
“Regional borders, local unemployment and happiness”

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Abstract

In this paper we provide novel evidence on the effect of local unemployment rate on life satisfaction. We investigate how changes in unemployment rate in local administrative areas affect subjective well-being in Germany, allowing for the presence of spatial spillovers and considering the role played by regional borders. The results indicate that higher unemployment in the own local area of residence has a negative effect on satisfaction. Similarly, individuals' happiness negatively correlates with the unemployment rate in contiguous local areas, but only if these areas are located in the same Federal State as the one where the individual lives. These results are robust to a variety of specifications, definitions, sample restrictions and estimation methods. Heterogeneity analysis reveals that these negative effects of local unemployment rate are larger for individuals with stronger ties to the job market and less secure jobs. This points to worries about own job situation as the main driver of individuals' dislike for living in areas with high unemployment rate and tight labour markets. Consistently with this, the same asymmetric effect of local unemployment rate of surrounding areas is replicated when life satisfaction is replaced with a proxy for perceived job security as outcome variable.

JEL Classification: I31, J64, J28, R23.

Keywords: Life satisfaction, Local unemployment, Spatial spillovers, Neighbouring areas, Regional borders.

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Acknowledgements

This paper benefited from comments received by the participants of various seminars (Pablo Olavide University and University of Granada) workshops and conferences (XXXXIV SAEe, 4th Workshop on the Spatial Dimensions of the Labour Market, XIII Jornadas de Economía Laboral, and 30th EALE); and specially the comments from Adrian Chadi and Andrew Clark. The usual disclaimers apply. Antonio Di Paolo gratefully acknowledges funding from the Spanish Ministry of Finance, Industry, and Competitiveness ECO2016-75805-R; and Ada Ferrer-i-Carbonell from ECO2017-88130-P (AEI/FEDER, UE), SGR: 1359 (Catalan Government), and the Spanish Ministry of Science and Innovation, through the Severo Ochoa Programme for Centres of Excellence in R&D (CEX2019-000915-S).

1. Introduction

In this paper, we provide novel evidence on the effect of local unemployment rate on life satisfaction. We analyse the effect of the local unemployment rate on subjective well-being and extend the analysis to allow for spatial spillovers from unemployment in contiguous labour markets (i.e. neighbouring local areas) and to test whether the potential influence of adjacent areas is driven by regional administrative borders. The paper also presents heterogeneity analysis and mechanisms to contribute to understanding the mechanisms for individuals' dislike for living in areas with high unemployment rate. The literature has found a consistent negative and large effect of unemployment rate on life satisfaction, which contrasts with the fairly small role of GDP (or growth) on life satisfaction, but is aligned with the significant and fairly large effect that economic crises (negative GDP growth) have on life satisfaction (De Neve et al., 2018). Different reasons have been put forward (and empirically tested) for why individuals dislike unemployment in their area of residence. One set of explanations is related to individuals' own position in the labour market in times of high unemployment: employed individuals become more concerned about losing their own job as well as about the difficulty of finding another one if this happens (anticipated effects); working conditions are harsher (there is pressure to decrease salaries and increase working hours); individuals might not leave a job they dislike; and unemployed individuals might see their chances of finding a job reduced (Clark, 2003; Clark et al. 2010; Luechinger et al., 2010; Chadi, 2014; Helliwell and Huang, 2014). Unemployed individuals with poor employability, however, seem to show a positive effect of unemployment rate on life satisfaction, which might come through the lower social pressure that unemployed individuals might experience when the incidence of unemployment increases (Clark, 2010). These arguments suggest that the correlation between local unemployment rate and life satisfaction would depend on the characteristics of the individuals and the jobs they hold, such as type of contract (job security), type of job and employability. Authors of earlier papers have considered some of these characteristics to disentangle the mechanisms through which unemployment in the region where the individual lives affect their reported life satisfaction. Another set of explanations concerns the impact that unemployment rate has on all individuals of a society, regardless of their job situation. These are related to the negative externalities associated with unemployment and poverty (e.g. increasing crime rate and fiscal pressure, or loss of human capital) and the empathy towards other members of society (i.e. individuals care about others' suffering).

Our work contributes to this growing literature by focussing on a novel spatial dimension of the analysis, thus providing new empirical evidence that contributes to understanding the channels that explain the negative relationship between life satisfaction and local unemployment rate. First, similarly to Helliwell and Huang (2014) and in contrast with the rest of the literature, we consider a geographically smaller measure of aggregate unemployment. Most of the papers use the unemployment rate at the country or regional level (typically NUTS1 level). Instead, we define unemployment rate at the local level. Specifically, we use German data and rely on unemployment at the Spatial Planning Region (ROR, *Raumordnungsregionen*) level for Germany. The RORs represent

96 territorial units that are in between NUTS 2 (Administrative Regions) and NUTS 3 (Districts) and are distributed across the 16 Federal States (NUTS 1) of the country. The definition of the ROR borders is based on the location of the different urban agglomerations and the spatial distribution of their respective catchment areas, taking into consideration commuting flows. This means that the RORs can be understood as local labour markets (Jaeger et al., 2010; Caliendo et al., 2019). We merge administrative data on unemployment rate at the ROR level with data from the German Socio-Economic Panel (for the years 2000–2015) and impute to each individual the unemployment rate of their own local labour market to estimate its impact on subjective well-being. The importance of using the local labour market unemployment rate rather than more aggregate measures of unemployment is crucial, as labour markets are fairly local (Manning and Petrongolo, 2017). Second, we also depart from the current literature by enlarging the definition of the area of influence of variations in unemployment rate. Specifically, we consider not only unemployment in the local area (ROR) where the individual resides, but also the unemployment rate of all bordering RORs to each specific local area. That is, our regression also includes the (weighted) average unemployment rate of all the contiguous areas. In other words, we test for the first time whether individuals not only react to changes in unemployment in their local labour market of residence, but also (and the extent to which) to unemployment in surrounding areas. Third, we investigate whether the spatial influence of unemployment rate in surrounding areas is driven by administrative regional borders. More precisely, we analyse whether the effect of unemployment of neighbouring areas depends on whether these neighbouring areas belong or not to the same Federal State as the one where the individual lives. Fourth and finally, we present heterogeneity analysis and use alternative dependent variables, which, together with the use of the novel spatial dimension we exploit, allow us to explore potential mechanisms and to understand the channels behind the dislike for local unemployment rate.

Our results indicate that local unemployment in the own area of residence matters for individuals' life satisfaction, confirming the standard result in the literature while using a smaller regional unit to define unemployment rate. Similarly, we find novel evidence on spillover effects of unemployment in neighbouring regions: individuals' life satisfaction negatively correlates with the unemployment rate in contiguous local areas, although only if these areas are located in the same Federal State as the one where the individual lives. In other words, unemployment rate in bordering areas belonging to the same Federal State where individuals reside affects their life satisfaction, while no effect is detected for variations in unemployment rate in adjacent areas belonging to other Federal States. This general evidence is robust to different specifications (also to the inclusion of Federal State-specific time trends), as well as to various definitions of the unemployment rate of bordering areas, all of which are based on spatial weighted averages of each bordering ROR's unemployment rate defined according to population, the share of the ROR's border, and the inverse of distance from the RORs' centroids. Similarly, we show that our results are not driven by endogenous residential sorting,

commuting behaviours, or time-invariant unobserved heterogeneity, and are consistent with estimating the model using collapsed data at the ROR-year level.

This evidence indicates that the relevant regional dimension individuals take into account is both, the local area as well as the federal level where the individual resides. More importantly, individuals seem not to give any weight in terms of life satisfaction to those living close by but in a different Federal State. That is, there exist spatial spillovers of local unemployment rate, but these are not exclusively driven by geographic proximity. Indeed, administrative regional borders interact with the geographical gradient of the detrimental effect of local unemployment in contiguous areas on happiness. There are two different sets of reasons that could explain this finding. One, individuals only care about unemployment in their own region to the extent that this correlates with own job situation (for example, through harder working conditions) and job uncertainty (for example, with a higher probability of losing one's own job and increasing difficulty in finding a new one, if necessary). This would be the case if the extended dimension of the local labour market beyond the own area (ROR) of residence is bounded by the administrative border of the Federal State. That is, the relevant spatial dimension in job search processes is defined by the local area of residence and surrounding areas located in the same Federal State. This assumption implies, for example, that individuals would face a higher arrival rate of job offers in their own local labour market and in the contiguous labour market only within the same Federal State; or that individuals would prefer searching for job opportunities in their own or surrounding labour markets if belonging to the same Federal State rather than others, equally far away, located in other Federal States. This is consistent with the relatively low labour mobility in the German labour market (as in other European countries) compared to more mobile realities, such as the US (Jaeger et al., 2010; Caliendo et al., 2017; Caliendo et al., 2019), as long as mobility is defined as crossing federal borders and not only as distance. This also implies that areas at the same distance are not considered part of the local labour market if they do not belong to the same Federal State. The second reason that could explain our findings is if individuals care about unemployment rate per se, regardless of their labour market situation (empathy motives), but the relevant others would only be those who belong to the same Federal State. This is consistent with the literature that argues that individuals care more about those belonging to the same group and that is often referred to as in-group bias (see, for example, Dahlberg, et al., 2012; Alesina, et al., 2018). Although most of the federal borders were designed after the Second World War (while some do have historical roots), we know that group identity can also be generated artificially and therefore individuals in our sample could identify more with those who live in the same Federal State than with the rest. One could also argue that our findings are driven by an information effect, in which individuals only know the unemployment rate at the federal level, as this is the information easily available in the media. Although this could be true, it also requires that individuals are well aware of (or are affected by) the unemployment rate of their ROR area, as its effect survives the introduction of unemployment of the bordering areas belonging to the same Federal State together with Federal State-specific time trends. Finally, since unemployment benefits

and labour market policies are designed at the national and not at the federal level, increased fiscal burden (negative externalities) cannot explain the differences found across different geographical definitions of unemployment rate. Other externalities –notably increased crime rate and loss of human capital – however, could still partially explain the empirical findings of the paper, even if our results are robust to the inclusion of local area controls (household income, share of migrants and housing prices), which should pick up most of the potential local level confounders.

