

What Makes Cities Attractive? The Determinants of Urban Labour Migration in Germany

Tanja Buch, Silke Hamann, Annekatriin Niebuhr and Anja Rossen

[Paper first received, March 2012; in final form, May 2013]

Abstract

Striking disparities characterise the population growth of cities in industrialised countries. Some cities suffer from ongoing population decline, whereas other cities have experienced increasing numbers of inhabitants in recent years. Whether labour market conditions or amenities via their impact on migration primarily account for differences in cities' demographic development is an important issue. This paper investigates the determinants of the migration balance of German cities between 2000 and 2007. The focus is on the mobility of workers because labour migration in particular affects the future prospects of cities. The findings suggest that not only labour market conditions but also amenities have an impact on the net migration rate. Moreover, large cities seem to be, *ceteris paribus*, more attractive than small cities. This finding possibly points to the importance of amenities such as cultural infrastructure and matching externalities in urban (labour) markets that are linked to city size. Urban policy aimed at enhancing the attractiveness of cities should thus consider both boosting the local economy and improving the quality of life.

Keywords: migration, cities, labour market conditions, amenities, Germany

1. Introduction

The demographic development of most cities in industrialised countries has been characterised by population decline for several decades (Glaeser and Gottlieb, 2006;

Tanja Buch is in the Institute for Employment Research, IAB Nord, Projensdorfer Str. 82, 24106 Kiel, Germany. Email: Tanja.Buch@iab.de.

Silke Hamann is in the Institute for Employment Research, IAB Baden-Württemberg, Hölderlinstr. 36, 70174 Stuttgart, Germany. Email: Silke.Hamann@iab.de.

Annekatriin Niebuhr is in the Department of Economics, Empirical Labour Economics and Spatial Econometrics, Christian-Albrechts-Universität zu Kiel, Olshausenstr. 40, 24098 Kiel, Germany. Email: niebuhr@economics.uni-kiel.de.

Anja Rossen is in the Hamburg Institute of International Economics (HWWI), Heimhuder Straße 71, 20148 Hamburg, Germany. Email: rossen@hwwi.org.

Fishman, 2005; Champion, 2001). Since the 1990s, however, a considerable number of studies have found evidence of widespread urban resurgence (for example, Cheshire, 2006; Storper and Manville, 2006) with partially re-increasing city populations and rising urban population shares. However, this reversed trend towards resurgence is not representative of all urban areas. Whereas cities such as New York and Chicago have experienced considerable population growth, other US cities have suffered from decline (Glaeser and Shapiro, 2003). Similarly, in Europe, London and Amsterdam are examples of resurgent cities, whereas other cities in the UK and the Netherlands are troubled with ongoing depopulation (see Champion and Townsend, 2011; Kloosterman, 2004).

Growth or decline of cities' populations is mainly driven by migration flows (Chen and Rosenthal, 2008). In line with this finding, Rodriguez-Pose and Ketterer (2012) argue that the ability to attract residents plays a fundamental role for cities' prospects. This ability becomes even more important in light of the demographic changes—i.e. population decline and ageing—that most European countries face. Information on the factors that influence the attractiveness of urban areas for migrants is therefore essential for local governances and urban planners (Royuela *et al.*, 2010). In principle, migration decisions result from the evaluation of local labour market conditions and location-specific amenities. There is, however, an ongoing debate on the main determinants of migration flows. Some authors note that labour market conditions are crucial (see Shapiro, 2006; or Scott, 2010). Others emphasise the relevance of amenities (Mueser and Graves, 1995; Glaeser and Gottlieb, 2006). Some authors believe that both groups of factors are relevant (Chen and Rosenthal, 2008; Rodriguez-Pose and Ketterer, 2012).

This study aims at contributing to the debate by adding some systematic empirical evidence on the factors that determine the net labour migration rates of German cities in the period from 2000 to 2007. We analyse the extent to which migration flows can be explained by urban labour market conditions and whether the specific amenities that cities offer matter. We focus on cities' *labour* migration and not—like most previous studies—on mobility of the overall population. Examining labour migration can provide more reliable results regarding the relative importance of labour market conditions and amenities. Employment prospects and wage levels should be of little importance for the migration decision of the non-active population. Analyses of migration flows of the entire population, which are principally used in existing studies, are likely to assign too much weight to other migration motives and might therefore underestimate the significance of labour market conditions.

To the best of our knowledge, there is no comprehensive evidence on the factors that influence the urban migration balance with a focus on worker mobility. Several studies examine the causes of interregional migration flows. However, they either do not refer to urban migration or do not consider the mobility of workers (see Scott, 2010, for a rare exception). Furthermore, the set of explanatory variables often tends to be fairly limited. Frequently, the investigations are restricted to only one group of factors—i.e. regional labour market disparities *or* amenities. In addition, there are almost no findings on the relationship between amenities and regional migration patterns in Europe.¹ Some case studies provide fairly detailed evidence on urban migration (for German cities, see for example, Kabisch *et al.*, 2010; Dittrich-Wesbuer *et al.*, 2008). However, the findings of case studies cannot be generalised.

For the analysis of urban labour migration and its determinants, Germany provides a particularly interesting example. Regional disparities in labour market performance are as striking as they are persistent. The endowment of amenities differs widely across cities and within-country migration is pronounced—in particular, between East and West Germany.² Moreover, demographic change is already a challenge to the economic and social perspectives of several regions and cities. However, disparities in urban population growth seem to follow neither differences in city size nor an East–West pattern (any more). Among the large central cities, we find both urban areas that show a significant population decrease in the first decade of this century (such as Essen) as well as cities with remarkable population growth (such as Munich). Of the medium-sized cities, Jena, located in East Germany, is an example of a rising city, whereas the West German city of Bremerhaven is bearing considerable population decline.

The paper is organised as follows. The next section provides a brief survey of the theoretical and empirical literature on labour mobility. Section 3 describes the data and the econometric analyses. We discuss the results of the regression analysis in section 4. Section 5 concludes the paper.

2. Literature

Migration theory discusses a variety of factors that influence migration decisions. Locational characteristics act as push or pull factors that repel or attract potential migrants. These regional attributes can be divided into labour market conditions, such as (un)employment and wage levels, and amenities, such as natural attractiveness, consumer facilities and public goods (Arntz, 2010).³ The empirical migration

literature has mainly considered the impact of regional labour market conditions. Some studies show that migration responds to (changes in) regional wage differentials and unemployment disparities (for example, Pissarides and McMaster, 1990; Etzo, 2011). Moreover, findings in Alperovich *et al.* (1977) suggest that not only wages and unemployment but also employment growth has an impact on migration. According to their results, job creation dampens out-migration and enhances in-migration.

