REGIONAL DIFFERENCES IN UNEMPLOYMENT AND THE LABOR SUPPLY DECISION

HARALD BADINGER

(BADINGER@FGR.WU-WIEN.AC.AT)
UNIVERSITY OF BUSINESS ADMINISTRATION AND ECONOMICS
AUGASSE 2-6, A-1090, VIENNA, AUSTRIA

THOMAS URL

(URL@WSR.AC.AT)
AUSTRIAN INSTITUTE OF ECONOMIC RESEARCH
P.O. BOX 91, A-1103, VIENNA, AUSTRIA

Abstract: We present a model that describes the labor supply decision of individuals under transaction costs and job-related amenities. The model indicates that individuals will respond to regional differences in wages net of transaction costs and accept higher job-amenities as compensation for low wages. We use a sample of regional data from Eastern Austria to proof the implications of the model. Controlling for demand side effects we can find that the major determinants of regional differences in unemployment rates are wages differentials between districts, the share of public housing, and the sectoral structure of the district's economy. We can identify regional amenities indirectly by using a spatial filter on regional variables and interpret the regional component of the unemployment rate as unobserved amenities.

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1. Introduction

Almost every European country suffers from stubbornly high and persistent unemployment. Especially in comparison with the recent surge in employment in the US-labor market this raises the question for reasons behind the inferior track record within Europe. One startling experience, however, is the prevalence of large regional differences in unemployment rates within one single country. This is the more surprising since throughout European countries uniform legal systems usually coincide with language areas, social security regulations, and housing markets with similar subsidies or rental regulations. Thus one would expect unemployed persons to migrate within a country from depressed areas to booming regions such that in equilibrium unemployment rates tend to be uniformly distributed over space. At least for the USA migration was found to be the main correction mechanism for regional unemployment, whereas regional wage adjustment is a lagging adjustment force (*Blanchard - Katz*, 1992).

Differences in regional unemployment rates across districts have to be explained by some sort of market imperfection or a structural deficiency which distracts the movement of enterprises into depressed areas. Examples for market imperfections are efficiency wage mechanisms, where unemployment enters the production function (*Marston*, 1985). *Layard – Nickel - Jackman* (1991) use a combination of mark up pricing strategies and efficiency wages to motivate unemployment. Another central argument for spatial differences resorts to a trade off between local unemployment and some compensating factors like real wages or regional amenities (*Molho*, 1995). High real wages or other attractive characteristics of an area are compensated by a higher probability of unemployment yielding a constant utility level for households across regions. Similarly *Treyz et al*. (1993) define an equilibrium by zero net migration across regions, where local amenities compensate for expected income differentials.

Those amenities can result from insider advantages due to location specific contacts and experience. *Fischer et al*. (1998) argue that for individuals migration will in many cases not pay off because the accumulated insider knowledge would have to be scrapped in case of emigration. The longer individuals stay within the same location the more time they will have spent on learning location specific information. Moving turns such investment into sunk costs and therefore individuals are less likely to move. Suggested location specific advantages can be place, job, or society related and may even result in a wage premium for residents over outsiders. Also leisure oriented advantages can improve individual utility levels for given resources and time constraints. For a sample of Swedish residents Fischer et al. are able to prove a duration dependent probability to stay local.

Related to our topic are papers on regional income or wage disparities like *Dickie - Gerking* (1998), because wage disparities should also disappear under full information and zero transaction costs. The modelling strategy in this literature stresses also regional amenities as a major source of income inequalities although Dickie - Gerking rely on more subtle barriers to migration through transaction costs and interregional transfer payments. *Ritter - Walz* (1998) stress the positive external effects of specialization within larger regions to motivate differences in wages and unemployment rates across regions.

A better understanding of regional differences in unemployment will allow to design policy measures that improve the flexibility of regional labor markets. This aspect gets more important with the introduction of the Euro, because precautionary labor market policies that enhance the flexibility of European labor markets get more important (*Calmfors*, 1998). The *OECD* (1998) proposes measures to foster entrepreneurship in order to improve economic dynamism and enhance the ability to adapt to adverse shocks, structural change or new challenges. Entrepreneurs are already central to the concept of creative destruction invoked by *Schumpeter* (1942). Besides a positive external effect of a higher number of firms on the level of competitiveness new start ups create employment and provide signals for profit opportunities. Regional data on enterprise activity provide an opportunity to test for the relevance of entrepreneurship in reducing unemployment figures.

In the following section we develop a model which is based on utility maximizing individuals facing transaction costs from commuting/migrating and job-related amenities. In part three data for a sample of Austrian districts are presented. We test for spatial autocorrelation and estimate a model for regional unemployment rates in part four. The final sections summarize the results and conclude.

2. The Model

The decision making process of individuals is based on the maximization of a utility function with respect to a budget constraint. Let *u(c, L)* be the utility from the consumption of a vector of goods (*c*) and leisure (*L*). Leisure is subject to following time constraint:

$$L = \overline{L} - \sum_{i=1}^{S} l_i \text{ ,} \qquad (1)$$

where $\overline{L}$ represents total time available and l_i is the amount of time spent with working at one of the *S* available jobs. If job *i* is accepted l_i takes a non-zero value. Utility is increasing at declining rates in both consumption and leisure. The standard utility maximization problem can be written as

$$\max_{c,l} u(c, L) \qquad (2)$$

$$\text{s.t.} \quad \sum_{j=1}^{N} p_j c_j = \sum_{i=1}^{S} w_i l_i + m \text{ .} \qquad (3)$$

$$L = \overline{L} - \sum_{i=1}^{S} l_i \text{ ,}$$

In this standard approach the individual receives wage income from selling labor at the prevailing wage rates w_i. The unit prices for all *N* available goods are given by p_i. The budget constraint allows for a non-wage income *m* and states that the amount spent on consumption must be equal to non-wage income plus earnings received from working. In this setting individuals who are only concerned with the amount of time spent on working and their income level will inevitably choose the job with the highest wage rate. If this happens to be a part time job, the individual will accept additional job offers until the wage rate is equal to the amount of money he is willing to accept for the loss of a marginal unit of leisure. In this setting regional unemployment does not exist even in the case of positive unemployment benefits as long as those benefits are below market clearing wages.

One possibility to allow for regional unemployment comes along with transaction costs from commuting/migrating in combination with unemployment benefits. If we introduce transaction costs the budget constraint changes into

$$\sum_{j=1}^{N} p_j c_j = \sum_{i=1}^{S} w_i (1-t_i) l_i + m \, , \qquad (4)$$

where t_i represents transaction costs associated with job *i*. Transaction costs are non-negative and will take high values if the individual has to commute/ migrate towards the new job but are close to zero for local jobs and unemployment. Since the individual is only interested in the net income from job *i* its transaction costs have to be accounted for.

