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The Impact of Cultural Diversity on the German Housing Market

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Mehmet Bayar[1]

The Impact of Cultural Diversity on the German Housing Market

Abstract

This paper documents a positive impact of cultural diversity and cultural similarity on rental prices of the German districts for the years between 2004 and 2013. On the one hand, an increase of the Herfindahl index as a measure for cultural diversity of 0.1 would increase rents by over 12 percent after controlling for relevant explanatory variables and city and time fixed effects. On the other hand, an increase in the share of foreign-born individuals is associated with a decrease in rents. These results suggest an economic impact that is an order of magnitude bigger than that found in labor markets. Consequently, cultural diversity can be considered as a city-specific consumption amenity. The positive impact of cultural diversity on the local housing market mirrors the fact that inhabitants are willing to pay higher rents in cities with a high level of diversity. Natives prefer to live in culturally diverse areas, but they avoid to reside in areas where the share of foreigners is too high. These findings show that amenity considerations play a role in residential location decisions.

JEL Classification: F22, J61, R23

Keywords: Housing market; immigration; cultural background; Germany

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1 Introduction

Because of globally increasing migration flows the economic impact of cultural diversity has attracted the attention of many researchers in recent years. The notable difference between the current migration flows in comparison with earlier migration flows is that migrants have become more diverse both in terms of motives (e.g. job, family, education etc.) and characteristics (e.g. nationality, age, profession etc.). This variety in migrants leads to cultural pluralism, especially in agglomerated areas. According to the 2013 Census, the proportion of foreigners in German metropolitan regions such as Stuttgart was 22.8 percent, compared to 25.4 percent in Munich. In the same year persons with Greek roots accounted for 6 percent of all foreign population in Munich and they were the second largest ethnic minority group after citizens of Turkey (11 percent).

Cultural, or more precisely, language similarity is also an important factor influencing an immigrants' settlement choice where to reside in the target country, because effective communication is fundamental for every day life. For immigrants who do not share a common language with natives, communication is a barrier. As a consequence, the demand for immigrant-specific amenities like foreign schools for kids, medical and financial services are important for them. Instead for common culture immigrants, the demand for the same services and amenities is lower. They can use services that are oriented towards the native population. Hence, for the common culture immigrants the demand for culture-oriented services should not be location specific. They are also able to integrate themselves in social networks shared by natives. Thus, migration flows are clearly larger to destinations with large numbers of ethnic and linguistic enclaves.

With ongoing demographic change in many countries, it is no wonder that immigration is of great importance. So far, economists have focused on wage impacts and have found either no or small effects. But immigrants also consume amenities and housing services in areas where they settle. Therefore, the effects of immigration are reflected in changes of housing prices and rents, which in turn affect real wages and wealth (Grossmann et al., 2013). The magnitude of this impact depends on the reaction of the supply of housing to the increased demand due to immigration. Contrary to the labor demand, the supply of housing is primarily inelastic, at least in the short run. This striking feature of the housing market causes that the adjustment process is much slower for rental prices than for wages. What is largely overlooked is that the housing and property owners benefit immensely from immigration. In this study, I argue for the high economic importance of the housing market. Germany is one of the most popular immigration countries, but to the best of my knowledge information on the effect of cultural diversity and cultural similarity on the housing market in this country is lacking. The present work aims to fill this gap.

There are two views why migrants provide complex contributions to the economy of the destination country. First, cultural diversity can generate costs from potential conflicts of preferences, hurdles to communication, or outright racism, prejudice or fear of other groups, leading to a sub-optimal provision of private and public goods (Alesina and Easterly, 1999; Alesina, 2004). This is only one side of the coin. Second, diversity can also help natives to learn about other ways of life and what goes on in other places of the world. It brings variety to almost every part of our ways of life. Diversity helps people to better appreciate humanity and human rights in general. Diversity of cultures can be regarded as an enriching opportunity if constitutional rules of free, democratic and tolerant society are not infringed. Moreover, cultural diversity creates potential benefits by increasing the variety of goods, services and skills available for consumption and production (O'Reilly III et al., 1998; Lazear, 1999a,b). One part of the migration literature even assumes that by bringing together complementary skills, different abilities and alternative approaches to problem solving, diversity may also boost creativity, innovation and ultimately growth. More precisely, workers from different backgrounds can generate a positive externality on one another that increases productivity at the plant level (Florida, 2002a,b; Berliant and Fujita, 2008). Nevertheless, findings about the urban or regional effects of immigration are controversial. On the one hand some see great value and benefit from increased cultural diversity (Ottaviano and Peri, 2006), on the other hand others fear that increased immigrant presence comes only at the expense of the native-born (Borjas, 1994). More research is required to understand the mechanism behind the impact of immigration on economic outcomes.

The paper's objective is to show empirically that the strength of the spatial correlations between the housing market and immigration is explained by the immigrant's culture. There are some reasons why examining the impact of immigration in a German context is desirable and useful. First, the composition of foreigners is significantly different in Germany than in other regions. Whereas, for example, Mexico and Central America account for a large share of immigrants in the U.S., Germany's immigrants tend to come from a wider spectrum of countries (most of the migrants living here are from Turkey, Poland, Italy or Romania). Immigrants from different countries bring a distinct set of values and skills that play a role in the overall diversity effect. For example, Fischer (2012) examines the behavior of Swiss house prices to European immigration flows for 85 districts between 2001 and 2006 and shows that an immigration inflow from non-common language countries equal to 1 percent of an area's population is coinciding with an increase in prices for single-family homes of about 4.9 percent. However, immigrant influx from a common language country has no impact. Second, undocumented immigration is less of a concern in Germany, because the presence of many illegal migrants leads due to the increase in housing demand to higher rents in the area. The neglect of this fact can distort

the results of the empirical analysis. Finally, a comparison of results between Germany and other countries can help us better understand the role of institutional framework and governmental policy in determining diversity effects. An effective migration policy is in the interests of society, since immigration is a subject which affects all fields of the economy.

I use annual data on the stock of foreigners, housing rents and prices at districts and autonomous cities level in Germany, and I find a very robust impact of cultural diversity on rents and housing prices that is an order of magnitude bigger than the estimates from the wage literature. My main findings from this study are threefold. On the one hand, cultural diversity enhances regional or urban attractiveness, thus confirming previous research. An increase in the diversity index by 0.1 is associated with increases in average housing rents and prices between 11 and 15 percent. In accordance with previous studies the effect of diversity appears to be more pronounced in urban than in rural areas. On the other hand, greater cultural similarity within an area has a stronger positive impact on regional or urban attractiveness. In other words, even though culturally diverse areas are very attractive to potential migrants, this advantage is exacerbated if there is substantially large cultural similarity between natives and immigrants in the area. This implication is to my knowledge, a new contribution to the understanding of how immigration affects economic outcomes. But, contrary to these findings, if the share of foreigners is considered as a whole group the impact on rents is negative. I estimate that an increase in the share of foreign-born people of 1 percent decreases housing rents per square meter by about 1 percent in all cities. This evidence is also accompanied by the fact that an immigrant shock to a district induces natives to resettle in other areas. The mechanism underlying this phenomenon can be explained by an income effect (i.e. the displacement of natives due to the increased demand for housing by immigrants) and an amenity effect. The results are very important in understanding the local economic impact of immigration and the link between immigration and the residential location decisions of natives.

