The Returns to International Migration in a Free Mobility Setting: Evidence from Austria and Germany*

Andrea Weber, David Card, Wolfgang Dauth, Wolfgang Frimmel, Julia Schmieder, Rudolf Winter-Ebmer

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Abstract

How big are the gains to international migration? How do they vary across migrants? We study these questions using linked administrative data for Austria and Germany, focusing on migrants who were steadily employed 5-12 quarters prior to their move and using co-workers from this period as a comparison group for a difference-in-differences design. Over 40% of cross-border migrants return home within a few years. We combine data from the origin and destination countries for 5 years after the move; we also look separately at stayers and returners. On average, migrants from Austria to Germany experience an immediate and persistent rise of around 10% in their daily wage relative to their matched co-workers, while migrants from Germany to Austria gain about 5%. The distribution of wages is compressed in Austria relative to Germany, but we see larger gains for lower-skilled Austrian migrants, contrary to a simple one-factor model. The longer-run returns to migration are largest for migrants who remain in the destination country, smaller for those who return after 1-4 years, and zero for those who return in less than a year. They are also larger for those who switch their country of work with no intervening spell of unemployment, and for migrants who follow established cross-border networks between workplaces. To help interpret our findings we conduct a parallel analysis for Austrians from smaller cities and non-urban areas who move to Vienna. Migrants to the "big city" get a boost in wages – albeit smaller than the gains to international migration – but there is little effect for those who eventually leave.

*Weber: Central European University, CEPR, IZA, RFBerlin; webera@ceu.edu. Card: UC Berkeley, NBER, RFBerlin; card@berkeley.edu. Dauth: Institute for Employment Research (IAB) and University of Bamberg; wolfgang.dauth@iab.de. Frimmel: Johannes Kepler University Linz; wolfgang.frimmel@jku.at. Schmieder: RFBerlin; juliaschmieder@posteo.net. Rudolf Winter-Ebmer: Johannes Kepler University Linz, IZA, IHS, CEPR, RFBerlin; rudolf.winterebmer@jku.at.

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Thousands of people move between developed countries every year (Docquier et al., 2014). Many of these are highly skilled workers whose talents allow them to sidestep the legal barriers to international migration (see Kerr et al. (2016) and Amanzadeh et al. (2024)). In settings like the EU with free mobility of labor, however, the flows include a broad range of skill groups.[1] How important are the opportunities provided by unfettered international migration? Do most migrants gain, or do some fare worse than they would have at home? If movers in one direction experience gains, do those moving in the opposite direction generally lose? And how do the gains from international migration compare to the gains from moving within a given country?

Conventional economic theory (Borjas, 1987; Sjaastad, 1962) suggests that migrants compare their expected earnings in a potential destination to their expected earnings in their origin market and migrate if the difference – the "return" to migration – exceeds the costs of moving.[2] As in other treatment effect settings, however, we never see the realized values for both sides of this comparison: a given individual either moves or stays. In fact, we rarely see even a naive approximation of the counterfactual for people who move, due to a lack of data for movers and stayers and difficulties in comparing these groups even when data are available.[3] Many international movers also return home after a few years abroad: a full assessment of the returns to migration therefore has to consider the value of international experience in the origin labor market.

In this paper we use novel linked administrative data and a previous co-workers research design (Jacobson et al., 1993) to evaluate the returns to migration for movers in both directions between Austria and Germany. The two countries share a common language and similar education systems, and for at least a century have imposed few legal constraints on cross-border flows.[4] Our samples are derived from underlying populations of 315,000 Austrian citizens who appear in the German Social Security system between 1975 and 2014, and 570,000 German citizens who appear in the Austrian system in the same interval. These worker's IDs are matched in their respective home countries to construct linked employment and earnings careers in both countries at the individual level. We focus on migrants who were 20-45 at the time of their (first) move and had a spell of steady employment in their origin labor market prior to moving – specifically, in a "baseline period" 5 to 12 quar-

[1] Other examples include Australia and New Zealand (Poot, 2010) and Ireland and Britain (Fitz Gerald and Kearney, 1999).

[2] We use the term "return to migration" to refer only to the proportional earnings gain associated with migration – similar to the widespread use of term "return to education" to refer to the earnings gain per year of schooling.

[3] A good example of this problem is the difficulty in knowing whether Mexican migrants to the US are better- or worse-educated than their average country mates (Ibarraran and Lubotsky, 2007). Card (2003) used data from similar surveys in US and Canada to compare the wages of Canadian immigrants in the US to workers in Canada with the same age, gender and education.

[4] A detailed description of the institutional setting is provided in Appendix Section B.

ters before they first appear in the administrative system of the destination country. This baseline allows us to measure the pre-migration wages of migrants, while accounting for the possibility that a migrant is out of work prior to their move. It also allows us to identify the pre-migration co-workers of migrants. We use the changes in labor market outcomes for migrants relative to their pre-migration co-workers to construct difference-in-differences estimates of the returns to migration. Importantly, we observe labor market outcomes for migrants whether they remain in the destination country or return home, addressing concerns about selective return migration (Adda et al., 2022; Akee and Jones, 2024; Dustmann and Görlach, 2016).

Comparisons between migrants and previous co-workers hold constant many factors that might otherwise confound a difference-in-differences design, including industry- and region-specific demand shocks.[5] But migrants tend to be younger than their co-workers, and many have lost their previous job prior to moving. Moreover, because we identify migration events using the date that an individual first appears in the administrative data of the destination country, and 95% of these first appearances are associated with the start of a new job, migrants in our sample are nearly all employed at the start of their index move. In the spirit of a synthetic control approach (Abadie, 2021), we therefore reweight the co-workers to have the same gender and age distribution as migrants, and the same profile of employment probabilities between the end of the baseline period and the index quarter that defines the migration event. We show that the mean log daily wages of migrants and their previous co-workers follow parallel trends in the 5 years prior to the move, suggesting that co-workers provide a credible comparison group for evaluating the wage impacts of migration.

We have four key sets of findings. First, descriptively, we find that workers who move from Austria to Germany and those who move from Germany to Austria are remarkably similar, paralleling "Linder's hypothesis" (Hufbauer, 1970) that trade flows in opposite directions between developed countries are often comprised of similar products. About two-thirds of migrants in both directions are male, while one-fifth were unemployed prior to moving. Based on an AKM (Abowd et al., 1999) decomposition, migrants from both countries are positively selected, and in the period 1-2 years before migrating they held relatively good jobs: their mean person effects in the baseline period are 10-15% above the national average; their mean firm effects are slightly above the national average.[6] They also come from a relatively diverse set of regions, though outmigration rates are higher from the border regions of both countries. One key difference is that the flow of workers from Germany

[5]Given the degree of assortative matching by education and occupation at a given workplace (see Card et al. (2013) for evidence from Germany), they also control to some extent for shocks that differentially affect different education or occupation groups.

[6]For simplicity we follow standard practice in calling the workplace-specific wage premiums from an AKM model "firm effects", but these are based on the administratively defined establishments where people work.

to Austria is concentrated in the post-1995 period, whereas the flow from Austrian to Germany is more evenly distributed. Rates of return migration are fairly similar for Austrian and German migrants, with about 40% of Austrians and 50% of Germans returning within 5 years.

Regarding the *impacts* of an international move, our second key finding is that migrants from both countries experience an immediate and persistent rise in mean log wages relative to their previous co-workers. The average wage gain is around 10 percentage points (ppts.) for Austrians and 5 ppts. for Germans. Reassuringly, these average impacts are very similar whether we use our preferred reweighing strategy or a simpler approach that equalizes only the age and gender distributions of migrants and co-workers. The alternative weighting strategies lead to some differences in the magnitude of the employment gap between migrants and previous co-workers in the post-migration period, so the stability of the estimated wage impacts suggests that they are not strongly affected by biases arising from selection into employment. AKM-based decompositions show that the average wage gains of Austrian movers incorporate a modest increase in the wage premiums offered by their employers and a small rise in their person effects relative to the average change for their co-workers – suggesting that some migrants "restart" their careers when they move.

Our third set of findings concerns the heterogeneity in the gains to migration. We find that the earnings gains are larger for men than women, potentially reflecting the "tied mover" status of many female migrants (DaVanzo, 1976; Mincer, 1978). Despite this gender gap, average returns to migration are generally higher for workers with wages in the bottom half of the pre-migration wage distribution. They are also higher for migrants who moved between countries without experiencing a spell of registered unemployment. Some of these "job-to-job" movers may have transferred between establishments owned by the same firm, or between firms that are part of an international supply chain. Others may have learned about the opportunities abroad from previous co-workers (as in Caldwell and Harmon (2019)). To assess the importance of such networked moves, we identified pairs of workplaces on opposite sides of the border connected by more than 4 movers. Just over 10% of Austrian migrants in our main sample move between such pairs, suggesting that connected moves are relatively common (though still a small share of overall moves). The wage gains after 5 years for movers between connected establishments are relatively large, contributing to the higher average gains for migrants who move with no spell of unemployment.

Another central dimension of heterogeneity is the duration of stay in the destination country. We find that the gains for Austrian migrants vary with the duration of stay, with gains that are close to zero for those who return within a year, but around 18 ppts. for those who are still in Germany after 5 years. For those who remain in Germany for at least a year but return within 5 years, we find longer-run gains at the end of our follow-up period (when

all the late returners are back in Austria), albeit smaller than the gains for the stayers. This suggests that there are positive returns in the home market from an international migration experience, as has been found in a few other settings (e.g., Görtz (2025); Koikkalainen et al. (2016); Wahba (2021)).

Our fourth set of findings relate to the similarities and differences between international and domestic migrants. We identify a set of Austrians who started their labor market careers outside the Vienna area and then move to Vienna for work. Paralleling our analysis of international migrants, we focus on movers who were steadily employed in the 5-12 quarters prior to their first spell in Vienna, and use the co-workers at these jobs to form a comparison group, reweighting the co-workers to have the same probabilities of employment as the migrants in the year leading up to the index quarter of their move. Domestic migrants to the "big city" are similar in their age and gender composition to international migrants, but are less positively selected. The estimated wage gains from domestic migration are smaller than the returns to international migration: migrants who are still in Vienna after 5 years have gains relative to previous co-workers of about 6%. In contrast, we find limited gains for the 45% of movers who ultimately leave Vienna. We also find some similarities in the patterns of heterogeneity for domestic and international migrants – including much smaller gains for women than men, and for those who were unemployed before their move – but no evidence of a premium for movers who follow established networks.

Our work contributes to the large but often disconnected literatures on international and domestic migration.[7] With respect to the former, we offer what we believe are the first causal estimates of the returns to cross-border migration. Unlike nearly all previous studies, we have access to linked records for the same individuals in the origin and destination countries, allowing us to follow individuals as they move between countries.[8] We use the earnings outcomes of previous co-workers to form a counterfactual for the earnings of migrants in the absence of moving – mimicking the workhorse design first proposed by Jacobson et al. (1993) for studying mass layoff events (see Bertheau et al. (2023) for a recent application). Importantly, in a setting where many migrants eventually return home, we measure post-migration outcomes in the destination and origin labor markets. We estimate average returns to migration in both directions for Austrians and Germans, and also charac-

[7] There is some literature on the choices of rural Mexicans to migrate to larger cities or to move the U.S. in the 1990s and early 2000s – see e.g., Davis et al. (2002). Ramos (1992) examines the migration of Puerto Ricans to the mainland U.S. as an example of a movement that is arguably "in between" a domestic and international move.

[8] Dodini et al. (2025) use linked records for medical doctors who commute from Sweden to Norway, focusing on how a rise in demand for doctors' services driven by the expansion of the petroleum extraction sector in Norway led to a reduction in the number of doctors per capita in Swedish regions close to the Norwegian border. Their results suggest that commuters experienced sizable wage gains.Bütikofer et al. (2024) use cross-country matched registry data to follow individuals commuting from Sweden to Denmark, studying how gaining access to a larger labor market after the opening of the Öresund Bridge affects labor market outcomes; they find substantial increases in commuting and wages, alongside rising inequality.

terize the heterogeneity in returns by workers' pre-move characteristics and by the duration of stay in the destination country.

With respect to the literature on domestic migration, we provide causal estimates of the return to migration for individuals who first enter the labor market outside the Vienna region then move to a job in Vienna. Our design complements other longitudinally based estimates of the returns to working in different labor markets in the same country (e.g., Card et al. (2025); Combes et al. (2008); Dauth et al. (2022); De La Roca and Puga (2017); Gibbons et al. (2014)). Unlike existing studies based on 2-way fixed effects specifications, however, we use narrower comparisons of migrants to their previous co-workers to estimate the returns to moving. Our approach addresses the possibility, raised by De La Roca and Puga (2017), that migrants to a larger urban area experience a permanent return to their "big city" experience even when they move to other areas. Interestingly, while we find evidence of a persistent boost in wages for international migrants who ultimately return home, we find less evidence of such an effect for domestic migrants.

The paper proceeds as follows: Section 1 describes the derivation of our migrant and co-workers data sets, and our methods for measuring workers' locations, wages, and other outcomes; Section 2 presents a descriptive overview of our migrant samples; Section 3 provides a graphical overview of the labor market outcomes of migrants and their matched co-workers before and after the index quarter of arrival of migrants in their destination country; Section 4 presents estimates of the average returns to migration for movers in both directions, as well as a decomposition of the sources of these returns in an AKM framework; Section 5 presents a detailed analysis of the heterogeneity in returns to migration for different subgroups of migrants; and Section 6 presents a parallel analysis of the returns to domestic migration for people who move from smaller cities and rural areas to a larger city. We conclude in Section 7.

1 Data Derivation and Measurement

Our data are derived from the social security registers of Austria and Germany. These registers record employment and benefit spells, and are used in both countries to determine pension benefits (among other purposes). All private sector wage and salary jobs and many public sector jobs are included; civil service jobs and self-employment are recorded in different register systems and are excluded. The German records have been assembled by the Institute for Employment Research (IAB) into the Integrated Employment Biographies (IEB) data set (see Schmucker and Berge (2025)). The Austrian records have been assembled by the Main Association of Austrian Social Security Institutions (HV) into the Austrian Social Security Database (ASSD) (see Zweimüller et al. (2009)).

Contracts signed in 2016 between Johannes Kepler University of Linz (JKU), the IAB, and HV created a protocol for linking records between the two countries. Because there is no common person identifier across countries, matching of individuals was performed by the statistical offices using first and last names and exact date of birth. The procedure was as follows: Records of 570,000 German citizens who were ever recorded in the ASSD by 2015 were sent to the IAB where they were matched with the full IEB population. Likewise, records of 315,000 Austrian citizens ever recorded in the IEB by 2015 were sent to the HV and were matched to the full population in the ASSD. We then received two person identifiers per matched individual, one that links to the ASSD and one that links to the IEB. Individual employment biographies for all matched individuals from the IAB were then linked to ASSD biographies in a safe data center.