However, to disentangle the underlying mechanisms of these results, the paper moves to heterogeneity analysis and to the use of a self-reported variable to proxy for job-security perceptions as alternative outcomes. To gauge the relevance of each of the hypothesized channels, we first investigate potential heterogeneous effects defined by individual characteristics related to their job market position. Specifically, we interact local unemployment rate in the own ROR and unemployment rate in bordering areas (within or outside the Federal State of residence) with gender, age, education, and labour market status (part- and full-time worker in the private sector, public sector worker, and unemployed). The results from the heterogeneity analysis show that the negative effect of both unemployment rate of the own ROR and of neighbouring RORs belonging to the same Federal State is stronger for individuals in the middle of the age distribution (i.e. aged 34–54) for those who are unemployed (compared to private sector workers) and, to a lesser extent, for highly educated individuals. In contrast (and in line with the literature), the correlation is weaker for public sector workers whose jobs are secure and might feel fortunate in times of high unemployment. The results obtained allowing for heterogeneous effects clearly point to labour market-related concerns as the main mechanism generating the negative correlation between life satisfaction and local unemployment rate. Second, we further investigate possible channels by comparing our baseline results (active population 16–65) with the results when using only employed and inactive individuals (of the same age range, 16–65) separately. Inactive individuals show very small and imprecise estimate coefficients for the three measures of unemployment rate (own area, adjacent areas within the same Federal State, and surrounding areas of other Federal States). This is aligned with unemployment rate affecting life satisfaction through individuals' concerns about own job situation, as individuals not active in the labour market show no concerns about the unemployment rate. As an additional test, we use a self-reported question on individuals' perceived probability (0 to 100) of losing their job and see that, as for life satisfaction, this perception increases with own and bordering areas' local unemployment, while it is not correlated with the unemployment rate of bordering areas not belonging to the same Federal State where the individual resides. In other words, self-perception of the probability of losing their job relates to the local unemployment rate in the same way as life satisfaction.

Our evidence indicates that, first, the effect of the local unemployment rate on life satisfaction comes through concerns about own labour market situation, rather than through empathy or other negative externalities, such as increased crime rate and fiscal burden, or loss of human capital. Second, it

shows that these concerns are shaped by the conditions in the local labour markets limited to the borders of the Federal State. That is, individuals' perceptions about own job stability are not driven by local unemployment in surrounding labour markets belonging to other Federal States. This speaks in favour of inter-regional mobility programmes implemented in Germany between 2003 and 2005 within the so-called "Hertz Reform" (Caliendo and Hogenacker, 2012; Caliendo et al., 2017). Those programmes aimed at incentivizing individuals to search by the geography of labour demand and the spatial distribution of employment opportunities, regardless of existing administrative regional borders.

2. Literature Review

Starting from the seminal work by Clark and Oswald (1994), there have been several papers examining the effect of being unemployed on individuals' subjective well-being (see Winkelmann, 2014, for an overview). Own unemployment has been reported to have a negative, substantial and long-lasting effect on life satisfaction, an effect that comes on top of the income-lost effect.¹ The importance of unemployment on own life satisfaction also shows important heterogeneity depending, for example, on individuals' personality traits (Boyce et al., 2015), own subjective well-being (Binder and Coad, 2015), and unemployment rate in the area where the individual lives (Clark, 2003). In addition to being one of the most important variables correlated with life satisfaction, individuals do not seem to adapt to unemployment, even after re-employment (Winkelmann, 2014). This evidence is mostly based on panel data that controls for time-persistent individual unobserved heterogeneity that affects both the probability of becoming unemployed and life satisfaction. Nevertheless, achieving a reliable identification strategy remains challenging, as identification comes only from those who change their (un)employment status. There is one paper, however, that exploits an exogenous shock on unemployment due to big plant closures, and it confirms the negative impact of losing a job on life satisfaction (Kassenböhmer and Haisken-DeNew, 2009).

The literature most related to our paper examines the effect of regional (or country) characteristics (Aslam and Corrado, 2012), notably aggregate measures of unemployment, on life satisfaction. This literature started with MacCulloch et al. (2001), who estimated the relative importance of inflation and unemployment rate of the country for individuals' self-reported life satisfaction, to conclude that, although both important, unemployment rate has a larger size effect on life satisfaction. Since then, the literature has consistently found an economically significant negative impact of aggregate measures of unemployment on life satisfaction (see, for example, Di Tella et al. 2003; Shields et al., 2009; Schwarz, 2012; and Blanchflower et al., 2014). There are different reasons (mechanisms) that have been put forward to explain this finding, but all of them are related to individuals' job situation. Social norms were one of the first studied mechanisms: with increasing unemployment, the social pressure on those unemployed is reduced and thus unemployment in the region can have a positive

¹ There is also a parallel literature that analyses the effect of the happiness drop due to unemployment on search behaviours of the unemployed (e.g. Gielen and Ours, 2014; Mavridis, 2015).

impact on those already unemployed. In other words, for individuals with low-employability prospects, being unemployed is less stigmatized with higher unemployment rates. Clark et al. (2010) find empirical evidence sustaining this argument: the negative effect of unemployment on life satisfaction is larger for those with high prospects of employability, both employed and unemployed. Luechinger et al. (2010) instead use an objective measure of job security (rather than employability), defined according to whether the individual works in either the public or the private sector (considering employment in the public sector as secure and with a virtually null probability of being fired). They expect those in less secure and stable job positions to react more negatively to increases in aggregate unemployment in the region of residence. As predicted, they empirically found that private sector workers are much more negatively affected by regional fluctuations in unemployment rate than their counterparts working in the public sector. These results have been confirmed by Helliwell and Huang (2014), who analysed the effect of variations in unemployment across US counties (i.e. a more local measure of unemployment than the one used in other papers, and thus more similar to the one in our study). They also report evidence suggesting that job stability appears to be the main channel explaining the effect of local unemployment on happiness. Again using German data, Chadi (2014) reports that the negative effect of regional unemployment is higher for individuals who are unemployed at the time of the survey, although in contrast with Clark et al. (2010) they do not distinguish between individuals' estimated employability. A related literature has documented a positive relationship between life satisfaction and the generosity of the labour market policies and of the unemployment benefits (DiTella, et al., 2003). More specifically, Wulfgramm (2014) analyses the role of labour market institutions, documenting that the generosity of (passive) labour market policies tends to mitigate the negative effect of regional unemployment on happiness.

Our paper contributes to this literature by (i) offering a local measure of aggregate unemployment, (ii) examining the impact of bordering areas and the existence of spatial spillovers, and (iii) distinguishing whether they belong or not to the same Federal State (i.e. the role of administrative regional borders). Moreover, the heterogeneity analysis and the use of different samples and dependent variables enable (iv) explaining the mechanisms of why individuals dislike local unemployment.

3. Empirical Approach and Data

3.1 Empirical approach

This paper thus presents the first empirical analysis of the effect of the unemployment rate in the local area of residence and in surrounding areas on individuals' life satisfaction (*LS*), while distinguishing according to whether the adjacent local areas belong or not to the same Federal State (i.e. administrative region) where the respondent lives. In most of our analyses, we exploit data at the individual level combined with aggregate information about the local unemployment rate and other control variables at the local level. Our results, however, are consistent when obtained from

collapsed data at the local level. We start by estimating an equation that explains LS_{irt} of individual i , residing in the local area (ROR) r at time t , as a function of a set of individual controls (X_{it}), local unemployment rate in the own ROR of residence (U_{rt}), local areas (ROR) fixed effects (θ_r), time dummies (ρ_t), and a set of time-varying local area characteristics (W_{rt}), which may confound the relationship between local unemployment and life satisfaction. The first equation to be estimated takes the form:

$$LS_{irt} = \alpha + \beta' X_{it} + \gamma U_{rt} + \theta_r + \rho_t + \omega' W_{rt} + \varepsilon_{it} \quad (1)$$

Subsequently, we augment the model by including not only the unemployment rate in the local area (ROR) of residence of the respondent (U_{rt}), but also the average unemployment rate in all the RORs that are adjacent (contiguous) to the one where the individual resides (\overline{UB}_{rt}). In this way, we expand the definition of the local area of influence considering a spatial contiguity approach, which represents the first main novelty of this paper. The corresponding equation to be estimated becomes:

$$LS_{irt} = \alpha + \beta' X_{it} + \gamma U_{rt} + \psi \overline{UB}_{rt} + \theta_r + \rho_t + \omega' W_{rt} + \varepsilon_{it} \quad (2)$$

The estimates from this equation would indicate whether individuals are affected by the unemployment rate prevailing in their area of residence (conditional on their own employment status and other individual and local controls), and whether they also respond to variations in unemployment rate in bordering areas, thus enlarging the spatial influence of local unemployment beyond the local labour market of residence (the ROR), based on a contiguity criterion.