1.1 Related literature

This paper is related to a number of recent studies, which analyze the relationship between immigration and local economies. Work in this area was pioneered by Saiz (2003) which analyzes the impact of the 1980 Mariel Boatlift on the Miami housing market. The main finding is that rental prices in Miami increased as a result of the demand shock between 1979 and 1981 from 8 to 11 percent more than comparable housing markets during this time. Immigration was the most likely explanation for this differential growth in rents. Another important conclusion of the author is that immigrants generally cause a short-run increase in rental prices. Namely, an immigrant inflow equal to 1 percent of a city's

population results in a 2 percent increase in house prices for U.S. cities. Following his formalized work Saiz (2007) finds that immigrants do not displace natives from "gateway" cities one-for-one. However, he argues that immigrants are less sensitive to housing costs, because local immigrant-specific amenities and networks are more important to them. The literature on the impact of immigration on housing market has evolved, but there is no consensus among researchers regarding the short-run impact of immigration on rents and housing values. The empirical results are time and country specific.

Ottaviano and Peri (2006) analyze in their seminal paper the US housing market and estimate that an increase in the diversity index by 0.1 (roughly the increase experienced by Los Angeles during the 1970–1990 period) is associated with a 19 percent increase in real rents. In other countries, the estimates tend to be even smaller. The instrumental-variables approach of Gonzalez and Ortega (2013) suggests that between 2000 and 2010, immigration led to an average 1.5 percent annual increase in the working-age population in Spain, which was responsible for an annual increase in housing prices of about 2 percent, and for a 1.2 – 1.5 percent increase in housing units.

Using individual panel data of homeowners in the Netherlands during the period 1999 and 2008 Bakens et al. (2013) find a positive effect of cultural diversity on average housing prices. But after controlling for spatial sorting, the effect of cultural diversity on housing prices is negative. Sá (2015) studies the effect of immigration on house prices in the UK. The author finds that immigration has a negative effect on house prices and presents evidence that this negative effect is due to the mobility response of the native population. Natives respond to immigration by moving to different areas and those who leave are at the top of the wage distribution. This generates a negative income effect on housing demand and pushes down house prices. The negative effect of immigration on house prices is driven by local areas where immigrants have lower education. Saiz and Wachter (2011) find a negative relationship between immigration and changes in house prices and rents in the U.S. at the local level. The authors provide three potential explanations for this outcome. First, natives may have a preference for living with residents of the same ethnic group and of higher socio-economic status. In other words, some individuals may have dislike for living in multicultural environments. This can arise if the indigenous population feels threatened cultural assets by the presence of foreign-born people. Second, immigration may generate more crime or affect the quality of locally provided public goods (e.g. schools) which may experience overcrowding. Finally, immigration may affect the quality of the housing stock. They furthermore suggest that the negative association between immigration and changes in housing values is stronger in neighborhoods where immigrants are less educated and tend to be ethnic minorities. This empirical fact is consistent with the idea that natives are willing to pay a premium for living in predominantly

native areas.[1]

The remainder of the paper is organized as follows: the next section briefly introduces the theoretical model that is used to develop a consistent estimation procedure for the diversity effect on mean rents. Section 3 presents measures of cultural diversity and linguistic similarity. Section 4 describes the data sources, key summary statistics, and stylized facts about cultural diversity in Germany. In Section 5 I present the empirical strategies adopted to test the theoretical findings. I show and discuss my key estimation results in section 6, including variations on the basic specifications, robustness checks, and addressing causality and endogeneity. A conclusion of my findings is summarized in section 7, along with a discussion of the limitations of this study and directions for future research.

2 Theoretical framework and hypotheses

According to economic theory an immigrant-induced increase in demand for housing is expected to have an upward effect on housing prices, particularly in large cities. Since immigration will be driving much of the German population growth in the near future, some argue that this phenomenon will cause a house price appreciation. While it is generally assumed that the housing market adjusts more slowly to immigration shocks than the labor market because housing is considered as a non-tradable good with relatively inelastic supply in the short term. This means that the impact of immigration on rental prices also depends on the elasticity of the housing supply. At the same time, if immigrants and natives are substitutes in the labor market, natives may prefer to leave the area to avoid possible competition. In this case the outflow of natives may neutralize the positive effect of an immigration shock on the housing market. As a result, prices decrease or remain unchanged.[2] Furthermore, growing immigrant enclaves or the creation of ghettos/parallel societies may negatively influence rental prices if natives might have negative attitudes towards foreigners motivated by a preference for homogeneity in terms of culture and social status and/or by racial or religious prejudice. Moreover, natives might be concerned about a deterioration of local living standards if they make foreigners responsible for rising crime. Further concerns might arise because immigrants could have a crowding effect on local indivisible goods (i.e. parks, transport). More importantly, the probably short duration of staying in the same place may decrease the incentives of immigrants to invest in local public goods. Finally, even local politicians could be tempted

[1] For more details about the effects of immigration on the housing market see also Van der Vlist et al. (2011) or Akbari and Aydede (2012).

[2] It should, however, be noted that Germans are relatively immobile compared to the population in the United States.

to cut down investments for example in infrastructure in minorities-dense areas because foreigners do not have the right to participate in elections (for more details, see Accetturo et al., 2014).

All these aspects could trigger an offsetting native out-migration, decreasing wages, thus reducing housing demand and prices in the city, or even segregation. It has shown empirically that native residents differ in their preferences for living in a multicultural environment, depending on their appreciation of the implied diversity of cultural values (Bajari and Kahn, 2008; Baranzini et al., 2008; Olfert and Partridge, 2011). Additionally, although foreign migrants often settle in cities because of thriving economies (see Scott, 2010), they also contribute to the diversity of human-made consumption amenities in cities — including ethnic products, restaurants, arts and entertainment events (Quigley, 1998; Glaeser et al., 2001). Arguably, a more unbalanced ethnic/race composition of the population raises the attractiveness of living in cities, and this "ethnic capital effect" is thought to positively impact housing or rental prices (Ottaviano and Peri, 2006) — thereby opposing a potential "native escape". The issue is that, a priori, one cannot conclude which effect dominates. The uncertainty about the direction of the final effect leaves room for further analysis.

A simple model is introduced to illustrate the link between immigration, native mobility in response to immigrant inflows from abroad and house prices. The model should help to understand the local impact of cultural background on housing. The model is an extension of the frameworks proposed by Saiz (2007) and Accetturo et al. (2014) to define cultural identity as a district-specific amenity that enters into the utility function. If diversity is an amenity (disamenity), then residents would be willing to pay higher (lower) rents in culturally diversified districts. Start by assuming that the preferences of individuals i living in district d can be represented by the following utility function:

$$U_{id} = A(div_d)H_{id}^{1-\alpha}C_{id}^{\alpha} \tag{1}$$

where $0 < \alpha < 1$, H is the consumption of housing and C is the consumption level of a homogeneous good. The price of this good has been normalized to one. The term $A(div_d)$ refers to the amenities in district d and captures the "utility effect" associated with local diversity. If natives value cultural diversity, the first derivative ($\partial A/\partial div_d$) is positive; on the contrary, if migrants cause a perceived deterioration in the quality of local amenities, then $\partial A/\partial div_d < 0$.

