Spatial Patterns of Recent Ukrainian Refugees in Germany: Administrative Dispersal and Existing Ethnic Networks

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Abstract: Since the beginning of the Russian invasion of Ukraine on February 24, 2022, many people have fled the war and left their home country. By the end of January 2023, more than one million Ukrainian refugees had been registered in Germany alone. In contrast to refugees from other countries of origin in Germany, Ukrainian citizens can choose their place of residence if they have either found private accommodation with family members or friends or do not claim state support. However, little information exists on where within Germany Ukrainian refugees have moved and why certain regions are potentially more attractive than others. There exists a substantial literature on the location choices of migrants in general, showing that the existing level of immigrant concentration is an important determinant, while economic factors have a smaller effect – if not in the initial location choice after immigration, then at least in later location decisions. Whereas these studies mainly focus on labour migrants, research on refugees' location choices is still scarce, because refugees are usually assigned to specific places of residence by the authorities in many European countries. In the context of forced migration, spatial patterns may therefore largely be related to administrative decisions. In this paper, we aim to answer the question of the settlement patterns of recently arrived refugees from Ukraine in Germany by using current data from the Central Register of Foreigners. These patterns are modelled on the NUTS-3 level and consider the proportion of previous Ukrainian migrants living within those regions as well as additional economic, demographic, and geographical factors. Spatial regression models show that, on the one hand, Ukrainian refugees indeed settle where the number of Ukrainians is already high. The empirical analyses also indicate a correlation between the spatial patterns of refugees in general and Ukrainian refugees, suggesting that dispersal policies may play a role in explaining settlement patterns. Furthermore, affordable housing and lower rents are important explanatory variables.

1   Introduction

The Russian invasion of Ukraine forced nearly one third of the Ukrainian population to leave their home within the war's first eleven months, between February 24, 2022 and January 31, 2023. Whereas almost 6 million people have been displaced internally, more than 7.9 million people have fled Ukraine, particularly towards other countries in Europe, making this one of the largest human displacement crises in the world today (*UNHCR* 2023). The vast majority has fled to neighbouring countries such as Poland, Romania, Hungary or Moldova. However, Germany also hosted over one million refugees in January 2023, ranking second after Poland in terms of the total numbers of Ukrainian refugees (*Brücker et al.* 2023; *UNHCR* 2023).

Migration scholars responded quickly to the crisis compared to refugee movements in the past. In many of the major receiving countries of Ukrainian refugees, new surveys have been launched to provide information on these refugees' living situations and their plans, including the recent longitudinal study "Refugees from Ukraine in Germany (IAB-BiB/FReDA-BAMF-SOEP-Survey)". However, these surveys provide little evidence about where these refugees move within Germany and why certain regions are more attractive to them than others. There is substantial literature on migrants' location choices and whether pre-existing ethnic networks, local economic conditions, socio-political context, or differences in the amenities offered by the regions are important determinants of residential choices (see e.g., *Bartel* 1989; *Tanis* 2020; *Zorlu/Mulder* 2008). However, most of these studies mainly focus on labour migrants and research on refugees' location choices remains scarce. In the initial period of their stay, refugees in many European countries are assigned to specific places of residence and accommodation by public migration administrations, and therefore cannot choose their place of residence. Due to the sudden and steep increase in the number of Ukrainian refugees, the activation of the European "Temporary Protection Directive," and consequently the implementation of this Directive by §24 of the Residence Act, Ukrainian refugees are not subject to the same regulations as other groups of refugees are. They can decide where to settle in their EU destination countries. In Germany, in the first weeks after the beginning of the war (until March 16), Ukrainian refugees could choose their place of residence without restrictions. Since then, refugees claiming state support have been distributed regionally between the federal states in accordance with the existing legal framework. The vast majority of those who find private accommodation are still exempt from official distribution policies (*BAMF* 2022b). As the spatial concentration of refugees is often one of the most intensely discussed political and public topics due to the financial and social consequences for the affected municipalities, local housing markets, and infrastructures, this paper takes a closer look at the settlement patterns of refugees who are largely unaffected by these administrative dispersal policies. Specifically, we aim to answer the following research questions: What are the spatial patterns of Ukrainian refugees within Germany, and why? What role do pre-existing ethnic networks of Ukrainians but also administrative dispersal policies play?

The paper provides initial empirical evidence on the settlement patterns of Ukrainian refugees arriving in Germany within the first months of the war. It uses recent data from the Central Register of Foreigners in Germany on the regional distribution of more than 700,000 Ukrainian citizens who were registered between February 24 and July 31, 2022. The aggregated data are available on the NUTS-3 level, allowing an analysis of the 400 administrative districts (Landkreise und kreisfreie Städte) in Germany. These data were merged with contextual information on economic, demographic, political and geographical characteristics of these administrative districts. Based on these aggregated data, initial insights into the main determinants of the spatial patterns of Ukrainian refugees can be gained. Moreover, these findings also provide necessary knowledge for political decision-makers. Numerous studies show that the initial conditions at the place of settlement influence migrants' economic, social and political integration (*Aksoy/Poutvaara* 2019; *Braun/Dwenger* 2020; *Tanis* 2020). Moreover, local governments are grappling with the fiscal and organisational costs of the large influx of refugees within a very short period of time and the social costs of integrating them. Thus, the determinants of the regional distribution of new immigrants, resp. refugees, have a high policy relevance, entailing important implications for the design of appropriate immigration and integration policies.