If individuals are additionally concerned with non-wage characteristics of a job the dimension of the decision problem gets bigger and provides more incentives for unemployment. Every job features amenities or disamenities which may be job, place, or society related and create either job-satisfaction or dissatisfaction, respectively. In a choice between two jobs that offer the same wage rate an individual will clearly prefer the one with higher expected job-satisfaction. Sometimes job-satisfaction may even outweigh a higher wage rate. Let the pleasantness of job *i* be measured by some index a_i. The total utility from job *i* will then consist of the wage income earned corrected by transaction costs $w_i(1-t_i)l_i$ and the pleasantness associated with the job $a_i l_i$. The introduction of amenities changes the utility function and adds one more constraint to the maximization problem (*Gravelle - Rees,* 1981, p. 136ff.; *Becker*, 1965):

$$A = \sum_{i=1}^{S} a_i l_i \, , \qquad (5)$$

Since the pleasantness of a job is relevant for the utility of an individual the amenity level A achieved from working at jobs l_i must be also included in the utility function $u = u(c, L, A)$ and the maximization problem gets slightly more complicated:

$$\max_{c,l} u(c, L, A) \qquad (6)$$

$$\text{s.t.} \quad \sum_{j=1}^{N} p_j c_j = \sum_{i=1}^{S} w_i (1-t_i) l_i + m$$

$$L = \overline{L} - \sum\nolimits_{i=1}^{S} l_i \,,$$

$$A = \sum_{i=1}^{S} a_i l_i \,.$$

By substituting the time and amenity constraints into the utility function we can reduce this problem into a maximization problem with one constraint and derive the following first order conditions:

$$u_{cj} = \lambda p_i \qquad \text{for } j = 1,\ldots,N, \tag{7}$$

$$u_L = \lambda w_i(1\text{-}t_i) + u_A a_i \quad \text{for } i = 1,\ldots,S. \tag{8}$$

The variable λ gives the marginal utility of money income, u_{cj} is the partial derivative of the utility function with respect to good *j*, and u_L the partial derivative of the utility function with respect to leisure. Condition (7) is standard and requires the utility from consuming an extra unit of good *j* to equal the price of *j* weighted by the marginal utility of money income. The second requires that the utility lost from giving up one unit of leisure for the *ith* job must be compensated by its net wage rate weighted by the marginal utility of money plus the marginal utility resulting from the associated amenity. The more job-satisfaction is generated by job *i* the lower the wage rate can be.

The introduction of transaction costs and amenities into the labor supply decision creates incentives to stay unemployed instead of commuting/migrating towards other more distant jobs. Figure 1 characterizes the decision problem of an individual who lost his original job (point O). Lets assume for simplicity and without consequences for the choice between alternative jobs that leisure is fixed. The horizontal axis represents the amenity level associated with a job and the vertical axis shows the respective net income level. The trade off between earnings and amenity in individual preferences is shown by indifference curve *I*. Every point at *I* shows a combination of income and amenity which leaves the individual indifferent: a higher amenity level can compensate lower net wages and vice versa. The utility associated with an indifference curve is lower the closer the curve lies towards the origin.

Individuals will choose to stay unemployed if the amenities associated with unemployment a_b and unemployment benefits w_b are sufficiently high to substitute for alternative jobs. The income-amenity combination for an unemployed person is shown as point *B* in Figure 1. Local job-alternatives (like *F*) may be rejected even if the offered wage is identical to the original job (*O*) because of a low amenity level. This situation is likely to occur if the offered job does not correspond to the education based aspirations of the individual. But usually local jobs will have a high amenity level due to a bundle of social, job, or place related characteristics which create insider advantages. Additionally, they feature low transaction costs compared to more distant jobs; neither the cost of commuting nor that of migrating are incurred.

Assuming that there is no local job-alternative with a high enough income-amenity combination the individual faces a trade off between staying locally unemployed or commuting/migrating to a more distant firm while incurring transaction costs. Point *D* shows the combination of income and amenity attainable to the individual if all his time is spent for working at the distant job. At the ray from the origin to *D* the amount of time spent at job *d* is varied while the wage rate, transaction costs and amenity characteristics remain constant. Suppose $w_b(1-t_b)<w_d(1-t_d)$ and $a_b=a_d$, then the individual will prefer working at the distant job (*D*) over staying locally unemployed (*B*). The original job, however, is clearly preferred to both alternatives.

The slope of the indifference curve is important for the comparison of jobs with different income-amenity combinations. A point like *E*, for example, which features lower net wage rate and amenity level compared to *D* but higher wage rate and lower amenity level compared to *B* is clearly rejected against *D* but would be accepted against *B*, if wages would have a higher weight in the preferences, i.e. if the slope of the indifference curve is less steep. Indifference curve *I'* gives an example where local unemployment is preferred against working at job *E*. Theoretically the individual may choose any partition of time between *B* and *E*, shown by the line connecting *B* and *E*. But legal restrictions on the amount of work allowed during unemployment enforce border solutions at *B* or *E*.

Clearly the individuals in this setup do not enjoy the same level of utility across regions. Depending on the wage level, non-wage income, and transactions costs the amount of consumed goods varies across regions, as well as the amenity level associated with the work place, even if we assume identical preferences. Economic incentives in terms of higher wages provide in our model a strong motivation to commute/migrate but transaction costs together with local amenities impose relocation costs on individuals and may prolong spells of unemployment.

3. Data

Our model explains regional unemployment by factors related to the net income and amenity associated with individual jobs relative to those of unemployment. Transaction costs arise in the form of time lost during commuting, direct costs of commuting or costs from migration which may be particularly high in Europe's illiquid housing market. If individuals migrate they face costs from resolving their old home, searching for a new one, and finally in the form of haulage costs and possibly higher rental costs. In our sample we have information on the share of housing available at a rental basis, the rental costs of districts, and the share of public housing provided. The share of rental apartments represents the complement of home ownership, which is often used to proxy amenities or transaction costs. Additionally one may argue that high age acts as a barrier to mobility (*Fischer et al.*, 1998). Thus we include the portion of employees aged between 45 and 60. This is also motivated by life time income profiles with a hump shaped pattern such that the incentive to move diminishes with increasing age. Similarly individuals with high education level loose more income from staying unemployed compared to low-education households.

Each individual associates amenity levels with local jobs, which might be significantly higher compared to distant jobs. Different amenity levels between distant jobs and local unemployment may also explain regional unemployment. In contrast to wage rates and transaction costs the amenity characteristics of jobs or regions are hardly observable. We have only a few proxies available. The share of employees in the tourism sector and weather indicators may reflect a beautiful area and other attractive leisure related features. A similar indicator is the share of the service sector employees. Low population density and a high share of farmers may approximate intact environment, a strong social network, and higher life quality. Nevertheless, we do not expect those variables to capture amenities completely. Thus we will use a spatial component, extracted from the unemployment rate as a proxy for unobserved regional amenities.

Besides regional amenities several indicators describing the sectoral structure of a district are taken into account. Furthermore, the model treats labor as homogenous input although in fact workers differ according to several measurable characteristics. The most important among them are education and age levels.

