The Integration of Migrants in the German Labor Market: Evidence over 50 Years*

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Germany has become the second-most important destination for migrants worldwide. Using all waves from the *microcensus*, we study their labor market integration over the last 50 years and highlight differences to the US case. Although the employment gaps between immigrant and native men decline after arrival, they remain large for most cohorts; the average gap after one decade is 10 pp. Conversely, income gaps tend to *widen* post-arrival. Compositional differences explain how those gaps vary across groups, and why they worsened over time; after accounting for composition, integration outcomes show no systematic trend. Still, economic conditions do matter, and employment collapsed in some cohorts after structural shocks hit the German labor market in the early 1990s. Lastly, we examine the integration of recent arrivals during the European refugee "crisis" and the Russo-Ukrainian war.

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1 Introduction

Immigration ranks among the most debated policy issues in Europe, and migrant flows are likely to remain high for decades to come (Hanson & McIntosh, 2016). The German case is particularly interesting: Since the recruitment of the first so-called "guest workers" in the late 1950s, Germany gradually became the world's second-most important migrant destination in absolute numbers (after the US). By 2021, the share of foreign-born reached 17.1%, rising to 27.3% when including second-generation migrants (DESTATIS, 2021).[1] They form an integral part of Germany's economy, but the realization that Germany has become a classic immigration country ("Einwanderungsland") is quite recent. Most immigration episodes took Germany by surprise and were accompanied by controversial political debates rather than positive narratives about the opportunities of immigration. Contrary to other destination countries, it took until the 2000s for Germany to adopt explicit integration policies for immigrants. Accordingly, their labor market integration was long neglected by policy makers and, until the 1990s, only marginally discussed by researchers.

In this paper, we provide comprehensive evidence on the labor market integration of immigrants in West Germany over the last 50 years. For that purpose, we use cumulated data from 34 waves of the weakly anonymized (i.e., on-site) version of the *microcensus*, an administrative survey that covers 1% of the resident population in Germany in each of its waves – resulting in more than 24 million individual observations over the years. Compared to more commonly used sources[2], the (pooled) microcensus combines three key advantages: it is representative of the total population, including the self- and non-employed (unlike social security registers and derived data sets); it offers large sample sizes (unlike surveys such as the Socio-Economic Panel); and immigrants are included right after arrival, not only when entering the labor force or when refreshment samples are taken. Although being the best data source to study the long-run integration of different immigrant groups in Germany, this is the first study to employ such a broad set of harmonized waves from the microcensus.[3] Our study focuses on male immigrants, as the labor market attachment of women varies across origin groups for reasons that are unrelated to their prospects on the German labor market. Sprengholz et al. (2021) and Lee et al. (2022) take a broader perspective, providing detailed evidence on the gender dimension of immigration that is complementary to our work.

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[1] Among the population younger than 20, the shares are higher: 38.9% have a migration background.

[2] Earlier work has primarily been based on the Socio-Economic Panel (SOEP, e.g., Kogan, 2004; Riphahn, 2004; Constant & Massey, 2003; Basilio et al., 2017), social security records (Lehmer & Ludsteck, 2015; Gathmann & Monscheuer, 2022) or up to three waves from the microcensus (Algan et al., 2010; Kalter & Granato, 2002; Kogan, 2011). Limitations of the microcensus are discussed in Section 3.1.

[3] But see Sprengholz et al. (2021) and Wiedner & Giesecke (2022), who also pool many waves from the microcensus. Our study includes a broader set of harmonized variables and about 60% more observations, as it covers a longer time span and is based on the full samples for on-site use rather than factually anonymized 70%-subsamples.

We first provide an overview on the labor market integration of different immigrant groups in Germany (Section 4). We distinguish 38 immigrant "cohorts" defined by time of arrival and region of origin, and track their *employment* and individual *income* (including non-labor income and welfare benefits). As we are interested in the overall gap between natives and immigrants, we focus on "unconditional" comparisons to German nationals of similar age, without controlling for other covariates or return migration – a change in the labor market gap due to selective return migration would be part of the "net" effect that we aim to capture. To aid the interpretation of our estimates, we however also discuss compositional effects and conditional comparisons.

Some findings are consistent with the corresponding evidence from the US or other countries. Integration profiles tend to be concave, with rapid gains in employment and income in the first years after arrival. The initial "downgrading" (Eckstein & Weiss, 2004; Dustmann et al., 2016) of immigrant arrivals compared to natives of similar education and work experience may reflect their lack of country-specific skills (Chiswick, 1978; Borjas, 1985, 1995), but also the disproportional sorting of new arrivals into small and low-paying firms (Arellano-Bover & San, 2020). Over time, immigrant's labor market outcomes improve as they acquire more work experience in the host country and move to better jobs and firms (Lehmer & Ludsteck, 2015; Gathmann & Monscheuer, 2022). The extent of this convergence, and how this pattern has changed across arrival cohorts remains however debated, both for the US (e.g. Card, 2005; Borjas, 2015) and Germany.[4]

Other findings are more novel, and differ from the corresponding patterns for the US. First, we find only partial convergence in employment, with large gaps remaining for most immigrant groups. The average gap ten years after arrival is 10 percentage points, compared to an employment rate of similarly aged German men of 91%, with little further progress in subsequent years. Accordingly, welfare dependency is much higher among immigrants. Second, the income gaps between immigrants and natives start widening after some years in the host country (i.e., *divergence* rather than convergence). This finding is at odds with earlier studies on wage convergence based on the SOEP, which predict wages to assimilate fully after about 20 years (Constant & Massey, 2005; Beyer, 2019) or less (Fertig & Schurer, 2007). And third, we document that the integration profiles can be non-monotonic, with some groups experiencing a persistent – and sometimes sharp – decline in employment after many years in the country.[5]

The observation of large and persistent employment gaps between immigrants and natives contrasts with the corresponding pattern in the US, but is consistent with the pattern in some

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[4] While earlier studies on "guest worker" cohorts did not find wage assimilation (Schmidt, 1997, Bauer et al., 2005), more recent studies tend to conclude that with the duration of stay, wage and employment gaps of immigrants compared to natives decline (Lehmer & Ludsteck, 2015; Sprengholz et al., 2021; Gathmann & Monscheuer, 2022).

[5] The findings of wage divergence over the life-cycle and high sensitivity of migrants to economic shocks are in line with segmented labor market theory (Doeringer & Piore, 1971), which predicts that migrants work in a secondary labor market that lacks labor protection and is more sensitive to economic shocks. For empirical evidence from Germany, see also Kogan (2004) and Dustmann et al. (2010).

European countries. The immigrant-native gaps are similarly large in other central and Northern European countries, such as Belgium, France, the Netherlands or Sweden (OECD and European Commission, 2023; Frattini & Dalmonte, 2024). The gaps are substantially smaller in Southern European countries, such as Italy or Spain. Eastern European countries have varying immigrant-native gaps in employment and smaller immigrant stocks. The poor labor market integration of immigrants is thus a much more pressing policy problem in some European regions than others.

Integration trajectories in Germany differ however widely between origin groups and arrival periods. Recent arrivals from low-income countries and the former Eastern Bloc experience larger initial gaps, but also faster income growth compared to the earlier "guest worker" cohorts (Lehmer & Ludsteck, 2015; Sprengholz et al., 2021; Gathmann & Monscheuer, 2022). As others, we find that refugees experience low initial employment, but tend to catch up to other immigrants eventually (Brell et al., 2020; Fasani et al., 2021b). Arrivals from the Middle East and Africa experience particularly low employment rates. While the gaps in employment vary widely, the income gaps are large for all groups. The exception are immigrants from North-West Europe, who increasingly outperform natives, earning 30-40% higher incomes in recent cohorts.

The long time span of our data also allows us to compare the labor market outcomes of first-generation immigrants and their children. The employment gaps shrink only by about 25% for the second generation, and therefore remain large (around 10 pp.) for those cohorts who also struggled most in the first generation. However, some groups make sizable intergenerational gains: the employment gaps shrink by two-thirds among Turks who arrived during the 1980s, and the children from East European or Central and East Asia parents catch up fully to natives. Income gaps decrease strongly in the second generation, but do not close fully.

We augment our general findings with more targeted evidence on specific questions. Studying the heterogeneity in integration outcomes across cohorts, we first ask how *predictable* integration profiles are (Section 5). We show that cohort-level characteristics, i.e. the average characteristics of all migrants from a given cohort are predictive of individual trajectories, even conditional on an individuals' own characteristics. Indeed, most of the variation in integration outcomes can be explained by a small set of cohort characteristics set before arrival (in particular education or refugee shares) or shortly after arrival (such as initial employment gaps or local economic conditions). Differences in integration outcomes between immigrant groups are therefore highly predictable – as are the labor market prospects of new arrivals.

We next test whether those integration outcomes have changed over the past five decades (Section 6). The employment gap 10 year after arrival has widened substantially – by 2.2 pp. for each decade, or 11 pp. over five decades. However, this systematic worsening can be fully explained by compositional changes and changing economic conditions. Controlling for education, refugee share and the regional unemployment rate, the long-term trend is close to zero – after abstracting

from changes in composition, integration outcomes have remained remarkably stable over the past five decades. Still, this "null result" is disappointing: Hopes that integration outcomes might improve over time, as institutions learn from experience and policies adapt to the needs of an "Einwanderungsland" (Dustmann & Frattini, 2013), have remained unfulfilled so far.

We conclude with case studies on two episodes of interest. First, we document a striking employment collapse in the early 1990s, in particular among earlier arrivals from Turkey: after a long spell of high employment, their employment rate collapsed by *25 percentage points*. We show that a structural decline of immigrant-intensive industries was the primary factor contributing to this collapse. This finding is in line with the observation that migrants are disproportionally sensitive to macroeconomic shocks (Kogan, 2004; Barth et al., 2004; Bratsberg et al., 2006; Dustmann et al., 2010), but the scale and speed of the employment loss is striking. The implication is that labor market integration is not a one-way street: policy makers have to worry not only about the successful integration of new arrivals, but also the potential for sudden evaporation of those gains in later years – a particular concern in light of economics shocks related to the 2020 global pandemic and the 2022 Russo-Ukrainian War.

Finally, we compare the labor market integration of recent refugee cohorts who arrived to Germany after the 2015 European refugee "crisis" and the 2022 Russo-Ukrainian war. Consistent with findings by Brücker et al. (2020), we find that the 2015 cohort integrated more quickly into employment than earlier refugees. However, these favorable integration outcomes were likely due to unusually favorable economic conditions, with the unemployment rate reaching a historic low in 2018. Abstracting from differences in economic conditions, we find that the 2015 cohort integrated slightly less rapidly than earlier arrivals. To conclude our study, we predict their likely future path of employment under different counterfactual scenarios. We perform a similar analysis for recent Ukrainian arrivals (Brücker et al., 2023); owing to their high educational attainment, Ukrainian refugees have a comparatively good labor market outlook.

2   Background: Immigration to Germany since the 1950s

Germany became one of the most important destinations for international migrants in recent decades, but as Figure 1 illustrates, migrant inflows have been unsteady and highly heterogeneous: arrivals increased after the mid-1970s, with peaks in the early 1990s and around 2015. Not only the regions of origin have changed over time, but also their educational composition, with increasing shares of immigrants who hold university degrees. We provide a brief overview of the most important immigration episodes here, while Appendix A provides more information on how institutional aspects and migration and integration policy changed over time.

The first important episode of international immigration after World War II consisted of so-

Figure 1: Immigration to Germany 1976-2019
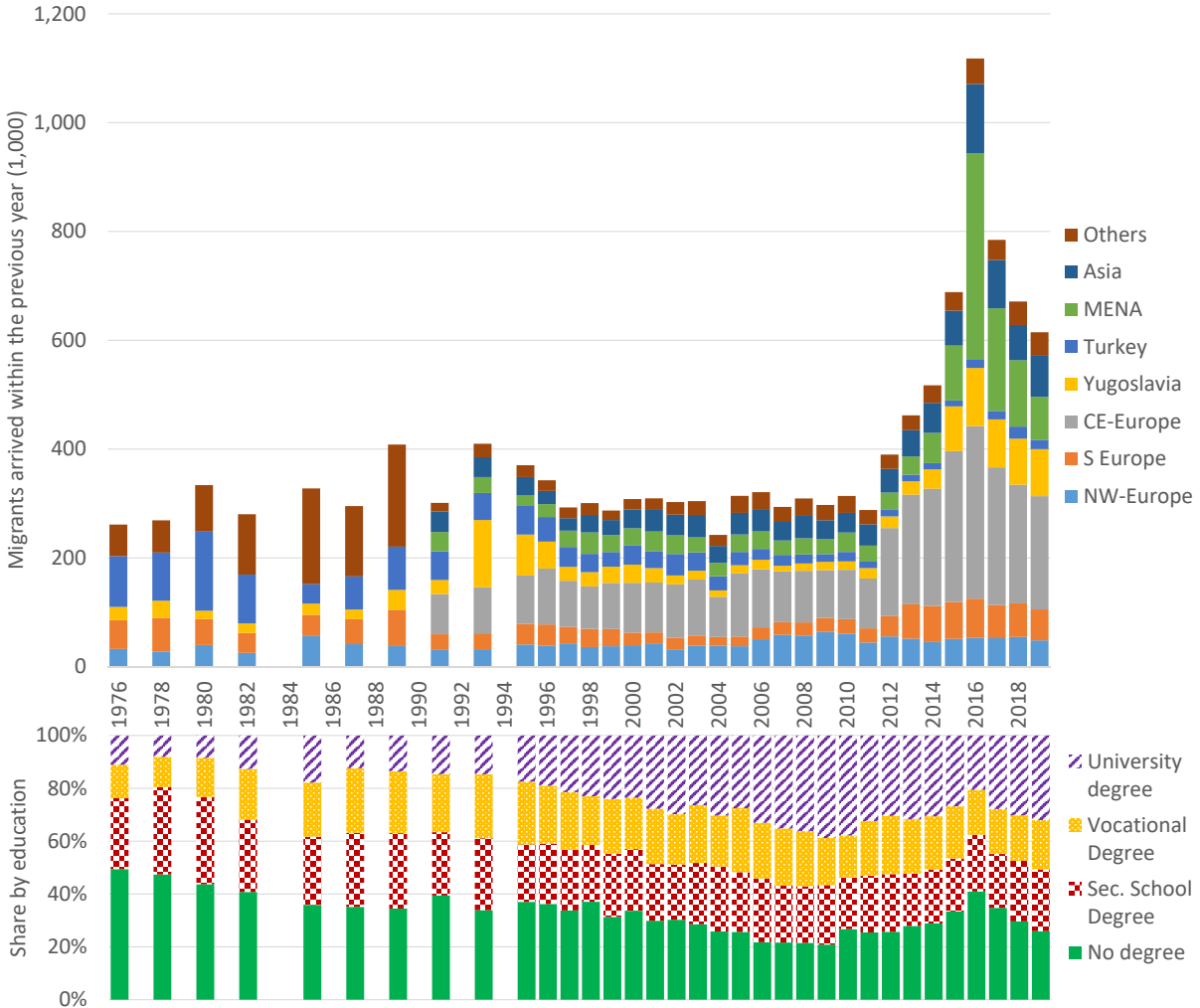
Notes: Microcensus, foreigners who have migrated to Germany within the past year, regardless of gender and age. Upper panel: Total numbers (extrapolated to the total population using extrapolation weights). Lower panel: Shares by education. Prior to 1991 the category "others" includes immigrants from Central and East Asia and the Middle East and Africa.

called "guest workers", who were recruited by German manufacturing firms during the economic boom of the 1960s and early 1970s from Southern Europe and Turkey. They were composed primarily of young men with low formal education, and were expected to stay only temporarily, so that little effort was put into their social integration. Nevertheless, a considerable share eventually brought their families to Germany and did not return, even after recruitment stopped during the economic downturn in 1973. As unemployment increased and social tensions rose during the following decade ("consolidation period"), the political response focused on restricting

further immigration and supporting return migration (Bade & Oltmer, 2004; Bauer et al., 2005; Dustmann, 1996). Consequently, fewer new immigrants arrived and their composition shifted from labor migration to family reunification.

During the 1980s, the number of humanitarian arrivals from Eastern Europe, but also countries such as Vietnam and Iran started to increase. As a response, policies were introduced to curb access to humanitarian protection (Münz, 1997; Herbert, 2001). This led to a temporary drop in asylum applications, before the number started to rise again in the 1990s during the Yugoslav Wars and as the Kurdish-Turkish conflict intensified. Around the fall of the Iron Curtain and German reunification, international migration in Germany experienced a second peak, primarily driven by immigrants from the former Eastern Block, including large numbers of ethnic Germans, but also seasonal workers, cross-border commuters and so-called "posted workers" (*Werkvertragsarbeitnehmer*). However, the initial enthusiasm in facilitating (temporary) immigration to address high labor demand following reunification soured following the 1993 recession; complaints about a violation of labor standards and "wage dumping" became frequent (Amior & Stuhler, 2022). The early 1990s also saw a significant surge of right-wing extremism and violence, including several fatal attacks on asylum seekers.

Since the late 1990s German migration policy underwent important changes that acknowledged the changing perception of Germany as an "immigration country". In 1999/2000, a reform of the citizenship law allowed second-generation foreigners to adopt the German nationality. The immigration act of 2005 ("Zuwanderungsgesetz") opened the German labor market for high skilled foreigners. In contrast to previous legislation, it explicitly envisaged integration measures, such as language courses. Since the 2000s, immigration from other EU member states became increasingly important, in particular after the EU enlargements in 2004 and 2007. To address fears about increasing labor market competition, Germany decided to temporarily restrict labor market access for citizens of these states until 2011 (Boeri & Brücker, 2005).

As a consequence of armed conflicts in Afghanistan and the Arabic World, arrivals of asylum seekers increased again, peaking in 2015. Overall, about 1.1 million asylum seekers reached Germany in the years 2015-2016. The public response to this sudden migration wave has been polarized, ranging from broad solidarity with the new arrivals to sharp criticism and protests. Most recently, more than one million Ukrainians (as of November 2022), primarily women and children, have been registered as refugees following the Russian invasion in February 2022.

3 Data and empirical approach

3.1 The German microcensus

For our empirical analysis we use cumulated data from 34 waves of the German microcensus that cover the years 1976 - 2019 (RDC, 2019). The microcensus is an annual survey of a representative 1%-sample of the resident population. This means that in recent years, about 380,000 households with 820,000 individuals participate. The survey is part of the German official statistics and respondents are obliged by law to provide information for the majority of the questions.[6] The topics covered in the questionnaires include socio-economic background, household composition and detailed information on employment and income. Unlike other studies (Sprengholz et al., 2021; Wiedner & Giesecke, 2022), we use the weakly anonymized full samples for on-site use for the years 1982, 1985, 1987, 1989, 1991, 1993 and all years between 1995 and 2019. For the years 1976, 1978 and 1980 where the full samples are not available we rely on the factually anonymized Scientific Use Files (SUF) instead that consist of 70% subsamples. When comparing the absolute size of immigrant cohorts across different census waves, we utilize the extrapolation weights provided. Our regressions are unweighted, as the microcensus is a random sample and non-response is rare. Estimates remain very similar when using extrapolation weights, as we demonstrate in Section 6.

The microcensus offers several useful features compared to other sources: It is representative of the total population, including self-employed and persons outside the labor force (unlike social security registers and derived data products, such as SIAB) while at the same time offering very large sample sizes (unlike surveys such as the Socio-Economic Panel, SOEP). In contrast to these other two datasets, immigrants are included right after their arrival and not only when they enter the labor force or when refreshment samples are taken. For these reasons and because it offers comparable questionnaires over more than 40 years[7], the microcensus is the best-suited available data source to study the long-run integration of different immigrant groups in Germany.

However, the microcensus also has important limitations: First, it consists of repeated cross-sections, so that we cannot track any particular individual over time. Instead, cohorts are defined by arrival year and nationality (synthetic cohorts). One consequence is that we cannot directly account for selective return migration, which can bias individual assimilation profiles from repeated cross-sections (Pischke, 1992; Dustmann, 1993; Dustmann & Görlach, 2016). We are not very concerned about this limitation for several reasons. Our primary interest is on the integration of different arrival cohorts rather than individual profiles, so compositional changes

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[6] However, interpreters are not provided. In case of linguistic difficulties, interviewers and respondents have to find a workaround, e.g. by switching to English or consulting with other household members (see Marbach et al., 2018).

[7] However, harmonization is not always possible without loss of information, in particular for early waves. We impute real income in 2010 Euros from income brackets, as proposed by Lengerer et al. (2019).

due to return migration would contribute the overall gaps that we aim to capture. Moreover, previous work using panel data suggests that in contrast to the US case, return migration does not strongly bias cross-sectional estimates of immigrants' labor market assimilation in Germany (Pischke, 1992; Constant & Massey, 2003; Lehmer & Ludsteck, 2015).[8] Finally, by tracking the overall size of a cohort we can gauge the potential importance of return migration for different cohorts and points in time (see Appendix Figure A1).

Second, the microcensus collects information about nationality, not country of birth. This implies that in the earlier waves, we cannot consistently identify immigrants who have obtained the German citizenship and thereby lost their former nationalities (see Appendix B). In particular, this study does not cover ethnic Germans ("Spätaussiedler") that were granted citizenship upon arrival.[9] For other groups, our results could be biased if selective naturalization affects their composition over time. However, since 2005, the microcensus also asks about previous nationalities so that we can infer how many immigrants from different cohorts eventually naturalize, and whether they differ with respect to their labor market performance from other immigrants. In Appendix B we show that naturalization is a relatively minor issue, changing the aggregate outcomes of cohorts only marginally; however, our pre-2005 estimates might contain a small bias for arrivals from Turkey 1979-87 or Middle East and Africa 1988-1995.

3.2 The Socio-Economic Panel (SOEP)

To estimate the share of refugees for each cohort we use the Socio-Economic Panel (SOEP), which offers much smaller samples but more information on individual characteristics. To consider recent asylum seekers (Section 7.2) we additionally use the IAB-BAMF-SOEP subsample of the SOEP, which covers refugee arrivals between 2013 and 2016. We use the survey waves 2016 to 2019 and impute employment in 2015 based on retrospective questions. Similar to the microcensus, the SOEP is representative of the population and contains a broad variety on questions on employment, wages and socio-economic background. However, (i) asylum seekers are strongly oversampled and (ii) information on migration causes and asylum applications are included.

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[8] Nevertheless, Berbée (2023) shows that there are large differences in return migration patterns between some groups. In particular, (the lack of) return migration has likely contributed to the employment collapse of Turks in comparison to other migrant groups in the early 1990s. Kuhlenkasper & Steinhardt (2017) review differences in return migration between migrants of different origin countries.

[9] We exclude ethnic Germans and German nationals who are not born in Germany from our native control group.

3.3 Definition of immigrant cohorts

We limit our analysis to males in working age (18-58 years) living in West Germany, including Berlin. We keep only first-generation migrants that have at least one foreign nationality.[10] We exclude immigrants who arrived at ages younger than 18, because younger migrants are likely to enter the education system and we want to track labor market outcomes from the first day of arrival. We divide immigrants into 38 distinct *cohorts* based on origin regions and arrival periods, defined such as to keep sufficient observations for each cohort over time. We drop individuals who do not belong to any of these cohorts (4.7% of all immigrants in 2019). Table 1 provides an overview. Cohort characteristics are taken from the first available wave after the complete cohort arrived (e.g., the 1996 microcensus for the 1988-95 cohorts). Using extrapolation weights, the implied cohort size in the total population varies between 31,000 and 162,000. The age at migration varies surprisingly little, with a mean of 29.26 and a standard deviation of about 1.73 years across immigrant cohorts, while educational attainment varies substantially. The reference group are individuals who are born in Germany and do not possess a second nationality.

3.4 Empirical approach

Non-parametric comparisons. Our baseline estimates compare immigrant cohorts and natives of the same gender and age. Specifically, we predict for each immigrant the gap

$$\hat{y}_i^{gap} = y_i - \hat{y}_i \tag{1}$$

where y_i is the actual outcome of immigrant i and $\hat{y}_i$ is his counterfactual outcome, defined as the average outcome of native men with the same age and observation year (we suppress time and age subscripts, as we have a single observation per individual). We predict this counterfactual outcome from the regression

$$y_n = \sum_{a=18}^{58} \delta_a^N A_a + \sum_{t=1976}^{2019} \gamma_t^N \Pi_t + \sum_{t=1976}^{2019} \sum_{a=18}^{58} \zeta_{ta}^N (A_a \times \Pi_t) + \varepsilon_n \tag{2}$$

where y_n denotes the labor market outcome y for native n, A_a denotes a set of dummy variables for age $a = [18, ..., 58]$, Π_t denotes a set of indicator variables for each calendar year t, and $A_a \times \Pi_t$ are full interactions of age and calendar year. The superscript N emphasizes that the coefficients are estimated based on our native reference sample as defined in the previous section (working-age men living in West Germany with only German nationality; also see footnote 9).

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[10] By doing so, our definition of immigrants is consistent over the entire time span, although we have the data on naturalized immigrants available since 2005. As pointed out in Appendix B, for the vast majority of cohorts, the differences in aggregate labor market outcomes are negligible whether we include naturalized immigrants or not.

