 m	13–24 m	>36 m	2015–19	2022–23	Failures
Panel A: full exposure, failure defined by the length of the re-entry window							
Any ending (as in Table 6)	0.750	0.541	0.192	0.079	0.923	0.829	1,010,139
No return within 3 months	0.650	0.484	0.165	0.073	0.913	0.819	704,784
No return within 6 months	0.637	0.360	0.159	0.072	0.941	0.857	610,852
No return within 12 months	0.597	0.388	0.177	0.084	0.983	0.915	496,944
No return within 24 months	0.595	0.389	0.178	0.085	0.990	0.929	448,715
Panel B: identical exposure, truncated so that every ending has a full window							
Any ending, 6-month window	0.749	0.541	0.192	0.080	0.923	0.828	1,006,315
No return within 6 months	0.636	0.360	0.158	0.073	0.941	0.856	607,730
Any ending, 12-month window	0.749	0.540	0.191	0.081	0.922	0.828	999,976
No return within 12 months	0.597	0.388	0.176	0.085	0.982	0.915	490,071
Panel C: identical exposure and a closed duration range, 12-month window							
Any ending, cap 24 months	0.743	0.536	0.188	n.a.	0.926	0.813	840,211
No return within 12 months	0.592	0.380	0.172	n.a.	0.983	0.919	405,834
Any ending, cap 36 months	0.729	0.537	0.185	n.a.	0.925	0.751	770,903
No return within 12 months	0.582	0.375	0.169	n.a.	0.983	0.878	372,066
Any ending, cap 60 months	0.724	0.534	0.177	0.098	0.922	0.764	641,175
No return within 12 months	0.574	0.370	0.161	0.100	0.981	0.896	313,170

Notes: Hazard ratios from piecewise-constant exponential models, relative to the 1–2 month duration interval and to 2010–2014, with controls as in Table 7 and standard errors clustered at the person level. Under the re-entry definitions, episodes followed by a return within the stated window are censored at episode end, so only the number of failures changes. Panel A uses the full exposure, so late endings may not have a complete re-entry window. Panels B and C truncate exposure at December 2024 so that each ending has a full return window; within each pair of rows, the sample is identical. Panel C additionally caps elapsed duration, so the interval above 36 months is not reached under the 24- and 36-month caps. Reference-cell hazards in Panel A are 0.180, 0.179, 0.167, 0.133, and 0.124 per person-month.

Table 18 Year-by-year interruption hazard ratios by sex and the Established type (base year 2011)

	All		Women		Men		Established	
	Estimate	**(SE)**	**Estimate**	**(SE)**	**Estimate**	**(SE)**	**Estimate**	**(SE)**
Episode duration (base: 1–2 months)								
3–5 months	0.750***	(0.002)	0.843***	(0.005)	0.714***	(0.003)	0.786***	(0.005)
6–8 months	0.541***	(0.002)	0.529***	(0.004)	0.552***	(0.003)	0.573***	(0.004)
9–12 months	0.503***	(0.003)	0.351***	(0.004)	0.571***	(0.004)	0.618***	(0.006)
13–24 months	0.193***	(0.001)	0.177***	(0.002)	0.203***	(0.001)	0.304***	(0.002)
25–36 months	0.134***	(0.001)	0.132***	(0.002)	0.138***	(0.001)	0.218***	(0.002)
>36 months	0.081***	(0.000)	0.086***	(0.001)	0.080***	(0.001)	0.135***	(0.001)
Year (base: 2011)								
2010	1.085***	(0.007)	1.159***	(0.013)	1.047***	(0.008)	1.253***	(0.018)
2011	1.000	-	1.000	-	1.000	-	1.000	-
2012	0.985**	(0.005)	0.979*	(0.009)	0.989	(0.006)	0.979	(0.011)
2013	1.005	(0.005)	0.997	(0.009)	1.010	(0.006)	0.978	(0.012)
2014	0.995	(0.005)	1.002	(0.009)	0.994	(0.006)	0.966**	(0.012)
2015	1.009	(0.005)	1.031**	(0.010)	0.999	(0.006)	0.969**	(0.012)
2016	0.975***	(0.005)	1.001	(0.010)	0.963***	(0.006)	0.936***	(0.011)
2017	0.886***	(0.005)	0.938***	(0.009)	0.865***	(0.006)	0.839***	(0.010)
2018	0.876***	(0.005)	0.923***	(0.009)	0.855***	(0.006)	0.827***	(0.010)
2019	0.908***	(0.005)	0.956***	(0.009)	0.886***	(0.006)	0.878***	(0.010)
2020	0.986**	(0.005)	1.013	(0.009)	0.976***	(0.006)	1.038***	(0.011)
2021	0.766***	(0.004)	0.796***	(0.008)	0.754***	(0.005)	0.705***	(0.008)
2022	0.821***	(0.004)	0.859***	(0.008)	0.805***	(0.005)	0.756***	(0.009)
2023	0.839***	(0.004)	0.841***	(0.008)	0.839***	(0.005)	0.791***	(0.009)
2024	0.800***	(0.005)	0.800***	(0.009)	0.801***	(0.007)	0.783***	(0.010)
2025	0.627***	(0.007)	0.624***	(0.013)	0.629***	(0.009)	0.626***	(0.010)
Observations								
N Episodes	1,077,517		330,312		747,205		373,597	
N Failures	1,010,139		310,538		699,601		314,227	