However, equation (2) is based on the underlying assumption that the unemployment rate in contiguous local labour markets has the same effect on individuals' life satisfaction regardless of whether these areas belong or not to the same Federal State where the respondent resides. Next, we relax this assumption and allow individuals to be differently affected by changes in the local unemployment rate in surrounding local areas that belong to the same (\overline{UB}_{rt}^{SFS}) and to different (\overline{UB}_{rt}^{DFS}) Federal States,² that is:

² We consider the specificity of some ROR's boundaries when computing the average of local unemployment of surrounding RORs. First, we consider the existence of State Cities (Berlin, Bremen and Hamburg), which represent separate Federal States (and ROR). As for the city of Berlin, which is nested within other RORs forming part to the Brandenburg Federal State, we consider as if it forms part of this Federal State. For Bremen and Hamburg, we assume they belong to the Schleswig-Holstein and Lower Saxony Federal States respectively. However, our results are consistent when excluding observations of individuals residing in these places, as it happens when removing individuals residing in Saarland (which represents a Federal State with a single ROR). Finally, we also check for the sensitivity of the results when we exclude individuals living in RORs with no adjacent areas from other Federal States (for whom the variable \overline{UB}_{rt}^{DFS} would always be equal to zero).

$$LS_{irt} = \alpha + \beta' X_{it} + \gamma U_{rt} + \delta \overline{UB}_{rt}^{SFS} + \lambda \overline{UB}_{rt}^{DFS} + \theta_r + \rho_t + \omega' W_{rt} + \varepsilon_{it} \quad (3)$$

We retain equation (3) as the baseline specification for our estimations throughout the paper. This specification contains ROR fixed effects, which capture time-invariant characteristics of the local areas, and year fixed effects, which control for time trends that are common across RORs in a flexible way. Given that our main variables of interest vary at the ROR-year level, while our dependent variable is defined at the individual level, we cluster standard errors using two-way cluster-robust standard errors.

One potential issue in the estimation of equation (3) could be the excessive spatial correlation in the measures of local unemployment rates, especially within each Federal State. Although the current literature shows important unemployment differences across European regions despite the European labour market integration (Andersson et al., 2015), there is clear spatial dependence in local unemployment rates within a country (Patacchini and Zenou, 2007). In our data, we find important unemployment variations across time and RORs within Germany, which allow us to identify well the effect of local unemployment rate. Nevertheless, with the aim of showing that our results are not just a statistical artefact due to spatial correlation between the unemployment rate in the own ROR and in contiguous RORs (especially if they form part of the same Federal State), we estimate the model with and without conditioning to the unemployment rate in the area of residence. With the same aim, we also present the results obtained by estimating the model introducing each of our local unemployment measures one by one in lags up to two years. Moreover, we also present the results from alternative specifications, in which we substitute ROR fixed effects (θ_r) by Federal State (NUTS 2) specific linear and quadratic trends. In this way we control for time-varying factors at a (more) aggregate regional level that might confound the relationship between local unemployment rates in the own and surrounding RORs and happiness.

For robustness, we also present results in which we cluster our data at the ROR-year level and run equation (3) with aggregate data. Our dependent variable is then a weighted average of SWB (\overline{SWB}_{rt}) per ROR and year, in which we use as weights the number of observations contained in each ROR-year cell.³ The counterpart of equation (3) based on grouped data would take the form:

$$\overline{SWB}_{rt} = \alpha + \gamma U_{rt} + \delta \overline{UB}_{rt}^{SFS} + \lambda \overline{UB}_{rt}^{DFS} + \theta_r + \rho_t + \omega' W_{rt} + \xi_{rt} \quad (4)$$

Notice that the previous equation only includes time-varying controls at the local level, but not individual characteristics. Since the results from aggregate data are consistent with those obtained

³ See Angrist and Pischke (2009) for more details. A similar approach has also been followed by Oreopoulos et al. (2012), among others.

using individual data, we retain equation (3) as our baseline, which allows us to perform heterogeneity analysis using individual characteristics.

To address different econometric and measurement concerns that could affect our estimates, we present a battery of sensitivity checks to equation (3). First, we present different reweighted measures of the average unemployment rate of the surrounding regions. In line with the literature on spatial econometrics, on top of the simple average (a), we also compute weighed average using as weights (b) the share of population in each region, (c) the fraction that each ROR represents of the total of the border length in kilometres, and (d) the inverse of the distance between the centroids of each ROR to each bordering RORs (normalized by the sum of all distances). We estimate equation (3) with each of these four different measures of average unemployment rate across all neighbouring regions (RORs). We also present results with these different measures on equation (4), which solely exploits aggregate data. Second, we present alternative estimations to provide evidence against the possibility that our results are driven by potential endogeneity issues. Specifically, as long as the place of residence is a choice variable and individuals/families might endogenously change their location according to fluctuations in local unemployment (i.e. endogenous residential sorting), we expect at least two opposite effects. One, those who care more about local unemployment will move to areas with lower unemployment and therefore our estimates would represent a lower bound of the effect of aggregate unemployment on life satisfaction. Two, individuals with a lower socio-economic background might also have worse employability prospects and thus be more affected by unemployment in their area. At the same time, those are less mobile individuals and thus have a larger probability of staying in their area of residence, even if unemployment increases. This means that our estimates would represent an upper bound of the true causal effects between life satisfaction and unemployment rate. Although mobility is very low in Germany and thus these concerns are bound to be small, we re-estimate equation (3) for the subsample of individuals who never change the area of residence (88% of the sample) while observed in the panel (stayers) and compare their LS changes with that of the total sample. Our baseline results are consistent with sample selection. Similarly, we estimate equation (3) with individual fixed effects, so as to absorb any time-invariant individual heterogeneity, including time-persistent unobserved individual characteristics that affect location choices. Individuals fixed effects, however, are problematic in this context: since the between unemployment rate ROR variation is larger than within ROR variation, the identification gives more weight to those individuals who move more often, who are likely to be younger or with a high wage potential. Therefore, we also estimate the regression with individual fixed effects, but excluding those individuals who move RORs while in the sample. Finally, we check the stability of our baseline results by removing individuals who commute, for job-related reasons, more than 25, 50, or 75 km, as those individuals have weaker ties with their local labour market. We show consistency across the different robustness checks, and we move to heterogeneity analysis and the use of other dependent variables to further analyse the mechanisms driving our findings.

3.2. Data

The empirical analysis is based on two different German data sets. On the one hand, we retrieved data about local unemployment rates (and other local variables) from administrative registers of the INKAR database (www.inkar.de) managed by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). The INKAR database contains information about several aggregate variables over time, at several levels of spatial aggregation. We considered data at the Spatial Planning Region (ROR, *Raumordnungsregionen*) level, which corresponds to 96 territorial units that are in between NUTS II (Administrative Regions/Provinces) and NUTS III (Districts) and are distributed across the 16 Federal States (NUTS I) of the country. This level of spatial aggregation has been selected for two main reasons: first, the RORs define geographical areas that are large enough as to not capture relative concerns⁴; and second, the RORs represent local labour markets as they are defined on the basis of agglomeration economies and commuting flows (Jaeger et al., 2010; Caliendo et al., 2019). From the INKAR database, we collected information (based on administrative registers) at the ROR level on unemployment rate, average household income, population, and the share of migrants, for the years 2000–2015. Figure 1 displays the spatial distribution of unemployment rate for the 96 RORs of Germany for the years 2000, 2007 and 2014. As can be appreciated, there is an important degree of time-varying spatial variation in local unemployment, which is the main source of variation we exploit in our empirical analysis. It is, however, true that, as expected, time variation (within each ROR) is larger than geographical variation (between RORs).

The second database we use is the German Socio-Economic Panel (SOEP) (Wagner et al., 2007), which contains individual-level information and is representative of German households. Although the German SOEP started in 1984 in West Germany and includes East German respondents since 1990, in this paper we use data for the years ranging from 2000 until 2015 only, as these are the years for which the aggregate variables are available. The estimation sample contains individuals aged 16 to 65, who were born in Germany and are not studying full time, retired, or permanently disable. That is, our main estimation only retains individuals who are active in the labour market and presumably care about fluctuations in the local unemployment rate.⁵ After cleaning observations with missing values in relevant variables, we obtained a final pooled sample of 187,431 observations. The dependent variable is measured as the answer to a life satisfaction question, which is taken as a proxy for utility. In the German SOEP, respondents are asked how satisfied they are with their life, all things considered, where the answers are cast on a 0 (completely dissatisfied) to 10 (completely satisfied) scale. The two basic assumptions underlying subjective satisfaction measures (Ferrer-i-Carbonell and Frijters, 2004) are: (i) individuals are able to evaluate their life satisfaction, i.e. there is a positive monotonic relationship between the answer to such questions and the theoretical concept we are

⁴ In 2015, the last year in which all the relevant variables from the INKAR database are available, the average ROR population was 854,053 individuals and the average surface 3722 square metres.

⁵ In order to understand the role of labour market prospects as a mechanism behind the results, we also retain inactive (i.e. retired or permanently disable) individuals of the same age range or older. Descriptive statistics for this additional estimation sample are reported in Table A1 of the Appendix.

interested in, and (ii) the answers to such question are interpersonally comparable. A good account of such measures, the underlying assumptions, its applications, and its (empirical) validity can be found in Ferrer-i-Carbonell and Frijters (2004), Clark et al. (2008), and Van Praag and Ferrer-i-Carbonell (2008).

Table 1 shows descriptive statistics of all individual, household, and regional aggregate variables used in the empirical analysis. Individual level controls have been selected according to the standard practice in the life satisfaction literature. Specifically, we consider gender, age (squared), years of schooling, marital status, number of children and adults in the household, average household income, labour market status (full-time private sector worker, part-time private sector worker, public sector worker, and unemployed), and the number of doctor visits during the three months preceding the interview (as an objective proxy for health status).⁶ Aggregate controls, defined at the level of the ROR of residence, have been selected according to relevance and data availability and include, besides the different measures of aggregate unemployment, the local share of immigrants, local average household income per capita, and local average housing prices per square metre (the last two variables are also logged).