Assuming that income does not depend on location within districts, individuals max-

imize utility subject to the following budget restriction:

$$C_i + r_d H_i = Y_i \tag{2}$$

where r_d and Y_i represent, respectively, rents in district d and individual income.[3] The utility maximization problem delivers the following Marshallian demand functions for housing and the homogeneous good:

$$\begin{aligned} H_i^* &= \frac{\alpha Y_i}{r_d}\,, \\ C_i^* &= (1-\alpha) Y_i\,. \end{aligned} \tag{3}$$

Suppose there are two districts, 1 and 2, and two types of individuals, natives and immigrants. The total number of natives is N, a share ω of which is located in district 1. Natives are free to move across districts and we assume that a mass M of immigrants is located in district 2. Immigrant income is equal to γY, with $\gamma \in [0,1]$. The supply of immigrants is treated as exogenous and immigrants are assumed to prefer to stay in district 2. Aggregate housing demand for each area is herefore:

$$\begin{aligned} H_1^D &= \omega N \frac{\alpha Y}{r_1} \\ H_2^D &= [(1-\omega)N + \gamma M]\frac{\alpha Y}{r_2} \end{aligned} \tag{4}$$

Housing supply in district d is assumed to be equal to:

$$H_d^s = \beta_d r_d^{\theta}\,, \tag{5}$$

where β_d is the price elasticity of the housing supply in district d and $\theta \geq 0$. In equlibrium, housing demand equals supply. Equilibrium prices are determined by Eqs. (4) and (5):

$$\begin{aligned} r_1^* &= \left(\omega N \frac{\alpha Y}{\beta_1}\right)^{\frac{1}{1+\theta}} \\ r_2^* &= \left\{[(1-\omega)N + \gamma M]\frac{\alpha Y}{\beta_2}\right\}^{\frac{1}{1+\theta}} \end{aligned} \tag{6}$$

In terms of other (natural) amenities, it can be assumed that the two districts are ex ante

[3] The introduced model neglects the existence of a production sector for two complementary reasons. First, Accetturo et al. (2014) argue that most of the previous studies find no considerable impact of immigration on natives' income. Second, similarly as in their case, wages do not vary at the district level, which is the geographic unit of analysis in this paper.

identical. They differ only in the degree of cultural diversity. The inflow of immigrants alters the natives' valuation of local amenities. More precisely, amenities are a function of cultural diversity, that is $A(div_d)$. It should also be assumed that amenities in district 1, unaffected by immigration, are fixed and equal to A, that is $A(0) = A$.

Free mobility of natives implies that in equilibrium their utility levels equalize across locations. This implies:

$$\frac{A}{\left(\frac{\omega N}{\beta_1}\right)^{\frac{\alpha}{1+\theta}}} = \frac{A(div_d)}{\left[\frac{(1-\omega)N+\gamma M}{\beta_2}\right]^{\frac{\alpha}{1+\theta}}} \tag{7}$$

In equilibrium, the share of natives in district 1 is therefore:

$$\omega* = \frac{N+\gamma M}{N}\Phi(M)\,, \tag{8}$$

where $\Phi(M) = \frac{\beta_1 A^{\frac{1+\theta}{\alpha}}}{\beta_1 A^{\frac{1+\theta}{\alpha}} + \beta_2 A(div_d)^{\frac{1+\theta}{\alpha}}} \in (0,1)\,.$

Using Eqs. (5), (6) and (8) we can derive the city level rent:

$$\bar{r}* = \frac{\left[(N+\gamma M)\alpha Y\right]^{\frac{1+\theta}{\alpha}}}{\beta_1^{\frac{1}{1+\theta}}\phi(M)^{\frac{\theta}{1+\theta}} + \beta_2^{\frac{1}{1+\theta}}[1-\phi(M)]^{\frac{\theta}{1+\theta}}} \tag{9}$$

Before deriving the core results on how migrants affect local rents and native outmigration, let us first discuss some characteristics of this model.

First of all, the model assumes that all migrants exogenously concentrate in the same district and utility-maximizing location decisions are let to the native population. This assumption may seem implausible, because the empirical evidence shows us, that immigrants do not locate randomly across cities; however, it represents a good guidance for the empirical part of the study, in which I show a (causal) effect of cultural diversity on the housing prices.

We can now assess how cultural diversity influences housing prices. For this purpose, I present the most important hypotheses with the aim of producing some clear testable predictions for the empirical part of the paper:

Hypothesis 1: The impact of cultural diversity at the district level is negative (positive) if cultural diversity deteriorates (improves) the perception of the quality of local amenities.

The impact of cultural diversity at the district level is obtained by deriving the log of Eq. (6) with respect to M:

$$\begin{aligned} \frac{\partial\ log(r_1)^*}{\partial M} &= \frac{1}{2}\left[\frac{\gamma}{N+\gamma M} + \frac{\phi'(M)}{\phi(M)}\right] \\ \frac{\partial\ log(r_2)^*}{\partial M} &= \frac{1}{2}\left[\frac{\gamma}{N+\gamma M} - \frac{\phi'(M)}{1-\phi(M)}\right] \end{aligned} \tag{10}$$

It is important to note that cultural diversity only partially accounts for differences in urban attractiveness. Not only the sizes or shares of cultural groups matter, but also the between-group cultural proximity within the area. Consider, for illustrative purposes, the case where district A is composed of 50 percent French and 50 percent Germans; in district B, 50 percent of residents are Germans and 50 percent are Turks. The two districts are not equally attractive to migrants, although they have statistically the same level of cultural diversity. The literature has used different methods to proxy cultural ties, such as common language, religion, or ethnicity (Boisso and Ferrantino, 1997; Melitz, 2008). In this paper, I exploit an original data set that contains information on linguistic proximity between German and all official languages of foreign nationals living in Germany. This concept describes how similar a culture actually is among these groups. The crucial difference between these two indices is that cultural diversity is mainly a quantitative measure, while cultural proximity is more a qualitative measure. The linguistic proximity index provides better-adjusted and smoother indicators of proximity than the standard dummy for common language used in most of the literature. From a theoretical perspective, a substantially large cultural similarity between natives and immigrants may decrease the probability of misunderstanding and social conflict, thus making an area more attractive. In order to identify whether there is a different effect of linguistic similarity and cultural diversity on the housing market, the following hypothesis will be tested:

Hypothesis 2: The inflow of immigrants who do share a similar culture with natives should yield rising housing rents and prices.

The extent of the impact immigrants have on the local housing market depends also on the reaction of natives on the sorting of foreigners into residential neighborhoods. The theoretical framework allows us to determine whether the outflow of natives from cities with a large proportion of immigrants tends to be higher. This theory will be examined in the context of the next hypothesis:

Hypothesis 3: Migration generates pressures for the outflow of natives because natives in general prefer to live with people in a neighborhood who share a similar culture.

This can easily be obtained by deriving Eq. (8) by M:

$$\frac{\partial\, \omega^*}{\partial M} = \frac{\gamma}{N}\phi(M) + \frac{N+\gamma M}{N}\phi'(M) \tag{11}$$

The first term on the right-hand side represents the change in the income effect - the crowding out of natives due to increased demand for housing on the part of immigrants - and is always positive. The second term captures the change in satisfaction with local amenities and is positive whenever immigration lowers the level of satisfaction with local amenities. The income effect is, thus, reinforced (attenuated) by the amenities effect if immigrants decrease (increase) the value of local amenities in area 2. This is one of the reasons why certain immigrant groups live in segregated neighborhoods not because they prefer to live in those places but because natives restrict their location choices to specific areas.