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. Cells report hazard ratios from piecewise-constant exponential models with single-year calendar indicators; standard errors clustered at the person level are shown in parentheses. The specification is otherwise identical to column 1 of Table 7. Additional controls are sex (except in the sex-specific columns), age group, sector, federal state, and country of residence.

Table 19 Episode-ending hazard of cross-border relative to resident employees by stage and matching

Panel A: Incidence rate ratios, cross-border relative to resident episodes

Stage	Matching	Average	2010–14	2015–19	2020	2021	2022–23	2024–25
All episodes	no	1.353	1.398	1.338	1.398	1.320	1.352	1.227
		(0.002)	(0.004)	(0.003)	(0.006)	(0.006)	(0.004)	(0.007)
	yes	1.258	1.255	1.252	1.308	1.274	1.283	1.143
		(0.003)	(0.007)	(0.005)	(0.008)	(0.009)	(0.005)	(0.008)
≥ 3 months	no	1.192	1.178	1.156	1.311	1.159	1.245	1.174
		(0.003)	(0.005)	(0.004)	(0.008)	(0.008)	(0.005)	(0.007)
	yes	1.118	1.071	1.099	1.222	1.125	1.153	1.123
		(0.004)	(0.007)	(0.005)	(0.010)	(0.010)	(0.007)	(0.009)
≥ 12 months	no	1.150	1.082	1.117	1.382	1.102	1.163	1.151
		(0.004)	(0.009)	(0.006)	(0.013)	(0.012)	(0.008)	(0.008)
	yes	1.079	1.009	1.060	1.277	1.055	1.092	1.058
		(0.005)	(0.013)	(0.008)	(0.018)	(0.017)	(0.011)	(0.011)

Panel B: Kaplan–Meier survival 12 and 24 months after the landmark

Stage	Cross-border	Residents, unmatched	Residents, matched
All episodes	0.249 / 0.179	0.349 / 0.262	0.326 / 0.240
≥ 3 months	0.411 / 0.304	0.493 / 0.380	0.445 / 0.335
≥ 12 months	0.719 / 0.576	0.750 / 0.618	0.731 / 0.597

Panel C: Average ratio in the matched sample under alternative specifications

	All episodes	≥ 3 months	≥ 12 months
Base	1.258 (0.003)	1.118 (0.004)	1.079 (0.005)
Coarser bins	1.277 (0.003)	1.128 (0.004)	1.088 (0.005)
With prior residence in AT	1.262 (0.003)	1.145 (0.003)	1.097 (0.005)
Share unmatched (base)	7.9%	10.0%	17.8%
Share unmatched (coarser bins)	1.1%	1.3%	3.2%