Amenities and disamenities reflect living conditions and may also explain the attractiveness of a city as a place of residence. According to Glaeser and Gottlieb (2006), urban resurgence is caused *inter alia* by the rising demand for urban amenities.⁴ In the literature, the roles of various amenities are discussed. Some aspects, such as the availability of well-priced flats or the quality of flats, refer to the housing market (see Borck, 2007; Kemper, 2008). However, the interpretation of these variables is ambiguous; although a slack housing market and low costs of living might be seen as attractive urban conditions (Chen and Rosenthal, 2008), one has to keep in mind that availability and prices also mirror the value of a city with regard to the quality of life (Buettner and Ebertz, 2009). Moreover, the impact of amenities is, in general, less clear-cut than that of labour market conditions because “one person’s amenity is often the next person’s inconvenience” (Storper and Manville, 2006, p. 1252).

Other aspects of amenities by and large refer to the social structure of a city. Shapiro (2006) finds some evidence that a high percentage of skilled residents encourages the growth of consumer services, such as restaurants and bars, which in turn increases the attractiveness of the area for potential migrants. In addition, workers might benefit from the human capital in cities through

localised knowledge spillovers, which increase their productivity and wages (Rodriguez-Pose and Ketterer, 2012). Thus, the share of highly educated people should correlate positively with the labour migration balance of cities (Glaeser and Shapiro, 2001; Buettner and Ebertz, 2009). Ethnic diversity, in turn, may be considered as a proxy for a climate of tolerance and openness (Florida, 2002). Furthermore, ethnic heterogeneity is likely to be linked to a diversified supply of goods and services—i.e. urban consumption externalities. However, ethnic diversity might also lower the utility from public good consumption due to differentiated preferences on the type of public good to provide (Alesina and La Ferrara 2005). Thus, from a theoretical point of view, the relationship between ethnic diversity and migration is ambiguous.

A pleasant climate (Glaeser and Shapiro, 2001; Porell, 1982; Wang and Wu, 2011), nice landscape (Greenwood and Hunt, 1989) and recreation area (Porell, 1982) are first nature amenities that are supposed to increase the net migration rate of a city. As second nature amenities, we classify, for example, the public infrastructure (Alperovich *et al.*, 1977), health care facilities (Porell, 1982), the presence of a university (Buzar *et al.*, 2007) and touristic sites (Buettner and Ebertz, 2009).⁵ In contrast, disamenities, such as a high crime rate (Glaeser and Shapiro, 2001; Buettner and Ebertz, 2009), are expected to reduce the utility of the inhabitants of a city and its net migration rate. Because public infrastructure in large urban locations is manifold and broad compared with small cities, we suppose, in line with Fishman (2005), a special attractiveness of large central cities. Whereas the expected effect of the above-mentioned second nature amenities on the urban migration balance is unambiguous, the impact of population density is less clear-cut (Glaeser and Shapiro, 2001). On

the one hand, high population density can correspond with positive agglomeration effects, such as dense interpersonal communication (Glaeser, 2012). On the other hand, it might reflect significant congestion costs and result in less net migration.

Some case studies provide detailed evidence on the migration results of specific German cities. Differently from our study, they mainly focus on the relationship between the characteristics of migrants and the spatial structure of the city of interest. However, some of their results are relevant to our research question. Kabisch *et al.* (2010) investigate clusters of urban development in Leipzig and identify the health infrastructure as being positively related to the dynamics of the reurbanisation process. Dittrich-Wesbuer *et al.* (2008) find that appealing architecture, public traffic infrastructure and local shopping facilities explain the attractiveness of the city of Bonn.

In summary, the literature points to various factors that might influence the net migration rate of regions. But the determinants of mobility have not been comprehensively analysed yet—neither for cities nor for labour migration. Some authors concentrate on labour market variables and ignore the potential impact of amenities and vice versa. Other studies consider both factors but investigate only a very limited set of potential determinants.⁶ Furthermore, fairly detailed evidence frequently rests on case studies whose results cannot be generalised. This study contributes to the literature by incorporating various push and pull factors. Furthermore, we provide results that are representative of German cities. Our investigation is thus more encompassing than the issue of most previous studies. In addition, we make use of figures on the migration of workers because they should be more suitable for an investigation of the relative importance of labour market conditions

and amenities than data on the migration of the entire population.

3. Data and Econometric Model

The analysis of the migration balance of German cities rests on a panel dataset that covers the period from 2000 to 2007.⁷ Annual information on migration flows and their potential determinants is available at the NUTS 3 level (counties). We consider 71 German cities with at least 100,000 inhabitants, 59 of which are located in West Germany and 12 in East Germany (the area of the former German Democratic Republic). The city sizes vary between 100,000 in Kaiserslautern and 3.4 million in Berlin.⁸

We use the employee history of the Institute of Employment Research (IAB) to generate our migration data. The employment history provides detailed information on all workers covered by the social security system, *inter alia* the county of their residence. Thus, self-employed, family workers and civil servants are excluded from the analysis. In 2007, the number of employees in Germany was approximately 26.9 million—i.e. almost 70 per cent of total employment. After excluding part-time workers, apprentices and persons with missing information, our sample population consists of 15.8 million persons. Because the dataset covers the majority of German employees, our migration data should be representative of labour mobility. Migration is defined as the change of residence of full-time employees between two reference dates (30 June of the present and previous year).⁹ The net migration of a city is the difference between in- and out-migration. To account for city size, we apply the net migration rate—i.e. the net migration standardised by the city's number of employees.

To investigate the impact of various push and pull factors on labour mobility, we use

different data sources. Information on labour market indicators—i.e. the regional wage level, unemployment rate and employment growth—is taken from the employment register and the unemployment statistic of the Federal Employment Agency (FEA). The wage level is measured as the 40 per cent percentile of the distribution of daily wages in the city. This percentile is used to avoid bias because individual wage information is trimmed at the social security threshold. The employment statistic also provides information on the qualification structure of the city labour force that we use in the regression analysis.

Housing market indicators (for example, the average flat size per inhabitant and average land price per square metre), the share of recreation areas and accessibility (access to an international airport, motorways and high speed trains) are taken from the database of the BBSR. We use the regional price index of the BBSR as an indicator for the urban price level. We also consider population density as a proxy for positive or negative agglomeration effects that might influence the migration decision. The per capita debt of the municipalities is likely to point to restrictions on investments in public infrastructure. Amenities and disamenities are furthermore captured by the city's crime rate and health care infrastructure, indicators for the social structure of the urban population and some first nature characteristics.¹⁰ For a detailed description of the variables and data sources, see Table A1 in the Appendix.