Among the Austrian citizens in the IEB, 60% could be merged to an individual with the same first and last name and birth date in the ASSD. Likewise, among the German citizens in the ASSD, 68% could be merged to an individual with the same name and birth date in the IEB. Most of the non-matches are people who never worked in their home country (e.g., because they moved as children, or before entering the labor market).[9] We drop the roughly 12% of individuals from the two countries whose name plus exact date of birth is not unique, or who have multiple records in the social security system, leaving us with 167,944 Austrians and 339,764 Germans who appear in the records of the two countries.

We then used the combined registers for these individuals to construct a quarterly panel with labor market status at each of 4 dates per year (January 1, April 1, July 1, October 1). We limit labor market status to 3 states – employed, unemployed, or inactive (including not in the register). The Austrian register has no indicator for part-time status so we cannot distinguish between full-time and part-time employment spells (as is possible in Germany). We assign each individual to a single country in each quarter. In quarters where an individual has an insurance spell in both countries, we give priority to the country where they were employed, or the country with the longer employment spell if they worked in both. For individuals with no record in either country in a quarter we assign inactive status and the country of the previous quarter. Using this approach, a move between countries always starts with a new insurance spell.[10] We define the quarter in which an individual first appears in their non-home country as the "index quarter" or, somewhat loosely as the "quarter of migration", although a person could have changed their country of residence up to 4 quarters before their index quarter.

[9] Austria is a major source for international students in German universities (Statistisches Bundesamt, 2025) and Germany is the largest source country for international students in Austrian universities (Statistik Austria, 2026). We suspect that many such students ultimately stay in the country where they were educated.

[10] 95% of these first spells in the destination country are spells of employment. The other 5% are people who move and register in the social security system as job searchers – an option that is available in both countries, and provides access to some information and services for job seekers.

The Austrian and German social security registers record the total earnings received from each employer in each year. They also include the starting and ending dates of each job spell, and an establishment identifier for the workplace. We use these data to calculate the main employer in each quarter: in most cases there is only one, but in cases with 2 (or more) employers we select the one with the highest (imputed) total earnings in the quarter. We assign the wage for the quarter as the average daily wage paid by the main employer, using imputed earnings for those with total earnings above the contribution caps.[11] We measure daily wages in real 2000 Euros per day.

Since our focus is on measuring the gains to migration for people who worked in their home country prior to moving, our next step is to identify people who move after attaining significant labor market experience. Starting from the universe of people who appear in both registers, we drop those who did not have at least two years of continuous employment in their home country prior to their first appearance in the records of the other country. This eliminates about 57% of Austrians and 42% of Germans, leaving us with samples described in the top row of each panel of Appendix Table A1. We then impose a series of further refinements, shown in the subsequent rows of Appendix Table A1. Specifically, we require that the migrant was continuously employed in a baseline period from 5 to 12 quarters prior to the index quarter that they first appear in the records of the other country, was age 20-45 in the index quarter, first appeared in the destination country in January 1980 or later, was either employed or receiving unemployment benefits in the index quarter, and was not working as an apprentice in the baseline period. These refinements eliminate about 71% of Austrian migrants and 81% of German migrants from the group with significant work experience prior to their first move: the main loss of sample arises from the requirement of continuous employment in the baseline period. Importantly, however, as we discuss below, the imposition of these refinements does not lead to a large change in the average characteristics of migrants relative to the pool with 2+ years of continuous employment prior to their move.

For each migrant in our main analysis sample, we identified all individuals who worked at the same employer(s) at any point during the baseline period, were continuously employed during the period corresponding to 5-12 quarters prior to the migrant's quarter of migration, and did not appear in the register of the other country. We then randomly selected 100 of the co-workers in each employer-quarter (or all the co-workers at smaller firms). Thus, each migrant is matched to up to 800 co-workers, though there is a small number of migrants for whom we cannot identify any co-workers – for example, people who worked at a smaller firm during the baseline period where none of their co-workers met the age and continuous employment requirements.

[11] We use Tobit style models to impute the annual total earnings for people whose earnings are above the social security maximum for a given country and year, following the procedures used in Card et al. (2013).

Finally, to aid in the interpretation of our findings, we estimated a set of AKM models separately for Germany and Austria across six consecutive seven- to eight-year intervals covering the period from 1978 to 2023. These models use daily wages for the main employer in each year, following the approach of Card et al. (2013). Given the lack of education data in the ASSD, we use a simple specification of the time-varying covariates in the AKM models, with only year dummies and a quartic in age. These models provide interval-specific estimates of the person effects for each of the migrants and their co-workers, as well as estimates of the firm effects for their employers in the quarters before and after the index quarter. Appendix Section C provides a more detailed discussion of the AKM models. We compare the person effects for the same individual in different intervals, and for the same individual in different countries. In brief, the person effects for the same individual in consecutive intervals in the same country are very highly correlated ($\rho \approx 0.9$); this correlation fades slightly as the gap between intervals widens. Likewise the person effects for the same individual observed in consecutive intervals but in two different countries are quite highly correlated ($\rho \approx 0.7$).

2 Description of Migrants

Table 1 presents a description of the Austrian and German migrants in our main analysis sample (columns 1 and 4), along with the subset who have at least one co-worker in the baseline period (columns 2 and 5), and the subset who have 1+ co-workers and estimated AKM effects for at least 2 quarters in the baseline period and 2 quarters in the post-migration period (columns 3 and 6). Figure 1 presents complementary information on how some of these characteristics have changed over our 35 year sample period (limiting attention to the overall analysis samples). On average, just over a third of migrants from both countries are female, with very stable female shares over time (panel b of Figure 1). Their average age at labor market entry is around 21 (slightly older in Germany) and their average age at migration is around 32 (again, slightly older in Germany). Age at migration shows a gradual rise over time for both countries (panel c of Figure 1), though after 2005 it stabilized for Austrian migrants and actually fell slightly for German migrants. The distribution of migration dates is relatively constant across decades for Austrians (panel a of Figure 1) but is more heavily concentrated in the 2000+ period for Germans. We believe the rise in German outmigration was driven by a combination of factors, including reunification, which opened the door for former East Germans to move to Austria, the prolonged recession after 1991,[12] and the Hartz reforms of the early 2000s that drastically reduced the availability of long-term unemployment benefits (see e.g., Bradley and Kügler (2019)).

[12]The German unemployment rate remained above 6% from 1992 to 2009. By comparison the unemployment rate in Austria was below 6% throughout this period.

A concern for our main analysis sample is that it includes only a fraction (20-30%) of all the between-country movers who had substantial labor market experience in their home country. To get a sense of the effects of this limitation, Appendix Figure A1 shows a series of comparisons between the trends in the average characteristics of all migrants with substantial pre-migration experience (i.e., the groups shown in the first rows of the two panels in Appendix Table A1), and those in our main analysis sample. Appendix Figure A1, panel a and b, for example, show the number of Austrian and German migrants in the larger sample (left side) and in our main analysis sample (right side), while Appendix Figure A1 panels c and d compare the fractions of female migrants by year in the two samples, and panels e and f compare mean ages at migration. Reassuringly, the patterns in our main analysis sample are very close to those in the larger population of migrants with at least 2 years of continuous labor market experience prior to their move.

Returning to Table 1, we see that mean wages of migrants (in the baseline period prior to migration) were somewhat higher for Germans than Austrians. As shown in panel d of Figure 1, however, this gap changed over our sample period. Mean pre-migration wages of Austrian and German migrants followed a parallel trend until the late 1990s. As outmigration flows from Germany expanded and residents of the former East Germany became a larger share of the flow (see panel g of Figure 1), the mean wages of German migrants fell while those of Austrian migrants continued to rise. Consequently, the German/Austrian gap in pre-migration wages switched signs: from +20% in the years before 2000 to -10% after 2005. Similar trends in pre-migration wages for both countries are also evident among the larger sample of migrants with substantial experience prior to moving (see panels g and h in Appendix Figure A1).[13]

To help understand whether the change in average wages of German migrants was driven by a change in their origin labor markets, or by a change in the selectivity of migrants relative to others in the same market, we compare the average estimated person effects for migrants (based on their earnings in the baseline period 1-3 years prior to migration) to the average estimated person effect for all workers in their home country. The firm effects in our AKM models incorporate differences in pay across regions (for example, between the former states of East and West Germany), so the person effects can be interpreted as measures of the relative selectivity of migrants. The entries in Table 1 suggest that both Austrian and German migrants are positively selected, with mean person effects 10-15% above the national average in both countries. Looking at the trends in the these means for our main analysis sample – shown in panel l of Appendix Figure A1 – we see that the mean person effects of German migrants were about 15% above average until the late 1990s, then drifted down

[13]Though all the migrants in the larger samples have a spell of continuous employment in their home country prior to migration, the time window for observing their pre-migration wage varies widely, and in some cases is >3 years prior to their quarter of migration.

to about 10% above average. This decline is smaller than the drop in mean pre-migration wages shown in panel d of Figure 1, suggesting that much of the decline in the wages of German migrants was due to a change in their origin labor market areas. In contrast, the mean person effects of Austrian migrants were typically about 10% above average in the pre-2000 period, but then rose to about a 20% premium after 2000. Thus the relative selectivity of German versus Austrian migrants also reverses signs around 2000, though the magnitude of the change is modest compared to the change in relative wages.

Table 1 and Figure 1 also show data on the former regions and industries of migrants. Around a quarter of migrants from both countries worked in manufacturing in the baseline period, about 40% in services, and 17% in sales. Figure 1, panels f and h, show the employment share of migrants in each sector, deviated from the corresponding share of all workers in the sector. One systematic pattern is that German migrants were less likely to come from manufacturing in the early years of our sample, and that across all years they were more likely to have worked in hotels. In terms of geography, just over 40% of Austrian migrants came from areas close to the German border, while about 30% of Germans came from areas close to the Austrian border – in both cases substantially above the national employment shares in these regions (see panels e and g). In contrast, the share of German migrants from the East was close to the share of all workers in the East in most years after reunification. For Austrian migrants we show the share from the Vienna region, which in the later years especially is not too far from the share of all workers in that region. For Germans we show the share of migrants from the 5 largest cities (Berlin, Munich, Frankfurt, Cologne, and Hamburg). This share is also not too different than the share of workers in those cities, suggesting that outmigration rates are not so different for people from larger cities as for people from smaller cities and rural areas.

Many migrants in many different settings eventually return home (see e.g. Akee and Jones (2024); Amanzadeh et al. (2024); Ward (2017)). This is also true for migrants between Austria and Germany: Figure 2 shows the fractions of migrants who have ever returned to their home country in each quarter after their index quarter of migration, as well as the fraction who are currently at home. The gap is made up of "circular migrants" – people who have migrated back and forth multiple times. Within a year of their index quarter 15% of Austrian migrants and 23% of German migrants have returned home. The exit rates then slow down, and within 5 years about 35% of Austrian migrants and 45% of German migrants are back in their home country. Given these rates, the ability to measure labor market outcomes on both sides of the border is crucial for assessing the true return to migration.

3 Graphical Overview of Outcomes Before and After Migration

With this background we turn to a graphical overview of the impacts of migration, using an event study framework that shows the outcomes of migrants and co-workers before and after the index quarter (which we denote as "quarter 0").[14] Results for the probability of employment are shown in Figure 3A. The left panels show profiles for co-workers reweighted to have the same age and gender composition as migrants; the right panels show profiles using our preferred approach, which reweights co-workers to have the same age and gender composition as migrants and the same employment probabilities in quarters -2 to 0. By construction all the migrants and their co-workers were employed in quarters -5 to -12. After quarter -5, the employment rates of the migrants fall off quickly, bottoming out at just over 60% in quarter -1 for both Austrians (upper left panel) and Germans (lower left panel). In quarter 0 their employment rates rebound to around 95%, reflecting the fact that most migrants start a new employment spell in the destination country in that quarter. Thereafter, their employment rates drift downward again to around 80% for Austrians and 87% for Germans by quarter 20. (We discuss differences in these profiles by gender below).

Reweighting only by age and gender, the co-workers' employment profiles evolve more smoothly than the migrants' after quarter -5, falling to around 90% in quarter 0 and 80% in quarter 20. Using our preferred reweighting approach, however, the employment rates of co-workers match the dip and rebound of the migrants. Effectively, this approach upweights the subgroup of co-workers who experience job losses in quarters -4 to -1 and return to work in quarter 0, so the average reweighted employment rate follows that of migrants. After quarter 0 the reweighted sample of co-workers experience the same declining trend in employment as the migrants, though there is a slightly larger divergence in employment between German migrants and their reweighted co-workers (lower right panel) than for Austrians.

Figure 3B shows the corresponding profiles of registered unemployment. Migrants (and co-workers) are all working in the baseline period, and therefore have zero unemployment rates in quarters -5 to -12.[15] Starting in quarter 4 the migrants start losing jobs and their unemployment rates rise accordingly, reaching around 15% in quarter -1. From quarter 0 onward the unemployment rate for Austrian migrants stabilizes at just under 5%, while the rate for German migrants fluctuates around a slightly higher rate. Reweighting only by age and gender, the co-workers' unemployment rates rise after the baseline and stabilize at about 4%. Reweighting to match the pre-migration employment pattern of the migrants, however, leads to profiles of unemployment that closely match those of the migrants.

[14] We assign the index quarter for a given migrant to all his or her co-workers.

[15] For simplicity we refer to the fraction of people who are registered as unemployed as the "unemployment rate", but we emphasize that this rate is not the same as the conventional (ILO definition) of the unemployment rate.

Figure 3C presents event study graphs for our main outcome variable, mean log daily wages. Looking first at the left-hand panels we see nearly parallel trends in wages in quarters -20 to -5, then some divergence in quarters -4 to -1 as the migrants lose their jobs, leading to some selection bias in wages for those who remain in work. The wage gap between migrants and their previous co-workers widens immediately in quarter 0, suggesting that any "assimilation" of migrants into the labor market of the destination country occurs very quickly. It is also noteworthy that despite the rising share of migrants who return home (see Figure 2), the wage gap between migrants and co-workers is relatively stable, suggesting that some of the gains to migration persist for those who return home.

These same features are evident in the right-hand panels of Figure 3C, though as might be expected, re-weighting the co-workers to match the employment rates of the migrants leads to wage profiles for the co-workers that more closely parallel those of the migrants in quarters -4 to -1. In the baseline period, the wage gap between migrants and their employment-reweighted co-workers was about 13 log points for Austrians and about 18 log points for Germans. Two years after migration (i.e., in quarter 8) the gap widened to around 25 log points for both Austrians and Germans, suggesting wage gains from migrating on the order of 12-13 ppts for Austrians, and 6-7 ppts for Germans. Subsequently the wage gap widens slightly for Austrian migrants but narrows a little for Germans.

4 Estimates of the Returns from International Migration

Table 2 presents a series of comparisons between migrants and co-workers in the pre- and post-migration periods, as well as difference-in-difference estimates of the effects of migration on log daily wages and the two main AKM components of wages over two horizons: from the baseline to the first year after migration (i.e., to quarters 1-4); and from the baseline to the 2nd through 5th years after migration (i.e., to quarters 5-20). Columns 1-3 show data for Austrian migrants and their co-workers (re-weighted using our preferred strategy) while columns 4-6 show corresponding data for German migrants. As a point of reference, panels 1 and 2 show employment shares and shares in the home country in quarters 1-4 and 5-20. We don't show data for the baseline period because 100% of migrants and co-workers where employed and working in their home country in this period.