4. Results

4.1. Baseline results

The first set of results based on equations (1)–(3) are displayed in Table 2. Column (1) displays the results from equation (2), which represents the regression of life satisfaction (*LS*) against local unemployment rate, controlling for a standard set of individual and household control variables, plus year and local area (ROR) fixed effects. The coefficients of the control variables are consistent with previous literature and are not printed in the table: males are slightly less satisfied than women, age shows a U-shaped relationship with life satisfaction, compared to public sector employees, full-time and part-time workers in the private sector are less satisfied with their life; and being unemployed has a strong negative and very precisely estimated coefficient (-0.69; s.e. 0.029). In addition, and also consistent with earlier literature, life satisfaction correlates positively with education, household income, and the number of children, but negatively with the number of adults living in the household and with our proxy measure of objective health status (i.e. the number of visits to the doctor during the last three months).

Most importantly, the estimated coefficient of local unemployment rate in the own area (ROR) of residence (γ) confirms earlier results in the literature, suggesting that aggregate unemployment rate in the local labour market has a negative and precisely estimated effect on individuals' reported life satisfaction (-0.051, s.e. 0.005). Specifically, a one standard deviation increase in local unemployment rate (mean 9.14%, s.d. 4.39), changes individual life satisfaction by 0.22 points, i.e. about a 13%

⁶ Notice that continuous covariates are included using logs (plus one for the number of children and the number of visits to the doctor during the last three months).

change of a one standard deviation of life satisfaction (mean 7.09, s.d. 1.71). In column (2) we also include time-varying controls at the ROR level that might correlate both with life satisfaction and unemployment. These are (logged) average household income per capita, (logged) average housing prices per square metre, and the share of immigrants. The estimates of these aggregate controls indicate that only the average household income has a positive and precisely estimated coefficient. Moreover, the size of coefficient of interest is just slightly reduced (-0.046 vs -0.051) and remains precisely estimated (s.e. 0.05).

Column (3) displays selected estimates from equation (2), which contains the average unemployment rate of all the bordering areas (ROR), i.e. all RORs adjacent to the ROR of residence (\overline{UB}_{rt}) as an additional regressor. This enables a broader definition of 'local labour markets' to be considered by increasing the geographical boundaries of influence based on geographic contiguity of surrounding RORs. However, this regression seems to indicate that only the unemployment rate in the own local labour market of residence matters for life satisfaction, whereas the coefficient of average unemployment in all contiguous labour markets is negative, but has a small (0.015) and imprecisely estimated coefficient. However, when we split average unemployment rate in bordering areas depending on whether the adjacent RORs belong or not to the same Federal State where the respondents live (equation 3), the estimates (column 4 in Table 2) reveal an interesting pattern. Although the coefficient of the unemployment rate of the own ROR remains negative, large, and precisely estimated (a 1 s.d. increase in unemployment in the area of residence reduces satisfaction with life by 0.15 points, instead of 0.22 when only unemployment in the own region was included, without local controls), unemployment in bordering areas that belong to the same Federal State also shows a large (although smaller), negative, and precisely estimated coefficient (-0.12 points for each s.d. increase in unemployment rate, compared to 0.15 for own local area unemployment). On the contrary, variations in unemployment rate in adjacent areas that belong to other Federal States yield a very small (-0.009) and imprecisely estimated coefficient on individuals' SWB.

As robustness, we also estimate the life satisfaction equation excluding unemployment rate of own local area, while including the two local unemployment rates of the neighbouring areas (column 5). This is to show that, although the measures of local unemployment rate are spatially and temporally correlated with each other (Patacchini and Zenou, 2007), the previous evidence is not the result of a statistical artefact due to collinearity. The results indicate that only unemployment rate in neighbouring areas that form part of the same Federal State matters for life satisfaction, while unemployment rate in other adjacent areas appears to be irrelevant even without controlling for unemployment rate in the ROR of residence. The effect of unemployment rate in bordering areas belonging to the same Federal States is higher in this case, possibly because it is capturing, due to spatial correlation, part of the variation in unemployment rate in own local area. However, the main evidence regarding the role of regional borders remains unaffected: on top of unemployment in the area of residence, unemployment in bordering areas matters only if these belong to the region where

the individual lives. Moreover, for the same purpose, we estimate equation (3) by introducing each of our three unemployment measures at year t , while controlling for unemployment rates in the other regions in year $t-1$ and $t-2$. The results from the model with lagged unemployment rate are again in line with our main evidence (see Table A2 of the Appendix).

Finally, columns (6) and (7) replicate our baseline results (equation (3)), but incorporating, respectively, linear and quadratic Federal State-specific time trends. In this case, the regression still controls for ROR fixed effects (θ_r), but excludes time effects (ρ_t) that are already captured by the trends. This allows us to control for aggregate factors that vary over time at the regional level and may confound the relationship between local unemployment rate and happiness. Specifically, our main concern is Federal State unemployment rate, as one might argue that our asymmetric results found in specification (4) are consistent with individuals caring only about fluctuations in rate at the Federal State level. Moreover, this should also rule out the effect of idiosyncratic regional differences (e.g. the evolution of labour market disparities between East and West Germany), which could be driving our results. Specifications (6) and (7), however, show that the asymmetric effects of variations in local unemployment rate of contiguous areas, depending on whether surrounding RORs are located in the same Federal State or not, survive. We only detect a certain increase in the coefficients of local unemployment rate in the own ROR and in surrounding RORs from the same Federal State when using linear Federal State trends, while the point estimates of the coefficients of interest obtained with quadratic trends are virtually the same as in specification (4), but less precisely estimated. However, the coefficient of local unemployment rates of bordering local labour markets from other Federal States is always close to zero and insignificant.

In what follows, we retain specification (4) of Table 2 as our baseline, which includes ROR and year fixed effects, while controlling for ROR time-varying (and individual and household) characteristics.⁷ Using this specification, we find that a one standard deviation increase in local unemployment rate in the own area (mean 9.14%, s.d. 4.39), changes individual life satisfaction by 0.13 points, i.e. a 7.6% of one standard deviation of life satisfaction (mean 7.09, s.d. 1.71). A one standard deviation increase in unemployment rate of the neighbouring RORs belonging to the same Federal State (mean 8.91%, s.d. 4.34) changes individual life satisfaction by 0.12 points, i.e. a 7% change of the standard deviation of life satisfaction. That is, the unemployment rate of the own local labour market has a similar effect on life satisfaction as the unemployment rate of the neighbouring areas that belong to the same Federal State. In contrast, the unemployment rate of the neighbouring areas not belonging to the same Federal State has a very small (0.009) and imprecisely estimated (s.e. 0.006) coefficient.

Therefore, there exist spatial spillovers from unemployment rate of contiguous local labour markets, but the effects on subjective well-being are limited to surrounding areas located in the same Federal

⁷ This specification provides a better fit than others that include Federal State-specific time trends according to any model selection criteria.

State and are thus bounded by administrative regional borders. These results are consistent with two theoretical explanations. First, if the Federal State is the relevant regional dimension to define labour markets (for example, for job search), our results could be explained by the fact that unemployment rate affects individuals' quality and perceptions of own job situation. Notably, in times of high unemployment, wages and potential employment opportunities decrease, while pressure at work and concerns about own job stability increase. Second, our findings could also be consistent with empathy motives, as long as individuals care more about those living in the same Federal State (within group empathy) than about the rest. Before moving to disentangling which of the two mechanisms explains our results, we present some robustness checks to different specifications and sample selection.

4.2. Robustness checks

In this section, we present a set of robustness checks to (i) different definitions of aggregate unemployment of adjacent areas, (ii) endogeneity issues, and (iii) econometric approach.⁸ First, in Table 3 we show results obtained using different measures to define the average unemployment rate of the contiguous local labour markets. In our baseline, we use a simple average that gives the same weight to the unemployment rate of all the contiguous RORs. That is, we assume that individuals attribute the same importance to variations in the unemployment rate of all the nearby local areas, depending on whether they belong or not in the same Federal State. A simple way of relaxing this assumption consists of computing weighted averages of unemployment rate by considering three main dimensions: a) the share of population living in each adjacent ROR; b) the fraction of the border of the own ROR that is shared with each of the bordering RORs; and c) the inverse of the distance between the centroid of own ROR with each of the bordering RORs (normalized by the sum of all distances). The estimations obtained using these three alternative weighted averages to compute unemployment in bordering areas (belonging or not to the same Federal State) are reported in Table 3 together with our baseline results reported in specification (1). As can be seen, the estimates obtained with these three different weighted measures of unemployment rates in bordering areas are virtually the same as the baseline results and confirm the main results obtained before.

