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## Jobs or Amenities – What determines the migration balances of cities?

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## ***Jobs or Amenities – What determines the migration balances of cities?***

Tanja Buch<sup>(a)</sup>, Silke Hamann<sup>(b)</sup>, Annekatrien Niebuhr<sup>(a),(c)</sup>, Anja Rossen<sup>(d)</sup>

### **Abstract**

The population growth of cities in industrialized countries is characterized by striking disparities. While some cities experience a kind of resurgence in recent years others suffer from an ongoing depopulation. In this context an important issue refers to the question whether labour market conditions or amenities primarily account for the huge differences in cities' demographic prospects. We investigate the determinants of migration balances of German cities between 2000-2007 focussing on mobility of workers and the significance of jobs and amenities. Our findings suggest that labour market conditions as well as amenities impact on the net migration rate. Furthermore, large cities seem to be ceteris paribus more attractive than small cities. This result possibly points to the importance of amenities such as cultural infrastructure and matching externalities in urban (labour) market that are linked to city size.

Key Words: migration, cities, labour market conditions, amenities, Germany

JEL: C23, J61, R23

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## 1 Introduction

The demographic development of most cities in industrialised countries has been characterized by population decline for several decades (Glaeser and Gottlieb, 2006; Fishman, 2005; Champion, 2001). Since the 1990s however, with partly re-increasing city population and rising urban population shares, a considerable number of studies discusses evidence of a widespread urban resurgence (e.g. Cheshire, 2006; Storper and Manville, 2006). The literature offers diverging explanations for the resurgence tendency (summarized in Kemper, 2008). One theoretical argument refers to demographic trends, particularly in terms of changing population structure, that are accompanied by a rising importance of non-traditional household forms. The growing groups of singles, lone parents and cohabiting couples prefer living in cities (Ogden and Hall, 2000). Another approach gives special emphasis to increasing demand for urban amenities in general (Borck, 2007) and a third argument focuses on structural change caused by a rising importance of agglomeration economies in fast growing knowledge-based sectors (Greenwood and Hunt, 1989).

The trend reversal toward resurgence – also named ‘rebirth’, ‘comeback’ or ‘renaissance’ of cities (Storper and Manville, 2006, p. 1248) – is not representative for all urban areas. While e.g. New York or Chicago achieves a considerable population growth, other US cities declined (Glaeser and Shapiro, 2003). Corresponding disparities can be observed in European countries where London and Amsterdam are quoted as characteristic examples of resurgence while other cities in the UK and the Netherlands suffer from ongoing depopulation (see Champion and Townsend, 2011; Kloosterman, 2004). Germany offers some demonstrative examples for this diverse development too (Kabisch et al., 2010): whereas several cities mainly in the Eastern part of the country experience a persistent process of population decline, many West German cities attain an increasing number of inhabitants. For instance, the population of Gera, a city located in East Germany, diminishes by more than 12% between 2000 and 2010 whereas Munich shows a growth of 12% during the same period.<sup>1</sup>

Given this differentiated development, the question arises which factors trigger the huge disparities in cities’ population growth rates. In this context it is reasonable to focus on migration because population change is mainly driven by migration flows (Chen and Rosenthal,

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<sup>1</sup> However, the disparities in urban population growth do not follow a simple East-West pattern. Some cities in West Germany have to bear a significant decline of population while one can also observe resurgence tendencies for some East German cities (Kemper 2008) – Potsdam for example scaled up its size by 20% between 2000 and 2010.

2008). The migration decision of people results from an evaluation of location specific amenities and local labour market conditions. There is an ongoing controversial discussion on the main determinants of interregional migration flows. Some authors point out the crucial role of labour market conditions while others emphasise the relevance of amenities. Mueser and Graves (1995) for example stress the contribution of life quality to population growth. Glaeser and Gottlieb (2006) argue that big cities experience a renaissance as places of consumption, not production.<sup>2</sup> In contrast, Shapiro (2006) and Scott (2010) state that jobs and wages matter much more than location-specific amenities. Yet some authors believe that both groups of factors are relevant (Alperovich et al., 1977; Beckstead et al., 2008; Chen and Rosenthal, 2008). Indeed, Porell (1982, p. 137) asserts that “rational individuals will trade-off income for increased quality of life consumption via geographic mobility”. Literature thus offers no clear-cut conclusions concerning the determinants of urban migration balances.

Our study aims at contributing to this controversial debate by adding some systematic empirical evidence on the factors that determine the net migration rates of German cities in the 2000–2007 period. To what extent can migration flows be explained by urban labour market conditions and which impact can be ascribed to the amenities that cities offer? With focusing on cities’ migration balances we choose a rather direct measure of urban attractiveness – in contrast to studies that use employment growth or other indicators. Our analysis does not focus on mobility of the overall population but on migration flows of workers. Examining labour migration should provide more reliable results as regards the relative importance of labour market conditions and amenities since employment prospects and the wage level should be of little importance for the migration decision of the non-active population. Analysing migration flows of the entire population thus likely assigns too much weight to other migration motives and might therefore underestimate the significance of labour market conditions. Besides, labour mobility becomes increasingly important for the economic prospects of cities as demographic change comes along with a notable decline of the work force in most European countries. There are – mainly due to data restrictions – only few studies as yet (for example Scott, 2010) that have focused on mobility of employees when considering the attractiveness of cities.