The summary statistics in Table 1 reveal the huge disparities in the migration balance of German cities and with respect to potential determinants of labour mobility. The net migration rate ranges from a severe mobility loss of -26.5% for the East German city of Cottbus in 2001 to a significant net in-migration of $+9.3\%$ for the West German city of Fürth in 2005. The

Table 1. Summary statistics

	<i>Mean</i>	<i>S.D.</i>	<i>Minimum</i>	<i>Maximum</i>
<i>net migration rate</i>	-4.05	4.39	-26.50	9.34
<i>employment growth</i>	-0.37	2.09	-6.25	6.39
<i>wage level</i>	90.39	11.06	61.87	118.51
<i>unemployment rate</i>	11.64	3.73	4.43	22.74
<i>population density</i>	1.65	0.72	0.48	4.17
<i>crime rate</i>	111.66	59.04	23.26	348.73
<i>hospital beds per capita</i>	10.19	3.43	5.05	23.29
<i>share of foreigners</i>	12.75	5.67	1.08	26.28
<i>recreation area</i>	4.81	2.62	1.22	15.05
<i>tourist stays</i>	2.56	1.59	0.40	7.80
<i>share high skilled</i>	11.82	4.91	4.03	27.17
<i>flat size</i>	38.53	2.25	32.30	45.50
<i>municipal debt</i>	1.35	0.60	0.05	3.41
<i>land price</i>	187.44	157.91	14.64	1,296.84
<i>population</i>	333,793	452,680	96,786	3,404,037
<i>price index</i>	94.85	5.41	86.90	114.40
<i>seashore</i>	4.80	16.62	0	77
<i>sun</i>	2.92	0.19	2.60	3.32
<i>emissions</i>	2.79	0.41	2	3
<i>access airport</i>	39.75	24.52	7	125.40
<i>access train</i>	5.57	9.92	0	45.80
<i>access motorway</i>	6.48	3.24	0	15

differences in the urban migration balance correspond to the considerable differences in city unemployment rates. Although unemployment in Germany is marked by systematic East–West disparities, we detect the minimum and maximum level in the period under consideration among West German cities (Munich, 4.4 per cent in 2002; Bremerhaven, 22.7 per cent in 2006). Remarkable differences also characterise other explanatory variables, such as the share of recreation areas, which ranges from 1.1 per cent in Gera in 2000 to approximately 15.1 per cent in Halle in 2007.

The basic regression model that is applied to identify the factors behind differences in the migration balance of German cities is given by

$$nmr_{it} = \alpha + \sum_{k=1}^k \beta_k labourmarket_{kit-1} + \sum_{l=1}^l \gamma_l amenities_{lit-1} + \delta_i + \varepsilon_{it}$$

The dependent variable is the net migration rate of city i in year t —i.e. the migration balance divided by the number of employees in the city. We include two groups of factors as explanatory variables, labour market variables and indicators for urban amenities. All regressors are predetermined to account for the potential endogeneity of the explanatory variables. We estimate a pooled version of the model and a panel specification that controls for city-specific effects δ_i . The white-noise error term is given by ε_{it} .

There are some critical econometric issues in analysing the effects of various influential factors on the city migration balance. We address unobserved time-invariant city characteristics and potential simultaneity bias resulting from reverse causality between migration and some explanatory variables by including fixed effects δ_i , using predetermined explanatory variables and applying instrument variable (IV) estimation. We focus on the instrumentation of the labour market indicators.¹¹

4. Regression Results and Discussion

The results of several pooled regressions are summarised in Table 2. Our models explain a considerable proportion of the disparities in urban net migration rates. The adjusted R^2 varies between 0.42 and 0.55. Moreover, the significant coefficients indicate that various factors influence the migration balance of German cities. The results in the first column point to the important role that labour market conditions seem to play. All labour market indicators exert significant influence and the signs of the coefficients are in line with theoretical expectations. According to the results, cities that are marked by low unemployment, relatively high employment growth and high wages are attractive for mobile workers. Yet there are also different amenities that tend to affect the utility level of the urban workforce. The negative coefficient of the crime rate points to the relevance of disamenities in migration decisions. In contrast, the negative impact of the share of foreigners and the urban health care infrastructure partly contradict the theoretical discussion in section 2 as well as the results of Kabisch *et al.* (2010) for the city of Leipzig with respect to the latter variable.¹² Important amenities that increase the attractiveness of urban

areas are the availability of recreation areas and the quality of housing as indicated by flat size. These findings correspond with evidence by Rodriguez-Pose and Ketterer (2012) for a cross-section of European regions. However, that highly educated people have a favourable effect on the urban migration balance, which was a finding by Glaeser and Resseger (2010) and Rodriguez-Pose and Ketterer (2012), was not confirmed by our results.

In column (2), we add the land price to our basic model. The effect of land prices does not significantly differ from zero and the coefficient estimates of most variables are more or less unaffected by the inclusion of land prices.¹³ If we substitute land prices with a more comprehensive measure of urban costs of living (column (3)), we detect a significant correlation with the urban migration balance. Yet the sign of the effect does not correspond with standard migration models that emphasise a dampening impact of high price levels on utility and in-migration. We find that cities characterised by a relatively high price level tend to realise a rather strong net in-migration. Waldorf (2009) and Buettner and Ebertz (2009) argue that a high regional price level might, however, reflect an amenity-rich environment and a high quality of life, which confirms findings by Dittrich-Wesbuer *et al.* (2008), who show that a reputation as a desirable place to live seems to compensate for high costs of living in the case of the German city of Bonn. According to Dahlberg *et al.* (2012), the fact that high regional price levels do not seem to reduce in-migration is broadly consistent with the idea that amenities capitalise into prices.

In column (4), we also consider the municipal debt, which turns out to be of no relevance for the migration decision of workers. Column (5) shows the estimates for the most comprehensive pooled model that also includes several time-invariant

Table 2. Results of pooled regressions (dependent variable = net migration rate)

