Berlin Calling – Internal Migration in Germany*

Thomas K. Bauer[1,2,3], Christian Rulff[1,2], and Michael M. Tamminga[1,2]

[1]*Ruhr University Bochum*
[2]*RWI Essen*
[3]*IZA Bonn*

Work in progress. Preliminary and incomplete – please do not cite without permission.
This version: July 15, 2019

Abstract

This paper analyzes the determinants of internal migration in Germany. Using data on the NUTS-3 level for different age groups and Pseudo-Poisson Maximum Likelihood (PPML) gravity models, the empirical analysis focuses on the relevant push and pull factors of internal migration over the life cycle. Labor market considerations appear to be most powerful explanatory variables for interregional migration, especially for the younger cohorts. Furthermore, internal migrants show heterogeneous migration behavior across age groups. Migrants of the same age groups cluster in particular areas and thus reinforce the regional heterogeneity of demographic change.

JEL-Code: R23, J11, O18
Keywords: Internal Migration, Gravity Model, Demographic Polarization

*All correspondence to: **Michael M. Tamminga**, Email: michael.tamminga@rub.de. The authors gratefully acknowledge the financial support of the German Science Foundation (DFG) within the Priority Program 1764: *The German Labor Market in a Globalized World*.

1 Introduction

Demographic change is one of the main social, political, and economic challenges for many developed countries in the coming decades. Also in Germany, the population is both declining and aging rapidly. The challenges of this development for the social security systems, in particular the health and pension system, have been analyzed comprehensively.[1] One aspect that has largely been ignored in the ongoing discussion so far is the regional heterogeneity of this demographic process. As shown in Figure 1, regional age heterogeneity is prevalent in Germany with a clear tendency of younger people clustering in urban areas (panel (a)), middle aged individuals in urban and suburban areas (panel (b)), and individuals older than 50 years clustering in the east as well as in some rural parts in West Germany (panels (c) and (d)).

The age structure of a region has implications on economic factors like the human capital base (brain drain) and the innovation potential of the affected regions, which in turn affect the economic performance of these regions (Gregory and Patuelli, 2015). Since fertility and mortality rates appear to be stable in the short-run (Dudel and Klüsener, 2016; Destatis, 2016), migration flows constitute one of the most important determinants of changes in the age structure of the regional population over time. The following paper will ignore international migration to Germany, since international migration flows and their age-composition are already widely analyzed.[2] Instead, we will focus exclusively on internal migration flows. Because internal migration, if heterogeneous across age groups, influences both the source region's as well as the host region's age-structure, we argue that it is important to gain insights into the different migration patterns of interregional migrants of different age groups.

In order to fully understand these patterns and dynamics, it is necessary to answer the question where people migrate depending on their age, before focusing on the reasons why. Our analysis builds conceptually on the previous works of Hunt (2006), Mitze and Reinkowski (2011) and Sander (2014). Following them, we expect economic factors to provide the most explanatory power concerning migration flows. This understanding can be viewed as the neoclassical model of migration.

We add to the literature by using smaller scale data compared to previous works, as well as by using age group-specific wages in order to more precisely measure earning perspectives for each group. Furthermore, for the first time, we add a price index based on housing prices to our model, which enables us to take regional differences in living costs into account. Based on various data sources on the county-level, we estimate an extended gravity model in order to investigate the locational decisions of internal migrants

[1] See for example Börsch-Supan *et al.* (2016).

[2] See Greenwood (1997) for an overview of the literature.

of different age groups.[3]

In a first step, we provide a detailed descriptive overview of the internal migration flows of different age groups in Germany. Our focus is to document heterogeneities across age groups concerning the frequency of migration and the locational choices of the migrants. Compared to the previous literature, our analysis is based on the original counties in their respective boundaries at the time of observation. This enables us to use smaller regional units, which we argue contributes to a more precise and realistic picture. Our findings show that migration behavior differs significantly between age groups, with the youngest group in our analysis (18 to 29 years old) being by far the largest (43% of all migration), as well as the one with the highest urbanization tendencies. In a second step, using regression analysis, we aim to pinpoint the exact drivers of the heterogeneous migration behaviors of different age groups, in order to shed light on possible heterogeneous magnitudes of push and pull factors across age groups.

In line with the majority of existing empirical studies, we find that labor market factors are the most powerful determinants of internal migration patterns. Our results further indicate that age group-specific wages are indeed a more precise measure for earnings perspectives explaining regional migration and affect predominantly younger age groups.

The paper proceeds as follows. The next section provides an overview of the framework of migration theory and the relevant empirical literature, also, the German case concerning internal migration is presented briefly in this section, since historically, internal migration in Germany differs significantly from that in other countries. It is followed by an outline of the empirical strategy and the description of our data in section 3. Sections 4 and 5 present the descriptive and the regression results of our analysis respectively. Section 5 concludes.

2 Theoretical Framework and Literature

The theoretical framework for the analysis of migration is based on the human capital theory developed by Sjaastad (1962) and Becker (1964). Under this view the process of migration is seen as an investment in human capital, i.e. the returns to migration should exceed the cost of migration. Therefore, labor market conditions are at the core of the theoretical notion of migration theory. This idea has been further formalized by Todaro (1969) and Harris and Todaro (1970) who relax the assumption of complete information about wages and job availabilities in all potential host destinations. Instead, they set up a model in which an individual compares the expected income from staying in the source region with the expected income from moving to another region net of the cost of the move. Here, the income is a function of the wage rate and the probability of being employed in

[3]In this paper, the term 'county' refers to German *Landkreise*.

the respective region. The probability of being employed is assumed to be a function of the region's unemployment rate.

On the aggregate level the individual's migration decision can be modeled by a gravity model, which is based on the early work of Ravenstein (1885, 1889) and was first introduced by Zipf (1946). Zipf (1946) uses the physical concept of gravity and explains the volume of migration to be proportional to the product of the origin and destination population, and inversely proportional to the distance of the two regions. Combining the human capital idea of migration with the basic gravity model leads to a modified version of the model. It extends the gravity model by variables capturing the push and pull factors proposed by the human capital theory. Therefore, the model can be written as:

$$M_{ij} = f(C_{ij}, P_i, P_j, Y_i, Y_j, U_i, U_j). \tag{1}$$

This model describes the number of migrants from region i to region j as a function of the costs C_{ij} of moving from region i to region j, the source (host) region's population P_i (P_j), a measure for the source (host) region's wage rate Y_i (Y_j), and the source (host) region's unemployment rate U_i (U_j). The model is usually extended by measures for local amenities and by variables reflecting regional living costs. In the simple model shown in Equation (1) the number of migrants between any two regions i and j is expected to decrease with increasing cost. The population of the origin, as well as the destination region is expected to positively contribute to the number of migrants. Above, the number of migrants is expected to increase if the wage rate of the host region increases or the unemployment rate of the host region decreases. Vice versa, an increase in the source region's wage rate decreases migration, while an increase in the unemployment rate increases migration. For a detailed description and a development of the migration theory, see, among others, Greenwood (1997) and Bodvarsson *et al.* (2015).

The implications of this model are empirically well documented, although mixed results concerning the influence of some particular push and pull factors are produced. Additionally, these factors are of different importance for the migration decision of individuals at different stages of their life cycle, with individuals in their working age reacting more sensitive towards regional differences in wages or other labor market conditions. Empirical studies generally confirm the predictions of the neoclassical model: labor market characteristics appear to be among the main drivers of internal migration flows and younger individuals react more sensitive towards regional differences of these characteristics (see, among others: Goss and Schoening (1984); Gregg *et al.* (2004); Plane *et al.* (2005); Bell and Muhidin (2009); De Groot *et al.* (2011); Etzo (2011); Piras (2017)).