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<sup>2</sup> Testing the determinants discussed in new economic geography (NEG) models against the factors favored in amenity based models Partridge (2010) concludes that regional growth patterns in the US are consistent with amenity-led migration.

Both the striking and persistent disparities in labour market performance and amenities across cities and the high internal migration – in particular between East and West Germany – predestine the country for an analysis of the determinants of urban migration balances. Moreover, massive demographic changes are already visible in several regions, notably in East Germany, and affect the economic and social perspectives of cities. Our findings indicate that both, jobs as well as (dis)amenities influence urban migration balances in Germany. Furthermore, city-specific effects point to an important impact of the city size. Large cities seem to be *ceteris paribus* more attractive for mobile workers than small cities. This result possibly reflects the significance of amenities such as cultural infrastructure, matching externalities in urban (labour) market or a special urban image that are linked to city size.

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

## **2 Literature**

Migration theory discusses a wide variety of factors that influence the migration decision. Push or pull factors (Lee, 1966) attract or repel potential migrants. The underlying assumption is that location characteristics influence the utility level that individuals attain by moving into or staying in a certain region. The utility linked with a mobility decision depends on individual preferences for region-specific attributes. These attributes can be divided into labour-market conditions such as (un)employment and wage level and amenities like natural attractiveness, consumer facilities and public goods (Arntz, 2010). In this framework an unfavourable local characteristic can be compensated by an attractive one that contributes to a high utility level (Schwartz, 1973; Hunt and Mueller, 2004). Individuals move if the gain from moving exceeds the costs of migration. The migration balance of a region can thus be understood as a function of the sum of individual utility levels (Sjaastad, 1962).

The empirical migration literature focuses on the role of regional labour market conditions for mobility decisions of workers. The returns to migration are supposed to depend on regional unemployment and the wage level. Graves (1998) shows that in-migration is indeed a function of regional wage differentials. Pissarides and Mc Master (1990) confirm the significance of wages, however, detecting that interregional migration responds to changes in rela-

tive wages rather than to the level of wage differentials. Unemployment disparities proxy differences in employment prospects of regional labour markets (Harris and Todaro, 1970). Pissarides and Mc Master (1990) and Graves (1998) provide evidence on an adverse effect of unemployment on migration. Etzo (2011) confirms for Italy that high unemployment is an important push-factor. Moreover, findings in Alperovich et al. (1977) suggest that not only wages and unemployment impact migration but also employment growth.

Besides labour market indicators amenities and disamenities that reflect living conditions may explain the attractiveness of a city as place of residence. According to Glaeser and Gottlieb (2006) urban resurgence is inter alia caused by the rising demand for urban amenities.<sup>3</sup> In the literature the role of various amenities is discussed. Some aspects like the availability of well-priced flats or the quality of flats refer to the housing market (see Borck, 2007; Kemper, 2008). But the interpretation of these variables is not unambiguous: 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 mirror the value of a city as regards quality of life (Buettner and Ebertz, 2009). Moreover, the impact of amenities is in general less clear-cut than the considerations about the labour market conditions as “one person’s amenity is often the next person’s inconvenience” (Storper and Manville, 2006, p. 1252.)

Other aspects of amenities refer by and large to the social structure of a city. Well educated individuals for example are supposed to improve the urban life quality as they are more likely to support cultural amenities and assumed to be more tolerant (Florida, 2002). The share of highly educated people should thus correlate positively with the migration balance of urban regions (Glaeser and Shapiro, 2001; Buettner and Ebertz, 2009). Ethnic diversity may as well be seen as a proxy for a climate of tolerance and openness and is also expected to increase net in-migration (Glaeser et al., 2001).

First nature amenities such as pleasant climatic conditions (Glaeser and Shapiro, 2001; Porell, 1982; Wang and Wu, 2011), a nice landscape (Greenwood and Hunt, 1989) or recreation area (Porell, 1982) are supposed to influence 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) and availability of touristic sites (Buettner and Ebertz,

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<sup>3</sup> Storper and Manville (2006) note, however, that it is unclear whether amenities are source of urban growth or a symptom.

2009). Corresponding disamenities refer for example to poor municipal financial status (Royuela et al., 2010) or a high crime rate (Glaeser Shapiro, 2001; Buettner and Ebertz, 2009), that is assumed to go hand in hand with low in-migration. As public infrastructure in large urban locations is manifold and broad compared to small cities, we finally suppose in line with Fishman (2005) a special attractiveness of big core cities. While the effect of the above-mentioned second nature amenities on urban migration balances is unambiguous the impact of population density is less clear-cut (Alperovich et al., 1977; Glaeser and Shapiro, 2001). On the one hand high population density can come along with some positive agglomeration effects like dense interpersonal communication (Glaeser, 2012) but on the other hand there might be significant congestion costs.

