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ORIGINAL ARTICLE

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The effect of co-ethnic social capital on immigrants' labor market integration: a natural experiment

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Abstract

Empirically identifying the causal effect of social capital on immigrants' economic prospects is a challenging task due to the non-random residential sorting of immigrants into locations with greater opportunities for prior or co-ethnic connections. Our study addresses this selection-bias issue by using a natural-experimental dataset of refugees and other immigrants who were exogenously allocated to their first place of residence by German authorities. This unique opportunity allows us to make an important methodological contribution to the predominantly observational knowledge about immigration and co-ethnic social capital. Although a growing body of migration studies in economics and sociology stresses the importance of social networks for migrants' labor market integration, our results show little evidence of a causal effect of social networks themselves. Being part of a larger co-ethnic community per se does not accelerate immigrants' labor market success except for the migrants who use the resources embedded in their social contacts when looking for a job. We conclude that further methodological advancements can be achieved by embracing recent technological developments and by combining different methods to increase both internal and external validity of findings in migration studies.

Keywords: Network social capital, Natural experiment, Immigrants, Co-ethnic community, Labor market

JEL Classification: F22, L14, J61, R23

Introduction

This article aims to make an important methodological contribution to the existing knowledge about immigration and co-ethnic social capital. When studying the role of networks in immigrants' labor market integration,¹ a large body of migration literature examines prior connections to relatives or friends in the destination country (e.g.,

¹ We focus on labor market integration, also known as "structural integration" in sociology (e.g., Esser, 2001), because it refers to immigrants' inclusion into the functional institutions of their host country via access to positions and statuses in the host labor market or education system. Labor market entry can be considered in this regard as a first step in the dynamic integration process (e.g., Alba, 2008).

Aguilera & Massey, 2003; Kalter & Kogan, 2014) or uses either the co-ethnic community size in the destination country as a proxy for potential co-ethnic networks (e.g., Battisti et al., 2022; Damm, 2009; Edin et al., 2003; Kristiansen et al., 2021; Stips & Kis-Katos, 2020) or the frequency and/or intensity of post-immigration contacts with different population groups (e.g., Kanas et al., 2011; Lancee, 2012). The main argument of this literature is that individuals' embeddedness in a network allows benefits from relevant (social) resources.

There is, however, a common issue in the literature on networks and (non-)immigrant labor market outcomes: it remains challenging to identify social networks' causal effect on (non-)immigrants' labor market prospects. As indicated first by McPherson et al. (2001) and later by Mouw (2003, 2006), the endogeneity between social network variables and labor market outcomes is high. The rationale is that social contacts are chosen non-randomly; thus, much of the social networks' estimated effect may be driven simply by selection effects. Selection bias in race and ethnicity represents one of the strongest divides in social networks (McPherson et al., 2001). As frequently found in the literature, immigrant inflow into particular destinations and/or regions is often driven by connections to previously immigrated family or friends (e.g., Palloni et al., 2001) or by the presence of previously immigrated co-ethnic groups (e.g., Damm, 2009; Tanis, 2020). That is, if newcomers choose their location within the destination country themselves, their choice will likely be driven by the networks (such as those with family, friends or co-ethnic groups) that they expect to have in different locations. Therefore, any estimated effect of immigrants' social connections may reflect a selection effect caused by an endogenous choice of networks.

In line with the established views on labor market social capital (Lai et al., 1998; Lin, 1999; Mouw, 2006), we recognize that both the availability of resources embedded in a person's social network and the use of these resources for a particular purpose can be essential in determining labor market outcomes. Thus, the use of network resources constitutes the network social capital.² Our goal is to make a methodological contribution by empirically examining the causal effect of network social capital on the labor market integration of refugees and other immigrants.³ More specifically, we look at immigrants' potential pool of social resources embedded in their co-ethnic community and immigrants' use of these resources for a job search, which we call "co-ethnic social capital". Ethnic communities, a.k.a. ethnic enclaves or ethnic concentrations, have been frequently used as a proxy for immigrants' social networks (e.g., Battisti et al., 2022; Damm, 2009; Edin et al., 2003; Kristiansen et al., 2021; Stips & Kis-Katos, 2020; Vervoort et al., 2011).

² We are aware of the argument that networks can be beneficial "even in the absence of instrumental action", known as the "invisible hand of social capital" (McDonald, 2015, p. 301). This argument has found empirical support regarding benefits at later career stages, in particular for the "non-searchers", those who already have a job and are not looking for another one. Our focus is, however, on immigrants at the early career stages when they are typically struggling to find a job and integrate in the labor market of destination countries. As reported later, our results show that the "invisible hand of (co-ethnic) social capital" seems to be marginal for the early integration of immigrants.

³ Henceforth, the term "refugees" is used colloquially and includes all persons who move to another country for humanitarian reasons (e.g., as refugees or asylum-seekers). The term "other immigrants" is used to refer to foreign-born individuals who have immigrated to a new country for non-humanitarian reasons. When we use the term "immigrants", we refer to all immigrants, including both refugees and other immigrants.

As argued by Mouw (2003), a causal examination of social capital effects requires one to assume that the use of networks is exogenous to the potential pool of social resources embedded in the network but that the benefit of networks depends on these resources. It is by now well established that showing that the use of networks is exogenous to their availability is a challenging task, both theoretically and empirically (Montgomery, 1992), unless one applies experimental research strategies. These offer a controlled setting that allows one to draw causal inferences regarding the “true” effect of social networks (Castilla et al., 2013; Mouw, 2006).

We have access to a unique natural-experimental dataset that is based on national dispersal policies that determine the residential allocation of refugees, namely, ethnic German and Jewish immigrants in Germany. In other words, these immigrant groups are exogenously allocated by an external state authority, which minimizes the likelihood that immigrant inflows into particular regions are driven by family and friendship ties or by the availability of a co-ethnic community. Moreover, our data from the German IAB-SOEP Migration Sample provide self-reported information about whether an immigrant’s first place of residence was determined by authorities, which increases our confidence that the allocation was exogenous. Such an allocation implies that any systematic differences in the (un)observable characteristics between the immigrants who were allocated to areas with a larger co-ethnic community (i.e., larger potential pool of co-ethnic social resources) and the immigrants who were allocated to areas with a smaller co-ethnic community (i.e., smaller potential pool of such resources) are unlikely. This, in turn, means that the identified effect is not a mere effect of self-selection. It is precisely this unique feature of our natural-experimental design that allows us to make important methodological contributions to the predominantly observational knowledge about immigration and co-ethnic social capital.