In general, these insights are true for Germany as well, but the German history of internal migration is rather particular. In the first years after World War II, migration

patterns in Germany were dominated by forced migrants from the former eastern territories of the German Reich.[4] In the 1950s and 1960s, when the economy was booming, West-Germany, as most of western Europe, was characterized by urbanization trends (Kontuly *et al.*, 1986; Fielding, 1989). This pattern changed during the 1970s and 1980s, where counterurbanization and sub-urbanization were the most prevalent trends. According to Kontuly (1991), the decentralization was especially strong in former industrial areas. Additionally, the main destination for internal migrants changed from the west to the south and the overall prevalence of internal migration in Germany declined from the 1960s until the 1990s (see, e.g., Bucher and Heins (2001)). The migration patterns of the following decade were largely shaped by the German reunification and the subsequent period of labor migration to the west with the main finding that internal migration partly balanced wage differentials in Germany.

Since Decressin (1994), a number of papers explicitly deal empirically with east-west migration in the aftermath of the German reunification. Examples for this field of research are Hunt (2000), Burda and Hunt (2001), Parikh *et al.* (2003); Heiland (2004), and, in part, Hunt (2006) and Alecke *et al.* (2010). Especially forced migration after 1945 and east-west migration after the collapse of the iron curtain 1989 are particular German phenomena, making the internal migration in Germany a relatively unique case and possibly distorting analyses on the influence of labor market factors on internal migration covering these periods.

Most these works focus on German interstate migration, which limits the implications of the results concerning migration between smaller regional units. Additionally, they lack geographical information, such as the distance between regions, which prohibits them to estimate gravity models. Nonetheless, most of these works find significant effects of labor market disparities on internal migration flows. One noticeable finding of Hunt (2000) and Burda and Hunt (2001) is that labor market factors have higher explanatory power as a pull factor, and variables like the unemployment rate are insignificant in the source regions. Also Hunt (2006) finds that wages have especially high explanatory power in the host region, while unemployment seems to be less important overall. This implies the effects of economic factors as push and pull factors to be asymmetric.

While the mentioned literature mostly focuses on the time period directly after the German reunification, Mitze and Reinkowski (2011) and Sander (2014) do not explicitly deal with post-reunification movements and base their analysis on somewhat later time frames, 1996 – 2006 and 1995 – 2010, respectively. Also, Mitze and Reinkowski (2011) use 97 Spatial Planning Regions and Sander (2014) 132 analytical regions calculated on the basis of county data for their analysis. In contrast to Mitze and Reinkowski (2011), who

[4]See Bauer *et al.* (2013) for a detailed discussion of post-war forced migration and its economic implications.

use extended gravity models to analyze the drivers of migration, Sander (2014) estimates a gravity model only including the distance and population as explanatory variables. Her focus, however, is on analyzing the locational choices descriptively.

Sander (2014) underlines that migration patterns in Germany are heterogeneous across age groups. She shows that the migration patterns of different age groups differ profoundly in Germany. 18 to 24 year olds move predominantly out of non-urban areas. In comparison, driven by more heterogeneous reasons to migrate, the group of 25 to 29 year olds have, in addition to moving to urban centers, a higher tendency to move to areas in commuting distance to urban areas. The group of 30 to 49 year-olds shows a pattern that contrasts the anecdotal notion of middle aged families in suburban areas. It seems that over time, middle aged families tend to contradict this stereotype to an extent by staying in urban centers instead of moving to suburban areas. Overall, Sander (2014) finds that migration to urban centers is increasing while out-migration from urban centers is decreasing, especially for the younger age groups. These results seem to reinforce the hypothesis that internal migration intensifies existing demographic trends.

Mitze and Reinkowski (2011) show high explanatory power for most of the economic factors. They find significant effects for income, measured as GDP per capita, being important drivers of locational choices, especially the income in the destination regions seems to be a strong pull factor for migration. Additionally, unemployment seems to have high explanatory power concerning migration. The discrepancy to older papers, some finding only little effects of unemployment on migration, might stem from the large unit of observation (states) of for example Hunt (2006). Mitze and Reinkowski (2011) further analyze the migration drivers for different age groups. They use differences between regions in unemployment, per capita income, and human capital as explanatory variables in their extended gravity model, which have the expected effects only for age groups under 50, indicating a higher sensitivity for the workforce relevant age groups. Younger age groups are also found to be more sensitive especially to income by Burda and Hunt (2001) and Hunt (2006). These findings seem to underline heterogeneous effects of economic factors across age groups, at least in magnitude, and in some cases even in direction.

3 Empirical Strategy and Data

3.1 Empirical Strategy

To analyze the determinants of internal migration in Germany, we estimate an extended gravity model (Greenwood, 1997) of the form:

$$M_{ijt} = \alpha d_{ij} + X_{it}^{'}\beta + X_{jt}^{'}\gamma + \phi_i + \kappa_j + \theta_t + \varepsilon_{ijt}. \tag{2}$$

The dependent variable M_{ijt} is the number of internal migrants between source county i and host county j in year t. The variable d_{ij} captures the distance in kilometers between the centroids of a county pair and the vectors X_{it} and X_{jt} control for time-variant source and host county characteristics, respectively.[5] ϕ_i denotes fixed effects for the counties of origin and κ_j for the counties of destination, while θ_t refers to year fixed effects. The distance is included to proxy for migration costs, including the actual monetary cost of moving from county i to j, information and search costs, as well as the psychic costs of changing residency (Greenwood, 1997; Greenwood and Hunt, 2003). The vector X_{it} (X_{jt}) controls for the population of the source (host) county. For our baseline specification we additionally include the source (host) county's unemployment rate, the GDP per capita, the (age group-specific) average wage, and a rental price index in the vector X_{it} (X_{jt}). The unemployment rate has been added to the model in order to somewhat reflect the probability of getting a job, whereas the GDP per capita should proxy macroeconomic business cycle effects in respective region (Bodvarsson *et al.*, 2015). The wage captures the earning perspectives of each group in the respective region, and the rental price index to some extent reflects the living costs in a region.

In a first step we estimate this extended gravity model for our overall sample. Subsequently, we estimate Equation (2) separately for the four age groups (i) 18 to 29 years, (ii) 30 to 49 years, (iii) 50 to 64 years, and (iv) individuals aged 65 years and older. In these age group specific estimations, except for the oldest group, we include the respective age group-specific wage instead of the average wage, since we argue that controlling for regional age-specific wages, we are able to proxy for group-specific regional income perspectives more precisely than most related empirical studies. Lastly, we estimate Equation (2) for the age group of people over 65 years, again including the overall average wage, because the majority of this group has already left the labor market. By estimating these sub-sample regressions, we take into account that the push and pull factors might differ with respect to their signs as well as their magnitudes across the age groups. For example, young individuals may particularly be attracted by urban areas with relatively job opportunities e.g. a low unemployment rate, while individuals in the middle of their life cycle may put more emphasis on other factors, such as earnings and lower living costs. Individuals on the far right side of the life cycle might be affected by even different factors.

We estimate Equation (2) using the Poisson Pseudo-Maximum-Likelihood (PPML) estimator suggested by Santos Silva and Tenreyro (2006), which uses the absolute number of migrants between any pair of counties as the dependent variable. This solves two fundamental problems of estimating gravity models using OLS: First, the log-linearization of the dependent variable truncates the sample due to the county pairs with zero observed

[5] All variables in the model, apart form the dependent variable, are included in their logarithmic form, this enables us to interpret them as elasticities. For the sake of readability, we refer to them only by their variable names in the rest of this paper.

migration, which are possibly not random, and thus the estimates would be biased. Second, in a gravity model, heteroskedasticity does not only affect the efficiency, but also the consistency of a linear estimator. This would also bias the coefficients and is also solved by PPML (Santos Silva and Tenreyro, 2006).

3.2 Data

Our analysis makes use of various data sources in order to obtain a comprehensive set of explanatory factors for the following analysis. Specifically, we have data on county to county migration including the migration status and the age group of the migrants.[6] We add regional information on the respective counties, namely population, GDP per capita, the unemployment rate, average (age group-specific) wages, and a rental price index. Additionally, we add the distance of the respective county pairs.