2   Previous migration from Ukraine to Germany and the situation of current refugees

Until the early 1990s, there was little international migration between Ukraine and countries outside the former USSR. Due to the social and economic changes in Ukrainian society after 1991, such as the rise in unemployment, long delays in payments of salaries and wage inflation, Ukrainian nationals began to migrate west. The main destinations were Central and Eastern Europe (mainly Poland and the Czech Republic), Southern Europe (Italy, Spain, and Portugal), but also countries in Western Europe with a long-shared history of migration, such as Germany (*Fedyuk/Kindler* 2016).

Migration from Ukraine to Germany increased from approx. 9,000 yearly immigrants in 1992 to about 24,000 Ukrainians in 2004. At the same time, annual out-migration accounted for 4,000 to 6,000 Ukrainians. After a decline in 2005, the annual in-migration remained relatively constant at around 7,000 cases from 2006 to 2013 (see Fig. 1). Until the Euromaidan protests in 2014, the social and economic situation was the main driver of Ukrainians' migration. After that, new push factors emerged, including political instability and the policy of mobilisation announced during the early stages of the armed conflict in eastern Ukraine and the violent Russian-backed breakaway of the Luhansk and Donetsk regions (*Gulina/Pozniak* 2018), resulting in a slight increase in in-migration from Ukraine to Germany (2014: approx. 13,500). For 2021, the German Federal Statistical Office counts more than 12,600 cases of in-migration and about 6,300 cases of out-migration, resulting in an annual net migration of about 6,300 (*Destatis* 2022a).

Fig. 1: In- and out-migration between Ukraine and Germany, 1992-2021
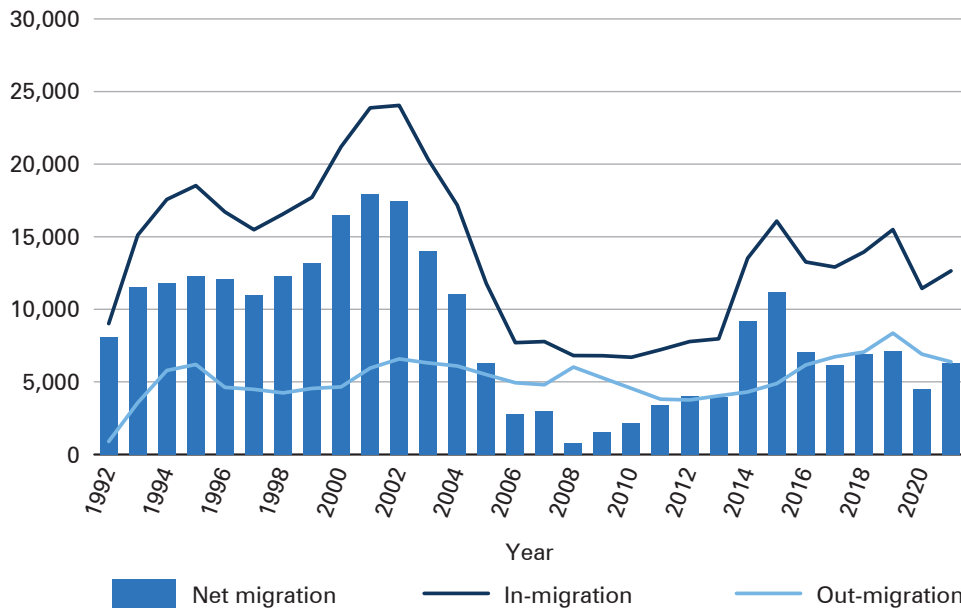
Source: *Destatis* 2022a

The positive net-migration over the last three decades resulted in an increasing number of Ukrainian citizens living in Germany. While there were fewer than 4,000 Ukrainian citizens living in Germany in 1992, this number had increased to 155,000 by the end of 2021 (*Destatis* 2022b). If the number of people living in Germany with Ukrainian roots (who were born in Ukraine but have been naturalised, including ethnic Germans as well as second-generation migrants) is included, this figure roughly doubles. Information from the German microcensus shows that at the end of 2021, about 308,000 people had a so-called Ukrainian migration background (*Destatis* 2022c).

Since the beginning of war on February 24, 2022, these numbers increased substantially – at the end of January 2023, more than one million refugees from Ukraine were registered in Germany (*Brücker et al.* 2023), many of whom were women.[1] The current legal situation for Ukrainians in Germany is as follows: Ukrainian citizens can enter and move freely in the Schengen area – which includes Germany – without a visa and can stay for up to three months (Annex II of EU Regulation 2018/1806). At the European level, the so-called "Temporary Protection

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[1] With few exceptions, men between the ages of 18-60 are prohibited from leaving Ukraine due to general mobilisation. Those suffering from health problems are allowed to leave, as are men who are financially responsible for three or more minor children. Single fathers of minor children and fathers of children with a disability are also exempt.