Next, we move to robustness checks related to potential endogeneity issues, to provide suggestive evidence that endogenous residential sorting and selection on individual unobserved characteristics are not the main drivers of our earlier results. Indeed, it can be argued that individuals may endogenously decide to move to another region (ROR) due to the economic situation (notably

⁸ As additional robustness checks (see footnote number 2), we also removed observations from individuals residing in State Cities (Berlin, Bremen and Hamburg) or in Saarland, for whom the definition of surrounding local labour markets is subject to the assumptions described in footnote 2. The results are virtually the same. Moreover, we also replicated the main estimations after excluding individuals living in RORs that have no single bordering RORs in other Federal States, for whom the variable capturing unemployment rate in surrounding areas would be always equal to zero. The results from these additional estimations are available upon request.

unemployment level). In this case, individuals who care more about unemployment will have a larger probability of moving when unemployment in their area of residence increases. This means that our result would be a lower bound of the *true* estimate. It is also true, however, that an individual's probability of moving when economic circumstances deteriorate also depends on their own characteristics and we expect those with larger salaries and education to be more mobile. In this case, individuals who will remain in the region are those more affected by unemployment and our estimates would be upward-biased. Therefore, the direction of the biases if individuals changed ROR of residence as a reaction to changes in unemployment is unknown. To address these concerns, in column 2 of Table 4 we present results using the observations from the subsample of individuals who never change their place of residence while observed in the panel, i.e. the stayers. The estimates obtained for the subsample of stayers are consistent and similar to the ones from the baseline model (reproduced in column 1 of Table 4), except for the fact that the point estimate attached to unemployment in the own ROR is higher (0.039 vs 0.029), while the one of unemployment in bordering areas from the same Federal State is lower (0.020 vs 0.027). It might well be that stayers are less employable, more risk-averse, and less likely to commute for a job and thus are more affected by own area unemployment rate, while they are less likely to job search further away and are thus less impacted by unemployment in bordering areas, even if in the same Federal State. Similarly, it could be that stayers are more attached to their region and therefore feel more empathy for their close "neighbours" (within group).

In specifications (3) to (5) we estimate the model with individual fixed effects, which enables controlling for time-invariant unobserved individual characteristics. Including individual fixed effects, however, introduces identification challenges: since variations in unemployment rate are much larger across RORs than over time within the same ROR, including individual fixed effects implies giving more weight to those individuals who move, which are likely to be younger or with a high wage potential. This is especially true in Germany, where there is very little mobility. Consequently, specification (3) includes both, individual and ROR fixed effects, and gives rise to very imprecisely estimated coefficients. This estimation is very demanding as it exploits variation within ROR and within individual and it gives more weight to those who move. To get rid of this issue, column (4) displays the main estimates for the total sample obtained, including individual fixed effects but excluding ROR fixed effects. Controlling for individual fixed effects exploits within individual variation only and therefore reduces the R-squared by about 80%. Similarly, it reduces the size of the coefficient of unemployment of own ROR by about 40%, while the other results remain fairly similar (most remarkably, our main result about the differential effect of unemployment in surrounding RORs). However, this specification does not control for time-invariant characteristics of the own local labour market, which are not picked up by the individual fixed effects among the movers. Therefore, in column (5) we repeat the estimation with individual fixed effects but no ROR fixed effects for the subsample of individuals who do not change ROR while in the panel (88%, the stayers). Our preferred specification with individual fixed effects is the one presented column (5), as

it excludes those individuals who do not move and therefore identifies the effects from a more homogeneous sample. This specification indeed provides very similar evidence to our baseline model, except for a reduction in the effect of local the unemployment rate in the own ROR, and thus confirms the overall evidence.

Finally, we test the robustness of our results to a different econometric approach. As discussed in section 3.1, our main variable of interest is clustered at the ROR level, while life satisfaction data is defined at the individual level. Therefore, all our regressions show (two-way) clustered standard errors. Although the number of clusters is sufficiently large to be confident that our standard errors are unbiased, we present robustness of our results by estimating the model with aggregated data. Specifically, we collapse our data into an ROR-year panel with 1536 observations (96 RORs \times 16 years). Our dependent variable is defined as the year-ROR average SWB (\overline{SWB}_{rt}), which we compute using as weights the number of observations contained in each year-ROR cell. This corresponds to equation (4) of section 3.1. The results are displayed in Table A3 of the Appendix, in which we follow the same order of presentation as in Table 2 to ensure comparability, and therefore column (4) shows our baseline results based on aggregate data. Specifically, column (4) shows that, as with data at the individual level, the local unemployment rate of the own ROR significantly reduces the average satisfaction of the individuals living in that ROR. One standard deviation increase in local unemployment correlates with 0.11 points decrease on the average ROR life satisfaction (just slightly lower than the effect obtained from microdata, which was 0.13 points). All the results with aggregate data are completely aligned quantitatively and qualitatively with those with microdata. That is, column (4) of Table A3 shows that also exploiting only aggregate data, only variations in unemployment rate in the own ROR and nearby RORs belonging to the same Federal State are negatively and significantly correlated with SWB.⁹ This alternative estimation approach therefore confirms the relevance of unemployment rate in the local labour market of residence and in contiguous local areas that belong to the same Federal State, and the null effect of variations in unemployment in neighbouring areas that belong to another Federal State. Although the results are very similar, we retain combined aggregate and microdata for the following empirical exercises, which enable exploits individual characteristics for the analyses that follows.

4.3. Heterogeneity analysis and mechanisms

As discussed above, the baseline results indicate that individuals' subjective well-being is affected by fluctuations in unemployment rate in the own area of residence and in neighbouring areas, but only if these belong to the same Federal State, suggesting that spatial spillovers of local unemployment rate are constrained within regional administrative and legal borders. As argued in the introduction, this evidence is consistent with two possible explanations or channels: (i) individuals care about

⁹ As for microdata, we also replaced the simple averages of unemployment rates in bordering areas with the reweighted averages according to population, border's share and inverse distance, which provided similar evidence (see Table A4 in the Appendix).

unemployment rate because it affects their perception about their own position in the labour market, which would be the case if the relevant geographical dimension of the labour market that individuals take into account is defined within the boundaries of the Federal State; and (ii) individuals empathize with those unemployed only if they belong to their group, where 'group' is defined as those living in the same Federal State (within-group empathy). In the rest of the paper, we seek to gauge the relevance of each of these two potential channels by means of heterogeneity analysis and additional tests.

The first set of heterogeneity tests are based on differentiating across samples defined according to characteristics related to wage potential, employability and labour market participation. If individuals care about unemployment rate to the extent that it affects their own job perceptions, we would expect specific samples to be more affected than others. Therefore, we proceed by estimating heterogeneous effects by including interaction terms between the unemployment variables and individuals' characteristics typically correlated with their labour situation (e.g. ties to the labour market, employability, uncertainty they face, and job quality). Specifically, we interact all unemployment rate variables with, respectively, gender, age group dummies, an indicator for having at least 14 years of education (corresponding to post-secondary education), and three dummies for labour market status (full-time private sector workers, which is the reference category, part-time private sector workers, public sector workers, and unemployed). Table 5 indicates that unemployment rate on life satisfaction is not different by gender (columns 2 and 3).¹⁰ On the contrary, as displayed in columns (4) and (5), the effect of unemployment rate, both of own ROR and of neighbouring areas belonging to the same Federal State, are larger (more negative) for people in the middle of the age distribution (i.e. 35–44 and 45–54). Individuals in this age range are more sensitive to fluctuations in local unemployment, because they have stronger ties with the labour market, some are still consolidating their working career, and are more concerned about the stability of their job. The interaction with higher education produces a very small coefficient that is not always precisely estimated (column 6). The unemployed, however, do show a larger negative coefficient for unemployment rate in own ROR and in bordering RORs from the same Federal State (they have an additional -0.016 and -0.013, respectively), while public sector workers show a positive interaction with the same two variables (0.011 and 0.010, respectively) compared to full-time private sector workers (column 8 and 9). These findings are in line with the results by Luechinger et al. (2010), who argued that public sector workers are less affected by unemployment rate because they are in a more secure job. In Table 5 we also see that, in line with previous results, the coefficients of the unemployment rate of bordering areas not belonging to the same Federal State are for all different groups, and as in the baseline results, very small and imprecisely estimated, except for males, who show a very small (0.005), but precisely estimated interaction coefficient.

¹⁰ The only exception is unemployment rate in bordering RORs from other Federal States, although the overall effect is statistically equal to zero for both males and females.

Next, we exploit the information about commuting for working reasons contained in the SOEP data. Recent statistics show that, on average, Germans commute about 45 minutes a day to get to work (Eurostat), a number that has been increasing over the years. In 2016 (microcensus 2016, Statistisches Bundesamt), 25% of the workers commuted less than 25 km, and only 4.5% commuted 50 km or more (67.7% of those commutes were made in private cars). If unemployment rate affects life satisfaction through individuals' worries about own job, we would expect commuters to be less affected by local unemployment to the extent that they are able and willing to find jobs further away, if needed. Therefore, under this hypothesis, excluding commuters should increase the coefficient of own ROR unemployment rate on life satisfaction and, if anything, reduce the coefficient for the neighbouring ROR unemployment, as non-commuters do not see jobs further away as attractive. Therefore, we replicate the estimations excluding those individuals who commute for work. In Table 6 we show the results excluding those who commute more than 25 km (column 2), 50 km (column 3), and 75 km (column 4). The estimated coefficients are qualitatively similar to our baseline results and, if anything, they show a slightly larger coefficient for own ROR unemployment, as consistent with our hypothesis.

Next, we present results for different samples, depending on their labour market participation, which are displayed in Table 7. The second specification of Table 7 shows our baseline results for the employed sample and indicates that employed individuals have virtually the same coefficients as the total sample (baseline results are copied in Table 7, column 1). In contrast, inactive individuals (aged 16 to 65, as the original sample) show a smaller and very imprecisely estimated coefficient for unemployment rate in own ROR (specification 3), while the coefficient for unemployment in bordering areas within the same Federal State is also very imprecisely estimated. In other words, we can argue that our baseline results were driven by individuals who are active in the labour market. That is, those who are employed or those who are not but are actively searching for a job are the only ones concerned about the prevalence of unemployment in the relevant local labour markets, which points again towards labour market concerns rather than empathy as the main driver of our baseline results. Of course, this assumes that there is no reason to believe that inactive individuals should show less empathy than the rest.