Information on the number of inter-regional migrants for each age group is drawn from changes in the place of residence as captured by the German population registers. These registers record every change of permanent residence across all counties (NUTS-3 level) within a year, including multiple and return moves. The data is disaggregated by age groups and by whether the person is a German citizen. The data needs to be corrected due to a German peculiarity concerning the settlement of ethnic German migrants from Eastern European countries. All ethnic Germans are required to enter Germany through a single 'border transit center' (*Grenzdurchgangslager*) located in the county *Göttingen* in Lower-Saxony. After being registered and accepted as an ethnic German immigrant, they are allocated to the German federal states following the so-called *Königssteiner Schlüssel*, a German allocation rule based on the regional tax base and population.[7] Because of this transit center, *Göttingen* appears to have extraordinary high migration flows. Additionally, after naturalization they appear as German migrants in our data. Therefore we exclude *Göttingen* from our analysis entirely.[8]

Data on the unemployment rate, GDP per capita, and the population at the county-level is drawn from the *Regionaldatenbank*, a database of regional statistics published by the German Federal Statistical Office.[9] We differentiate between urban and rural areas based on population size and density. Urban areas are defined as either counties or district-free cities with a population density above 150 inhabitants per square kilometer.

[6]Since migration behavior of international migrants might be systematically different to the natives' behavior, for example due to network effects, we restrict our analysis on German natives (Bodvarsson *et al.*, 2015).

[7]The allocation of these migrants varies between the different German federal states. For example in the case of Baden-Wuerttemberg they are transferred directly to particular counties and towns, whereas in Bavaria they are allowed to freely choose their region of settlement within the state. Further information on the distribution system for ethnic Germans can be found in Haug and Sauer (2007).

[8]For a detailed explanation of this process, see Sander (2014).

[9]https://www.regionalstatistik.de/genesis/online

This calculation in principle follows the definition of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR).

The centroids for the calculation of distances are based on shape files provided by the German Federal Agency for Cartography and Geodesy (BKG), which uses the territorial boundaries of the counties by the end of each year.[10] Information on regional age-specific gross daily wages is provided by the Institute for Employment Research (IAB) and calculated exclusively for this project using the full sample of employees subject to social security contributions.[11]

We use a price index derived from the RWI-GEO-REDX data set, which is provided by the FDZ Ruhr at the RWI. Based on data from *Immobilenscout24*, the leading online platform for housing in Germany, the price index is created using hedonic price regressions, which control for differences in the quality of the facility and regional characteristics and is provided as deviations of housing costs from the national mean.[12] Note that housing costs constitute the biggest single share of living costs in Germany, reaching a share of almost 20% in the consumer price index (Destatis, 2019).

4 Descriptive Analysis

For the descriptive analysis, we use the full sample of internal migrants, restricted only on German natives, for the years 2008 to 2014. Depending on the year, we observe 401 to 412 counties with a total of 15,878,335 individuals changing residency across county borders in Germany in this time frame.

Concerning the intensity of internal migration, we find the same patterns as in other industrialized countries. Migration intensity in Germany differs according to the life cycle, which is illustrated by Figure 2, showing the skewed distribution of internal migrants across age groups. Compared to the group between 0 and 18 years, we observe a threefold increase in migration intensity for the group between 18 and 29 years, and a sharp decline in intensity for the older groups. While it can be observed that the age group between 18 and 29 years has the highest migration intensity, comparing the relative size of the respective group with its share of internal migrants further highlights the heterogeneity between age groups concerning migration behavior.

The smallest age group relative to the total population in Germany is the one between 18 and 29 years, which constitutes 14% of the total population, but at the same time accounts for 43% (6.9 million) of all native internal migrants in Germany. This is the

[10] http://www.geodatenzentrum.de/geodaten/gdz_rahmen.gdz_div?gdz_spr=deu&gdz_akt_zeile=5&gdz_anz_zeile=1&gdz_unt_zeile=0&gdz_user_id=0

[11] For detailed information on the data ind the underlying calculations, see: Schmucker *et al.* (2016).

[12] See Klick and Schaffner (2019) for a detailed explanation of the data set and the corresponding price index.

largest group of internal migrants, followed by the age group between 30 and 49 which, while being the single largest population group (28%), accounts for 29% (4.6 million) of internal migrants. The other two age groups (50 to 64 years and 65 years and above), both representing around 21% of the total population, only have comparably small parts in the internal migration flows in Germany with shares of 8% and 6% respectively.[13] These numbers are relatively stable throughout the years of our observation period, which is illustrated in Figure A1 in the Appendix.

Additional to migration intensity, destination choices of internal migrants also differ across age groups. Table 1 displays the number of migrants by source and host counties differentiated by rural and urban areas. It shows that a large majority of internal migrants, 12 million or 76%, originate from counties classified as urban and correspondingly 24% from counties classified as rural. However, only 3.6 million (23%) individuals migrate into rural counties and 12.3 million (77%) migrate into urban counties, resulting in a migration gap of roughly 250,000 individuals less being in rural counties. If age groups are examined separately, the disparity of regional choices appears even more pronounced. From the 6.9 million migrants of the age group between 18 to 29 years 1.7 million (25%) originate from rural counties and 5.1 million (75%) originate from urban counties. However, only 1.3 million (19%) of them migrate into rural destinations, while the remaining majority of 5.6 million choose to migrate into urban areas. This leads to a migration gap of almost 460,000 individuals for the rural counties. For the remaining age groups, this picture is reversed. Compared to younger groups, more individuals move to rural instead of urban destinations. This results in a rural migration surplus of 83,561 individuals for the age group 30 to 49 years, around 46,000 for the age group 50 to 64, and around 20,000 for the age group older than 65.

These results indicate that the intensity, as well as the origin and destination regions of internal migrants differ largely across age groups with the youngest age group differing distinctively from the others. Their migration behavior leads to an increase in the share of the younger population in urban counties and to a decline of the same share in the rural counties. Vice versa, the migration patterns of the other age groups leads to an increase in the population share of the older age groups in the rural counties, and to a decrease in the urban counties. Therefore, these trends seem to reinforce regional age heterogeneity. These migration patterns are displayed geographically in Figure 3. It highlights counties with a positive net migration for all age groups (panel (a)), as well as differentiated for the four age groups (panel (b) to panel (d)). Again, this figure highlights the disparities between the youngest and the other age groups.

The individual effect of internal migration on the size of the population can be large for

[13]The remaining 2 million (13%) internal migrants are formed by the group of individuals under 18 year old. Since the largest part of this group can be assumed to move only with their parents, they are not part of the analyses.

many counties. For one, the county of *Bautzen* has lost 12,292 people of the initial 328,990 inhabitants in 2008 due to internal migration. However, 10,924 of these people were in the age group 18 to 29, while the initial population of this age group was only 46,420 people which corresponds to almost a quarter of the age group specific population. Comparable figures can be observed for several other counties in East Germany and for some rural areas of West Germany. Figure 4 shows this development geographically. The maps in this figure display the total amount (2008 – 2014) of net migration of the respective county as a share of the initial population of the respective age group from the year 2008 and illustrate the effect of internal migration on age polarization. In panel (a), we observe that the greatest relative loss of population has happened in eastern and some western rural counties, whereas the highest gains can be observed in metropolitan and suburban areas no matter whether in the east or the west. Panel (b) once more showcases the extreme clustering of younger individuals in urban areas and a loss of up to 45% in some rural counties. Panels (c) to (e) highlight the fact that the migration behavior of the older groups is rather similar, reflecting the findings from Figure 3.

In general, we find strong urbanization tendencies regarding internal migration in Germany, which are driven to a large extent by the youngest age group in our analysis, which accounts for 43% of all internal migrants. The older age groups have an opposite migration pattern, but since the migration intensity of these groups is substantially lower, (younger) migrants cluster in metropolitan areas and a large share of them does not seem to leave the cities at later points in the life cycle.

5 Regression Results

For the regression analysis, we restrict the sample of internal migrants to German natives, exclude counties with non-constant boundaries during our sample period, and observations with missing values in our variables of interest. In doing so, we end up with 1,095,414 observations and 15,426,558 adult German internal migrants in the years 2008 to 2014. Since we use the 2014 borders of the counties, we observe, depending on the year, 377 to 401 counties.