	(1)	(2)	(3)	(4)	(5)
<i>employment growth</i>	0.44*** (5.00)	0.47*** (4.79)	0.43*** (4.83)	0.39*** (4.16)	0.39*** (5.22)
<i>wage level</i>	0.11*** (5.31)	0.11*** (4.56)	0.10*** (4.81)	0.09*** (4.21)	0.12*** (5.85)
<i>unemployment rate</i>	-0.32*** (-4.97)	-0.21*** (-2.96)	-0.22*** (-3.01)	-0.16** (-2.05)	-0.11 (-1.47)
<i>population density</i>	0.08 (0.26)	-0.01 (-0.04)	-0.05 (-0.17)	0.01 (0.04)	-1.40*** (-4.15)
<i>crime rate</i>	-0.02*** (-5.81)	-0.03*** (-6.68)	-0.02*** (-6.00)	-0.03*** (-5.93)	-0.03*** (-5.56)
<i>hospital beds per capita</i>	-0.45*** (-9.00)	-0.43*** (-7.77)	-0.43*** (-8.26)	-0.40*** (-7.93)	-0.31*** (-6.32)
<i>share of foreigners</i>	-0.10* (-1.96)	-0.05 (-0.75)	-0.14** (-2.54)	-0.11** (-2.12)	-0.28*** (-4.26)
<i>recreation area</i>	0.23*** (2.77)	0.25*** (2.99)	0.22*** (2.62)	0.20** (2.34)	0.43*** (4.77)
<i>tourist stays</i>	0.18 (1.25)	0.24 (1.55)	-0.01 (-0.03)	0.08 (0.47)	0.22 (1.56)
<i>share high skilled</i>	0.01 (0.22)	0.02 (0.30)	-0.04 (-0.77)	-0.06 (-1.06)	-0.13** (-2.38)
<i>flat size</i>	0.17* (1.89)	0.19* (1.95)	0.23** (2.49)	0.25*** (2.70)	0.08 (1.00)
<i>land price</i>		0.00 (0.19)			
<i>price index</i>			0.18*** (2.65)	0.17** (2.42)	0.13** (2.15)
<i>municipal debt</i>				0.03 (0.09)	
<i>Dummy East</i>					-0.92 (-0.96)
<i>Dummy city type</i>					-2.12*** (-4.86)
<i>seashore</i>					-0.02* (-1.80)
<i>sun</i>					5.01*** (4.16)
<i>emissions</i>					-1.81*** (-3.31)
<i>access train</i>					-0.00 (-0.02)
<i>access airport</i>					-0.05*** (-4.59)
<i>access motorway</i>					0.25*** (4.28)
constant	-9.98** (-2.37)	-12.47*** (-2.75)	-27.61*** (-3.51)	-27.29*** (-3.41)	-26.49*** (-3.45)
Observations	515	429	515	482	515
R ²	0.430	0.457	0.437	0.441	0.563
Adjusted R ²	0.417	0.441	0.423	0.425	0.545
F-statistic	20.93	18.30	20.54	17.64	21.11

Notes: t-statistics in parentheses are based on robust standard errors. * significance at the 0.1 level; ** significance at the 0.05 level; *** significance at the 0.01 level.

regressors. The majority of effects identified in the previous specifications remain unaffected. However, the unemployment rate and the flat size are not significant in this extended model. By contrast, as indicated by the coefficient of the population density, we arrive at negative agglomeration effects in this specification. Moreover, the impact of highly skilled inhabitants now turns out to be significant. The adverse effect is, however, not in line with the theoretical arguments put forth in section 2 that suggest a positive impact of residents' human capital on the migration rate due to localised knowledge spillovers or growth of consumer services.

Turning to the additional explanatory variables, we do not observe a systematic disadvantage of East German cities once we control for urban labour market conditions and different amenities. Furthermore, the results point to important differences between small and large cities. The highly significant coefficient of the city type dummy indicates that small cities are, *ceteris paribus*, marked by less net in-migration than large cities,¹⁴ which points to specific benefits of living in large cities. These specific benefits might accrue from consumption of public goods such as theatres and other cultural infrastructure, which are only supplied if demand exceeds a certain threshold, as argued by Borck (2007). Climate, the environmental situation and accessibility seem to affect the residential choice of workers as well. Emissions decrease the migration balance of regions, whereas sunny locations attract mobile labour. Access to an international airport increases the average utility, whereas proximity of motorways seems to dampen net in-migration.¹⁵ Only the negative impact of the seashore is rather implausible but is in line with the evidence of Wang and Wu (2011). They show that, for US regions, an initially positive effect of the proximity of a

coast on population growth has turned negative in recent years. Altogether, the importance of different first and second nature amenities confirms the evidence provided by Rodriguez-Pose and Ketterer (2012) for European regions.

Table 3 summarises some robustness checks. The results of two fixed-effects models are displayed in columns (1) and (2). Taking into account unobserved time-invariant heterogeneity significantly changes the estimates, pointing to the omitted variable bias that affects the pooled regression results. The sizes of all the labour market effects on migration tend to decline. In contrast, findings for the crime rate, the recreation area and the flat size are rather robust. However, we notice substantial differences with respect to the foreign population share. While the pooled estimates point to a negative impact, the results in Table 3 suggest that ethnic diversity tends to increase the net migration rate. This is in line with Florida (2002) who argues that ethnic diversity reflects the openness of a city. Dahlberg *et al.* (2012) also detect a corresponding effect for the Stockholm region according to their arguments mainly driven by foreign-born immigrants who are drawn to immigrant-dense areas. Similarly, Gans (2000) traces the population growth of German cities back to the net in-migration of foreigners while the native population declines. However, the positive impact of the share of foreigners might also point to a differentiated supply of goods and services due to ethnic diversity, as argued by Alesina and La Ferrara (2005).

The inclusion of city-specific effects gives rise to a significant correlation of tourist stays per capita with migration flows pointing to the importance of tourist sites as amenities that seem to increase the utility of the population. Including land prices in the model (column (2)) does not result in noteworthy changes apart from

Table 3. Results of fixed effects and IV regressions (dependent variable = net migration rate)

	<i>Fixed effects</i>		<i>Fixed effects IV (2SLS)</i>	
	(1)	(2)	(3)	(4)
<i>employment growth</i>	0.27*** (3.64)	0.32*** (3.75)	0.33* (1.92)	0.24 (1.44)
<i>wage level</i>	0.06 (0.62)	0.12 (1.03)	0.67** (2.04)	0.30 (1.09)
<i>unemployment rate</i>	-0.12 (-0.98)	-0.16 (-1.16)	-1.48** (-2.25)	-0.84** (-2.14)
<i>population density</i>	-4.19 (-1.21)	-3.13 (-0.97)	-5.80 (-1.63)	-4.83 (-1.42)
<i>crime rate</i>	-0.01* (-1.69)	-0.02** (-2.33)	-0.02* (-1.70)	-0.01 (-1.38)
<i>hospital beds per capita</i>	-0.35* (-1.72)	-0.06 (-0.18)	0.18 (0.43)	-0.22 (-0.73)
<i>share of foreigners</i>	1.14*** (3.27)	1.14*** (3.33)	0.89** (2.45)	0.45 (1.58)
<i>recreation area</i>	0.64*** (5.94)	0.64*** (6.26)	0.77** (2.42)	0.36** (2.03)
<i>tourist stays</i>	1.47** (2.60)	1.53** (2.46)	1.09 (1.50)	1.09* (1.88)
<i>share high skilled</i>	-0.15 (-0.46)	-0.25 (-0.71)	-1.41* (-1.74)	-0.43 (-0.59)
<i>flat size</i>	1.46*** (3.89)	1.48*** (3.93)	0.94* (1.87)	1.05** (2.27)
<i>land price</i>		-0.00 (-1.13)		
Observations	515	429	488	485
R^2 , within	0.45	0.49	0.00	0.17
R^2 , between	0.14	0.15	0.17	0.12
R^2 , overall	0.16	0.19	0.13	0.10
F-statistic	19.04	44.84	8.28	11.28
<i>F-test of excluded IV</i>				
<i>employment growth</i>			24.06***	19.01***
<i>wage level</i>			15.31***	16.98***
<i>unemployment rate</i>			40.94***	45.06***
Hansen J-statistic (p-value)			0.049	0.291
Kleibergen–Paap LM test (p-value)			0.000	0.000
Anderson–Rubin test (p-value)			0.011	0.044