Since our model describes only the supply side of a regional labor market we include the GDP per employee, the development in employment, and the job offer rate to control for demand side effects in an Instrumental Variable estimation. Finally local job opportunities may be reflected in a high share of entrepreneurs and in the case of Austria also in a high share of guest workers. Economic dynamism of a region is not only determined by the share of entrepreneurs but also by the start up rate of new businesses. We proxy this variable by the change in the share of entrepreneurs over recent years. Thus our initial approach was based on the following groups of variables:

Regional amenities:	FARMER, DENSD, DENSK, FOG, LDENSD, LDENSK, RAIN, SERVICE, SNOW, SUN, TOUR
Sectoral structure:	D_AGRO, D_CITY, D_IND_AGRO, D_IND, D_IND_TOUR, D_IND_SER, D_TOUR, D_TOUR_AGRO, FARMER, MANU, SERVICE, TOUR
Transaction cost:	DRENT, LEASE, LRENT, OLD, OLDN, PUBHOUSE, RENT, YOUNG, YOUNGN
Wages:	DWAGE, LWAGE
Demand fluctuations:	DLEMPL, DSEMPL, PROD
Heterogeneous labor:	ACAD, APPRENT, GUEST, HIGH, NOEDU, OLD, YOUNG
Local job opportunities:	ENTREPR, ENTNOTU, DENTRE, GUEST, DLEMPL

Our model suggests that transaction costs, amenities and wage differentials are the main determinants of regional unemployment and we are able to concentrate our empirical analysis on those variables. The analyzed area comprises 87 districts from Eastern-Austria. Districts from Tirol and Vorarlberg — the most Western states of Austria — are excluded for reasons of spatial symmetry. Figure 2 shows that a compact area is left over for the analysis. Due to limited data availability a few districts have to be consolidated such that 72 districts remain[1]). Our cross section information comes from 1991, the year of the last

[1]) Consolidated districts are usually cities plus suburbs, specifically these are Eisenstadt-Stadt+Rust+Eisenstadt Umgebung; Güssing+Jennersdorf; Klagenfurt Stadt+Land; Villach Stadt+Land; Krems a. d. Donau Stadt+Land; St. Pölten Stadt+Land; Wiener Neustadt Stadt+Land;

Austrian Population Census undertaken by the Austrian Statistical Office. A detailed description of the data is given in appendix 1.

Amstetten+Waidhofen a. d. Ybbs; Linz Stadt+Land+Urfahr Umgebung; Steyr Stadt+Land; Wels Stadt+Land; Salzburg Stadt+Land; Graz Stadt+Land.

4. Estimation

In the estimation we expect to be confronted with the problem of spatial dependence. Commuting or migration as well as economic interactions between households and firms across different political districts - whose borders are „arbitrarily" drawn - are likely to result in spatial correlation patterns. The strength of the relation is determined by the distance between districts but may also depend on the topology of an area (*Anselin - Florax*, 1995). As opposed to the one-directional situation in time series analysis, with the related problem of serial correlation, the nature of dependence in space may be multidirectional, thereby generating complex patterns of interactions which may also be of interest in themselves. Therefore, standard results from time series analysis do not carry over in a straightforward way and a different regression framework is necessary.

In principle there are two ways to deal with the problem of spatial dependence. One is to specify a spatial model, that explicitly takes into account spatial effects. A general regression model including spatial effects is (*Anselin*, 1988, p. 34f):

$$y = \boldsymbol{r}\boldsymbol{W}_1 y + X\boldsymbol{b} + \boldsymbol{e} \qquad (9)$$

$$\boldsymbol{e} = \boldsymbol{l}\boldsymbol{W}_2\boldsymbol{e} + \boldsymbol{m}, \qquad (10)$$

where y is the dependent variable, $\boldsymbol{b}$ is a parameter vector associated with the matrix of explanatory variables X. Spatial dependence results from non-zero off-diagonal elements of the matrices $\boldsymbol{W}_1$ and $\boldsymbol{W}_2$ in combination with the autoregressive coefficient $\boldsymbol{r}$ of the spatially lagged variable, and the spatial autoregressive structure for the disturbance $\boldsymbol{e}$ associated with the coefficient $\boldsymbol{l}$. The disturbance $\boldsymbol{m}$ is normally distributed with zero mean and diagonal covariance matrix. The covariance matrix can be specified such that heteroskedasticity is possible.

For model *(9)* and *(10)* it is known that OLS estimation yields biased as well as inconsistent parameter estimates and R^2 values (*Anselin*, 1988). Second there is little known about $\boldsymbol{r}$ and $\boldsymbol{l}$ beforehand and, furthermore, the weighting matrices $\boldsymbol{W}_i$ should be derived from a spatial theory. Many problems involved in the specification and estimation of spatial models have been solved, but they exhibit a considerable degree of complexity.

As an alternative approach *Getis* (1990) proposes a filter for spatially correlated variables. For our analysis we use the simplified version suggested in *Getis* (1995). The basic idea is to transform the variables by removing the spatial dependence. This is achieved by filtering spatially correlated variables and splitting them up into two components: a filtered component lacking spatial dependence and a second component isolating the spatial dependence embedded in the original variable. This transformation does not only allow a proper specification of an OLS-regression but also helps us to identify and isolate spatial dependence which can be given some economic interpretation. Filtering avoids explicit spatial modeling and estimation procedures that complicate statistical inference. Additionally, we intent to relate the spatial component of the unemployment rate to the notion of regional amenities. The method proceeds in four steps: After estimating a trial-model without controlling for spatial effects

$$y = X\boldsymbol{b} + \boldsymbol{e}, \qquad (11)$$

by OLS, we test y, x, and $\boldsymbol{e}$ for spatial autocorrelation. The OLS estimation should be done because the spatial pattern in the explanatory variables may fully explain the spatial structure of y, such that there is no spatial dependence remaining in the residuals. In this unlikely case OLS would be appropriate and no further steps are needed. We expect the residuals and some of the variables to exhibit spatial autocorrelation and employ a test for spatial autocorrelation on the residuals and each variable. As a criterion for spatial dependence we use Moran´s I statistic assuming that the observations are random independent drawings from a population with unknown distribution function (*Cliff - Ord*, 1973). The inference for spatial autocorrelation is carried out on the basis of the asymptotically normal standardized *Z(I)*-value. The 5%-critical value for this statistic is 1.96.

If the statistics indicate spatial autocorrelation we proceed to step two and apply a spatial filter to the variables. The filter is based on the G_k-statistic, an indicator of the spatial association around a particular region k relative to the whole area. Suppose the area under consideration has R sub-regions ($k = 1,...,R$) then each sub-region has to be identified by a point whose coordinates are known. In our case we will use the districts' capitals as the reference points. We determine whether the spatial dependence occurs only between nearest neighbours or whether sub-regions located farther away are also correlated to the reference point k, by choosing a radius d around the district's capital.