The estimation results of our basic model (Equation (2)) are shown in Table 2. Column (i) shows the results for the all age groups, column (ii) for the age group 18 to 29 years, column (iii) for the age group 30 to 49 years, column (iv) for the age group 50 to 64 years, and column (v) those for the age group 65 years and older. In columns (ii), (iii), and (iv) we use age group-specific wages rather than average wages, as mentioned above, this is not feasible for columns (i) and (v).[14]

[14]We estimated the sub samples using the overall average wages without finding significant differences in the directions of the effects. The change in the wage variable mainly affects the coefficients concerning

Concerning our explanatory variables, the results of the overall estimation (i) are mostly as expected from economic theory. We find a negative effect for the distance, increasing distance decreases the number of migrants with an estimated elasticity of around -1.78. In absolute terms, the effect of distance is large compared to the other estimated coefficients. Source counties with increasing population have a higher number of out-migrants, while the host county's population does not significantly affect the number of in-migrants. While the effect for the source county is as expected and likely to be a mechanical effect, the non significant host county effect is counterintuitive. However, if age group specific results are considered, it becomes clear that the population effect for the host counties is heterogeneous across age groups. It is positive for the age group 18 to 29 years, negative for the age groups 30 to 49 and 50 to 64 years, and not significantly different zero for the age group 65 years and above. The population effect for the source counties is more homogeneous. It is positive overall and for all age groups, with it's highest magnitude for the age group between 18 and 29, but for the age groups 50 to 64 and 65 years and above the effect is not significantly different from zero. Therefore, the estimated effects for the population confirm the findings from the descriptive analysis, the majority of internal migrants originates from larger counties or district free cities. This is because large counties simply have a larger migration potential as sending regions. The youngest age group predominantly migrates into more populated counties, while the older age groups move into more rural, and smaller in terms of population size, counties.

The source county's unemployment rate predominantly serves as a push factor. If the unemployment rate increases, the number of out-migrants increases as well. As for the population effect, the unemployment effect differs across the different age groups. The effect is positive and significant on the 0.1% level overall and for all age groups except for the oldest. The age group 18 to 29 years reacts stronger to an increase in the unemployment rate than the age groups 30 to 49 years and 50 to 64 years. The oldest age group is unaffected by the unemployment rate, possibly because they choose to migrate not primarily due to labor market considerations. This pattern is in line with the findings of Mitze and Reinkowski (2011), who find unemployment effects exclusively for workforce relevant age groups as well. Vice versa, an increase in the host county's unemployment rate decreases the number of migrants. This effect, however, is only driven by the age group 30 to 49 years. All other age groups seem to be unaffected by unemployment as a pull factor.

The source county's GDP per capita is negatively associated with the number of migrants in the overall analysis. Looking at the age groups separately however, it turns out that this effect is mostly driven by the age groups 18 to 29 and 30 to 49 years. While the effect is negative for these two age groups, it is positive for the remaining two age

the age group 18 to 29 years.

groups. The effect is significant for all groups. Regarding the host county, no significant effect of GDP per capita can be observed for the overall age groups. This, however, is again due to the heterogeneity of the effect across the age groups. An increasing GDP per capita is negatively associated with the number of in-migrants for the age group 18 to 29 years, while it is positively associated with the number of in-migrants for the age groups 30 to 49 years and 50 to 64 years. It is not significant for the age group 65 years and above.

For the source county the (age group-specific) average wage has the expected sign for most age groups and the overall estimation. An increasing wage is associated with less out-migration of the age groups 18 to 29 and 30 to 49 years. Again, the younger age group reacts stronger to changes in the average wage. The age group 50 to 64 years does not react to changes in the average wage at all, whereas the age group 65 years and older even reacts stronger (with more out-migration) due to an increase in average wages. Regarding the host county's average wages, the overall effect is positive, but again heterogeneous across the different age groups. No effect can be observed for the age groups 50 to 64 years and for the age group 65 years and older. The estimations for the two younger age groups show positive significant effects as expected, with the effect for the youngest group being by far the largest in terms of magnitude.

The rental price index for the source county has no effect for the overall group. It affects the age groups below 64 but the effect is negative for the group between 18 and 29 and the one between 30 and 49. The magnitude of the effect is rather small in any case. For the host counties the price index negatively affects the overall group as well as each age group individually. Also the magnitude of the effects is higher compared to the source county effects. This indicates that rental prices only play a minor role for the decision to migrate. However, they do play a role for the decision where to migrate. Higher living costs are associated with a decrease of in-migration.

Our results confirm the findings of the previous literature in several ways. First, the results obtained indicate that economics factors have, as predicted, strong influence on internal migration decisions in Germany. The effects of these factors are significant in the predicted ways for almost all age groups. Also, we observe heterogeneities across age groups, which possibly stem from life cycle effects. Especially the effect of wage as a pull factor seems to influence the younger age groups and the youngest in particular. This is in line with literature arguing that younger workers have on average higher returns to migration compared to other groups (Lehmer and Ludsteck, 2011).

However, it is important to keep in mind that the results above can only be interpreted as correlations and not as causal effects. This problem stems from the fact that the explanatory variables cannot be considered as exogenous in many cases. In some cases migration itself can have an effect on the explanatory variables, therefore the results are likely to suffer from reverse causality. This could especially be the case for the wages

and the rental price index, a connection that has been established for example by Tanja *et al.* (2016) for Germany. It is well known that especially young high skilled individuals are the most mobile group. This might imply that wages in regions with mostly young in-migration are rising disproportionally, and the source regions of these individuals might suffer unusual high wage losses. The same could be true for unemployment, since young, high skilled individuals have higher employment probabilities compared to the other age groups in our analysis.

6 Conclusion

In this paper we have analyzed internal migration behavior in Germany. In a descriptive analysis we found out how locational choices differ between age groups and that urbanization tendencies are predominantly driven by younger migrants. After descriptively analyzing migration flows within Germany, we investigated the determinants of the locational choices of internal migrants by using regression analysis.

The results are based on small scale administrative data, containing every migration movement across county borders between 2008 and 2014 disaggregated for different age groups. This data is further enriched with regional information on unemployment, GDP, (age group-specific) wages, and a housing price index. Additional to the overall effects of these push and pull factors for internal migration, we are focusing on the question whether the influence of these determinants varies over the life cycle. Since the propensity to migrate as well as the absolute number of migrants differ profoundly across age groups in Germany, differential analyses are essential to fully understand these movements across regional boundaries.

The empirical strategy we use is based on the gravity migration model and estimated using the PPML technique as suggested by Santos Silva and Tenreyro (2006). This strategy implies a positive connection between population and migration and a negative one between distance and migration. Furthermore, if migration is viewed as a human capital investment, locational choices should be driven by interregional disparities in income perspectives. This view can be described as the neoclassical migration model. Previous studies tried to measure income perspectives using GDP and unemployment rates in the respective regions. We argue that wages, especially age group-specific wages, are more suitable for explaining income perspectives. Furthermore, we are able to use a hedonic price index for rents, based on *Immobilienscout24* data, to take disparities in living costs between regions into account, which have been largely neglected in previous studies. This enables us to provide a more precise picture of the role of living costs concerning migration decisions.

The descriptive analysis shows that the largest share of internal migrants is comprised by the age group between 18 and 29 years, which accounts for more than 40% of the migrants.

The major part of internal migration is directed to urban areas, which is especially true for this youngest group. These movements might intensify the age polarization between rural and urban areas in the future.

The estimation results concerning the classic labor market indicators like the unemployment rate and GDP per capita, generally confirm the implications of the neoclassical migration model. In addition we find that both wages and rents have high explanatory power for internal migration in Germany and that these estimates are robust across several specifications. An overall wage increase in a region leads to lower migration outflows and higher migration inflows. Overall, living costs do not seem to have a strong effect on out-migration, higher costs only reduces the amount of in-migrants.

To demonstrate the heterogeneous effects of labor market variables on migration behavior over the life course, we disaggregated our sample into four age groups (18 to 29, 30 to 49, 50 to 64, and older than 65 years). Indeed, the labor market indicators have different effects across age groups.