Table 1: Definition and characteristics of immigrant cohorts

	Cohort size (extrapolated)		Age at migration (mean)	Share university degree (%)		Refugee share (%)
	at arrival	after 10 years		at arrival	after 10 years	
1. Recruitment period (1955-1973)						
North-West Europe 55-73	100,000	94,000	27.6	24.6	23.8	0
Italy 55-67		99,000	27.0		1.2	0
Italy 68-73	80,000	71,000	28.8	3.0	0.7	0
Turkey 55-67		89,000	28.6		1.1	0
Turkey 68-70		118,000	29.7		1.8	0
Turkey 71-73	162,000	156,000	29.4	2.2	1.9	0
Yugoslavia 68-70		135,000	27.7		2.4	0
Yugoslavia 71-73	74,000	80,000	28.0	1.0	2.9	0
Other recr. states 55-67		111,000	28.0		2.7	0
Other recr. states 68-73	170,000	100,000	29.4	1.6	2.4	0
2. Consolidation period (1974-1987)						
North-West Europe 74-87	100,000	46,000	28.1	20.5	27.1	0
Southern Europe 74-78	53,000	36,000	28.8	7.6	6.7	0
Southern Europe 79-87	58,000	27,000	27.4	7.9	4.5	0
Yugoslavia 74-87	47,000	19,000	28.9	4.7	6.4	13
Turkey 74-78	55,000	41,000	30.2	8.1	4.4	0
Turkey 79-87	71,000	42,000	26.4	7.8	5.6	6
3. Fall of the Iron Curtain (1988-1995)						
North-West Europe 88-95	59,000	34,000	31.2	46.3	37.7	0
Southern Europe 88-95	77,000	61,000	29.5	9.0	5.7	2
Centr.-East Europe 88-91	43,000	30,000	32.6	25.7	15.2	3
Centr.-East Europe 92-95	82,000	56,000	30.7	24.3	21.1	9
Yugoslavia 88-91	31,000	21,000	29.3	10.7	3.4	41
Yugoslavia 92-95	111,000	64,000	30.7	7.8	7.7	77
Turkey 88-91	52,000	40,000	25.6	8.7	5.5	19
Turkey 92-95	50,000	52,000	26.1	7.1	4.4	29
Mid.East & Africa 88-95	82,000	77,000	27.8	27.5	20.6	57
Central & East Asia 88-95	51,000	39,000	28.5	28.7	17.0	65
4. Period of East-West integration (1996-2009)						
North-West Europe 96-09	111,000	59,000	33.2	55.8	56.3	2
Southern Europe 96-09	68,000	48,000	29.8	30.8	29.5	0
New EU states 96-03	43,000	45,000	29.0	27.4	24.8	4
New EU states 04-09	88,000	89,000	32.4	20.6	15.9	1
Former USSR 96-03	105,000	86,000	33.2	27.7	24.9	34
Former USSR 04-09	39,000	25,000	32.6	32.0	39.4	12
Yugoslavia 96-09	64,000	53,000	28.8	9.6	6.5	38
Turkey 96-03	70,000	68,000	26.0	9.5	10.4	20
Turkey 04-09	35,000	25,000	27.4	21.7	13.2	4
Mid.East & Africa 96-03	104,000	82,000	29.3	26.6	23.7	56
Mid.East & Africa 04-09	56,000	43,000	28.1	37.3	36.8	52
Central & East Asia 96-09	77,000	43,000	28.7	56.7	49.6	34

Notes: Cohort sizes and characteristics measured in the first available census wave after and 10 years after complete arrival. Total population numbers extrapolated using the extrapolation weights provided by the microcensus. Refugee share taken from the SOEP. See Appendix Table A4 for a precise definition of the origin regions.

To compare the integration profiles of different immigrant groups, i.e. arrival cohorts by country of origin and years since migration, we take the group mean of the immigrant-native gaps $\hat{y}_i^{gap}$ (or its components y_i and $\hat{y}_i$). To highlight the distinction to other studies, which often condition on education or other individual characteristics, we label these as "*unconditional*" estimates (even though we do condition on age and time). In parts of our analysis we also consider "*conditional*" immigrant-native gaps that abstract from compositional differences in education and possibly other characteristics (such as demographic characteristics, region or industry and occupation groups), by additionally including the corresponding indicator variables interacted with year dummies in equation (2).

Parametric estimates. To study the role of macro-economic conditions and to predict immigration profiles for more recent cohorts we additionally implement a parametric framework that is similar to Borjas (1995) and Bratsberg et al. (2014). Specifically, we model the outcome y_i for immigrant i of immigrant cohort I in calendar year t as

$$y_i = \phi^I X_i + \delta^I A_i + \alpha^I YSM_i + \sum_{t=1976}^{2019} \gamma_t^I \Pi_t + \varepsilon_i \tag{3}$$

where X_i is a set of socio-economic characteristics, most notably education, A_i a third-order polynomial in age, and YSM_i a third-order polynomial of years since migration. As previously, Π_t denotes a set of indicator variables for each calendar year. The corresponding regression model for natives reads:

$$y_n = \phi^N X_n + \delta^N A_n + \sum_{t=1976}^{2019} \gamma_t^N \Pi_t + \varepsilon_n \tag{4}$$

If immigrant group I is defined by arrival years, the parameters in equations (3) and (4) are not jointly identified (because of collinearity between YSM_i and observation year). Assuming identical period effects for immigrants and natives, $\gamma_t^I = \gamma_t^N$, the predicted immigrant-native gap for immigrant i simplifies to:

$$\hat{y}_i^I - \hat{y}_i^N = (\hat{\phi}^I - \hat{\phi}^N)X_i + (\hat{\delta}^I - \hat{\delta}^N)A_i + \hat{\alpha}^I YSM_i \tag{5}$$

In practice, the assumption of equal period effects is unlikely to hold, as immigrants' labor market outcomes tend to be more sensitive to recessions than natives. Following Barth et al. (2004) and Bratsberg et al. (2014) we adjust equations (3) and (4) in two ways. First, we include in the empirical model a full set of interaction terms between indicators for educational attainment and year of observation, so that period effects may differ by attainment. Second, we include the regional unemployment rate on the level of 75 spatial planning regions ("Raumordnungsregionen",

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with an average population of 890,000) and allow for its effect on the outcome y_i to be different for natives and immigrants.

4 Integration profiles over 50 Years

This section provides non-parametric evidence on the economic integration of male immigrants over the last five decades. Specifically, we compare the labor market trajectories of immigrant cohorts (defined by arrival year and origin region, see Section 3.3) to the corresponding mean trajectories for natives with an equivalent distribution of age and birth year. To measure labor market success we focus on employment and real post-tax personal income. We briefly consider other outcomes, such as intermarriage rates and welfare dependence, to provide insight into other dimensions of the integration process that may interact with labor market integration.

4.1 Results: Employment

Unconditional comparisons. Figure 2 plots the average employment rate for different origins by years since arrival, separately for four broad arrival periods (1955-1973, 1974-1987, 1988-1995 and 1996-2009). Our definition of employment includes any kinds of regular employment and formal education.[11] Immigrants from EU-15 countries (North-West and Southern Europe) are coded blue, non-EU-15 immigrants with a refugee share of less than 50% red, and origin groups with a higher share of refugees green. For comparison, we include the average employment rate of natives of comparable age and birth years (grey line), which corresponds to the prediction based on equation (2).[12]

Unsurprisingly, Figure 2 shows much heterogeneity between groups. These differences are not only due to differences in "cohort quality" (Borjas, 1985), but may also reflect the specific macroeconomic or policy conditions that immigrants face (see Section 5). Nevertheless, the cohort profiles share a few key patterns. First, the immigrants' profiles are generally concave, with low employment rates in the year of arrival but rapidly increasing employment over time. This typical assimilation profile (Borjas, 1995; Gathmann & Monscheuer, 2022) reflects the hurdles that migrants have to overcome, including barriers to formal labor market access, language acquisition and the imperfect translatability of skills and qualifications from their home countries. The observation that employment gaps close rapidly over the first 10 years after arrival for *all*

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[11] Specifically, it includes the self-employed, civil servants and military personnel as well as part-time, marginal and family employment. We additionally include persons in formal education (schools and universities; but not training, language or integration programs that do not lead to a general/vocational degree), so that the initial gaps capture labor market disadvantages rather than differences in educational attainment at younger age. However, our main findings are robust to dropping persons in education (see Appendix Figure A7).

[12] The slight concavity of these employment profiles for counterfactual natives reflects the decline of employment rates at older ages.

Figure 2: Employment shares of immigrant cohorts

(a) Arrivals 1955-1973

(b) Arrivals 1974-1987

(c) Arrivals 1988-1995

(d) Arrivals 1996-2009
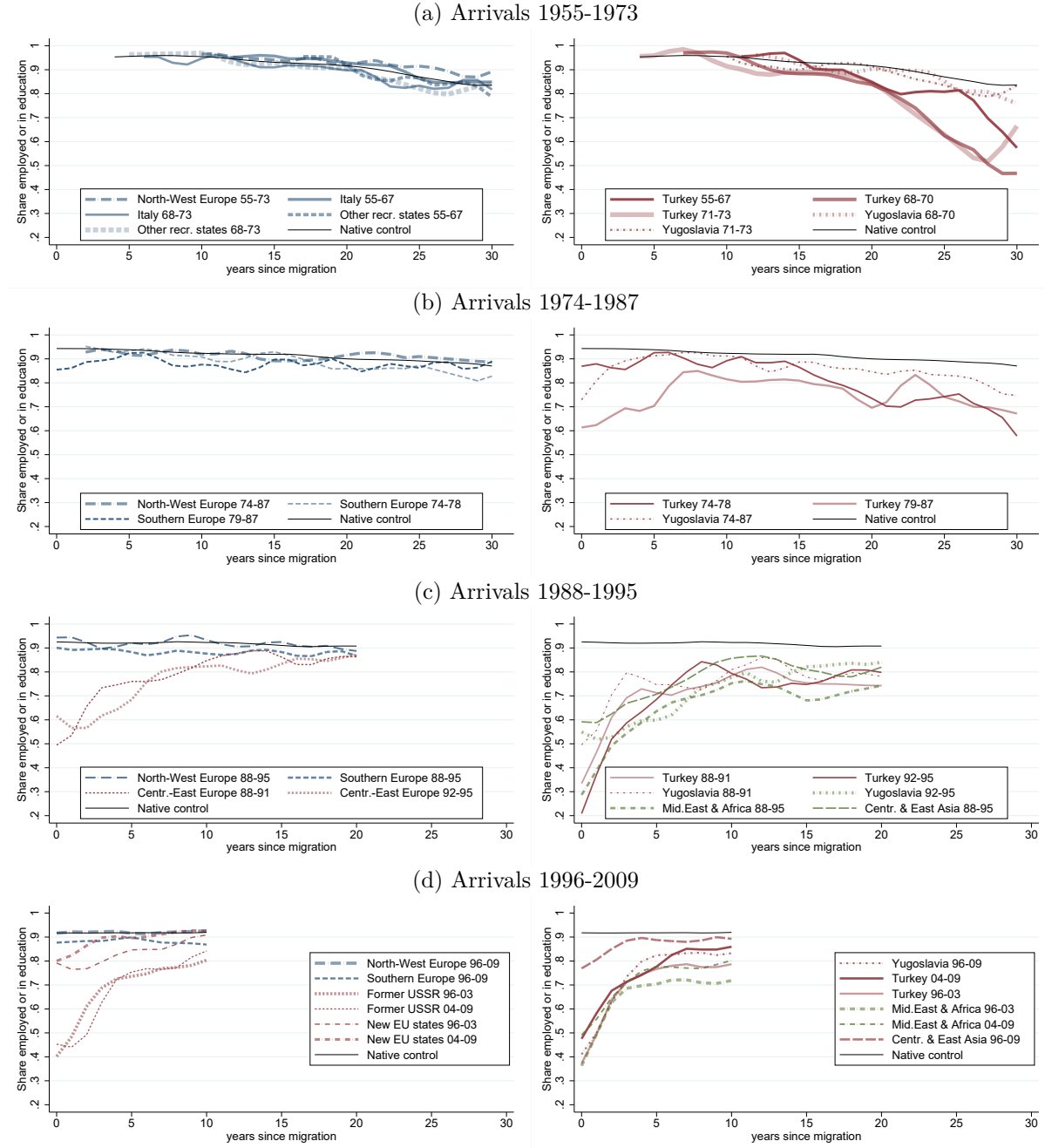
Notes: Share in employment or formal education by year since migration, for different immigrant cohorts and a native control group (of the same age and observation year, see eq. (2)). The thickness of each line is proportional to the cohort size in the first year after complete arrival.

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groups is positive from a policy perspective. As we show below, the size of those initial gaps is nevertheless highly predictive of the size of immigrant-native gaps in the long run.

Second, most origin groups have substantially lower employment rates than natives of comparable age. The exceptions are migrants from North-West and Southern Europe (the former have *higher* employment rates), Yugoslavian arrivals from the 1960s and 1970s and recent immigrants from new EU member states (who both reach employment rates above 90%). Other cohorts from Central and Eastern Europe, Yugoslavia during the Yugoslav wars and Asia (including Afghanistan, Pakistan and Vietnam) also do comparatively well, reaching employment rates above 80%. Migrants from Turkey do less well, in particular those arriving in the 1980s, for whom the employment rate remains 10-20 percentage points lower than for similarly-aged natives. Immigrants from the Middle East and Africa (1988-95 and 1996-03) have the lowest employment rates, reaching 70% ten year after arrival – a 20 pp. gap to similarly aged native men.

Third, the gaps never close fully for those groups who have low employment rates at arrival. While immigrants catch up rapidly over their first years, the gaps then stabilize for most groups. Ten years after arrival, the mean gap across all immigrants is about 10 pp. For comparison, the employment gap in mid-life (age 35-50) between native men with and without a university degree has been around 6 pp. throughout our analysis period. While previous researchers have hypothesized that immigrants in Germany assimilate fully in terms of wages (Constant & Massey, 2005; Fertig & Schurer, 2007; Gundel & Peters, 2008), less attention has been put so far on whether they catch up in employment. We find that initial gaps are not fully overcome. However, immigrants from Central-Eastern Europe and the new EU member states do well, nearly closing the employment gaps after 20 years, despite large initial gaps among earlier arrivals.

Fourth, the slope of the employment profiles differs for refugees and other migrants. Cohorts with low refugee shares assimilate quite quickly after arrival, but show little convergence – or even divergence – after about 7-8 years in Germany. In contrast, the integration process for refugee cohorts takes longer, with ongoing convergence even 10 years after arrival. As a result, refugee cohorts tend to catch up to other immigrants over time, as we show more explicitly below. These pattern also reflect differences in labor market access. While most migrants from European countries "migrate into" an employment contract, refugee migrants are often subject to employment bans upon arrival.

Fifth, for some cohorts, the employment gaps started to worsen again after the initial convergence. This pattern is particularly pronounced for Turks who arrived up to the 1980s, for whom employment rates dropped massively – by up to 30 pp. – in the early 1990s. This pattern can be considered an extreme example of the more general finding that immigrant employment is "fragile", in the sense of being more sensitive to economic conditions and shocks than the employment of natives (Bratsberg et al., 2010). Specific explanations are considered in Section 7.1.

The employment gaps remain more stable for more recent cohorts. However, these cohorts have not yet experienced a similarly strong economic downturn, or reached older ages. An important policy concern, also in light of recent pandemic- and war-related downturns, is whether a similar collapse in employment could occur for the current immigrant population.

Conditional comparisons. To quantify their overall integration, we so far compared migrants to similarly aged natives, without attempting to match their education or other characteristics. Still, conditional comparisons can be indicative about the mechanisms that contribute to the unconditional immigrant-native gap in employment.

Figure 3 shows four types of conditional comparisons. Sub-figure (a) compares the unconditional immigrant-native gap as defined in equation (1) with a conditional gap that controls for education (interacted with observation year). The dark lines correspond to arrival cohorts 1974-95, which we can track over at least 24 years. The light lines include our full set of arrival cohorts 1974-2009, whom we can track over 10 years.[13] Appendix Figure A7 provides robustness tests in which we code persons in education as missing. As expected, the lower education level among migrants explains part of their employment gap to natives. More specifically, while explaining little of the initial gaps after arrival, education explains an increasingly larger share in later years: 24 years after arrival, almost the entire remaining employment gap can be explained by the lower educational attainment of immigrants.

This pattern is illustrated further in sub-figure (b), which plots the employment gap separately for immigrants without any secondary school or vocational degree (13.2% of immigrants vs. 3.2% of the native control group), with secondary school or vocational training (68.5% vs. 77.4%), and with a university degree (18.3% vs. 19.4%). Each group is compared to corresponding natives with the same education, age and observation year. We find that less educated migrants experience larger initial gaps but catch-up much more rapidly over time. After about 10 years, the employment gaps are similar for those with a university education or a vocational/secondary school degree, while immigrants without educational degree overtake their native counterparts (perhaps reflecting that the latter are a particularly small and selective group).

Sub-figure (c) compares the employment profiles of three types of cohorts who arrived from EU-15 countries, from other countries with less than 50% refugees, and from other countries with at least 50% refugees. Consistent with Figure 2, we observe that EU-15 arrivals have small initial gaps and catch up quickly to their similarly-aged native counterparts. In contrast, the employment gaps remain substantial for non-EU migrants, even conditional on education. Interestingly, the gap between non-EU cohorts with low vs. high share of refugees shrinks throughout, and becomes negligible two decades after arrival. This finding is in line with Fasani et al. (2021b) and Marbach

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[13] Here, we exclude cohorts who arrived before 1974, because we can only observe them only starting in 1976.

Figure 3: Conditional employment gaps
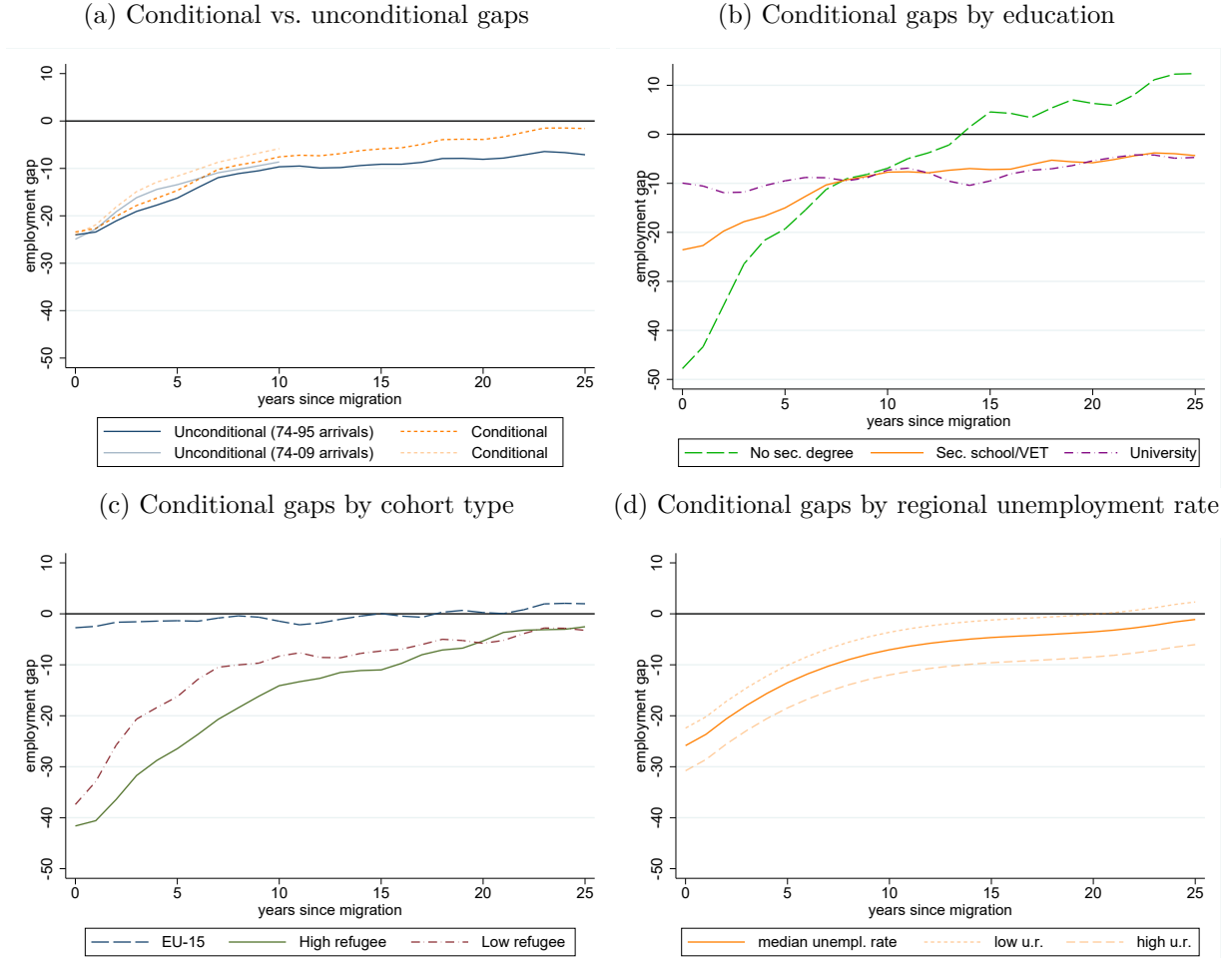
(a) Conditional vs. unconditional gaps

(b) Conditional gaps by education

(c) Conditional gaps by cohort type

(d) Conditional gaps by regional unemployment rate

Notes: Dark long lines include arrival cohorts 1974-95 (observable over 24 years since arrival), light short lines include cohorts 1974-2009 (observable over 10 years). **Sub-figure (a):** Solid blue line: Unconditional immigrant-native gaps estimated non-parametrically according to eq. (1). Orange dotted line: additionally control for education group × year dummies. **Sub-figures (b) and (c):** Conditional gaps for different immigrant groups. **Sub-figure (d):** Conditional gaps based on variants of eq. (3) and (4), including interactions between the regional unemployment rate and indicators for immigrants and natives, predicted at the median regional unemployment rate (7.8%, solid line), bottom decile (4.4%, dashed line) and top decile (12.6%, dotted lines).

et al. (2018) who find that the integration process tends to be much more long-lasting for refugees than for non-refugees.

Finally, sub-figure (d) of Figure 3 illustrates that the size of the employment gap varies with economic conditions. Following Barth et al. (2004), we include the current unemployment rate in each regional planning unit ("Raumordnungsregionen") interacted with a migrant dummy and educational attainment interacted with time dummies into a parametric estimation of equation

(5). The predicted employment gap is plotted at the median regional unemployment rate (7.8%, solid line), the 10th percentile (4.4%, dotted line) and the 90th percentile (12.6%, dashed line). Regional unemployment has a strong association with integration trajectories: 15 years after arrival, the immigrant-native gap (conditional on education) has closed in regions with low unemployment, but is still 10 pp. in regions at the 90th percentile.

We provide detailed conditional comparisons for each cohort group in Tables A5 and A6 in the Appendix, comparing our "unconditional" model that controls only for age and observation year and conditional models that also control for education (interacted with year dummies, see equation (2)) or education, marital status, household size, number of children, region, and – in the case of income and wage – also broad industry and occupation groups.[14] Consistent with Figure 3a, we find that controlling for education explains some of the employment gaps in later years, but little of the initial gaps. Including the full set of controls instead *increases* the employment gaps for most cohorts, reflecting that immigrants tend to locate in urban regions that are characterized by better employment opportunities. Irrespectively of the choice of model, the employment gaps tend to remain large for most cohorts.

4.2   Results: Income

Unconditional comparisons.   Figure 4 plots the integration profiles for real personal monthly post-tax income, including non-labor income.[15] The patterns are broadly similar when considering log monthly income (see Figure A8) or log hourly wages (Table A5).

A first interesting pattern is how stable the income pattern of different origin groups have been over the past 50 years. In particular, the income trajectories of Southern Europeans have changed surprisingly little since the so-called "guest worker" period: 10 years after arrival, their average income reaches around 1,500 Euros in real terms, with only moderate income growth over time. Turkish and Central-Eastern European cohorts arriving after the recruitment period start with larger initial gaps (average income below 1,000 Euros) but experience faster growth, so that they eventually catch up to Southern-Europeans. Groups with a high share of refugees receive particularly low incomes and show relatively slow, but steady income growth, in particular those from the Middle East and Africa. Asian groups show similar patterns, but on a substantially higher level. Finally, immigrants from North-Western Europe increasingly outperform natives,

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[14] Note that in contrast to our other evidence from the microcensus, these tables are based on the Scientific Use rather than the weakly anonymized versions of the microcensus. The "unconditional" estimates in Tables A5 and A6 differ therefore slightly from the corresponding estimates in Figure 2.

[15] Real incomes increase less than one might expect over the decades for several reasons: First, unemployment rates have grown from close to zero in the 1970s to 12% around the year 2000 and average weekly working hours conditional on employment have dropped from 37.7 to 33.3 between 1976 and 2015. Both trends mask an increase in hourly wages of more than 30%. Additionally, we focus on males and therefore ignore the increase in female labor supply that contributed to an increase in average per-capita household income of more than 40%.

with their income gap rising from a few percents in the 1955-73 arrival cohort to a 30-40% gap for the 1996-2009 cohort.