Summing up, the theoretical migration literature points to various factors that might influence the net migration rate of regions. But there is no specific theory referring to the migration balance of *cities*. As for the empirical evidence there are some studies with explicit focus on urban migration balances (see Greenwood and Hunt, 1989; Findlay et al., 2003). The determinants of the mobility results of cities are, however, analysed piecemeal so far. Some authors concentrate on labour market variables and ignore the potential impact of amenities and vice versa. Other studies consider both groups of factors, but investigate only a limited set of potential determinants. Furthermore, evidence rests frequently on case studies. Our study contributes to the literature by incorporating various push and pull factors. Furthermore, we provide results that are representative for German cities. In addition, we make use of migration figures of workers, which are more suitable to investigate the relative importance of labour market conditions and amenities than migration data referring to the entire population or to specific age groups.

### **3 Data and econometric model**

The analysis of migration balances of German cities rests on a panel data set that covers the period from 2000 to 2007. Annual information on migration flows and their potential determinants is available on the NUTS 3 level (counties). We focus on the explanation of migration balances of 71 German cities with at least 100,000 inhabitants,<sup>4</sup> 59 of them are located in

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<sup>4</sup> Two cities with more than 100,000 inhabitants (Hannover and Herne) are not included in our analysis due to data restrictions.

West Germany and 12 in East Germany. City size varies between roughly 100,000 in Kaiserslautern and 3.4 million in Berlin.

We use the employee history of the Institute of Employment Research (IAB) to generate our migration data. The employment history provides detailed information on workers, inter alia the county of their residence. The IAB employee history includes all employees covered by the social security system.<sup>5</sup> Since the data set covers the majority of employment in Germany (about 80 percent), our migration data should be representative as regards labour mobility. Migration is defined as the change of residence of employees between two reference dates (June 30 of present and previous year).

To investigate the impact of various push and pull factors on labour mobility we use different data sources. Information on the main labour market indicators, i.e. 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% percentile of the distribution of daily wages in the city. This percentile is used to avoid bias due to the fact that individual wage information is trimmed at the social security threshold. The employment statistic also provides information on the qualification structure of city labour force that we use in the regression analysis.

Apart from labour market conditions we take into account urban amenities as a second group of factors that might explain differences in migration balances of cities. Housing market indicators (average flat size per inhabitant, average land price per square meter), the share of recreation area in the city and accessibility (access to an international airport, motorways and high speed trains) are taken from the databases of the Federal Statistical Office and Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). As an indicator for the urban price level we use the regional price index of the BBSR. We also consider population density as a proxy for positive or negative agglomeration effects that might affect the migration decision. The per capita debt of the municipalities might point restricted investment in public infrastructure. Amenities and disamenities are furthermore captured by the city's crime rate and health care infrastructure, indicators for

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<sup>5</sup> Self-employed, family workers, and civil servants are not included. Moreover, we consider only migration of full-time workers.



the social structure of the urban population and some first nature characteristics.<sup>6</sup> For a detailed description of all considered variables and data sources see Table 1 and Table A.1 in the appendix.

[Table 1 around here]

Summary statistics in Table 1 reveal the huge disparities in migration balances 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 Cottbus in 2001 to a significant net in-migration of +9.3‰ for the West German city Fürth in 2005. The differences in urban migration balances correspond for instance with considerable differences in city unemployment rates. Although unemployment is marked by systematic East-West disparities, we detect the minimum and maximum level in the period under consideration among the West German cities (Munich, 4.4% in 2002; Bremerhaven, 22.7% in 2006). Remarkable differences also mark other explanatory variables such as the share of recreation area that ranges from about 1.1% in Gera in 2000 to roughly 15.1% in Halle in 2007.

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

$$nmr_{it} = \alpha + \sum_{k=1}^3 \beta_k labourmarket_{kit-1} + \sum_{l=1}^9 \gamma_l amenities_{lit-1} + \delta_i + \varepsilon_{it}$$

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. As explanatory variables we include two groups of factors, labour market variables and indicators for urban amenities. All regressors are predetermined in order to account for potential endogeneity of explanatory variables. We estimate a pooled version of the model and a panel specification that controls for city-specific effects  $\delta_i$ . The white noise error term is given by  $\varepsilon_{it}$ .