Within this area the spatial dependence is maximized. In our case an eligible geographical measure for the „radius" d are street-kilometers between districts' capitals rather than air-line distances[2]). This choice is motivated by considerations of travelling costs between work places located in different regions. The G_k-statistic for any variable z is calculated as follows:

$$G_k = \frac{\sum_{j=1}^{R} w_{kj}(d) z_j}{\sum_{j=1}^{R} z_j} \qquad j \neq k \qquad (12)$$

where w_{kj} is an element from a spatial weight matrix W, with ones for all districts defined as being within the given distance d of district k's capital and zero for all other districts. The numerator in G_k is therefore the sum of all z_j–values within distance d of district k's capital except k's own value and the denominator is the sum of all z_j–values except k's own value. The intuitive interpretation of the G_k-statistic is that - with respect to the sum of all z_i-s - it measures the deviation of the area around k from the total area average. The expected value of G_k is:

$$E(G_k) = \frac{S_k}{(R-1)},$$

with

$$S_k = \sum_{j=1}^{R} w_{kj}(d) \qquad j \neq k.$$

If we further define

$$Y_{k1} = \frac{\sum_{j=1}^{R} z_j}{R-1} \quad \text{and} \quad Y_{k2} = \frac{\sum_{j=1}^{R} z_j^2}{R-1} - Y_{k1}^2, \qquad j \neq k,$$

2) We use street-kilometers based on fastest motorways which do not necessarily coincide with the shortest way between capitals.

then the variance of G_k is given by

$$Var(G_k) = \frac{S_k(R-1-S_k)}{(R-1)^2(R-2)}\left(\frac{Y_{k2}}{Y_{k1}^2}\right).$$

Under the assumption of a uniform distribution of G_k the difference between the actual G_k and its expectation provides an answer, whether high or low values are significantly clustered in the vicinity of k. The result of the filtering procedure is a decomposition of z into a spatially uncorrelated part z^* and the purely spatial component z_l. The spatially uncorrelated component for each sub-region k:

$$z_k^* = \frac{z_k\left(\frac{S_k}{R-1}\right)}{G_k(d)},$$

rescales the value of z for each sub-region such that the deviation from its expected value is eliminated. The difference between the original z and the filtered variable z^* is a new variable z_l, that represents purely spatial effects embedded in z. The choice of an appropriate distance d is essential for filtering. The optimal distance can be interpreted as the radius of an area where spatial effects maximize the probability of deviations between observations and expected values. *Getis* (1995) suggests to choose the d-value which maximises the absolute sum of the normal standard variate of the G_k-statistic:

$$\sum_{k=1}^{R}\left|Z_k(G_k)\right| = \sum_{k=1}^{R}\frac{\left|G_k(d) - E\left(G_k(d)\right)\right|}{\sqrt{Var\left(G_k(d)\right)}}. \quad (13)$$

Getis (1995) outlines four criteria to asses the effectiveness of the spatial filter in removing spatial dependence. First, there should be no spatial correlation in z^*. Second, if z is a variable with spatial dependence embedded in it, then $z_l = z - z^*$ is a spatially autocorrelated variable. Third, in any regression model where all variables have been filtered using an appropriate distance d, residuals are not spatially associated. Finally, theoretically motivated explanatory variables in a regression equation should be statistically significant after spatial dependence has been removed. Of course, this criterion depends on the validity of the theory and appropriate measurement. If these conditions are met OLS can be applied for the regression and we can proceed by estimating the spaceless model

$$y^* = X^* \boldsymbol{b}' + \boldsymbol{e}'. \qquad (14)$$

This spaceless model should reveal the „spaceless" relations between the according variables without influences from purely spatial effects. Since space obviously matters if variables are spatially autocorrelated it is natural to reintroduce the spatial component into a final model for the original variable *y*. But adding all spatial components to x_l is likely to result in multicollinearity. Thus using the spatial component of the dependent variable y_l may suffice to control for purely spatial aspects. As the final model we then have:

$$y = [X^*, y_l\,]\boldsymbol{b}'' + \boldsymbol{e}''. \qquad (15)$$

If we succeed in isolating the pattern of spatial dependence in one or more independent spatial variables one would expect that there is only a small change in the coefficients compared to the spaceless model, as the spatial pattern in the dependent variable should be explained by the spatial variable(s). Furthermore, a significant increase in R^2 through adding the spatial information, high significance levels of the spatial variables and a lack of spatial dependence in the regression residuals indicate that – at least from a technical viewpoint – a proper specification is found.

5. Results

The regional distribution of unemployment rates shown in Figure 2 provides a first impression of spatial patterns. We can find clusters of high unemployment rates in the eastern part of Austria, whereas low unemployment rates dominate in the western part. Before checking for spatial correlation we identify the optimal distance for each variable by searching for the maximum sum of absolute $Z_k(d)$-values over various values of d (cf. equation *13*). Figure 4 provides a graphical illustration for the unemployment rate (UE) and the relative rental rate (DRENT). For example the unemployment rate has a global maximum at 180 which represents its optimal d-value. Optimal d-values for the remaining variables in Table 1 vary between 80 and 290. Interestingly the variable indicating local fluctuations in labor demand (DLEMPL) has a similar d-value (170) to the unemployment rate.

The d-values from Table 1 form the basis for subsequent tests on spatial autocorrelation and the application of the spatial filter. Using the 5%-critical value of the standardized Moran's I statistic (1.96) we conclude that spatial correlation is prevalent in many of the variables. Thus we proceed by applying the filter to spatially correlated variables. As can be seen from Table 1 the spatially filtered components z^* show no significant spatial correlation, whereas the spatial components z_l reveal strong spatial correlation.

The spatial concentration of unemployment rates can be seen in Figure 3, where the standardized concentration measure $Z(G_k)$ is plotted. The areas of high and low unemployment are more compact. Obviously the border-districts to the north benefit from their neighbourhood to low unemployment areas in the states Lower and Upper Austria. Contrary to that, south-eastern border districts form hot spots of high unemployment.

The regression analysis starts with estimating the spaceless model (*14*) for the filtered component of the unemployment rate UE*. Table 2 shows results from an instrumental variable estimation that eliminates the feedback between wage levels and unemployment rates resulting from interactions between supply and demand on the labor market. The long run change in employment (DLEMPL) incorporates demand side effects directly into the regression. As instruments we use all variables except the relative wage variable (DWAGE) and add the job offer ratio (OPEN) and the productivity of labor measured by the GDP per employed person (PROD). Both additional variables control for demand side effects on the labor market since in their labor demand decision firms equate the marginal productivity of labor with the real wage, and the number of open positions is a direct indicator of demand induced job opportunities. The p-value of Sargan's test on the validity of instruments is 0.46 and thus fails to reject the null of valid instruments.

Beginning with a general model which includes all variables listed in appendix 1 we proceed by a general to specific approach and eliminate all insignificant variables[3]). Because of the high correlation among explanatory variables (cf. appendix 2) we add again variables eliminated in the first step in a specific to general strategy (*Hendry*, 1995). Variance Inflation Factors for the resulting spaceless model indicate that multicollinearity is negligible.

Interestingly none of educational and neither of the age related variables proves to be significant, whereas two of the structural variables the share of employees in manufacturing and tourism enter the model. The long run change in employment (DLEMPL) controls for demand side effects, whereas the relative wage rate (DWAGE) reflects local differences in opportunity costs of being unemployed. The only transaction cost based variable in the spaceless model is the share of public housing. Most of the variables are significant at the 1%-level, only the share of manufacturing employees variable turns out to be significant at the 10% level. Of the existing variation in the unemployment rate the equation explains 49%. The residuals from the spaceless model (e') are spatially uncorrelated (cf. Table 1) and thus fulfill one of *Getis*'s (1995) criteria. Further residual based tests on normality and heteroscedasticity indicate well behaved residuals.