Although income tends to increase with more time spent in Germany, the income of similarly aged natives increases at a similar or higher pace (with migrants from North-West Europe being the exception). More specifically, the immigrant-native income gap tends to be stable or decrease for a few years after arrival, but then widens considerably. Twenty years after arrival, the average income gap between migrants and natives has grown to 750-1,000 Euro/month in the 1974-87 cohort, and similar or more pronounced gaps are visible for later arrival cohorts. This lack of convergence, and even divergence for most groups, contrasts with previous studies that found wage assimilation (Gundel & Peters, 2008; Constant & Massey, 2005; Fertig & Schurer, 2007; Lehmer & Ludsteck, 2015; Gathmann & Monscheuer, 2022). However, these studies differ in two important aspects from our work. First, they evaluate the wage profiles of *employed* immigrants, which reflect selection into employment (Gathmann & Monscheuer 2022). We instead consider all immigrants independent of their employment status, and include non-labor earnings. Second, most other studies control for individual characteristics, such as education. In contrast, we focus on unconditional comparisons between immigrants and natives, holding only their age and observation year fixed. Indeed, the immigrant-native income gaps show less divergence when conditioning on education and considering wage rather than personal income (see Appendix C and Table A5).

Surprisingly, the integration profiles vary much less across cohorts for income than for employment. In employment, we see major differences between groups; for example, after one decade the employment rate of Turkish 1979-87 arrivals is more then 10 pp. below the corresponding rate for natives, while there is essentially no gap for the 1974-87 arrivals from Yugoslavia. However, both groups earn substantially less than similarly-aged natives. Indeed, according to Figure 4, the mean (monthly) income stabilizes at around 1,500 Euro (1955-73 cohorts) or slightly higher (later cohorts) for all origins, with North-Western Europeans as the only exception. That the income profiles vary so little across groups is puzzling, given that their educational and employment levels do differ widely. Moreover, the steadily increasing income gaps shown in Figure 4 stand in contrast to the corresponding time pattern for employment, for which we observe rapidly decreasing gaps within the first years after arrival.[16]

Conditional comparisons. Figure 5 reports four different conditional comparisons. Sub-figure (a) compares the unconditional income gap between immigrants and similarly-aged natives with

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[16] One potential explanation is that immigrant's income may not improve much when finding their first job, with welfare payments being crowded out by labor earnings. However, immigrants who recently found a job do have considerably higher income than those who did not. Instead, the main explanation for divergence in income is that, compared to natives, migrants have lower earnings growth conditional on being employed.
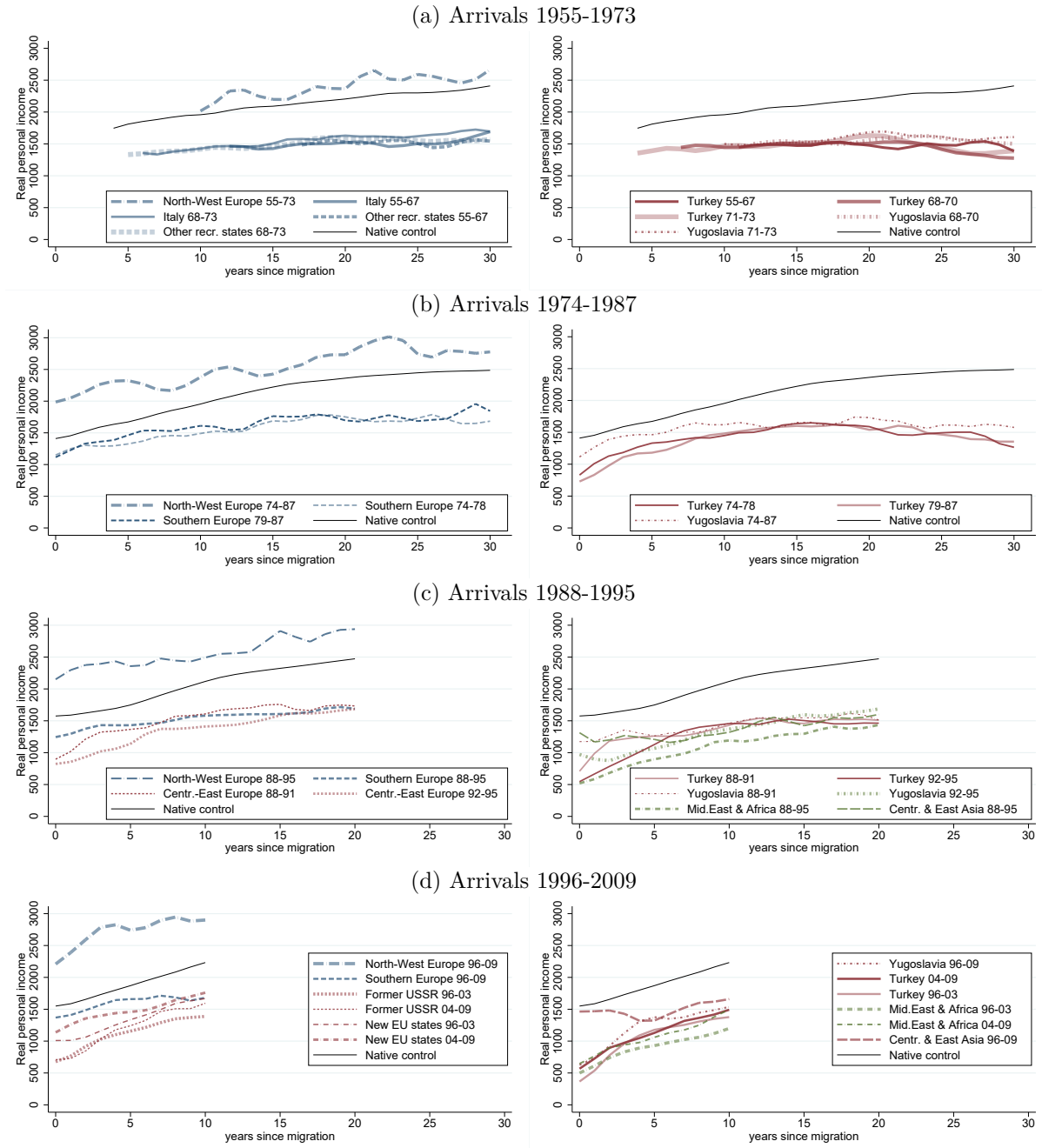
Figure 4: Mean income of immigrant cohorts

(a) Arrivals 1955-1973

(b) Arrivals 1974-1987

(c) Arrivals 1988-1995

(d) Arrivals 1996-2009

Notes: Average personal monthly post-tax income (real income, in 2010 Euros) by year since migration, for different immigrant cohorts and a native control group (of the same age and observation year, see eq. (2)). The thickness of each line is proportional to the cohort size in the first year after complete arrival.

Figure 5: Conditional gaps in income

(a) Conditional and unconditional income gaps

(b) Conditional gaps by education groups
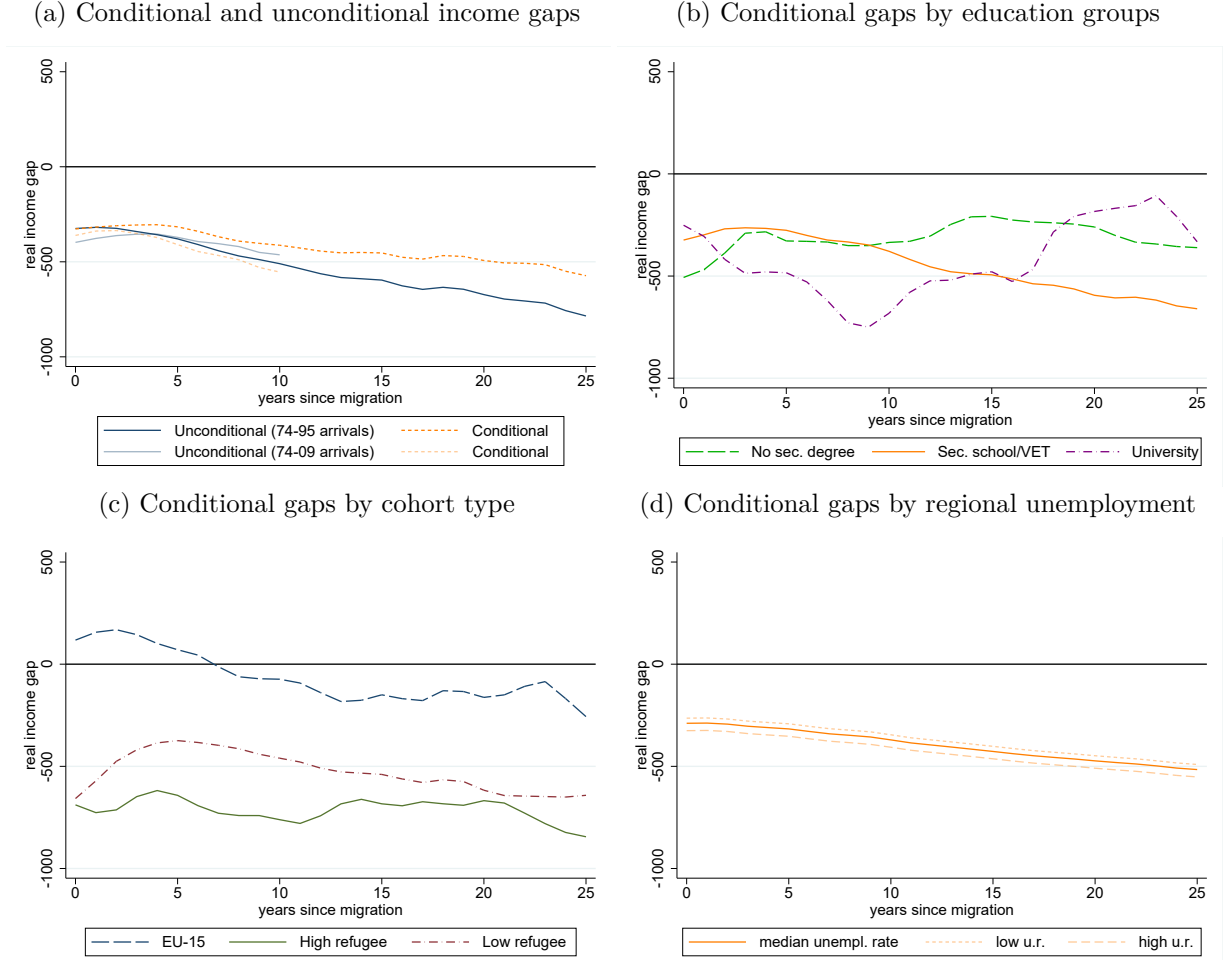

(c) Conditional gaps by cohort type

(d) Conditional gaps by regional unemployment

Notes: Personal monthly post-tax income (real income, in 2010 Euros). Dark long lines include arrival cohorts 1974-95 (observable over 24 years since arrival), light short lines include cohorts 1974-2009 (observable over 10 years). **Sub-figure (a):** Blue solid line: Unconditional immigrant-native income gaps, estimated non-parametrically according to eq. (1). Orange dotted line additionally control for education group × year dummies. **Sub-figures (b) and (c):** Conditional gaps by different immigrant groups. **Sub-figure (d):** Conditional gaps based on variants of eq. (3) and (4), including interactions between the regional unemployment rate and indicators for immigrants and natives, predicted at the median regional unemployment rate (7.8%, solid line), bottom decile (4.4%, dashed line) and top decile (12.6%, dotted lines).

the corresponding gap conditional on education. The patterns are similar for earlier cohorts (1974-95, dark lines) that we can track over 24 years and a wider set of cohorts tracked over 10 years (1974-2009, light lines). Educational differences cannot explain the initial immigrant-native gaps, but explain some of the widening of those gaps over time. Still, the income gaps also tend to widen conditional on education, perhaps due to immigrants working in segmented labor markets

with unfavorable career opportunities Doeringer & Piore (1971).[17] As illustrated in sub-figure (b) of Figure 5, this pattern is driven by the large share (68.5%) of immigrants with secondary school or vocational training. The absolute gaps are instead highest for university-educated immigrants, widening substantially over the first decade after arrival (from 250 Euro to about 750 Euro per month), before closing partially in later career stages. As shown in Appendix C, controlling additionally for region ("*Raumordnungsregionen*") or broad occupation and industry groups (Blossfeld's occupational classifications and 12 industries; see footnote) has only a modest effect on the dynamics but a large effect on the level of these gaps; the income gaps increase substantially when controlling for region of residence (reflecting the concentration of immigrants in urban areas with high wages), but shrink when controlling for industry (reflecting their concentration in low-pay industries).

Sub-figure (c) illustrates that the income gaps are largest for non-EU migrants. As for employment, we observe that the convergence process is different for cohorts with a high share of refugees, but the income gaps are in fact similar for low- and high-refugee cohorts in the long run. Finally, sub-figure (d) demonstrates that income gaps vary surprisingly little with economic conditions. Based on variants of equations (3) and (4) that include the regional unemployment rate (on the level of regional planning units, "Raumordnungsregionen", interacted with an immigrant indicator and years since migration), we plot the predicted income gap at the median regional unemployment rate (7.8%, solid line) and the 10th and 90th percentiles (4.4% and 12.6%, dotted and dashed lines). We therefore find that economic conditions have a large effect on the immigrant-native gaps in employment (Figure 3(d)), but only a small effect on the corresponding gaps in income (the difference between the 10th and 90th percentile is just 60€).[18]

We again provide more detailed conditional comparisons for each cohort group in Tables A5 and A6 in the Appendix, comparing our "unconditional" model to different conditional models. Consistent with Figure 5a, we find that controlling for education explains little of the initial gaps, but some of the income or wage gaps in later years. For some cohorts, most of the wage gap 10 or 20 years after arrival can be explained by their low education. Controlling additionally for marital status, household size, number of children, region, and broad industry and occupation groups reduces the gap only modestly, and only for some groups. The income gaps remain large for almost all cohorts, even when comparing them to natives working in the same region and broad industry and occupation groups.

What is the (policy) relevance of these findings? The good news is that in *absolute* terms, the economic situation of immigrants improves considerably with more time spent in Germany.

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[17] As shown in Appendix C, the immigrant-native gaps widen less when focusing on the subset of employed individuals and considering wage rather than personal income.

[18] One likely explanation is that immigrants who earn low wages face also a greater risk of job loss during economic downturns, such that the gap between earnings in employment and benefits in unemployment may be modest.

However, the employment gaps often remain large, and the *relative* income gaps compared to natives of similar age do in fact widen for most groups. Immigrants tend to have worse career opportunities compared to natives over their entire lifecycle, even when being employed, a finding that is discouraging from a distributional perspective. Another important finding is regarding the role of education in the integration process. On the one hand, differences in education can explain some of the employment gap between immigrants and natives. This suggests that educational policies – which can be directly affected by policymakers – might have a direct effect on the employability of immigrants. On the other hand, the immigrant-native gap in income remains high even conditional on education, and in the early career stages is highest among the university-educated. Educational policies alone might therefore have only a limited effect on the economic standing of immigrants in Germany.

4.3 Other outcomes

As auxiliary outcomes we also track welfare dependency (contributing to the potential costs of immigration) and intermarriage rates (as an indicator for social segregation, which may interact with economic segmentation). The results are shown in Appendix Figure A5 and Table A1 and discussed in Appendix D. Immigrants are more likely to depend on benefits as their main source of income compared to the native comparison group, with the pattern across cohorts mirroring our results on employment. In terms of marriage pattern, the differences between origin groups are striking: immigrants from the traditional "guest worker" countries married nearly exclusively within their own ethnic communities, while the intermarriage rates vary more considerably for more recent immigrant groups.
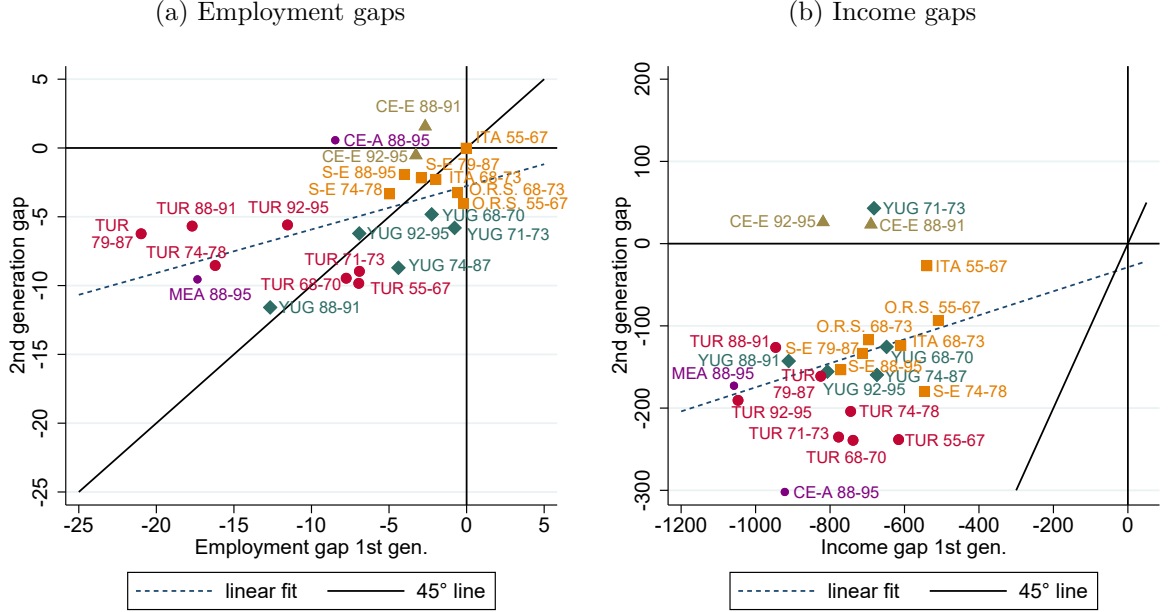
4.4 Second-generation immigrants

Do these employment and income gaps persist across generations? US studies generally find that the wages of first-generation immigrants do not fully catch up to natives, but that the wage gap closes for their children (Card, 2005). Thus, full assimilation might take more than one generation. To identify second-generation immigrants reliably, we exploit that in the years 2005, 2009, 2013 and 2017, the microcensus includes a supplementary questionnaire on the migration background of parents living outside the household. To be consistent with the rest of our study, we define second-generation immigrants as working-age males whose fathers migrated to Germany (including naturalized fathers, but excluding ethnic Germans). The definition is thus independent of the mother's nationality or migration status.[19] Contrary to many other studies, we include not only persons born in Germany but also persons who migrated at pre-school age (at age 6 or

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[19] In this section we drop arrival cohorts later than 1995 because they only have very few children in labor market age by the year 2017. This should be kept in mind when comparing results to other sections of the paper.

younger; a group that is sometimes called "generation 1.5"). Their share is less than 10%, so excluding them has little impact on our results.

Figure 6: Labor market gaps for first and second generation immigrants

(a) Employment gaps   (b) Income gaps

Notes: Unconditional immigrant-native gaps estimated non-parametrically according to eq. (2). First-generation gaps measured 20 years after migration to Germany. Second-generation gaps measured in 2005, 2009, 2013 and 2017. The labels refer to region of origin (See Table A4) and arrival year: CE-E: Central and Eastern Europe; ITA: Italy; MEA: Middle East and Africa; O.R.S: Other recruitment states; CE-A: Central and East Asia; S-E: Southern Europe; TUR: Turkey; YUG: (former) Yugoslavia. We drop second-generation immigrants from North-Western Europe because of low observation numbers and drop cohorts who arrived after 1995, as their children have not yet reached working age by the time of observation.

Figures 6a and 6b plot the employment and income gaps of first generation migrants (measured 20 years after migration) against the second generation gaps (measured in 2005, 2009, 2013 and 2017).[20] A few observations stand out: First, the average employment gap shrinks by about 25% between the first and second generation (6.4 pp. for the first and 4.8 pp. for the second generation), but does not close fully. The sons of the so-called "guest worker" cohorts who arrived before the recruitment stop in 1973 were actually *less* likely to be employed than their fathers. However, later arrivals from Turkey who experienced particularly low employment rates improved across generations. The income gains appear more impressive: For most cohorts, the income

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[20] We focus on 20 years since migration for the first generation to abstract from the initial convergence after arrival. Also recall that the immigrant-native gaps as defined in equation (1) condition on age and observation year, addressing that children of more recent cohorts are observed at younger ages than children of older cohorts. Additionally accounting for age variation in the immigrant-native *gap* itself, the patterns change only marginally.

gaps ranged between 400 and 1,000 Euros for the first generation, but shrink to 500-200 Euros for the second generation. However, these estimates should be interpreted with caution, as we observe many second-generation immigrants at young ages, when some immigrants and natives are still in education and income gaps generally tend to be smaller (see Section 4.2). As shown in Appendix Figure A9, the income gaps increase slightly if we drop individuals in education.

Second, the labor market gaps are correlated across generations: The children of groups with favorable labor market performance tend to be successful as well, while integration difficulties are passed on to the next generation. Specifically, there are clear clusters by regions of origins: Southern European cohorts (orange squares) and East Europeans (brown triangles) had small employment and large income gaps in the first generation, but in particular East Europeans catch up fully to natives in the second generation. The employment gaps of Turkish and Yugoslav cohorts instead remain large, between 5-10 pp., although they experience large income gains across generations.

Third, while the first-generation employment gaps varied strongly by arrival year within group (e.g., between 7 and 21 pp. for Turkish cohorts), the second-generation gaps tend to be more uniform (6-10 pp.). Diehl & Granato (2018) argue that differences in education and language proficiency explain why second-generation gaps are largest for Turks and Yugoslavs.

Our findings for wages resemble evidence from the US (Cadena et al., 2015), where wage gaps on average shrink by about 70% between the first and second generation, but do not disappear for all migrant groups (e.g., they remain substantial for second-generation Hispanic migrants). In contrast, the employment gaps are much worse in Germany: While immigrants have *higher* employment rates than natives in the US (Cadena et al., 2015), in Germany the employment gaps are large for most migrant groups and shrink only partially across generations.

From a policy perspective, the large income gains for the second generation are good news. However, the employment gaps are persistent, particularly for those origin groups that already struggled most in the first generation (e.g., Turkish and MEA arrivals). These results extend on findings by Algan et al. (2010), who find that the evidence for labor market progress is not so clear-cut in Germany, and Dustmann & Frattini (2013), who document persistent economic disadvantages for children of non-EU immigrants. While we confirm their finding that the employment gaps tend to worsen across generations for the earlier cohorts of Turkish "guest workers", we find more positive patterns for later Turkish arrivals and other origin groups, such as Italians and other Southern Europeans. We also find more substantial convergence in income for all groups.[21]

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[21] Comparisons between our findings and Algan et al. (2010) require some caution as our analysis uses a different approach: Instead of pooling all first- and second-generation migrants in the cross-section, we use information about the fathers' arrival year to assign second-generation immigrants to the specific cohorts of their fathers. We therefore compare sons to their actual fathers' generation, and measure their outcomes at different points in time

5 How predictable are integration outcomes?

Labor market outcomes vary substantially across groups: while some catch up with natives, for others the employment gap remains as large as 20 percentage points. One key question is how predictable those gaps are – is it possible to predict which cohorts will integrate well into the labor market, based on information that is observable at arrival? We here show that this is indeed the case: most differences can be explained by a small set of characteristics that are readily available to policymakers.

A first interesting question is whether *individual* or *group-level* characteristics, i.e. the average characteristics of a "cohort" defined by arrival period and origin, are more predictive of labor market success. If the aim is to predict individual outcomes, the answer may appear obvious – a person's own education should be more predictive for that person's prospects than the average attainment of the group he happens to belong to. But as shown in Appendix E, that is not generally the case, and cohort-level characteristics are important predictors even conditional on a person's own characteristics.

We therefore focus on the explanatory power of group-level statistics. Table 2 reports the coefficient estimates from a regression of the unconditional labor market gaps $\hat{y}_i^{gap}$ as defined in equation (1), and averaged for each of the 38 cohorts, on different sets of cohort characteristics.[22] In panel A we consider the *initial* gaps upon arrival. Columns (1) and (5) show that 39% (adjusted R-squared) of the variation in the initial employment and income gaps can be explained by the average education of each cohort (the share with secondary school or vocational degree, and the share with a university degree). As shown in columns (2) and (6), the cohort shares of refugees and a dummy for EU-15 origins (see Section 3.3) are even more predictive, explaining 56% of the arrival gaps in employment and 64% of the gaps in income. Cultural distance between the origin regions and Germany, proxied by an index based on the six dimensions of national culture according to Hofstede et al. (2010), is also quite predictive of income gaps, but has only limited predictive power for employment, as shown in columns (3) and (7). While the gaps are mostly explained by characteristics of the origin groups themselves, economic conditions do matter. As shown in columns (4) and (8), the employment or income *gaps* to similarly aged natives are greater when the (standardized) average unemployment rate at arrival is higher, although this association also reflects general trends over time (see Section 6).