Panels 3-4 present wage outcomes. We show separate baseline means for workers whose data contribute to the mean for Q1-4 and for the group whose data contribute to the mean for Q5-20. Differences between these means reflect the degree of selectivity in the subset who are still working in the later period. Also, for consistency with our analysis of the AKM components of wages (in panels 5-6), we limit attention in the construction of the Q1-Q4 samples to people who have person and firm effects in at least 2 quarters of the baseline

period and 2 quarters in the year after moving. Similarly, in the construction of the Q5-Q20 samples we limit attention to people who have person and firm effects in at least 2 quarters of the baseline period and 8 quarters in years 2-5 after moving.

Panel 3 shows the levels of daily earnings of migrants and co-workers, assigning a 0 for quarters of non-work. The mean baseline earnings of the co-workers of Austrian and German migrants are very similar, while the baseline earnings of German migrants are a little higher than those of the Austrian migrants. Post-migration, the mean earnings of migrants rise relative to those of their co-workers, with a difference in differences of about 17 Euros/day for Austrian migrants (roughly 21% of their baseline daily earnings) and 7-9 Euros per day for German migrants (around 8-10% of their baseline daily earnings)

Similar patterns are evident in Panel 4, where we show mean log daily wages calculated over the subset of people who are working in a given quarter. Using this measure, migrants from Austria gain about 13 log points relative to their previous co-workers, with similar gains in the short and longer runs. By comparison, migrants from Germany gain about 6-7 log points, again with similar gains in the short and longer runs.[16]

To help interpret the observed gains in wages of migrants, we show the mean estimated person effects and mean estimated firm premiums received by migrants and co-workers before and after migration in panels 5 and 6 of Table 2. As noted earlier, we normalize the firm effects to have mean 0 across all person-year observations in the AKM estimation sample from which they are derived. Thus a positive difference-in-differences in the mean firm effects of migrants relative to their co-workers implies a shift toward relatively higher-paying firms. Similarly, we normalize the person effects to have mean 0 across all person-year observations in the relevant sample. Zen (2024) interprets the change in the estimated person effects for a given individual from consecutive time intervals as evidence of market learning about their abilities (as in Farber and Gibbons (1996)). Under this interpretation, a positive difference in difference in the mean person effects of migrants relative to co-workers implies that employers view migration as a demonstration of (previously unrecognized) talent. An alternative mechanism is that the migration experience actually raises the human capital of the migrants.

For Austrian migrants we see that any relative moves up the job ladder or relative changes in perceived or actual human capital are modest. For quarters 1-4, the difference in differences in mean person effects is +4 ppt while the difference in differences in mean firm effects is +1 ppt, together representing about 35% of the overall gain in migrants' wages. For quarters 5-20 the difference in differences in person effects is +3 ppt, while the gain in firm

[16]The differences in differences in mean log daily wages are smaller than the proportional gains in the level of daily earnings for both Austrians and Germans, though the gap is larger for Austrians than Germans. In part this is due to the fact that there is a gain in the probability of employment for Austrian migrants – which adds 2-3 ppts. to the mean gain in daily earnings including 0's for nonworkers – while there is a fall in the probability of employment for German migrants – which subtracts 2 ppts to their mean gain in daily earnings.

pay premiums is +2 ppt, together contributing 40% of the overall gain in migrant's wages.

5 Heterogeneity in the Returns to Migration

While the average gains to migration are positive for both Austrian and German migrants, it is important to know how the returns vary across different subgroups. Figures 4A to 4C present graphical comparisons of the profiles for employment and wages across various subgroups, while Table 3 summarizes their short-run (Q1-4) and longer-run (Q5-20) gains to migration. (This draft limits attention to Austrian migrants: the next version of the paper will present a parallel analysis for Germans). We emphasize that the comparison group for any particular subgroup of migrants is made up entirely of their own previous co-workers, reweighted to have the same age and gender distribution as the migrants, and the same employment rates in quarters -2 to 0. The importance of this feature of our design is illustrated in panel a of Figure 4A, where we show employment rates before and after migration by male and female migrants and their respective co-workers. The nearly 30 ppt. decline in employment rates of female migrants in the post-migration period is quite close to the decline exhibited by their previous co-workers, while the more modest decline in the employment rates of male migrants is quite close to that of their previous co-workers.

The wage profiles in panel b of Figure 4A suggest that the gains to migration are larger for males than females. This is confirmed in rows 2 and 3 of Table 3, where we see that both the short- and longer-run wage gains for Austrian males are around 17 ppt, whereas the gains for females are only 2 ppt. in the short run and around 4 ppt. in the longer run. As we discuss below, we see a very similar pattern of gender differences in the returns to domestic migration. We suspect that at least part of the explanation these gender gaps is that women are more likely to be "tied movers" (DaVanzo, 1976; Mincer, 1978) whose personal earnings gains from migration are small or even negative, but who are moving with a male partner whose gains are larger. Unfortunately, in our data we cannot identify partners so we cannot directly test this hypothesis.

Panels c and d of Figure 4A and rows 4 and 5 of Table 3 compare migrants who had a spell of registered unemployment just prior to moving versus those who did not. Looking first at the employment profiles in panel c, we see that the employment rate in quarter -1 was close to 0 for those who were unemployed pre-move, but nearly 80% for those who were not. Post-migration, those who were unemployed pre-move have somewhat lower employment rates than who were not, but in both cases their employment rates are not too different from those of their matched co-workers. The wage profiles in panel d show that just prior to moving the mean wages of previously unemployed migrants' dip while the mean wages of migrants with no unemployment rise, suggesting opposite patterns of selection

bias. Post migration it appears that the wage gains relative to the comparison groups are a little larger for migrants with no unemployment. This is confirmed in Table 3 where we estimate gains for the no-unemployment group of around 14 ppt, and gains for the group with unemployment of around 8-9 ppt.

One explanation for the larger wage gains of the no-unemployment group is that some of them are being transferred between establishments owned by the same firm, or between firms connected through a supply chain relationship.[17] An alternative explanation is that workers are learning from previous co-workers about the opportunities in the destination firm (as in Caldwell and Harmon (2019)) and are able to move job-to-job across the border with little or no down time. We cannot identify the owners of different workplaces in our data. To probe the importance of cross-border connections, however, we identified origin and destination establishments that are connected by 4 or more movers (in either direction) in our matched file. Under this criteria, around 10% of Austrian migrants moved to a connected establishment in Germany – a rate that is far too high to have occurred by chance. As expected, migrants between connected workplaces have a much smaller drop in pre-migration employment (see panel a of Figure 4B) and higher employment rates post migration. They also experience larger wage gains (17-18 ppt.) than other movers (12 ppt.): see rows 6 and 7 of Table 3.

The traditional theory of migration suggests that people with higher costs of migration will only move if their expected gains are larger. A standard proxy for moving costs is distance (e.g., Vanderkamp, 1971). Putting these pieces together, we might expect that the average returns to migration are higher for Austrians who have moved from parts of the country further from the German border. As shown in panels c and d of Figure 4B and rows 19 and 20 of Table 3, this is indeed the case. The average wage gains from migration are over twice as large for migrants from Vienna (which is located about 260 km from the German border) than for migrants from the border region of Austria. Interestingly, the pre-migration employment dips for migrants from Vienna and the border region are quite similar, suggesting that heterogeneity by place of origin is not driven by differences in the fraction of migrants who lost a job prior to their move. It is also not related to the gender mix of migrant flows, or to the share of migrants who move between connected establishments.

The proportional wage gains from migration may also differ systematically between higher- and lower-skilled workers. Wage distributions are compressed in Austria relative to Germany, particularly in the lower tail, at least in part because of the much higher rate of collective bargaining coverage in Austria. A simple-minded analysis might therefore suggest that the returns to migration for Austrians who move to Germany will be increasing

[17] Many auto parts manufacturers in Austria, for example, export to German auto companies or major German parts suppliers like Bosch. See https://con-labour.at/en/home/oesterreichische-autoindustrie/, last accessed March 2026.

with worker skills.[18] Panels e and f of Figure 4B present employment and wage profiles for Austrian migrants whose baseline wages were in the bottom two quintiles of all migrants or above; rows 13 and 14 of Table 3 present estimated short-run and longer-run gains for the two groups. The average returns are notably higher for migrants from the lower part of the baseline wage distribution (17-19 ppt) than for those from the upper part (around 10 ppt). Interestingly, we see similar patterns when we compare migrants who had above-average or below-average AKM person effects in the baseline period (rows 17 and 18 of Table 3), and above-average or below-average AKM firm effects in the baseline period (rows 15 and 16 of 3). We emphasize, however, that the general pattern of returns is not consistent with a one-dimensional model of heterogeneity, since male migrants gain more than female migrants (despite earning 30% higher wages), and people who move without a spell of unemployment gain more than previously unemployed migrants (despite earning 10% more).

Another fundamental dimension of heterogeneity is the duration of stay in the destination country. We divide migrants into three groups: those who are still in Germany 5 years after their index quarter ("stayers"); those who stayed in Germany at least a year then returned ("late returners"); and those who stayed in Germany less than a year ("early returners"). Figure 4C presents employment and wage profiles for these three groups of migrants and their matched co-workers, while rows 8-10 of Table 3 report their estimated short-run and longer-run returns. For reference, panel e of Figure 4C also shows the shares of early returners (and their previous co-workers) who are in registered unemployment in each month. We emphasize that the decision on if or when to return to Austria is likely driven in part by the wage and employment outcomes that migrants experience after moving (see Akee and Jones (2024), for a detailed analysis in the US context). Given that, differences in the ex post gains to migration between the three groups have to be interpreted carefully.

Starting with the stayers and late returners, we note first that the late returners earned about 7% higher wages in the baseline period. The two groups had similar dips in employment prior to their move, but after the index quarter their employment and wage profiles diverge. The stayers' employment rates decline relatively smoothly to about 85% in quarter 20, and remain consistently above the rates of their former co-workers. The late returners had similar employment rates in quarters 1-4 (while they were still in Germany) but then experience a long period of decline, ending in quarter 20 with only about 75% working. This rate is about 5 ppt lower than the employment rate of their previous co-workers – one of the largest gaps we see in our comparisons between employment rates of migrants and previous co-workers.

After migration the wages of stayers rise relative to the wages of their former co-workers,

[18] Specifically, suppose that a worker with latent skills s earns log wages of $\sigma_c s + e_c$ in country $c \in \{A, G\}$, where e_c is a country-specific random component that is uncorrelated with the probability of migration. In this case the expected return to migration is $(\sigma_G - \sigma_A)s$, which is increasing in skills if $\sigma_G > \sigma_A$.

leading to an estimated short-run gain to migration of about 15 ppt. and a longer-run gain of 19 ppt. The wages of late returners also rise immediately upon moving across the border, with gains in Q1-4 of around 14 ppt relative to their previous co-workers. But starting around a year after their index move – as their employment rates begin to fall off – the average wages of late returners stagnate. We suspect that this leveling-off reflects the fact that they are returning to Austria and earning somewhat less than they made in Germany. It may also part reflect selectivity biases in the observed wages for the subset who are working. By quarter 20, all of the late returners are in Austria, so their wages reflect pay in the Austrian labor market. Benchmarked relative to their previous co-workers, migrants who spent at least a year in Germany and returned home have wage gains of about 7% – less than the boost they would have received if they remained in Germany, but still substantial.

Finally, panels c, d, and e of Figure 4C show the profiles of employment, wages, and unemployment for the early returners and their previous co-workers. The early returners experience a large drop in employment and a sharp rise in registered unemployment in quarter 1, suggesting that they experienced labor market problems almost immediately after arriving in Germany. In the years after migration their average employment rate is relatively stable at around 75% – about 5 ppt. below the rate of their co-workers. Looking at their wage outcomes, they show some instability in the first two years after their index move, again possibly associated with the switch back to the Austrian labor market, but a more consistent trend from quarter 8 onward. Our summary measures of the gains for migration (row 9 of Table 3) show approximately 0 returns in both the short and longer runs.

6 Returns to Domestic Migration

Many people who are contemplating an international move could alternatively move to a different labor market in their home country. The costs of a domestic move are typically lower, since a change in countries often involves a change in language, adaptation to different labor market institutions, and substantial legal barriers. In our context, however, these extra costs are relatively small: Germany and Austria share the same language and labor market institutions, and the legal barriers are minor. Consistent with the absence of large adjustment costs for movers between the two countries, we see in Tables 2 and 3 that the short run gains in wages are about the same as the longer run gains. There is little evidence of the pattern of "wage assimilation" that is often found for international migrants (see e.g., Akee and Jones (2024)). It is therefore interesting to compare the economic returns to international migration between the two countries to the returns to migration within each country.

In this draft we present an analysis of the wage gains for Austrians who move from

smaller cities and rural areas to Vienna – the country's main city.[19] We focus on the move the "big city" for three main reasons. First, it simplifies the analysis, providing us with a single definition of domestic migration. Second, we need large numbers of migrants to reliably estimate the gains to migration, and mobility from outside Vienna to the Vienna region is relatively common. And third, we suspect that for many people who are contemplating an international move, migration to the big city (or one of the big cities) in their home country is a leading alternative (see Davis et al. (2002), for an analysis of Mexican migrants).

We use the ASSD data to construct a panel of migrants who were first observed working in a labor market at least 100 km away from Vienna, and were later observed working in Vienna. Paralleling our analysis of international migrants, we focus on movers who were steadily employed in the 5-12 quarters prior to their first spell in Vienna, and use the co-workers at these jobs to form a comparison group, reweighting the co-workers to have the same probabilities of employment as the migrants in the quarters -2 to 0 leading up to their move.

Table 4 presents a side-by-side comparison of Austrians who had worked continuously for 2 years at a job or series of jobs outside Vienna, and then moved to a job in Vienna (columns 1-3) or Germany (columns 4-6) within a year of their baseline period. Note that the movers to Germany in this table are a strict subset of the migrants described in Table 1, since the population in Table 1 also includes people who moved from Vienna to Germany. Nevertheless, the characteristics of the group are similar to the characteristics of the full set of international movers, with the main exception being a lower average baseline wage (reflecting the fact that movers from Vienna had relatively high pre-move wages). There are somewhat bigger differences between the people who move to Vienna and those who move to Germany. The domestic movers are a little younger at the time of their move, are somewhat less likely to have been unemployed just before moving, and had mean earnings about 5-7 ppt lower in the baseline period. Importantly, and potentially not surprisingly, the regions of origin of international movers, about 60% of whom come from border regions, differs from the the regions of origin of domestic movers who are predominately from the center and South of the country.