There are some critical econometric issues in analysing the effects of various influential factors on city migration balances. The first one is the omitted variable bias that can result from the potential correlation between unobserved urban characteristics and the net migration

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<sup>6</sup> Some indicators for climate and environmental burden are only available on NUTS 2 level. However, we might well assume that the variation of these variables within the regions is modest and the regional value provides an appropriate approximation of conditions characterising the corresponding city.

rate. We deal with unobserved time-invariant city characteristics by including fixed effects  $\delta_i$ . A second econometric issue concerns the potential simultaneity bias resulting from reverse causality between the migration balance and some explanatory variables. This refers in particular to the labour market variables. The estimated effects of labour market conditions on city migration balance are likely biased since labour migration may influence the urban unemployment rate, the wage level and employment growth. Due to endogeneity of these variables, the relationship estimated by OLS cannot be interpreted as causal. We address this problem by using predetermined explanatory variables. However, relying only on predetermined variables seems inappropriate given the forward looking nature of the issue. Therefore we also apply instrument variable (IV) estimation focusing on the instrumentation of those variables that are most likely affected by simultaneity bias, i.e. the labour market indicators.

In the two-stage least squares estimation several instruments enter. We consider time lags of corresponding variables (lagged by 5 years). Furthermore, the employment share of the age group 45 to 59 years (lagged by 5 years) is applied since older workers, especially the age group above 50 years, suffer from above average unemployment in Germany. And finally to isolate exogenous shifts in city employment we use a shift share instrument. The annual employment growth is instrumented by a weighted average of nationwide employment growth by 222 branches where the weights correspond with the city-specific employment share of the industries  $j$  in  $t-1$  ( $\omega_{jt-1}$ ). The instrument is given by:

$$\sum_{j=1}^{222} \omega_{jt-1} \Delta E_{jt-1,t}$$

where  $\Delta E_{jt-1,t}$  is the nationwide change in employment in industry  $j$  between  $t-1$  and  $t$ . If we consider two cities with significantly different industry composition, the region where branches dominate that are marked by a countrywide increase (decline) of jobs will experience a positive (negative) employment shock (see Moretti, 2010).

#### 4 Regression results

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 number of significant coefficients in Table 2 indi-

cates that various factors influence the migration balances of German cities. The results in the first column point to the important role that labour market conditions seem to play for urban migration balances. 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 a low unemployment, relatively high employment growth and wages are attractive for mobile workers. However, there are also different amenities that tend to affect the utility level of the urban work force. The negative coefficient of the crime rate points to the relevance of disamenities for the migration decision and corresponds well with theoretical expectations. In contrast, the negative impact of the share of foreigners and the urban health care infrastructure contradict the theoretical discussion in section 2. Important amenities that increase the attractiveness of urban areas are the availability of recreation area and spacious flats. However, we get no indication for a favourable effect of highly educated people on urban quality of life.

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 inclusion of land prices. There is, however, one exception: the impact of the share of foreigners declines to insignificance in the extended model.<sup>7</sup> In column 3 we substitute land prices by a more comprehensive measure of urban costs of living. Again, the impact on other coefficient estimates is limited. In contrast to the evidence on land prices there is a significant correlation between the city price index and the urban migration balance. But the sign of the price level effect does not correspond with standard migration models that emphasize the dampening effect of a high price level 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. According to Waldorf (2009) and Buettner and Ebertz (2009) a high regional price level might, however, reflect an amenity-rich environment and a high quality of life. In column (4) we consider in addition the municipal debt that turns out to be of no relevance for the migration decision of workers.

[Table 2 around here]

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<sup>7</sup> The shift of this coefficient is most likely caused by the strong correlation between the variable and the land prices. There is again no important impact of land prices on urban migration balances if we include the land prices instead of the population share of foreigners in the model of column (1).

Column (5) shows the estimates for the most comprehensive pooled model that includes also several time-invariant 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. On the other hand, as indicated by the coefficient of the population density, we arrive at negative agglomeration effects in this specification. Moreover, the impact of high skilled inhabitants now turns out to be significant, though not in line with theoretical arguments put forth in section 2. Turning to the additional explanatory variables, firstly we do not detect a systematic disadvantage of East German cities once we control for urban labour market conditions and different amenities. Furthermore, the results point to significant 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.<sup>8</sup> Climate, the environmental situation as well as accessibility seem to affect the residential choice of workers as well. Emissions decrease the migration balance of regions whereas sunny places attract mobile labour. Access to an international airport increases the average utility while proximity of motorways seems to dampen net in-migration.<sup>9</sup> Only the negative impact of the seashore is rather implausible but in line with evidence of Wang and Wu (2011). They show that for U.S. regions an initially positive effect of the proximity of a coast on population growth has turned into an unfavourable impact in recent years.

Table 3 summarises some robustness checks. The results of two fixed effects models are displayed in column (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 size of all labour market effects on migration tends to decline. Only the impact of employment growth is still significant at the 1% level when we control for city-specific effects. In contrast, findings for the crime rate, the recreation area and the flat size are rather robust as regards significance and sign of the coefficient. The impact of the latter variables even increases in the fixed effects specification. Whereas several estimates

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<sup>8</sup> The dummy variable bases on a classification of the BBSR that differentiates between cities in large agglomerated areas and cities in urbanised region. Virtually this corresponds more or less with distinction between large and small cities. The mean population of the first group of cities is more than 440,000 whereas the average size of latter group is roughly 160,000 inhabitants.