Finally, when studying immigrants’ labor market integration, the migration literature primarily considers immigrants at different career stages and with very heterogeneous backgrounds in terms of, on the one hand, host-country-specific human capital such as language proficiency, and the degree and type of labor market experience (cf. cultural capital; Esser, 2001) and, on the other hand, the accumulation of social contacts in the labor market. We focus on a specific and crucial life-course stage for immigrants – their first job – because here we assume the effect of co-ethnic social capital to be less confounded by other factors at the labor market entry stage. There is some empirical evidence that co-ethnic social capital is particularly important at the beginning of one’s career and decreases in influence as experience is accumulated (Battisti et al., 2022; Dustmann et al., 2016). Moreover, immigrants labor market integration is often measured not only by monitoring their labor market participation but also their positioning such as earnings, occupational status or quality of workplace (OECD, 2018). Therefore, we investigate the effect of co-ethnic social capital on both the transition rate to and the wages in migrants’ first jobs (see, e.g., Kalter & Kogan, 2014). By looking at both indicators, we aim to provide a more comprehensive picture on the effect of network social capital on immigrants’ labor market integration.

A theoretical overview

Labor market social capital and immigrants' job opportunities

Originating from social resources theory (Lin, 1999) and further developing into a broader theory of labor market social capital (a.k.a. the network social capital perspective, Mouw, 2006), it is by now well established that both the social structure in which a person is embedded and the resources located in this structure are crucial for labor market outcomes, as long as the resources are mobilized for such purposes. Thus, the resourcefulness of social networks, not their mere existence, affects job search outcomes. This resourcefulness can be of two types. First, resourcefulness can derive from certain social characteristics of the contact person, such as her status (Lai et al., 1998). Second, network resources may involve the “general benefits” of being embedded in a social structure. An example of such benefits is access to information about job availability (Mouw, 2003, p. 877). This second type of resourcefulness is what our study focuses on.

More specifically, we focus on the general benefits that immigrants derive from being embedded in a co-ethnic community. An important assumption that we make is that being embedded in a co-ethnic community increases the likelihood that co-ethnic networks are established. These networks would allow immigrants to benefit if they use the information transmitted through these networks about, for example, available jobs in ethnic or native businesses or loan opportunities to start one's own business (Portes, 1998). Vervoort et al. (2011) summarize three main theoretical reasons for why being embedded in a co-ethnic community makes it likely that co-ethnic networks are established. First, the so-called “supply side perspective” (Blau, 1977; Fischer, 1977) argues that a larger co-ethnic community provides more opportunities than a smaller co-ethnic community to interact with other co-ethnics and ultimately establish networks. Second, ethnic competition theory (Blalock, 1967) claims that in larger ethnic communities, natives may feel more “threatened” than in smaller ethnic communities. As a result, natives will minimize their exchanges with ethnic minorities, which, in turn, will increase the intra-ethnic exchanges among ethnic minority groups. Third and similarly, the “third party” influence (Kalmijn, 1998) explains greater intra-ethnic interaction in larger ethnic communities because of a stronger demand for conformity and solidarity from one's own ethnic group. Aside from these theoretical approaches, a rich literature in migration economics and sociology (e.g., Battisti et al., 2022; Damm, 2009; Edin et al., 2003; Kristiansen et al., 2021; Stips & Kis-Katos, 2020) simply assumes a direct link between ethnic communities and ethnic networks. This assumption finds support in Vervoort et al. (2011) who empirically show that when the co-ethnic community is larger, the contacts with natives are fewer, whereas the contacts with co-ethnics are more frequent.

A growing body of sociological and economic research has empirically examined the role of immigrants' social networks in newcomers' labor market opportunities. In the migration literature, connections to prior migrants in the destination country are considered to be the main source of “information about or direct assistance with migrating” (Garip, 2008, p. 593). Several studies have found positive effects of co-ethnic networks on immigrants' employment opportunities (e.g., Elliott, 2001; Sanders et al., 2002) and on job quality (e.g., Aguilera & Massey, 2003; Dustmann et al., 2016; Massey & Espinosa,

1997). Other studies, however, report that co-ethnic networks have either no effect on labor market outcomes (e.g., Xie & Gough, 2011) or may even hinder newcomers' labor market integration (e.g., Kalter & Kogan, 2014; van Tubergen, 2011).

These inconclusive findings may be due to a reliance on methodologies that cannot fully account for immigrants' self-selection into (co-ethnic) social networks (see Obukhova & Lan, 2013 for a similar discussion). If individuals are part of a (co-ethnic) social network that they chose to be in, the use of this network to find a job is endogenous to the network to which they may have access. As a consequence, one cannot conclude that using (co-ethnic) networks to find a job leads to more or better jobs.

Causal effects of co-ethnic social capital on immigrants' labor market outcomes

Using experimental designs that vary from a random assignment of treatments (laboratory or field experiments) to an exogenous allocation of actors (natural or quasi experiments) has been recognized as the only means to truly identify the causal effect of social networks (Castilla et al., 2013; Mouw, 2006).⁴ This is because the randomized assignment eliminates the problem of individuals (e.g., immigrants) selecting one another based on observable or unobservable characteristics. Natural experiments, on the other hand, are considered to be "particularly helpful for studying how unexpected exogenous changes in employment relations may affect network structures (e.g. sudden geographic relocations of companies)" (Castilla et al., 2013, p. 1021).