Figure 5 shows the profiles of employment and wages for migrants who move to Vienna and a comparison group made up of their previous co-workers. In panels a and c, we have reweighted the co-workers to have the same gender and age distribution as the migrants, while in panels b and d we use our preferred reweighting approach that also matches the employment rates of the migrants in quarters -2 to 0 up to the move. The employment and wage profiles for domestic movers are broadly similar to those of the international mi-

[19] Vienna had just over 2 million residents in 2025, more than double the sum of populations of the 2nd through 5th largest cities in Austria (Graz, Linz, Salzburg, Innsbruck, and Klagenfurt), and representing nearly 22% of the country's total population.

grants, though the post-migration increases in wages relative to their previous co-workers are smaller. This is confirmed in row 1 of Table 5, where we show the estimated difference-in-differences of wages for migrants relative to previous co-workers (using our preferred reweighing strategy) in quarters 1-4 and 5-20. The short-run boost to wages from moving to Vienna is only 1.9 ppt., while the longer-run boost is 4.0 ppt. Both are much smaller than the 12-13 ppt. boosts we estimate from moving to Germany in both the short and longer runs (reported in row 1 of Table 3). Importantly, the estimated wage gains from domestic migration are very similar if we use the simpler reweighting approach: in this case the short-run boost is 0.0 ppt., while the longer-run boost is 4.0 ppt.

The lower rows of Table 5 report the short run and longer-run wage gains from migration to Vienna for various subgroups. Looking by gender (rows 2 and 3) our estimates suggest that the gains are much smaller for women than men, as we found for international migrants. Splitting migrants by the date of their move (rows 4 and 5), we find that the gains to moving to Vienna were quite small for people who moved pre-2000, but much larger – 6 ppt in the short-run and 9 ppt in the longer run – for people who moved after 2000. We suspect this change reflects the expansion of the Viennese economy that has occurred over the past 25 years – a trend that coincided with the expansion of the EU and the integration of the former East Block countries, many of which had historical ties with Vienna. Looking separately at domestic migrants who had a spell of registered unemployment prior to their move and those who did not (rows 6 and 7), we find very small returns to migration for the previously unemployed group and larger returns for those how moved without unemployment, paralleling the results for international migrants.

We also compare migrants by their duration of stay in Vienna. Paralleling our analysis of international migrants, we divide domestic migrants into three groups: those who were still in Vienna 5 years after their index quarter ("stayers"); those who stayed in Vienna for at least a year but then moved on (for simplicity we call these "late returners", though we emphasize that they did not necessarily return to their origin labor market after leaving Vienna); and those who stayed in Vienna for less than a year ("early returners"). Panels a and b of Figure 6 show the employment and wage profiles for the stayers and late returners, along with their respective comparison groups of previous co-workers. Panels c and d show the corresponding profiles for early returners and their previous co-workers.

Starting with the stayers and late returners, the data in panel b show that in the baseline period these two groups had very similar wages (though the wage gap relative to their co-workers was larger for the late returners). Both groups experienced dips in employment prior to their move, but (as we found for similar comparisons of international migrants) their post-migration employment profiles diverge. In the first 4 years after the move, the stayers' employment rates decline smoothly, whereas the late returners experience a relatively rapid decline between months 0 and 4 before stabilizing. This pattern suggests that for many of

the late returners', the decision to move on from Vienna was related to difficulties in finding work.

After moving to Vienna the wage gap between the stayers and their previous co-workers widens relative to the baseline period; this widening continues over the follow-up period. As shown in row 8 of Table 5, the short-run boost in wages from moving to Vienna is around 3 ppt while the longer-run gain is 6 ppt. In contrast, for the late returners these is only a small boost in wages relative to their previous co-workers when they first arrive in Vienna, and this gap not widen over time. The wage gains for late returners are only 1-2 ppt in both the short run and the longer-run (see row 10 of Table 5).

Looking at the data for the early returners in panels c and d of Figure 6, we see that this group had an immediate drop in employment after the index quarter (similar to the pattern for early returning international migrants), suggesting that they had problems almost immediately after arriving in Vienna. Their wage profiles suggest very little gain in the short run relative to their previous co-workers, but more evidence of a boost in the longer run. The estimates in row 9 of Table 5 show a negligible short run return to migration for the early leavers, but a gain of around 3 ppt over quarters 5-20. Interestingly, these estimates suggest that the move to Vienna had a slightly larger long run effect on the wages of migrants who were only there for less than a year than on those who stayed longer before moving on. This does not appear to match predictions from a model in which big city workers accumulate a special type of human capital that is relatively valuable in the rest of the economy (De La Roca and Puga, 2017).

A striking result from our analysis of international migration is the relatively large wage gain associated with moving between "connected" establishments in Austria and Germany. Panels e and f of Figure 6 show the wage profiles for a parallel set of domestic movers who move between connected establishments within Austria, and their previous co-workers. As we found for the international migrants, we see that the connected domestic movers come from relatively high-wage establishments: their co-workers earned about 15% more than the co-workers of non-connected movers. But contrary to the pattern for international movers, the connected domestic movers did not earn more than their co-workers in the baseline period. They also do not seem to experience any wage gain relative to their previous co-workers, whereas the non-connected domestic movers have noticeable gains. These visual impressions are confirmed by the estimates in rows 11 and 12 of Table 5.

We conjecture that the difference between the large wage boost for connected international movers and the negligible boost for connected domestic migrants reflects differential selection. Based on their wages in the baseline period, the connected international migrants were "high flyers" who were already earning more than their co-workers. Some of these workers may have been selected by their employer to transfer internationally and follow a career track up the internal job ladder of their firm. In contrast, connected domestic mi-

grants do not stand out relative to their previous co-workers, and their moves may have little connection to within-firm career tracks.

7 Summary and Conclusions

We have used an innovative new data set based on administrative records from Austria and Germany, together with a "previous co-workers" research design, to measure the gains to international migration for movers between the two countries over the past 40 years. A key descriptive finding is that migrants from Austria to Germany, and those from Germany to Austria, are remarkably similar. Both groups are positively selected relative to other workers in their origin labor markets, and end up earning above-average wages in their destination markets. While existing theoretical models of migration often emphasize comparative advantage based incentives for migration, in the case of Austria and Germany it appears that migration flows and the gains to migration are driven by heterogeneity in skills and market-specific demands – similar to the Linder hypothesis regarding the similarity of bilateral trade flows between developed countries.

Another key set of results pertain to the heterogeneity in returns to migration in a setting where 40 percent or more of migrants return home within 5 years. Post-migration employment outcomes differ a lot between migrants who remain in the destination country, those who stay for a significant time but then return home, and those who return home quickly, with patterns suggesting that the return decision is driven at least in part by realized job outcomes in the destination. In terms of wages, the gains to migration are largest for migrants who remain in the destination country, smaller but still persistent for migrants who stay abroad at least a year, and negligible for those who return within a year. This combination of findings suggests that there is substantial risk in the migration decision, but that the option to return home provides a lower bound for wages that is no worse than never moving at all.

Our third set of findings relate the similarities and differences between international and domestic migration. In the case of Austria we find that international movers have broadly similar pre-move characteristics to people who move from smaller cities and rural areas to Vienna. The average wage gains for moving to Germany, however, are substantially larger than the returns for moving to Vienna. As with international migrants, we find that the benefits of moving to Vienna are larger for those who remain there longer term. Again, the post-migration patterns of employment and wages suggest that the decision to remain in Vienna is closely linked to realized employment outcomes, and that the option to move onward (back home or to other parts of Austria) provides a lower bound that is no worse than never moving. We also find that the wage boosts for domestic and international mi-

gration are much smaller for women than men, perhaps reflecting the importance of tied moves. Finally, we note an interesting pattern of higher wage gains to international movers who transit between connected workplaces, but no such pattern for domestic movers. Further research using information on family relationships and ownership patterns for different establishments is clearly needed to help understand these differences.

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Table 1: Descriptive Statistics of international migrants, different estimation samples

	Austrian Migrants			**German Migrants**		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.37	0.37	0.36	0.35	0.34	0.34
Age at LM Entry	20.38	20.20	20.40	21.52	21.48	21.51
Age at First Move	31.50	31.63	31.60	33.29	33.78	33.41
Move in 1980's	0.20	0.16	0.20	0.03	0.03	0.03
Move in 1990's	0.28	0.30	0.28	0.14	0.15	0.14
Move in 2000's	0.31	0.33	0.31	0.58	0.58	0.58
Move after 2010	0.20	0.21	0.20	0.25	0.25	0.26
Unemployed pre move	0.22	0.23	0.21	0.20	0.19	0.18
Connected Firm	0.11	0.12	0.12	0.10		0.10
Return in year 1	0.19	0.19	0.16	0.27		0.23
Return in years 2-5	0.23	0.24	0.24	0.27		0.27
Wage imputed	78.92	81.38	80.97	84.80	86.39	87.00
Logwage imputed	4.24	4.28	4.27	4.30	4.33	4.33
AKM person	0.13	0.14	0.14	0.11	0.12	0.13
AKM firm	0.05	0.06	0.06	0.02	0.03	0.02
AKM xb	4.06	4.07	4.06	4.17	4.17	4.17
AKM residual	0.02	0.02	0.02	0.02	0.02	0.02
Manufacturing	0.26	0.26	0.27	0.22	0.22	0.23
Construction	0.07	0.06	0.07	0.07	0.07	0.07
Sales	0.17	0.17	0.17	0.15	0.15	0.15
Hotel	0.06	0.06	0.06	0.10	0.10	0.10
Transport	0.05	0.05	0.05	0.08	0.08	0.08
Service	0.39	0.39	0.38	0.38	0.38	0.38
Austria Border regions	0.42	0.41	0.42			
Austria Center South	0.27	0.27	0.27			
Austria within 100km of Vienna	0.07	0.07	0.07			
Vienna	0.24	0.24	0.24			
Germany cities				0.16	0.17	0.16
East Germany				0.14	0.14	0.14
Other Germany				0.24	0.24	0.24
South Germany				0.29	0.29	0.29
German Border Region				0.17	0.16	0.17
Individuals	21,005	19,009	17,917	36,306	33,175	30,212

Notes: The table reports summary statistics for Austrian and German migrants in the main analysis samples. Mean characteristics are measured in quarter -5 before migration. The columns show (1) all Austrian migrants, (2) Austrian migrants with at least one co-workers in base period, (3) Austrian migrants with at least 2 AKM person and firm effects in base period and at least 2 AKM person and firm effects in quarters 1 to 4 after migration, (4) all German migrants (5) German migrants with at least one co-workers in base period (6) migrants with at least 2 AKM person and firm effects in base period and at least 2 AKM person and firm effects in quarters 1 to 4 after migration.

Table 2: Comparisons of Migrants and Co-workers, Before and After Migration

	Austrians			Germans		
	Migrants (1)	Co-workers (2)	Difference (3)	Migrants (4)	Co-workers (5)	Difference (6)
1. Share employed						
Quarters 1–4	0.96	0.93	0.03	0.94	0.96	-0.02
Quarters 5–20	0.93	0.91	0.02	0.92	0.94	-0.02
2. Share in home country						
Quarters 1–4	0.11	1.00	-0.89	0.15	1.00	-0.85
Quarters 5–20	0.29	1.00	-0.71	0.38	1.00	-0.62
3. Mean daily earnings (including 0's)						
Baseline (Q1–4 workers)	80.10	69.51	10.59	85.06	69.33	15.73
Baseline (Q5–20 workers)	80.68	69.90	10.78	84.63	69.60	15.03
Quarters 1–4	98.54	70.87	27.67	94.70	70.47	24.23
Quarters 5–20	103.12	75.28	27.84	96.67	73.93	22.74
Diff.: baseline to Q1–4	18.44	1.36	17.08	9.64	1.14	8.50
Diff.: baseline to Q5–20	23.44	5.37	17.07	11.61	4.60	7.01
4. Mean log daily wage						
Baseline (Q1–4 workers)	4.27	4.14	0.13	4.31	4.13	0.18
Baseline (Q5–20 workers)	4.28	4.15	0.13	4.31	4.13	0.18
Quarters 1–4	4.48	4.22	0.25	4.41	4.16	0.25
Quarters 5–20	4.55	4.29	0.26	4.45	4.21	0.24
Diff.: baseline to Q1–4	0.21	0.08	0.12	0.10	0.03	0.07
Diff.: baseline to Q5–20	0.28	0.15	0.13	0.14	0.08	0.06
5. Mean person effect						
Baseline (Q1–4 workers)	0.14	0.03	0.11			
Baseline (Q5–20 workers)	0.14	0.04	0.10			
Quarters 1–4	0.21	0.07	0.14			
Quarters 5–20	0.25	0.11	0.13			
Diff: baseline to Q1–4	0.07	0.04	0.04			
Diff: baseline to Q5–20	0.11	0.07	0.03			
6. Mean firm effect						
Baseline (Q1–4 workers)	0.06	0.04	0.02			
Baseline (Q5–20 workers)	0.07	0.04	0.02			
Quarters 1–4	0.09	0.06	0.03			
Quarters 5–20	0.10	0.06	0.04			
Diff: baseline to Q1–4	0.02	0.01	0.01			
Diff: baseline to Q5–20	0.04	0.02	0.02			

Notes: The table reports outcomes for migrants and their pre-migration co-workers. Columns (1)–(3) refer to Austrian migrants and columns (4)–(6) to German migrants. Baseline values are averages over quarters -12 to -5, and post-migration outcomes are reported for quarters 1–4 and 5–20. Co-workers are reweighted to match migrants in age, gender, and employment probabilities in quarters -2 to 0. The Austrian sample includes 16,235 migrants for the short run (quarters 1–4) and 15,564 for the medium run (quarters 5–20), each with at least 2 AKM observations in the baseline period and 2(8) AKM observations in the respective post-migration window, and with at least one co-worker satisfying the same requirements. The German sample includes 30,212 migrants for both horizons, subject to analogous AKM requirements.

Table 3: Heterogeneity in Returns to Migration

	Austrian Migrants		German Migrants	
	Short Run	Medium Run	Short Run	Medium Run
1. All	0.124	0.128		
	(0.002)	(0.002)		
2. Female	0.017	0.043		
	(0.004)	(0.004)		
3. Male	0.175	0.171		
	(0.002)	(0.002)		
4. No Unemployment in Base Period	0.137	0.142		
	(0.002)	(0.002)		
5. Unemployed in Base Period	0.090	0.084		
	(0.003)	(0.003)		
6. Not Connected Firm	0.116	0.120		
	(0.002)	(0.002)		
7. Connected Firm	0.177	0.173		
	(0.006)	(0.006)		
8. Stayers	0.154	0.188		
	(0.002)	(0.002)		
9. Early Returns	0.002	-0.001		
	(0.004)	(0.004)		
10. Late Returns	0.143	0.085		
	(0.004)	(0.004)		
11. Migrate Pre 2000	0.120	0.131		
	(0.002)	(0.002)		
12. Migrate Post 2000	0.128	0.126		
	(0.003)	(0.003)		
13. Low Earnings in Base Period	0.166	0.186		
	(0.002)	(0.002)		
14. High Earnings in Base Period	0.105	0.104		
	(0.002)	(0.002)		
15. Positive AKM firm effect	0.114	0.124		
	(0.002)	(0.002)		
16. Negative AKM firm effect	0.157	0.153		
	(0.003)	(0.003)		
17. Positive AKM person effect	0.111	0.112		
	(0.002)	(0.002)		
18. Negative AKM person effect	0.157	0.168		
	(0.002)	(0.002)		
19. Origin: Border Region	0.071	0.081		
	(0.003)	(0.003)		
20. Origin: Vienna	0.180	0.177		
	(0.004)	(0.004)		

Notes: The table reports difference-in-differences estimates from regressions of log wages on a time indicator, a migrant indicator, and their interaction; coefficients on the interaction term are shown. Short-run effects compare the baseline period to quarters 1–4, and medium-run effects to quarters 5–20. All regressions include moving-year fixed effects. Co-workers are reweighted to match migrants in age, gender, and employment probabilities in quarters -2 to 0 (see Table 2 for sample definitions). Low earnings refers to the bottom two quintiles of the migrant earnings distribution in the baseline period. Connected firms are employer pairs linked by at least 4 migrant transitions over 1980–2022.