3 Measuring cultural diversity and linguistic similarity

In the estimations I include two variables related to foreign citizens to measure cultural diversity. Firstly, I control for foreign residents as a share of total population, i.e. $s_{d,t} = foreigners_{d,t}/population_{d,t}$. This variable refers to the size of the group of foreign individuals who live in district d at time t. The second variable then specifically measures the degree of diversification of the stock of residents into different nationalities. The nationality is used as a proxy for cultural background. The number of nations or islands that is included in the analysis amounts to 206. There is also information on stateless people or persons whose citizenship is unknown/not clarified. However, these only make up a small proportion in the overall foreign population. To calculate cultural diversity, I use a standard Herfindahl-Hirschman index, an indicator frequently used in the socioeconomic research literature (see for example Ottaviano and Peri, 2005). The calculated diversity index is defined as

$$div_{d,t} = 1 - \sum_{i=1}^{n} (E_{i,t}^{d})^2, \tag{12}$$

where $E_{i,t}^{d}$ is the share of people from cultural group i among the residents of district d in year t. The index ranges between 0 and 1. An index value of 0 indicates that everyone living in a city belongs to the same cultural group, while the index rises the more evenly the shares of the different foreign nationalities are distributed. The advantage of this measure of heterogeneity is that it takes into account both cultural "richness" (i.e., the number of different groups in the population) and cultural "diversity" (i.e., the distribution across groups). The correlation between $s_{d,t}$ and $div_{d,t}$ in the data seems to be rather modest ($\rho_{s,div} \approx 0.45$), which allows to include both variables in the analysis at

the same time and thus to separate the fractionalization and size effects of the foreign residents. Moreover, in line with recent research that distinguishes between the size of the migrant community and its diversity I decompose an additional index to measure the diversity of non-German born residents (i.e. excluding the dominant, native residents from the index - see Suedekum et al., 2014). By doing so, I can test more precisely if it is diversity or simply the share of foreign-born individuals that influence the housing market.

In order to check that the empirical results do not depend too strongly on the particular form chosen for the diversity index, I consider, however, a more standard measure of diversity, namely, the so called "index of fractionalization". Formally, the fractionalization index of linguistic diversity of district d in year t is defined as:

$$frac(Lang_{d,t}) = 1 - \sum_{i=1}^{n} (l_{i,t}^{d})^2, \tag{13}$$

where $(l_{i,t}^{d})$ is the share of the group with the official language i in the host country in the total population of district d in year t. The index reaches its minimum value 0 when all residents speak the same language, and its maximum value 1 when there are no individuals speaking the same language. Intuitively, when all individuals share the same language, the probability that two randomly selected individuals belong to different linguistic groups is 0, whereas it equals 1 when all individuals speak different languages.

4 Data and stylized facts

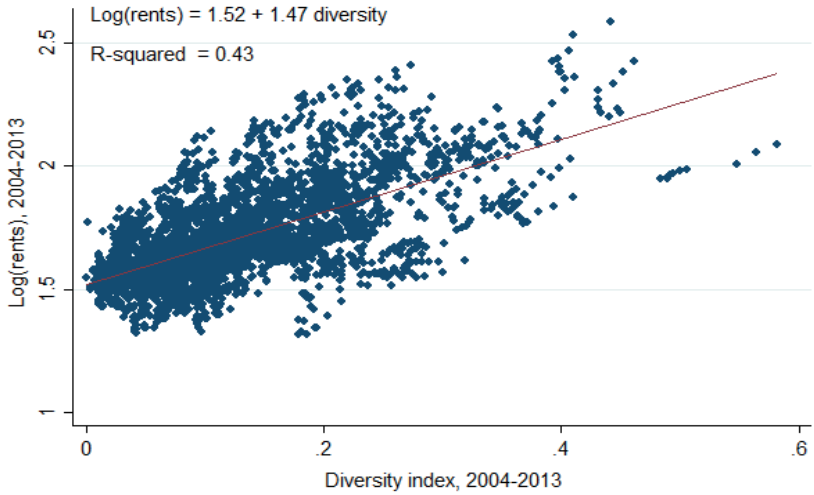
The data used in this paper come from five different sources. The data on inserted housing prices per square meter in Euro was provided by Empirica regional data base, an independent institution for economic and social science. The average valuation price is used, because there does not exist data which allows me to distinguish between the quality or the characteristics of the properties. Further, the city crime data comes from the Federal Criminal Police Office. The Federal Institute for Research on Building, Urban Affairs and Spatial Development and the German Federal Statistical Office provide data on rental prices, number of foreigners and the included control variables. CEPII's database provides various measures of linguistic proximity. I use these unique data for common native language and common spoken language for many countries to proxy cultural similarity. For example, the common language index based on level specification between Germany and Austria is 0.88. This means that there is a high degree of cultural similarity between these two countries. The same index shows a value of zero between Germany and India, which can be interpreted in terms of cultural dissimilarity. The geographic unit of analy-

sis corresponds to a panel of 402 administrative districts and autonomous cities (NUTS3) over a period of ten years (2004-2013). In my final data set I have 3,927 observations. I work with an unbalanced panel, as I do not have sufficient observations for all 10 years for all 402 districts and autonomous cities. From an economic perspective, it would be interesting to identify how the housing market reacts to cultural diversity at the municipality level because housing prices can differ within cities. But, unfortunately, there is no data on housing/rental prices at this disaggregated level.

Germany is still a country of tenants. The ownership rate according to the census of 2011 is nationwide at about 45 percent. In particular, the housing markets in major cities are heavily characterized by rental contracts. The ownership rate in Berlin, for example is only 15.6 percent, compared to 24.1 percent in Hamburg. The reasons for the high proportion of tenants in Germany are conditioned due to historical, cultural and economic factors. The Allies damaged a considerable part of the living space in German cities during World War II. About 20 percent of the housing stock in West Germany was destroyed, also refugees entered from the east into the country, who had lost everything. In 1950 there was a shortage in the amount of 4.5 million dwellings. But the government did not respond by incentivizing Germans to buy property, rather it promoted social housing grants, guarantees and the possibility of write-downs for the building owners. In addition, the housing market was liberalized soon after the war (German Federal Statistical Office, 2014). In recent years, there is a massive growing housing shortage particularly in agglomerated areas, which primarily affects households with low and middle incomes. Similar to the USA, private households of Germany spend on average almost one third of their net salary for rent and operating costs. Living in metropolitan areas is still considerably more expensive (Kholodilin, 2015). Because of further immigration a rising demand for housing is especially expected in major cities. The effect of an increase in the stock of immigrants depends on the income of migrants, the price elasticity of housing supply and displacement of domestic residents to other areas (Meen, 2016).

Economic theory suggests the possibility of a causal impact of cultural diversity for mean rents. Before using formal econometric methods to test this hypothesis, a preliminary graphical representation helps to reinforce my findings of a positive correlation. Figure 1 shows the linkage between the cultural diversity index and the logarithm of rents. It should be noted that this approach first does not enable us to eliminate the effect of fixed district characteristics, such as location or geographic amenities. The OLS coefficient estimates implies that an increase of one standard deviation in the amount of 0.08 in the diversity index (as, for example, Frankfurt did) is associated with an increase of 12 percent in the average rent prices, relative to cities whose diversity index did not change at all. This is the case especially for many cities in eastern Germany.

Figure 1: Correlation between the logarithm of rents and diversity index



Source: Own illustration based on FIRBUS and the German Federal Statistical Office.

Descriptive statistics for the main variables used in the regression framework are summarized in Table 1. The average basic rent at the district level is 5.6 Euros per square meter and the variation across districts is considerable. Moreover, in the average district there are about 7 percent foreigners. In terms of cultural richness and diversity the regions also differ greatly from one another. Diversified cities, such as Munich or the small district Saarlouis, have diversity indices between 0.4 and 0.6. More homogeneous cities such as Bayreuth and Leipzig, exhibit a degree of fractionalization of smaller than 0.05.

Table 1: Summary statistics

Variable	Mean	Std. Dev.	25th %ile	50th %ile	99th %ile
Cold rent per m^2	5.6	1.1	4.8	5.3	9.7
House price per m^2	1,327	398	1,071	1,273	2,696
Share of foreigners	0.07	0.05	0.03	0.06	0.23
Diversity index	0.13	0.08	0.07	0.11	0.40
GDP per capita	28,383	11,607	21,068	25,352	75,722
No. of observations	3,927				

Source: Own illustration based on FIRBUS and the German Federal Statistical Office.