Directive" (Council Directive 2001/55/EC of 20 July 2001) was adopted on 4 March 2022 (*Council of the European Union* 2022). Due to the implementation of this Directive by §24 of the Residence Act, specific conditions now apply to Ukrainian refugees, some of which differ significantly from refugees from other countries of origin (*BAMF* 2022b). Instead, they are automatically granted temporary protection, a status that is currently valid for up to two years. Within this timeframe, an alternative residence title can be applied for. Since March 16, 2022,[2] Ukrainian refugees who have not been able to find accommodation and apply for state support can be distributed among the federal states after their arrival – similarly to asylum seekers and refugees in general – according to the "Königsteiner Schlüssel" as the existing administrative allocation key in Germany (*BAMF* 2022a). Below the level of federal states, additional regulations exist concerning the distribution between the different administrative districts which are regularly used when refugees are confronted with requirements to reside in specific areas (for a description of Germany's distribution policy of asylum seekers, see *Tanis* 2022). Official figures on the proportion of redistributed Ukrainian refugees are not available. This data also cannot be deduced from the number of Ukrainian recipients of state benefits, because the decision of redistribution is often a discretionary one and is mainly based on the urgent need of adequate housing. However, current data collected by the IAB-BiB/FReDA-BAMF-SOEP Survey indicate that only about 16 percent of Ukrainian refugees were assigned and the vast majority have chosen their place of residence themselves (*Brücker et al.* 2023).

3   Theoretical framework and hypotheses

Since the seminal work on the local concentration of migrants of similar ethnicity in the United States by *Bartel* (1989), a vast literature on migrants' location choices has emerged. Generally, these studies have analysed whether ethnic concentration, local economic conditions and amenities are associated to migrants' residential choices. Most of these studies find that local labour market conditions, welfare benefits as well as other local amenities seem to have only a small effect on where migrants choose to settle. Instead, studies highlight the importance of path dependency regarding migration in-flows: newly arrived migrants are likely to go where other migrants of the same ethnicity or from the same country of origin have settled. From a theoretical perspective, the underlying mechanism is that rational individuals are assumed to choose a location from a set of possible locations that maximises their expected utility minus moving cost (*Epstein* 2008). In this sense, externalities arising from ethnic networks may reduce migration costs or increase the expected utility. Beneficial externalities within these networks include information and direct assistance with accommodation, employment, bureaucracy, as well as a general

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[2] Due to legislative changes in June 2022 (§12a of the Residence Act is applied to Ukrainian refugees), possibilities of governmental allocation were further extended.

reduction of the stress of adapting to a foreign culture, particularly regarding language (*Boyd* 1989; *Hugo* 1981; *Massey et al.* 1987/1993).

Studies focusing on refugees' location choices are rare, as in the initial period of their stay, refugees in many European countries are assigned to specific places of residence and accommodation by authorities and cannot choose their residence freely. Previous research analysing where refugees decide to live either examines subsequent migration choices or compares different groups of migrants (*Åslund* 2005; *Damm* 2009; *Weber* 2022; *Zorlu/Mulder* 2008).

For the Netherlands, *Zorlu* and *Mulder* (2008) find distinct patterns for different groups of migrants varying in duration of stay as well as initial and subsequent location choices. Western immigrant groups tend to first choose neighbourhoods where people from the same country of origin are concentrated. Over time, they leave these areas for less concentrated ones and move to labour markets with more employment possibilities. In contrast, newly arrived refugees or asylum seekers are initially much more geographically dispersed across the Netherlands due to the specific government settlement policies, but tend to move to more ethnically segregated neighbourhoods over time. This result is supported by findings of *Åslund* (2005) and *Damm* (2009) for placed refugees in Sweden and Denmark, letting us assume that refugees – if they can choose their residence – decide to reside in areas where other persons from the same country of origin live. We therefore hypothesise:

H1: The more people from Ukraine already live in a region, the more attractive this region is for newly arriving Ukrainian refugees.

Previous literature on residential choices often contrasts pre-existing ethnic networks on the one hand with the conditions on the local labour market. A recent study for Germany (*Tanis* 2020) shows that after the financial crisis and recession in 2008/09, Germany's immigrant population changed towards immigrants coming from southern EU countries and from the new member states in Eastern Europe. In particular, immigrants from southern EU countries have a relatively high level of education and are likely to prefer a quick entry into the labour market. Thus, local labour market conditions are important for settlement patterns (*Tanis* 2020). A high proportion of Ukrainian refugees holds a university degree (72 percent), was previously employed in Ukraine and wants to work in Germany (almost 80 percent of the currently not working Ukrainian refugee population in working age) (*Brücker et al.* 2023). In order to financially support family members left behind in Ukraine, it is important to earn money quickly. Thus, the availability of employment opportunities is also important for location choices. Furthermore, regions with a lower unemployment rate, more available employment opportunities and higher wages are economically more prosperous. We therefore assume that:

H2: The lower the local unemployment rate and the higher the expected wage in a region, the more attractive a region is for newly arriving Ukrainian refugees.