Table 4: Descriptive Statistics, Austria Internal Migrants and International Migrants from same origin regions

	Migrants to Vienna			**Migrants to Germany**		
	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.38	0.39	0.38	0.37	0.37	0.35
Age at First Move	29.70	29.66	29.74	31.12	31.25	31.39
Move in 1980's	0.39	0.33	0.29	0.22	0.17	0.17
Move in 1990's	0.31	0.34	0.35	0.30	0.32	0.32
Move in 2000's	0.24	0.26	0.28	0.29	0.31	0.31
Move after 2010	0.07	0.07	0.08	0.19	0.20	0.20
Unemployed pre move	0.25	0.26	0.25	0.23	0.23	0.23
Connected Firm	0.16	0.17	0.19	0.10	0.10	0.11
Return Early	0.18	0.18	0.18	0.20	0.21	0.18
Return Later	0.27	0.28	0.27	0.23	0.24	0.25
Wage imputed	62.11	63.56	65.11	73.65	75.91	77.70
Logwage imputed	4.02	4.05	4.08	4.18	4.21	4.24
AKM person	0.02	0.02	0.04	0.09	0.10	0.11
AKM firm	-0.02	-0.01	0.00	0.04	0.05	0.06
AKM xb	4.01	4.03	4.03	4.05	4.06	4.06
AKM residual	0.01	0.01	0.01	0.02	0.02	0.02
Manufacturing	0.27	0.27	0.28	0.30	0.31	0.32
Construction	0.10	0.09	0.10	0.07	0.07	0.07
Sales	0.23	0.23	0.23	0.16	0.16	0.16
Hotel	0.04	0.03	0.03	0.08	0.07	0.07
Transport	0.04	0.04	0.04	0.05	0.05	0.05
Service	0.32	0.33	0.32	0.34	0.34	0.34
Border region	0.23	0.22	0.22	0.60	0.60	0.60
Center /South	0.77	0.78	0.78	0.39	0.40	0.40
Individuals	43,139	37,419	31,205	14,430	12,977	11,053

Notes: The table compares Austrian workers moving from locations at least 100 km outside Vienna to Vienna (columns 1–3) with those moving from the same regions to Germany (columns 4–6). Mean characteristics are measured in quarter -5 before migration. Columns (1) and (4) include all migrants, columns (2) and (5) restrict to migrants with at least one co-worker in the baseline period, and columns (3) and (6) further require at least 2 AKM person and firm effects in the baseline period and at least 2 in quarters 1–4 after migration.

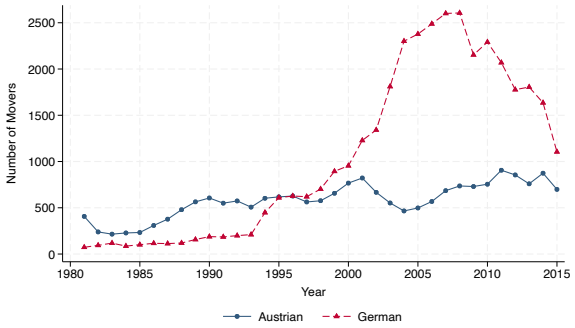
Table 5: Migrants within Austria: Returns to migration for full sample and subgroups

	Short Run	Medium Run
1. All	0.019	0.040
	(0.001)	(0.001)
2. Female	0.005	0.021
	(0.002)	(0.002)
3. Male	0.025	0.047
	(0.002)	(0.002)
4. Move pre 2000	0.003	0.019
	(0.001)	(0.001)
5. Move post 2000	0.059	0.090
	(0.002)	(0.002)
6. No Unemployment	0.023	0.046
	(0.001)	(0.001)
7. Unemployed	0.007	0.003
	(0.002)	(0.002)
8. Stayers	0.027	0.056
	(0.002)	(0.002)
9. Early Returns	0.002	0.032
	(0.003)	(0.003)
10. Later Returns	0.016	0.014
	(0.002)	(0.002)
11. Not connected	0.029	0.054
	(0.001)	(0.001)
12. Connected	-0.008	-0.003
	(0.006)	(0.006)

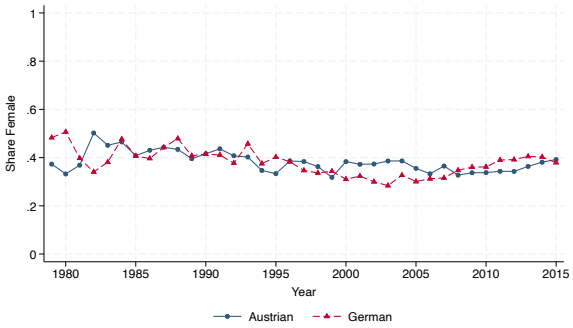
Notes: The table reports difference-in-differences estimates from regressions of log wages on a time indicator, a migrant indicator, and their interaction; coefficients on the interaction term are shown. Short-run effects compare the baseline period to quarters 1–4, and medium-run effects to quarters 5–20. All regressions include moving-year fixed effects. The sample includes Austrian migrants moving from locations at least 100 km outside Vienna to Vienna and their baseline co-workers, reweighted to match migrants in age, gender, and employment probabilities in quarters -2 to 0. The sample includes 31,205 migrants for the short run and 28,892 for the medium run, each with at least 2 AKM observations in the baseline period and the respective post-migration window, and with at least one co-worker satisfying the same requirements.

Figure 1: Selection of first-time migrants by year of migration

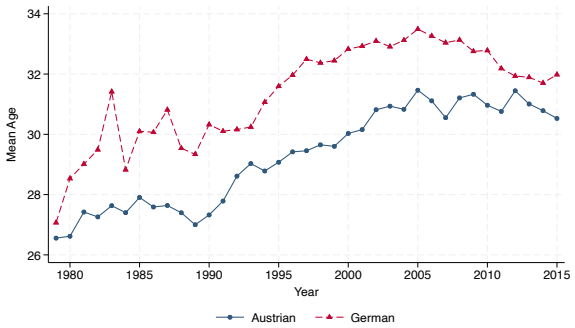
(a) Number of Movers



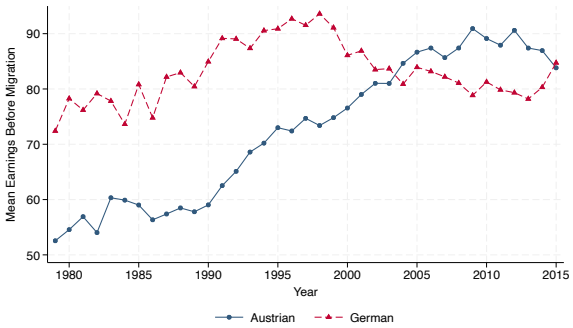
(b) Share Female



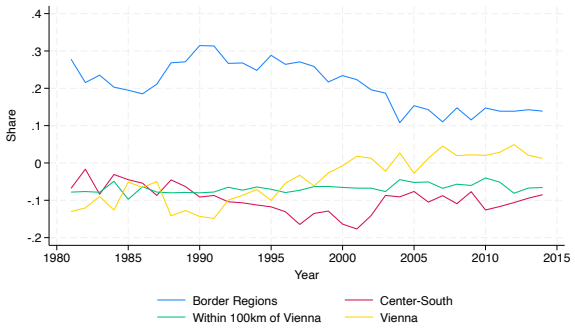
(c) Age at First Move



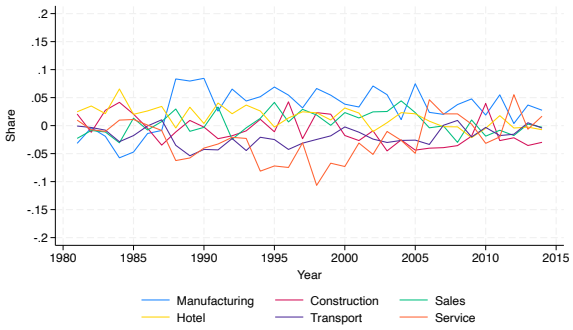
(d) Earnings in Base Period



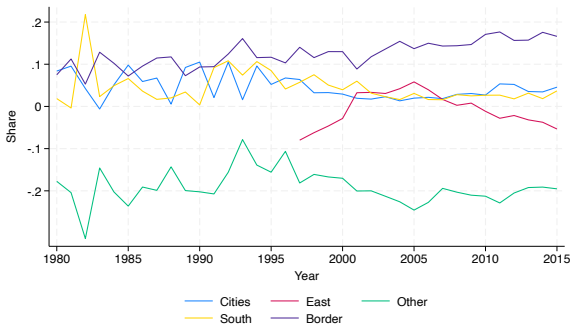
(e) Origin Regions Austrian Migrants



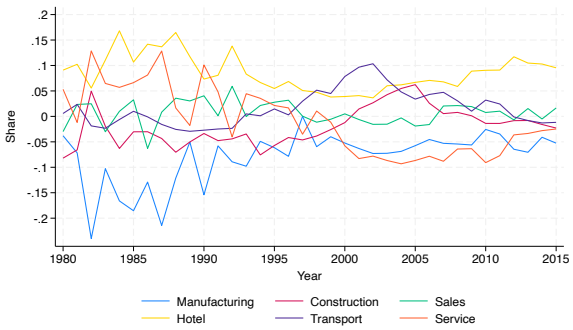
(f) Origin Industries Austrian Migrants



(g) Origin Regions German Migrants



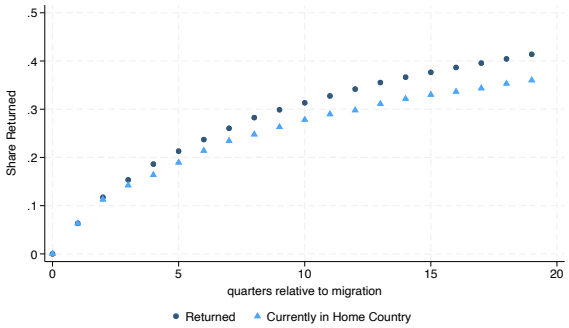
(h) Origin Industries German Migrants



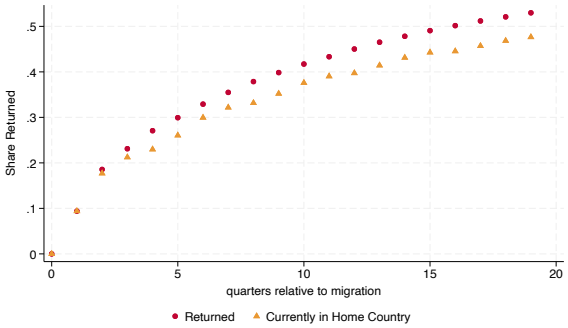
Notes: Panel (a) shows the number of new migrants moving each year and the remaining panels show average characteristics of new movers. Panels (e) to (h) show the share of Austrian/German migrants across origin regions and industries compared to the overall employment shares in the respective regions and industries (employment shares migrants - employment shares full population).

Figure 2: Return to Home Country

(a) Austrians



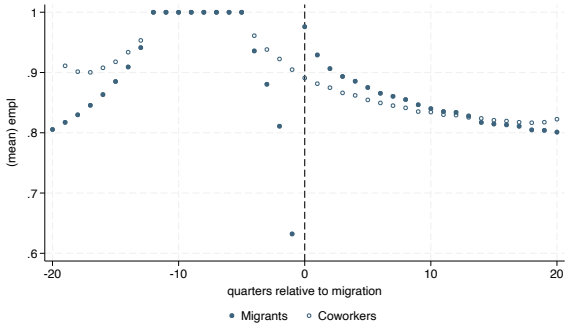
(b) Germans



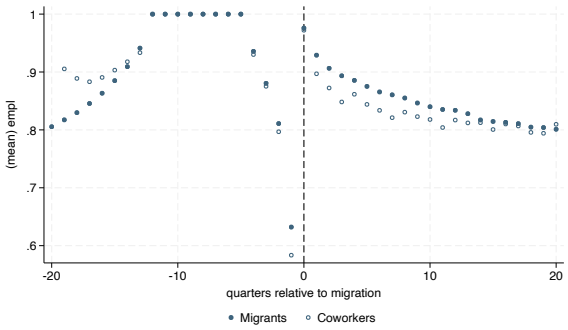
Notes: Figure shows returns relative to the index quarter measured by the share of migrants who have returned to their home country by the current quarter (dots) and the share of migrants who are in the home country in the current quarter (triangles). The gap between the dots and triangles shows the share of circular migrants.