The experimental method thus ensures that the use of network resources to find a job is not endogenous to the availability of resources embedded in a person's social network. Consistent with the theory of labor market social capital, this implies that if there is any effect of an immigrant's co-ethnic network on job-related outcomes, this effect would not be because of the potential pool of resources embedded in the immigrant's co-ethnic network but rather because of the mobilization of these resources to achieve the desired job-related outcomes. As discussed in Mouw (2003), this theoretical possibility of a causal effect of co-ethnic social capital relies on the assumption that the relationship between the availability and the use of these co-ethnic network resources is exogenous.

We intend to test for a causal relationship between co-ethnic social capital and success in the labor market. The theoretical and empirical evidence presented above establishes that being part of a larger co-ethnic community yields a larger pool of potential resources to tap into. Immigrants who live in a larger co-ethnic community therefore have more opportunities to benefit from co-ethnic social capital than immigrants who live in a smaller co-ethnic community. If this co-ethnic social capital is beneficial for immigrants' labor market integration, then having a large co-ethnic community network will benefit an immigrant's job search if she taps into these resources. Importantly, having access to a network does not necessarily imply that one uses the resources. We predict that migrants who do not mobilize contacts when looking for a job will not benefit from the resources available in a co-ethnic community.

⁴ See Additional file 1: Appendix A for an extensive discussion of various statistical methods used in the literature to address self-selection into (co-ethnic) social networks.

This reasoning allows us to develop two hypotheses. For immigrants who do not mobilize contacts, the degree of resource availability – and, therefore, the community size – is irrelevant to their success in the job market.

H1a: For immigrants' who do not mobilize contacts, the propensity to find a job and their wages are not affected by their co-ethnic community size.

In contrast, immigrants who mobilize contacts will benefit from a larger community size because they can tap into the greater availability of resources.

H1b: For immigrants who mobilize contacts, the propensity to find a job and their wages increase with their co-ethnic community size.

German dispersal policies

To examine whether co-ethnic social capital has a causal effect on immigrants' labor market integration, we focus on Germany. Germany has historically played an important role as a migration-receiving country in Europe and is characterized by a large proportion of migrants (see Kogan, 2011 for an overview). Nevertheless, previous research has revealed the deficiencies of the integration policies in Germany: immigrants face greater rates of unemployment, are concentrated in a lower occupational hierarchy (Kogan, 2011), and have lower wages (Constant & Massey, 2003) than natives. Social networks, however, seem to mitigate immigrants' economic disadvantages (e.g., Dustmann et al., 2016; Kalter & Kogan, 2014). A final and decisive reason for focusing on Germany relates to a natural experiment that we exploit for our research purposes, which is described below.⁵

Depending on their specific status in Germany, refugees, ethnic Germans, and Jewish immigrants have been subject to national dispersal policies. Regulated by law (from the 1970s to the present for refugees and from 1989 to the end of 2009 for ethnic Germans and Jewish migrants), these immigrants' allocation to their first residence place across German Federal States was based on a quota system, the so-called "Königsteiner Schlüssel".⁶ Based on similar quota regulations, authorities in the federal states were responsible for the further allocation of the assigned immigrants within their territory. In the case of family reunification (which applied only to married couples and their minor children), refugees, ethnic Germans, and Jewish immigrants could request to join their (nuclear) families in a different reception center (in a different German Federal State). Such situations allow for deviations from the policies, which may undermine the exogenous allocation of immigrants and increase the probability of self-selection. Some studies have attempted to exploit these exogenous allocation policies to identify the effect of social networks on immigrants' labor market outcomes, but they have used the data on all immigrants in the groups that fall under the policy. These data may still suffer from self-selection because they do not take into account the aforementioned possibilities to deviate from the policy (e.g., Battisti et al., 2022 for Germany; Edin et al., 2003

⁵ Note that our data do not cover the recent refugee flow to Germany (with arrivals from the fall of 2015 onwards). Therefore, the integration policies and law changes launched from 2015 onwards are not discussed.

⁶ The quota is calculated annually based on the tax revenues and population size of each German Federal State, thereby specifying the allocated shares of refugees, ethnic Germans and Jewish immigrants.

for Sweden; see also Lange & Sommerfeld, 2020). In contrast, our data provide a unique opportunity to consider only the immigrants who were truly subjected to the allocation policy. In the process of gathering the data, the respondents were asked whether their choice of the first residence place in Germany was driven by factors such as economic conditions, family living there, or whether they were allocated by the German authorities. The respondents who report having been assigned are evidently the respondents who were indeed allocated by German authorities, whereas the respondents who report family reasons (although they arrived as refugees, ethnic Germans or Jewish migrants) are likely migrants arriving for family reunification.⁷

Refugees' first residential allocation was binding, and the obligation to reside in the district in which they were initially allocated could be abolished either upon the official recognition of one's refugee status or 24 months after arrival at the latest. The duration of the recognition procedure is time-consuming; this process took 22 months on average in 2005 (BAMF, 2005). The first regional allocation was binding for ethnic German migrants (since 1996), and it could be abolished if these immigrants showed proof of sufficient (permanent) job income three years after arrival at the latest. For Jewish immigrants, there were no residential obligations.⁸

Data and method

Data sample

The empirical analysis is based on data from the IAB-SOEP Migration Sample, a large longitudinal household survey of migrants in Germany that was launched in 2013 and is conducted yearly (Brücker et al., 2014).⁹ The anchor persons were drawn from administrative data (the Integrated Employment Biographies, IEB) to be representative of the target population of individuals who migrated to Germany between 1995 and 2010. All persons living in the same household were interviewed. The overall mean response rate amounted to approximately 32% and conforms to the response rates of earlier SOEP samples (Kroh et al., 2015).¹⁰ In 2015 (third wave), a refreshment sample was added targeting migrants who arrived between 2009 and 2013 in Germany. For more information about the sampling procedure and further methodological issues, see Brücker et al. (2014) and Kroh et al. (2015).