Panel B of Table 2 shows estimation results for the corresponding gaps 10 years after arrival. The cohort composition remains an equally strong predictor of immigrant-native gaps, but the

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to address the age difference between generations.

[22] For cohorts who arrived before 1974 we cannot observe employment and income at arrival and instead take values from the earliest available census wave in 1976. The results change only marginally if we exclude these early waves from our analysis. We report standard errors that are robust to small samples in these tables (STATA's vce(h3) option, based on Davidson et al. 1993), but conventional standard errors are similar.

Table 2: Explaining cohort-level labor market gaps

	Employment gaps (p.p.)				Real income gaps (Euros)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Initial gaps								
Share w/ school dgr.	11.13***			-0.50	193.4***			-48.7
	(1.57)			(2.53)	(48.3)			(79.9)
Share w/ university	-3.82			2.78	193.9**			251.3**
	(2.73)			(3.25)	(90.1)			(99.1)
Refugee share		-11.07***		-4.61**		-79.3***		-71.5
		(2.48)		(2.04)		(29.1)		(119.3)
EU-15 (dummy)		3.66**		3.80*		306.9***		142.9*
		(1.46)		(2.20)		(79.2)		(80.1)
Hofstede Index			-0.28***	-0.05			-10.6***	-2.4
			(0.05)	(0.06)			(2.2)	(2.7)
Unempl. rate				-10.86***				-183.3***
				(2.31)				(57.8)
N (cohorts)	38	38	38	38	38	38	38	38
adj. R^2	0.39	0.56	0.25	0.74	0.44	0.64	0.64	0.79
Panel B: Gaps 10 years after arrival								
Share w/ school dgr.	5.22***			1.24	206.7***			46.3
	(0.72)			(1.00)	(39.8)			(70.9)
Share w/ university	-1.07			2.39**	132.7			160.7
	(0.83)			(1.06)	(89.5)			(101.0)
Refugee share		-5.32***		-3.00***		-105.4***		-62.3
		(0.86)		(0.62)		(24.4)		(104.6)
EU-15 (dummy)		0.41		-0.58		218.5**		50.1
		(0.70)		(0.85)		(84.7)		(84.8)
Hofstede Index			-0.09***	-0.01			-8.5***	-3.1
			(0.02)	(0.02)			(2.1)	(2.4)
Unempl. rate				-3.53***				-101.9*
				(1.13)				(59.4)
N (cohorts)	38	38	38	38	38	38	38	38
adj. R^2	0.57	0.61	0.16	0.79	0.51	0.58	0.58	0.73
Panel C: Explaining 10-year gaps with initial gaps								
Initial gap				6.31***				320.7***
				(0.57)				(26.4)
N (cohort				38				38
Adj. R^2				0.82				0.89

Notes: Dependent variable: Cohort-level employment gaps in percentage points (columns 1-4) or real personal monthly post-tax income in 2010 Euros (columns 5-8) according to equation (1). Explanatory variables are measured upon arrival and standardized (mean=0, standard deviation=1). The Hofstede Index of cultural distance is the Euclidean distance between Germany and a weighted average of countries within each origin region of the six dimensions of national culture according to Hofstede et al. (2010). We report small sample robust standard errors (Davidson et al., 1993), ***/**/* denote statistical significance at the 1%/5%/10% level.

relative importance of different characteristics changes. In particular, educational gaps become an increasingly stronger predictor of differences between immigrant groups, in addition to also explaining an increasingly larger share of the overall immigrant-native gaps over time (see Figures 2a and 4a). Considering the unemployment rate at arrival in columns (3) and (6), we again find coefficients of the expected sign: employment and income gaps are more negative for cohorts who arrived in times of high unemployment. However, economic conditions explain a much smaller share of these gaps than cohort characteristics. Overall, we can explain 79% of the variation in employment and 73% of the variation in income with simple summary statistics for each immigrant group. Cohort characteristics at arrival therefore explain the initial and 10-year gaps equally well – while immigrants catch up with natives, the differences between immigrant groups remain highly predictable. Indeed, long-run integration outcomes can be also predicted based on the initial gaps. As shown in panel C of Table 2, the initial employment gaps explain 82% of the employment gaps one decade later, and the corresponding R-squared is even higher for income.

Overall, integration outcomes are highly predictable: historically, basic summary statistics on the composition of each origin group or their initial labor market performance have been very predictive of how well those groups integrate into the German labor market.[23] This also suggests that most of the heterogeneity in integration profiles documented in Section 4 is due to differences in the characteristics of those groups rather than differences in the circumstances they faced at arrival, although macroeconomic conditions do matter (see Section 7.1). We illustrate the potential use of these results in Section 7.2, by predicting the likely integration paths of (i) the large refugee cohort that arrived to Germany around 2015 and (ii) the most recent group of refugees who fled the war in Ukraine since 2022.

6   Has integration improved over time?

Has the labor market integration of immigrants structurally improved over the past 50 years? As other European countries, Germany has become exposed to immigration much later than the US, and Dustmann & Frattini (2013) note that this lack of experience of institutions and societies may be one of the factors hindering successful integration. Following this argument, we might expect the institutional setting and thus integration outcomes to improve over time.

A visual inspection of Figures 2 and 4 however suggests that in Germany, the *initial* employment and income gaps have grown larger for recent cohorts. Multiple factors might explain this pattern: On the one hand, the composition of cohorts has changed, with increasing shares of refugees who tend to require more time to gain a foothold in the labor market than other

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[23] To probe the robustness our these results, we repeat our analysis for finer cells of arrival "cohorts" defined as origin group × arrival period × education × age at migration. The results are similar and available upon request.

migrants. On the other hand, Germany's immigration policy today is placing a greater emphasis on integration measures and language acquisition, which could improve long-run prospects but reduce employment in the first years after arrival. General labor market conditions, such as the high unemployment in the late 1990s and early 2000s, might also affect integration patterns.

To better understand those trends, Table 3 reports linear time trends from the regression

$$\hat{y}_i^{gap} = \alpha + \rho\, Year_t + \phi X_{i,c(i)} + \varepsilon_i \tag{6}$$

where $\hat{y}_i^{gap}$ is the predicted labor market gap as defined in equation (1) for immigrant i from cohort c in region of residence r, observed 10 years after arrival in year t, $Year_t$ represents a linear time trend, $X_{i,c(i)}$ a vector of controls that – depending on the specification – include dummies for individual school degree and university degree, the refugee share of each cohort, and the regional (distinguishing 75 regional planning units, "Raumordnungsregionen") or the national unemployment rate in year t.

Figure 7: Time trends in immigrant-native employment gaps (10 years after arrival)
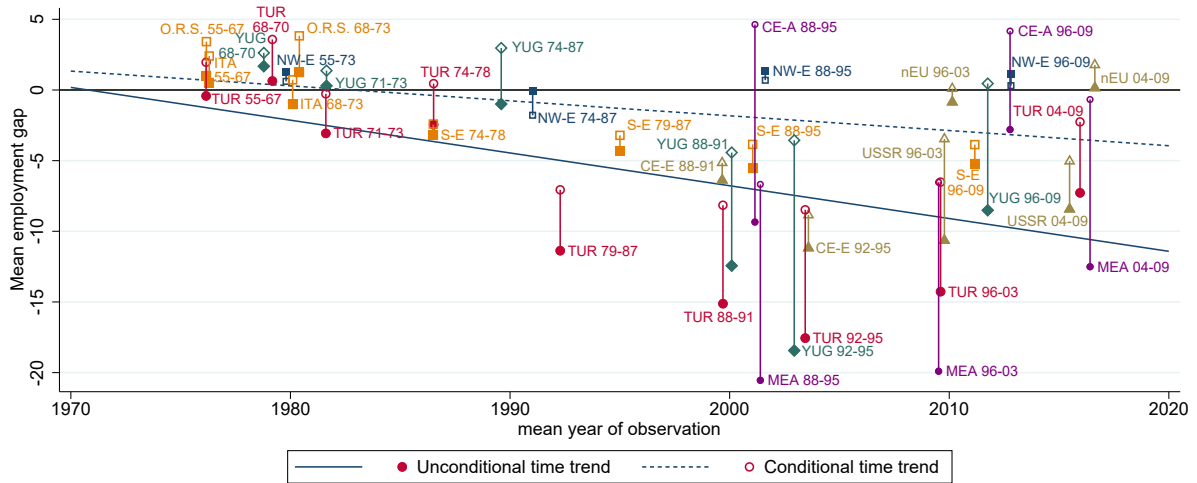
Notes: Filled markers and solid line: unconditional immigrant-native employment gaps and time trend; hollow markers and dashed line: conditional employment gaps and trend. Gaps and time trends are predicted based on the time trend, the average covariates for natives and the residuals from regressions in panel B of Table 3 and aggregated to the cohort level. Unconditional time trends refer to column (1) and conditional time trends to column (4), including controls for individual education, regional unemployment rate (on the level of 75 regional planning units, "Raumordnungsregionen") and cohort-level refugee share. The labels refer to region of origin and arrival year (see Appendix Table A4): CE-A: Central and East Asia; CE-E: Central and Eastern Europe; ITA: Italy; MEA: Middle East and Africa; nEU: New EU member states in Central and Eastern Europe; O.R.S: Other recruitment states; S-E: Southern Europe; TUR: Turkey; USSR: Former Soviet Union; YUG: (former) Yugoslavia.

Panel A confirms that the initial employment gaps have widened over time, by 5 percentage

Table 3: Time-trends in immigrants' labor market gaps

	(1)	(2)	(3)	(4)	(5)
Panel A: Employment gaps at arrival (p.p.)					
Time trend (10 years)	-5.00**	-6.12***	-2.98*	-0.80	0.45
	(2.14)	(1.96)	(1.48)	(1.168)	(1.46)
Observations	40,309	40,309	40,309	40,309	40,309
Panel B: Employment gaps 10 years after arrival (p.p.)					
Time trend (10 years)	-2.15***	-2.75***	-1.14**	-0.68*	-0.63
	(0.75)	(0.70)	(0.49)	(0.36)	(0.41)
Observations	32,612	32,612	32,612	32,612	32,612
Panel C: Income gaps at arrival (Euros)					
Time trend (10 years)	2.63	-72.43	-9.21	31.61	-7.19
	(81.33)	(52.65)	(59.54)	(63.94)	(74.77)
Observations	38,483	38,483	38,483	38,483	38,483
Panel D: Income gaps 10 years after arrival (Euros)					
Time trend (10 years)	-43.87	-108.3***	-52.27	-43.90	-58.16
	(43.01)	(26.24)	(35.07)	(37.48)	(36.65)
Observations	31,607	31,607	31,607	31,607	31,607
Education contr.	No	Yes	Yes	Yes	Yes
Refugee share	No	No	Yes	Yes	Yes
Regional unempl. rate	No	No	No	Yes	No
National unempl. rate	No	No	No	No	Yes

Standard errors clustered on the level of cohorts in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Equations estimated according to equation (6). The dependent variables are individual migrant-native employment gaps (including education) predicted according to equation (1). The variable that captures the linear time trend is year/10, thus coefficients capture a change over one decade. Educational controls are individual dummies for an academic degree and a vocational degree, refugee share is measured on the cohort level, regional unemployment rate on the level of 75 regional planning units ("Raumordnungsregionen").

points for each decade (column 1, $\hat{\rho}/10 = -5.0$) – an enormous increase of 25 percentage points over 50 years. This increase cannot be explained by changing educational composition; indeed, the time trends are *more* negative when conditioning on education (column 2). This observation is in line with previous findings by Kogan (2011), who notes that the cohorts who arrived since the 1990s were not able to translate their higher levels of formal education compared to earlier "guest workers" into better employment prospects. The remaining gap is highly correlated with refugee shares and changing labor market conditions over time; when additionally controlling for refugee share and either the regional or national unemployment rate, $\hat{\rho}$ becomes insignificant and close to zero (columns 4 and 5).[24]

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[24] While the regional unemployment rate is a useful measure of economic conditions, immigrants' location choice is

Panel B shows that the employment gaps 10 years after arrival have also widened substantially (column 1, $\hat{\rho}/10 = -2.15$), although less in absolute levels – as is expected, given that the employment gaps generally shrink with time after arrival. Its statistical significance however is higher, suggesting a clear worsening of immigrant-native gaps over time. The higher refugee share of recent arrival cohorts explain half of this trend (column 3), while additionally controlling for the regional or national unemployment rate dampens the time trend further (column 4).

Figure 7 provides more details on these results, visualizing time trends in the employment gaps. The solid markers and line correspond to the unconditional employment trends 10 year after arrival, corresponding to column (1), while the hollow markers and dashed line correspond to the conditional trend as reported in column (4) of Table 3, panel B. The figure illustrates that the widening of immigrant-native gaps is most pronounced when comparing the cohorts of "guest workers" to migrants who arrived since the 1980s, and this trend levels off thereafter.

Income gaps as reported in panels C and D of Table 3 have also been widening over the past 50 years. When controlling for education (column 2), these time trends become more negative, both at arrival and after 10 years: Every decade, the immigrant-native gap in income 10 years after arrival has widened by about 110 Euros, amounting to 550 Euros over 50 years. Appendix Figure A10 provides a graphical illustration of these trends.

To summarize, the unconditional labor market gaps between immigrants and natives have increased considerably over time, as is also in line with findings by Sprengholz et al. (2021). Much of this negative trend can be explained by changing cohort composition and economic conditions: accounting for these factors, the labor market prospects of immigrants have remained fairly stagnant. We do not find support for the hypothesis that structural integration conditions have improved as a consequence of new policy approaches that acknowledge Germany's role as an immigration country more explicitly. One possible explanation for this puzzle has been identified by Kogan (2016): Germany ranks highly in terms of providing access to general and targeted integration support, but in practice, there is a large discrepancy between policy intentions and the actual uptake of these policies.[25] Moreover, structural shifts such as deindustrialization, educational expansion among the native population, or increasing returns to skills may have magnified immigrant-native gaps in the labor market (Wiedner & Giesecke, 2022), masking potential improvements in policy or institutional setting.

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potentially endogenous; we therefore also report a specification using the national unemployment rate instead. The results remain similar when controlling for region of origin dummies instead of refugee shares (as the two are highly correlated), or when studying conditional gaps (comparing immigrants and natives of the same age, observation year and education). They also remain similar when weighting observations using extrapolation weights from the microcensus (see Table A7).

[25] In 2008 less than 5% of recently arrived immigrants had actually participated in training programs and about 10% in job search assistance, much less than in many other European countries.

7 Case studies

We conclude with two case studies. First, we provide a deeper analysis of what we consider the most striking observation in the integration profiles depicted in Figure 2: the sudden collapse of employment among Turkish and some other groups in the early 1990s, after two decades of high attachment to the German labor market. Second, we study and forecast the employment profiles of the most important recent arrivals: the large cohort of refugees who arrived around 2015 and a more recent refugee wave who fled the 2022 war in Ukraine.

7.1 The 1990s employment collapse

After a long spell of high employment, the employment rate of Turkish 1955-73 arrival cohorts collapsed by *25 percentage points* in the early 1990s (relative to natives, and even more in absolute level).[26] The implication is that integration is not a one-way street: policy makers have to worry not only about the successful labor market integration of new immigrant arrivals, but also the potential for sudden evaporation of those gains in later years.

Our goal here is to identify potential explanations for this sudden collapse (for a more in-depth analysis, see Berbée, 2023). In a first step, we analyze whether the drop in employment is due to *time effects* (e.g., caused by sudden political or economic events around the fall of the iron curtain) or *age effects* (e.g., reflecting a difference in retirement behavior of immigrants relative to natives). Figure 8 shows (see Appendix F for details), separately for three Turkish arrival cohorts, that while employment gaps between immigrants and natives do widen at older ages, the employment drop is nearly entirely explained by time effects: For each cohort, the employment rate starts to drop around 1990, and continues to drop in subsequent years. Sub-figure 8b shows that other immigrant groups were less affected, although the employment gaps are also widening for migrants from Southern Europe and Yugoslavia.

The explanation for the collapsing employment shares must therefore be an event or structural change that occurred in the early 1990s. Indeed, the West-German labor market was subject to several important shocks at that time: First, a recession in 1993 and high levels of unemployment over the following years. More generally, the 1990s were characterized by increasing automation and structural adjustments, and a strong decline in (mainly low-skilled) manual work in manufacturing (Spitz-Oener, 2006). And finally, after the fall of the Iron curtain and German

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[26] Bratsberg et al. (2010) find a similarly large decline in employment for migrant workers who arrived during the 1970s in Norway. While in the Norwegian context this decline in employment was spread over 15-20 years, the drop in employment was much more sudden in Germany. Our observations here are also consistent with evidence on high unemployment and welfare dependence among Turkish migrants in the 1990s in Germany (Uhlendorff & Zimmermann, 2014; Riphahn, 2004; Riphahn et al., 2013). While these studies had limited data for earlier years, we show that these labor market disadvantages opened up sharply in the early 1990s.

Figure 8: The 1990s employment collapse

(a) Turkish cohorts 1955-1978

(b) Other cohorts 1955-1978 (actual gaps)

Actual gap (Cohort 55-67)   Age component
Actual gap (Cohort 68-73)   Age component
Actual gap (Cohort 74-78)   Age component

Italy 55-73   Yugoslavia 68-73
Other recr. states 55-73   Non-recruitment states 55-78
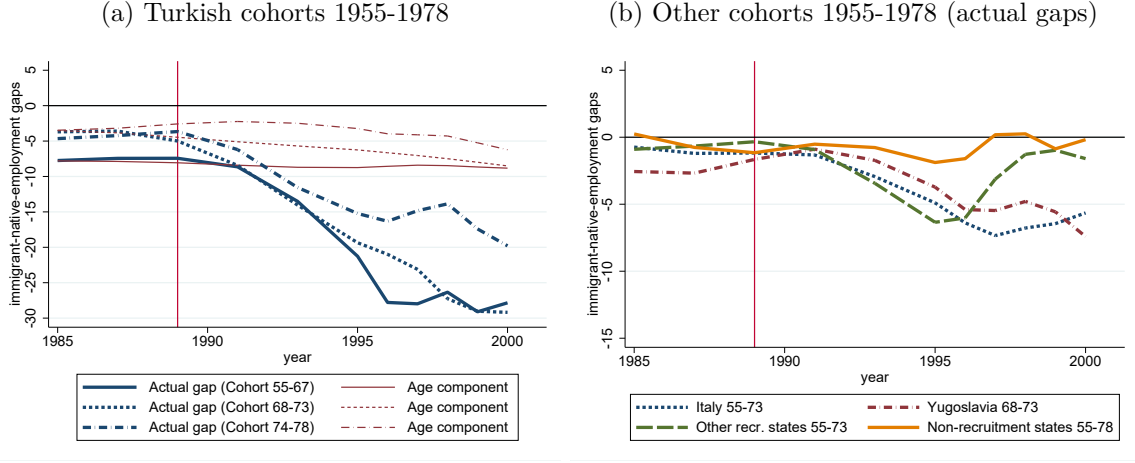
Notes: Results are based on a regression of the individual immigrant-native gaps as defined in equation (1) on a full set of age and year dummies (see Appendix F for details). Sub-figures (a) shows the actual immigrant-native employment gap as defined in eq. (8) (thick blue lines) and the age-specific component as defined in eq. (9) (thin red lines). Sub-figure (b) shows actual gaps of other origin groups only.

reunification in 1990, a large inflow of new immigrants (see Figure 1), as well as increased trade exposure to Eastern European countries.

To probe these explanations, we assign to each individual the regional unemployment shock related to the 1993 recession (measured as the 1989-1997 increase in the unemployment rate for 75 spatial planning units, "Raumordnungsregionen") and an aggregate proxy for structural change (measured on the level of immigrant cohorts or birth years for natives). Specifically, we measure structural change as a Bartik-shifter that predicts how much the employment of each group was expected to change based on their allocation across industries in 1989 and industry-wide employment trends between 1989 and 1997 (see Appendix G for details). We then use Oaxaca-Blinder decompositions to study whether the growing employment gaps as shown in Figure 8 are due to immigrants being clustered in regions and industries that were more heavily exposed to adverse shocks, or due to immigrants being generally more sensitive to adverse economic conditions (see Appendix H for methodological details).

Figure 9 shows the results, where the thick green line represents the change in the employment gap explained by each shock (change in regional unemployment or industry-level employment), the dotted orange line represents the component that is due to differences in exposure (i.e. whether immigrants were located in regions or sectors that were struck by more adverse shocks) and the blue dashed line the component that is due to differences in sensitivity (i.e. immigrants being more strongly affected by a given shock than natives).

Figure 9: Determinants of the 1990s employment collapse, Turkish migrants
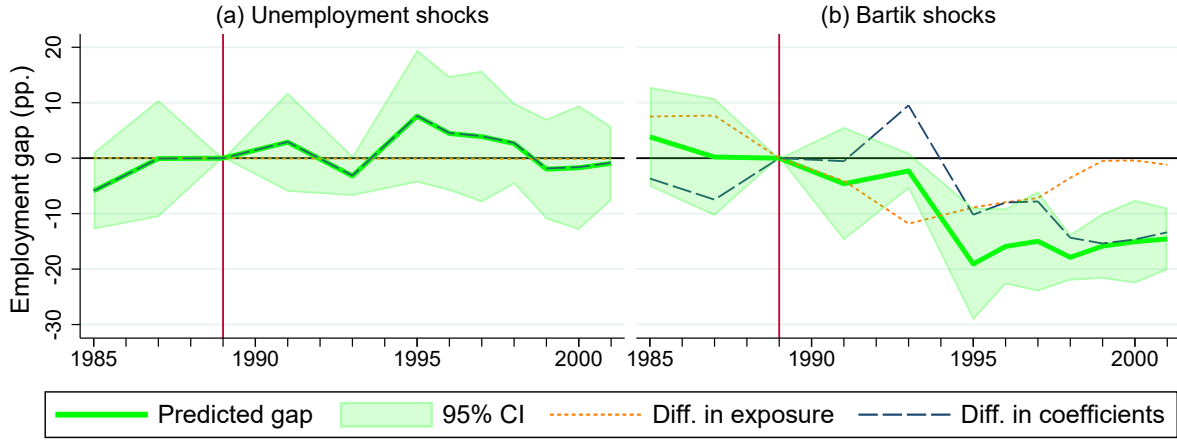
Notes: Based on all Turkish migrant cohorts who arrived before 1988. In Sub-figure (a), the thick green line plots the predicted immigrant-native gap that can be explained by regional 1989-1997 unemployment shocks (measured at the level of 75 spatial planning units, "Raumordnungsregionen") and in Sub-figure (b) the predicted immigrant-native gap that can be explained by cohort-level Bartik shifters. The dashed and dotted lines represent the components of Oaxaca-Blinder decompositions (See Appendix H for methodological details).

The widening employment gaps between Turkish immigrants and natives by 20 pp. by 1995 (here we average over more and less affected arrival cohorts) are primarily explained by the decline of sectors in which immigrants were employed, as measured by the Bartik-Shocks in Sub-figure 9b. More specifically, it can be explained in roughly equal shares by their unfavorable allocation into declining industries (as captured by the "difference in exposure") and by their stronger *sensitivity* to industrial downturns ("difference in coefficients"). Furthermore, increasing regional unemployment rates *conditional* on sectoral decline did not contribute to the widening of employment gaps between Turks and natives after the 1993 recession, as illustrated in Sub-figure 9a. The regions that Turks and natives lived in were similarly affected by increasing unemployment, i.e. there was little difference in exposure. Appendix Figure A11 suggests that other migrant groups where not only less exposed to industrial decline, they were also less susceptible to recessions compared to Turks.

Using panel data, Berbée (2023) shows that younger Turkish cohorts were also negatively affected by new immigration in the early 1990s, and that the employment rates of other migrant groups remained more stable because of selective return migration: While "guest workers" from Southern European countries were very likely to return to their home when they lost their jobs (i.e., stayers were positively selected in terms of employment), Turks tended to instead remain in Germany and to apply for unemployment benefits – probably because of unfavorable economic

and political perspectives in their home country at the time.

In sum, worsening economic conditions amplified the immigrant-native gap in the early 1990s, with the declining fortune of certain industries being the primary cause. These results are in line with the finding that immigrants are more vulnerable to economic downturns, as they are more likely to work in volatile sectors or precarious employment relations (Bratsberg et al., 2006; Dustmann et al., 2010), as also consistent with segmented labor market theory (Doeringer & Piore, 1971). They are also related to findings by Kogan (2004) and Uhlendorff & Zimmermann (2014) that sectoral and other job characteristics contributed to the dynamics of unemployment among Turkish and other "guest workers". However, a new observation here is that low employment rates among Turkish immigrants were the result of an abrupt decline in the early 1990s.