Figures 2 and 3 reveal the uneven distribution of cultural diversity and cold rents per square meter across German districts.[4] The proportion of non-natives in West Germany is higher compared to East Germany. One in five citizens in Germany has a migration background. For example, in North Rhine-Westphalia the share of immigrants is approximately 25 percent. As expected, cultural diversity clearly rises with total regional size: more densely populated agglomerated regions such as Berlin or Hamburg tend to host various foreign nationalities. The housing market also shows a striking pattern because it is becoming spatially and structurally more differentiated. The spreads between "cheap" and "expensive" districts are wide. The rental price range is particularly pronounced between prosperous and shrinking regions. Housing is most expensive in Munich compared to any other district in Germany. Residents in the Bavarian capital pay 65 percent more than the national average. Half of the 30 most expensive cities are located in Baden-Württemberg. Actually, in Eastern Germany or in rural areas both rents and the degree of diversity are below the national average. It is clear that cultural diversity is particularly high in the economically well-developed regions such as Frankfurt or Munich. This would confirm the theory that regions with high economic activity attract more migrants. In fact, at first glance, the rents in culturally diversified areas are higher compared to more homogeneous regions. However, not controlling for other characteristics these correlations are at best only suggestive as they may be affected by omitted variables or reverse causation. In the following section I deal with these issues.

Figure 2: Diversity index, 2013

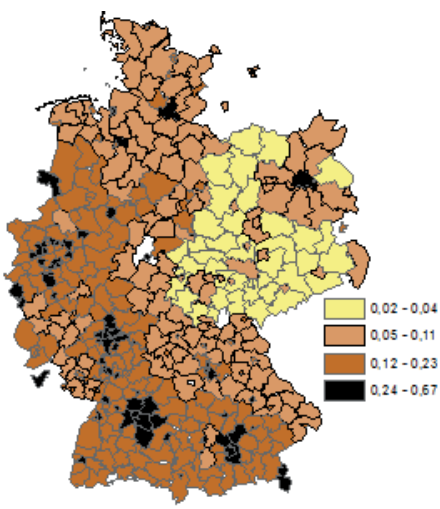
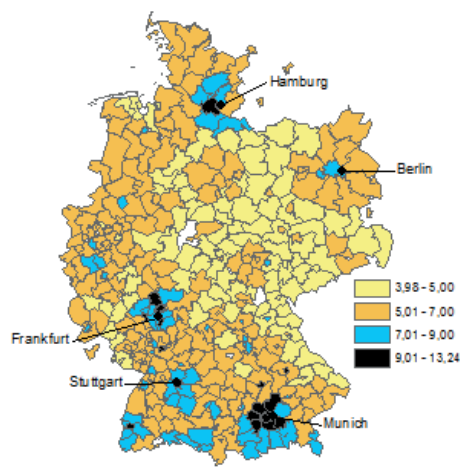


Figure 3: Rents per square meter, 2013



Source: Own illustration based on FIRBUS and the German Federal Statistical Office.

[4] Figures 4 and 5 in the appendix show the spatial distribution for further important indicators, namely for the share of foreigners and GDP per capita.

5 Empirical methodology

The theoretical model predicts that an increase in the diversity index would raise the average housing and rental prices at the city level. This prediction can be readily tested by using the following linear specification:

$$\log(r_{d,t}) = \gamma_0 + \beta div_{d,t} + \delta s_{d,t} + \psi X'_{d,t} + \lambda_t + \varphi_d + \varepsilon_{d,t} \tag{14}$$

where the dependent variable, $log(r_{d,t})$, is either the natural logarithm of housing or rental price per square meter, respectively, in district d in year t. The coefficient γ_0 is a constant, and the variable $s_{d,t}$ denotes the share of foreigners. The independent variable of interest, $div_{d,t}$ is the diversity index calculated amongst the whole population of district. Area fixed effects (φ_d) are considered to control for time invariant heterogeneity among districts and year dummies (λ_t) capture the common housing market business cycle shocks. The variable $X'_{d,t}$ is a vector of district time-varying controls. Finally, the term $\varepsilon_{d,t}$ is a random error with zero mean and independent from the other regressors. I apply a set of control variables which may affect the housing market. It includes the following variables: the gross domestic product (GDP) and the unemployment rate to control for local macroeconomic conditions [5]; population density in order to pick up agglomeration effects [6]; the local home burglary rate, which may affect housing demand [7]; the ratio of the number of dwellings to local population to take account of the housing supply; and a set of local (natural) amenities. In addition, the variable overnight stays of guests per 1,000 inhabitants in hotels is also included in the regression equation as a proxy for the attractiveness of the city. This indicator provides information on the quantitative importance of tourism in a region. It is also called tourism intensity. Consequently, increased demand for attractive residential space results in higher prices in the housing market (Brueckner et al., 1999). This variable can also be considered as a local amenity that is related to housing prices. Amenities are generally defined as place-specific assets that are known to contribute to a city's attractiveness. The depth and breadth of amenities attract households to the hosting region. One strand of research shows that location decisions are also driven by amenity considerations (Clark et al., 2002; Glaeser et al., 2005).

To test the hypothesis 2, I use the total native outflows (NO) as the dependent variable because immigrant inflows can lead to outflows of natives. To empirically identify this

[5] Because richer provinces which are growing faster and employing more people could be attracting more immigrants and thus could also have higher growth in house and rental prices.

[6] Population density is computed by dividing the total population by the size of the district in square kilometers.

[7] High levels of recorded home burglaries will affect demand for housing in affected areas, and that will inevitably lead to lower rental prices. For example, Thaler (1978) found that property crime reduces house values by approximately three percent.

phenomenon, the following equation can be used:

$$log(NO_{d,t}) = \gamma_0 + \beta log(imm_{d,t}) + \psi Z'_{d,t} + \lambda_t + \varphi_d + \varepsilon_{d,t}\,, \tag{15}$$

where $imm_{d,t}$ is the immigration of foreigners and $Z'_{d,t}$ stands for a vector of controls. The unemployment rate and GDP per worker are the covariates traditionally used in the literature as main determinants of the migration flows. They measure the job opportunities in an area and clearly determine the expected income. Furthermore, rents and home burglary rate are also included as explanatory variables in the regression equation.

Research in this area is related to some challenges. First, according to network theory, immigrants sort themselves in cities, where people with the same ethnic or cultural background already reside. Rooted networks reduce the costs and risks of movement for new immigrants, making it easier to find a place to live, a source of employment and a community from which to draw support. Economic literature on migration provides evidence supporting this prediction (Taylor et al., 1989; Massey, 1990; Pedersen et al., 2008). Ignoring these and other sorting effects may lead to inaccurate measurement of rent residuals. Secondly, which cannot be controlled for could be driving both immigration inflows and housing costs. Immigrants may respond to other factors that cause rents to increase, such as expectations of future economic growth, improved amenities, or changes in the preferences for existing amenities. In principle, this could lead to overestimating the impact of cultural diversity on rents. Thirdly, immigration could be endogenous. The reason for this claim is that immigrants might consciously settle in areas where rents are considerably cheaper. If immigration inflows are very sensitive to housing costs, then the estimates of the relation between cultural diversity and housing markets could be biased downward. Despite controlling for potential influencing indicators, the estimation of the coefficients β and δ in regression models (14) and (15) by ordinary least squares (OLS) may still suffer an endogeneity bias. Another point is that the sign of the bias is difficult to predict ex ante. In this context, one needs to look for exogenous sources of variation in the immigration inflows to ascertain causality (Saiz, 2007).