Unemployment does effect all labor market relevant age groups as a push factor, but is only connected to in-migration for the age group between 30 and 49. Housing prices in the source county influences the age group between 30 and 49 positively implying that rising living costs increase out-migration of this age group from the respective region. Wages influence different age groups heterogeneously as well; the age groups between 18 and 29 and 30 and 49 are influenced in both regions, but the older groups seem not to be affected by wages.

Overall, our analysis provides empirical evidence in favor of the neoclassical migration model, especially for younger age groups. These groups also pose the majority of internal migrants in Germany and show the strongest urbanization tendencies. Our findings suggest that younger individuals are drawn into urban areas by better labor market opportunities and higher returns to their human capital. These migration movements reinforce the demographic age differential between rural and urban areas in Germany.

References

Alecke, B., Mitze, T. and Untiedt, G. (2010). Internal migration, regional labour market dynamics and implications for german east-west disparities: results from a panel var. *Jahrbuch für Regionalwissenschaft*, **30** (2), 159–189.

Bauer, T. K., Braun, S. and Kvasnicka, M. (2013). The economic integration of forced migrants: Evidence for post-war Germany. *The Economic Journal*, **123** (571), 998–1024.

Becker, G. S. (1964). Human capital: A theoretical and empirical analysis with special reference to education. *NBER Books*.

Bell, M. and Muhidin, S. (2009). Cross-National Comparison of Internal Migration. *MPRA Papers*.

Bodvarsson, Ö. B., Simpson, N. B. and Sparber, C. (2015). Migration Theory. In B. R. Chiswick and P. W. Miller (eds.), *Handbook of the Economics of International Migration, Vol. 1A*, Amsterdam: Elsevier, pp. 3–51.

Börsch-Supan, A., Härtl, K. and Leite, D. N. (2016). Social Security and Public Insurance. In J. Pigott and A. Woodland (eds.), *Handbook of the Economics of Population Aging, Vol. 1B*, Amsterdam: Elsevier, pp. 781–863.

Bucher, H. and Heins, F. (2001). Binnenwanderungen zwischen den Ländern. *Institut für Länderkunde*.

Burda, M. C. and Hunt, J. (2001). From reunification to economic integration: productivity and the labor market in eastern germany. *Brookings Papers on Economic Activity*, **2001** (2), 1–92.

De Groot, C., Mulder, C. H., Das, M. and Manting, D. (2011). Life Events and the Gap between Intention to Move and Actual Mobility. *Environment and Planning A*, **43** (1), 48–66.

Decressin, J. W. (1994). Internal Migration in West Germany and Implications for East-West Salary Convergence. *Review of World Economics*, **130** (2), 231–257.

Destatis (2016). Bevölkerung und Erwerbstätigkeit. Zusammenfassende Übersichten-Eheschließungen, Geborene und Gestorbene: 1946-2015 [Population and Employment. Overview-Marriages, Born and Died: 1946-2015].

— (2019). Consumer Price Index for Germany / Weighting Pattern for Base Year 2015. https://www.destatis.de/DE/Presse/Pressekonferenzen/2019/HGG_VPI/Waegungsschema_VPI.pdf?__blob=publicationFile&v=3, acessed: 04/05/2019.

Dudel, C. and Klüsener, S. (2016). Estimating male fertility in eastern and western germany since 1991: A new lowest low? *Demographic Research*, **35**, 1549–1560.

Etzo, I. (2011). The Determinants of the Recent Interregional Migration Flows in Italy: A Panel Data Analysis. *Journal of Regional Science*, **51** (5), 948–966.

Fielding, A. J. (1989). Migration and urbanization in western europe since 1950. *The Geographical Journal*, **155** (1), 60–69.

Goss, E. P. and Schoening, N. C. (1984). Search Time, Unemployment, and the Migration Decision. *Journal of Human Resources*, pp. 570–579.

Greenwood, M. J. (1997). Internal Migration in Developed Countries. *Handbook of Population and Family Economics*, **1**, 647–720.

— and Hunt, G. L. (2003). The Early History of Migration Research. *International Regional Science Review*, **26** (1), 3–37.

Gregg, P., Machin, S. and Manning, A. (2004). Mobility and Joblessness. In *Seeking a Premier Economy: The Economic Effects of British Economic Reforms, 1980-2000*, University of Chicago Press, pp. 371–410.

Gregory, T. and Patuelli, R. (2015). Demographic Ageing and the Polarization of Regions – An Exploratory Space-Time Analysis. *Environment and Planning A*, **47** (5), 1192–1210.

Harris, J. R. and Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American economic review*, **60** (1), 126–142.

Haug, S. and Sauer, L. (2007). *Zuwanderung und Integration von (Spät-) Aussiedlern: Ermittlung und Bewertung der Auswirkungen des Wohnortzuweisungsgesetzes*, vol. 3. DEU.

Heiland, F. W. (2004). Trends in East-West German Migration from 1989 to 2002. *Demographic Research*, **11**, 173–194.

Hunt, J. (2000). *Why do people still live in East Germany?* Tech. rep., National Bureau of Economic Research.

— (2006). Staunching Emigration from East Germany: Age and the Determinants of Migration. *Journal of the European Economic Association*, **4** (5), 1014–1037.

Klick, L. and Schaffner, S. (2019). FDZ Data Description: Regional Real Estate Price Indices for Germany (RWI-GEO-REDX). RWI - Leibniz - Institut für Wirtschaftsforschung.

Kontuly, T., Wiard, S. and Vogelsang, R. (1986). Counterurbanization in the federal republic of germany. *The Professional Geographer*, **38** (2), 170–181.

Lehmer, F. and Ludsteck, J. (2011). The returns to job mobility and inter-regional migration: Evidence from germany. *Papers in Regional Science*, **90** (3), 549–571.

Mitze, T. and Reinkowski, J. (2011). Testing the Neoclassical Migration Model: Overall and Age-Group Specific Results for German Regions. *Zeitschrift für Arbeitsmarktforschung*, **43** (4), 277–297.

Parikh, A., Van Leuvensteijn, M. *et al.* (2003). Internal Migration in Regions of Germany: A Panel Data Analysis. *Applied Economics Quarterly*, **49** (2), 173–192.

Piras, R. (2017). A Long-Run Analysis ofPpush and Pull Factors of Internal Migration in Italy. Estimation of a Gravity Model With Human Capital Using Homogeneous and Heterogeneous Approaches. *Papers in Regional Science*, **96** (3), 571–602.

Plane, D. A., Henrie, C. J. and Perry, M. J. (2005). Migration Up and Down the Urban Hierarchy and Across the Life Course. *Proceedings of the National Academy of Sciences*, **102** (43), 15313–15318.

Ravenstein, E. G. (1885). The Laws of Migration. *Journal of the Statistical Society of London*, **48** (2), 167–235.

— (1889). The Laws of Migration: Second Paper. *Journal of the Royal Statistical Society*, **52** (2), 241–305.

Sander, N. (2014). Internal Migration in Germany, 1995-2010: New Insights into East-West Migration and Re-Urbanisation. *Comparative Population Studies*, **39** (2).

Santos Silva, J. M. C. and Tenreyro, S. (2006). The Log of Gravity. *The Review of Economics and Statistics*, **88** (4), 641–658.

Schmucker, A., Seth, S., Ludsteck, J., Eberle, J. and Ganzer, A. (2016). Betriebs-Historik-Panel 1975-2014. *FDZ-Datenreport*, **3**, 2016.

Sjaastad, L. A. (1962). The costs and returns of human migration. *Journal of political Economy*, **70** (5, Part 2), 80–93.

Tanja, F. *et al.* (2016). Migration and regional wage disparities in germany. *Journal of Economics and Statistics (Jahrbuecher fuer Nationaloekonomie und Statistik)*, **236** (1), 3–35.

Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. *The American Economic Review*, **59** (1), 138–148.

Zipf, G. K. (1946). The P_1P_2/D Hypothesis: On the Intercity Movement of Persons. *American Sociological Review*, **11** (6), 677–686.