7.2 Recent refugee migration

Motivated by the observation that the integration profiles of immigrant *cohorts* are fairly predictable (Section 5), we predict the employment trajectories for two large refugee waves arriving from Syria and other countries around 2015, and from Ukraine in 2022. Despite widespread solidarity, the challenges related to the integration of such large refugee cohorts have been one of the leading policy issues and a source of major concern in large parts of the population. The policy response was intended to avoid mistakes made in the past, with a stronger emphasis on the provision of language courses and other integration measures (such as job counseling). The question therefore is whether the labor market trajectories of recent refugees are developing more favorably than for similar cohorts in the past. To address this question, we complement the microcensus with individual-level data from the IAB-BAMF-SOEP survey for the years 2016-2020, which is representative of refugees who arrived to Germany between 2013 and 2016 (see Section 3.2) and aggregate statistics from the IAB-BiB/FReDA-BAMF-SOEP survey of Ukrainian refugees who arrived in 2022 (Brücker et al., 2023).

2015 refugee arrivals. Figure 10a compares the employment profile of refugees who arrived between 2013 and 2016 with the progress that we would expect based on the pattern observed for earlier migrant cohorts. Specifically, the solid line shows the *actual* employment gap of refugees observed in the IAB-BAMF-SOEP data relative to the corresponding Germans of the same age and observation year. The dashed orange line represents the *predicted* employment gap, based on the integration of earlier cohorts with high share of refugees observed in the microcensus, accounting for the age composition and education of the 2013-16 refugee cohort (as described further in Appendix I). During the first years after arrival, the actual employment gap is slightly larger than the predicted gap, but after about three years, recent refugees catch up and are more

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Figure 10: Employment gaps for recently arrived refugees

(a) 2013-2016 refugee cohorts

(b) Ukrainians
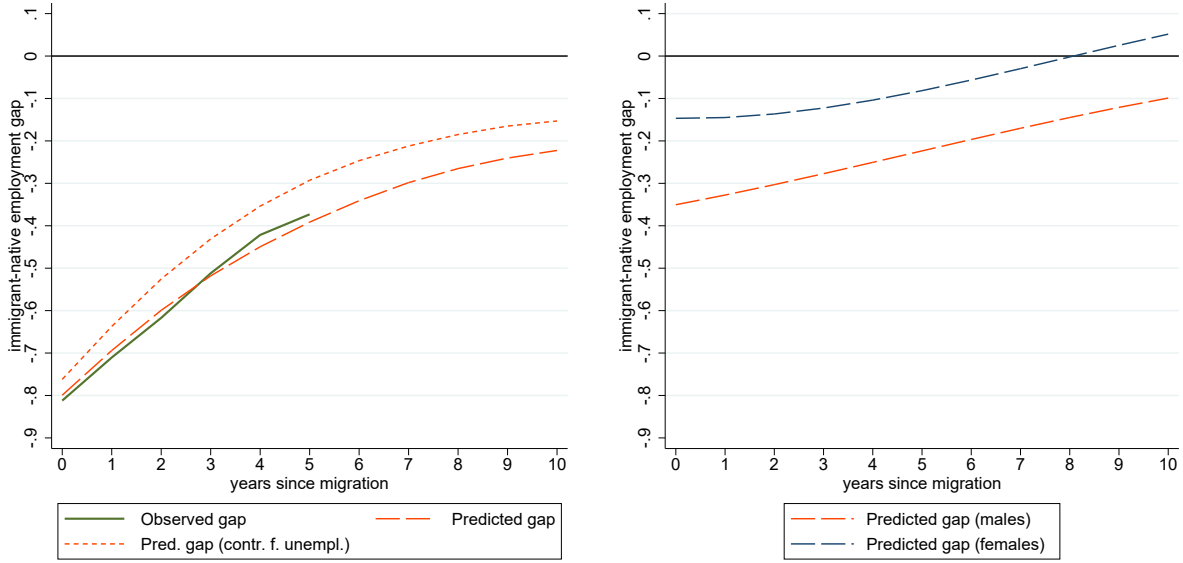
Notes: **Figure (a):** Solid green line: Actually observed immigrant-native employment gaps from IAB-BAMF-SOEP survey, estimated non-parametrically based on eqs. (2) and (1). Orange dashed and dotted lines: Predicted gaps estimated parametrically based on the Microcensus (including cohorts since 1974), accounting for age, education, refugee share (dashed line) and the regional unemployment rate in 2021 (dotted line). See Appendix I and eq. (16) for details. Characteristics for the new refugee cohorts are taken from the IAB-BAMF-SOEP survey. **Figure (b):** Predicted gaps estimated parametrically based on the Microcensus (including cohorts since 1974) seperately for a male and female sample, orange and blue lines), accounting for age, education and refugee share. Characteristics for the new refugee cohorts are taken from the IAB-BiB/FReDA-BAMF-SOEP survey of Ukrainian refugees (Brücker et al., 2023).

likely to be employed than earlier refugee cohorts with similar education and age.

These findings are consistent with evidence by Brücker et al. (2020), who combine the IAB-BAMF-SOEP with an earlier sample from the SOEP to show that after a slower start, the employment trajectory of recent refugees starts to overtake the corresponding profile for earlier refugee cohorts. Brücker et al. (2020) mention two potential explanations for this pattern. On the one hand, it could reflect Germany's stronger emphasis on language acquisition in Germany's revamped integration policy, delaying labor market entry but improving long-run prospects. Indeed, in line with this hypothesis we observe that refugees with favorable perspectives of staying (and therefore immediate access to integration and language courses) experienced *lower* initial employment rates, but quicker employment growth than refugees with unfavorable prospects (see Appendix Figure A12).[27]

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[27] In 2016 the Federal Office for Migration and Refugees (BAMF) classified asylum seekers from Syria, Iraq, Eritrea,

On the other hand, recent refugees might have benefited from unusually favorable labor market conditions, with the unemployment rate at a historic low in 2018.[28] To explore this hypothesis, we construct another prediction that accounts for economic conditions by including an interaction between years since migration and regional unemployment rates (assuming that these rates remain constant after 2020). The implied employment gaps (Figure 10a, dotted line) are now 5-10 pp. smaller than the actually observed gaps. Considering the unusually favorable conditions on the labor market, the integration of the 2015 refugee cohort has thus been slower than for earlier cohorts. One potential reason for this could be the sheer size of the refugee cohort, which increases the competition for jobs among immigrants (Albert et al., 2021).

Finally, we predict the likely long-term trajectories for the 2013-2016 cohorts. For this purpose, we include the initial employment gap as an additional predictor, so as to use the best information available at arrival for predicting integration in later years (See Appendix I for details on the methodology). The resulting forecast (Appendix Figure A13) is very close to the actual integration trajectory that we can observe during the first five years since migration. For the following years, our forecast predicts the employment gap to narrow further, before widening again slightly (reflecting the tendency of immigrant-native gaps to widen at older age among earlier cohorts) to around 25 pp.

2022 Ukrainian Arrivals. In comparison, our predictions for the employment gaps of Ukrainian refugees are more favorable (Figure 10b). They are based on the actual age distribution and educational composition of Ukrainian refugees who migrated to Germany in 2022, as documented in Brücker et al. (2023, based on the IAB-BiB/FReDA-BAMF-SOEP survey). Unlike previous immigrant cohorts, the majority of adult Ukrainian refugees who arrived in 2022 were women. Consequently, we estimate and predict employment trajectories separately for men and women (as outlined in Appendix section I).

The predicted initial employment gap for Ukrainian men is less than half the size of the gap observed among men in the 2013-2016 refugee cohort (35 pp. vs. 80 pp.). Similarly, the predicted employment gaps for female Ukrainians (15 pp.) are much smaller than the initial gaps found for other female migrants by Sprengholz et al. (2021). This difference mainly reflects the significantly higher levels of education among Ukrainian migrants compared to the 2013-2016-refugee cohort (72% with tertiary education and 95.0% with secondary education, compared to 18.6% and 56.6%, respectively, although educational levels might not be directly comparable; also see Basilio

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Iran and Somalia as having "good perspectives of staying" because more than 50% of asylum claims from these countries were accepted. Only asylum seekers from these countries were eligible for language and integration classes and labor market support even before a decision on their asylum claim was made.

[28] Several studies underpin the importance of local economic conditions and attitudes for the short- and medium run integration of refugees (Aksoy et al., 2020; Jaschke et al., 2021; Barreto et al., 2022).

et al., 2017). While the expected employment gap for Ukrainian men after ten years is still around 10 pp., Ukrainian women are predicted to catch up fully with native women (due to the relatively low participation rate of the latter). These findings complement previous studies on the gender dimension of integration (Sprengholz et al., 2021; Lee et al., 2022) with evidence from recent migration events. However, caution is warranted in interpreting the predictions, as the situation of Ukrainian refugees may differ substantially from that of previous cohorts and existing estimates on the employment rate of Ukrainians in 2022 are only 17% (Brücker et al., 2023). On the one hand, Ukrainians are granted refugee status and labor market access immediately, without lengthy application processes (which should facilitate integration, Fasani et al., 2021a). On the other hand, many Ukrainian women migrated with young children and without their male partners, and the provision of childcare options as an important policy margin.

8 Conclusions

With Germany now the world's second most important migrant destination, the integration of more than 13 million foreign-born has become a leading policy issue. Our aim was to provide insight into how well arrivals over more than 50 years integrated into the German labor market, drawing on pooled waves from the microcensus that offer broader and more representative coverage than previous work on register or survey-based sources.

While varying across groups, the integration profiles follow a few key patterns. First, employment profiles tend to be concave, with low initial employment but rapidly increasing employment in the first years after arrival (*convergence*). However, income gaps *widen* with more time in Germany (*divergence*). This pattern is in contrast to the US, where immigrants have traditionally enjoyed strong assimilation in earnings, although less so for recent cohorts (Borjas, 2015). Second, for most groups the employment gaps do not close, despite the initial catch-up. This is again in stark contrast to the US, where immigrants have *higher* employment rates than natives (Cadena et al., 2015), but similar to other continental European and Scandinavian countries (Kogan, 2006; OECD and European Commission, 2023). Third, the income and employment gaps close partially in the second generation, but the employment gaps shrink by only 25% and remain large for some groups. Finally, the perhaps most striking observation is the sudden collapse of employment among earlier arrivals from Turkey in the early 1990s. This observation implies that policy makers have to worry not only about the successful integration of new immigrant arrivals, but also a sudden evaporation of those gains during economic downturns.

We found the variability in integration outcomes between groups to be quite predictable, as it can be explained by a limited set of cohort characteristics that are readily available to policymakers. Motivated by this finding, we predicted the likely integration paths of *recent* arrival

cohorts in the final part of our study. The employment shares of the refugees arriving around 2015 are similar to earlier refugee cohorts, despite the unusual favorable labor market conditions and the increased focus on integration policies. Their predicted long-term gaps in employment (about 20-25 pp.) are more than twice as large as the corresponding gap for Ukrainian refugees (about 10 pp.). Of course, any such forecast depends on future economic trends and other unknowns.

Overall, the *raw* employment gap 10 year after arrival has widened substantially – by 11 pp. over five decades. However, accounting for changes in composition and economic conditions, the labor market prospects of immigrants have remained stagnant. This lack of improvement is puzzling. Having been exposed to immigration much later than the US, European countries may initially have lacked the experience to foster successful integration (Dustmann & Frattini, 2013). But we would then expect the institutional setting and integration outcomes to improve over time; indeed, the literature has identified policies that improve the integration process (Fasani et al., 2021a; Foged et al., 2022), some of which have been adopted when Germany revamped its integration policies in the 1990s and 2000s.[29] Why are the effects of these improvements not yet reflected in aggregate outcomes? One potential explanation would be low uptake and poor targeting of integration policies (Kogan, 2016), and it might take more time before we see the positive effects of recent policy changes in aggregate outcomes. Moreover, the observation that education and refugee shares explain most of the variation in labor market outcomes across cohorts highlights the potential effectiveness of skill-based immigration policies in promoting labor market integration.

Summing up, immigration has become indispensable for the German economy, and the experience from more than 50 years shows that many migrant groups achieve substantial employment rates and incomes. However, barriers to integration persist, and while integration policies have improved along some dimensions, as yet we see no systematic improvements in integration outcomes over time. Against this background, and in view of looming recessions and structural changes, the labor market risks for immigrants should not be underestimated, not only for recent arrivals, but also for established cohorts.

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Appendix

A   Institutional details of immigration and integration since 1955

Recruitment of "guest workers":   Because it was the original intention that foreign workers recruited between 1955 and 1973 would soon return to their home countries, they obtained only temporary (usually one-year) residence and working permits. Since these permits were linked to their jobs and assigned to firms by the Federal Employment Office, their freedom of settlement was very limited (Danzer & Yaman, 2016). Upon pressure from firms that had an interest in reducing the rotation of workers, temporary residence permits could be renewed since 1965. Since 1971, 5-year residence permits could be issued for foreigners that were living in Germany for 5 years. Family reunification was possible during the recruitment period.

Consolidation period: On one side, family migration was facilitated as more countries joined the European Community[30], granting freedom of settlement and free labor market access to their citizens. On the other, economic and political instability in Turkey and eligibility of foreigners to family benefits ("Kindergeld") reduced incentives to return home (Velling, 1993). During the 1980s, a series of policies was pursued that was meant to (1) restrict new immigration, (2) to reduce the movement of foreigners into metropolitan areas where already large migrant communities existed, and (3) to encourage return migration by offering financial incentives and counseling.

Refugee migration in the 1980s and 1990s: Until the 2000s, applying for asylum was de facto the only legal way for non-EU citizens of obtaining residence in Germany, except for family reunification and the naturalization of ethnic Germans. During the 1980s, policies were introduced that limited the options for appealing against asylum decisions, limiting the freedom of settlement and movement, introducing visa bans for origin countries and making the asylum procedures stricter. While accepted refugees had labor market access, a one-year long employment ban for asylum applicants was increased to two years in 1982 and to five years in 1986. In 1991, these employment bans were abolished again. In the early 1990s, unprecedented violent attacks against refugee accommodations took place at several locations. In 1992/1993, the parliament adopted the so-called "asylum compromise" including institutional amendments and strictly reducing the access to the asylum system for persons that entered German territory from countries defined as safe, including all neighbor states. Between 1997 and 2000, a general employment ban for asylum applicants was put into practice again, before it was replaced by a priority review ("Vorrangprüfung"), meaning that asylum seekers would only get permissions to work in jobs where no other suitable candidate could be found.

Eastern European immigration since the Fall of the Iron Curtain: After the fall of the Iron curtain, not only refugee migration from increased strongly, also many ethnic Germans (*Spätaussiedler*) living in Eastern Europe took the opportunity to migrate to Germany. Around 1990, almost 400,000 ethnic Germans arrived each year who were – by the constitution – given German citizenship and labor

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[30] Most notably the recruitment countries Italy, Greece, Spain and Portugal.)

market access if they could prove their German descent (Glitz, 2012). We exclude ethnic Germans from the entire study because as German citizens they cannot be identified in the microcensus before 2005. At the same time, also internal migration and commuting from former East German states increased strongly (Fuchs-Schündeln & Schündeln, 2009). While the German labor market was otherwise closed to Eastern Europeans in the early 1990s, bilateral agreements established a number of exceptions (Werner, 1996) for seasonal workers, cross-border commuters and so-called "posted workers" (*Werkvertragsarbeitnehmer*). Posted workers would only obtain very short-run and temporary residence permits (up to three months).

Immigration in the 2000s: In the years 2004 and 2007, 12 new member states joined the European Union. The German government – out of fear for labor market competition and "wage dumping" – decided to restrict labor market access and the freedom of residence for citizens from these countries for as long as possible, until 2011. At the same, time a fundamental shift in Germany's immigration policy took place and entry barriers for labor migration of high-skilled workers from non-EU countries were successively reduced. Although only a few thousand foreign IT-specialists benefited the "Green-Card-Initiative" of the year 2000, it marks a turning point in the public debate. A "real" immigration law outside the asylum system that granted residence and employment permits to substantial number of foreigners who had to meet certain requirements, passed in 2005. It acknowledged for the first time that the German economy was in need of immigration because skilled labor was becoming increasingly scarce as the society was aging. Unlike before, high skilled foreigners, including foreign graduates from German universities could receive temporary work permits if they found a job to earn their livings in Germany. Over the following years, several amendments were made that lowered labor market barriers further, such as for skilled workers without academic degree. In contrast to previous legislation, the immigration law of 2005 for the first time explicitly envisaged language and integration courses. Consequently, Germany's labor market was considered to be one of the most open among OECD countries (OECD, 2013).

Recent refugee migration: Asylum seekers faced significant labor market barriers, until being accepted as a refugee, which could take more than a year during the 2015/2016 peak (including priority checks and the requirement to obtain an individual working permit). A strict employment ban only applied for the first three months after arrival. Asylum applications from countries defined as safe were massively complicated, affecting in particular refugees from many African states and the West-Balkans. In order to create alternative migration options than applying for asylum, labor market access was eased for citizens of West-Balkan states in 2016. In contrast, Ukrainians who fled the war in their home country in 2022 were granted asylum and immediate labor market access without an asylum procedure.

# B Immigrant definitions and naturalizations

In the microcensus, immigrant status can only be identified based on nationality as country of birth is not reported. Until 1995, the questionnaire includes only one item on whether respondents possess German citizenship or not and for non-Germans one additional item on the foreign nationality. Since 1996, all respondents, including those with German nationality, are asked whether they possess a second nationality. Since 2005, the microcensus includes additional information on whether and when a respondent has obtained the German nationality by naturalization, and on previous nationalities.

These expanding questionnaires reflect the changing citizenship law in Germany: Until the 1990s, only persons of ethnic German ancestry had the right to obtain German citizenship (with some exceptions for immigrants that lived in Germany for longer than 15 years and second-generation immigrants that were born in Germany). Against this background, we are very confident that the first nationality captures true immigrant status well until the mid 1990s, with the important exception of Ethnic Germans that arrived from Central and Eastern Europe that are excluded from this study.

Figure A1 presents the size of the different cohorts (extrapolated to match population numbers) based on different migrant definitions over the census waves from 1976 till 2015. We only show numbers for males that have migrated to Germany at age 18 or older, also including people that are older than 58. The dotted lines represent the number of immigrants that only possess a foreign nationality and do not hold German citizenship. These are the immigrants that we can identify before 1996. The solid line additionally includes immigrants with double citizenship, corresponding to our definition of immigrants since 1996. At that point in time, none of the cohorts included any substantial number of dual nationals, which is to be expected because former law required foreigners to abandon other nationalities when obtaining German citizenship, which was only loosened by the new citizenship law in the year 2000. Finally, the dashed line additionally includes naturalized immigrants without foreign nationality (available since 2005). We exclude ethnic Germans and other immigrants that obtained the German nationality during their first year after arrival. Among immigrants from non-EU countries, a non-negligible fraction eventually gets naturalized.

In Figures A2 and A3 we similarly plot employment shares and mean personal real incomes of cohorts, using the three different immigrant definitions pointed out in the previous paragraph. If there were important deviations between the solid line (including double nationality, the migrant definition we adopt throughout the main parts of the paper) and the dashed line (including naturalized immigrants), this would be an indication that selective naturalization was likely to bias our results. We find such deviations only for three cohorts (Turkey 1974-78 and 1979-87, Middle East and Africa 1988-1995). For that reason we are confident that our results on employment and income gaps between immigrants and natives are not strongly biased because of selective naturalization.

Figure A1: Different immigrant definitions: Number of observations
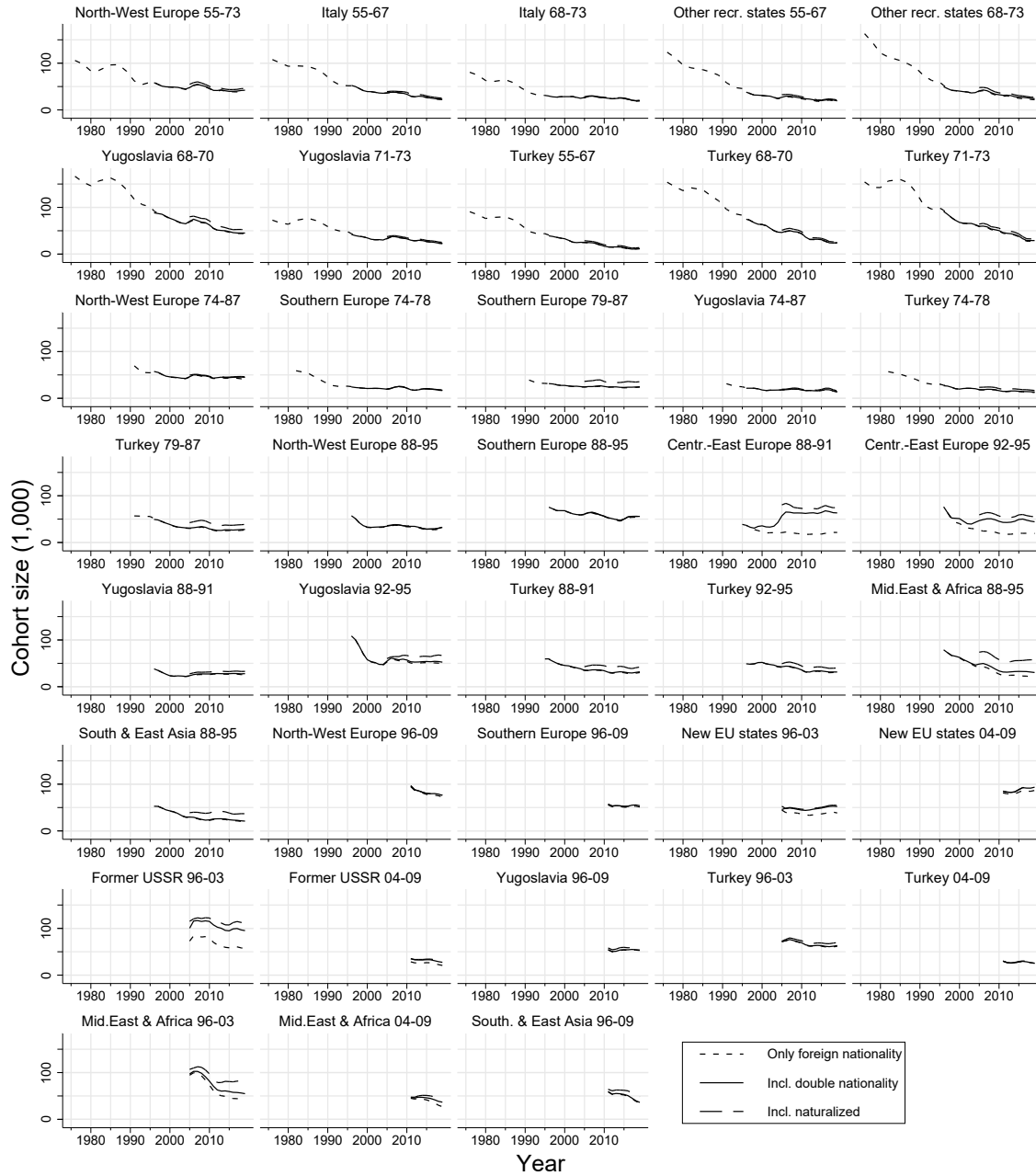
Notes: Observation numbers (in 1,000; extrapolated with microcensus weights to match total population numbers; male migrants aged 18 or older, including those above 58). Short dashed line: Migrants holding a foreign nationality, but no German nationality (since 1976). Solid line: Additionally migrants holding both, German and foreign nationality (since 1995). Long dashed line: Additionally naturalized migrants who lost foreign nationality when adopting German citizenship (since 2005).