For our analyses, we considered only the respondents from the third wave because information about their residential allocation was surveyed for the first time in this wave. We restricted our sample to foreign-born individuals who *reported being assigned to their first place of residence in Germany* (13% of the original data; 15% of the immigrants). Although we substantially reduced the sample size with this restriction, this

⁷ To check the robustness of our claim that the sample of immigrants that we examine is exogenously allocated, we replicated our analyses to exclude the immigrants who immigrated after their spouses. The results are robust to these sample restrictions (see Additional file 1: Appendix E, Model 2.8 in Table E1 and Model 3.8 in Table E2). The arrivals of minor children are excluded by definition since we confine the data to immigrants who arrive in Germany at working age.

⁸ A more detailed description of the allocation and integration policies for refugees, ethnic Germans and Jewish immigrants is presented in Additional file 1: Appendix B.

⁹ Given our focus on the first job of immigrants from biographical perspective, our data -per definition- covers job entries occurred from 1995 till the last interview included in our study (2015).

¹⁰ Previous research reveals that the response rates from studies of migrants are lower than the response rates of non-migrants (see Bethlehem et al., 2011).

sampling ensured that the respondents' sorting across locations was exogenous and not due to self-selection. The natural-experimental opportunity in this empirical setting lies in the exogenous variations in the features of these first places of residence among the assigned group of immigrants.

The sample of the assigned migrants (i.e., 536 respondents) was further restricted based on some additional criteria. To capture the first stages in the German labor market, we considered only immigrants of working age at the time of their arrival in Germany (i.e., aged between 15 and 64 years). This led to a further exclusion of 108 respondents. Since the dispersal policies for some immigrant groups (i.e., ethnic Germans and Jewish migrants) were first launched in 1989, we also excluded 12 respondents who had arrived before 1989.¹¹ Individuals who had not experienced a first job entry in Germany by the time of the survey and had no intention to work were similarly not included in the analyses (30 respondents). To avoid bias in our results due to inconsistencies in the respondents' information, 47 individuals were also excluded from the analyses as follows: (1) individuals who reported "never having entered a first job in Germany" but who were "currently working" and (2) individuals with the reported date of first job entry preceding the date that they arrived in Germany. After all of these exclusions and the listwise deletion of missing values for the variables of interest (approximately 8%), the resulting final sample consisted of 309 individuals.

Dependent variables and empirical method

The first labor market outcome that we examine is migrants' *transition rate to their first jobs* in Germany by employing discrete event-history modeling for the empirical analyses (Allison, 1982). The key statistical concept within the event-history approach is the transition rate (i.e., the hazard rate), which represents the probability of experiencing the labor market entry in year t given that by the beginning of t , no entry had occurred. Accordingly, when the transition rate is higher, the transition into the first job is faster. The period of observation begins in the year of immigration to Germany and either ends in the year of the first job entry or is right-censored at the date of the interview (if entry into the first job has not yet occurred).¹² The data are organized in a person-year format, which means that each row of the dataset corresponds to a time period of one year.¹³ This step leads to a total of 1001 person-year observations. The dependent variable is whether an individual entered his or her first job in Germany in a given year t . This event occurred for 249 of the person-years and is coded 1 (whereas 0 means no first job entry in year t). The time dependency of the process of first job entry is modeled by using a piece-wise constant approach, which is useful to control for the dependency of duration (between arrival in Germany and first job entry) but does not require complex assumptions about the time dependence of the process. Durations are assumed to follow an exponential distribution, which implies a time-constant hazard rate. By introducing five

¹¹ The immigrants who arrived before 1989 are the household members of the anchor persons. The results do not change substantially after including these immigrants.

¹² By relying on event-history analyses – the method is well suited to capture right-censoring (i.e., when the end of the episode is not observed) – our analyses consider the information for the immigrants who had already begun and the immigrants who had not yet begun their first jobs in Germany.

¹³ It would have been advantageous to consider monthly information of the timing of immigrants' first jobs. This information is unfortunately not available in the IAB-SOEP Migration Sample.

period-specific dummy variables (up to one year since arrival, two years since arrival, three to five years since arrival, six to ten years since arrival, and 11 years or more since arrival), the rate is allowed to vary across periods.

For our second labor market outcome—the quality of the first job—we construct a measure of *real hourly wages* by using the monthly labor earnings of and weekly hours worked at the first job in Germany. The information on both monthly labor earnings and weekly hours worked was available for 219 job entrants (88% of our sample). For the immigrants who entered their first job before 1999 (the year when the euro was introduced), the reported values were divided by the constant exchange rate for the Deutschemark to the Euro (which is equal to 1.95583). To calculate real hourly wages, we use the Consumer Price Index (CPI) deflator with 2015 as the base year. For the empirical analysis, we rely on an ordinary least squares (OLS) regression model with the real log hourly wages in the first job as the dependent variable. We consider wages to be a good indicator of job quality since wages are often linked to consumption opportunities and job prestige (Weiss & Fershtman, 1998). Moreover, in his theoretical work, Montgomery (1992) argues that social contacts operate as a channel for the transmission of information about unobservable characteristics between the employer and the potential employee, which facilitates a better match quality and, as a result, higher starting wages. Accordingly, higher wages in the first job may approximate higher quality matches.

Independent variables and confounders

The exogenous treatment in our sample is the local labor market that migrants encountered in their first place of residence in Germany. We consider an important possible variation in the features of these local labor markets, namely, the *co-ethnic community size*¹⁴ in the district of assignment in the year of arrival. In line with our earlier theoretical discussion, it follows that our respondents' exogenous allocation across local labor markets—which vary in the prevalence of co-ethnic communities—ensures that the respondents' pool of resources embedded in these co-ethnic communities is exogenously determined. This setup eliminates the typical methodological problem of selection on the dependent variable (Obukhova & Lan, 2013).

The co-ethnic community size is measured by the number of previous working immigrants by nationality (group) as the share of total employment in each district in the year in which the immigrant (last) arrived in Germany. We follow Battisti et al. (2022) and aggregate nationalities into the following seven country groups: (1) Western countries, including Western Europe; (2) Eastern Europe; (3) Southeastern Europe; (4) Turkey; (5) the USSR; (6) Asia and the Middle East; and (7) Africa (see also Dustmann et al., 2016; Glitz, 2014). The rationale for using country groups instead of single countries is that by using single countries, we would have had many empty cells. For this reason, we aggregated countries by geographic proximity, which is likely to correlate with linguistic and cultural proximity (e.g., Melitz & Toubal, 2014). More importantly, having single countries would undermine the possibility to estimate the country fixed effects due to lower

¹⁴ Note that here, we do not compare the benefits of having co-ethnic ties versus having cross-ethnic ties. Although this comparison could be very interesting, due to data availability, we focus our attention only on the resources embedded in co-ethnic communities.

sample sizes (as per country) in the survey in general and in the sample of the assigned immigrants in particular.