Reintroducing space into the regression leads to the spatial model in the first column of Table 3. In this regression the original unemployment rate is the dependent variable and the spatial component of the unemployment rate UE_l is added to take account of the

[3]) The sample consists of 72 districts from the eastern part of Austria. To avoid problems from missing links for neighbouring districts the decomposition of variables into filtered and spatial components is based on the full sample. For the regression analysis the sample has to be restricted to 70 observations because two districts emerge as outliers due to measurement problems which turn out to be pivotal (Tulln, Freistadt). Including both observations into the regression leads to residuals bigger than three standard deviations.

spatial structure in the unemployment rate. The coefficient is positive and significantly different from zero. Adding the spatial variable UE_l to the regression improves the explanatory power from 0.49 to 0.67. The size of estimated coefficients is almost unchanged and the test for spatial autocorrelation in the residuals (e') indicates again spatial independence (cf. Table 1). The p-value for *White's* (1980) heteroscedasticity test is significant. A heteroscedasticity-consistent estimation of standard errors increases the significance level of the public housing variable towards 9%. The t-statistics of the other variables are hardly affected.

Applying the filter and taking care of the spatial correlation in the unemployment rate and its explanatory variables allows us to correctly specify a least squares regression for a regional data set. Ignorance of spatial correlation leads to the regression shown in column two of Table 3, where the original unemployment rate is related to unfiltered explanatory variables. The test on spatial autocorrelation in the residuals of this model (e) rejects the null of spatial independence and therefore indicates misspecification. Consequently two of the explanatory variables appear insignificant. Moreover, the size of the parameters in the trial model differs strongly for the employment and the tourism variable. A specification search neglecting spatial autocorrelation is likely to result in a different final model.

The spaceless model comprises variables which are strongly motivated by our labor supply model. All coefficients show the expected sign. Areas with relatively higher wages tend to have lower unemployment because the opportunity cost of staying unemployed within the district are higher. The sign of relative wages coincides also with alternative explanations. The efficiency wage and the bargaining power models described *by Blanchflower - Oswald* (1994) suggest that workers in high unemployment areas earn less than identical individuals in regions with low joblessness. *Ritter - Walz* (1998) provide a theoretical model with high wages and low unemployment rates in larger areas. Agglomeration effects create a higher number of market participants and more specialized demand for horizontally differentiated skills. Those models, however, suffer from artificial assumptions on the mobility of workers. After first rounds of a decision on the location, workers are locked within their residential area.

As expected the results show that areas with a superior labor demand development feature lower levels of unemployment, although the size of the parameter indicates a high regional labor supply elasticity. A one percent increase in employment over five years reduces regional unemployment by only 0.1 percentage points, thus vacancies are filled by increased commuting/migration activities, or rising labor supply, rather than integrating the local unemployed into the work force.

The negative coefficient for the share of tourism employees indicates at first glance positive effects from dynamic service industries on the labor market. The tourism share, however, may only reflect seasonal fluctuations in the unemployment rate. Our unemployment data refer to mid of the year observations (July) and thus are subject to seasonal fluctuations from summer tourism. Estimating the same equation for January unemployment provides a check for this interpretation. In the regression for winter unemployment the tourism variable gets insignificant. The difference between winter and summer regressions can be traced back to a couple of specialized summer tourism districts.

Another information embodied in the tourism variable are preferable environmental characteristics of a district which we associate with high levels of regional amenities. According to our model high amenities may result in higher unemployment. Actually this interpretation of the tourism variable is not applicable, due to its seasonal variation.

As a measure of economic dynamism business start ups are often suggested. We proxy this variable by the change in the share of self-employed over time (DENTRE) or the share of self employed (ENTREPR). Introducing these variables into the model does not improve estimation results.

The only significant measure of transaction costs in the model is the share of public housing (PUBHOUS). The positive coefficient indicates that a high share of public housing causes a lock in for households affected by unemployment. The straightforward conclusion is that migration would result in a loss of subsidized housing and target migration districts do not provide flexible distribution schemes of public housing to immigrants. Compare *Oswald* (1997) for similar results with respect to the home ownership and unemployment in industrial countries.

We cannot find a significant amenity related variable in our spaceless model. This may be due to the bad measurement of amenities. Having controlled for other determinants of regional unemployment we can – with some caution - interpret the spatial component of the unemployment rate as a measure of unobserved regional amenities. In this case we can clearly find a positive relation between regional amenities and unemployment rates which is consistent with the model from section 2. UE_l enters the regression at the 1% significance level and has a strong positive impact on unemployment. Figure 5 shows a scatter plot of the spatial component and the original unemployment rate.

6. Conclusion

Regional unemployment rates in Austria vary between 2.1% and 16.8%. Given the possibilities to commute/migrate such a large variation cannot be the consequence of pure demand variations across regions. Alternative explanations stress the importance of market imperfections or structural deficiencies. Under such conditions regional differences in unemployment can be motivated by the rational choice of individual households between staying unemployed and commuting or migrating to jobs located more distant from their actual residence. We propose a simple model for the labor supply decision that makes the trade off between receiving a higher wage at a more distantly located job and getting a lower unemployment benefit at home explicit. The key parameters of the choice problem are relative wages, transaction costs between locations, and different amenity levels associated with each job.

In an application to unemployment data from political districts in Eastern Austria we apply a filtering technique that removes spatial correlation from the analyzed data. The extracted spatial information embedded in the district's unemployment rates can be interpreted as an indicator of unobservable regional amenities. Purely job-specific amenities cannot be integrated into our estimation due to the high aggregation level. The estimation results suggest that relative wages between districts are a relevant opportunity cost variable to private households. Unemployment rates tend to be higher in regions with low relative wages because the opportunity cost of staying unemployed are smaller. Other interpretations like efficiency wage or bargaining power models or specialization based externalities provide alternative theoretical underpinnings that motivate the same sign for relative wages. Additionally, the share of public housing appears to be the only significant transaction cost variable in our sample. Individuals are locked in by the subsidized provision of public housing and prefer to stay unemployed in their residential district over migrating into distant regions, where they would have to cue up again at the end of the distribution line for public housing. This creates significant transaction costs from terminating a rental contract with a public housing organization.

When controlling for other structural features of districts, characteristics of the labor force, or general labor demand conditions within an area, we can identify the medium term change in employment to be a relevant explanatory variable. Since the coefficient for employment growth is rather small we conclude that there is a high regional labor supply elasticity in Eastern Austria. Using the spatial filter enables us to asses the distance within which labor supply is elastic. In our sample the optimal distance for the spatial filter indicates that individuals are willing to commute within a distance of 180 street kilometers, which contributes to the comparatively high regional labor supply elasticity. At distances of approximately 180km seems to be a point of discontinuity in transaction costs, where considerations of migration start to get relevant.

The spatial filter provides us with another useful result. With some caution we can identify spatial agglomerations of the unemployment rate and interpret these agglomerations as unobservable regional amenities, i. e. the higher the spatial component in the unemployment rate, the higher is the level of regional amenities within this district. The positive sign of the coefficient of the spatial unemployment component confirms this interpretation.