Figure A2: Different immigrant definitions: Employment rates
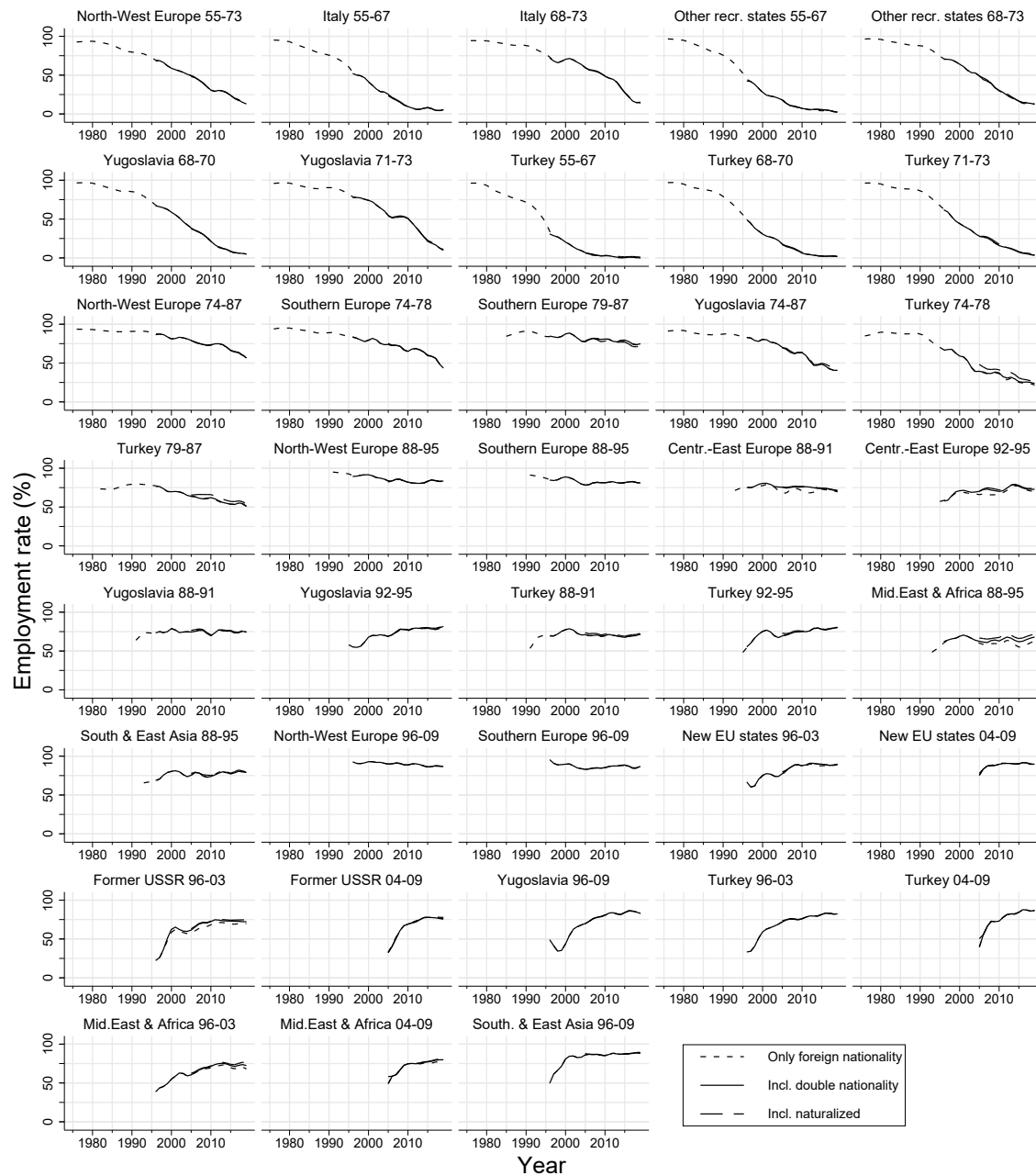
Notes: Mean employment rates (male migrants aged 18 or older, including those above 58). Short dashed line: Migrants holding a foreign nationality, but no German nationality (since 1976). Solid line: Additionally migrants holding both, German and foreign nationality (since 1995). Long dashed line: Additionally naturalized migrants who lost foreign nationality when adopting German citizenship (since 2005).

Figure A3: Different immigrant definitions: Average personal income income
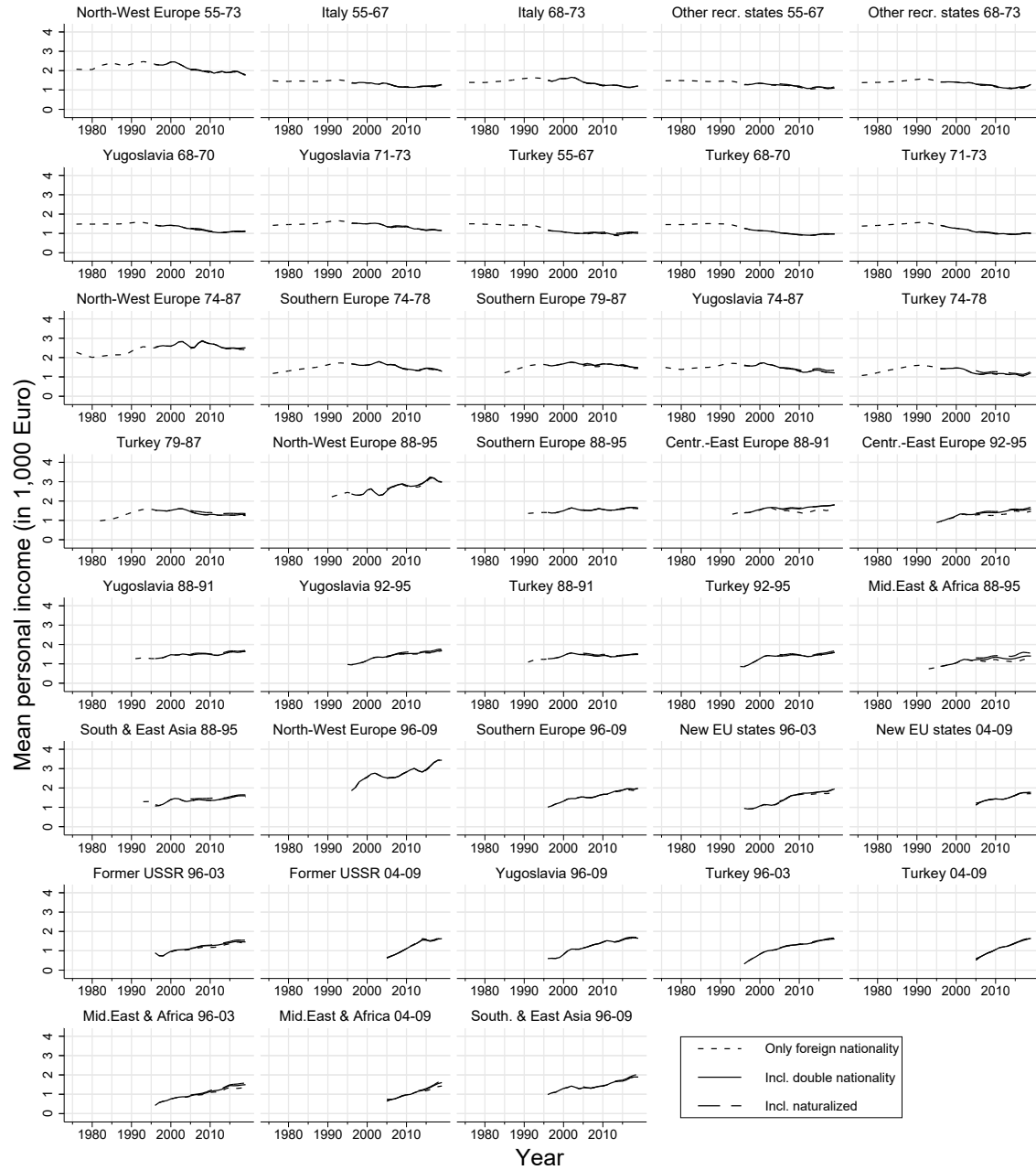
Notes: Mean real individual post-tax income (in 1,000 Euro - reference year 2010; male migrants aged 18 or older, including those above 58). Short dashed line: Migrants holding a foreign nationality, but no German nationality (since 1976). Solid line: Additionally migrants holding both, German and foreign nationality (since 1995). Long dashed line: Additionally naturalized migrants who lost foreign nationality when adopting German citizenship (since 2005).

C   Additional evidence on income gaps

In this section, we show additional evidence on the immigrant-native gaps in income. In our baseline analysis we highlighted that these gaps increase with time after arrival, which contrasts with some previous work on this question. To shed light on what might explain this difference, we vary our baseline specification along three dimensions. First, we compare three different income definitions (personal income, log hourly wage and full-time daily labor wage).[31] This is useful, as previous work often focused on the evolution of wages for a subset of employed workers rather than total income for the full cohort. Second, we compare estimates from the full sample and from cohorts with low return migration.[32] This is useful as our data does not allow us to track a fixed set of individuals over time; the observation of income divergence could therefore be driven by the return migration of immigrants with comparatively high personal incomes (a compositional effect). While we cannot observe return migration on the individual level, we observe whether a given arrival cohort maintain or shrinks over time (see Appendix B). Third, we compare unconditional and conditional estimates, comparing our baseline specification (which controls only for observation year and age) and conditional specifications that control successively for education, region of residence, number of children and marital status, and occupation and industry groups.

Figure A4 shows the results. Return migration does not appear to drive our finding, as the patterns are similar if we restrict our sample to cohorts with low return migration (cf. left and right panels). Second, we find less divergence in hourly or daily labor wages than in personal income (cf. top and lower panels). Third, we find substantially less divergence when controlling for education (compare blue and dotted orange lines), as already discussed in the main text. Controlling additionally for regional and job-related characteristics has a large effect on the level of the income gaps but does not affect much the convergence pattern. Specifically, controlling for regional indicators increases the immigrant-native gaps substantially, as immigrants cluster in more urban regions that are characterized by higher wages. Controlling for industry and occupation groups instead shrinks those gaps, as immigrants are over-represented in low-pay industries and occupations.

In sum, while the unconditional *income* gap increases substantially over time, conditional *wage* gaps remain more stable. Much of the difference to previous work is therefore due to our focus on unconditional rather than conditional estimates, and on total rather than wage income. When considering wage outcomes and controlling for education (Figure A4c, green dashed line) – the specification that is arguably most similar to studies based on administrative data based on social security – we find some divergence in the first years after arrival but the gaps then stabilize in subsequent years (i.e. neither divergence nor convergence).

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[31] The hourly wage is defined as the total income of persons who report labor as their main source of income, divided by the reported average working hours. The full-time daily labor wage is defined as the total income of those persons who a) report labor as their main source of income and b) report working at least 30 hours per week.
[32] Cohorts with low return migration are that half of our cohorts whose sizes shrink the least during their first 10 years after arrival (according to Table 1).
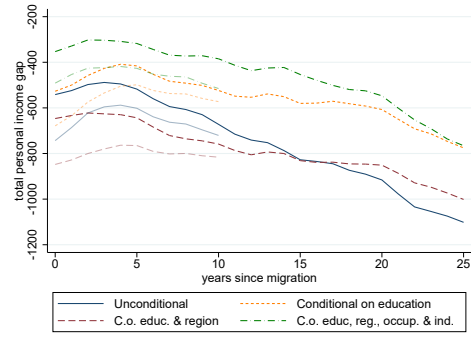
Figure A4: Additional evidence on income profiles

Gaps in monthly personal income (2010 EUR)
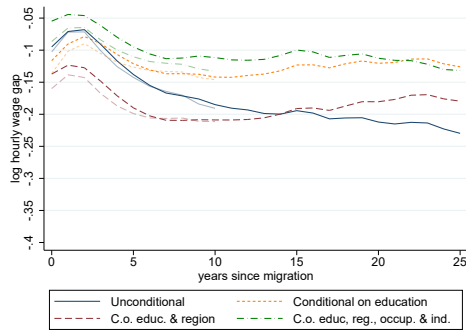
(a) All cohorts
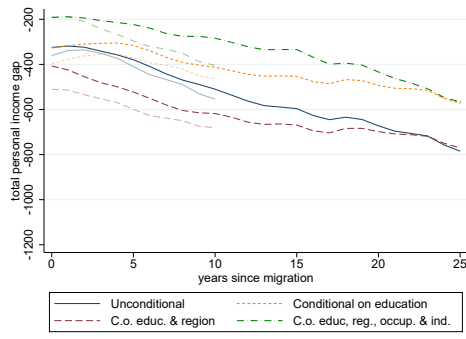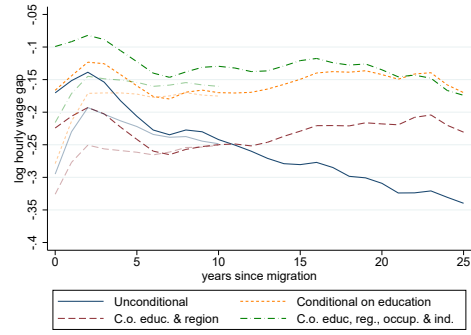
(b) Cohorts with low return migration

Gaps in log hourly labor wage (log-points)

(c) All cohorts

(d) Cohorts with low return migration

Gaps in full-time daily labor wage (log-points)

(e) All cohorts
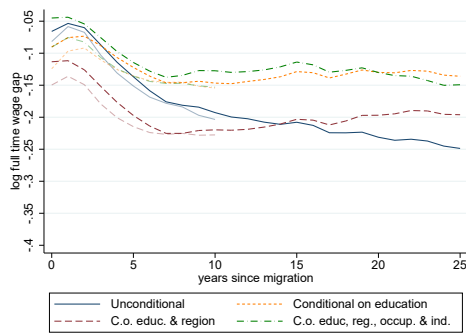
(f) Cohorts with low return migration
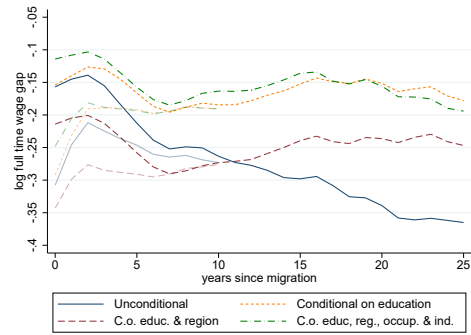
Notes: Dark long lines include arrival cohorts 1974-95, light short lines include cohorts 1974-2009. Solid blue lines depict unconditional immigrant-native gaps (controlling only for observation year and age); dotted orange lines additionally controls for education; dashed red lines additionally controls for region, number of children and marital status; dash-dotted green lines additionally controls for occupation and industry groups.

D Other outcomes: Welfare dependency and intermarriage

Figure A5 plots the welfare dependency rate of different cohorts, defined as receiving any kind of public transfers as the main source of personal income.[33] It is higher among immigrants than among natives, for all cohorts except arrivals from North-West Europe. Upon arrival, the gap is particularly large for refugee cohorts, because refugees are eligible for asylum-related benefits while facing restrictions in labor market access (see Appendix A for details). Welfare dependency upon arrival is low for some Turkish cohorts. Turks often rely on support from relatives during the first year ("assistance by friends and family" in the microcensus), which is less likely to be the case for other origin groups with a smaller diaspora in Germany. Welfare dependency tends to decline quickly in the first years after arrival, mirroring the profiles for employment (Figure 2). However, some groups, in particular Turkish cohorts, develop higher welfare dependency in the second and third decade after arrival (as previously noted by Riphahn, 2004; Riphahn et al., 2013). While dependency also increases among their native counterparts (due to the correlation of years since migration with age), the increase is much more pronounced among immigrant cohorts – resulting in divergence, rather than convergence. We thus find non-monotonic integration profiles: after large improvements in the early years after arrival, the immigrant-native gap stagnates and then widens again for some groups – both in employment (Figure 2) and welfare dependency (Figure A5).

Table A1 shows intermarriage and intramarriage rates of cohorts upon arrival and ten years after arrival.[34] While our focus is on labor market outcomes, assortative patterns can be an indicator for social integration or segmentation, which may interact with economic integration (Meng & Gregory, 2005). The observed patterns are very similar to results reported by Constant et al. (2012) and reflect cultural and religious distances to the native German population (as well as a decline in the overall importance of marriage over time). North-West-European immigrants are most likely to be married to a German spouse, in particular when accounting for their low baseline probability of being married. They are the only group that is continuously more likely to be married to a German spouse rather than to a spouse of the same nationality group. Reasons might include small cultural differences and relatively low incentives to move for economic reasons. In contrast, the vast majority of immigrants that arrived previous to 1987 from the traditional "guest worker" recruitment countries, in particular from Turkey, married within their communities: Ten years after arrival, about 90% of all Turks that arrived between 1955 and 1973 and about 80% of 1974-1987 arrivals were married to a Turkish spouse, but only about 1% respectively 7% to a German spouse.

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[33] These include unemployment benefits, social assistance, but also other programs like asylum seeker benefits, parental benefits or student aid (BAFoeG). Pensions from the pension insurance are *not* considered.

[34] Intramarriage refers to be married to a spouse of the same origin group (the same groups our cohorts are based on); intermarriage refers to being married to a German spouse. Since "German spouse" refers to the current nationality, it excludes foreign-born who hold only the German nationality. Non-married persons are treated as "zeros".

Table A1: Inter- and intramarriage rates of immigrant cohorts

|	at arrival		10 years after arrival	
	intermarriage	intramarriage	intermarriage	intramarriage
1. Recruitment period (1955-1973)				
North-West Europe 55-73			39.6	31.7
Italy 55-67			16.7	68.8
Italy 68-73			15.1	64.5
Turkey 55-67			1.5	92.0
Turkey 68-70			0.8	90.0
Turkey 71-73			1.9	91.6
Yugoslavia 68-70			4.7	82.5
Yugoslavia 71-73			4.5	79.5
Other recr. states 55-67			4.2	75.1
Other recr. states 68-73			2.4	69.9
2. Consolidation period (1974-1987)				
North-West Europe 74-87	18.1	30.7	34.7	32.0
Southern Europe 74-78	4.0	48.0	23.2	53.7
Southern Europe 79-87	7.2	41.7	7.5	63.3
Yugoslavia 74-87	11.2	54.4	11.2	71.0
Turkey 74-78	2.9	68.9	4.3	84.7
Turkey 79-87	6.3	54.0	7.4	80.7
3. Fall of the Iron Curtain (1988-1995)				
North-West Europe 88-95	8.0	28.7	27.6	16.8
Southern Europe 88-95	1.0	49.2	9.8	57.9
Centr.-East Europe 88-91	7.9	66.2	21.8	55.7
Centr.-East Europe 92-95	9.3	58.3	20.0	57.6
Yugoslavia 88-91	6.4	65.7	20.8	58.6
Yugoslavia 92-95	1.7	62.5	17.0	60.1
Turkey 88-91	3.7	76.9	13.2	72.2
Turkey 92-95	9.4	71.2	21.5	62.7
Mid.East & Africa 88-95	7.9	31.5	23.3	33.2
Central & East Asia 88-95	2.9	38.7	11.0	61.7
4. Period of East-West integration 1996-2005				
North-West Europe 96-09	6.4	19.8	23.6	20.0
Southern Europe 96-09	3.7	22.8	8.7	36.5
New EU states 96-03	16.4	29.9	14.7	47.3
New EU states 04-09	4.4	43.8	4.9	48.1
Former USSR 96-03	23.1	53.1	22.1	54.5
Former USSR 04-09	21.7	42.0	25.1	44.4
Yugoslavia 96-09	21.2	41.6	17.8	56.2
Turkey 96-03	39.3	42.0	37.4	44.0
Turkey 04-09	49.7	33.5	43.2	33.6
Mid.East & Africa 96-03	22.8	16.4	18.6	32.1
Mid.East & Africa 04-09	25.8	20.0	15.8	30.1
Central & East Asia 96-09	5.3	29.6	13.8	45.7

Notes: Percentages are taken from the entire sample, regardless of marital status. Non-married persons are included in the percentages and treated as zeros. Intramarriage refers to be married to a spouse of the same nationality group (the same groups our cohorts are based on); intermarriage refers to being married to a spouse that only holds the German nationality.

Figure A5: Welfare dependency of different immigrant cohorts

(a) Arrivals 1955-1973
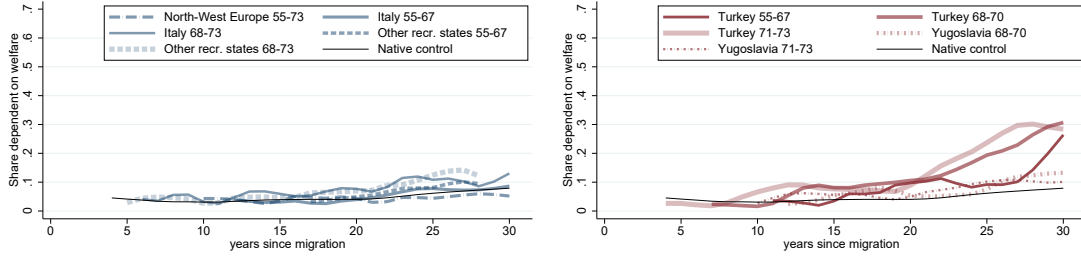
(b) Arrivals 1974-1987
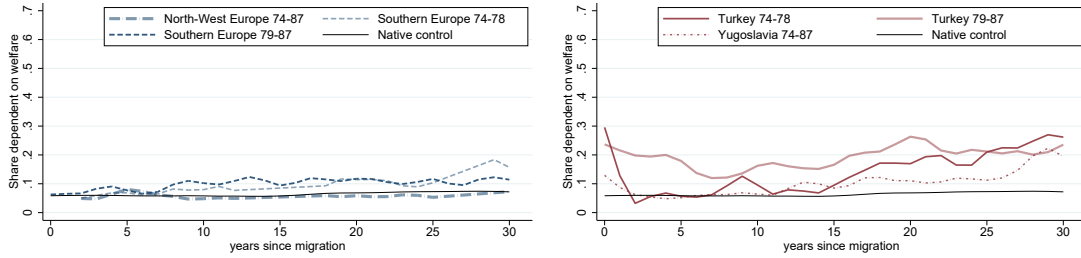
(c) Arrivals 1988-1995
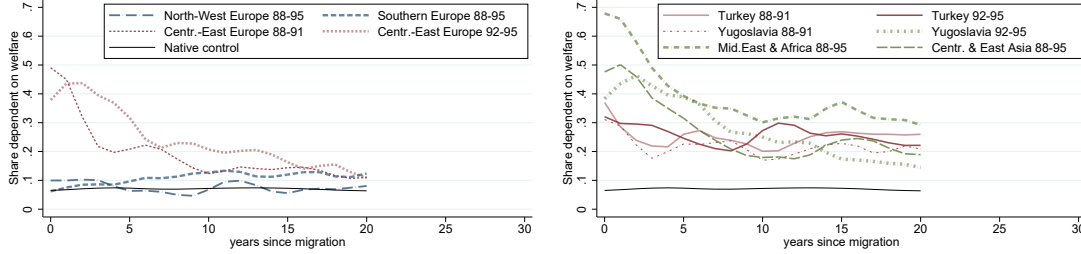
(d) Arrivals 1996-2005
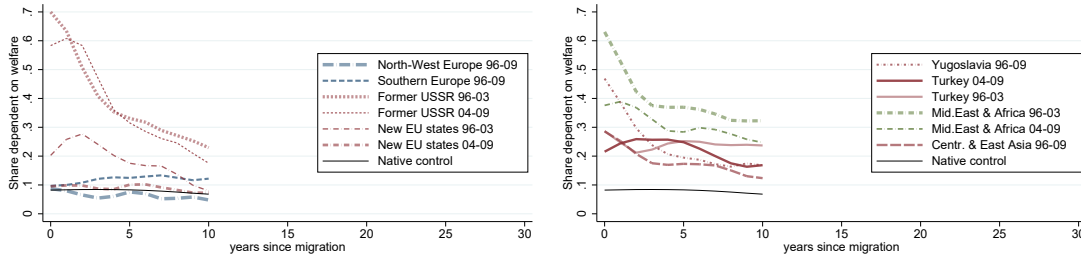
Notes: Share of persons whose main source of income is public transfers. This includes unemployment benefits and social assistance, but also other programs like asylum seeker benefits, parental benefits, student aid (BAFoeG). Pensions are *not* considered. The counterfactual native welfare shares are for natives of the same age observed in the same year as the immigrant sample (estimated according to equation 2).

E   Individual vs. cohort-level predictors

Are *individual characteristics* or *group-level characteristics*, i.e. the average characteristics of the "cohort" defined by arrival period and region of origin (Section 3.3), more predictive of labor market success? If the aim is to predict individual outcomes, the answer may appear obvious – a person's own education should be more predictive for that person's success than the average attainment of the group he happens to belong to. Interestingly, that is not generally the case, and cohort-level characteristics tend to be important predictors even conditional on the persons' own characteristics.

To illustrate this point, we regress the individual labor market gaps $\hat{y}_i^{gap}$ at around 10 years after arrival as defined in equation (1) on

$$\hat{y}_i^{gap} = \alpha + \beta X_i^{individual} + \gamma X_{c(i)}^{cohort} + \varepsilon_i$$

where $X_i^{individual}$ a vector of individual level controls and $X_{c(i)}^{cohort}$ cohort-level controls at the time of arrival (the results are similar if $X_{c(i)}^{cohort}$ are measured at the time of observation). We standardize all regressors such that the coefficients represent the effect of a one-standard deviation increase in the respective variable.

The results are shown in panel A of Table A2 for employment and panel B for income. Apart from the (adjusted) R-square on the individual level, we also report the corresponding R-square on the cohort level, defined as the share of variation between cohorts who can be explained by the covariates. The coefficients on education (column 1) have the expected sign[35] and are highly significant, explaining about 60% of the variation in employment gaps between immigrant groups. In contrast, the mean age of the cohort or the overall migrant share at their arrival (the population share of immigrants regardless of origin who arrived within the previous 5 years) explain little of the differences in integration outcomes (columns 2 and 3).[36] The latter result contrasts with recent findings by Albert et al. (2021) for the US, who find that the immigrant-native gaps are larger when larger number of immigrants arrive in the US at the same time.

As is perhaps intuitive, the cohort-level variation can be at least as well explained by cohort average as by individual-level characteristics (cf. columns 4-6 of Table A2). Cohort-level controls can explain about two thirds of the between-cohort variation in employment and income after 10 years (column 3) while individual-level characteristics are predictive for cohort-level employment gaps but not for income (column 6 of same tables).

More surprising is that the cohort-level characteristics can be also better predictors for *individual* outcomes. For example, the cohort shares with a school or university degree explain 2.7% of the variation in individual employment, while own education only explains 2.1%. For income, individual education becomes more predictive, as having a university degree is associated with substantially higher individual incomes. Finally, column (7) shows that cohort-controls (in particular the cohort share with a completed

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[35] The negative sign on cohort-share university degree turn positive when including a time-trend. The negative sign is thus probably driven by improving education over time that is not reflected in improving employment.