The measure of co-ethnic community size varies across origin-country-groups and districts of arrival, and it is fixed, for each immigrant, to the value in the year of arrival. We consider working immigrants instead of all immigrants because we assume that working immigrants are more established in the community than non-working immigrants. As a result, information transmission from employed immigrants is likely to be more beneficial for the newcomers' labor market opportunities. By relating co-ethnic working immigrants to the total working population in each district of arrival, we account for the potential "easiness" to thwart other co-ethnic groups. Recall that the assumption underlying our use of co-ethnic community size is that a denser distribution of co-ethnics increases the chance of meeting co-ethnics and as a result, increases the opportunities of tapping into the potential pool of resources embedded in the co-ethnic community.

To calculate the share of working immigrants (groups) for each specific district and year, we rely on the full registry of employees in Germany (IEB). The number of districts in Germany is 401, with a mean (median) of 65,801 (43,643) workers per district. Our sample of assigned migrants is distributed across 112 districts of first arrival. Our measure of co-ethnic community size has an average size of 0.005, with a standard deviation of 0.007 and a maximum of 0.057. The assigned immigrants with the highest value of the average co-ethnic community size are those from Western Europe (0.025), followed by Turkish (0.020) and Southeastern European migrants (0.017).¹⁵ For the empirical analyses, we standardize the "co-ethnic community size" variable; it has a mean of zero and a standard deviation of one.

To capture immigrants' *use of social contacts*, we use a survey question regarding the search methods that the respondents used to find their first job in Germany. Accordingly, for the respondents who have started their first job, the use of social contacts is coded 1 if they found their first job via friends, acquaintances, relatives, or business relationships and is coded 0 if they used other search methods.¹⁶ For the immigrants who had not entered a job by the time of their interview (19%), we examine the search methods that they used to look for their first jobs. Because each respondent could employ several search methods, we consider the method through which each respondent had the highest expectations of finding a job to be his or her main search method. Therefore, for the respondents who were still looking for their first job at the time of the interview, "use of social contacts" is coded 1 if they were looking for a job via friends, acquaintances, relatives, or business relationships and if they had the highest expectations of finding a job via this search method and is coded 0 otherwise. More details about the variable coding strategy can be found in Additional file 1: Appendix C.

Our data do not capture any information about the co-ethnic community characteristics, such as the co-ethnic community's employment quality. However, the natural

¹⁵ In our sample, only one respondent originates from Western countries (Greece), three originate from Eastern Europe (Poland), and one originates from Turkey. A replication of our analyses excluding these immigrants does not alter the conclusions (see Additional file 1: Appendix E, Model 2.10 in Table E1 and Model 3.10 in Table E2).

¹⁶ Because the social and business contacts that migrants used to find their first job could also include connections to natives or other ethnic migrants, the interaction between the immigrants' use of these resources for their job search and the co-ethnic community size captures immigrants' use of co-ethnic community resources, which we call co-ethnic social capital.

experiment ensures that the lack of information about a co-ethnic community's quality is randomly distributed (as is the case with the distribution of other confounders); thus, omitting this information does not bias our results for the sample of assigned immigrants. However, a natural experiment such as ours allows for more noise than a controlled laboratory or field experiment. For this reason, we re-ran our estimates to account for potential confounders that could lead to variations across the local labor markets that the assigned group of immigrants encountered at their first arrival in Germany. We control for a rich set of individual time-constant and time-varying characteristics including fixed effects for country-group-of-origin and district of assignment that may affect labor market integration and simultaneously correlate with the size or the use of co-ethnic community resources. This conservative analysis aims to test whether our results are robust to any misspecification or omitted variable bias.

More specifically, we account for gender (*female*), family-related characteristics (*partnership status at arrival* and the time-dependent¹⁷ *number of children*), *age at last migration* (and its squared term), and the visa category for entering Germany (asylum-seeker or *refugee*, ethnic German or other type of migrant). We further control for pre-migration human capital characteristics such as *educational attainment*, *German language proficiency*, *a good math score in school* and *having working experience*. Post-migration human capital characteristics include the time-dependent *new educational degree* and the time-dependent *recognition of foreign educational degree*. To further minimize the possibility of self-selection into migration, we control for the existence of *pre-migration connections in Germany* and for the main *reason to migrate* (which is grouped into political, family, economic, and other reasons). We also account for the *unemployment rate in Germany in the year before immigration* to control for the overall economic effects (e.g., the business cycle). An indicator of the *refreshment sample* (see the section [Data sample](#)) is included to account for any differences across survey samples. As mentioned above, we further include country-group-of-origin fixed effects and assignment-district fixed effects, which should absorb any systematic differences in any characteristics across countries of origin and in economic performance across districts. In the models regarding real hourly wages in the first job, we additionally account for the *years before entry into the first job in Germany*. Table 1 provides descriptive statistics of dependent and independent variables, as well as of confounders for immigrants who were assigned to their first residence place in Germany.

Results

Exogeneity between the co-ethnic community size and the mobilization of its potential resources by immigrants

Before we turn to the test of our main hypotheses, we first corroborate the assumption that the relationship between the access to and the use of co-ethnic community resources is exogenous. We examine, therefore, the relationship between the use of social contacts to find the first job in Germany (versus relying on other methods for a job search) and the exogenously “assigned” co-ethnic community sizes. The results are presented in Table 2.

¹⁷ Time-dependent variables are used for the analyses of the transition rate to the first job in Germany and are measured for each person-year observation. For analyses of wages in the first job, time-dependent variables are captured in the year of the first job.