Analyses of the refugee sample of the SOEP show that although previous migrants from Ukraine were highly educated and learned the German language

quickly, they integrated into the German labour market more slowly than other migrant groups did (*Brücker* 2022). Based on qualitative interviews, *Schork et al.* (2022) conclude that the majority of former migrants from Ukraine work as skilled workers ("Facharbeiter"), whereas only a small proportion works in precarious jobs, mainly as seasonal workers or as care workers in private households. As a large proportion holds a university degree, it can thus be assumed that:

H3: Ukrainian refugees are more likely to settle in regions with a high proportion of high-qualification jobs than to settle in regions with higher proportions of lower-qualification jobs.

Another important contextual factor for settlement patterns is suitable and affordable housing (*Adam et al.* 2008; *Mulder* 2006). Previous work on the impact of housing costs on migration in Western countries found that for migrants with higher average incomes, high housing prices are positively associated with immigration, as higher housing prices are an indication for high-income jobs (*Graves* 1983). In contrast, other studies showed that migrants tend to move to regions with low housing prices or – in the German context – low rents (e.g., for Germany: *Busch* 2016; *Stawarz et al.* 2021; *Sturm/Meyer* 2008). This holds particularly true for migrants with limited financial resources, such as refugees. We assume that:

H4: The lower the rents, the more attractive a region is for newly arriving Ukrainian refugees.

Studies covering local amenities argue that certain populations (mainly urban populations due to long migration histories) are more accustomed to the interaction with foreigners (*Damm* 2009). For different European countries (including Germany), it can be shown that concerns about immigration are positively correlated with political support for right-wing populist parties (*Edo et al.* 2019; *Sola* 2018). In contrast, regions with a higher support for left parties can be assumed to be more open-minded towards refugees and provide more support (*Tanis* 2020). Thus, we hypothesise that:

H5: Ukrainian refugees are more likely to choose regions with a higher support for left parties.

However, Ukrainian refugees who are dependent on state support are restricted in their location choice. Like other refugees, they are distributed to the federal states according to the so-called Königsteiner Schlüssel, where they are usually first accommodated in initial reception facilities and then distributed to the municipalities (*BAMF* 2022a). As it takes time to set up new accommodations and time resources were limited in the spring of 2022, it can be assumed that, especially in this initial period, existing accommodation facilities were used that had previously been created and expanded in 2015 and 2016 in the course of the influx of refugees, largely from the Middle East. Therefore, the spatial pattern of those Ukrainian refugees who have been subject to administrative dispersal should correspond to the spatial patterns of former refugees across Germany's administrative districts. We therefore propose that:

H6: The higher the proportion of refugees in a region who arrived in previous years, the higher the proportion of recent Ukrainian refugees in this region.

4   Data and methods

Analyses of the regional distribution of international migrants are regularly hampered by the long time horizons at which administrative data are provided for further scientific studies. Within the preparation of the study "Refugees from Ukraine in Germany (IAB-BiB/FReDA-BAMF-SOEP-Survey)," current data on this new refugee population was made available by the Central Register of Foreigners (AZR). In principle, a central register such as the AZR provides high quality data about the foreign population in Germany. Because of its administrative character, however, this register is confronted with a certain time lag between the arrival of a refugee in Germany and their actual registration. Particularly given the accelerating numbers of refugees in the first weeks of the war and the ambiguous administrative regulations concerning Ukrainian citizens, a potential time lag must be taken into account. However, a comparison between two German administrative registers – the Central Register of Foreigners and the local population registers – for 100 randomly selected municipalities shows highly consistent statistical information about the numbers of newly registered Ukrainian citizens in late May 2022 (correlation coefficient 0.96) and there are no indications of any selective registration process of Ukrainian refugees concerning the spatial pattern.

4.1   Dependent variable

For the following analyses, information from the Central Register of Foreigners is used for the reference date 31 July 2022, when a total of 722,000 Ukrainian citizens had been registered in Germany since the beginning of the war. The register does not include information about the postal address of the population, but it does cover information about the corresponding local foreigners' registration office. This offers data on at least 390[3] of all 400 German administrative districts, covering 673,000 (93.2 percent) of all newly arriving Ukrainians.