Figure 3A: Employment Profiles of Migrants and co-workers

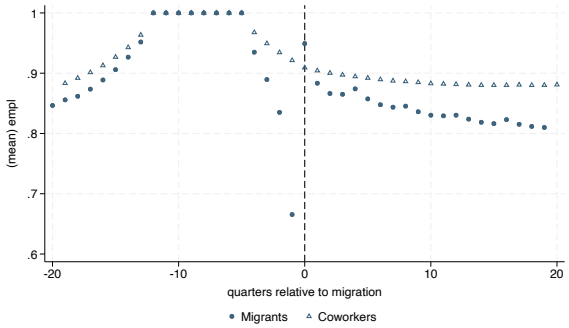
(a) Austrians, cow age-gender weighted



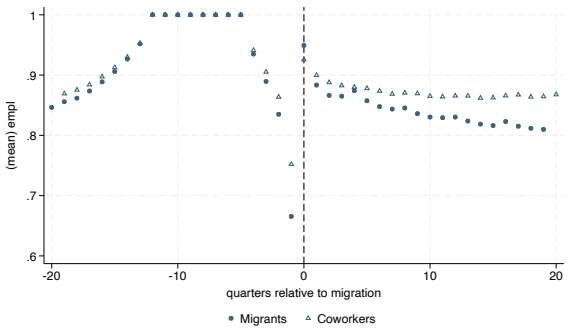
(b) Austrians, cow age-gender-employment weighted



(c) Germans, cow age-gender weighted

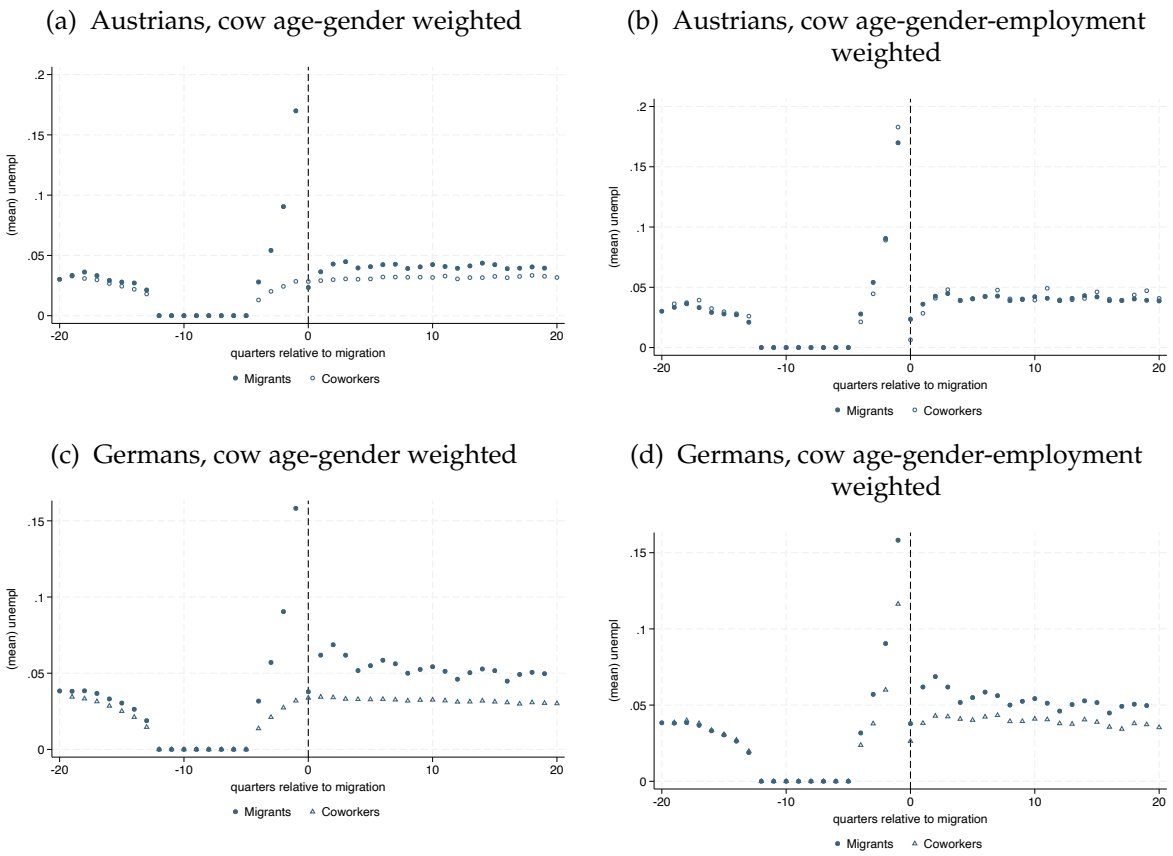


(d) Germans, cow age-gender-employment weighted



Notes: co-workers are reweighted by network size, age, gender in panels a and c. In panels b and d co-workers are re-weighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian and German migrants to the other country shown in columns (1) and (4) in Table 1 and their co-workers.

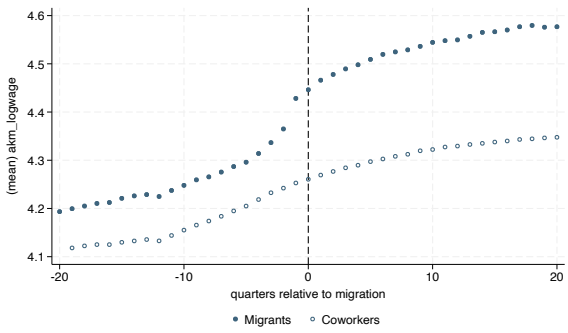
Figure 3B: Unemployment Profiles of Migrants and co-workers



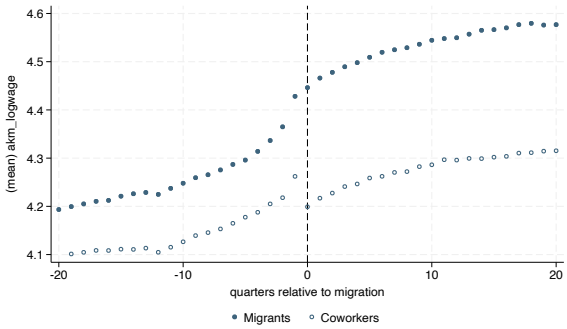
Notes: This figure shows career outcomes of migrants and their co-worker around the index quarter. co-workers are reweighted by size, age, gender in panels a and c. In panels b and d co-workers are re-weighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian and German migrants to the other country shown in columns (1) and (4) in Table 1 and their co-workers.

Figure 3C: Log Wage Profiles of Migrants and Co-workers

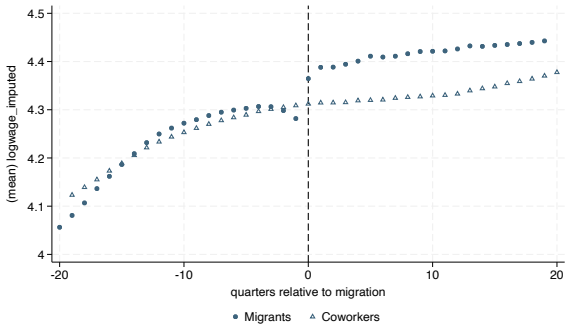
(a) Austrians, cow age-gender weighted



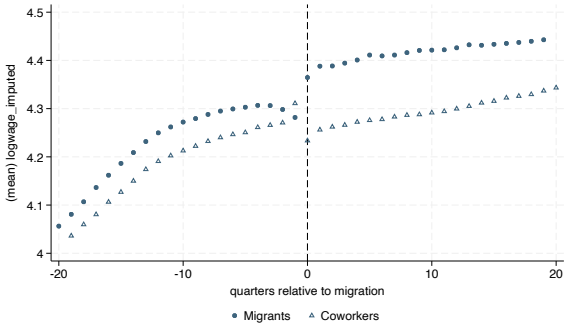
(b) Austrians, cow age-gender-employment weighted



(c) Germans, cow age-gender weighted



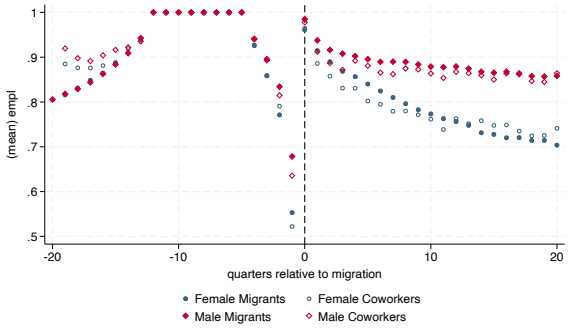
(d) Germans, cow age-gender-employment weighted



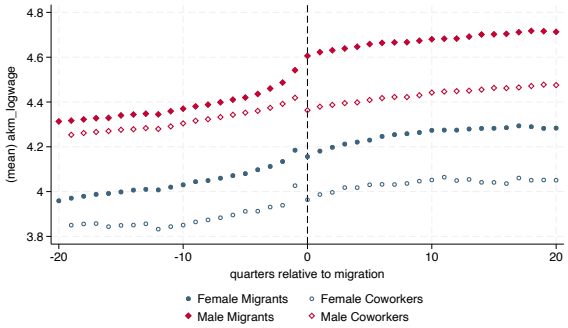
Notes: This figure shows career outcomes of migrants and their co-worker around the index quarter. Co-workers are reweighted by network size, age, gender in panels a and c. In panels b and d co-workers are re-weighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian and German migrants to the other country shown in columns (1) and (4) in Table 1 and their co-workers.

Figure 4A: Heterogeneity in Career Profiles of Austrian Migrants and Co-workers

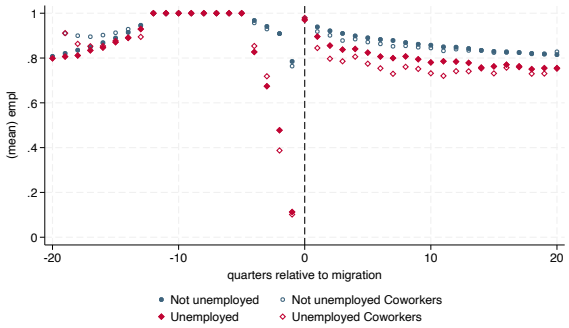
(a) By Gender: Employment



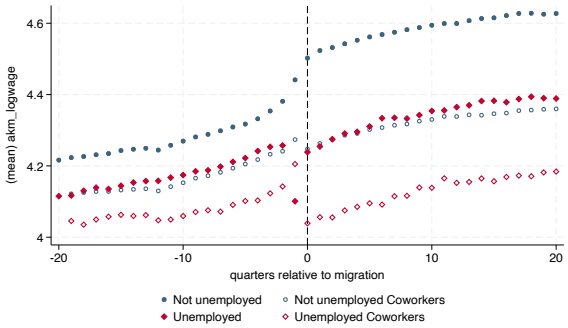
(b) By Gender: Logwage



(c) By Unemployment Experience: Employment



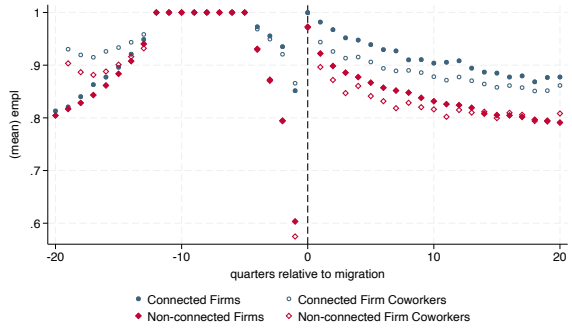
(d) By Unemployment Experience: Logwage



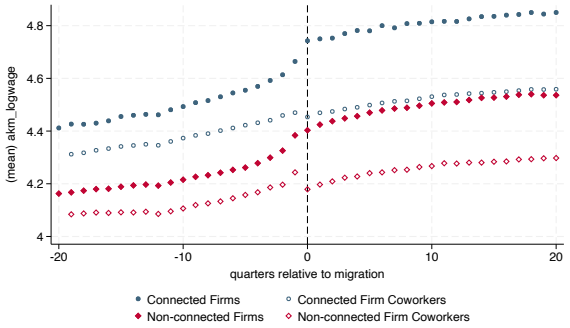
Notes: This figure shows career outcomes of migrants and their co-worker around the index quarter. Co-workers are reweighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian migrants to the other country shown in columns (1) in Table 1 and their co-workers.

Figure 4B: Heterogeneity in Career Profiles of Austrian Migrants and Co-workers

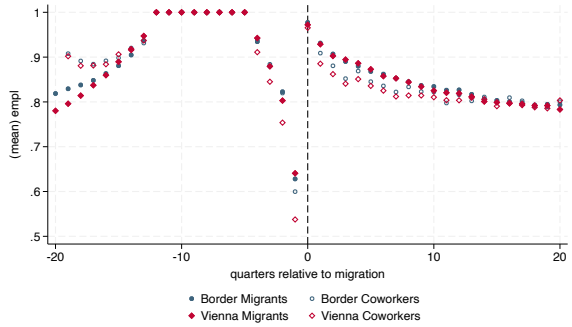
(a) By Firm Connection: Employment



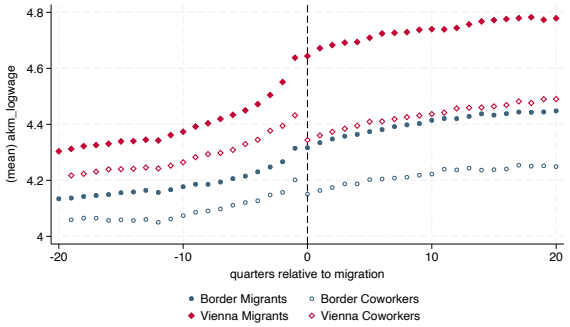
(b) By Firm Connection: Logwage



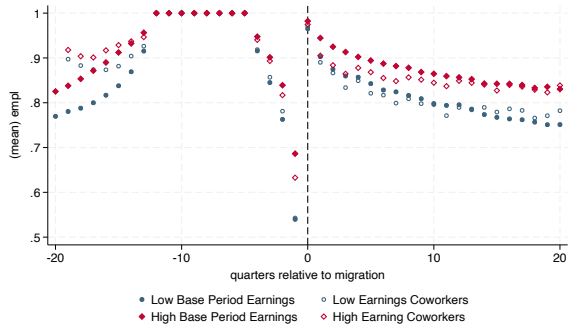
(c) By Location: Employment



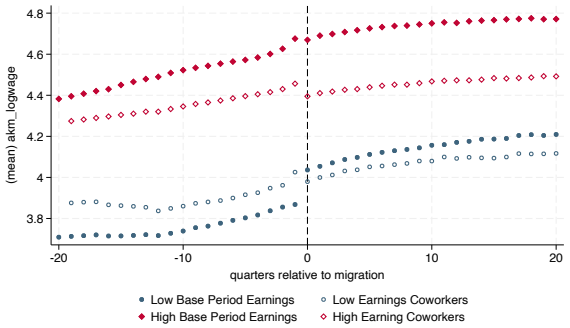
(d) By Location: Logwage



(e) By Pre migration Earnings: Employment



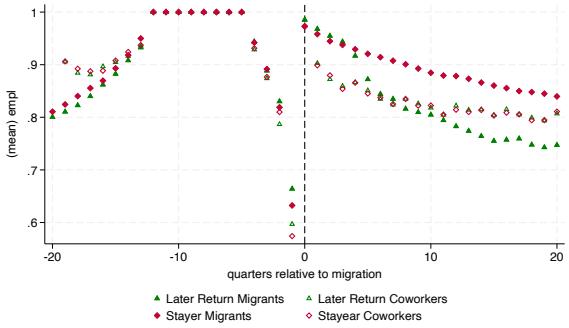
(f) By Pre migration Earnings: Logwage



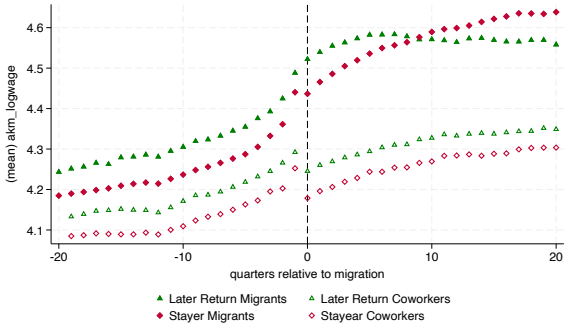
Notes: This figure shows career outcomes of migrants and their co-worker around the index quarter. Co-workers are reweighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian migrants to the other country shown in columns (1) in Table 1 and their co-workers.