<sup>9</sup> Note that accessibility is measured as average driving time to an airport or a motorway. Thus, the negative coefficient of airport accessibility implies that the urban migration balance declines with increasing driving time to an international airport.

show moderate changes between pooled and fixed effects specification, we notice substantial differences for the foreign population share. Whereas the pooled estimates point to a negative impact, the results in Table 3 suggest that – in line with reasoning by Glaeser et al. (2001) – a culturally diverse urban environment tends to increase the net migration rate. Furthermore, whereas there is no evidence on an important impact of tourist stays per capita in the pooled models, the inclusion of city-specific effects gives rise to a strong and significant influence on migration flows. Including land prices in the model (column (2)) does not result in noteworthy changes apart from the effects of the endowment with hospital beds that becomes insignificant in the second specification.<sup>10</sup>

[Table 3 around here]

In particular the estimates of the labour market effects on the net migration rate might also suffer from simultaneity bias. The columns (3) and (4) in Table 3 show the results of fixed effects IV estimation that are applied to account for endogeneity of the labour market variables. As indicated by different tests statistics at the bottom of the table the applied instruments  $z_{it}$  should be valid, i.e. relevant [ $\text{corr}(z_{it}, \text{labourmarket}_{kit}) \neq 0$ ] and uncorrelated with the errors term [ $\text{corr}(z_{it}, \varepsilon_{it}) = 0$ ]. We apply the test of overidentifying restrictions to check instrument exogeneity. The results of the Hansen J-statistic suggest that we cannot reject the hypothesis that the instruments are exogenous, though in column (3) only at the 5% level. Moreover, the Kleibergen–Paap LM tests reject the null hypothesis at the 1% level, i.e. our instruments should be adequate for identification of the model. The F-statistics of excluded instruments indicate that the partial correlation between the instruments and the endogenous explanatory variables is sufficient to ensure unbiased estimates and relatively small standard errors. Finally, according to the Anderson-Rubin test we cannot reject the joint significance of our labour market indicators at the 5% level.

Changes of the size of labour market effects are – more or less – in line with theoretical expectations since reverse causality should bias the coefficients towards zero. As regards our labour market indicators IV estimates tend to be larger in absolute value than their fixed effects counterparts. In particular, the impact of urban unemployment and the city wage level increase as compared to the fixed effect results in the first two columns in Table 3. However, the IV estimates for the unemployment rate and the wage level are rather sensi-

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<sup>10</sup> We cannot consider the regional price index in the fixed effects models because the information is only available as an average for several years.

tive with respect to changes in instrumentation as indicated by the results in column (4). The coefficient of employment growth shows less variation. But significance declines in the IV regression pointing probably to the efficiency loss caused by the instrumentation. The efficiency loss of the IV estimation is likely important since we have to instrument three variables and use four instruments. Thus, adequate instrumentation seems to be important in order to ensure valid IV estimates. Moreover, the estimates of other explanatory variables are affected by the instrumentation as well. The influence of tourist stays and the flat size declines, but in particular the impact of the latter variable remains important in the IV regressions. 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 other aspects that matter. For the determination of city fixed effects we apply a constrained regression where we set the sum of fixed effects to zero in order 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.<sup>11</sup>

[Figure 1 around here]

Figure 1 shows the most characteristic feature of the city-specific effects, i.e. 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. In particular the large city-specific effects of Berlin and Munich are striking.<sup>12</sup> For East German cities we estimate significant negative fixed effects except for Leipzig, Dresden, Halle and of course Berlin. But there are also some small sized cities in West Germany like Salzgitter and Wolfsburg where adverse time-invariant characteristics significantly dampen net-migration of workers. Large cities thus seem to be *ceteris paribus* more attractive than

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<sup>11</sup> We are aware that these results can provide only tentative evidence since a consistent estimation of fixed effects is not possible when the cross sectional dimension is large compared to the time dimension (incidental parameter problem). The cities Zwickau and Kaiserslautern are excluded from the constrained regression due to some missing observations.

<sup>12</sup> Only one medium sized city, Oberhausen that is located in the Ruhr agglomeration, achieves a fixed effect of similar size as the largest agglomeration cores.

small cities for the mobile labour force. The significant size effect that we detect in this analysis corresponds with findings in Fishman (2005) and Glaeser (2006).