Notes: t-statistics in parentheses are based on robust standard errors. * significance at the 0.1 level; ** significance at the 0.05 level; *** significance at the 0.01 level. The IV regressions in columns (3) and (4) differ only with respect to instrumentation. Because some instruments are not available for all observations, changes in the number of observations arise. In column (3), the share of older workers, the shift share instrument and time lags of the unemployment rate and the wage level are applied as IV. In column (4), we instrument with the lagged employment growth instead of the lagged unemployment rate.

the effect of the endowment with hospital beds, which becomes insignificant in the second specification.¹⁶

The estimates of the labour market effects might also suffer from simultaneity bias. Columns (3) and (4) in Table 3 show the results of fixed-effects IV estimations that are applied to account for endogeneity of the labour market variables. As indicated by the different test statistics at the bottom of the table, the applied instruments should be valid—i.e. significantly correlated with the endogenous regressors and uncorrelated with the error term.¹⁷ The changes of the labour market effects are—more or less—in line with theoretical expectations because reverse causality should bias the coefficients towards zero. IV estimates tend to be larger in absolute value than their fixed-effects counterparts. However, the results are rather sensitive to changes in instrumentation. Moreover, the estimates of other explanatory variables are affected by the instrumentation as well. The influence of tourist stays and of the flat size declines, but the impact of the latter variable especially remains important. Furthermore, the favourable effect of the urban recreation area turns out to be very robust.

Finally, we investigate the city-specific effects because they might offer some additional information on important unobserved factors that influence the urban migration balance. Of course, the fixed effects will, to some extent, reflect the impact of the significant time-invariant factors that we considered in the pooled regression. However, they might well point to additional aspects that matter.¹⁸

Figure 1 shows the most characteristic feature of the city-specific effects, the correlation between city size and unobserved urban characteristics. The fixed effect tends to increase with the number of inhabitants. All big cities are marked by significant and positive fixed effects and seem to thus be

ceteris paribus more attractive than small cities for the mobile labour force, which confirms corresponding arguments regarding city size in Fishman (2005) and Glaeser and Gottlieb (2006). In particular, the large city-specific effects of Berlin and Munich are striking.¹⁹ With regard to Berlin, the highly significant fixed effect could point to the capital city function. Since Berlin has become the German capital after reunification it has experienced noticeable economic stimuli that are likely to have increased the attractiveness of the city for mobile workers. These effects *inter alia* result from being the seat of government which is accompanied by the settlement of embassies, interest groups and media offices and a rising attractiveness for investors. In addition, the positive correlation between city size and fixed effects might reflect a broad urban supply of (public) goods or matching externalities that arise in large (labour) markets. Another possible explanation for the city size effect is what Glaeser and Gottlieb (2006, p. 1281) have called “a feeling all their own” for large dense cities, which refers to every part of urban life.

There are several (small-sized) cities in West Germany, such as Salzgitter and Wolfsburg, where adverse time-invariant characteristics significantly reduce the net migration rate. For East German cities except Leipzig, Dresden, Halle and, of course, Berlin, we estimate negative fixed effects. The specific role of the large East German cities indicated by the estimates is consistent with the spatial polarisation in East Germany described by Herfert and Lentz (2006). Accordingly, these cities represent islands of growth surrounded by otherwise shrinking demographic space.

Our findings show that fairly different combinations of amenities and labour market performance are likely to result in a similar migration balance, suggesting some kind of compensation between different

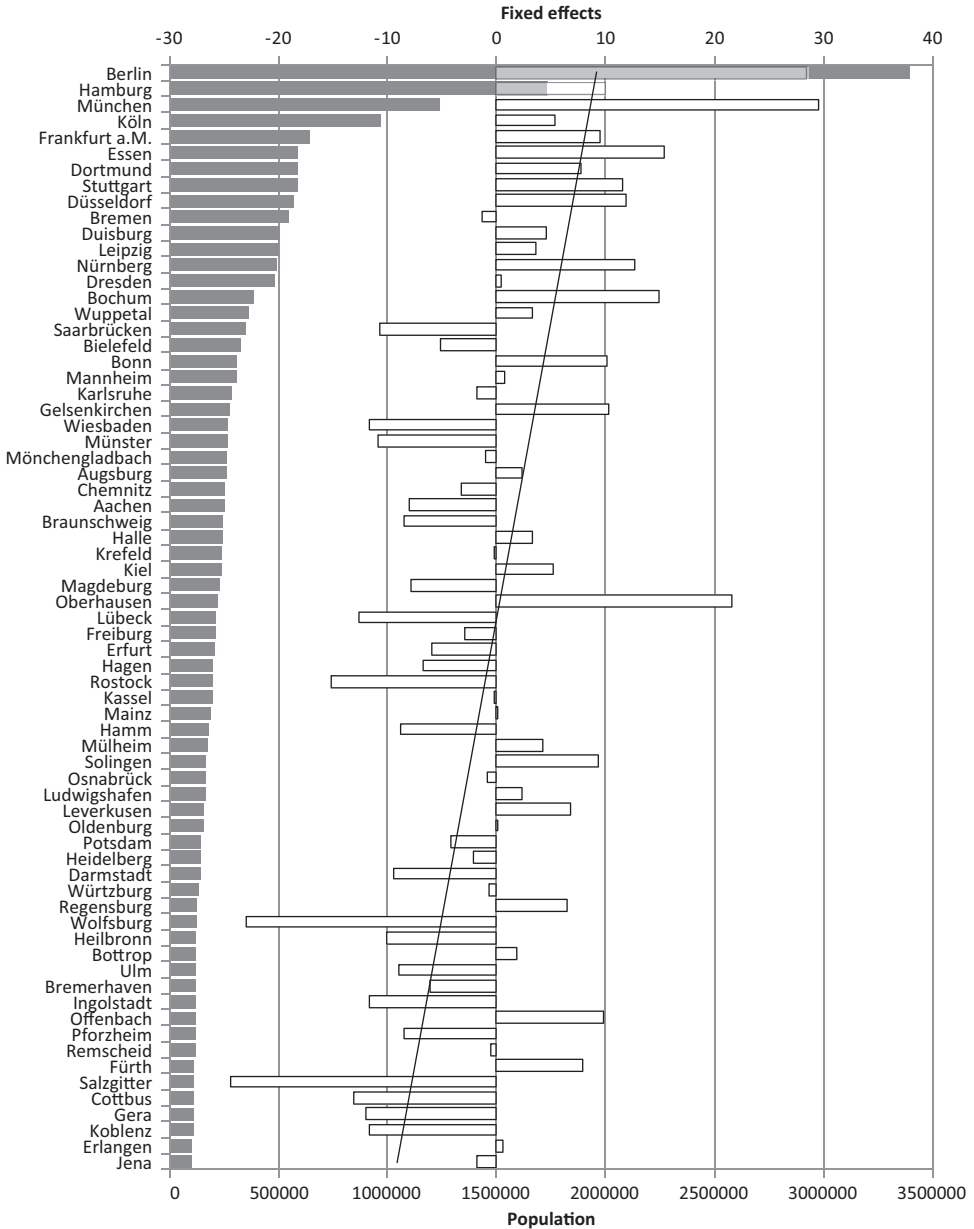


Figure 1. City-specific effects and city size.