In short, all the evidence presented in Tables 5 to 7 is consistent again with the hypothesis that individuals' dislike about local unemployment rate is related to their concerns about own job situation, rather than to empathy or externalities that affects all the population similarly. That is, all the evidence points towards labour market concerns as the underlying factor behind the negative relationship between local unemployment rate and life satisfaction. Finally, in Table 7 we present the baseline specification (equation 3), but using as dependent variable the self-reported 'probability of losing own job' on a scale from 0 to 100. Since this question is only asked every odd year and only to employed individuals, in (column 4) we show the life satisfaction baseline results with this sample to show that the results are maintained. The results obtained using perceived probability of losing

the own job (column 5) show large and precisely estimated coefficients of unemployment rate in own ROR as well as bordering areas belonging to the same Federal State. Since the reported probability of losing own job lower is defined on a 0-100 scale, these larger coefficients do not translate in much larger effects in terms of standard deviations of the dependent variable. For example, a one standard deviation increase in unemployment rate of the own local area of residence increases the reported probability of losing own job by 11% of the standard deviation (compared to 7.6% for life satisfaction). In line with the life satisfaction results, the coefficients for unemployment rate of bordering areas not belonging to the same Federal State are small and imprecisely estimated. Thus, as for the heterogeneity analysis, this evidence also points towards the importance of worries about losing the own job as a reason to dislike unemployment rate in the geographical area of influence (own ROR or contiguous RORs in the same Federal State).

5. Conclusions

This paper has provided novel evidence on the effect of local unemployment rate on life satisfaction, by analysing the existence of geographical spillovers from adjacent local labour markets, examining whether these spatial spillovers interact with regional administrative borders and, finally, by contributing to understanding the underlying mechanisms behind individuals' dislike for local unemployment rate. The analysis is carried out with combined micro and aggregate data at the ROR (*Raumordnungsregionen*) level for Germany, covering the period 2000–2015. We contributed to the literature by focussing on a new spatial dimension of analysis that exploits variation over time and space in unemployment rate in the local labour market of residence (ROR) as well as in contiguous labour markets, distinguishing whether these neighbouring areas belong or not to the same Federal State where the individuals reside. In doing that, we go a step ahead with respect to the previous literature by enlarging the definition of the local area of influence and allowing the existence of spatial spillovers based on a contiguity approach, while defining the local area of residence as smaller than usual geographical units that correspond to labour markets. In addition, the analysis also takes into account the role of existing regional borders and exploits the difference between contiguous regions belonging or not to the same Federal State as the one where the individual resides. The results are aligned with earlier works and indicate that local unemployment in the own area of residence matters for individuals' life satisfaction, confirming the standard result in the literature. However, only unemployment rate in contiguous local labour markets belonging to the same Federal State where individuals reside affects their life satisfaction, while no effect is detected for variations in unemployment rate in adjacent areas belonging to other Federal States. Therefore, the existence of spatial spillovers of local unemployment on happiness appear to be constrained by the geography of administrative regional borders. Our results are robust to various specifications, unemployment rate definitions, endogenous residential sorting, time-invariant unobserved heterogeneity, specific local boundaries, and to using collapsed data at the same level of variation as local unemployment.

With the aim of disentangling the underlying factors that generate this asymmetric effect of local unemployment in surrounding areas, according to whether they belong to the same Federal State or not, we provide additional analyses that contribute to understanding the mechanisms behind individuals' dislike for local unemployment rate. We hypothesize that the general evidence reported in this paper could be due to either the effect of unemployment in adjacent local labour markets on concerns about job security and own employment status, empathy motives that are biased towards individuals belonging to the same group defined as residing in the same Federal State, or broad negative externalities associated with unemployment rate (e.g. fiscal pressure, increasing crime rate, and human capital lost). However, the evidence reported in the last part of the paper indicates that the latter theoretical channels do not seem to be driving our results. Instead, our results point to the increase in own labour market situation concerns (e.g. work and salary pressure and uncertainty) as the mechanism explaining why individuals dislike local unemployment.

We sustain these conclusions through various empirical exercises. First, heterogeneous analysis shows that the negative effect of unemployment rate is stronger for those individuals more attached to the labour market (individuals in the middle of the age distribution and highly educated) and for those looking for a job (unemployed), while the effect is less strong for those with safer jobs (public workers). Similarly, we find that individuals who do not commute to work and are thus more attached to their own local labour market, are more affected by local unemployment rate. Moreover, we find that individuals not participating in the labour market (inactive aged 16–65) show no correlation between life satisfaction and unemployment rate at the different geographic levels, which goes against the interpretation based on empathetic reasons or externalities. Finally, the same asymmetric effect of local unemployment rate in contiguous areas is reproduced when we use individuals' self-reported probability of losing their job as our dependent variable. We recognize that we cannot discard the presence of altruistic and empathetic factors behind the relationship between local unemployment rate and life satisfaction, or other negative externalities, such as increasing fiscal burden and loss of human capital. This, however, would require that individuals with stronger ties with the labour market are more emphatic or have a stronger perception of the detrimental effects of local unemployment for others' well-being (and there are no a priori reasons to believe that this happens).

In short, the overall evidence points towards labour-related concerns to explain the link between local unemployment and life satisfaction. This, together with the consistent findings that, not only unemployment rate in the local area of residence, but also the prevalence of unemployment in neighbouring areas matter only if these belong to the same Federal State, make us conclude that local labour markets, in Germany, are defined or perceived at the federal level. Individuals seem not to be concerned about the unemployment rate in areas equally far from the place of residence, but belonging to other Federal States. Therefore, policies aimed at incentivizing individuals to search for jobs in other states would thus be efficient in reducing unemployment differences across space. In

other words, the evidence speaks in favour of inter-regional mobility programmes for job-seekers to promote a search driven by the geography of labour demand and the spatial distribution of employment opportunities regardless of existing administrative regional borders. This was already in place in Germany in the years 2003 to 2005 under the so-called 'Hartz Reform' (Caliendo and Hogenacker, 2012; Caliendo et al., 2017).

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Figure 1: local unemployment rate at the ROR (*Raumordnungsregionen*) level

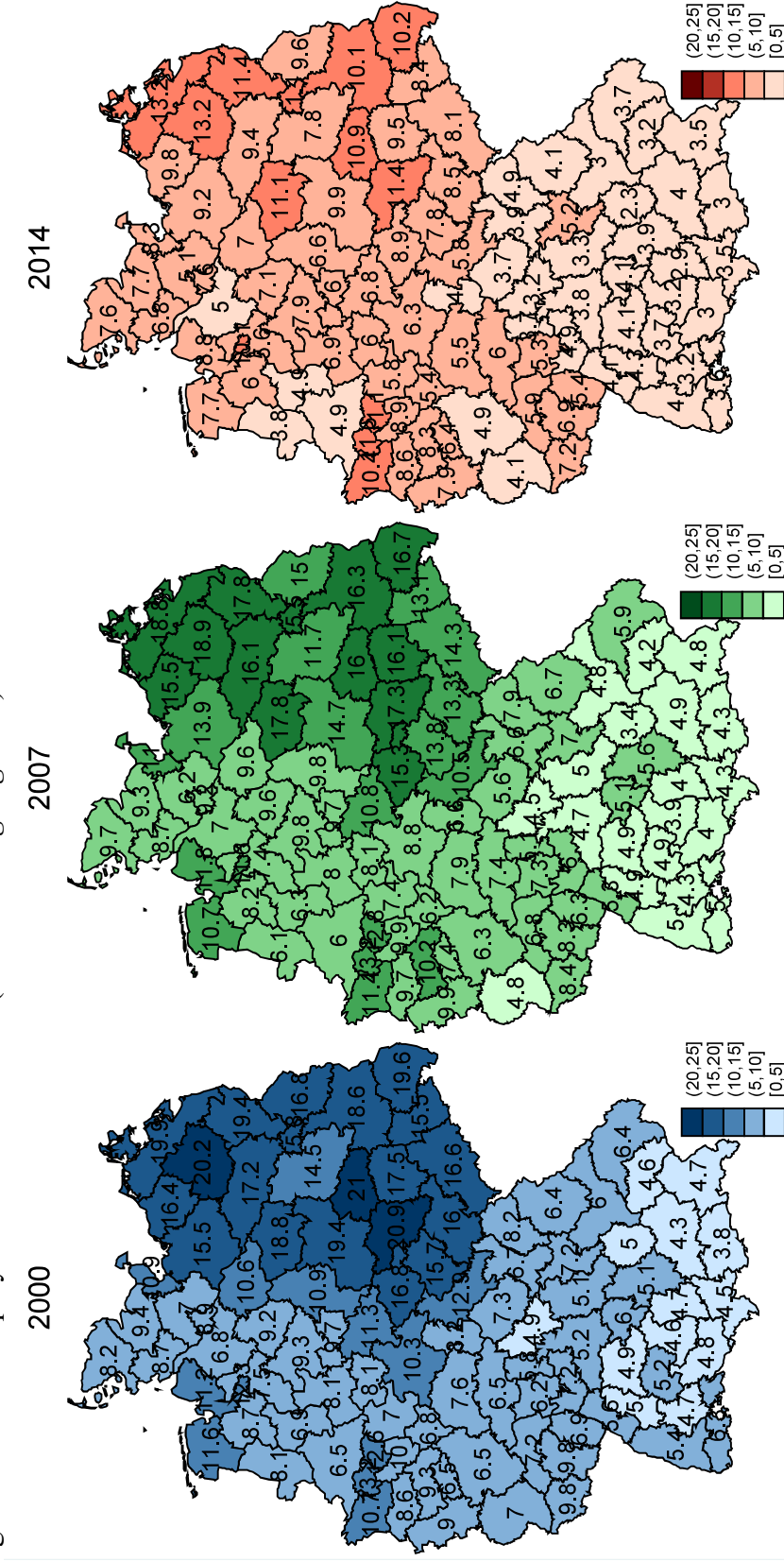


Table 1: Descriptive statistics (pooled sample 2000-2015)