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Table 1: Test for Spatial Autocorrelation

	Optimal d[1]	Moran's I	Z(I)[2]
ACAD	80	0.0106	0.4334
DSEMPL	170	0.0113	0.8741
DLEMPL	170	0.0767	**3.1317**
DLEMPL_L		0.2024	**7.4665**
DLEMPL*		-0.0416	-0.9498
DRENT	230	0.1603	**7.9845**
DRENT_L		0.3910	**18.5525**
DRENT*		0.0249	1.7866
DWAGE	90	0.2712	**5.6181**
DWAGE_L		0.7239	**14.5347**
DWAGE*		-0.0807	-1.3128
ENTREPR	270	0.0061	1.0978
FARMER	290	-0.0274	-0.7808
FOG	190	0.1086	**4.6574**
FOG_L		0.4610	**18.0349**
FOG*		-0.0148	-0.0275
GUEST	130	0.1810	**5.2675**
GUEST_L		0.5114	**14.1834**
GUEST*		-0.0424	-0.7650
LDENSK	250	0.0069	1.0560
LEASE	270	-0.0158	-0.0908
MANU	120	0.1351	**3.7832**
MANU_L		0.5765	**14.9820**
MANU*		-0.0738	-1.5137
NOEDU	130	0.1772	**5.1614**
NOEDU_L		0.5718	**15.8086**
NOEDU*		-0.0693	-1.4908
OLD	210	0.2511	**11.0600**
OLD_L		0.5323	**22.7897**
OLD*		0.0145	1.1932
OLDN	160	0.5381	**17.9459**
OLDN_L		0.7164	**23.7420**
OLDN*		0.0284	1.3822

	Optimal d[1]	Moran's I	Z(I)[2]
OPEN	280	-0.0232	-0.5142
PROD	120	0.1984	**5.3935**
PROD_L		0.7520	**19.4322**
PROD*		-0.0493	-0.8932
PUBHOUS	250	-0.0367	-1.1384
RAIN	190	0.3036	**12.0582**
RAIN_L		0.5696	**22.1549**
RAIN*		0.0295	1.6557
SERVICE	120	0.1224	**3.4615**
SERVICE_L		0.5471	**14.2348**
SERVICE*		-0.0757	-1.5636
SNOW	250	0.1665	**9.0815**
SNOW_L		0.3299	**17.3003**
SNOW*		0.0160	1.5124
SUN	260	0.1114	**6.5511**
SUN_L		0.3605	**19.5494**
SUN*		0.0204	1.7978
TOUR	320	0.0594	**4.6465**
TOUR_L		0.2160	**14.5405**
TOUR*		0.0081	1.4008
UE	180	0.1399	**5.5640**
UE_L		0.4877	**18.1305**
UE*		-0.0145	-0.0145
YOUNG	210	0.2093	**11.6878**
YOUNG_L		0.5008	**21.8154**
YOUNG*		-0.0016	0.6282
YOUNGN	210	0.1881	**8.4309**
YOUNGN_L		0.4906	**21.0489**
YOUNGN*		-0.0082	0.2441
ε	180	0.0711	**2.8944**
ε'	170	0.0227	1.2588
ε''	170	-0.0183	-0.2321

Note: Bold values indicate that spatial independence is rejected. The 5% critical value of Z(I) is 1.96.
For spatially dependent variables z* and z_L represent the filtered and the spatial component, respectively.

[1]) Optimal distance in street-kilometers using fastest motorways.

[2]) Standardized normal variate of Moran's I based on randomization assumption.

Table 2: Instrumental Variable estimation of the spaceless model[1])
Dependent Variable: Filtered component of Unemployment Rate (UE)*

Independent variables	Coefficients	t-values
(Constant)	8.79	4.50
DLEMPL*	-0.11	-4.15
DWAGE*	-0.11	-3.41
MANU*	0.06	1.72
TOUR*	-0.26	-2.66
PUBHOUS	0.18	2.13
R^2	0.49	
Adjusted R^2	0.45	
SEE	1.93	
Jarque-Bera test[2])	0.79	0.67
White Heteroskedasticity test[3])	11.54	0.32
Number of observations	70	

Note: For spatially dependent variables * indicates its filtered component. - [1]) Instrumental variables: OPEN, PROD. - [2]) *Jarque-Bera* (1980) test on normality and p-value. - [3]) White (1980) heteroskedasticity test and p-value.

Table 3: Instrumental Variable estimation of the Spatial Model and a trial regression without spatial considerations [1])
Dependent Variable: Unemployment Rate (UE)

Independent variables	Spatial model		Trial model[2])	
	Coefficients	t-values	Coefficients	t-values
(Constant)	8.14	3.94	11.20	5.58
DLEMPL*	-0.10	-4.09	-0.21	-5.47
DWAGE*	-0.10	-2.86	-0.10	-3.80
MANU*	0.06	1.87	0.04	1.11
TOUR*	-0.23	-2.11	-0.37	-3.72
PUBHOUS	0.16	1.89	0.16	1.70
UE_L	1.22	5.82		
R^2	0.67		0.60	
Adjusted R^2	0.64		0.57	
SEE	1.92		2.11	
Jarque-Bera test [3])	1.47	0.48	1.59	0.45
White heteroskedasticity Test [4])	27.66	0.01	6.93	0.73
Number of observations	70		70	

Note: For spatially dependent variables * and _L represent the filtered and the spatial component, respectively. - [1]) Instrumental variables: OPEN, PROD. - [2]) The independent variables of the trial model are not filtered, i. e. DLEMPL, DWAGE, MANU and TOUR, respectively. - [3]) Jarque-Bera (1980) test on normality and p-value. - [4]) *White* (1980) heteroskedasticity Test and p-value.