## 5 Conclusions

In this paper, we have investigated the determinants of migration balances of German cities. Our results suggest that different groups of factors influence the urban net migration rates. Local labour market conditions influence the mobility decision but amenities matter too. There is some indication that relatively high wages, low unemployment and especially the creation of new jobs attracts mobile workers. Moreover, the quality of life that a city offers is an important factor for the migration balance. This is in particular reflected by the robust effects of the recreation area and the flat size. Moreover, our findings point to relevance of climatic conditions and accessibility. The estimates for the urban crime rate and emissions indicate that we also need to consider the unfavourable impact of different disamenities. There is no robust evidence on an important role of the social structure of the city population. In contrast to Glaeser and Resseger (2010) we detect no significant positive impact of the high skilled on net in-migration. If anything there is some weak indication of adverse effects that are, however, not in line with theoretical implications. Results with respect to the urban price level and even more to the city's health care infrastructure seem to contradict theoretical arguments as well. But as regards the former variable we have to keep in mind that some authors such as Buettner and Ebertz (2009) and Waldorf (2009) argue that a high price level primarily mirrors a high quality of life.

Beyond, there is no clear-cut evidence on agglomeration effects. Possible disamenities resulting from congestion do not seem to influence the urban migration balance. However, we identify a size effect that might point to important agglomeration economies that are rather related to size than to density of the cities. Our findings confirm the results of Borck (2007) who argues that residents of larger cities might benefit from consumption of goods such as theatres and other cultural infrastructure that are only supplied if demand exceeds a certain threshold. But the positive correlation between city size and fixed effects might also reflect 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" of big dense cities that refers to every part of urban life. This specific urban feature may not only be traced back to the size but also to a special image that some and in particular big

cities have. Klaus Wowereit, the mayor of Berlin, has for example advertised his city as “poor but sexy” (see also Storper and Manville, 2006). This means these kinds of cities might offer something (immeasurable) beyond labour market conditions and amenities that make them a pleasant and interesting place to live.

Our findings suggest that there might be some room for compensation among various push and pull factors and thus different strategies could be pursued by local governments as regards policy measures to increase the attractiveness of a city for workers. On the one hand, policy makers may choose a rather specific strategy if a significant potential to improve for example housing supply, public infrastructure or the environmental situation is apparent. On the other hand, referring to the above mentioned special image of some cities, public policy could seize a more general strategy of promoting tolerance and openness, i.e. a positive urban image. However, Storper and Manville (2006) 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 like Berlin or Munich, but probably not for the majority of smaller cities like Bielefeld or Bottrop. For these cities a policy focus on labour market conditions and amenities constitutes probably a more promising way of attracting mobile labour, keeping in mind of course that some determinants of migration decisions are easier to influence than others and some factors cannot be changed by policy measures at all.



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## Tables and Figures

**Table 1: Summary statistics**

	Mean	Standard deviation	Minimum	Maximum
net migration rate	-4.05	4.39	-26.50	9.34
employment growth	-0.37	2.09	-6.25	6.39
wage level	90.39	11.06	61.87	118.51
unemployment rate	11.64	3.73	4.43	22.74
population density	1.65	0.72	0.48	4.17
crime rate	111.66	59.04	23.26	348.73
hospital beds per capita	10.19	3.43	5.05	23.29
share of foreigners	12.75	5.67	1.08	26.28
recreation area	4.81	2.62	1.22	15.05
tourist stays	2.56	1.59	0.40	7.80
share high skilled	11.82	4.91	4.03	27.17
flat size	38.53	2.25	32.30	45.50
municipal debt	1.35	0.60	0.05	3.41
land price	187.44	157.91	14.64	1296.84
population	333793	452680	96786	3404037
price index	94.85	5.41	86.90	114.40
seashore	4.80	16.62	0	77
sun	2.92	0.19	2.60	3.32
emissions	2.79	0.41	2	3
access airport	39.75	24.52	7	125.40
access train	5.57	9.92	0	45.80
access motorway	6.48	3.24	0	15

**Table 2: Results pooled regressions**

Dependent variable	Net migration rate				
	(1)	(2)	(3)	(4)	(5)
employment growth	0.44*** (5.00)	0.47*** (4.79)	0.43*** (4.83)	0.39*** (4.16)	0.39*** (5.22)
wage level	0.11*** (5.31)	0.11*** (4.56)	0.10*** (4.81)	0.09*** (4.21)	0.12*** (5.85)
unemployment rate	-0.32*** (-4.97)	-0.21*** (-2.96)	-0.22*** (-3.01)	-0.16** (-2.05)	-0.11 (-1.47)
population density	0.08 (0.26)	-0.01 (-0.04)	-0.05 (-0.17)	0.01 (0.04)	-1.40*** (-4.15)
crime rate	-0.02*** (-5.81)	-0.03*** (-6.68)	-0.02*** (-6.00)	-0.03*** (-5.93)	-0.03*** (-5.56)
hospital beds per capita	-0.45*** (-9.00)	-0.43*** (-7.77)	-0.43*** (-8.26)	-0.40*** (-7.93)	-0.31*** (-6.32)
share of foreigners	-0.10* (-1.96)	-0.05 (-0.75)	-0.14** (-2.54)	-0.11** (-2.12)	-0.28*** (-4.26)
recreation area	0.23*** (2.77)	0.25*** (2.99)	0.22*** (2.62)	0.20** (2.34)	0.43*** (4.77)
tourist stays	0.18 (1.25)	0.24 (1.55)	-0.01 (-0.03)	0.08 (0.47)	0.22 (1.56)
share high skilled	0.01 (0.22)	0.02 (0.30)	-0.04 (-0.77)	-0.06 (-1.06)	-0.13** (-2.38)
flat size	0.17* (1.89)	0.19* (1.95)	0.23** (2.49)	0.25*** (2.70)	0.08 (1.00)
land price		0.00 (0.19)			
price index			0.18*** (2.65)	0.17** (2.42)	0.13** (2.15)
municipal debt				0.03 (0.09)	
Dummy EAST					-0.92 (-0.96)
Dummy city type					-2.12*** (-4.86)
seashore					-0.02* (-1.80)
sun					5.01*** (4.16)
emissions					-1.81*** (-3.31)
access train					-0.00 (-0.02)
access airport					-0.05*** (-4.59)
access motorway					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)
N	515	429	515	482	515
R-squared	0.430	0.457	0.437	0.441	0.563
adj. R-squared	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.