Variable	Mean	Std. Dev.	Min	Max
subjective well being (happiness)	7.09	1.71	0.00	10.00
difficulty to find a job ^a	1.94	0.66	1.00	3.00
worried about job security ^b	2.39	0.69	1.00	3.00
perceived probability to lose the job ^c	20.10	25.11	0.00	100.00
unemployment own area	9.14	4.39	2.10	24.00
unemployment bordering areas	8.89	4.10	2.95	21.70
unemployment bordering areas - same Federal State	8.91	4.34	0.00	21.85
unemployment bordering areas - different Federal State	6.03	5.74	0.00	23.95
individual controls				
male	0.51	0.50	0.00	1.00
age	42.73	11.03	16.00	65.00
labour situation = public sector worker	0.23	0.42	0.00	1.00
labour situation = private sector full time worker	0.57	0.50	0.00	1.00
labour situation = private sector parttime worker	0.09	0.29	0.00	1.00
labour situation = unemployed	0.11	0.32	0.00	1.00
years of schooling	12.77	2.71	7.00	18.00
net household income	3404.0	2309.1	10.0	200000
married	0.60	0.49	0.00	1.00
number of children	0.78	1.03	0.00	9.00
number of adults in the household	2.94	1.29	1.00	14.00
number of visits to the doctors (last 3 months)	2.08	3.45	0.00	99.00
local controls				
local average household income per-capita	1531.7	234.2	1013.8	2312.1
local share of migrants	8.12	4.64	1.00	19.21
local average housing price (per mq2)	121.5	103.7	9.0	632.4
years/waves				
year/wave = 2000	0.06	0.24	0.00	1.00
year/wave = 2001	0.06	0.23	0.00	1.00
year/wave = 2002	0.06	0.25	0.00	1.00
year/wave = 2003	0.06	0.24	0.00	1.00
year/wave = 2004	0.06	0.23	0.00	1.00
year/wave = 2005	0.06	0.23	0.00	1.00
year/wave = 2006	0.06	0.23	0.00	1.00
year/wave = 2007	0.05	0.23	0.00	1.00
year/wave = 2008	0.05	0.22	0.00	1.00
year/wave = 2009	0.05	0.22	0.00	1.00
year/wave = 2010	0.07	0.26	0.00	1.00
year/wave = 2011	0.07	0.26	0.00	1.00
year/wave = 2012	0.07	0.26	0.00	1.00
year/wave = 2013	0.07	0.26	0.00	1.00
year/wave = 2014	0.07	0.25	0.00	1.00
year/wave = 2015	0.06	0.24	0.00	1.00
Number of observations	187,431			

^a only 163,397 valid observations of employed individuals; ^b only 162,797 valid observations of employed individuals; ^c only 64,800 valid observations of employed individuals from waves 2001, 2003, 2005, 2007, 2009, 2011, 2013.

Table 2: Local unemployment and SWB, individual data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
unemployment own area	-0.051*** (0.005)	-0.046*** (0.005)	-0.034*** (0.012)	-0.029** (0.012)		-0.037*** (0.013)	-0.033** (0.014)
unemployment bordering areas			-0.015 (0.013)				
unemployment bordering areas - same Federal State				-0.027*** (0.010)	-0.049*** (0.006)	-0.047** (0.019)	-0.023 (0.016)
unemployment bordering areas - different Federal State				0.009 (0.006)	0.003 (0.006)	0.006 (0.007)	0.009 (0.007)
local area controls	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
linear Federal State specific trend	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>yes</i>	<i>no</i>
quadratic Federal State specific trend	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>no</i>	<i>yes</i>
adjusted R-squared	0.148	0.148	0.148	0.148	0.148	0.145	0.146
Number of observations	187431	187431	187431	187431	187431	187431	187431

*** **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. All regressions include ROR fixed effects and individual controls (gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors in the last 3 months). Additional local area (ROR) controls: (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq². Regressions in columns (1)-(5) include year effects. Regressions in columns (6) and (7) include linear and quadratic Federal State specific trends, respectively.

Table 3: Local unemployment and SWB, alternative definitions of average unemployment in bordering areas

	(1)	(2)	(3)	(4)
unemployment own area	-0.029** (0.012)	-0.034*** (0.013)	-0.027** (0.012)	-0.029** (0.012)
unemployment bordering areas - same Federal State	-0.027*** (0.010)	-0.022** (0.010)	-0.029*** (0.010)	-0.027*** (0.010)
unemployment bordering areas - different Federal State	0.009 (0.006)	0.009 (0.007)	0.009 (0.006)	0.009 (0.006)
adjusted R-squared	0.148	0.148	0.148	0.148
Number of observations	187431	187431	187431	187431

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. Column (1): baseline results (as in column 4 of Table 2); column (2): unemployment rate in bordering areas weighted by population share; column (3): unemployment rate in bordering areas weighted by the share of border's contiguity; column (4): unemployment rate in bordering areas weighted by the inverse of the distance from the centroids. All regressions include controls for gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq2, year fixed effects and ROR fixed effects.

Table 4: Local unemployment and SWB, estimations without movers and with individual fixed effects

	(1)	(2)	(3)	(4)	(5)
unemployment own area	-0.029** (0.012)	-0.039*** (0.013)	-0.016 (0.014)	-0.017* (0.009)	-0.020* (0.011)
unemployment bordering areas - same Federal State	-0.027*** (0.010)	-0.020* (0.010)	-0.022 (0.014)	-0.020** (0.007)	-0.021* (0.012)
unemployment bordering areas - different Federal State	0.009 (0.006)	0.010 (0.007)	-0.008 (0.008)	-0.007 (0.004)	-0.008 (0.007)
fixed effects	ROR	ROR	ROR & Ind	Ind	Ind
sample	all	stayers	all	all	stayers
adjusted R-squared	0.148	0.154	0.032	0.031	0.032
Number of observations	187431	165107	187431	187431	165107

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. Column (1): baseline results (as in column 4 of Table 2); column (2): estimation for the subsample of stayers (i.e. no change in the ROR of residence); column (3): estimation with individual fixed effects (i.e. variation from movers) and ROR fixed effects for the whole sample; column (4): estimation with individual fixed effects, but without ROR fixed effects for the whole sample; column (5): estimation with individual fixed effects for the subsample of stayers. Regressions in columns (1) and (2) include controls for gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq2 and year fixed effects. Regressions in columns (3), (4) and (5) contain only time-varying covariates.

Table 5: Heterogeneous effects of local unemployment rate on SWB

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
unemployment own area	-0.029**	-0.027**	-0.029**	-0.021*	-0.030***	-0.021*	-0.028**	-0.027**	-0.028**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
unemployment own area × male		-0.004							
		(0.003)							
unemployment own area × I(34 < age < 45)				-0.018***					
				(0.004)					
unemployment own area × I(44 < age < 55)				-0.011**					
				(0.006)					
unemployment own area × I(54 < age < 66)				-0.003					
				(0.007)					
unemployment own area × I(high education)						-0.009*			
						(0.005)			
unemployment own area × I(public sector)								0.010**	
								(0.004)	
unemployment own area × I(private partime)								-0.005	
								(0.006)	
unemployment own area × I(unemployed)								-0.016***	
								(0.004)	
unemployment bordering areas - same Federal State	-0.027***	-0.027***	-0.024**	-0.026***	-0.013	-0.027***	-0.019*	-0.027***	-0.027***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)
unemployment bordering areas - same Federal State × male			-0.005						
			(0.004)						
unemployment bordering areas - same Federal State × I(34 < age < 45)					-0.021***				
					(0.005)				
unemployment bordering areas - same Federal State × I(44 < age < 55)					-0.016**				
					(0.008)				
unemployment bordering areas - same Federal State × I(54 < age < 66)					-0.011				
					(0.009)				
unemployment bordering areas - same Federal State × I(high education)							-0.010		
							(0.007)		
unemployment bordering areas - same Federal State × I(public sector)									0.011**
									(0.004)
unemployment bordering areas - same Federal State × I(private partime)									-0.001
									(0.007)
unemployment bordering areas - same Federal State × I(unemployed)									-0.013**
									(0.006)
unemployment bordering areas - different Federal State	0.009	0.009	0.006	0.009	0.006	0.009	0.008	0.009	0.011
	(0.006)	(0.006)	(0.007)	(0.006)	(0.008)	(0.006)	(0.006)	(0.006)	(0.007)
unemployment bordering areas - different Federal State × male			0.005*						
			(0.003)						
unemployment bordering areas - different Federal State × I(34 < age < 45)					0.003				
					(0.004)				
unemployment bordering areas - different Federal State × I(44 < age < 55)					0.002				
					(0.006)				
unemployment bordering areas - different Federal State × I(54 < age < 66)					0.007				
					(0.008)				
unemployment bordering areas - different Federal State × I(high education)							0.001		
							(0.005)		
unemployment bordering areas - different Federal State × I(public sector)									-0.001
									(0.004)
unemployment bordering areas - different Federal State × I(private partime)									-0.006
									(0.005)
unemployment bordering areas - different Federal State × I(unemployed)									-0.003
									(0.003)
adjusted R-squared	0.148	0.148	0.148	0.145	0.145	0.147	0.147	0.148	0.148
Number of observations	187431	187431	187431	187431	187431	187431	187431	187431	187431

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. Column (1): baseline results (as in column 4 of Table 2); columns (2) and (3): base category females; columns (4) and (5): base category age < 35, control for base effects of age groups; columns (6) and (7): base category low education (years of schooling < 14), control for base effect of high education; columns (8) and (9): base category private sector full time workers, control for base effects of labour market status. All regressions include controls for gender, age and its square (except columns 4 and 5), (log) years of schooling (except columns 6 and 7), marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq2, year fixed effects and ROR fixed effects.