Following similar analyses on the location choice of foreigners in Germany, the main dependent variable is the number of Ukrainian refugees registered between February 24, 2022 and July 31, 2022 in one of the 390 administrative districts (NUTS-3). To account for the population size of the administrative districts, we divided

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[3]   In the federal state Saarland, one local foreigners' registration office is responsible for six administrative districts. Similarly, in Kassel and Cottbus, one office is responsible for the registration of foreigners living in a neighbouring district. For these ten administrative districts, no district-specific data about the registration of Ukrainian refugees are available and they are therefore excluded from the analyses. The districts are: Kassel (city), Kassel (county), Saarbrücken, Merzig-Wadern, Neunkirchen, Saarlouis, Saarpfalz, St. Wendel, Cottbus, Spree-Neiße.

the number of Ukrainians by the overall number of inhabitants in the respective districts. Whereas in the first few weeks of the war, the arriving Ukrainian refugees were highly concentrated in major cities, by July 2022 a more balanced spatial distribution emerged. On average, 0.97 percent of the resident population in Germany were Ukrainian refugees ranging from 0.29 to 2.92 percent between the 390 administrative districts (see Table 1 for a descriptive overview of all dependent and independent variables).

4.2 Independent variables

Following the hypothesis discussed above, four sets of explanatory variables are tested in our empirical analyses – ethnic networks, political determinants, economic context, and demographic structures. The necessary data for these variables are provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (*BBSR* 2022) as well as the Federal Statistical Office, which both offer region-specific indicators along the four sets of variables (*Destatis* 2022b).

The key independent variable to test the correlation of existing ethnic networks with the location choice of recent Ukrainian refugees is the spatial pattern of Ukrainians living in Germany before the start of the war in February 2022. Data from the Central Register of Foreigners on the stocks of Ukrainian citizens in December 2021 is used. In line with the dependent variable, the variable measures the share of Ukrainians among the overall resident population in each district. Testing the robustness of this hypothesis, the models test for alternative operationalisations of ethnic networks, including the general share of all foreign citizens – irrespective of their citizenship – in administrative districts, the share of EU-28 nationals and the share of non-EU-28 nationals.

The second set of variables examines the relevance of regional economic aspects observed in December 2019:[4] The regional unemployment rate is an indicator of the performance as well as the tightness of the local labour market and its employment opportunities for recent immigrants. The importance of jobs in the higher educational segment of the labour market is tested by an indicator measuring the share of jobs with highly complex occupations requiring at least four years of university education or corresponding professional experience (*BBSR* 2022). As the German housing market is characterised by a high share of rentals, we follow the approach of other studies (e.g., *Stawarz et al.* 2021) using rental prices as a proxy for housing costs. In particular, we use data on the average asking rents per square metre at the county level observed in 2021, which are collected from real estate listings published online and in print media (*BBSR* 2016). The relevance of more welcoming political opportunity structures is measured by the share of votes for left and centre-left parties (SPD, The Greens, Die Linke) in the most recent national election in 2021. Finally, the state dispersal policies are operationalised by taking

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[4] As we assume that the location choice and the resulting spatial patterns are based on information of previous years, our regional variables are lagged.

the share of refugees into account. As the residence requirement and restricted mobility for refugees usually ceases three years after their asylum application has been approved, we use the share of refugees at the end of 2018 to capture information on refugees who arrived and were distributed as part of the large influx of refugees in 2015.

More dense regions and large cities seem to be more attractive for new immigrants, because they are well-known, better equipped with jobs, housing and educational institutions as well as the access to certain urban amenities (e.g. public transport) and because urban populations are thought to be more accustomed to interactions with foreigners (*Damm* 2009; *Jayet et al.* 2010; *Massey* 1995; *Waldinger* 1996). We thus included a measurement of urban (large and medium sized cities) versus rural (less urbanised and rural counties) as further control by applying a summarised typology of German counties (siedlungsstrukturelle Kreistypen; see *BBSR* 2022). Moreover, Ukrainian refugees might prefer regions closer to their home country in order to have the possibility to remigrate immediately after the end of the war. Therefore, we also added the distance to Kyiv (in 1,000 km) as additional control variable. Table 1 summarises all dependent and independent variables.

4.3 Empirical strategy

Building on a descriptive analysis of the development of the regional distribution of Ukrainian refugees, the correlations between this spatial pattern and the different theoretical determinants are analysed. As basic assumptions of standard regression models are often violated when analysing spatial data, spatial regression models are generally used to detect this spatial dependence. In line with the usual procedure for testing spatial correlation, we first applied the Moran test (Moran's I), which is significant and therefore suggests using spatial models instead of regular OLS regressions for our data.[5] There are two common variants of spatial regression: the spatial error model (SEM) and the spatial lag model (SLM). While the SLM captures the cross-section dependence of the dependent variable, the SEM incorporates the spatial dependence in the error term (*LeSage/Pace* 2009). Therefore, we decided to apply a spatial error regression (SER) model which has been regularly applied in similar analyses in the German context (e.g., *Lehmann/Nagl* 2019). SER model specifications use a spatial weighting matrix based on inverse distances between the regional entities following the most regularly used approach (again, alternative model specifications based on contiguity matrices have been estimated as well). All independent variables have been tested for multicollinearity, never exceeding a variance inflation factor of more than 2. To ease the interpretation of coefficients, all independent variables are included in the models untransformed, but additional tests with logarithmic indicators support the findings presented in the following.