**Table 3: Results fixed effects and IV regression**

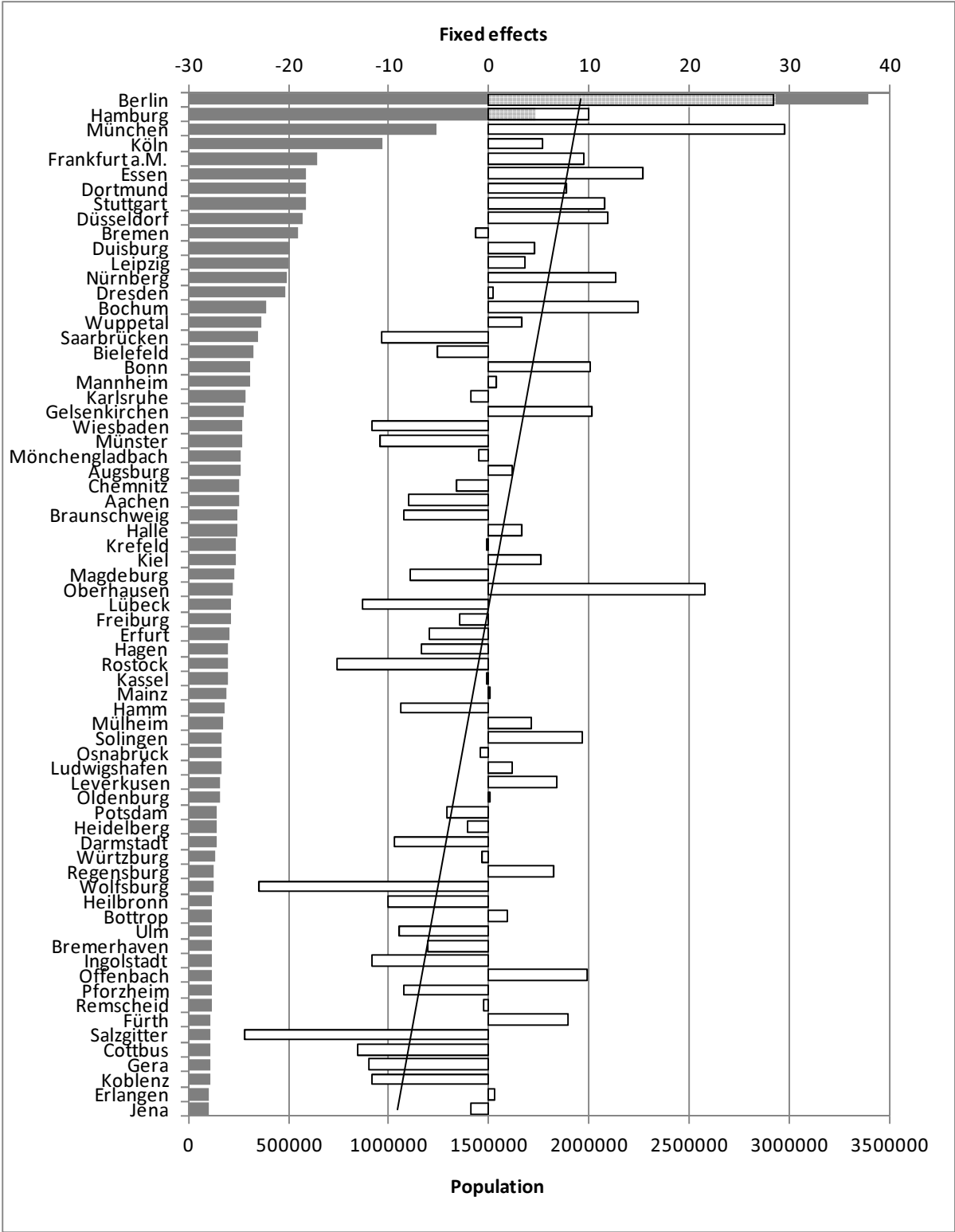
Dependent variable	Net migration rate			
	Fixed effects		Fixed effects IV (2SLS)	
	(1)	(2)	(3)	(4)
employment growth	0.27*** (3.64)	0.32*** (3.75)	0.33* (1.92)	0.24 (1.44)
wage level	0.06 (0.62)	0.12 (1.03)	0.67** (2.04)	0.30 (1.09)
unemployment rate	-0.12 (-0.98)	-0.16 (-1.16)	-1.48** (-2.25)	-0.84** (-2.14)
population density	-4.19 (-1.21)	-3.13 (-0.97)	-5.80 (-1.63)	-4.83 (-1.42)
crime rate	-0.01* (-1.69)	-0.02** (-2.33)	-0.02* (-1.70)	-0.01 (-1.38)
hospital beds per capita	-0.35* (-1.72)	-0.06 (-0.18)	0.18 (0.43)	-0.22 (-0.73)
share of foreigners	1.14*** (3.27)	1.14*** (3.33)	0.89** (2.45)	0.45 (1.58)
recreation area	0.64*** (5.94)	0.64*** (6.26)	0.77** (2.42)	0.36** (2.03)
tourist stays	1.47** (2.60)	1.53** (2.46)	1.09 (1.50)	1.09* (1.88)
share high skilled	-0.15 (-0.46)	-0.25 (-0.71)	-1.41* (-1.74)	-0.43 (-0.59)
flat size	1.46*** (3.89)	1.48*** (3.93)	0.94* (1.87)	1.05** (2.27)
land price		-0.00 (-1.13)		
Observations	515	429	488	485
R <sup>2</sup> - within	0.45	0.49	0.00	0.17
R <sup>2</sup> - between	0.14	0.15	0.17	0.12
R <sup>2</sup> - overall	0.16	0.19	0.13	0.10
F-statistic	19.04	44.84	8.28	11.28
F-test of excluded IV				
employment growth			24.06***	19.01***
wage level			15.31***	16.98***
unemployment rate			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 column (3) and (4) differ only with respect to instrumentation. Since some instruments are not available for all observations this gives rise to changes in the number of observations. 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.