Notes: Population refers to the mean number of inhabitants in the period 1999–2006.

(groups of) migration determinants. For instance, Munich is a city that combines both rather favourable labour market conditions, as indicated by the above-average

wages, high employment growth and low unemployment, and important amenities reflected by the large city-specific effects in Figure 1. In contrast, the above-average net

migration rate of Leipzig arises despite rather poor labour market conditions. The wage level is significantly below the city average, slightly fewer jobs have been generated, and the unemployment rate is approximately 7 percentage points above the mean value. Thus, the attractiveness of Leipzig seems to be mainly driven by the amenities that the city offers, which is in line with evidence of the rather persistent process of reurbanisation in Leipzig described in Kabisch *et al.* (2010). They discuss in detail the local settings of spatial, socioeconomic and residential-environment factors that are likely to promote favourable development and might be reflected by the city-specific effect. The attractiveness of Leipzig seems partly to relate to the past renovations of old buildings. By the end of the 1990s, there was an influx in the upper class segment in the urban housing market (Herfert and Lentz, 2006; Kabisch *et al.*, 2010).

Finally, Ingolstadt provides an example in which a completely different combination of labour market conditions and amenities is linked to one of the highest net migration rates in the cross-section. As indicated by Figure 1, the city is rather small and shows a negative city-specific effect. However, from an economic perspective, the area is one of the most prosperous regions as one of the main locations of automotive manufacturing in Germany. Ingolstadt shows one of the lowest unemployment rates among all cities and the specialisation of the regional economy is associated with above-average wages and the highest employment growth of all the cities considered in our analysis.

5. Conclusions

In this paper, we have investigated the determinants of the labour migration balance of German cities. Our results suggest that, in line with theoretical expectations, local

labour market conditions influence mobility decisions. There is some indication that cities marked by relatively high wages, low unemployment and the creation of many new jobs attract mobile labour. However, the quality of life that a city offers matters for the residential choice of workers as well, which is reflected by the robust effects of some first and second nature amenities such as recreation areas, climatic conditions and accessibility. Moreover, the urban housing market is a key factor of the city's migration balance. There is, however, no robust evidence on the importance of the urban population's social structure. The estimates for the urban crime rate and emissions indicate that we also need to consider the unfavourable impact of different disamenities that reduce the utility of inhabitants of a city. In summary, our results show that in discussing the determinants of cities' attractiveness, a focus on economic conditions would neglect some influential aspects.

The ability to attract workers is of the utmost importance for cities' future prospects. Our findings thus provide useful information for local governments and urban planners. The results suggest that there might be some room for compensation among various push and pull factors; thus, different strategies could be pursued by local governments with regard to policy measures to increase the attractiveness of a city for workers. In line with arguments by Rodriguez-Pose and Ketterer (2012) and Partridge (2010), this finding implies that urban areas that do not offer, for example, first nature amenities, have to provide favourable economic conditions or second nature amenities to compensate for the disadvantage. With respect to Germany, cities, especially in the eastern part of the country and the old industrialised Ruhr area, face severe demographic challenges due to significant net out-migration. The local governments of these areas should try to boost

the local economy to improve poor labour market conditions but should also increase the quality of life in their cities. Urban policies are likely to be more successful when considering labour market conditions as well as amenities.

Yet urban policy could also seize a more general strategy of promoting tolerance and openness—i.e. a positive urban image. The evidence on city-specific effects indicates that big cities in particular seem to possess a special image. Klaus Wowereit, the mayor of Berlin, has, for example, advertised his city as “poor but sexy” (see also Storper and Manville, 2006). Some cities might thus offer something beyond labour market conditions and amenities that make them a pleasant and interesting place to live. However, Storper and Manville (2006, p. 1252) advise policy-makers against the idea of overbearing their ‘Dullsville image’ by corresponding campaigns. Even if we assume that the ‘spirit’ of a city can, in principle, be successfully influenced, this might be a promising option for some (large) cities such as Berlin or Munich but is most likely not to be for the majority of smaller central cities, such as Salzgitter or Wolfsburg. For the latter group of cities, a policy focus on labour market conditions and amenities constitutes a more promising way of attracting mobile labour.

There are still some open issues regarding urban migration that are left for future research. It is likely that preferences for various types of amenities and the significance of labour market conditions differ between groups of workers. In particular, we might well expect corresponding variations across levels of educational attainment. With regard to the specific role of human capital in the economic prospects of regions, qualification-specific patterns are an important topic. Moreover, we have not addressed the relationship between international and interregional migration in this analysis.

Because cities are the main destinations of international migration, these migration flows are an important component of the urban migration balance and are most likely to impact the attractiveness of locations for domestic migration.

Acknowledgements

The authors have benefited from useful discussions with seminar participants at the Annual Meeting of the Western Regional Science Association and the ERSA Conference 2012. The authors would also like to thank the Editor, anonymous referees and Stefan Fuchs for their very helpful comments and suggestions for an earlier version of this paper. The usual disclaimer applies.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Notes

1. Rodriguez-Pose and Ketterer (2012) recently presented first findings.
2. The differentiation between East and West Germany refers to the territories of the two former German states—i.e. East Germany to the German Democratic Republic and West Germany to the Federal Republic of Germany.
3. Apart from regional characteristics, there are factors on the individual level, such as housing tenure (Lux and Sunega, 2012) or social networks (Simpson *et al.*, 2008), that impact the mobility decision. We address regional characteristics because they are relevant for urban policy.
4. Storper and Manville (2006) note, however, that it is unclear whether amenities are a symptom of urban growth or its source.
5. Dahlberg *et al.* (2012) provide evidence on the differentiated effects of local public services on migration in the Stockholm region and a brief review of the corresponding international literature.