Figure 4C: Heterogeneity in Career Profiles by Return Groups

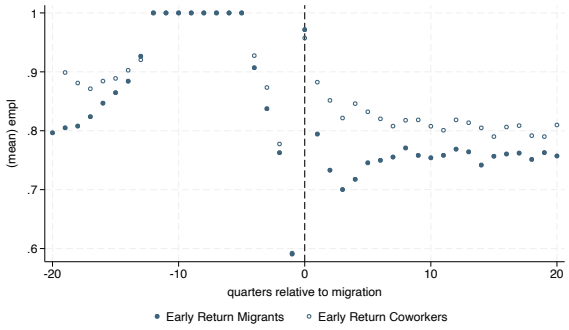
(a) Employment



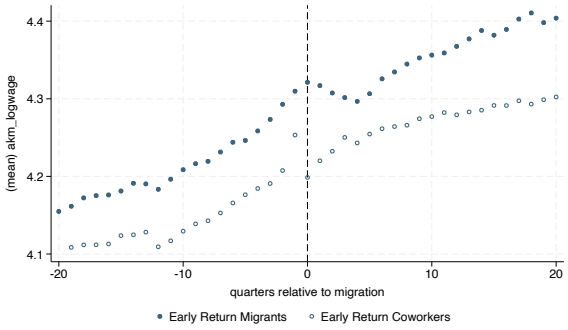
(b) Logwage



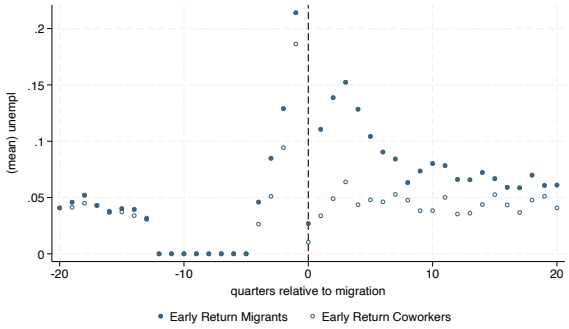
(c) Employment



(d) Logwage

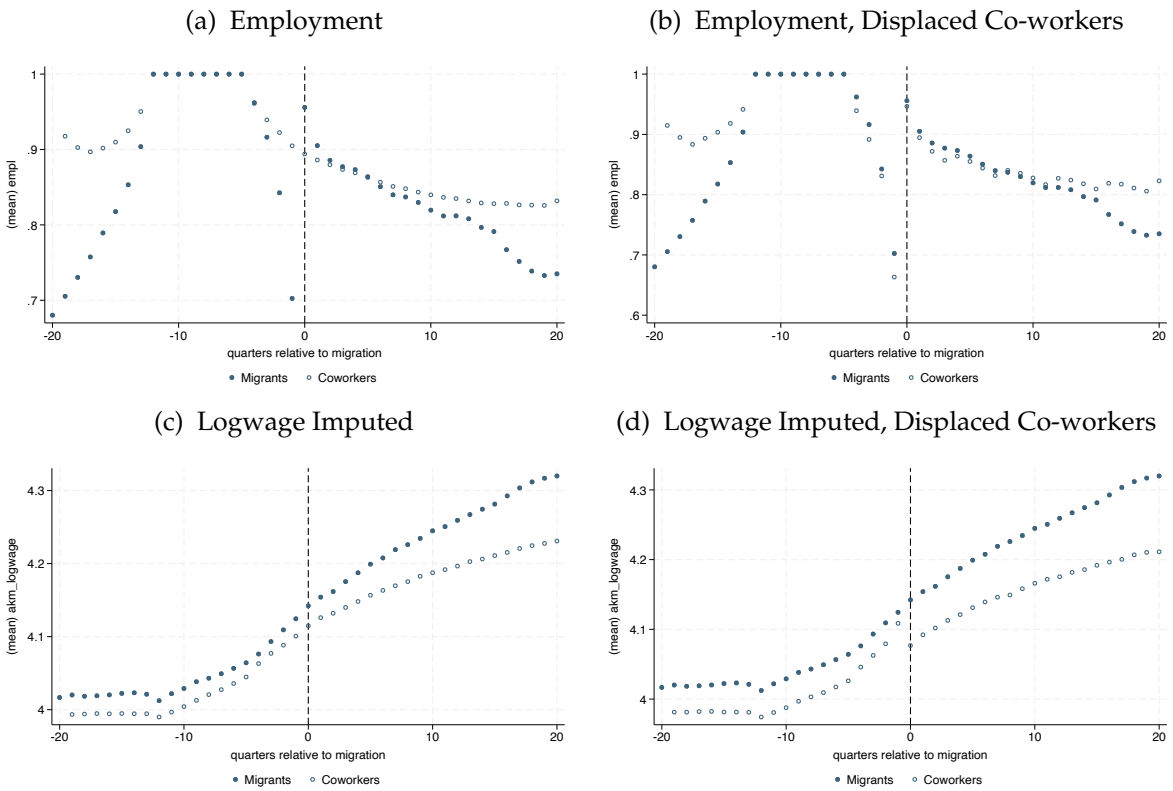


(e) Unemployment



Notes: Co-workers are reweighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian migrants to the other country shown in columns (1) in Table 1 and their co-workers.

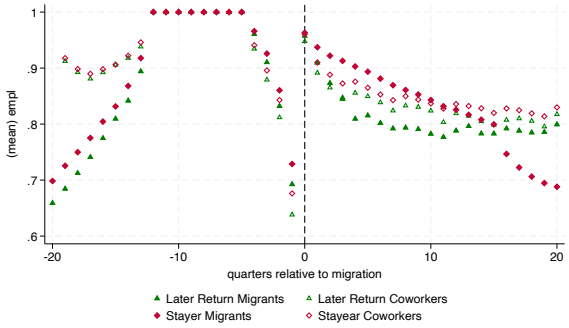
Figure 5: Career Profiles of Domestic Migrants within Austria and Co-workers



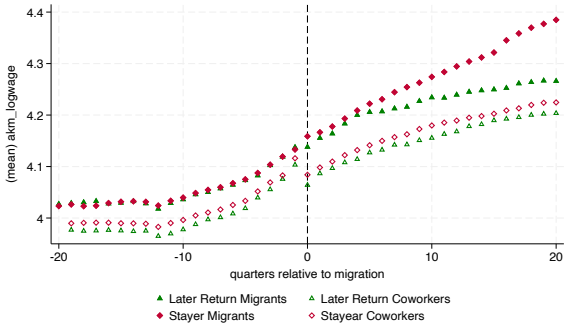
Notes: Co-workers are reweighted by network size, age, gender in panels a and c. In panels b and d co-workers are reweighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian migrants to Vienna shown in columns (1) and (4) in Table 4 and their co-workers.

Figure 6: Migrants within Austria: Heterogeneity in Profiles

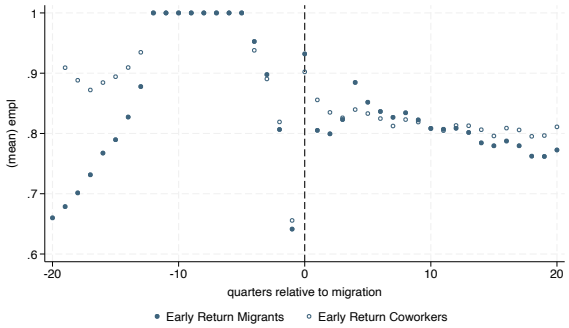
(a) By Return: Employment



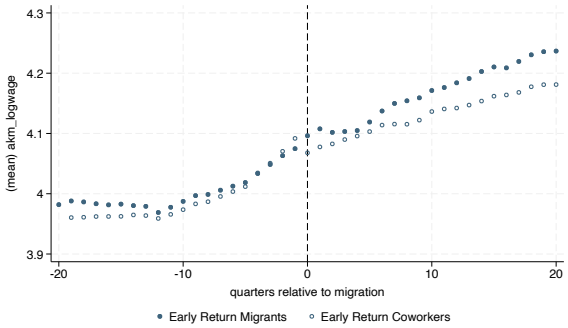
(b) By Return: Log wage



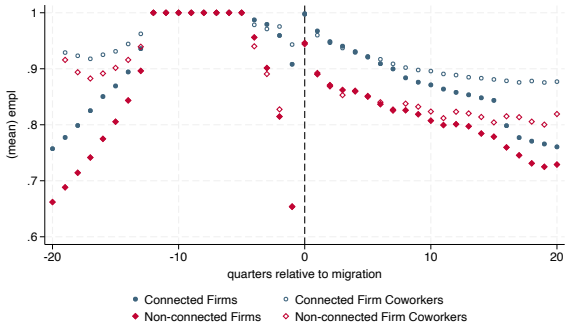
(c) Early Return: Employment



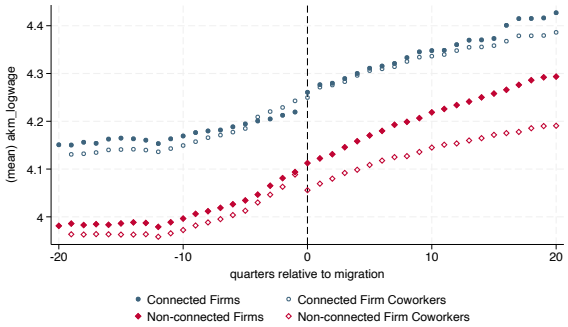
(d) Early Return:Logwage



(e) By Firm Connection: Employment



(f) By Firm Connection: Logwage



Notes: Co-workers are re-weighted by network size, age, gender, employment in quarters 0, -1, -2. The sample includes all Austrian migrants to Vienna shown in columns (1) and (4) in Table 4 and their co-workers.

Supplemental Appendix

A Additional tables and figures

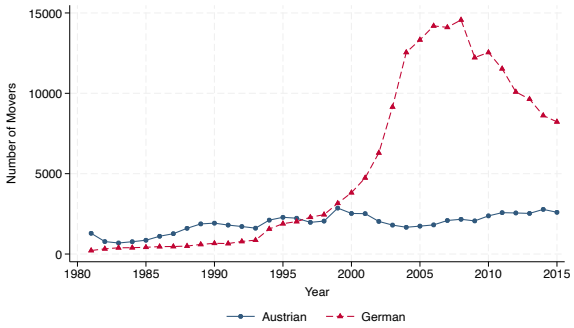
Table A1: Sample Construction

		Nb of migrants	Share Female	Age at LM entry	Age at first move	Return within 3 years	East German
Austrians							
(1)	Move to the other country after a continuous 2-year employment period in the home country	71,980	0.37	19.70	31.54	0.41	
(2)	Employed in baseline period	30,615	0.37	20.08	30.85	0.37	
(3)	Age 20-45 move 1980 or later	24,960	0.38	19.72	29.95	0.36	
(4)	No apprentices in baseline period	21,097	0.37	20.38	31.49	0.34	
(5)	Employed or unemployed in moving quarter	21,005	0.37	20.38	31.50	0.34	
Germans							
(1)	Move to the other country after a continuous 2-year employment period in the home country	196,825	0.39	22.28	34.58	0.53	0.12
(2)	Employed in baseline period	84,161	0.43	21.74	34.16	0.52	0.17
(3)	Age 20-45 move 1980 or later	63,336	0.43	20.30	29.56	0.53	0.18
(4)	No apprentices in baseline period	39,208	0.38	21.47	33.28	0.46	0.14
(5)	Employed or unemployed in moving quarter	36,306	0.35	21.52	33.29	0.45	0.14

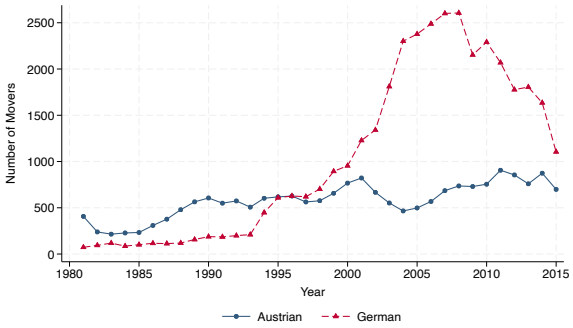
Notes: This table shows the steps to arrive at the analysis samples of Austrian and German migrants, starting with all migrants that have a substantial period of employment in their home country before moving to the other country, shown in Row (1) of each panel.