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Episodes are defined by employment continuity; a change of residence does not end an episode, and group status is defined by residence in the first month. Stages are defined by the episode month at risk: month 1 for all episodes, month 4 for episodes lasting at least 3 months, and month 13 for episodes lasting at least 12 months. Panel A reports Poisson models of the monthly ending probability with duration intervals, sex, current age group, federal state of workplace, and sector. Period-specific ratios are linear combinations of the cross-border main effect and its interaction with calendar period; the average ratio comes from a model without interaction. Matched rows use coarsened exact matching weights (Appendix A.2). Standard errors clustered at the person level are shown in parentheses. Panel B reports weighted life-table estimates from the stage-specific landmark. Panel C reports average ratios for the matched samples under coarser matching bins (start quarter, wage terciles, four age groups) and when workers with Austrian residence before their first cross-border episode are retained. It also reports the share of unmatched cross-border episodes under the baseline and coarser matching definitions.

Table 20 Sensitivity of the career typology to changes in classification rules

Specification	N persons	Trial	Circ.	Estab.	Trans.	Flex.	Estab. % of time	% same type
Panel A: threshold variations (full-history design)								
Baseline (Appendix A.1)	738,247	34.3	8.0	31.0	17.8	8.9	67.0	100.0
Max administrative gap = 1	738,247	34.3	9.3	27.9	17.8	10.7	64.7	96.9
Max administrative gap = 8	738,247	34.3	6.7	34.1	17.8	7.1	69.0	97.0
Continuity share ≥ 0.80	738,247	34.3	7.6	31.7	17.8	8.5	68.6	99.3
Continuity share = 1.00	738,247	34.3	8.3	29.7	17.8	9.9	63.9	98.7
Continuity-share rule removed	738,247	34.3	8.7	21.0	17.8	18.2	48.9	89.9
Gap CV threshold = 0.20	738,247	34.3	7.9	31.0	17.8	8.9	67.0	99.9
Gap CV threshold = 0.75	738,247	34.3	8.4	31.0	17.8	8.5	67.0	99.6
All thresholds strict	738,247	34.3	9.9	25.5	17.8	12.5	59.3	94.5
All thresholds permissive	738,247	34.3	6.4	34.8	17.8	6.7	70.4	96.2
Panel B: fixed classification window								
Window = 24 months	651,452	35.3	2.2	37.7	15.9	8.9	72.3	79.3
Window = 36 months	599,560	32.5	3.4	37.9	17.7	8.4	74.5	83.4
Window = 60 months	496,373	29.6	6.9	35.6	20.0	7.9	71.7	88.7
Panel C: order in which the criteria are applied								
Interruption rhythm applied last	738,247	34.3	6.0	33.1	17.8	8.9	71.8	98.0
Residence switching before Established	738,247	34.3	9.6	29.4	17.8	8.9	64.1	98.4
Rhythm overrides Transitional	738,247	34.3	8.5	31.0	17.3	8.9	67.0	99.5

Notes: Type shares are reported as percentages of workers. “Estab. % of time” is the share of total cross-border person-months accumulated by Established workers. “% same type” is the share of workers assigned the same type as in the baseline classification. Panel A varies thresholds around the baseline classification in Appendix A.1, one at a time except in the last two rows. Panel B applies fixed classification windows from the first observed cross-border month and includes only workers whose full window fits within the panel. Panel C varies the order of assignment while holding thresholds and criteria fixed. Own calculations based on AMDB/BMASGPK administrative data, 2010–2025.