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[5] The dependent variables include fractional responses all within the 0;1 interval. The fitted values of all SER models do not exceed or fall below this interval. Additionally, generalised linear models with logit link functions were applied, providing largely identical results.

Tab. 1: Descriptive statistics of all dependent and independent variables for all 390 administrative districts

	Min	Max	Mean	Median	SD
Dependent variables					
Newly registered UKR nationals 3/2022 [in % of the resident population]	0.00	1.96	0.43	0.42	0.23
Newly registered UKR nationals 5/2022 [in % of the resident population]	0.01	4.48	0.78	0.76	0.33
Newly registered UKR nationals 7/2022 [in % of the resident population]	0.29	2.92	0.97	0.92	0.28
Independent variables					
Stocks of UKR nationals 12/2021 [in % of the resident population]	0.03	1.28	0.16	0.12	0.14
Stocks of refugees [in % of the resident population]	0.21	11.29	1.97	1.85	0.99
Unemployment [in %]	1.35	12.83	4.66	4.32	2.10
Highly complex occupations [in %]	5.14	29.34	10.73	9.70	3.89
Rental prizes 2021 [in Euro per m^2]	4.81	18.92	8.15	7.73	2.08
Left party vote share [in %]	22.31	65.70	42.99	43.46	8.91
Further control variables					
Large and medium sized cities [in %]	0.00	1.00	0.49	0.00	0.50
Stocks of foreign nationals [in % of the resident population]	2.11	36.56	10.84	9.98	5.43
Stocks of EU-28 nationals [in % of the resident population]	0.65	25.72	5.36	4.84	3.15
Stocks of Non-EU-28 nationals [in % of the resident population]	0.99	17.44	6.42	5.80	3.47
Distance to Kyiv [in 1,000 km]	1.20	1.64	1.46	1.49	0.12

Source: *BAMF* 2022c, *Destatis* 2022b, *BBSR* 2022

5 Results

The descriptive findings presented in Figure 2 show the spatial patterns of all resident Ukrainian citizens in Germany on 31 December 2021, before the start of the war, alongside the newly arriving Ukrainian citizens who were registered in Germany between February 24 and July 31 2022, after the start of the war. Before the February 2022 invasion, the 155,000 Ukrainian citizens living in Germany showed a very distinct spatial pattern standing in sharp contrast to most other foreign national groups (see Panel 1 in Fig. 2). Whereas foreign nationals are generally concentrated in West Germany, the Ukrainian settlement also has a significant concentration in the eastern parts of Germany – particularly in the states of Brandenburg and Mecklenburg-Western Pomerania as well as along the Polish border. More in line with the general findings of immigrant location choices in Germany, many Ukrainian citizens also live in urban agglomerations such as Berlin, Hamburg, Cologne, Frankfurt/Main, Bremen, Munich, and their surroundings regions (see also *Kosyakova* 2022).

Fig. 2: Spatial pattern by NUTS-3 in Germany of all resident Ukrainian citizens on 31 December 2021 (Panel 1) and all Ukrainian citizens registered in Germany between 24 February and 31 July 2022, after the start of the war (Panel 2), share of Ukrainian citizens among the overall resident population

(1)　　　　　　　　　　　　　　　(2)
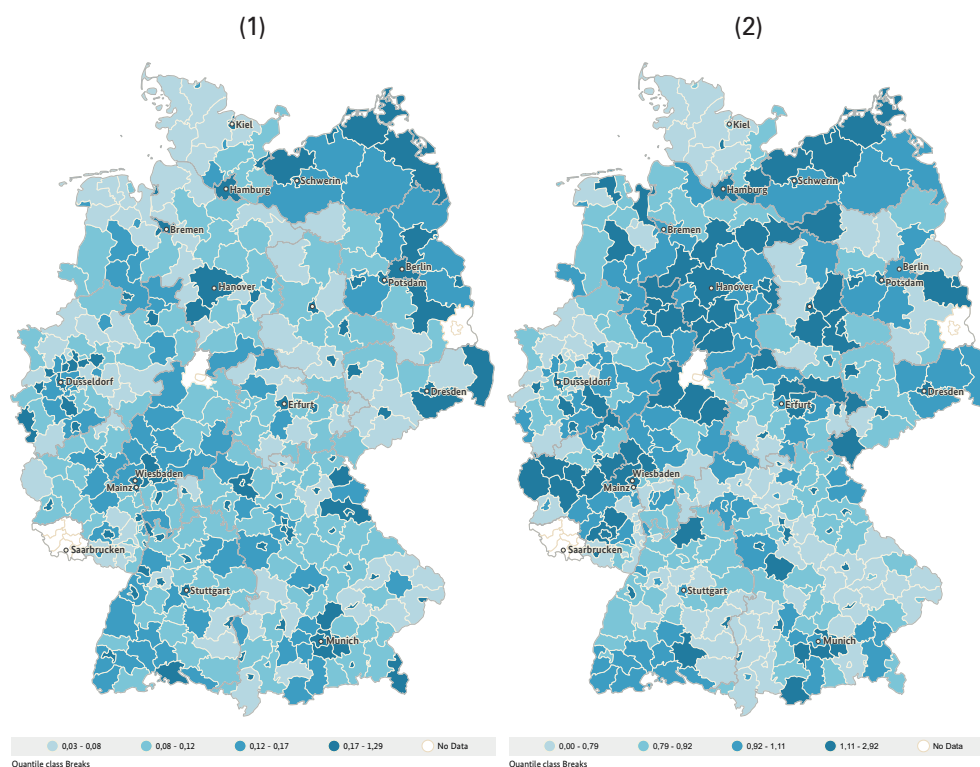
Note: Ten districts without data not shown; quantile classification method
Source: *Destatis* 2022b; *BAMF* 2022c