Figure A1: Selection

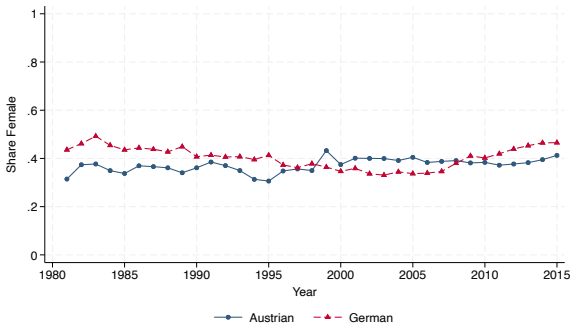
(a) Number of Movers



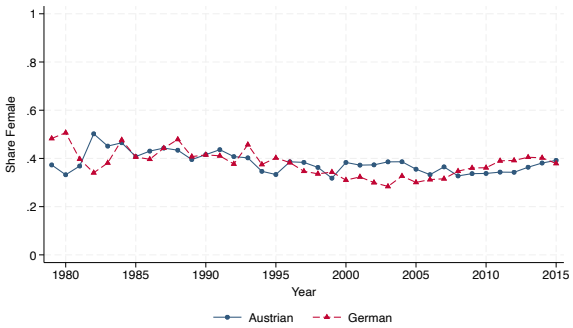
(b) Estimation Sample



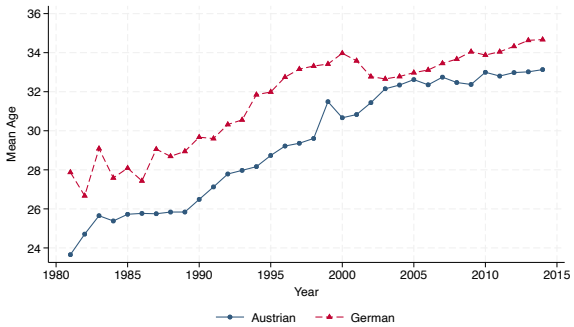
(c) Share Female



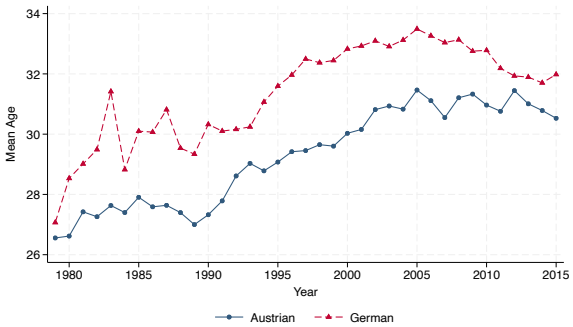
(d) Estimation Sample



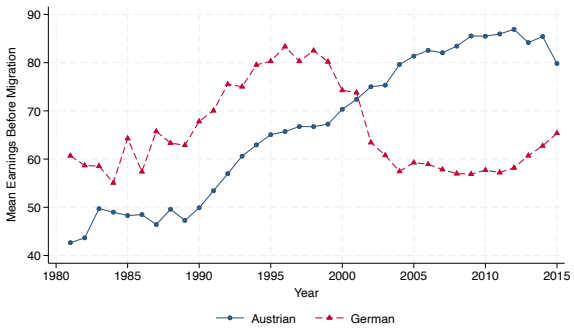
(e) Age at first migration



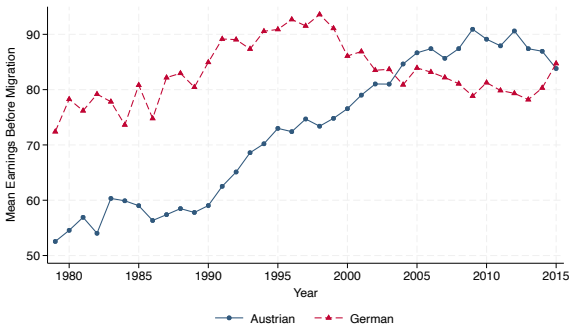
(f) Estimation Sample



(g) Earnings in first job

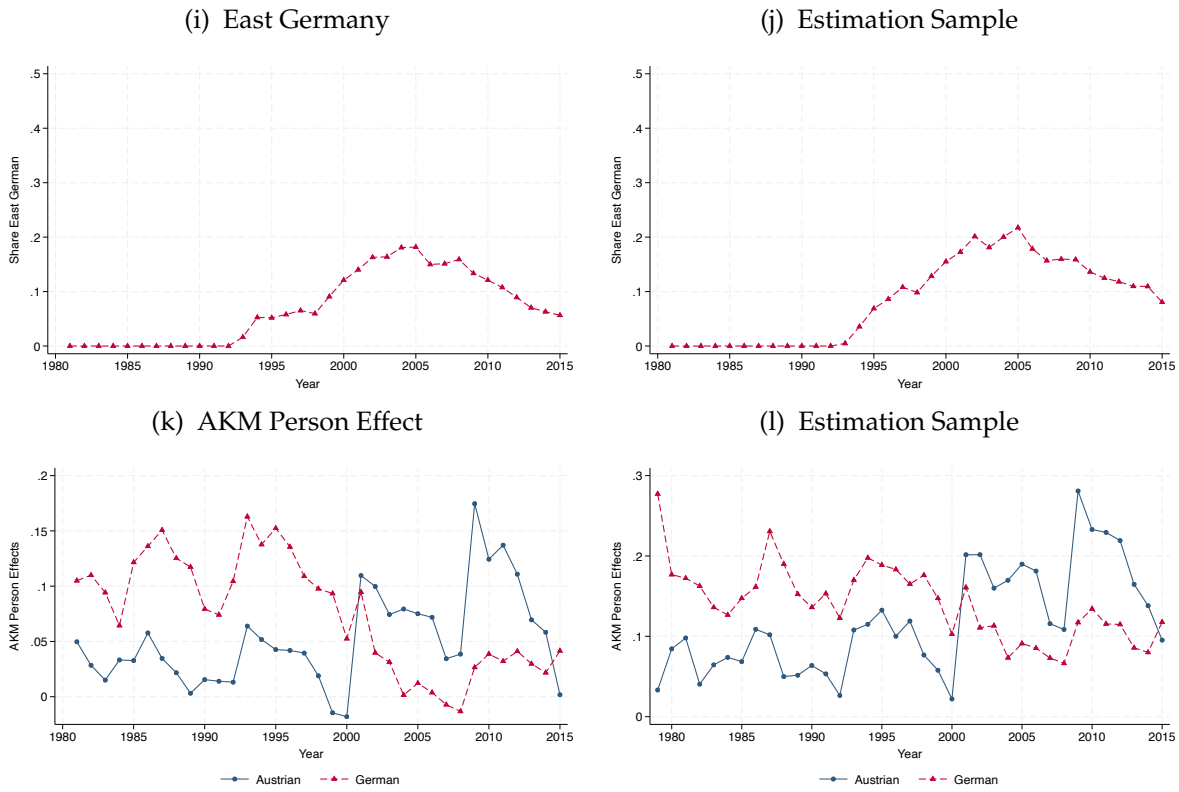


(h) Estimation Sample: Earnings in Base Period



Notes: Comparison of sample in row (1) of Appendix table A1, migrants first moving to other country after a 2 year job in home country (left column) and row (5) of Appendix table A1, migrants with the additional restrictions of being employed in the base period, aged 20-45 at the first move, moving after 1980, without apprenticeships in base period, and employed or unemployed in quarter 0 (right column).

Figure A1: Selection (continued)



Notes: Comparison of sample in row (1) of Appendix table A1, migrants first moving to other country after a 2 year job in home country (left column) and row (5) of Appendix table A1 migrants with the additional restrictions of being employed in the base period, aged 20-45 at the first move, moving after 1980, without apprenticeships in base period, and employed or unemployed in quarter 0 (right column).

B Institutional setting

General: Austria joined the European Economic Area (EEA) on January 1, 1994, and the European Union (EU) on January 1, 1995. Germany, as a founding member of both the EEA and the EU, had already been part of these frameworks. The freedom of movement of workers within the EU was established with the *Maastricht Treaty* in 1992: EU citizens are entitled to seek employment in another EU country, are allowed to work and reside there without needing a work permit, and may stay even after employment has ended. Moreover, EU citizens have the right to equal treatment with nationals in access to employment, working conditions, and all other social and tax advantages. The *Schengen Agreement* was implemented on December 1, 1997. It abolished all internal borders between its members, including Austria and Germany, thereby rendering checks on persons at internal borders obsolete.

Social security: Social security coordination between Austria and Germany is governed by EU Regulation (EC) No. 883/2004, effective since May 2010, which ensures that individuals pay contributions to the social security system of the country where they work, regardless of their country of residence. This regulation also provides mechanisms for the aggregation of insurance periods across both countries, allowing cross-border workers and migrants to qualify for social benefits such as pensions, healthcare, and unemployment benefits based on combined contribution records. Benefits are generally paid by the institution of the country where the insured person resides or moves to, but calculated based on total periods accumulated in all member states.[20] Before 2010, Regulation (EEC) No. 1408/71 governed social security coordination since 1972, establishing similar principles of single-state coverage and coordination for benefits across borders.[21] Regarding unemployment benefits (Arbeitslosengeld), individuals who become unemployed in one country but have worked in the other can export their entitlement for up to three months while seeking employment abroad. The coordination rules also allow periods of insurance in one country to count towards qualifying for unemployment benefits in the other.

Taxation: The taxation of employment income between Austria and Germany is governed by the Double Taxation Agreement (DBA) in force since 2003, which is based on the OECD Model Convention Lang et al. (2002). Under this framework, employment income is taxed exclusively in the country where the work is physically performed, while the country of residence exempts the income using the exemption with progression method Kofler (2005). Thus, Germans living and working in Austria are subject to Austrian income tax, while Austrians living and working in Germany are taxed under German income tax law. Prior to 2003, a special Grenzgängerregelung applied under the 1954 DBA, allowing daily

[20] Regulation (EC) No. 883/2004
[21] Regulation (EEC) No. 1408/71

cross-border commuters to be taxed in their country of residence, provided they returned home each working day Gassner and Lang (2002). This rule applied from 1980 until its abolition in 2003, after which the source-based taxation principle became the standard between both countries.

Exchange rate: There has been little uncertainty regarding the exchange rate between the Austrian and German currencies during the relevant time period. Since the introduction of the Euro on January 1, 1999, both countries have shared a common official currency, and from January 1, 2001, also a common day-to-day operating currency. Prior to that, the Austrian central bank had unofficially pegged the Austrian Schilling to the Deutschmark since the late 1970s (Androsch, 1985)

Skill portability Portability of skills between Germany and Austria is very high due to the equivalence of degrees, the similarity of their education systems, the common language, and the right to equal treatment within the EU. Since July 1, 1990, a bilateral agreement between Austria and Germany guarantees the equivalence of professional certificates, except for occupations requiring a state examination.[22] Additionally, both countries share a dual system of vocational training, commonly known as the apprenticeship education system. Before this agreement, recognition of professional qualifications was less formalized and often required case-by-case approval, creating administrative hurdles and limiting cross-border professional mobility.

C Estimation of AKM models

This section describes the estimation of a set of AKM models as in Abowd et al. (1999), estimated separately for Germany and Austria, following the approach of Card et al. (2013). For Germany, we use data from the *Integrated Employment Biographies (IEB)*, which contain information on the universe of workers in employment subject to social security in Germany. For Austria, we use data from the *Austrian Social Security Database (ASSD)*. We consider data from 1978 to 2023; data for East Germany are included from 1992 onward. The data for both Germany and Austria include information on total (gross) earnings and the number of days worked in each job per year for nearly all private-sector employees (civil servants and the self-employed are not included). Our focus is on male and female employees aged 20 to 60 years, excluding marginal employees and apprentices.[23]

As the ASSD does not contain information on part-time status, we include both full-time and part-time employees for both countries (unlike Card et al. (2013)). Based on data from the European Labour Force Survey available from 1995 onward, the share of part-time employment in total employment has evolved at a similar level in Austria and Germany.

[22] Berufsbildungsabkommen Österreich - Deutschland

[23] In Germany, approximately 4.5 million individuals were employed exclusively in marginal jobs, while 1.3 million worked as apprentices in 2023.

In both countries, the part-time share has increased substantially over time: in Germany, it rose from 16.4% in 1995 to 28.4% in 2023, and in Austria from 13.8% to 30.4% over the same period.[24]

From the universe of employment spells, we construct a person-year dataset. For workers who have more than one job during the year, we select the main job per person and year. We sum the earnings received by a given individual from the main job in each year and obtain the daily wage by dividing the total earnings by the number of days worked (including weekends and holidays). Wages are adjusted for inflation using the Consumer Price Index in the respective country (base year 2000). Employees with daily earnings below 10 Euro (2000 prices) are excluded from the sample.

In both the data for Germany and Austria, earnings are right-censored at the contribution assessment ceiling. In the ASSD, following Card et al. (2013), we fit a series of Tobit models to impute the right tail of the wage distribution.[25] We estimate the Tobit regressions by year, sex, and age group (four 10-year ranges). The model includes the variables age, the worker's mean log wage in other years, the fraction of censored wages in other years, establishment size and its square, a dummy for individuals observed for only one year, a dummy for employees in one-worker establishments, a dummy for employees at establishments with 10 or fewer workers, the mean log wage of co-workers in the current year (i.e., the "leave out mean" of log wages at his or her employer), and the fraction of co-workers with censored wages in the current year. Using the estimated parameters of these models, we replace each censored wage value with a random draw from the appropriate conditional wage distribution. In the IEB data, each censored wage value is replaced with an imputed wage provided by Drechsler and Ludsteck (2025).[26]

Given the lack of education data in the ASSD, the time-varying covariates included in the AKM model comprise year dummies and an age function including quadratic and cubic terms, with age deviated from 40 (similar to Card et al. (2025)). The AKM effects are estimated separately for the time intervals 1978-1984, 1985-1991, 1992-1999, 2000-2007, 2008-2015, and 2016-2023. In the first two periods (1978-1984 and 1985-1991) only individuals employed in West Germany are included in the data for Germany.

Table C2 summarizes the estimation results for the six time intervals in our analysis for Germany (upper panel) and Austria (bottom panel).

[24] Data retrieved in March 2026 from Eurostat (https://doi.org/10.2908/LFSA_EPPGA). The data refer to all employed persons aged 25–64 according to the ILO concept (including self-employed, civil servants, and other groups not covered in our sample). For comparison, the part-time rate among employees subject to social security contributions in Germany was approximately 30.0% in 2023, very similar to that of all employed persons.

[25] In contrast to the data used in Card et al. (2013) in the ASSD, we do not have (complete) information on education.

[26] The imputation is similar to Card et al. (2013). In particular, the model also includes leave-one-out-means.

Table C2: Estimation Results for AKM Model, Fit by Interval

	Interval 1 1978-84 (1)	Interval 2 1985-91 (2)	Interval 3 1992-99 (3)	Interval 4 2000-07 (4)	Interval 5 2008-15 (5)	Interval 6 2016-23 (6)
I. GERMANY						
Person and Establ. Parameters						
N person effects	24,135,630	26,280,155	35,667,472	33,348,050	34,240,348	38,527,834
N establ. effects	1,832,072	2,030,679	3,087,201	3,083,712	2,881,677	2,916,235
Std. dev. person effects	0.369	0.389	0.385	0.406	0.428	0.426
Std. dev. establ. effects	0.203	0.229	0.256	0.290	0.294	0.265
Std. dev. Xb effects	0.063	0.100	0.051	0.059	0.079	0.074
Corr. person/establ. effects	0.073	0.101	0.160	0.172	0.242	0.282
Corr. person/Xb effects	0.041	0.007	0.008	0.037	-0.019	-0.053
Corr. establ./Xb effects	0.074	0.049	0.019	0.080	0.053	0.041
RMSE AKM residual	0.138	0.151	0.161	0.169	0.174	0.183
Adjusted R^2	0.911	0.910	0.904	0.911	0.917	0.904
Comparison to match model						
RMSE match model	0.111	0.124	0.130	0.131	0.135	0.142
Adjusted R^2 match model	0.941	0.939	0.937	0.944	0.949	0.940
Std. dev. match effect	0.081	0.086	0.096	0.106	0.109	0.115
Addendum						
Std. dev. log wages	0.460	0.503	0.519	0.566	0.566	0.588
II. AUSTRIA						
Person and Establ. Parameters						
N person effects	2,755,715	2,915,665	3,337,817	3,579,463	4,061,026	4,635,005
N establ. effects	234,417	255,169	353,656	377,647	367,362	372,150
Std. dev. person effects	0.370	0.381	0.404	0.425	0.441	0.442
Std. dev. establ. effects	0.226	0.235	0.253	0.256	0.255	0.249
Std. dev. Xb effects	0.055	0.083	0.056	0.052	0.055	0.074
Corr. person/establ. effects	0.018	0.038	0.073	0.120	0.125	0.077
Corr. person/Xb effects	0.067	0.028	-0.003	-0.037	-0.024	-0.039
Corr. establ./Xb effects	0.028	0.013	-0.009	-0.016	-0.007	0.024
RMSE AKM residual	0.133	0.140	0.164	0.176	0.183	0.205
Adjusted R^2	0.916	0.916	0.900	0.896	0.894	0.866
Comparison to match model						
RMSE match model	0.106	0.113	0.132	0.142	0.151	0.173
Adjusted R^2 match model	0.946	0.945	0.935	0.932	0.928	0.903
Std. dev. match effect	0.080	0.083	0.097	0.104	0.104	0.109
Addendum						
Std. dev. log wages	0.462	0.485	0.520	0.549	0.566	0.562

Notes: Results from estimating AKM models following Card et al. (2013). Time-varying covariates include year dummies and quadratic plus cubic terms in age. Match model additionally includes a separate dummy for person–establishment pair. The standard deviation of the match effect is estimated as the square root of the difference in mean squared errors between the AKM and the match effects model. For Germany, the first two intervals include only individuals employed in West Germany.