Figure 1: The trade off between local unemployment and distant employment

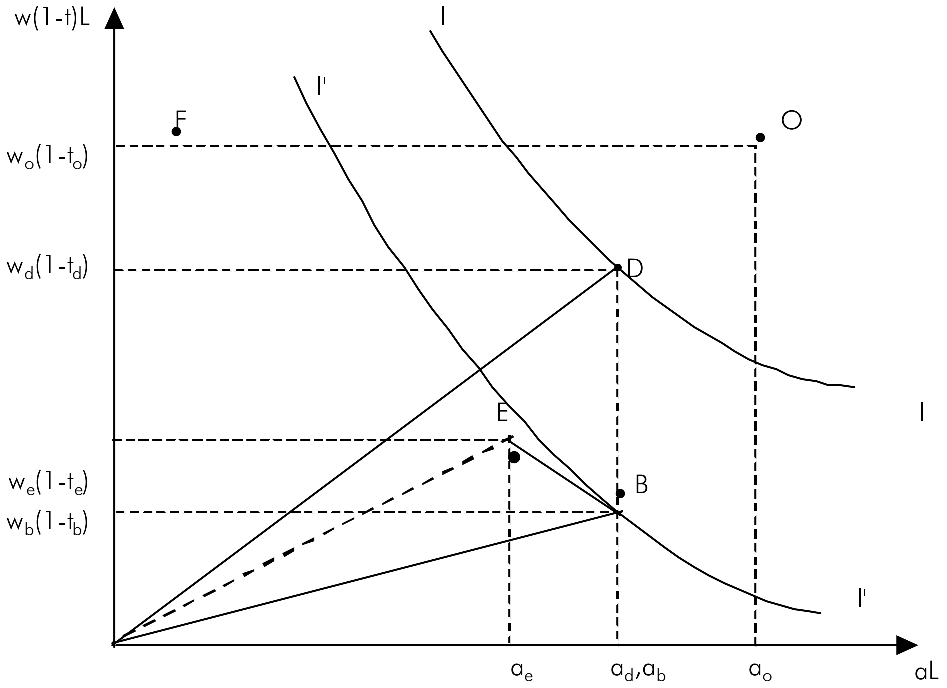


Figure 2: Spatial distribution of unemployment rates 1991

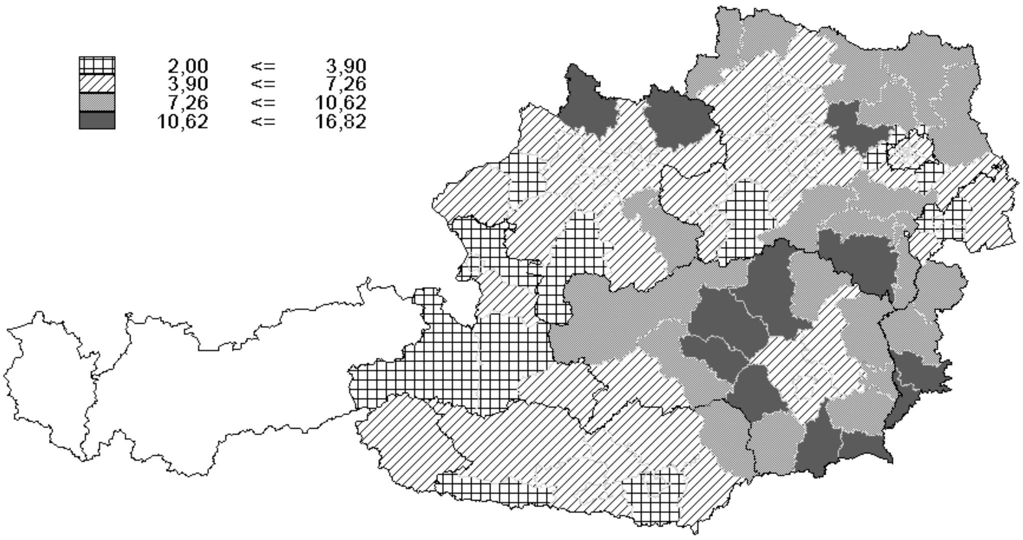


Figure 3: Spatial concentration of unemployment rates - Z(G_k) - 1991

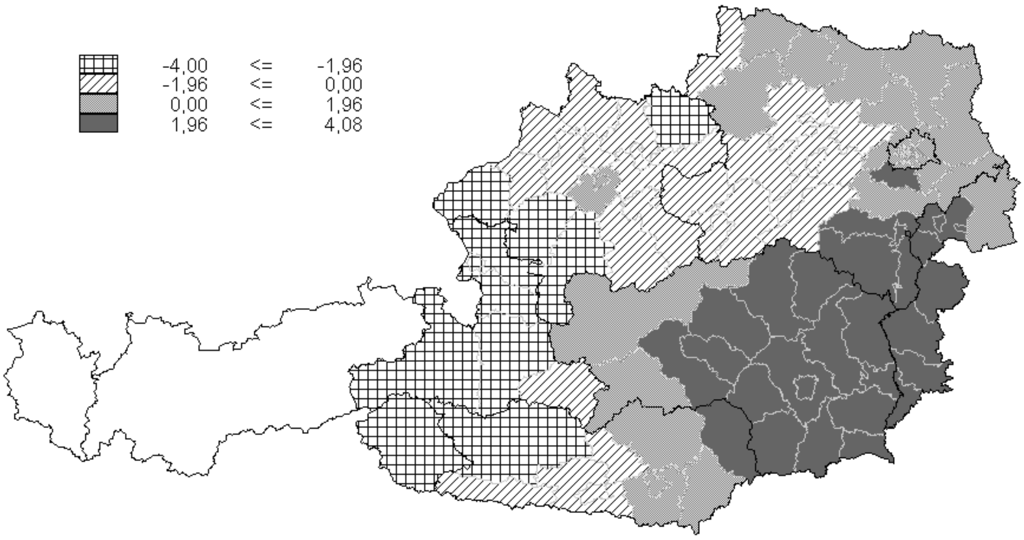


Figure 4: Choice of the Optimal d-Value for unemployment (UE) and the relative rental rate (DRENT)

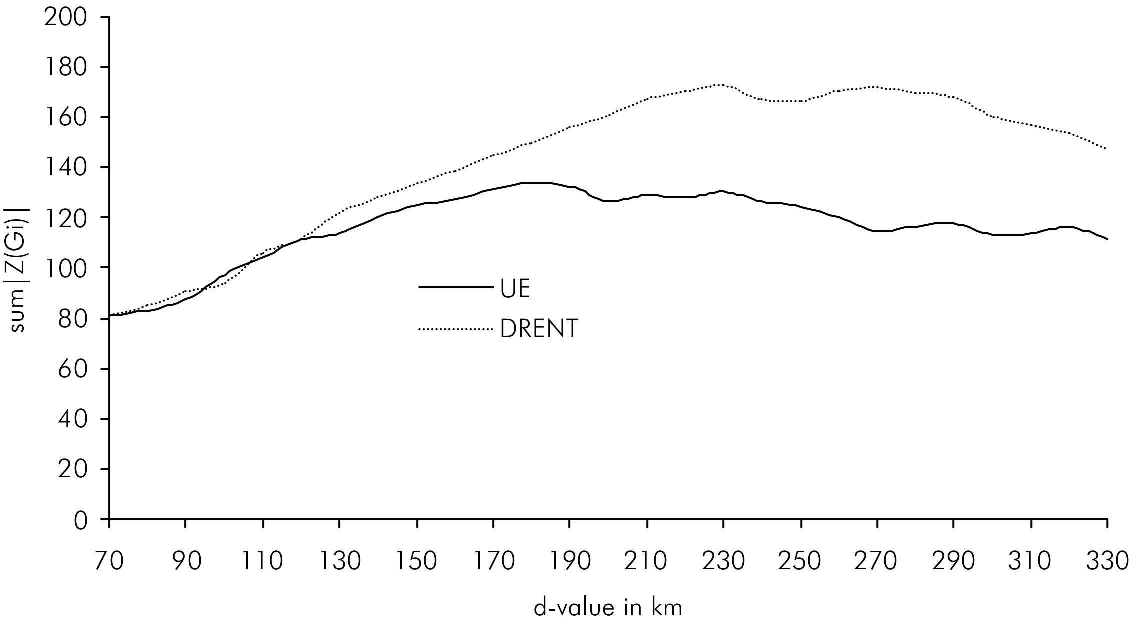
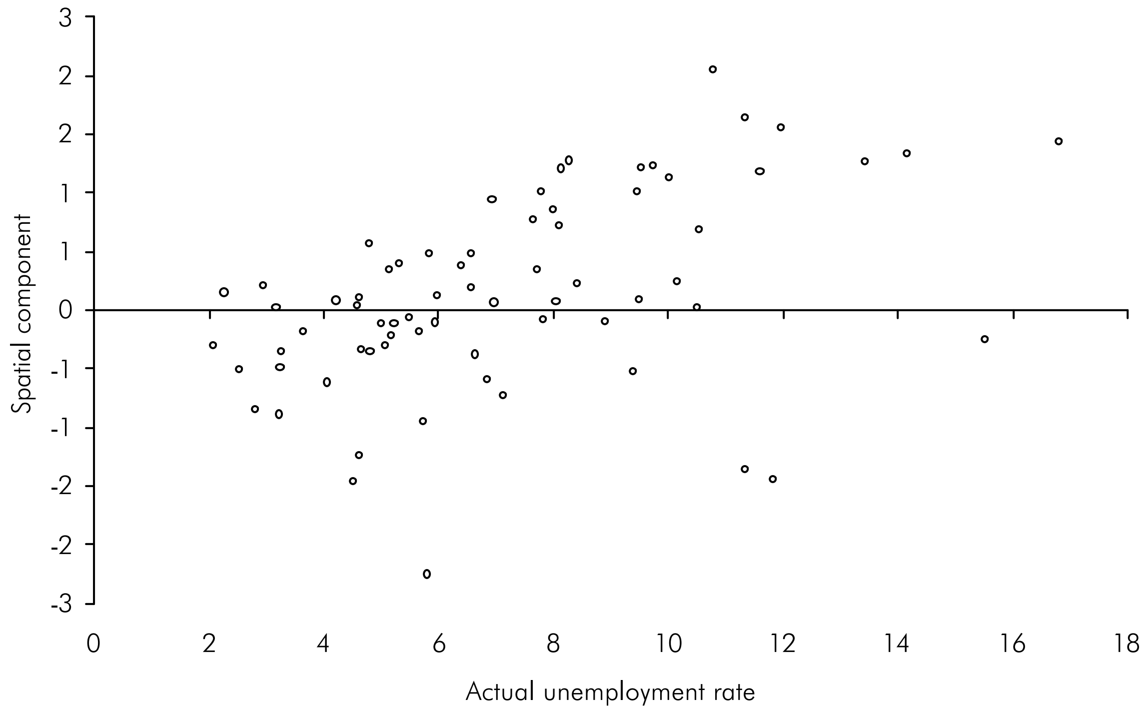