One possible solution to tackle these problems would be to seek external instrumental variables that are correlated with the change in the diversity of cities in the considered time period, but that are uncorrelated with any city-specific shocks. This strategy has been frequently used in studies that focus on the impact of diversity at the aggregate level (Card, 2005; Ottaviano and Peri, 2006). First, following Bakens et al. (2013) I use a shift share methodology to predict current diversity based on immigrants' location choices in the past. The underlying idea is that immigrants locate there where immigrant enclaves from the same country have already been created. The data confirm that the share of immigrants with a certain culture in a city is an appropriate predictor of where new

immigrants with that culture will settle in the future. For each city, I use the share of immigrants from a specific culture (i.e., foreign nationality) in 1998 to predict the share between 2004 and 2013 by allocating the national growth rate of that culture to the initial city level as follows:

$$\widehat{E^d_{i,t}} = E^d_{i,t=1998}[1 + g_{i,1998-t}] \tag{16}$$

where $\widehat{E^d_{i,t}}$ is the estimated share of migrants with culture i in district d in year $t = 2004, ..., 2013$, $E^d_{i,t=1998}$ is the share of migrants with culture i in district d in 1998, and $g_{i,1998-t}$ is the overall national growth rate of the share of culture i from 1998 to year $t = 2004, ..., 2013$.

As second instrument, I use the gateways instrument to take potentially endogenous locational choices of foreigners into account (see for more details Gonzalez and Ortega, 2013). The idea behind this approach is to exploit the differences in physical accessibility across German districts. Immigrants enter Germany either by land, sea, or air, and the most common mode of transportation varies widely by country of origin. The main dimension of immigrants' access is the distance between the area of origin and destination. We would expect higher migration flows from countries which are closer to Germany. For instance in the year 2013, the share of Danes accounted for about 30 percent of the total foreign population in the border town Flensburg, making them by far the largest immigrant group in this town. In other words, there were a total of 20,312 Danish immigrants living in Germany and 11 percent of those people were settled in Flensburg. More specifically, the construction of the gateways instrument to predict the foreign-born population in district d and year t is as follows:

$$GI^d_{i,t} = \sum_{i=1}^{n} \gamma_{ij} FB^d_{i,t}. \tag{17}$$

Within-district changes of immigrants over time in $GI^d_{i,t}$ are the basis for the gateways instrument. $FB^d_{i,t}$ is the share of foreign individuals with nationality i that inhabited district d in some base year t. Further, γ_{ij} measures the degree of accessibility of each German district from each country of origin. The basic idea is to calculate the distance between two countries based on bilateral airline distances in kilometers between the capitals of those two countries. I use data from CEPII, which provides current population figures and geographic coordinates for cities, towns and places of all countries. Moreover, I consider three additional instruments. These are respectively the first time lagged values of the endogenous regressors. The above-mentioned instruments are likely to be correlated with the size of the foreign residents in an area, but unlikely to be correlated with the housing market characteristics. The requirement that the instruments need to vary across cities and time is fulfilled here. According to a standard Hansen J-statistic

these are suitable instruments for the current levels of cultural diversity, immigration and share of foreigners. The use of various instruments should correct for the bias that would plague OLS estimations.

6 Empirical results

Tables 2 and 3 (see Appendix) report estimation results based on the model described in Equation (14).[8] The second stage of the estimation procedure is presented in the last column. The estimates of the coefficient β suggest that an increase in the diversity index by 0.1 is associated with a 12-13 percent increase in rents and 10-15 percent increase in house prices.[9] All estimation methods show that cultural diversity is positively associated with rents and house prices. On the other hand, I find negative rental price effects from the total share of foreign population. An increase in the share of foreign-born people by 1 percent would cause a 1 percent decrease in rents. But this correlation is not statistically significant. However, the IV estimate reveals a stronger negative and still insignificant effect of the share of foreigners on average rents at the district level. That is, rental and house prices are lower in German regions with a large share of foreign inhabitants, but for a given share rental and house prices are higher if the residents are diversified into many nationalities.

In fact, the macroeconomic variables and population may depend on several exogenous factors and may affect the rental prices. In reality, there is no doubt that wages are the prime determinant of income, while migration is a major driver of population growth. The two potential channels through which diversity can affect rents are either by increasing productivity (which would be reflected in higher wages and rents), or by increasing the desirability of a city. After controlling for income [10]and population (density), a residual significant positive effect of diversity would imply that city dwellers do value cultural diversity per se, and are willing to push up rents more than what would be implied only by higher income and higher population. The positive estimated sign of the diversity parameter indicates that diversity has a positive amenity value and plays a role in determining rents. It can therefore be stated that the areas hit by different nationalities are likely to experience an improvement of local amenities. The positive amenity effect of diversity (for example in terms of immigrant-induced product variety) does outweigh the negative effect of cultural diversity on rental prices. The effect of cultural diversity on the

[8] The next estimation tables will primary focus on the effect of the variables of interest on rents because the main findings do not change significantly when housing prices are considered.
[9] I also estimated equation (14) using the index for diversity among migrants only. This modification does not significantly change the main findings.
[10] GDP per capita is used as a proxy measure for income.

Table 2: Regression results for Equation (14) - Explaining average Rental Prices

Independent variable:	(OLS)	(FE)	(IV)
Diversity index	1.27***	1.18***	1.23***
	(0.088)	(0.06)	(0.12)
Share of foreigners	-0.01	-0.01**	-0.03
	(0.017)	(0.036)	(0.019)
Unemployment rate	-0.02***	-0.002***	-0.02***
	(0.002)	(0.0004)	(0.002)
Log (GDP per capita)	0.20***	0.02**	0.20***
	(0.02)	(0.01)	(0.02)
Log(population/size)	0.16***	0.80**	0.16***
	(0.01)	(0.04)	(0.01)
Log(stock of dwellings/population)	-0.63***	-0.32***	-0.67***
	(0.084)	(0.026)	(0.19)
R^2	0.60	0.52	0.60
F-test			69.68
Hansen J statistic			0.157
(p-value)			(0.69)

Note: Heteroskedasticity robust standard errors in parentheses. **Instruments:** shift share and gateway instrument.
All models include time dummies.
Total number of observations: 3,927. *** significance at 1 %, ** at 5 %, * at 10 %.
Source: Own illustration based on the Federal Statistical Office, FIRBUS and the Federal Criminal Police Office.

German housing market is weaker than, for example, in the USA or in the Netherlands (see Ottaviano and Peri, 2006; Bakens et al., 2013). There are some reasons why my estimates are smaller than the ones computed by Ottaviano and Peri (2006). For example, the difference could be explained by the fact that the USA has experienced higher levels of net migration during the observation period (World Bank). Additionally, the USA has a different place-of-birth composition and characteristics of immigrants. More importantly, the attitudes of German citizens toward immigrants may differ to those of Americans because of their different history, culture and values. Another point is that urban features of metropolitan areas are very different between the two countries, e.g. in terms of the spatial distribution of population or the infrastructures (Wiechmann and Pallagst, 2012).

The test for weak instruments looks at the Cragg-Donald F-statistic for joint significance of instruments. The number is 69.68 for the model with rental prices as dependent variable is larger than the rule of thumb of 10 (Stock and Yogo, 2005). Therefore, the instruments appear to be strong. According to the Hansen's J-test the used instruments are

suitable for the current levels of cultural diversity and share of foreigners. The comparison between OLS and IV shows that the estimators are nearly equal. But all specifications demonstrate that cultural diversity has a stronger effect on house prices than on rents. The estimated effect of share of foreigners is stronger and significant if I consider just West Germany. I restrict the sample to West Germany (including East and West Berlin) because the share of the immigrant population residing in East Germany outside of Berlin is very small. Table 4 shows that according to the spatial equilibrium model proposed by Roback (1982) the total share of foreigners is a negative city amenity. Natives possibly perceive the strong presence of one particular foreign group as an unattractive location characteristic, because they fear that foreign infiltration gives rise to parallel societies - or the emerge of ghettos in German cities (Mueller, 2006). As is shown in Table 5 culturally diverse urban areas experienced faster rent appreciation in comparison to all districts of the sample. An increase in the diversity index of 0.1 increases rental prices per square meter by about 15 percent. This may reflect large migration to high density urban areas. The signs of control variables are in accordance with economic theory. As was to be expected, rental prices are higher in densely populated and prosperous areas. However, domestic burglaries have regarding the estimated crime coefficient a negative impact on the housing market.[11] We can conclude from this result that natives are willing to pay a premium to live in a low crime neighborhoods.