Comparing the pre-invasion settlement pattern with that of the 673,000 post-invasion refugees from Ukraine in the analytical sample of 390 administrative districts, certain continuities are obvious (see Panel 2 in Fig. 2). This concerns the strong presence of Ukrainians in East Germany in particular, including Mecklenburg-Western Pomerania and additional districts close to the Polish border, as well as the continuing interest of many Ukrainians to settle in urban agglomerations such as Berlin, Bremen, Hamburg, Frankfurt/Main, Cologne, or Munich. However, there are also some new spatial patterns, with a relatively high proportion of Ukrainian refugees settling in Hanover and its surroundings (where one of the central distribution centres was located), as well as more rural areas in Rhineland-Palatinate, Hesse, North Rhine-Westphalia and Lower Saxony.

The similarities in the spatial patterns discussed so far provide an initial indication of the importance of existing ethnic networks for the settlement patterns

of newly arriving Ukrainian refugees, as expected in Hypothesis 1. This descriptive finding is also supported by multivariate spatial regression models. The first model shows that the proportion of recently registered Ukrainian refugees in July 2022 is positively correlated to the proportion of Ukrainians living in German regions at the end of 2021 (see M1 in Table 2). This finding is significant in bivariate analyses and remains a strong predictor even when controlling for other determinants regularly used to account for migrants' settlement patterns. Alternative models based on neighbourhood weight matrices (Model 2) as well as ordinary least square regression (Model 3) support the robustness of this finding.

Hypothesis 2 proposed that local labour market conditions are also important for spatial patterns of recent Ukrainian refugees. It was expected that the higher the regional unemployment rate, the lower the proportion of recent Ukrainian refugees living in the administrative district. However, the regional unemployment rate in general does not show any statistically significant correlations. This might be explained by the particular structure of the Ukrainian refugee flows, which are mainly women and children, for whom labour market conditions are less important for settlement behaviour.

Whereas earlier immigration from Eastern Europe into the German labour market was oriented towards lower qualified occupations in recent decades, Ukrainian refugees are often highly qualified by comparison. The IAB-BiB/FReDA-BAMF-SOEP-Survey shows that more than two thirds of Ukrainian refugees employed in Germany are working as skilled workers, specialists or experts (*Brücker et al.* 2023), which might be an explanation for why Ukrainian refugees are oriented towards regions with a higher share of highly complex occupations, supporting Hypothesis 3.

Previous studies have shown that housing costs play an important role in the decision of where to move. We also find that the lower the housing costs – here measured as residential asking rental prices – the more attractive a region is for recently arriving Ukrainian refugees (Hypothesis 4), which illustrates the importance of affordable housing for the settlement patterns of migrants. This finding is driven by individual location choices, but could also be partly caused by the dispersal policy of Ukrainian refugees, in which the availability of affordable housing plays a central role (*Weber* 2022).

Furthermore, the percent of the stocks of refugees in the districts – whose spatial pattern is most directly influenced by administrative requirements to reside in particular areas – is positively correlated with the proportion of recent Ukrainian refugees, which seems to support Hypothesis 6. As expected, the institutional distribution mechanisms thus also seem to have an impact on the spatial distribution of newly arriving Ukrainian refugees.

With respect to the political opportunity structures in the administrative districts, we did not find empirical support for a positive correlation between the share of left-wing voters and the spatial patterns of Ukrainian refugees (Hypothesis 5). Finally, the control variables – distance to Kyiv and degree of urbanisation – do not reveal any statistically relevant results.

To check the robustness of the significant ethnic network effect presented above, we estimated several additional models. In a first step, the models were estimated

Tab. 2: SER estimates of the regional determinants of location choice of recently registered Ukrainian refugees in July 2022, following different model specifications