6. The only exception is a recent investigation by Rodriguez-Pose and Ketterer (2012) who consider a rather broad set of economic and amenity-based characteristics in their analysis of regional migration patterns in Europe. However, they do not focus on mobility of workers and urban migration pattern.
7. The panel dataset is unbalanced. We have 568 city-year observations for the net migration rate. However, for several explanatory variables, observations are missing. Therefore, the number of observations included in the regression analysis depends on the specification of the model.
8. The selection of cities is based upon the classification of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). The BBSR classification distinguishes 9 types of NUTS 3 regions according to their settlement structure. The cities in our study belong to types 1 (central cities in agglomeration areas with more than 100,000 inhabitants) and 5 (central cities in urbanised areas with more than 100,000 inhabitants). Two cities with more than 100,000 inhabitants (Hannover, Herne) are not included in our analysis due to data restrictions.
9. The sample population also consists of workers with spells of unemployment and non-participation between the reference dates.
10. Information on climate and environmental burdens is only available on the NUTS 2 level. However, we might well assume that the variation of these variables within the regions is modest and that the regional value provides an appropriate approximation of conditions characterising the corresponding city.
11. As instruments, we use the time lags of the endogenous regressors (lagged by 5 years), the employment share of the age group 45 to 59 years (lagged by 5 years) and a shift share variable—i.e. the weighted average of nation-wide employment growth by 222 branches with weights corresponding to city-specific employment shares of the branches (see Moretti, 2010).
12. The result for the hospital beds per capita is in line with evidence in Glaeser and Shapiro (2001), who detect a negative correlation between a city's employment in the health care industry and urban growth. Our finding is likely to be driven by reverse causality—i.e. net out-migration will temporarily increase the number of hospital beds per inhabitant if the endowment is adjusted to population changes only with a certain time lag. Unreported IV regressions confirm this: if we only instrument the number of hospital beds per inhabitant, we obtain a significant and positive impact on the net migration rate. Corresponding results are available upon request.
13. There is one exception; the impact of the share of foreigners declines towards insignificance in the extended model, which is most likely to be caused by the strong correlation with land prices. Again, land prices have no important impact on the urban migration balance once we include the land prices instead of the share of foreigners in the model of column (1).
14. The dummy variable is based on the classification of the BBSR explained in section 3, which virtually corresponds with the distinction between large and small cities. The mean population of the first group of cities is around 440,000, whereas the average size of latter group is approximately 160,000 inhabitants.
15. Note that accessibility is measured as the average driving time to an airport or a motorway. Thus, the negative coefficient of airport accessibility implies that the urban migration balance declines with increased driving time to an international airport.
16. We cannot consider the regional price index in the fixed effects models because the information is only available as an average for several years.
17. The Hansen J-statistic suggests that we cannot reject the hypothesis that the instruments are exogenous. Moreover, according to the Kleibergen–Paap LM tests, our instruments should be adequate for identification of the model, which is confirmed by the F-

statistics of excluded instruments and the Anderson–Rubin test on the joint significance of our labour market indicators.

18. We apply a constrained regression to determine the city fixed effects in which the sum of the fixed effects is set to zero to avoid perfect multicollinearity. Thus, there is no need to define a reference city and we can interpret the fixed effects relative to the city average. The results provide only tentative evidence because a consistent estimation of fixed effects is not possible when the cross-sectional dimension is large compared with the time dimension. The cities of Zwickau and Kaiserslautern are excluded from the constrained regression due to some missing observations.
19. Only one medium sized-city located in the Ruhr agglomeration (Oberhausen) achieves a fixed effect of similar size.

References

- Alesina, A. and La Ferrara, E. (2005) Ethnic diversity and economic performance, *Journal of Economic Literature*, 43(3), pp. 762–800.
- Alperovich, G., Bergsman, J. and Ehemann, C. (1977) An econometric model of migration between US metropolitan areas, *Urban Studies*, 14(2), pp. 135–145.
- Arntz, M. (2010) What attracts human capital? Understanding the skill composition of inter-regional job matches in Germany, *Regional Studies*, 44(4), pp. 423–441.
- Borck, R. (2007) Consumption and social life in cities: evidence from Germany, *Urban Studies*, 44(11), pp. 2105–2121.
- Buettner, T. and Ebertz, A. (2009) Quality of life in the regions: results for German counties, *The Annals of Regional Science*, 43(1), pp. 89–112.
- Buzar, S., Ogden, P., Hall, R., Haase, A. et al. (2007) Splintering urban populations: emergent landscapes of reurbanisation in four European cities, *Urban Studies*, 44(4), pp. 651–677.
- Champion, T. (2001) Urbanization, suburbanization, counterurbanization and reurbanization, in: R. Paddison (Ed.) *Handbook of Urban Studies*, pp. 143–161. London: Sage.
- Champion, T. and Townsend, A. (2011) The fluctuating record of economic regeneration in England's second-order city-regions, 1984–2007, *Urban Studies*, 48(8), pp. 1539–1562.
- Chen, Y. and Rosenthal, S. (2008) Local amenities and life-cycle migration: do people move for jobs or fun?, *Journal of Urban Economics*, 64(3), pp. 519–537.
- Cheshire, P. (2006) Resurgent cities, urban myths and policy hubris: what we need to know, *Urban Studies*, 43(8), pp. 1231–1246.
- Dahlberg, M., Eklöf, M., Fredriksson, P. and Jofre-Monseny, J. (2012) Estimating preferences for local public services using migration data, *Urban Studies*, 49(2), pp. 319–336.
- Dittrich-Wesbuer, A., Föbker, S. and Osterhage, F. (2008) Demographic change and migration in city regions: results from two German case studies, *Zeitschrift für Bevölkerungswissenschaft*, 33(3/4), pp. 315–350.
- Etzo, I. (2011) The determinants of the recent interregional migration flows in Italy: a panel data analysis, *Journal of Regional Science*, 51(5), pp. 948–966.
- Fishman, R. (2005) The fifth migration, *Journal of the American Planning Association*, 71(4), pp. 357–366.
- Florida, R. (2002) Bohemia and economic geography, *Journal of Economic Geography*, 2(1), pp. 55–71.
- Gans, P. (2000) Urban population change in large cities in Germany, 1980–64, *Urban Studies*, 37(9), pp. 1497–1512.
- Glaeser, E. L. (2012) *Triumph of the City: How our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: The Penguin Press.
- Glaeser, E. L. and Gottlieb, J.-D. (2006) Urban resurgence and the consumer city, *Urban Studies*, 43(8), pp. 1275–1299.
- Glaeser, E. L. and Resseger, M. G. (2010) The complementarity between cities and skills, *Journal of Regional Science*, 50(1), pp. 221–244.
- Glaeser, E. L. and Shapiro, J. M. (2001) *Is there a new urbanism? The growth of U.S. cities in the 1990s*. Working Paper No. 8357, National Bureau of Economic Research.
- Glaeser, E. L. and Shapiro, J. M. (2003) Urban growth in the 1990s: is city living back?, *Journal of Regional Science*, 43(1), pp. 139–165.