Table 21 Distribution of matching variables by group before matching

		All episodes			Episodes ≥ 3 months			Episodes ≥ 12 months		
Variable	**Category**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**
Sex	Male	69.7	53.9	15.8	71.4	54.4	16.9	70.1	49.1	21
Sex	Female	30.3	46.1	-15.8	28.6	45.6	-16.9	29.9	50.9	-21
Age at episode start	<25	19.7	32.3	-12.7	14.7	22.5	-7.8	12.3	23.9	-11.5
Age at episode start	25-34	30.7	28.3	2.4	33.3	31.8	1.5	35.6	34.2	1.4
Age at episode start	35-44	25.4	19.7	5.7	27.8	23.1	4.7	30.4	24	6.4
Age at episode start	45-54	18.8	15.1	3.6	19.2	17.5	1.8	18.2	14.8	3.4
Age at episode start	55+	5.5	4.5	1	5	5.1	-0.2	3.4	3.2	0.2
Federal state	Missing	3.4	6.5	-3.1	3.2	6.7	-3.5	3.3	8	-4.7
Federal state	Vienna	12	22.3	-10.3	11.9	22.7	-10.8	14.4	25.5	-11
Federal state	Lower Austria	12.6	13.4	-0.8	13.4	13.2	0.1	16	13.5	2.5
Federal state	Burgenland	14.7	1.9	12.9	15	1.9	13.1	14.5	1.8	12.7
Federal state	Upper Austria	13.6	15	-1.3	15.1	14.7	0.4	16.3	16.4	-0.1
Federal state	Styria	18.8	12.2	6.5	15.8	12.3	3.4	17.6	12.2	5.4
Federal state	Carinthia	3.2	6.5	-3.3	3.1	6.4	-3.3	2.2	5.1	-2.9
Federal state	Salzburg	9.6	7.3	2.3	9.9	7.2	2.8	7.6	6	1.6
Federal state	Tyrol	7.2	10.9	-3.8	7.2	11	-3.8	3.3	7.7	-4.5
Federal state	Vorarlberg	4.9	4.1	0.9	5.5	3.9	1.6	4.7	3.8	0.9
Sector	Production	20.4	12.4	8	15.5	10.8	4.7	18.1	12.5	5.6
Sector	Construction	11.2	11.1	0.1	13	13	0	10.8	8	2.9
Sector	Retail	7.5	11.7	-4.3	8.1	12.1	-4.1	11.2	14.8	-3.6
Sector	Tourism	19.2	16.3	2.9	20.4	15.1	5.3	13	8.8	4.2
Sector	Business services	31.6	26.6	5	34.4	26.5	7.9	36.1	29.1	7
Sector	Public services	5.5	16.5	-11	5.4	17.5	-12.1	7.2	21.7	-14.5
Sector	Other	3.3	4.3	-1	2.7	4.2	-1.5	3.1	4.5	-1.3
Sector	Missing	1.3	1	0.3	0.5	0.7	-0.2	0.5	0.7	-0.2
Wage quintile	Q1 (lowest)	15.8	20.8	-5.1	14.1	21.2	-7.1	12.5	21.3	-8.8
Wage quintile	Q2	17.8	20.1	-2.3	17.3	20.3	-3.1	17.7	20.1	-2.4
Wage quintile	Q3	18.9	19.9	-1	21.6	19.3	2.3	22	19.2	2.8
Wage quintile	Q4	23	18.6	4.3	24.9	18.4	6.5	24.3	18.7	5.6
Wage quintile	Q5 (highest)	22.6	18.7	4	21.2	19.3	1.8	22.3	19.1	3.2
Wage quintile	Missing	1.9	1.8	0.1	1.1	1.5	-0.5	1.1	1.6	-0.5
Start month	January	6	6.2	-0.2	5.4	5.9	-0.5	6.3	6.6	-0.3
Start month	February	7.9	7.4	0.5	8.5	8.3	0.2	9.6	8.7	0.9
Start month	March	8.4	9.2	-0.7	10.6	11.6	-1	9.3	9.4	0
Start month	April	8.3	9	-0.7	10.8	11.2	-0.4	9.1	8.7	0.4
Start month	May	8.8	7.5	1.4	10.3	8.7	1.6	9.6	7.9	1.6
Start month	June	10	8.2	1.8	10.1	8.6	1.5	8.9	7.5	1.4