Table 4: *IV* results for West Germany
Dependent variable: Rents

Independent variable	**Coefficient** (Std. Err.)
Diversity index	1.21***
	(0.06)
Share of foreigners	-0.10***
	(0.03)
Number of observations:	3,082
R^2	0.59
F-test	91.62
Hansen J statistic	3.42
(p-value)	(0.18)

Table 5: *IV* results for urban areas
Dependent variable: Rents

Independent variable	**Coefficient** (Std. Err.)
Diversity index	1.49***
	(0.36)
Share of foreigners	-0.50
	(0.75)
Number of observations:	1,779
R^2	0.43
F-test	31.49
Hansen J statistic	2.50
(p-value)	(0.29)

[11] The full estimation results for all variables are available on request.

The models in Table 6 suggest positive and statistically significant estimators for cultural proximity. It is worth emphasizing that the magnitude of these estimators is somewhat larger than the coefficients for the variable cultural diversity. Estimates across methods range from 1.27 (column 2, fixed-effects model) to 1.61 (column 3, two stage least squares). This indicates that local residents appreciate culturally diverse regions, but they have more pronounced preferences if there is a similarity in terms of language between cultures. Wang et al. (2016) have shown by studying a sample of 1,935 first-generation immigrants that migrants prefer to move to regions with a cultural background similar to theirs, and this holds especially for EU migrants. They identify that migrants are more likely to choose regions that are geographically close to their country of origin. The authors also found a significant and robust negative correlation between average cultural distance and attractiveness of regions, while cultural diversity has a positive impact.

Table 6: Regression results for Equation (14) - Explaining average Rental Prices

Independent variable:	(OLS)	(FE)	(IV)
Linguistic proximity index	1.60***	1.27***	1.61***
	(0.14)	(0.06)	(0.15)
Share of foreigners	-0.01	-0.01**	-0.01***
	(0.017)	(0.005)	(0.038)
Unemployment rate	-0.02***	-0.003***	-0.03***
	(0.002)	(0.0004)	(0.002)
Log (GDP per capita)	0.05**	0.02	0.05**
	(0.02)	(0.01)	(0.02)
Log(population/size)	0.04***	0.67***	0.03**
	(0.01)	(0.04)	(0.01)
Log(total stock of dwellings/population)	-0.63***	-0.31***	-0.67***
	(0.084)	(0.003)	(0.188)
Area fixed effects	NO	YES	NO
R^2	0.70	0.57	0.70
F-test			77.06
Hansen J statistic			0.825
(p-value)			(0.36)

Note: Heteroskedasticity robust standard errors in parentheses. **Instruments:** shift share and 1^{st} time lag linguistic proximity index. All models include time dummies.
Total number of observations: 3,927. *** significance at 1 %, ** at 5 %, * at 10 %.
Source: Own illustration based on the Federal Statistical Office, FIRBUS, the Federal Criminal Police Office and CEPII.

Finally, I test hypothesis 3 by estimating Equation (15). To the best of my knowledge,

this analysis is the first attempt to identify the reaction regarding the internal mobility of natives to immigration in Germany. The rental price dynamics can be explained by the fact that natives decide to move to other districts and are willing to pay higher rents to avoid foreigners. I can provide direct evidence of this theory.[12] The estimates obtained from the second stage are displayed in Table 7.

Table 7: *IV* results
Dependent variable:
Ln(outmigration of natives)

Independent variable	**Coefficient** (Std. Err.)
Ln(immigration of foreigners)	0.20***
	(0.04)
Unemployment rate	0.02***
	(0.003)
Log(GDP per capita)	-0.07
	(0.05)
Log(rents)	0.63***
	(0.07)
Home burglary rate	0.06***
	(0.01)
Number of observations:	3,380
R^2	0.89
F-test	340.75
Hansen J statistic	1.76
(p-value)	(0.18)

Table 8: *IV* results
Dependent variable:
Ln(outmigration of natives)

Independent variable	**Coefficient** (Std. Err.)
Diversity index	-0.58***
	(0.12)
Unemployment rate	0.02***
	(0.002)
Log(GDP per capita)	-0.05**
	(0.02)
Log(rents)	0.13**
	(0.05)
Home burglary rate	0.002***
	(0.007)
Number of observations:	3,380
R^2	0.96
F-test	125.93
Hansen J statistic	2.03
(p-value)	(0.15)

The instruments (based on the distance from the gateways and the first-order time lag of the endogenous variable immigration of foreigners) seem to be suitable. The first stage F-statistic is well above the rule-of-thumb of 10, thus suggesting that the weak instrument problem is not an issue in my case. The correlation between the inflow of

[12] It should be noted that other reasons like a job prospect can also play a role for the location choices of natives. Using data for the empirical analysis does not allow us to conclude that natives have emigrated to a more homogeneous environment only in response to foreigners. Nevertheless, we can obtain a first impression.

foreigners and the outflow of natives is statistically significant, the IV estimate shows a negative effect. Indeed, according to this estimate 1 percent increase of the share of foreigners induces 0.2 percent of the native population to relocate to other districts. This is (partly) consistent with the evidence identified by Mocetti and Porello (2010) for Italy finding a crowding out of low-educated natives.[13] Conversely, Table 8 shows that native residents have no incentive to leave culturally diverse districts. The signs for the coefficient of the control variables are also consistent with intuitive expectations, thus further supporting the validity of the results. For instance, the estimated parameter for GDP per worker has the "correct" negative sign, which means that high economic growth (i.e., more employment opportunities in the region) is negatively associated with net-outflows of natives.

6.1 Robustness checks

In the hedonic literature, there has been a marked increase in studies highlighting concerns about the spatial interdependence of residential prices. Dependence arises because housing typically consists of a set of interlinked local markets. The use of regional data sets that do not correspond to local housing markets will often introduce spatially correlated errors. Se Can and Megbolugbe (1997) give rise to the possibility of spatial lags, where prices depend on prices in neighbouring areas, rather than correlation arising through the error terms. I have so far treated the districts as if they were independent of each other. However, it is likely that there exist cross-regional spillovers and thus spatial dependence across the single units. Spatial interactions are also likely due to common factors in unobserved variables and/or movement of households. To account for this issue I make use of spatial econometric techniques. More specifically, I assume a spatial AR(1)-process for the error term:[14]

$$\varepsilon_{d,t} = \rho \cdot \sum_{i=1}^{n} \omega_{i,r} \cdot \varepsilon_{i,t} + \upsilon_{d,t} \tag{18}$$

where $\sum_{i=1}^{n} \omega_{i,r} \cdot \varepsilon_{i,t}$ is the spatial lag of the error process, ρ spatial autoregressive parameter and $\upsilon_{d,t}$ denotes an i.i.d. error term with zero expectation and variance σ_v^2. The error term for the period t can be written as:

$$\varepsilon_t = \rho \cdot W \cdot \varepsilon_t + \upsilon_t \tag{19}$$

The matrix W is the spatial row-normalized weighting matrix of dimension N x N[15]

[13] Unfortunately, because of data restrictions it is not possible to distinguish between different skill levels of natives in this study.
[14] For more details, see Suedekum et al. (2014).
[15] A matrix with the dimension 391 x 391 is used for this analysis.

and collects the weights $\omega_{i,r}$. In my case I use a simple contiguity matrix to allows for contiguous neighbors that affect each other. I specify a panel model with fixed effects to estimate the parameter ρ. As can be seen in Table 9, I still obtain positive rent effects for the diversity index. For the total share of foreigners, I obtain negative rent effects, which are in line with my previous findings. For the latter group the coefficient estimator is similar to the fixed-effects model significant at the 5 percent level. The outcomes do not change if we apply a modified approach developed by Kelejian and Prucha (2010). The authors use instrumental variables and the generalized-method-of-moments (GMM) to estimate the parameter ρ. These results confirm that my findings are robust to explicitly accounting for spatially correlated errors.