Tables

Table 1: Number of Internal Migrants by Age Group and County Type

	All	18-29	30-49	50-64	65+
			Source		
Rural	3,824,023	1,749,591	980,778	316,722	267,366
	24.08%	25.42%	21.18%	24.43%	26.93%
Urban	12,054,312	5,133,362	3,650,694	979,608	725,394
	75.92%	74.58%	78.82%	75.57%	73.07%
			Host		
Rural	3,573,182	1,289,861	1,064,339	362,922	287,834
	22.50%	18.74%	22.98%	28.00%	28.99%
Urban	12,305,153	5,593,092	3,567,133	933,408	704,926
	77.50%	81.26%	77.02%	72.00%	71.01%
Total	15,878,335	6,882,953	5,631,472	1,296,330	992,760

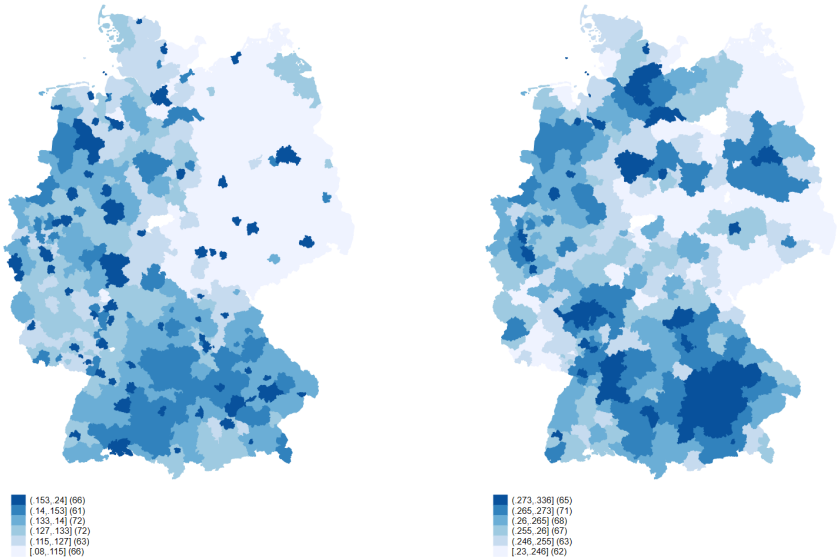
Source: Destatis

Table 2: Gravity Model of Internal Migration including Rents and Average Wages

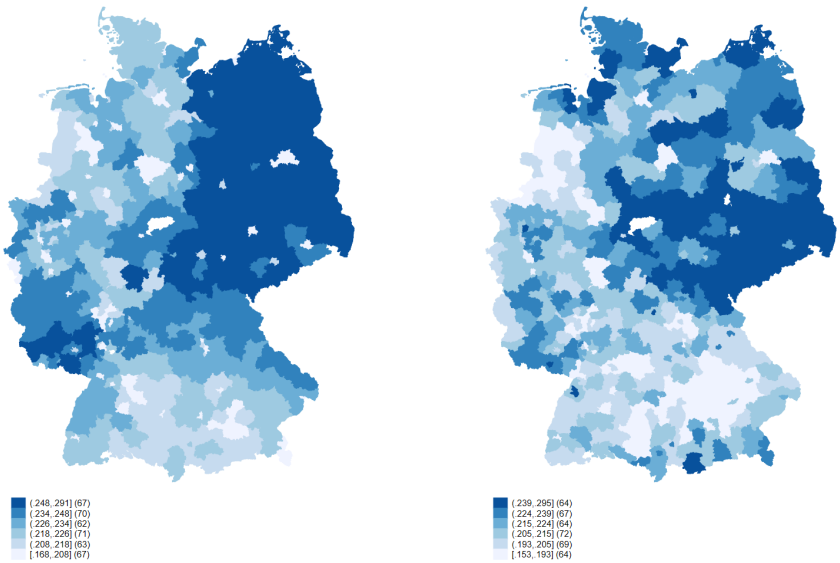
	(All) β/StdE	(18–29) β/StdE	(30–49) β/StdE	(50–64) β/StdE	(65+) β/StdE
Distance	-1.7768^{***}	-1.6970^{***}	-1.8122^{***}	-1.9093^{***}	-1.8792^{***}
	(0.0075)	(0.0074)	(0.0087)	(0.0074)	(0.0076)
Source county characteristics					
Population	0.9188^{***}	1.5480^{***}	0.8684^{***}	0.2039	0.0767
	(0.0700)	(0.0777)	(0.0808)	(0.1209)	(0.1462)
Unemployment rate	0.1420^{***}	0.2648^{***}	0.0615^{***}	0.1062^{***}	0.0469
	(0.0122)	(0.0135)	(0.0164)	(0.0246)	(0.0293)
GDP per capita	-0.0643^{**}	-0.2216^{***}	-0.0785^{*}	0.1219^{**}	0.2159^{***}
	(0.0222)	(0.0246)	(0.0317)	(0.0388)	(0.0473)
Age-specific average wage	-0.5996^{***}	-0.2309^{***}	-0.2578^{***}	-0.0807	0.7030^{***}
	(0.0597)	(0.0680)	(0.0725)	(0.0721)	(0.1315)
Rental price index	0.0002	-0.0008^{*}	0.0015^{***}	-0.0019^{***}	-0.0006
	(0.0003)	(0.0003)	(0.0004)	(0.0005)	(0.0006)
Host county characteristics					
Population	-0.0501	0.5717^{***}	-0.5218^{***}	-0.6217^{***}	-0.1277
	(0.0704)	(0.0852)	(0.0823)	(0.1152)	(0.1343)
Unemployment rate	-0.0792^{***}	0.0071	-0.1539^{***}	-0.0220	0.0301
	(0.0110)	(0.0130)	(0.0148)	(0.0232)	(0.0274)
GDP per capita	0.0081	-0.1344^{***}	0.1492^{***}	0.1004^{*}	0.0177
	(0.0231)	(0.0273)	(0.0293)	(0.0393)	(0.0481)
Age-specific average wage	0.2534^{***}	0.4229^{***}	0.3776^{***}	0.0463	-0.0443
	(0.0665)	(0.0662)	(0.0792)	(0.0749)	(0.1399)
Rental price index	-0.0029^{***}	-0.0023^{***}	-0.0031^{***}	-0.0048^{***}	-0.0025^{***}
	(0.0003)	(0.0004)	(0.0003)	(0.0005)	(0.0005)
R^2	0.7988	0.7883	0.8029	0.8102	0.7900
Observations	1,095,414	1,095,414	1,095,414	1,095,414	1,095,414

Source: Destatis, IAB, Immobilienscout24; authors' calculations.
*Notes: Results represent estimated coefficients and robust standard errors (clustered at the region-pair level) obtained from a Poisson pseudo-maximum likelihood estimator. The dependent variable for each column is the number of migrants between all county pairs. All explanatory variables are included in logarithmic form. The model further includes host and source county as well as year fixed effects. Asterisks denote statistical significance * at the .05 level; ** at the .01 level; *** at the .001 level.*

Figures



(a) 18 - 29 YEARS **(b)** 30 - 49 YEARS



(c) 50 - 64 YEARS **(d)** 65+ YEARS

Figure 1: REGIONAL AGE SHARES, QUANTILES (2014)
Source: Destatis, authors' illustrations.