Table 1 Sample characteristics: Dependent and independent variables and confounders

Variables	Mean/Share	(SD)	Sample size
<i>Dependent variables</i>			
Entered first job	0.86		309
Duration until first job	3.10	(3.02)	249
Real hourly wages in first job	6.44	(2.61)	219
<i>Independent variables</i>			
Co-ethnic community size	0.01	(0.01)	309
Use of social contacts for job search	0.46		309
<i>Confounders</i>			
Female	0.38		309
Partner at arrival	0.66		309
Children at arrival	0.48		309
Age at arrival	29.40	(9.76)	309
Country group of origin ^a			
Western, Eastern, and Southeastern Europe	0.13		309
Former USSR	0.45		309
Asia and the Middle East (incl. Turkey)	0.25		309
Africa	0.17		309
Years since immigration ^a	13.06	(6.10)	309
Refugees	0.53		309
Ethnic Germans	0.25		309
Reason for immigration			
Political	0.39		309
Family	0.20		309
Economic	0.28		309
Other (including unclear)	0.13		309
Pre-migration connections to Germany	0.53		309
Educational attainment before immigration			
Low	0.60		305
Medium	0.25		305
High	0.15		305
(Very) good German language proficiency before immigration ^b	0.07		309
Good math score in school (above median)	0.20	(0.40)	273
Worked before immigration	0.68		309
New educational degree	0.03		309
Recognition of foreign educational degree	0.04		309
Unemployment rate in Germany in the year before immigration	9.38	(1.77)	309

Data source: IAB-SOEP-Migration Sample 2015, own calculations. Design weights are used

Standard deviation (SD) in parentheses. Variation in the sample size (column 4) is due to the differences in missing data across variables. In the multivariate model, we control for missing values in the variables of interest. ^a These variables are only presented for illustrative purposes and are not used in the multivariate models (at least in the form presented here).

^b For the sake of interpretation, German language proficiency is coded 1 if German language proficiency is equal to 4 or above ("good" or "very good") and is coded 0 otherwise

Model 1.1 provides a bivariate positive correlation between the two variables of interest. Note, however, that the co-ethnic community size varies across district, country (group) of origin and arrival year. This means that the bivariate positive correlation between co-ethnic community size and the use of social contacts for the first job search might be attributed to confounding factors related to district, arrival year, or origin. Consider, for instance, an immigrant who uses social contacts for a job search and lives

Table 2 Using social contacts for the first job search

	Model 1.1	Model 1.2	Model 1.3
<i>Co-ethnic community size</i>	0.07** (0.02)	0.04 (0.05)	0.01 (0.05)
N of individuals	309	309	309
<i>Model fit</i>			
Log likelihood	− 219	− 146	− 128
Degrees of freedom	1	62	86
AIC	442	418	430
BIC	449	653	755
Adjusted R^2	0.02	0.15	0.16
<i>Model specification</i>			
Origin (group) FE	No	Yes	Yes
District FE	No	Yes	Yes
Confounders	No	No	Yes

Data source: IAB-SOEP-Migration Sample 2015, own calculations

Notes: The dependent variable is the use of social contacts for the first job search. The estimated model is a linear probability regression model. The “co-ethnic community size” variable is standardized: the relevant coefficient corresponds to the effect of an increase by one standard deviation. Robust standard errors are in parentheses. FE = fixed effects. For the list of confounders included in the models, see the section [Independent variables and confounders](#). For the full models, see Additional file 1: Appendix F

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed test)

in a district characterized by a large co-ethnic community and a minimal presence of (state) job agencies and another (identical) immigrant who does not use social contacts for a job search and lives in a district with a smaller co-ethnic community and many (state) job agencies. This means that the size and availability not only of a co-ethnic community but also of state job agencies varies by district. In our example, a bivariate correlation between the use of social contacts for a job search and the co-ethnic community size would result in a positive relationship. However, given that a minimal presence of (state) job agencies is likely to push individuals to rely on social contacts for a job search, the positive bivariate correlation between the use of social contacts for a job search and the co-ethnic community size is likely to be spurious. Moreover, some origin groups tend to rely on social contacts more often than other origin groups because of cultural differences and attitudes towards the activation of social ties (see, e.g., Sharone, 2014).

Therefore, to absorb any systematic differences in any characteristics across country (or country group) of origin and across district of assignment, we include the corresponding fixed effects in Models 1.2 and 1.3. As these models show, introducing fixed effects eliminates the positive (spurious) correlation between the co-ethnic community size and the use of social contacts for a job search. That is, other factors that are attributable to origin or the district of assignment seem to drive immigrants to use social contacts for their job search. Therefore, we conclude that the use of social contacts is exogenous to the co-ethnic community size. This conclusion holds when we also control for additional socio-demographic characteristics of migrants (Model 1.3).

Co-ethnic community resources and immigrants' transition to their first jobs in Germany

As outlined in Table 3, we test whether variations in the co-ethnic community size (our exogenous treatment variable) affect immigrants' transition to their first job in Germany.

Table 3 Transition to the first job in Germany

	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 2.5	Model 2.6
<i>Co-ethnic community size</i>	0.09 (0.09)	0.38 (0.22)	0.36 (0.22)	− 0.25 (0.32)	0.49 (0.28)	− 0.17 (0.34)
<i>Use of social contacts for job search</i>			0.15 (0.24)	0.26 (0.24)	0.37 (0.29)	0.50 (0.29)
<i>x Co-ethnic community size</i>				1.06** (0.36)		1.37*** (0.39)
N of person-year observations	1001	1001	1001	1001	1001	1001
N of individuals	309	309	309	309	309	309
<i>Model fit</i>						
Log likelihood	− 557	− 461	− 461	− 456	− 402	− 395
χ^2	8	200	200	211	319	332
Degrees of freedom	5	90	91	92	114	115
AIC	1127	1105	1107	1098	1034	1023
BIC	1156	1552	1558	1555	1599	1592
<i>Model specification</i>						
Origin (group) FE	No	Yes	Yes	Yes	Yes	Yes
District FE	No	Yes	Yes	Yes	Yes	Yes
Confounders	No	No	No	No	Yes	Yes

Data source: IAB-SOEP-Migration Sample 2015, own calculations

The dependent variable is the transition to the first job in Germany in a given year t . Estimated model is a time-discrete piece-wise constant exponential model. The “co-ethnic community size” variable is standardized: the relevant coefficient corresponds to the effect of an increase by one standard deviation. Standard errors are in parentheses. FE = fixed effects. For the list of confounders included in the models, see the section [Independent variables and confounders](#). For the full models, see Additional file 1: Appendix F

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed test)

Additional file 1: Appendix D provides an overview of the model specifications and likelihood ratio tests for the improvement of model fit from model to model. Additional file 1: Appendices E and F include robustness checks with an alternative sample and model specification.