Figure 1: City-specific effects and city size





## Appendix

**Table A.1: Variables definition and data sources**

label	variable	source	period
net migration rate	Migration balance divided by corresponding employment in %	Employee history (“Beschäftigten-Historik”) of the Institute for Employment Research (IAB)	2000-2007
employment growth	Growth rate of employees subject to social insurance in %	Employment statistics by the Federal Employment Agency of Germany (available via Pallas)	1994-2006
wage level	Regional wage level per capita; 40% percentile of the distribution of daily wages	Employee history (“Beschäftigten-Historik”) of the Institute for Employment Research (IAB)	1995-2006
unemployment rate	Number of unemployed persons divided by labour force in %	Unemployment statistics of the Federal Employment Agency of Germany (FEA)	1995-2006
population density	Number of population divided by the total area in %	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006
crime rate	Number of (robbery) cases per 100,000 inhabitants	Crime statistics of Germany’s Federal Criminal Police Office (BKA)	1999-2006
hospital beds per capita	Number of hospital beds per 1,000 inhabitants	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006
share of foreigners	Number of foreigners divided by the total population in %	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006
recreation area	Recreation area divided by the total area in %	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006
tourist stays	Number of overnight stays in tourist accommodation establishments per capita	“INKAR - indicators and maps on spatial development” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	1999-2006
share high skilled	Number of high skilled workers (university degree) at place of residence divided by the total number of workers at place of residence	Data Warehouse by the Federal Employment Agency of Germany (FEA)	1999-2006
flat size	Average flat size per inhabitant in m <sup>2</sup>	“INKAR - indicators and maps on spatial development” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	1999-2006
land price	Average land price per square meter in €	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006

price index	Average regional price index; Bonn=100	“Regionaler Preisindex” by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2005-2009
municipal debt	Communities’ debts per capita in thousand €	“Regionaldatenbank Deutschland” by the Federal Statistical Office of Germany	1999-2006
seashore	Length of seashore in percentage of region’s perimeter	Data from the Study Program on European Spatial Planning (SPESP) by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2000
sun	Mean annual sunshine radiation in kWh/m	Data from the Study Program on European Spatial Planning (SPESP) by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2000
emissions	Emissions of acidifying gases, scale: 1 (low) to 3 (high)	Data from the Study Program on European Spatial Planning (SPESP) by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2000
access train	Average driving time to the next ICE station in minutes	“INKAR - indicators and maps on spatial development” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2007
access airport	Average driving time to the next international airport in minutes	“INKAR - indicators and maps on spatial development” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2007
access motorway	Average driving time to the next motorway junction in minutes	“INKAR - indicators and maps on spatial development” of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)	2007