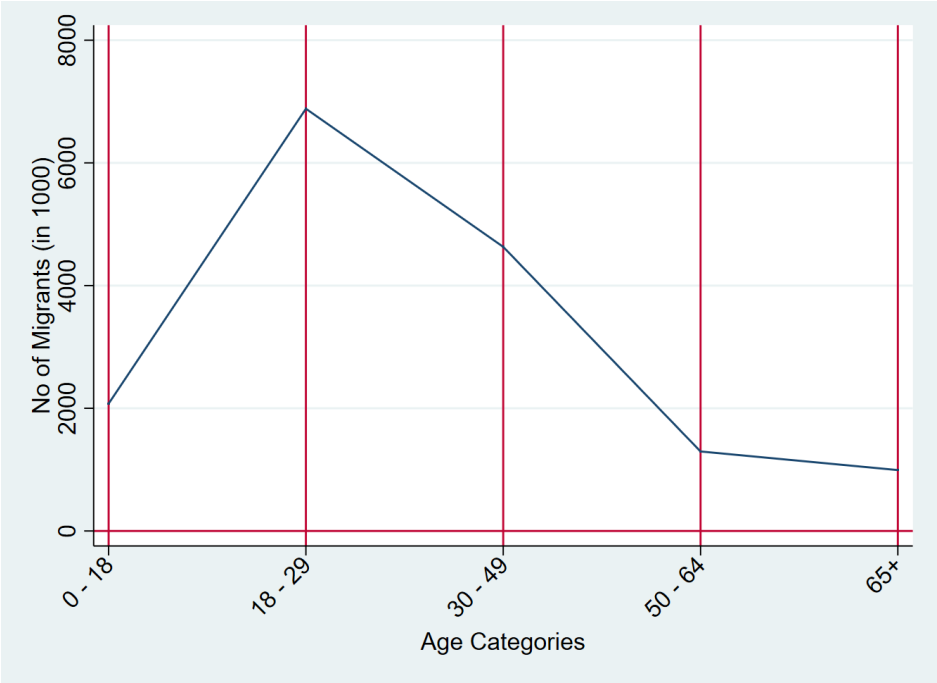
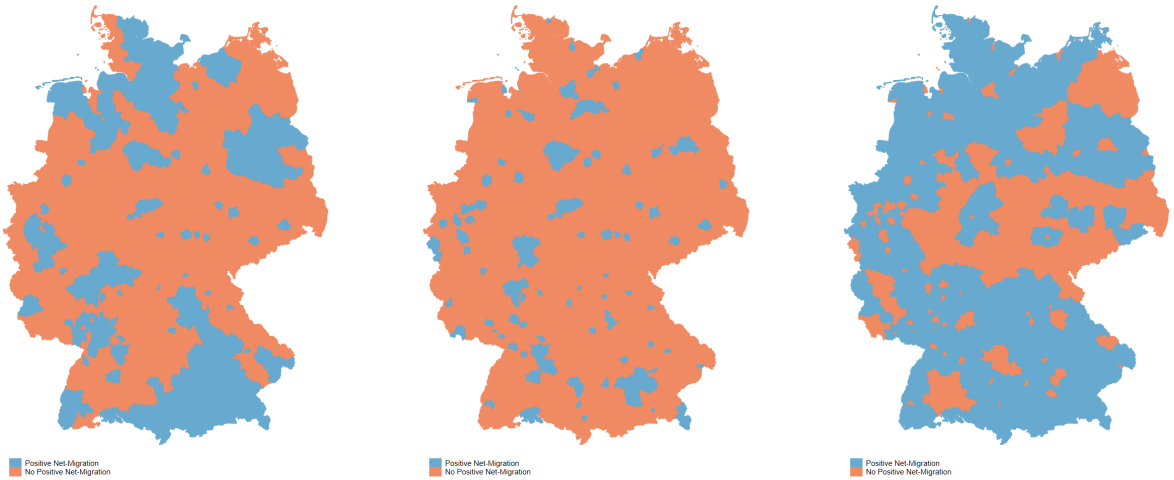


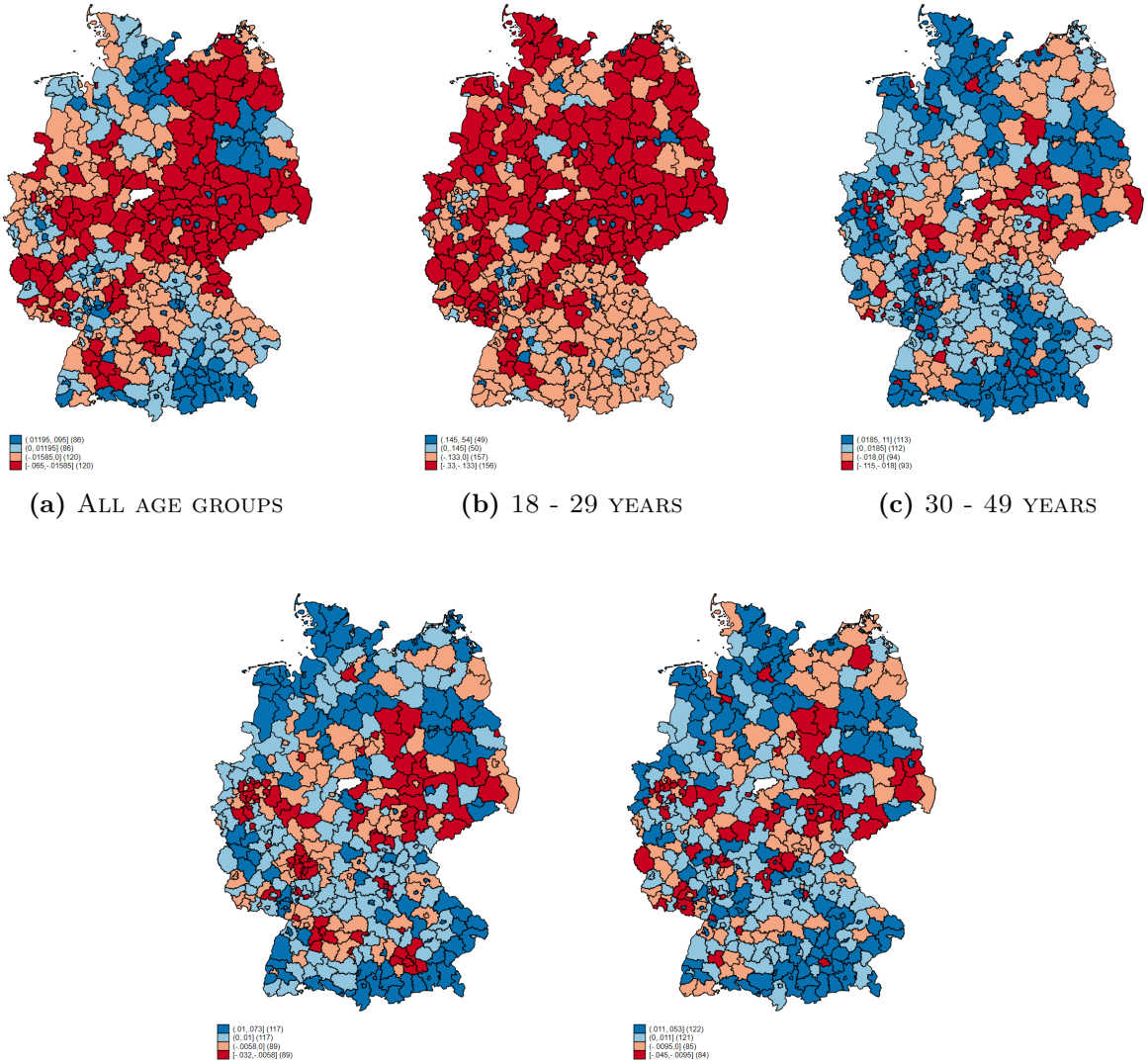
Figure 2: Relationship Between Age Group and Migration Intensity.
Source: Destatis; authors' calculations.
Note: The figure shows the average number of internal migrants for the five age groups.



(a) All age groups **(b)** 18 - 29 years **(c)** 30 - 49 years

(d) 50 - 64 years **(e)** 65+ years

Figure 3: Positive net migration
Source: Destatis, authors' illustrations.



(a) All age groups **(b)** 18 - 29 years **(c)** 30 - 49 years

(d) 50 - 64 years **(e)** 65+ years

Figure 4: Cumulative net migration (2008 – 2014) relative to initial population of each age group (2008)
Source: Destatis, authors' illustrations.