In Model 2.1, we conduct a bivariate test by including our main variable of interest: co-ethnic community size. We find that an increase in the co-ethnic community size is neither statistically nor substantially related to the transition rate to the immigrants’ first job. Adding fixed effects for the country-group of origin and the district of assignment does not alter the results (Model 2.2). Thus, having potential access to a larger pool of co-ethnic community resources per se does not accelerate immigrants’ labor market entry.

In Model 2.3, we introduce the variable “use of social contacts for job search” (versus use of other search methods), and Model 2.4 includes an interaction term between the co-ethnic community size and the use of social contacts variable. Likewise, Models 2.5 and 2.6 replicate Models 2.3 and 2.4 by introducing a full array of potential confounders (cf. section [Independent variables and confounders](#)). By interacting the co-ethnic community size with the use of social contacts, we can test our hypotheses that the size of migrants’ co-ethnic community matters in their propensity to find a job (only) when immigrants mobilize the potential co-ethnic community resources for this purpose. The test is shown in Model 2.6, which also exhibits a superior model fit and, therefore, is

Table 4 Hourly wages in the first job in Germany

	Model 3.1	Model 3.2	Model 3.3	Model 3.4	Model 3.5	Model 3.6
<i>Co-ethnic community size</i>	0.01 (0.02)	0.03 (0.06)	− 0.04 (0.06)	0.02 (0.08)	− 0.06 (0.07)	− 0.04 (0.10)
<i>Use of social contacts for job search</i>			0.15 (0.12)	0.13 (0.12)	0.27 (0.14)	0.26 (0.14)
<i>x Co-ethnic community size</i>				− 0.07 (0.08)		− 0.02 (0.10)
N of individuals	219	219	219	219	219	219
<i>Model fit</i>						
Log likelihood	− 168	− 101	− 99	− 99	− 71	− 71
Degrees of freedom	1	53	54	55	78	79
Adjusted R^2	− 0.00	0.11	0.12	0.12	0.17	0.17
<i>Model specification</i>						
Origin (group) FE	No	Yes	Yes	Yes	Yes	Yes
District FE	No	Yes	Yes	Yes	Yes	Yes
Confounders	No	No	No	No	Yes	Yes

Data source: IAB-SOEP-Migration Sample 2015, own calculations

The dependent variable is the log of real wages in the first job in Germany. The estimated model is the OLS regression model. The “co-ethnic community size” variable is standardized: the relevant coefficient corresponds to the effect of an increase by one standard deviation. Robust standard errors are in parentheses. FE = fixed effects. For the list of confounders included in the models, see the section [Independent variables and confounders](#). For the full models, see Additional file 1: Appendix F

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed test)

our preferred model. Accordingly, when controlling for all model covariates, among the immigrants who use social contacts for job searches, an increase in the co-ethnic community size by one standard deviation results in a 6.5-times faster transition rate to the first job ($= \exp(0.50 + 1.37)$). In contrast, the co-ethnic community size does not seem to affect the first job entry rate among the immigrants who do not utilize social contacts but use other search methods to find a job. Altogether, these results support our hypotheses *H1a* and *H1b*.

Co-ethnic community resources and the hourly wages in immigrants’ first jobs in Germany

To test whether variations in the co-ethnic community size affect immigrants’ job quality, we model hourly wages following the same steps as the analysis for the transition to the first job. The results are presented in Table 4. An overview of the model specifications and likelihood ratio tests for the improvement of model fit from model to model can be found in Additional file 1: Appendix D. Likewise, Additional file 1: Appendices E and F provide robustness checks with an alternative sample and model specification.

Similar to the result of immigrants’ transition to their first job, the co-ethnic community size has no statistically significant effect on immigrants’ hourly wages (Model 3.1). Accounting for further covariates in Models 3.2, 3.3 and 3.5 increases the goodness of fit of the model but does not change the insignificant effect of the co-ethnic community size. Contrary to the result on migrants’ transition to their first job, the interaction term between the co-ethnic community size and the use of social contacts for a job search

has no significant effect on immigrants' hourly wages. Moreover, the inclusion of this interaction term does not increase the goodness of fit of the model (Models 3.4 and 3.6), which renders Model 3.5 our preferred specification. Overall, these results suggest that neither resources' potential availability embedded in immigrants' co-ethnic community nor the mobilization of these resources for a job search increase the quality of migrants' first jobs, thereby not supporting hypotheses *H1a* and *H1b*.¹⁸

Discussion

We set out to empirically examine the causal effect of co-ethnic social capital on the labor market integration of refugees and other immigrants. In line with the broader theory of labor market social capital, we look at the combination of immigrants' potential pool of social resources embedded in their co-ethnic community networks and immigrants' use of such resources for a job search. For our empirical inquiry, we rely on a unique natural-experimental dataset of refugees and other immigrants who were exogenously allocated to their first residence place by the German authorities. This data sampling accounts for the exogenous exposure of immigrant groups to the different local labor markets that they encountered in their first place of residence. One such exogenous exposure concerns the size and potential pool of co-ethnic community resources that immigrants can tap into to benefit in these labor markets, which ensures that the effect of such resources' potential availability on immigrants' job outcomes is exogenously determined. Although an assumption can be made that because of this exogenous exposure, the use of these resources for instrumental purposes—such as faster job entry or higher wages—is not endogenous to their availability (Mouw, 2003), we can empirically confirm that indeed, immigrants' use of social contacts is independent of the co-ethnic community size. As a result, this study manages to come closer to a causal test of co-ethnic social capital on immigrants' labor market integration.