Table 9: *R*esults of spatial AR-model
Dependent variable: Rents

Independent variable	**Coefficient** (Std. Err.)
Diversity index	1.50***
	(0.081)
Share of foreigners	-0.01**
	(0.005)
Number of observations:	3,927
R^2	0.54

Lastly, instead of GDP per capita I also control for average income per capita. Of course, this indicator is heavily related to GDP, but may also affect the level of rents in a city. Including this regressor, however, does not seem to have much effect on the results of the base specification. In summary, the significance of diversity is remarkably robust to variations in the basic regression. On the whole, the base specification point estimates seem to provide an accurate estimate for the true parameter value: a 0.1 increase of the diversity index is associated with a 15 percent increase in rents.

7 Conclusions and Discussion

The aim of this paper is to examine the impact of immigration on the housing market across German districts. I find that the cultural composition of the population matters in people's housing decisions. I develop three hypotheses, i.e. on the one hand natives' preferences for cultural diversity and/or language similarity as a proxy for close cultural

ties between Germany and immigrants' country of origin. On the other hand the distaste of native residents against a huge number of foreigners. It is important to investigate these aspects in order to gain a better understanding of the impact of immigration on local markets and to gauge the consequences for the socio-demographic structure of the local population.

I first provide a theoretical guide to the empirical data showing that the effects of migration on rental prices at district level are solely driven by the changes in amenities perceived by natives. These variances in quality of life also influence the spatial distribution of natives within the districts. The empirical evidence demonstrates that a 0.1 increase in diversification of the residents with respect to their nationalities at the district level raises housing prices by 11-15 percent. This finding suggests that cultural diversity generates a clear improvement of local amenities as perceived by natives. Natives like to live in cities with different foreign nationalities because they value cultural diversity. One more striking finding of my study is that natives prefer to dwell in regions with a cultural background similar to themselves, which provides strong support for the home-culture-preference hypothesis. People in general favor locations with greater cultural similarity, and are willing to pay more for housing in those communities. Moreover, the size of the group of foreign residents in a district has a negative but insignificant impact on housing prices. But the arrival of new migrants generates an outflow of natives to other districts. Native outflows are even greater in districts characterized by adverse macroeconomic conditions. These results are robust in a series of extended analyzes in which I try to address different cultural diversity measures and endogeneity problems.

In recent years, many people immigrated to Germany and the top source countries of newcomers changed. The consequence is that the pattern of cultural diversity has shifted and is likely to alter further. It is unclear what effect the new composition of foreigners will have on the housing market. In fact, the housing market in Germany is undergoing a structural shift and is faced with due to the housing shortage major challenges. There are two main causes for this problem. 1) The aging of the German population, and 2) the increasing concentration of jobs in urban areas. On the one hand, the elderly are dependent on a well-functioning infrastructure (doctor, supermarket, transport), which should be easily accessible on foot. On the other hand, many workers wish partly for financial reasons (e.g. waiving of a second car) a certain proximity to their workplace. In addition, the propensity of immigrants to settle in the large urban areas (people go where the jobs are) could once again aggravate this situation. In general, the quality of life and job or training opportunities in cities are higher than in rural areas. This phenomenon attracts more and more people in the cities, which in turn can trigger rising rental prices in the city and declining in the countryside. The strained housing situation in cities is also

exacerbated by the fact that the subjective space requirement increases continuously. For example, a small apartment with a capacity for a four-person household in the 1930s is now mostly inhabited by a single person. The housing shortage in the metropolitan areas is therefore mainly caused by the (rational) behavior of the native population themselves. This existential problem can be eliminated by new buildings.

What remains to be identified for future research is the set of channels through which the arrival of immigrants causes changes of perceived amenities. When more data are available, one could also investigate the impact of immigration on mobility depending on the skill composition of natives. For example, it is possible that well-educated natives have a more positive attitude towards immigrants, because human capital theory claims that a higher level of education leads to a higher level of tolerance. That means having a considerable number of immigrants in a neighborhood would not lead to out-migration of higher educated natives.

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Appendix

Figure 4: Share of foreigners, 2013

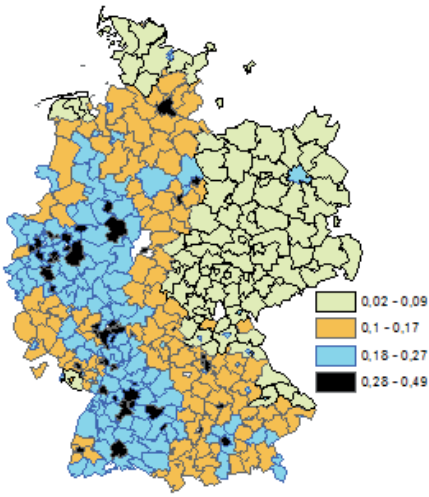
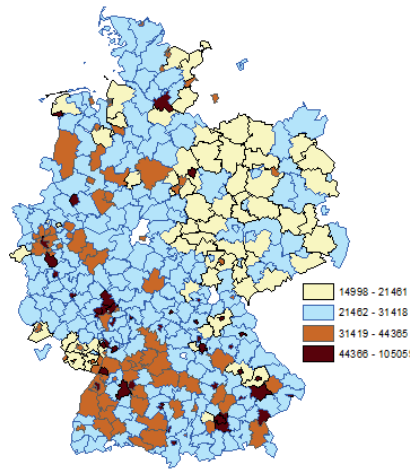


Figure 5: GDP per capita, 2012



Source: Own illustriation based on the German Federal Statistical Office.

Table 3: Regression results for Equation (14) - Explaining average Housing Prices

Independent variable:	(OLS)	(FE)	(IV)
Diversity index	1.53***	1.54***	1.09***
	(0.088)	(0.06)	(0.12)
Share of foreigners	-0.01	-0.03**	-0.07
	(0.017)	(0.036)	(0.019)
Unemployment rate	-0.03***	-0.01***	-0.08***
	(0.002)	(0.0004)	(0.002)
Log (GDP per capita)	0.02***	0.06**	0.03***
	(0.02)	(0.01)	(0.02)
(Log(Population/size)	0.08***	0.08**	0.20***
	(0.01)	(0.04)	(0.01)
Log(Total stock of dwellings/population)	-0.57***	-0.97***	-0.63***
	(0.084)	(0.026)	(0.19)
Area fixed effects	NO	YES	NO
R^2	0.45	0.35	0.61
F-test			49.09
Hansen J statistic			0.932
(p-value)			(0.63)

Note: Heteroskedasticity robust standard errors in parentheses. **Instruments:** shift share and gateway instrument. All models include time dummies.
Total number of observations: 3927. *** significance at 1 %, ** at 5 %, * at 10 %.
Source: Own illustration based on the Federal Statistical Office, FIRBUS and the Federal Criminal Police Office.