- Greenwood, M. J. and Hunt, G. L. (1989) Jobs versus amenities in the analysis of metropolitan migration, *Journal of Urban Economics*, 25(1), pp. 1–16.
- Herfert, G. and Lentz, S. (2006) New spatial patterns of population development as a factor in restructuring eastern Germany, in: S. Lentz (Ed.) *Restructuring Eastern Germany*, pp. 91–106. Berlin: Springer.
- Kabisch, N., Haase, D. and Haase, A. (2010) Evolving reurbanisation? Spatio-temporal dynamics as exemplified by the East German city of Leipzig, *Urban Studies*, 47(5), pp. 967–990.
- Kemper, F. J. (2008) Residential mobility in East and West Germany: mobility rates, mobility reasons, reurbanization, *Zeitschrift für Bevölkerungswissenschaft*, 33(3/4), pp. 293–314.
- Kloosterman, R. C. (2004) Recent employment trends in the cultural industries in Amsterdam, Rotterdam, The Hague and Utrecht: a first exploration, *Tijdschrift voor Economische en Sociale Geografie*, 95(2), pp. 243–253.
- Lux, M. and Sunega, P. (2012) Labour mobility and housing: the impact of housing tenure and housing affordability on labour migration in the Czech Republic, *Urban Studies*, 49(3), pp. 489–504.
- Moretti, E. (2010) Local multipliers, *American Economic Review*, 100(2), pp. 373–377.
- Mueser, P. R. and Graves, P. E. (1995) Examining the role of economic opportunity and amenities in explaining population distribution, *Journal of Urban Economics*, 37(2), pp. 176–200.
- Partridge, M. D. (2010) The duelling models: NEG vs. amenity migration in explaining US engines of growth, *Papers in Regional Science*, 89(3), pp. 513–536.
- Pissarides, C. A. and McMaster, I. (1990) Regional migration, wages and unemployment: empirical evidence and implications for policy, *Oxford Economic Papers*, 42(4), pp. 812–831.
- Porell, F. W. (1982) Intermetropolitan migration and quality of life, *Journal of Regional Science*, 22(2), pp. 137–158.
- Rodriguez-Pose, A. and Ketterer, T. D. (2012) Do local amenities affect the appeal of regions in Europe for migrants?, *Journal of Regional Science*, 52(4), pp. 535–561.
- Royuela, V., Moreno, R. and Vaya, E. (2010) Influence of quality of life on urban growth: a case study of Barcelona, Spain, *Regional Studies*, 44(5), pp. 551–567.
- Scott, A. J. (2010) Jobs or amenities? Destination choices of migrant engineers in the USA, *Papers in Regional Science*, 89(1), pp. 43–64.
- Shapiro, J. M. (2006) Smart cities: quality of life, productivity, and the growth effects of human capital, *The Review of Economics and Statistics*, 88(2), pp. 324–335.
- Simpson, L., Gavalas, V. and Finney, N. (2008) Population dynamics in ethnically diverse towns: the long-term implications of immigration, *Urban Studies*, 45(1), pp. 163–183.
- Storper, M. and Manville, M. (2006) Behaviour, preferences and cities: urban theory and urban resurgence, *Urban Studies*, 43(8), pp. 1247–1274.
- Waldorf, B. (2009) Is human capital accumulation a self-propelling process? Comparing educational attainment levels of movers and stayers, *Annals of Regional Science*, 43(2), pp. 323–344.
- Wang, C. and Wu, J. J. (2011) Natural amenities, increasing returns and urban development, *Journal of Economic Geography*, 11(4), pp. 687–707.

Appendix

Table A1. Variable definitions and data sources

<i>Label</i>	<i>Variable</i>	<i>Source</i>	<i>Period</i>
<i>net migration rate</i>	Migration balance divided by corresponding employment (‰)	Employee history, the Institute for Employment Research	2000–2007
<i>employment growth</i>	Growth rate of employment subject to social security (percentage)	Employment statistics, the Federal Employment Agency	1995–2006
<i>wage level</i>	40 per cent percentile of the distribution of daily wages	Employee history, the Institute for Employment Research	1995–2006
<i>unemployment rate</i>	Number of unemployed persons divided by labour force (percentage)	Unemployment statistics, the Federal Employment Agency	1995–2006
<i>population density</i>	Population per square metre	Regionaldatenbank Deutschland, the Federal Statistical Office	1999–2006
<i>crime rate</i>	Number of (robbery) cases per 100,000 inhabitants	Crime statistics, Germany's Federal Criminal Police Office	1999–2006
<i>hospital beds per capita</i>	Number of hospital beds per 1000 inhabitants	Regionaldatenbank Deutschland, the Federal Statistical Office	1999–2006
<i>share of foreigners</i>	Number of foreigners divided by the total population (percentage)	Regionaldatenbank Deutschland, the Federal Statistical Office	1999–2006
<i>recreation area</i>	Recreation area (urban green space, parks, allotment gardens, sport fields, campsites) divided by the total area (percentage)	Regionaldatenbank Deutschland, the Federal Statistical Office	1999–2006
<i>tourist stays</i>	Number of overnight stays in tourist accommodation establishments per capita	INKAR database—indicators and maps on spatial development, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	1999–2006
<i>share high skilled</i>	Number of highly skilled workers (university degree) at place of residence divided by the total number of workers (percentage)	Employment statistics, the Federal Employment Agency	1999–2006
<i>flat size</i>	Average flat size per inhabitant (square metres)	INKAR database—indicators and maps on spatial development, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	1999–2006

(continued)

Table A1. (Continued)

<i>Label</i>	<i>Variable</i>	<i>Source</i>	<i>Period</i>
<i>land price</i>	Average land price per square metre (€)	Regionaldatenbank Deutschland, the Federal Statistical Office of Germany	1999–2006
<i>price index</i>	Average regional price index; Bonn = 100	Regional price index of the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2005–2009
<i>municipal debt</i>	Communities' debts per capita (€1000)	“Regionaldatenbank Deutschland” of the Federal Statistical Office of Germany	1999–2006
<i>seashore</i>	Length of seashore as the percentage of region's perimeter	Data from the Study Program on European Spatial Planning of the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2000
<i>sun</i>	Mean annual sunshine radiation (kilowatt hours per square metre)	Data from the Study Programme on European Spatial Planning, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2000
<i>emissions</i>	Emissions of acidifying gases (scale: 1 (low) to 3 (high))	Data from the Study Programme on European Spatial Planning, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2000
<i>access train</i>	Average driving time to the next fast train station (minutes)	INKAR database—indicators and maps on spatial development, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2007
<i>access airport</i>	Average driving time to the next international airport (minutes)	INKAR database—indicators and maps on spatial development, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2007
<i>access motorway</i>	Average driving time to the next motorway junction (minutes)	INKAR database—indicators and maps on spatial development, the Federal Institute for Research on Building, Urban Affairs and Spatial Development	2007