To identify whether the effect of co-ethnic social capital holds for different labor market outcomes, we study both the transition rate to and the (real) hourly wages in immigrants' first jobs. Our main finding is that being part of a larger co-ethnic community per se does not accelerate immigrants' labor market entry except for the immigrants who use the resources embedded in their social contacts when looking for a job. For this group of immigrants, the social ties that may emerge within a co-ethnic community prove to be beneficial for their speedy employment. In contrast, neither potential access to a larger pool of co-ethnic community resources nor the use of these resources has any effect on the job quality of immigrants' first job (as measured by the first wages).

Our results allow us to conclude that co-ethnic social capital has a causal effect on immigrants' speedy employment in the destination country but only when the resources embedded in the co-ethnic community are mobilized. The fact that we find an effect on the transition rate to the first job but not on the wages in the first job suggests that the co-ethnic community resources that immigrants seem to benefit from are more related

¹⁸ Additional analyses that take account of immigrants' required education in the first job, show a non-significant positive impact of the co-ethnic community size on the probability of having a high-skilled first job (defined as either "required vocational or higher education versus otherwise" or as "required higher education versus otherwise"). Also, the effect of the interaction term between the co-ethnic community size and the use of social contacts is positive but not significant. These results indicate that our main finding on the quality of immigrants' first jobs does not depend on the job skill level.

to the general benefit of being part of a co-ethnic community and hearing about job availability in ethnic or native businesses.

Overall, the main takeaway of our study is that although a growing body of migration studies in economics and sociology stresses the importance of social networks for migrants' labor market integration, we find little evidence of a causal effect of social networks themselves. This finding reinforces the main conclusion of the few studies that, like ours, rely on an experimental design. The opportunity to access a unique natural-experimental dataset allowed us to contribute to some methodological advancement in the migration studies, which we see as complementary to existing methods in the field. In fact, an important implication for future research is to combine different methods to increase both internal and external validity of findings in migration studies. Technological developments offer ample opportunities to incorporate information on social media or big data to complement case studies, ethnography, and (natural)experimental designs (see Hofstra et al., 2017). For instance, future research can try to link administrative data on allocated refugees with their social media data.

Any method by itself has its strengths and weaknesses and ours suffers from the limitation of not having a direct measure of immigrants' co-ethnic networks. Due to a lack of available data, our measure of co-ethnic social capital is based on the assumption that being embedded in a co-ethnic community increases the likelihood of co-ethnic networks being established. Although this assumption is based on theoretical arguments and empirical evidence from both sociology and economics literature (e.g., Battisti et al., 2022; Kristiansen et al., 2021; Stips & Kis-Katos, 2020; Vervoort et al., 2011), it remains an assumption. Therefore, to test whether our findings are sensitive to our proxy variable, a replication of our study with a more direct measure of immigrants' actual co-ethnic network size and its resources would certainly be useful (see, e.g., Garip, 2008; Lai et al., 1998). Furthermore, our results indicate that we must broaden our focus of interest: the effect of co-ethnic social capital varies by outcome. Although our study emphasizes the importance of co-ethnic social capital for migrants' first job entry, more research is needed to understand why this social capital becomes less important when it concerns the quality of immigrants' first jobs (see, e.g., Demireva & Zwysen, 2021; Kalter & Kogan, 2014). This additional research could help to unravel the mechanisms that underlie such differential effects of co-ethnic social capital. Finally, although our study makes a contribution in the European context, we cannot claim that the results are generalizable to other Western countries with diverse migration policies. We encourage more studies that, like ours, take into account potential selection and endogeneity bias while considering the institutional differences across other European and non-European countries (see, e.g., Demireva & Zwysen, 2021).

Abbreviations

a.k.a.: Also known as; BAMF: Federal Office of Migration and Refugee; CPI: Consumer price index; DOI: Digital object identifier; exp: Exponential function; FE: Fixed effects; H: Hypothesis; IAB: Institute for Employment Research; IEB: Integrated employment biographies; OLS: Ordinary least squares; SD: Standard deviation; SOEP: Socioeconomic panel; USRR: Union of Soviet Socialist Republics.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40878-022-00289-x>.

Additional file 1. Appendix A. Methodological tools to address endogeneity of (co-ethnic) social networks. **Appendix B.** Allocation of refugees, ethnic Germans and Jewish immigrants in Germany. **Appendix C.** Information about the coding of variables. **Appendix D.** Comparison of model specifications. **Appendix E.** Models of robustness checks. **Appendix F.** Omitted confounders.

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Authors' contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication. The authors are listed in alphabetical order. All authors read and approved the final manuscript.

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Availability of data and materials

The data analysed in this study is subject to the following licenses/ restrictions: This article uses the factually anonymous data of the German IAB- SOEP Migration Sample, waves 1–3. The German IAB- SOEP Migration Sample is a representative longitudinal survey conducted jointly by the Institute for Employment Research (IAB) in Nuremberg and the German Socio- Economic Panel (SOEP) at the DIW Berlin. Data access was provided via a Scientific Use File supplied by the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB). <https://doi.org/10.5684/soep.iab-soep-mig.2015>. All documentation concerning the IAB- SOEP Migration Sample and including questionnaires and data manuals are made available by the FDZ (https://fdz.iab.de/en/FDZ_Individual_Data/iab-soep-mig.aspx) and DIW (https://www.diw.de/en/diw_01.c.552818.en/soep_iab_soep_mig_2015.html). Due to the German Data Protection legislation, we cannot make the original data from the IAB- SOEP Migration Sample or the dataset we generated available. Researchers can however apply for data access via the FDZ or DIW. Requests to access these datasets should be directed to https://fdz.iab.de/en/FDZ_Individual_Data/iab-bamf-soep.aspx. The computer code for the analysis is available from the corresponding author upon the request.

Declarations

Competing interests

The authors declare that they have no competing interests.

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