		All episodes			Episodes ≥ 3 months			Episodes ≥ 12 months		
Variable	**Category**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**	**Share CBE**	**Share Res.**	**Diff. (in p.p.)**
Start month	July	10.6	14.1	-3.5	7.9	7.4	0.5	8.5	8.3	0.2
Start month	August	7.3	9.2	-1.9	6.2	5.8	0.4	7.1	6.9	0.2
Start month	September	11.6	9.4	2.2	8.4	10.3	-1.9	10.4	12.4	-2
Start month	October	7.6	7.2	0.4	6.6	8	-1.4	8.7	9.8	-1.1
Start month	November	5.8	5.9	-0.1	5.5	6.3	-0.8	7.1	7.7	-0.6
Start month	December	7.7	6.9	0.8	9.7	7.9	1.7	5.5	6.2	-0.8
Start year	2010	4.2	6.5	-2.3	4.2	6.4	-2.2	3.4	6.1	-2.6
Start year	2011	5.9	7	-1.1	5.8	6.8	-1	5.9	6.5	-0.6
Start year	2012	6.2	7	-0.7	6.1	6.8	-0.6	5.9	6.4	-0.4
Start year	2013	6.3	7	-0.7	6	6.8	-0.7	6.1	6.4	-0.4
Start year	2014	6.2	7	-0.8	5.7	6.8	-1.1	5.7	6.6	-0.9
Start year	2015	6.4	7	-0.7	5.8	6.9	-1.1	5.7	6.7	-1
Start year	2016	6.3	7.2	-0.9	6.2	7.1	-1	6.3	6.9	-0.7
Start year	2017	6.8	7.5	-0.7	7.2	7.6	-0.4	7.8	7.7	0.1
Start year	2018	7.3	7.4	-0.2	7.5	7.5	0	7.8	7.6	0.2
Start year	2019	7.6	7.4	0.1	7.7	7.5	0.2	6.9	7.1	-0.2
Start year	2020	7.4	6.9	0.5	7.3	6.9	0.4	9	8	1
Start year	2021	8.2	7	1.1	8.7	7.4	1.3	9.2	8	1.2
Start year	2022	10.5	7.5	3	10.9	7.8	3.1	10.4	8.1	2.3
Start year	2023	10.6	7.4	3.2	10.9	7.7	3.3	9.9	7.9	2

Notes: Own calculations based on AMDB/BMASGPK administrative data, 2010–2025. Entries are shares of episodes (%) in each category, measured in the first month of the episode, for the three stages used in Table 19. “Share CBE” and “Share Res.” refer to all cross-border and resident episodes in the relevant stage before matching; “Diff.” gives the difference in percentage points. After weighting, resident shares equal those of the matched cross-border episodes in every category. The share of unmatched cross-border episodes is 7.9%, 10.0%, and 17.8% across the three stages. Wage quintiles are computed on the pooled sample of each stage; the missing category covers episodes without a recorded gross wage in the first month. Federal state refers to the workplace; sector categories are defined in Appendix A.2.

Statements and Declarations

Data availability statement

The analysis uses pseudonymised individual-level employment and residence records from the Austrian Labour Market Database (Arbeitsmarktdatenbank, AMDB) and Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection (BMASGPK). The AMDB is operated on behalf of the Public Employment Service Austria (AMS) with cost participation by the Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection (BMASGPK), and whose underlying raw data are supplied by the Federation of Austrian Social Security Institutions (Dachverband der Sozialversicherungsträger - DVSV) and the AMS. The data are not publicly available and cannot be shared by the author: under the AMDB terms of participation, person-level records are provided for research purposes only and may be published in aggregated form only. Access is available to other researchers on the same terms through registration at https://arbeitsmarktdatenbank.at/, subject to approval by the AMS in coordination with the BMASGPK, verification of the stated research purpose and submission of a data security concept; the conditions are documented at https://arbeitsmarktdatenbank.at/docs/Teilnahmebedingungen.pdf. The Stata code used for the analysis is available from the author on request.

Competing interests

The author declares no financial or non-financial interests that are directly or indirectly related to the work submitted for publication.

Ethics approval and consent to participate

Not applicable. The analysis uses pseudonymised administrative data.

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Use of generative AI

Generative AI tools (Claude/Anthropic and ChatGPT/OpenAI) were used to assist with drafting, revising and language editing of the manuscript, checking references and internal consistency. All analyses were conducted by the author, who reviewed and verified all AI-assisted content and takes full responsibility for the article.