[36] In interpreting the coefficient on age at migration, it is helpful to consider two distinct mechanisms: On the one hand, highly-educated immigrants with university diplomas tend to migrate at higher ages than other immigrants, which probably explains the positive coefficients in columns (2). On the other hand, younger migrants might be more willing or able to accumulate country-specific human capital. These arguments are consistent with the observation that once we condition on education the coefficient on age at migration flips sign and becomes negative.

school degree) remain predictive even after conditioning on an individual's own education and age at arrival.

Why are cohort-level characteristics so predictive? One potential explanation is that the composition of an arrival cohort does indeed have a causal effect on their members because of peer or network effects. For example, Borjas (1992) introduces the concept of "ethnic capital" to characterize the ethnic context in which individuals take decisions, e.g. to invest in country-specific human capital. An alternative explanation is that the discernible membership to certain groups leads to labor market disadvantages because of discrimination. For example, Weichselbaumer (2019) shows that among female job applicants with identical resumes, those with a Turkish name receive much fewer callbacks. Finally, the reported education of an immigrant may simply not be very informative about his or her actual level of productive knowledge and skills, partly because educational credentials may not be fully translatable from origin to destination country (see Fortin et al., 2016; Basilio et al., 2017). The individual-level information is then only a noisy proxy, and cohort averages constructed over many individuals may be a more precise signal for individual skills. Irrespectively of which explanation applies, we can conclude that cohort-level statistics are the most relevant predictors for the labor market success of immigrant cohorts, and that individual characteristics yield little additional power (compare R-squared: cohort-level for columns (3) and (7)).

Table A2: Individual- vs. cohort-level predictors of labor market gaps

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Employment gaps (Percentage points, 10 years after arrival)							
School degree (coh. mean)	5.35*** (0.55)		5.69*** (0.69)				5.04*** (0.69)
University degree (coh. mean)	-1.10 (0.82)		-0.17 (0.70)				-0.55 (0.68)
Cohort size at arrival (coh. mean)		2.33*** (0.77)	1.66** (0.66)				1.40** (0.61)
Age at arrival (coh. mean)		1.74 (1.11)	-1.68 (1.15)				-1.56 (1.08)
School degree (individual)				2.30*** (0.24)		2.281*** (0.238)	1.69*** (0.20)
University degree (individual)				1.47*** (0.50)		1.561*** (0.494)	1.77*** (0.25)
Age at migration (individual)					-2.40*** (0.71)	-2.536*** (0.703)	-3.03*** (0.60)
Observations	32,612	32,612	32,612	32,612	32,612	32,612	32,612
Adj. R^2 (in~)	0.03	0.01	0.03	0.02	0.00	0.03	0.05
Adj. R^2 (co~)	0.61	0.15	0.69	0.50	0.08	0.57	0.70
Panel B: Income gaps (2010 Euro, 10 years after arrival)							
School degree (coh. mean)	192.4*** (30.2)		246.7*** (28.3)				239.5*** (30.0)
University degree (coh. mean)	117.4* (68.6)		179.0** (77.1)				82.1 (77.3)
Cohort size at arrival (coh. mean)		-0.701 (24.54)	22.6 (243)				20.20 (26.7)
Age at arrival (coh. mean)		29.8 (73.52)	-205.9*** (59.4)				-157.5** (58.6)
School degree (individual)				48.04*** (6.6)		44.7*** (6.2)	24.7*** (4.4)
University degree (individual)				308.9*** (65.1)		320.8*** (64.3)	297.2*** (36.2)
Age at migration (individual)					-333.3*** (54.9)	-355.9*** (49.4)	-366.5*** (35.9)
Observations	31,607	31,607	31,607	31,607	31,607	31,607	31,607
Adj. R^2 (in~)	0.04	0.00	0.06	0.08	0.04	0.12	0.16
Adj. R^2 (co~)	0.48	0.01	0.66	0.22	0.01	0.23	0.63

Notes: The regressions include immigrants 9-11 years after arrival. Dependent variables: Predicted individual gaps according to equation (1). Panel A: Employment or in education (in percentage points). Panel B: Personal monthly post-tax income (real income, in 2010 Euros). Cohort mean variables are measured upon arrival. Cohort size is measured as the share of all working-age immigrants that arrived in the 5 years previous to an immigrant's arrival year in the working-age population in the arrival year. Explanatory variables are standardized (mean=0, standard deviation=1). Standard errors are clustered on the cohort level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

F Decomposing employment gaps into age and year components

We estimate for each immigrant group I separately:

$$\hat{y}_i^{gap} = \lambda^I + \sum_{a=18}^{58} \delta_a^I A_{ia} + \sum_{t=1976}^{2015} \gamma_t^I \Pi_{it} + \varepsilon_i \tag{7}$$

where $\hat{y}_i^{gap}$ denotes the immigrant-native employment gap for immigrant individual i predicted according to equation (1). λ^I is a (cohort-specific) constant, A_{ia} a dummy for age a and Π_{it} a dummy for year t. For individual i, observed at age a in year t, $\hat{y}_i^{gap}$ can be predicted by:

$$\hat{y}_i^{pgap} = \hat{\lambda}^I + \hat{\delta}_a^I + \hat{\gamma}_t^I \tag{8}$$

We can drop the year-parameter $\hat{\gamma}_t^I$ to obtain what we call the age-component, which is the part of the gap that can be explained by the age structure of immigrant groups, which could be for instance be caused by systematically earlier retirement of immigrants compared to natives:

$$\hat{y}_i^{pgap-age} = \hat{\lambda}^I + \hat{\delta}_a^I \tag{9}$$

Figure A6: The age-component of employment gaps by birth years

(a) Turkey, birth years 1935-1939
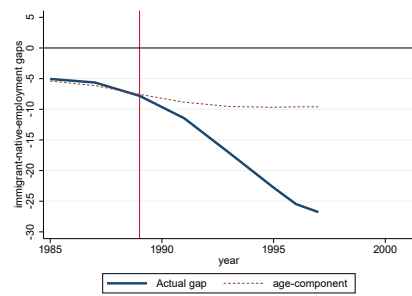
(b) Turkey, birth years 1940-1944
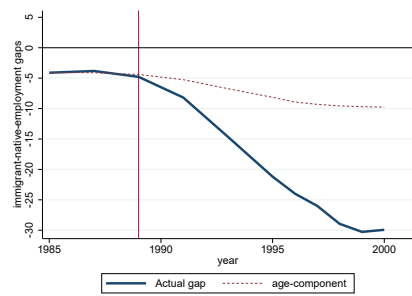
(c) Turkey, birth years 1945-1949

(d) Turkey, birth years 1950-1954

Notes: Turkish arrivals 1955-1978. The solid lines show the predicted immigrant-native employment gap as defined in equation (8) and the dotted line the age-specific component as defined in equation (9).

G Unemployment- and Bartik-shocks

Table A3 illustrates that immigrants were not generally living in regions with higher unemployment rates in 1991 (Column 1), but in regions where unemployment increased stronger between 1991 and 1997 ("Unemployment shock", Column 2). Turkish immigrants were already allocated in the 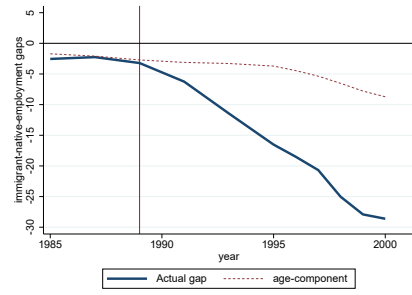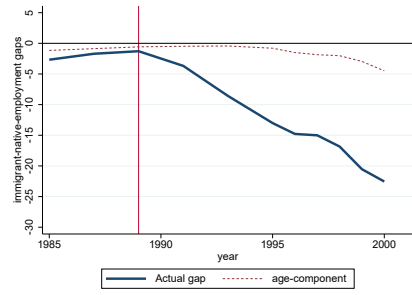most unfavorable regions before their employment rates collapsed, both in terms of baseline unemployment as well as unemployment growth. A second potential reason why immigrant employment rates dropped could be their concentration in industries that went into decline during the 1990s. To explore this mechanism, we predict how much the employment of each immigrant cohort would have dropped based on their 1989 allocation into industries and industry-wide employment trends between 1989 and 1997. We define this type of Bartik-shifter as:

$$BS_{1997-1991,c} = \sum_{s=1}^{N} \left(\frac{emp_{cs,1989}}{emp_{c,1989}} \times \frac{emp_{s,1997}}{emp_{s,1989}} \right) \tag{10}$$

where $emp_{cs,1989}$ is the number of workers in cohort c working in industry sector s in 1989[37], $emp_{c,1989}$ the total number of employed persons in cohort c and $emp_{s,1997}$ respectively $emp_{s,1989}$ total employment (including immigrants and natives) in sector s in the years 1997 and 1989. $BS_{1997-1991,c}$ thus captures the employment trend (between 1989 and 1997) of the industry sectors that a group c was employed in in the base year 1989. Column 3 of Table A3 thus shows that employment in the sectors in which natives were employed in 1989 grew on average by 4.5% until 1997, whereas many immigrant cohorts worked in sectors that on average shrank. Again, Turkish cohorts were already previously allocated to the most unfavorable industries, with predicted employment declines of up to 9.2%. More recent immigrants from predominantly EU countries instead selected in sectors with even better growth prospects than natives. This could be due to younger and higher educated cohorts sorting into booming industries, whereas older migrants that have already spend about 20 years or more in Germany are less able to change into promising jobs.

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[37] Harmonizing industry sectors over the census waves is not straight-forward because the used industry classifications change frequently. Additionally, many (service industries) employ only very small numbers of migrants. We therefore aggregate sectors to the following broad industries: 1 Agriculture, forestry and fishing; 2 Mining, quarrying, manufacture of non-metallic mineral products; 3 Manufacture of food and beverage products; 4 Manufacture of textiles, wearing apparel, leather and related products; 5 Manufacture of wood and products of wood, paper and paper products; 6 Manufacture of coke, refined petroleum, chemicals and chemical products, rubber abd plastic products; 7 Manufacture of basic metals, metal products except machinery; 8 Manufacture of electrical equipment, computers, electronic and optical products; 9 Manufacture of machinery, motor vehicles and equipment; 10 Construction, Electricity, gas and water supply, waste management, repair and installation; 11 Wholesale and retail trade; 12 Transport and storage; 13 Accommodation and food service activities; 14 Other services.

Table A3: Regional unemployment rates and Bartik-trends during the 1990s

Cohort	Unemp. rate 1991	Δ Unemp. rate 1997-1991	Bartik shock 1997-1989
Natives	8.18	4.84	0.41
North-West Europe 55-73	7.48	4.88	1.57
Italy 55-67	7.52	4.80	-5.64
Italy 68-73	7.64	4.78	-7.85
Turkey 55-67	8.36	4.86	-8.18
Turkey 68-70	8.47	4.93	-10.47
Turkey 71-73	8.24	4.82	-11.92
Yugoslavia 68-70	7.15	4.83	-3.83
Yugoslavia 71-73	7.17	4.81	-5.14
Other recr. states 55-67	8.16	4.69	-8.50
Other recr. states 68-73	8.23	4.72	-9.71
North-West Europe 74-87	7.69	4.91	2.14
Southern Europe 74-78	7.83	4.77	-4.45
Southern Europe 79-87	7.42	4.84	-3.77
Yugoslavia 74-87	7.76	4.78	-3.36
Turkey 74-78	8.38	4.86	-10.54
Turkey 79-87	8.30	4.96	-8.39

Notes: Column (1): Mean unemployment rate at region of residence in 1991; Column (2): Change in mean unemployment rate at residence 1997-1991; Column (3): Predicted change in employment based on the cohort's allocation across industries in 1989, as defined in equation (10).

H   Methodological details: The 1990s employment collapse

We estimate the following parametric regressions that are based on equations (3) and (4) for the census waves 1976-2001. Specifically, we model the outcome y_{ictr} (employment or income) for immigrant i in cohort c in calendar year t and region r as:

$$y_i = \delta^I A_i + \alpha^I YSM_i + \sum_{t=1985}^{2005} \gamma_t^I \Pi_t + \sum_{t=1985}^{2005} \mu_t^I \Pi_t \times UR_{shock1997-1989,r} + \sum_{t=1985}^{2005} \xi_t^I \Pi_t \times BS_{1997-1989,c} + \varepsilon_i \quad (11)$$

where A_i is a third-order polynomial in age, YSM_i a third-order polynomial of years since migration and Π_t denotes a set of indicator variables for each calendar year (where we omit the year 1989 as base year). $UR_{shock1997-1989,r}$ denotes the regional unemployment shock of the 1993 recession (unemployment rate in 1997 - unemployment rate in 1989, measured at 75 spatial planing units, "Raumordnungsregionen") and $BS_{1997-1989,c}$ is a type of Bartik-shifter (details above in Appendix G) that varies between immigrant cohorts. The corresponding regression model for native individual n, where the subscript c refers to 5-year

birth cohorts reads:

$$y_n = \delta^N A_n + \sum_{t=1985}^{2005} \gamma_t^N \Pi_t + \sum_{t=1985}^{2005} \mu_t^N \Pi_t \times UR_{shock1997-1989,r} + \sum_{t=1985}^{2005} \xi_t^N \Pi_t \times BS_{1997-1989,c} + \varepsilon_n \quad (12)$$

We estimate equations 11 and 12 jointly on a pooled sample of immigrants and natives. The results in Figure 9 are based on a sample of Turkish immigrants (superscript I) and natives (superscript N). As is commonly done (Barth et al., 2004), we assume identical time effects for immigrants and natives $\gamma^I = \gamma^N$, but we allow the coefficients on age, unemployment shocks and Bartik shifters to differ between immigrants and natives.

Our goal is firstly to estimate how much of the unemployment collapse among immigrants in the 1990s can be explained by deteriorating labor market conditions and structural change, and secondly whether immigrants were already previously allocated into regions or industries that were stronger affected or whether they were systematically more sensitive to these shocks compared to natives.

For that purpose we perform Oaxaca-Blinder decompositions to determine the parts in the aggregate immigrant-natives gaps that can be explained by the severity of the regional unemployment shocks, which is defined as $\Delta gap\ y_t^{UR}$ (and perform identical decompositions for the Bartik-shifters):

$$\Delta gap\ y_t^{UR} = \hat{\mu}_t^I \bar{U}R_{shock1997-1989}^I - \hat{\mu}_t^N \bar{U}R_{shock1997-1989}^N$$
$$= \underbrace{\hat{\mu}_t^N (\bar{U}R_{shock1997-1989}^I - \bar{U}R_{shock1997-1989}^N)}_{\text{Difference in exposure}} + \underbrace{(\hat{\mu}_t^I - \hat{\mu}_t^N) \bar{U}R_{shock1997-1989}^I}_{\text{Difference in coefficients}} \quad (13)$$

where $\bar{U}R_{shock1997-1989}^N$ is the average unemployment shock for natives (and $\bar{U}R_{shock1997-1989}^I$ the average unemployment shock for immigrants) is exposed to. The first component captures whether immigrants on average lived in regions that were stronger affected by increasing unemployment than the regions where natives lived ("Difference in exposure") and the second component whether immigrants were more negatively affected by a given increase in regional unemployment compared to natives ("Difference in coefficients").

I   Methodological details: Refugee application

We are interested in comparing the employment trajectories of recent refugee cohorts to the integration profiles of previous immigrant cohorts. In particular we ask which role the favorable labour market conditions in the late 2010s played.

In a first step, we estimate employment for immigrants and natives *in the microcensus data* using parametric equations that are similar to equations (3) and (4):

$$y_i = \lambda^I + \delta^I A_i + \alpha^I YSM_i + \phi^I X_{ctr} + \chi^I X_{ctr} \times YSM_i + \sum_{t=1976}^{2015} \gamma_t^I \Pi_{it} + \varepsilon_i \quad (14)$$

$$y_n = \lambda^N + \delta^N A_n + \sum_{t=1976}^{2015} \gamma_t^N \Pi_{nt} + \varepsilon_n \tag{15}$$

where y is a dummy for employment of immigrant individual i from cohort c or native individual n. λ denotes a separate intercept immigrants I and for natives N.[38] A_i a vector of polynomials up to the power three for age and YSM_i up to third-order polynomials of years since migration. Higher order polynomials are not shown for simplicity. As previously,X_{ctr} a vector of control variables that vary between cohorts c, points in time t or regions r. X_{ctr} always includes the cohort-specific share of immigrants with a school degree as well as the share of immigrants with a university degree, measured immediately after arrival and the refugee share of each cohort. Depending on the specification, we additionally include regional unemployment rates. We fully interact all these control variables with the different polynomials of YSM_i to allow the integration trajectories to differ flexibly depending on education, refugee share and economic conditions. We include X_{ctr} only for immigrants and not for natives, because we are interested in unconditional, raw comparisons. The purpose of including group-level covariates is to account for differences in cohort composition between newer and older refugee groups and not to account for differences between immigrants and natives. For simplicity, consistency and in order to be able to perform out-of sample predictions, we assume that time effects for migrants and natives are identical ($\gamma_t^I = \gamma_t^N$).

In a second step, we use the microcensus-based coefficients $\hat{\lambda}^I$, $\hat{\lambda}^N$, $\hat{\delta}^I$, $\hat{\delta}^N$, $\hat{\alpha}^I$ and $\hat{\phi}^I$ from equations (14) and (15) to predict the individual immigrant-native wage gaps:

$$\hat{y}_i^I - \hat{y}_i^N = (\hat{\lambda}^I - \hat{\lambda}^N) + (\hat{\delta}^I - \hat{\delta}^N)A_i + \hat{\alpha}^I YSM_i + \hat{\phi}^I X_{ctr} + \hat{\chi}^I X_{ctr} \times YSM_i \tag{16}$$

where X, A and YSM are taken from the newly arrived asylum seekers *from the IAB-BAMF-SOEP sample* of refugees. We extrapolate the data backwards also for the year 2015 based on retrospective questions on arrival date and date of first job in Germany.

For the second type of predictions that are shown in Figure A13, where we are more interested in forecasting, we force the immigrant-specific intercept in equation (14) ($\lambda^I - \lambda^N$) to be equal to the cohort-specific employment gap at arrival. We also add the cohort-specific initial employment gap as additional control variable to the vector X_{ctr}. In addition we drop $\phi^I X_{ctr}$ and keep only the interaction of X_{ctr} with YSM. By doing so, we force the forecast to start at the true observed initial employment gap and avoid differences in initial gaps between the forecast and the observed integration profile.

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[38] In this application we cannot estimate coefficients separately for different immigrant cohorts because we use them for out-of sample predictions where new immigrants belong to none of the cohorts the model is estimated on.

J   Additional figures and tables

Table A4: Definition of origin regions

Label	Countries
North-West Europe	Austria, Belgium, Denmark, Finland, France, Iceland, Ireland, Liechtenstein, Luxembourg, Netherlands, Norway, San Marino, Sweden, Switzerland, United Kingdom
Southern Europe	Greece, Italy, Portugal, Spain
Italy	Italy
Other recruitment states	Greece, Morocco, Portugal, Spain, Tunisia
Eastern Europe	Former USSR (including Estonia, Latvia, Lithuania), Albania, Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, excluding former Yugoslavia
Fomer USSR	Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan (excluding the new EU members Estonia, Latvia and Lithuania)
New EU member states	Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia.
(Former) Yugoslavia	Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia, Serbia, Slovenia
Turkey	Turkey
Middle East and Africa	All African states plus Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen
Central and East Asia	All East Asian and South-East Asian states plus Afghanistan, Bangladesh, Buthan, India, Iran, Pakistan, Nepal, Sri Lanka

Table A5: Assimilation of immigrant-native gaps by cohorts (Part I)

	ysm	personal income (EUR)			log hourly wage			employment (p.p.)		
		uc	ed	fm	uc	ed	fm	uc	ed	fm
1. Recruitment period (1955-1973)										
N. & W. Europe 55-73	10	105.9	63.7	84.5	0.01	-0.02	0.02	1.64	1.09	1.26
	20	204.8	132.3	177.1	0.06	0.01	0.05	-1.41	-2.46	-1.85
Italy 55-67	10	-483.8	-403.1	-181.6	-0.29	-0.24	-0.09	0.52	1.84	2.34
	20	-556.0	-492.1	-299.2	-0.25	-0.21	-0.13	-0.37	0.64	0.35
Italy 68-73	10	-435.9	-351.5	-181.5	-0.25	-0.20	-0.11	-1.04	-0.44	-1.10
	20	-709.9	-651.1	-344.0	-0.33	-0.29	-0.19	-2.21	-1.22	-1.42
Turkey 55-67	10	-596.4	-527.1	-260.4	-0.26	-0.21	-0.08	-0.42	1.52	1.26
	20	-565.1	-495.1	-338.9	-0.17	-0.13	-0.09	-4.94	-1.88	-2.71
Turkey 68-70	10	-529.3	-453.6	-251.8	-0.24	-0.18	-0.11	0.64	2.24	1.26
	20	-805.4	-721.0	-519.2	-0.24	-0.19	-0.16	-6.92	-4.24	-5.77
Turkey 71-73	10	-574.8	-490.3	-301.6	-0.23	-0.17	-0.11	-3.05	-1.71	-2.93
	20	-834.7	-738.1	-544.8	-0.22	-0.16	-0.14	-6.30	-4.22	-5.76
Yugoslavia 68-70	10	-459.5	-388.6	-183.2	-0.23	-0.18	-0.10	1.68	1.90	1.15
	20	-692.6	-660.7	-386.4	-0.24	-0.20	-0.15	-2.26	-2.15	-3.11
Yugoslavia 71-73	10	-436.2	-350.6	-154.8	-0.19	-0.13	-0.04	0.23	0.89	0.11
	20	-728.5	-662.4	-420.7	-0.25	-0.20	-0.15	-0.14	-0.24	-1.35
O. recr. states 55-67	10	-542.4	-487.4	-258.0	-0.26	-0.22	-0.10	1.02	1.91	1.27
	20	-486.6	-434.9	-267.7	-0.24	-0.20	-0.15	-0.79	0.46	-0.12
O. recr. states 68-73	10	-528.0	-444.3	-267.9	-0.26	-0.20	-0.13	1.34	2.38	1.76
	20	-740.8	-677.7	-418.7	-0.25	-0.20	-0.15	-0.72	0.93	-0.17
2. Consolidation period (1974-1987)										
N. & W. Europe 74-87	1	292.2	193.2	164.9	0.18	0.08	0.12	-9.74	-10.38	-10.48
	10	369.8	281.1	245.8	0.08	0.03	0.06	0.97	-0.46	-0.79
	20	433.5	297.6	305.1	0.06	0.00	0.03	2.24	0.95	1.22
S. Europe 74-78	1	-111.1	-78.3	-20.9	-0.08	-0.06	0.09	0.15	0.46	1.70
	10	-420.4	-380.2	-182.4	-0.22	-0.18	-0.11	-5.44	-4.63	-5.91
	20	-538.1	-423.1	-204.7	-0.21	-0.14	-0.06	-6.59	-4.30	-4.70
S. Europe 79-87	1	-138.5	-130.1	-91.3	-0.16	-0.17	-0.05	-5.89	-5.71	-6.49
	10	-351.3	-278.3	-173.2	-0.21	-0.17	-0.11	-2.88	-1.76	-3.24
	20	-772.1	-616.6	-465.5	-0.29	-0.20	-0.13	-2.40	1.08	-0.91
Yugoslavia 74-87	1	-396.9	-362.0	-276.1	-0.17	-0.15	0.01	-10.44	-10.08	-8.37
	10	-408.1	-339.5	-144.8	-0.19	-0.15	-0.10	-0.15	0.76	-0.85
	20	-701.1	-582.1	-430.6	-0.22	-0.17	-0.11	-3.78	-2.17	-3.50
Turkey 74-78	1	-485.2	-447.4	-207.2	-0.16	-0.13	-0.01	-9.20	-7.47	-6.82
	10	-489.2	-411.4	-276.0	-0.18	-0.13	-0.11	-2.81	-0.12	-1.97
	20	-733.7	-574.6	-438.3	-0.18	-0.10	-0.10	-15.14	-10.71	-12.80
Turkey 79-87	1	-534.6	-483.7	-124.0	-0.06	-0.03	0.07	-30.67	-28.90	-29.44
	10	-495.6	-390.6	-277.2	-0.14	-0.09	-0.09	-14.27	-11.58	-14.38
	20	-838.9	-541.0	-336.4	-0.16	-0.02	-0.02	-22.98	-15.41	-18.19

Notes: **ysm:** years since migration; **uc:** unconditional estimates (controlling only for age and observation year); **ed:** conditional estimates (controlling for age, observation year and education); **fm:** full model (controlling for age, observation year, education, marital status, household size, number of children, region, and – in the case of income and wage – also for broad industry and occupation groups).