Appendix

Table A1: Sample Means

	Mean	Std. Dev.	Min.	Max.
No. of migrants (total)	16.5134	108.1857	0.00	10028.00
No. of migrants (18–29)	7.0202	41.5945	0.00	2912.00
No. of migrants (30–49)	5.0983	38.0553	0.00	4439.00
No. of migrants (60–64)	1.3346	9.7096	0.00	847.00
No. of migrants (65+)	0.9309	6.8252	0.00	690.00
Distance	301.9133	150.7265	0.95	824.48
Population	201385.6484	231209.2108	33944.00	3469849.00
Unemployment	7.5768	3.5444	1.40	21.20
GDP per capita	31301.8812	13579.5021	12712.00	136224.00
Rent	13.6286	6.2734	3.95	45.23
Wage (total)	99.9862	14.7742	67.84	160.91
Wage (18–29)	77.2964	8.8056	55.91	111.90
Wage (30–49)	108.1328	16.9319	72.26	176.73
Wage (60–64)	114.5295	19.6756	72.61	204.23
Observations	1,095,414			

Source: Destatis, IAB, Immobilienscout24; authors' calculations.

Table A2: Gravity Model of Internal Migration

	(I) β/StdE	(II) β/StdE	(III) β/StdE
Distance	-1.7768^{***}	-1.7768^{***}	-1.7768^{***}
	(0.0075)	(0.0075)	(0.0075)
Source county characteristics			
Population	1.0675^{***}	0.9255^{***}	0.9188^{***}
	(0.0732)	(0.0710)	(0.0700)
Unemployment rate	0.1810^{***}	0.1468^{***}	0.1420^{***}
	(0.0120)	(0.0122)	(0.0122)
GDP per capita	-0.1254^{***}	-0.0673^{**}	-0.0643^{**}
	(0.0223)	(0.0228)	(0.0222)
Average wage	–	-0.6612^{***}	-0.5996^{***}
	–	(0.0616)	(0.0597)
Rental price index	–	–	0.0002
	–	–	(0.0003)
Host couty characteristics			
Population	-0.1658^{*}	-0.1534^{*}	-0.0501
	(0.0705)	(0.0713)	(0.0704)
Unemployment rate	-0.0700^{***}	-0.0655^{***}	-0.0792^{***}
	(0.0108)	(0.0112)	(0.0110)
GDP per capita	0.0393	0.0206	0.0081
	(0.0238)	(0.0238)	(0.0231)
Average wage	–	0.2309^{***}	0.2534^{***}
	–	(0.0665)	(0.0665)
Rental price index	–	–	-0.0029^{***}
	–	–	(0.0003)
R^2	0.7987	0.7986	0.7988
Observations	1,095,414	1,095,414	1,095,414

Source: Destatis, IAB, Immobilienscout24; authors' calculations.

*Notes: Results represent estimated coefficients and robust standard errors (clustered at the region-pair level) obtained from a Poisson pseudo-maximum likelihood estimator. The dependent variable for each column is the number of migrants between all county pairs. All explanatory variables are included in logarithmic form. The model further includes host and source county as well as year fixed effects. Asterisks denote statistical significance * at the .05 level; ** at the .01 level; *** at the .001 level.*

Table A3: Gravity Model of Internal Migration including Rents and Average Wages

	(All) β/StdE	(18–29) β/StdE	(30–49) β/StdE	(50–64) β/StdE	(65+) β/StdE
Distance	−1.7768***	−1.6970***	−1.8122***	−1.9093***	−1.8792***
	(0.0075)	(0.0074)	(0.0087)	(0.0074)	(0.0076)
Source county characteristics					
Population	0.9188***	0.2845***	0.5156***	0.6642***	0.5606***
	(0.0700)	(0.0680)	(0.1021)	(0.1181)	(0.1610)
Unemployment rate	0.1420***	0.1334***	0.0575***	0.1048***	0.0424
	(0.0122)	(0.0126)	(0.0163)	(0.0249)	(0.0292)
GDP per capita	−0.0643**	−0.1293***	−0.0871**	0.0147	0.1461**
	(0.0222)	(0.0227)	(0.0301)	(0.0406)	(0.0472)
Average wage	−0.5996***	−0.3089***	−0.1340	−0.2073	0.7177***
	(0.0597)	(0.0654)	(0.0731)	(0.1086)	(0.1310)
Rental price index	0.0002	−0.0004	0.0010**	−0.0017***	−0.0003
	(0.0003)	(0.0003)	(0.0004)	(0.0005)	(0.0006)
Age specific population share	–	0.8879***	0.7221***	0.6716***	1.1144***
	–	(0.0267)	(0.0968)	(0.0774)	(0.1527)
Host county characteristics					
Population	−0.0501	0.0050	−0.3817***	−0.1233	−0.1393
	(0.0704)	(0.0718)	(0.0904)	(0.1200)	(0.1565)
Unemployment rate	−0.0792***	−0.0767***	−0.1419***	−0.0127	0.0366
	(0.0110)	(0.0127)	(0.0147)	(0.0235)	(0.0272)
GDP per capita	0.0081	−0.1032***	0.1409***	−0.0242	0.0075
	(0.0231)	(0.0241)	(0.0284)	(0.0402)	(0.0500)
Average wage	0.2534***	0.6178***	0.5491***	0.0838	−0.0111
	(0.0665)	(0.0720)	(0.0783)	(0.1122)	(0.1421)
Rental price index	−0.0029***	−0.0006	−0.0030***	−0.0045***	−0.0026***
	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0005)
Age specific population share	–	0.5755***	−0.1415	0.7199***	0.1991
	–	(0.0291)	(0.0879)	(0.0772)	(0.1602)
R^2	0.7988	0.7897	0.8031	0.8108	0.7898
Observations	1,095,414	1,095,414	1,095,414	1,095,414	1,095,414

Source: Destatis, IAB, Immobilienscout24; authors' calculations.
*Notes: Results represent estimated coefficients and robust standard errors (clustered at the region-pair level) obtained from a Poisson pseudo-maximum likelihood estimator. The dependent variable for each column is the number of migrants between all county pairs. All explanatory variables are included in logarithmic form. The model further includes host and source county as well as year fixed effects. Asterisks denote statistical significance * at the .05 level; ** at the .01 level; *** at the .001 level.*

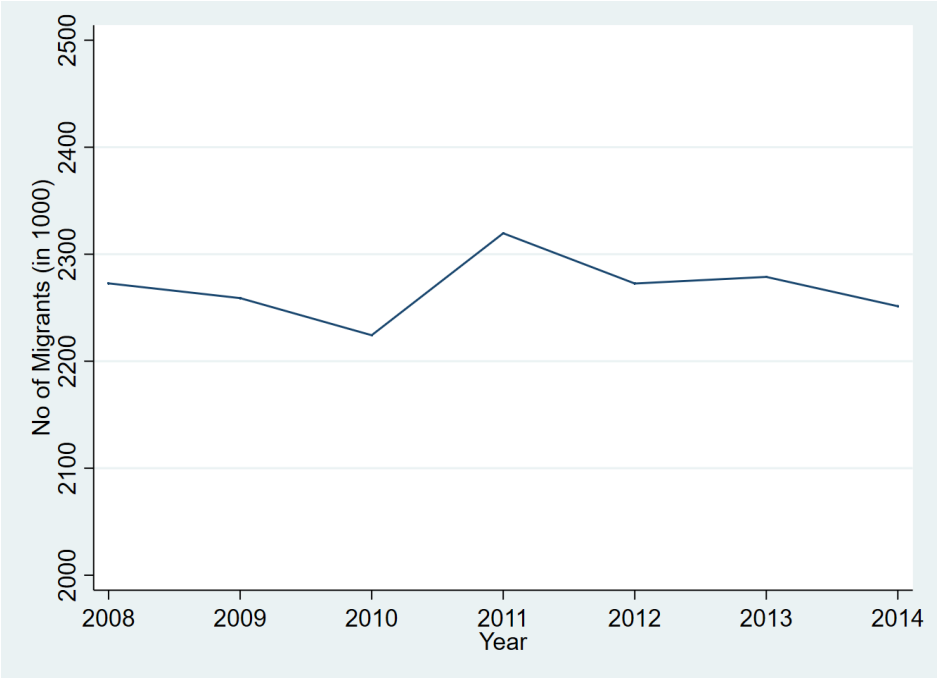


Figure A1: Number of Migrants per Year.
Source: Destatis; authors' calculations.
Note: The figure shows the average number of internal migrants for each year of observation.