Table 6: Local unemployment and SWB, estimations without commuters

	(1)	(2)	(3)	(4)
unemployment own area	-0.029** (0.012)	-0.035*** (0.012)	-0.032*** (0.012)	-0.033*** (0.012)
unemployment bordering areas - same Federal State	-0.027*** (0.010)	-0.024** (0.010)	-0.023** (0.010)	-0.024** (0.010)
unemployment bordering areas - different Federal State	0.009 (0.006)	0.011* (0.006)	0.008 (0.006)	0.009 (0.006)
adjusted R-squared	0.148	0.154	0.149	0.149
Number of observations	187431	162752	179577	183117

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. Column (1): baseline results (as in column 4 of Table 2); column (2): estimation without individuals who commute more than 25 km; column (3): estimation without individuals who commute more than 50 km; column (4): estimation without individuals who commute more than 75 km. All regressions include controls for gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq2, year fixed effects and ROR fixed effects.

Table 7: Potential mechanisms

	(1)	(2)	(3)	(4)	(5)
unemployment own area	-0.029** (0.012)	-0.028** (0.012)	-0.000 (0.028)	-0.027* (0.015)	0.674** (0.337)
unemployment bordering areas - same Federal State	-0.027*** (0.010)	-0.026** (0.011)	-0.035 (0.030)	-0.024** (0.011)	0.412* (0.226)
unemployment bordering areas - different Federal State	0.009 (0.006)	0.010 (0.006)	0.005 (0.013)	0.006 (0.008)	-0.112 (0.118)
adjusted R-squared	0.148	0.104	0.205	0.104	0.108
Number of observations	187431	166007	34732	64800	64800

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. Column (1): baseline results (as in column 4 of Table 2). Column (2): Dependent variable = SWB (0-10 scale), estimation for employed individuals. Column (3): Dependent variable = SWB (0-10 scale), estimation for inactive individuals with age between 16 and 65 (same as in the baseline sample). Column (4): Dependent variable = SWB (0-10 scale), estimation for observations with valid information on perceived probability to lose the job in the next two years. Column (5): Dependent variable = perceived probability to lose the job (0-100 scale). All regressions include controls for gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq2, year fixed effects and ROR fixed effects.

Appendix A

Table A1: Descriptive statistics for additional samples

Variable	<i>employed individuals</i>		<i>inactive individuals, age 16-65</i>		<i>inactive individuals</i>	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
subjective well being (happiness)	7.21	1.61	6.97	1.92	6.986238	1.875583
difficulty to find a job ^a	1.94	0.66				
worried about job security ^b	2.40	0.69				
perceived probability to lose the job ^c	20.10	25.11				
unemployment own area	8.93	4.27	9.20	4.35	9.23	4.32
unemployment bordering areas	8.70	4.00	8.95	4.03	8.98	4.01
unemployment bordering areas - same Federal State	8.71	4.23	8.95	4.27	8.97	4.24
unemployment bordering areas - different Federal State	5.85	5.61	5.95	5.76	6.05	5.76
individual controls						
male	0.51	0.50	0.26	0.44	0.38	0.48
age	43.02	10.54	50.35	13.56	64.85	15.24
labour situation = public sector worker	0.26	0.44				
labour situation = private sector full time worker	0.64	0.48				
labour situation = private sector parttime worker	0.10	0.30				
labour situation = unemployed						
years of schooling	12.93	2.73	11.76	2.43	11.59	2.50
net household income	3550.92	2331.65	2917.25	2055.58	2576.22	1816.61
married	0.62	0.48	0.75	0.43	0.68	0.47
number of children	0.79	1.03	0.75	1.14	0.30	0.81
number of adults in the household	2.95	1.28	2.86	1.32	2.21	1.10
number of visits to the doctors (last 3 months)	2.00	3.26	3.42	5.17	3.60	4.92
local controls						
local average household income per-capita	1541.53	233.14	1512.20	227.38	1526.04	229.93
local share of migrants	8.28	4.62	8.22	4.55	8.08	4.60
local average housing price (per mq2)	124.27	104.38	119.49	99.62	119.93	102.92
years/waves						
year/wave = 2000	0.06	0.24	0.08	0.28	0.06	0.25
year/wave = 2001	0.06	0.23	0.07	0.26	0.06	0.24
year/wave = 2002	0.06	0.24	0.07	0.26	0.06	0.24
year/wave = 2003	0.06	0.23	0.07	0.25	0.06	0.24
year/wave = 2004	0.06	0.23	0.06	0.24	0.06	0.23
year/wave = 2005	0.05	0.23	0.06	0.23	0.06	0.23
year/wave = 2006	0.06	0.23	0.06	0.24	0.06	0.24
year/wave = 2007	0.06	0.23	0.05	0.22	0.06	0.24
year/wave = 2008	0.05	0.22	0.05	0.21	0.06	0.23
year/wave = 2009	0.05	0.23	0.05	0.21	0.06	0.24
year/wave = 2010	0.07	0.26	0.08	0.27	0.07	0.25
year/wave = 2011	0.07	0.26	0.07	0.25	0.07	0.25
year/wave = 2012	0.08	0.26	0.07	0.25	0.07	0.25
year/wave = 2013	0.07	0.26	0.06	0.23	0.07	0.25
year/wave = 2014	0.07	0.25	0.05	0.23	0.06	0.25
year/wave = 2015	0.06	0.25	0.05	0.21	0.06	0.24
Number of observations	166,007		34,732		88,362	

^a only 163,397 valid observations; ^b only 162,797 valid observations; ^c only 64,800 valid observations from waves 2001, 2003, 2005, 2007, 2009, 2011, 2013.

Table A2: Local unemployment and SWB, individual data, lagged unemployment rate

	(1)	(2)	(3)	(4)	(5)
unemployment own area (t)	-0.029** (0.012)			-0.033*** (0.009)	-0.036*** (0.008)
unemployment own area (t-1)		-0.021* (0.011)			
unemployment own area (t-2)			-0.018* (0.010)		
unemployment bordering areas - same Federal State (t)	-0.027*** (0.010)	-0.035*** (0.008)	-0.040*** (0.007)		
unemployment bordering areas - same Federal State (t-1)				-0.024*** (0.009)	
unemployment bordering areas - same Federal State (t-2)					-0.021*** (0.008)
unemployment bordering areas - different Federal State (t)	0.009 (0.006)	0.007 (0.007)	0.007 (0.007)		
unemployment bordering areas - different Federal State (t-1)				0.009 (0.006)	
unemployment bordering areas - different Federal State (t-2)					0.007 (0.007)
adjusted R-squared	0.148	0.148	0.148	0.148	0.148
Number of observations	187431	187431	187431	187431	187431

***, **, * denote significance at the 1, 5 and 10 percent level. OLS Regressions with two-way clustered standard errors at the local (ROR) and year level. All regressions include controls for gender, age and its square, (log) years of schooling, marital status, (log) number of children, (log) number of adults in the household, (log) net family income, dummies for labour market status (unemployed, public sector worker, private sector full-time worker, private sector part-time/mini-job worker), (log) number of visits to the doctors (last 3 months), (log) average household income per-capita, local share of migrants, (log) of average housing prices per mq², year fixed effects and ROR fixed effects.

Table A3: Local unemployment and SWB (aggregate data) — dependent variable: (weighed) average SWB at the ROR × year level

	(1)	(2)	(3)	(4)	(5)
unemployment own area					
		-0.050***	-0.045***	-0.038***	-0.026*
	(0.007)	(0.008)	(0.016)	(0.014)	
unemployment bordering areas			-0.008		
			(0.018)		
unemployment bordering areas - same Federal State				-0.032**	-0.052***
				(0.014)	(0.010)
unemployment bordering areas - different Federal State				0.010	0.005
				(0.008)	(0.008)
local area controls	<i>no</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
adjusted R-squared	0.398	0.401	0.401	0.406	0.404
Number of observations	1536	1536	1536	1536	1536

*** **, * denote significance at the 1, 5 and 10 percent level. Fixed Effects (ROR & year) Regressions with standard errors clustered at the local (ROR) level. Additional local area controls: (log) average household income per-capita, (log) of average housing prices per mq², local share of migrants.

Table A4: Local unemployment and SWB (aggregate data), alternative definitions of average unemployment in bordering areas

	(1)	(2)	(3)	(4)
unemployment own area	-0.026*	-0.029**	-0.021	-0.024
	(0.014)	(0.014)	(0.014)	(0.015)
unemployment bordering areas - same Federal State	-0.032**	-0.027**	-0.036***	-0.034**
	(0.014)	(0.013)	(0.013)	(0.014)
unemployment bordering areas - different Federal State	0.010	0.009	0.010	0.010
	(0.008)	(0.008)	(0.008)	(0.009)
adjusted R-squared	0.406	0.404	0.407	0.406
Number of observations	1536	1536	1536	1536

***, **, * denote significance at the 1, 5 and 10 percent level. Fixed Effects (ROR & year) Regressions with standard errors clustered at the local (ROR) level. Column (1): baseline results (as in column 4 of Table 2); column (2): unemployment rate in bordering areas weighted by population share; column (3): unemployment rate in bordering areas weighted by the share of border's contiguity; column (4): unemployment rate in bordering areas weighted by the inverse of the distance from the centroids. All regressions include as local area controls the (log) average household income per-capita, the (log) of average housing prices per mq2 and the local share of migrants.

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