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Table A6: Assimilation of immigrant-native gaps by cohorts (Part II)

		personal income (EUR)			log hourly wage			employment (p.p.)		
	ysm	uc	ed	fm	uc	ed	fm	uc	ed	fm
3. Fall of the Iron Curtain (1988-1995)										
N. & W. Europe 88-95	1	705.5	490.2	436.4	0.22	0.10	0.12	1.78	-0.44	-0.14
	10	265.2	167.2	207.6	0.02	-0.01	0.03	0.73	-0.02	0.15
	20	412.7	236.0	307.1	0.13	0.07	0.08	-3.37	-4.08	-4.66
S. Europe 88-95	1	-232.0	-182.3	-122.8	-0.19	-0.18	-0.08	-4.49	-3.44	-4.60
	10	-557.2	-419.3	-254.9	-0.25	-0.19	-0.11	-7.19	-5.01	-7.29
	20	-774.0	-536.7	-301.2	-0.32	-0.19	-0.10	-3.71	1.47	-0.21
C. & E. Europe 88-91	1	-669.1	-708.5	-611.9	-0.17	-0.21	-0.19	-33.75	-34.67	-36.27
	10	-551.5	-518.5	-419.2	-0.14	-0.12	-0.11	-4.93	-4.22	-6.32
	20	-677.2	-596.2	-430.2	-0.19	-0.16	-0.13	-2.30	-1.60	-3.32
C. & E. Europe 92-95	1	-773.2	-766.4	-669.7	-0.37	-0.37	-0.32	-33.32	-33.07	-35.54
	10	-771.5	-749.2	-533.8	-0.24	-0.24	-0.19	-10.58	-9.95	-11.92
	20	-783.2	-681.6	-476.6	-0.22	-0.17	-0.12	-2.71	-1.48	-3.37
Yugoslavia 88-91	1	-458.4	-428.1	-289.0	-0.13	-0.13	-0.09	-28.50	-28.28	-30.99
	10	-643.3	-532.5	-353.8	-0.20	-0.15	-0.14	-12.27	-10.67	-13.57
	20	-950.3	-722.1	-517.0	-0.25	-0.15	-0.12	-13.34	-9.61	-12.04
Yugoslavia 92-95	1	-816.6	-714.6	-553.7	-0.30	-0.28	-0.23	-40.01	-38.46	-40.23
	10	-771.2	-626.5	-381.1	-0.25	-0.19	-0.14	-16.59	-14.63	-17.50
	20	-816.0	-622.2	-454.3	-0.23	-0.13	-0.08	-8.55	-4.97	-7.59
Turkey 88-91	1	-424.0	-346.8	-393.8	-0.05	-0.05	-0.11	-40.23	-38.18	-43.40
	10	-605.6	-402.0	-293.8	-0.17	-0.08	-0.08	-16.05	-11.85	-15.84
	20	-950.0	-527.6	-411.3	-0.28	-0.06	-0.08	-18.70	-7.65	-11.08
Turkey 92-95	1	-687.9	-546.2	-643.8	-0.08	-0.04	-0.09	-48.70	-45.31	-50.45
	10	-600.7	-324.9	-277.4	-0.22	-0.10	-0.11	-18.09	-12.07	-16.60
	20	-1040.8	-586.2	-451.7	-0.27	-0.06	-0.04	-12.58	-1.96	-5.38
M.East & Africa 88-95	1	-952.0	-965.6	-771.9	-0.32	-0.35	-0.28	-46.71	-44.82	-45.17
	10	-914.9	-835.0	-549.2	-0.31	-0.28	-0.17	-20.13	-16.92	-18.09
	20	-1086.4	-834.3	-604.4	-0.34	-0.19	-0.12	-17.43	-10.00	-10.99
C. & E. Asia 88-95	1	-352.2	-409.5	-74.2	-0.04	-0.11	-0.05	-36.79	-35.79	-36.11
	10	-793.1	-753.3	-540.4	-0.33	-0.29	-0.18	-8.67	-5.98	-8.60
	20	-812.6	-526.8	-335.9	-0.42	-0.27	-0.19	-8.45	-1.22	-3.42
4. Period of East-West integration (1996-2005)										
N. & W. Europe 96-09	1	698.7	413.3	471.6	0.25	0.13	0.14	1.56	-0.94	-1.07
	10	517.3	325.6	281.1	0.14	0.07	0.07	0.93	-0.01	-0.48
S. Europe 96-09	1	-213.9	-258.4	-149.5	-0.17	-0.18	-0.06	-3.24	-2.66	-3.29
	10	-558.4	-456.4	-288.8	-0.26	-0.20	-0.13	-3.46	-0.25	-1.57
New EU states 96-03	1	-495.1	-521.4	-283.3	-0.23	-0.24	-0.18	-18.85	-18.87	-21.84
	10	-389.5	-373.8	-336.7	-0.12	-0.11	-0.10	0.34	0.95	-1.44
New EU states 04-09	1	-566.3	-604.1	-408.2	-0.26	-0.27	-0.18	-10.93	-10.82	-13.62
	10	-560.5	-508.8	-394.5	-0.22	-0.18	-0.13	1.44	2.60	0.68
Former USSR 96-03	1	-917.2	-948.7	-618.4	-0.23	-0.24	-0.26	-44.24	-44.01	-47.05
	10	-798.4	-757.1	-543.8	-0.26	-0.24	-0.21	-11.39	-10.45	-12.94
Former USSR 04-09	1	-1039.6	-1028.6	-827.1	-0.29	-0.33	-0.33	-47.95	-47.12	-50.45
	10	-926.4	-862.9	-688.6	-0.28	-0.24	-0.22	-10.32	-8.60	-11.44
Yugoslavia 96-09	1	-783.9	-629.9	-343.7	-0.22	-0.19	-0.16	-45.91	-42.38	-39.61
	10	-661.4	-423.6	-315.0	-0.23	-0.12	-0.10	-10.17	-5.36	-8.75
Turkey 96-09	1	-717.5	-546.9	-526.8	-0.19	-0.16	-0.18	-41.28	-36.94	-42.24
	10	-702.7	-370.0	-341.5	-0.26	-0.10	-0.11	-13.19	-5.63	-10.10
M.East & Africa 96-09	1	-848.7	-827.8	-654.3	-0.30	-0.29	-0.23	-41.57	-37.91	-35.58
	10	-918.1	-762.1	-539.0	-0.31	-0.22	-0.16	-18.48	-12.19	-14.14
C. & E. Asia 96-09	1	-137.0	-448.7	60.3	0.09	-0.04	-0.03	-12.74	-13.93	-12.79
	10	-608.0	-710.6	-677.5	-0.19	-0.22	-0.18	-4.47	-1.90	-4.32

See Table A5 for table notes.

Table A7: Time-trends in immigrants' labor market gaps (weighted)

	(1)	(2)	(3)	(4)	(5)
Panel A: Employment gaps at arrival (p.p.)					
Time trend (10 years)	-4.78**	-5.89***	-2.80*	-0.64	0.84
	(2.13)	(1.98)	(1.47)	(1.12)	(1.33)
Observations	40,288	40,288	40,288	40,288	40,288
Panel B: Employment gaps 10 years after arrival (p.p.)					
Time trend (10 years)	-2.28***	-2.92***	-1.26**	-0.74*	-0.64
	(0.82)	(0.77)	(0.53)	(0.39)	(0.43)
Observations	32,612	32,612	32,612	32,612	32,612
Panel C: Income gaps at arrival (Euros)					
Time trend (10 years)	12.34	-63.03	-0.04	43.05	5.89
	(79.48)	(51.69)	(58.23)	(62.74)	(72.94)
Observations	38,462	38,462	38,462	38,462	38,462
Panel D: Income gaps 10 years after arrival (Euros)					
Time trend (10 years)	-46.82	-111.8***	-55.02	-45.63	-62.22
	(44.40)	(26.99)	(36.40)	(39.43)	(38.26)
Observations	31,598	31,598	31,598	31,598	31,598
Education contr.	No	Yes	Yes	Yes	Yes
Refugee share	No	No	Yes	Yes	Yes
Regional unempl. rate	No	No	No	Yes	No
National unempl. rate	No	No	No	No	Yes

Standard errors clustered on the level of cohorts in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Equations estimated according to equation (6), using microcensus weights. The dependent variables are individual migrant-native employment gaps (including education) predicted according to equation (1). The variable that captures the linear time trend is year/10, thus coefficients capture a change over one decade. Educational controls are individual dummies for an academic degree and a vocational degree, refugee share is measured on the cohort level, regional unemployment rate on the level of 75 regional planning units ("Raumordnungsregionen").

Figure A7: Coding of persons in education, employment gaps

(a) Coding persons in education as employed   (b) Coding persons in education as missing
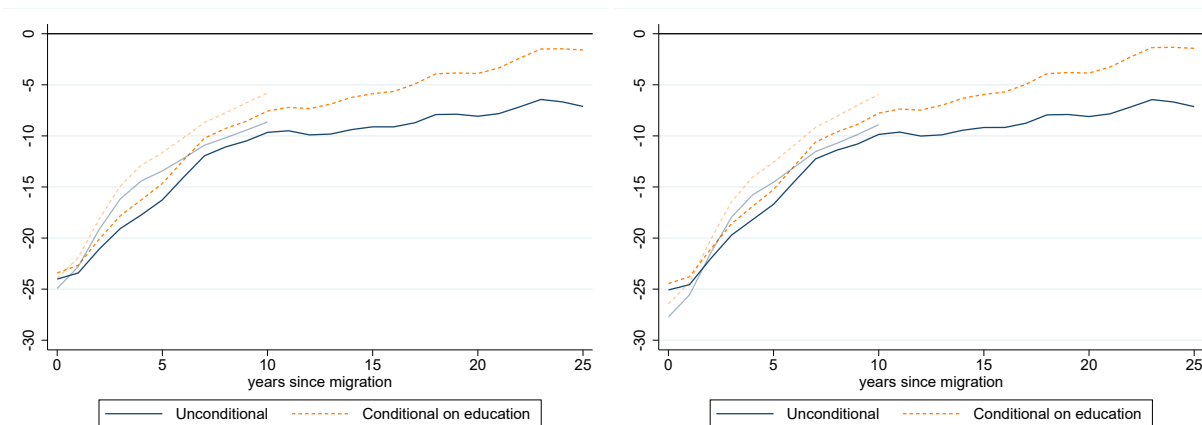

Notes: Dark long lines include arrival cohorts 1974-95 (observable over 24 years since arrival), light short lines include cohorts 1974-2009 (observable over 10 years). Solid blue lines depict unconditional immigrant-native gaps (controlling only for observation year and age); dotted orange lines depict conditional gaps, additionally controlling for education.

Figure A8: Log monthly income of immigrant cohorts

(a) Arrivals 1955-1973
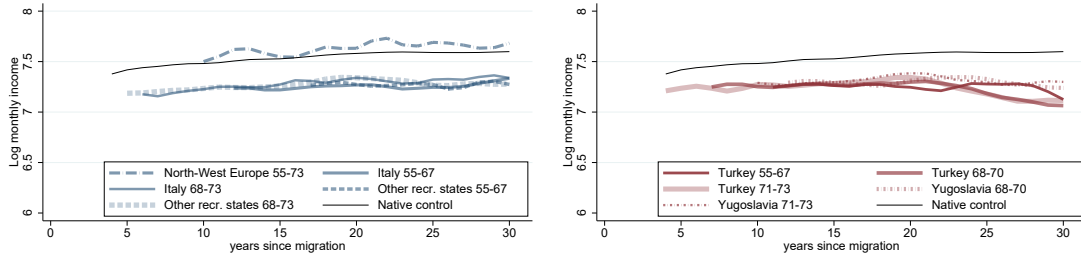
(b) Arrivals 1974-1987
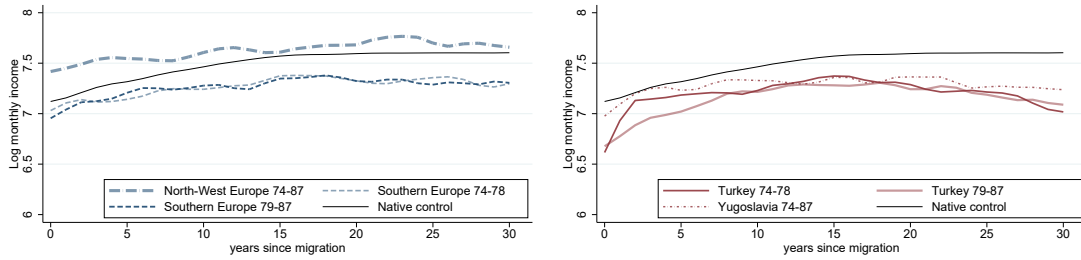
(c) Arrivals 1988-1995
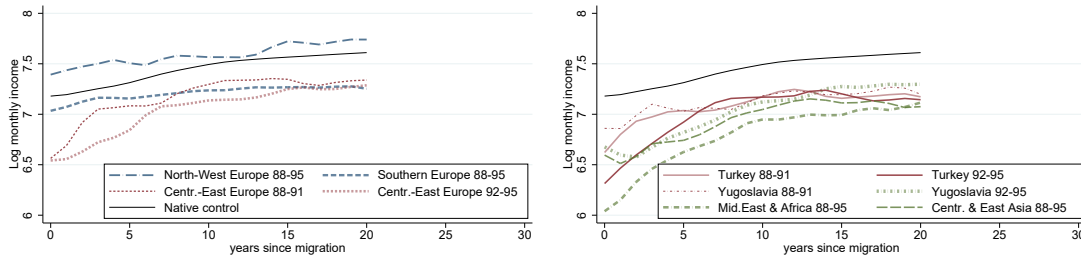

(d) Arrivals 1996-2005
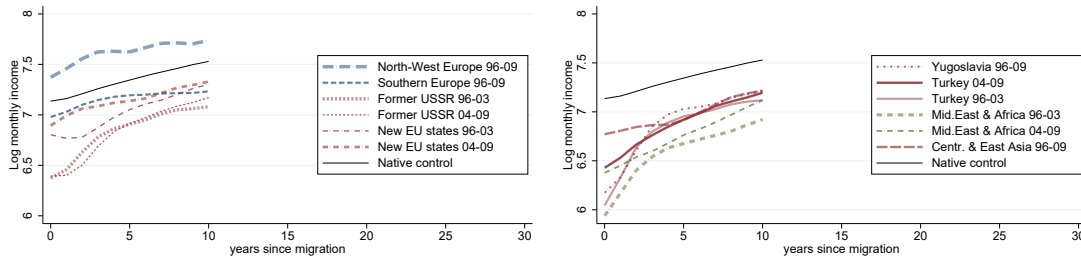
Notes: Log of mean personal monthly post-tax income (real income, in 2010 Euros) by years since migration, for different immigrant cohorts and a native control group (of the same age and observation year). The thickness of each line is proportional to the cohort size in the first year after complete arrival.

Figure A9: Labor market gaps for first and second generations, dropping persons in education
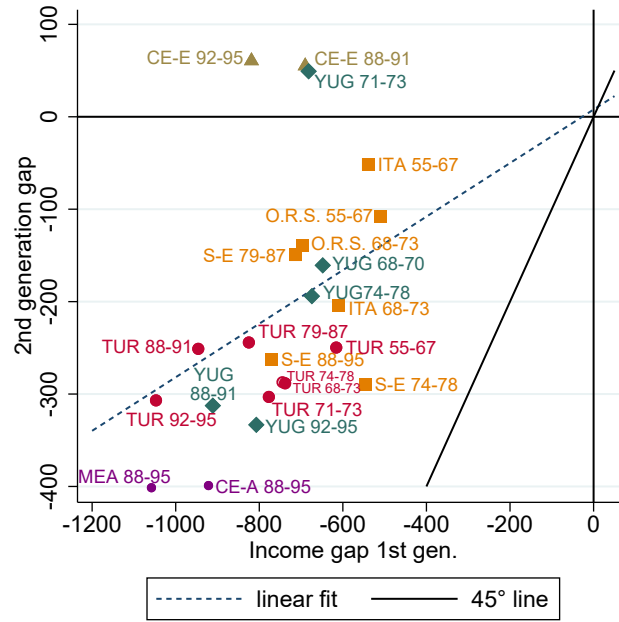
Notes: Unconditional immigrant-native gaps estimated non-parametrically according to eq. (2), dropping persons still in education. First-generation gaps measured 20 years after migration to Germany. Second-generation gaps measured in 2005, 2009, 2013 and 2017. The labels refer to region of origin (See Table A4) and arrival year: CE-E: Central and Eastern Europe; ITA: Italy; MEA: Middle East and Africa; O.R.S: Other recruitment states; CE-A: Central and East Asia; S-E: Southern Europe; TUR: Turkey; YUG: (former) Yugoslavia. We drop second-generation immigrants from North-Western Europe because of low observation numbers and drop cohorts who arrived after 1995, as their children have not yet reached working age by the time of observation.

Figure A10: Time trends in immigrant-native income gaps (10 years after arrival)
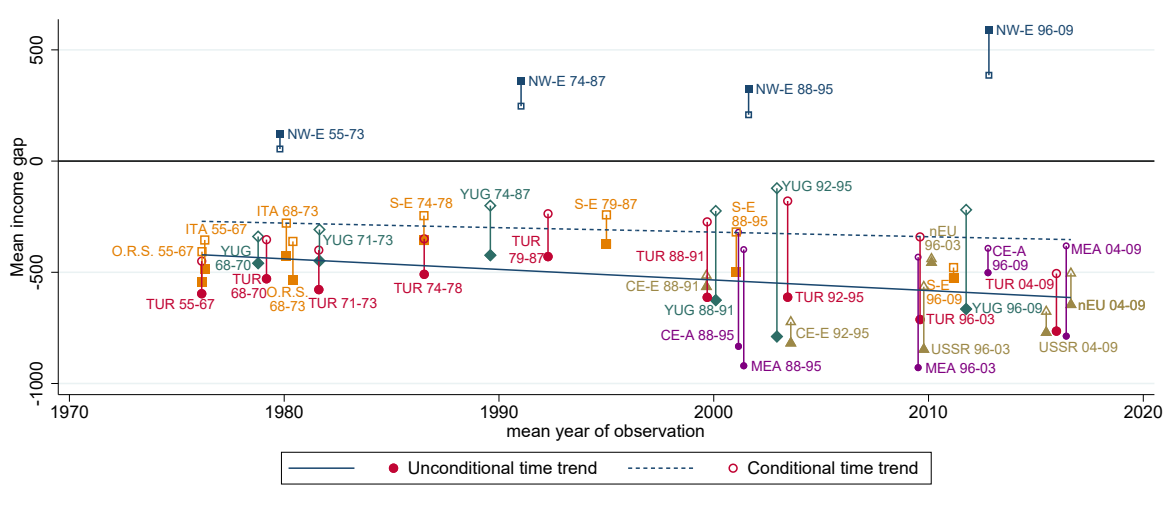

Notes: Filled markers and solid line: unconditional immigrant-native income gaps and time trend; hollow markers and dashed line: conditional income gaps and trend. Gaps and time trends are predicted based on the time trend, the average covariates for natives and the residuals from regressions in panel B of Table 3 and aggregated to the cohort level. Unconditional time trends refer to Column (1) and conditional time trends to Column (4), including controls for individual education, regional unemployment rate (on the level of spatial planning units) and cohort-level refugee share. The labels refer to region of origin and arrival year (see Table A4): CE-A: Central and East Asia; CE-E: Central and Eastern Europe; ITA: Italy; MEA: Middle East and Africa; nEU: New EU member states in Central and Eastern Europe; O.R.S: Other recruitment states; S-E: Southern Europe; TUR: Turkey; USSR: Former Soviet Union; YUG: (former) Yugoslavia.

Figure A11: Determinants of the 1990s employment collapse, non-Turkish migrants
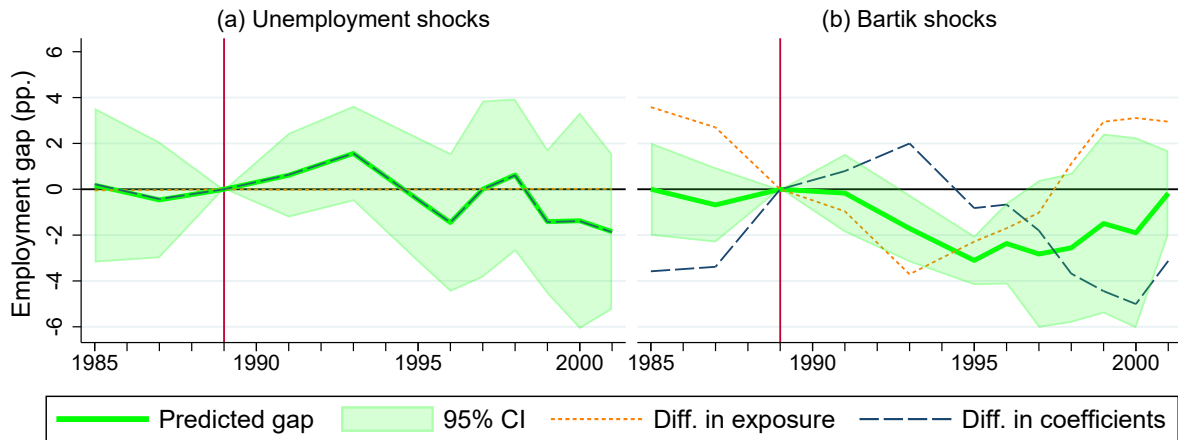

Notes: Results from Oaxaca-Blinder decompositions (see Appendix H for methodological details). Including all non-Turkish migrant cohorts who arrived before 1988. In Sub-figure (a), the thick green line plots the predicted immigrant-native gap that can be explained by regional 1989-1997 unemployment shocks (measured at the level of 75 spatial planning units, "Raumordnungsregionen" and cohort-level Bartik shifters in sub-figure (b).

Figure A12: Employment gaps of refugees by perspective of staying
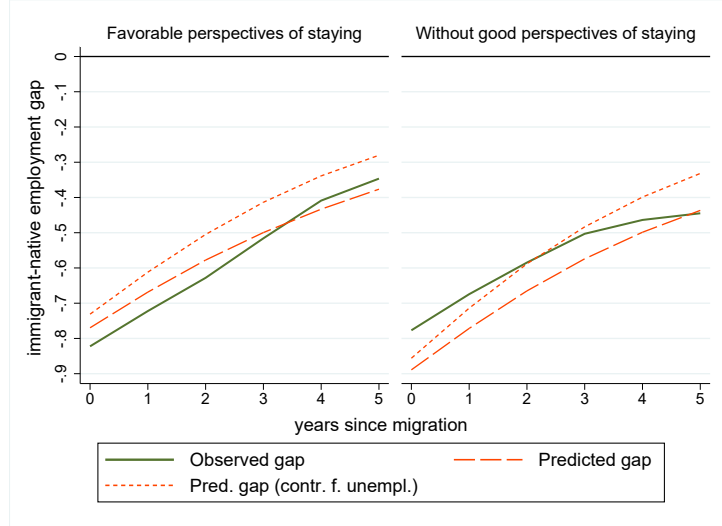
Notes: Countries with favorable perspectives of staying include Syria, Iraq, Eritrea, Iran and Somalia, asylum seekers from other countries classified as "without good perspectives of staying". Green line: Actually observed immigrant-native employment gaps from IAB-BAMF-SOEP survey, estimated non-parametrically based on eqs. (2) and (1). Orange dashed and dotted lines: Predicted gaps estimated parametrically based on the Microcensus (including cohorts since 1974), accounting for age, education, refugee share (dashed line) and the regional unemployment rate in 2021 (dotted line). See Appendix I and eq. (16) for details.

Figure A13: Employment Forecasts for Recently Arrived Refugees
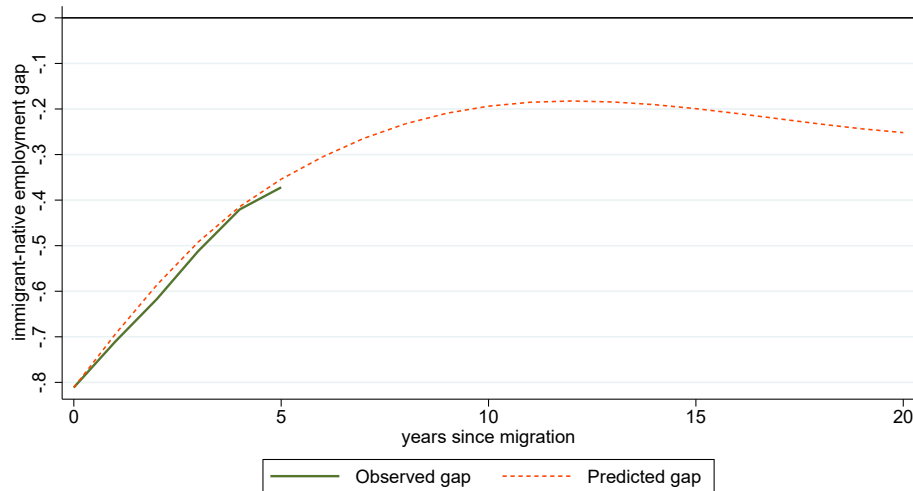
Notes: Green line: Actually observed immigrant-native employment gaps from IAB-BAMF-SOEP survey, estimated non-parametrically based on eqs. (2) and (1). Orange dotted lines: Predicted gaps estimated parametrically based on the Microcensus (including cohorts since 1974), accounting for initial employment gap, age, education, refugee share and the regional unemployment rate in 2021. See Appendix I for details.