	UKR nationals 7/2022		
	(inverse distance matrix) (M1)	(contiguity matrix) (M2)	(OLS) (M3)
Stocks of UKR nationals	0.723***	0.660***	0.723***
	(0.115)	(0.115)	(0.116)
Unemployment rate	-0.012	-0.008	-0.014
	(0.009)	(0.010)	(0.009)
Highly complex occupations	0.010**	0.011**	0.011**
	(0.005)	(0.005)	(0.005)
Rental prizes in Euro per m^2	-0.351***	-0.338***	-0.355***
	(0.082)	(0.085)	(0.080)
Left party voters	0.003	0.002	0.003
	(0.002)	(0.002)	(0.002)
Stocks of refugees	0.048***	0.048***	0.046***
	(0.017)	(0.017)	(0.017)
Urbanisation (Ref. suburban and rural counties)			
Large and medium sized cities	-0.049	-0.046	-0.050
	(0.033)	(0.034)	(0.034)
Distance to Kyiv	-0.001	-0.006	-0.003
	(0.013)	(0.014)	(0.013)
Constant	1.082***	1.123***	1.088***
	(0.276)	(0.288)	(0.275)
Spatial error	0.326	0.277**	
	(0.251)	(0.115)	
Adjusted r^2	0.27	0.27	0.25
Observations	390	390	390

Note: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: *BAMF* 2022c, *Destatis* 2022b, *BBSR* 2022

based on earlier reference dates to check whether the numbers of registered refugees – particularly in the first months of the war – on a regional level are a valid indicator for our analysis or follow administrative idiosyncrasies. The first two models in Table 3 show the coefficients for the stocks of Ukrainian citizens living in Germany in December 2021 to account for the numbers of registered Ukrainian refugees at the end of March 2022 as well as the end of May 2022. Both coefficients support the findings presented above for the situation at the end of July 2022, providing further evidence for the importance of ethnic networks.

Finally, we also tested the relevance of the structure of ethnic networks. The results of models M3-M5 in Table 3 show that the distribution of arriving Ukrainian refugees is not related to the proportions of other immigrants in Germany, but

Tab. 3: Additional SER estimates of the regional determinants of location choice of Ukrainian refugees: alternative reference time of dependent variable (M1-M2) as well as alternative definition of ethnic networks in July 2022 (M3-M5)

| | UKR nationals | | | | |
	5/2022 (M1)	3/2022 (M2)	7/2022 (M3)	7/2022 (M4)	7/2022 (M5)
UKR nationals	0.260* (0.153)	0.332*** (0.105)	-	-	-
Foreign nationals	-	-	0.004 (0.004)	-	-
EU-28 nationals	-	-	-	0.007 (0.006)	-
Non-EU-28 nationals	-	-	-	-	-0.001 (0.009)

Note: Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All model specifications follow M1 in Table 2, but only the selected estimates are shown here.
Source: *BAMF* 2022c, *Destatis* 2022b, *BBSR* 2022

rather primarily to the concentration of other Ukrainian citizens. The variables on the share of foreign nationals in the administrative districts (M3), on the share of EU-28 nationals (M4) as well as non-EU-28 nationals (M5) are all not significantly correlated with the share of newly registered Ukrainian refugees.

6 Discussion and conclusion

This study aimed to analyse the location choices and spatial patterns of refugees who are largely unaffected by administrative dispersal policies. Based on the case of Ukrainian refugees arriving in Germany between February 24 and July 31, 2022, and making use of current administrative data, this paper not only focuses on a group of forced migrants with different demographic characteristics and legal conditions than other refugee groups in Germany, but also provides valuable insights into the settlement patterns of this specific group. It must be noted, however, that these analyses are based on aggregated data that do not allow for testing the mechanisms of location choice at the individual level. Therefore, these data need to be combined with more detailed individual-level information, such as data from the IAB-BiB/FReDA-BAMF-SOEP survey, to enable the examination of the main drivers of the spatial patterns of recent Ukrainian refugees.

Our analyses offer several insights and conclusions. First, our spatial regression models find strong evidence that the settlement patterns of Ukrainian refugees are correlated with pre-existing networks of Ukrainians already living in Germany. As no official figures on the proportion of Ukrainian refugees who are redistributed are available, it is difficult to interpret the importance of dispersal policies. Nevertheless,

the empirical analyses also suggest a correlation between the spatial patterns of refugees in general and Ukrainian refugees, suggesting that dispersal policies may play a role. Second, the findings on regional economic factors (unemployment rate and highly complex occupations) provide a mixed picture. These results indicate that Ukrainian refugees are more likely to move to regions where the share of high-skilled employment is high, which can be interpreted as an attempt to move into these labour market segments. However, the results of the spatial regression models for the local unemployment rate seem to be of limited relevance because of the particular structure of Ukrainian refugees to Germany (i.e., mostly women and children). Instead of general labour market characteristics, affordable housing and low rent seem to play a more important role. Once again, more individual-level data are needed to better understand these results, which may point to strong selection effects of refugees compared to the Ukrainian citizens who moved to Germany before the beginning of the war.

To the best of our knowledge, the present study is the first to examine the spatial patterns of recent Ukrainian refugees to Germany using current register data. It provides quick and useful information not only for existing research but also for policy makers. The results indicate that the large influence of pre-existing ethnic networks could lead to regional concentrations of Ukrainian refugees, which could consequently result in regionally varying financial and social burdens. Conversely, ethnic networks could also lead to reduced burdens by providing informal support structures and resources. The further development of these spatial patterns must be kept in mind when considering short-term regional burdens as well as long-term integration effects.

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