Figure 5: Unemployment rate 1991 versus its spatial component



Appendix 1: Variables and Statistical Summary

Variable name		Mean	Standard deviation	Minimum	Maximum
ACAD	Share of employees with university degree	3.03	1.34	1.73	8.16
APPRENT	Share of employees with apprenticeship or occupation specific schooling	36.06	3.53	26.58	44.59
DENSD	Population density (developed area)	322.82	593.61	58.00	4,711.00
DENSK	Population density (district area)	194.85	472.10	21.00	3,695.00
DENTRE	Change in the share of entrepreneurs 1991 to 1981	-1.59	2.62	-13.25	4.31
DRENT	Rental rate relative to lowest in logs	42.44	24.69	0.00	136.02
DSEMPL	Short-term change in employment (1991 to 1990)	2.62	2.01	-3.56	8.48
DLEMPL	Long-term change in employment (1991 to 1986)	7.21	7.83	-17.83	25.36
DWAGE	Wage per capita relative to lowest in logs	24.16	15.22	0.00	76.02
D_AGRO	Agricultural district dummy	-	-	0.00	1.00
D_CITY	Big city dummy	-	-	0.00	1.00
D_EAST	Dummy for Eastern Border Districts	-	-	0.00	1.00
D_IND	Industrial district dummy	-	-	0.00	1.00
D_IND_AGRO	Mixed Industrial-Agricultural district dummy	-	-	0.00	1.00
D_IND_TOUR	Mixed Industrial-Tourism district dummy	-	-	0.00	1.00
D_IND_SER	Mixed Industrial-Serviceoriented district dummy	-	-	0.00	1.00
D_TOUR	Tourism district dummy	-	-	0.00	1.00
D_TOUR_AGRO	Mixed Tourism-Agricultural district dummy	-	-	0.00	1.00
D_WEST	Dummy for Western Districts	-	-	0.00	1.00
ENTREPR	Share of entrepreneurs in employed persons	8.58	1.95	4.38	13.44
ENTNOTU	Share of entrepreneurs in employed persons, tourism sector excluded	6.43	1.37	3.19	10.98
FARMER	Share of farmers in employed persons	9.40	6.22	0.20	26.11
FOG	Foggy days per year	49.17	19.93	19.00	105.00
GUEST	Share of guest workers in employees	7.68	4.87	1.89	32.91
HIGH	Share of employees with highschool degree	6.09	2.25	3.44	15.08
LDENSD	Population density (developed area) in logs	4.49	1.01	3.04	8.21
LDENSK	Population density (district area), in logs	5.28	0.83	4.06	8.46
LEASE	Share of rental appartments and houses	19.15	11.69	4.02	63.74
LRENT	Rental rate in logs	3.45	0.17	3.11	3.97
LWAGE	Wage per capita in logs	5.80	0.12	5.59	6.16
MANU	Share of employees in manufacturing sector	34.08	8.04	18.92	53.40
NOEDU	Share of employees without further education	54.83	5.64	40.45	66.39
OLD	Share of employees aged between 45 and 60	23.06	2.84	19.13	32.47
OLDN	Share of employees aged between 50 and 60	13.84	1.71	10.83	17.65
OPEN	Ratio of open positions to employed persons	3.00	1.51	0.86	11.37
PROD	Productivity: GDP per employed person	89.51	17.37	60.10	170.00
PUBHOUS	Share of public housing	5.19	3.67	2.38	25.65
RAIN	Annual quantity of rain in mm	809.46	209.35	500.00	1,397.00
RENT	Rental rate	31.99	5.55	22.46	53.01
SERVICE	Share of employees in services sector	34.36	5.91	23.52	52.06
SNOW	Days with snowfall of more than 1 cm per year	60.55	21.47	30.00	118.50
SUN	Hours of sunshine per year	1,702.09	115.83	1,467.00	1,925.00
TOUR	Share of employees in tourism sector	6.67	2.97	2.66	17.31
UE	Unemployment rate	7.26	3.36	2.09	16.82
UE*	Unemployment rate, spaceless component	7.02	2.91	2.06	15.92
UE_L	Unemployment rate, spatial component	0.24	1.28	-3.42	3.09
YOUNG	Share of employees aged between 15 and 35	52.58	4.00	40.21	59.59
YOUNGN	Share of employees aged between 15 and 30	38.52	3.79	27.95	45.51

Appendix 2: Correlation Coefficients between variables

	ACAD	OLD	UE	FARMER	HIGH	D_IND	D_CITY	D_TOUR	DSEMPL	DLEMPL	DENSD	DENSK	DRENT	DWAGE	APPRENT	GUEST
ACAD	1.00	**0.59**	**-0.33**	**-0.57**	**0.92**	0.02	**0.71**	0.03	0.02	0.10	**0.65**	**0.62**	**0.53**	**0.70**	0.19	0.04
OLD	**0.59**	1.00	-0.02	**-0.34**	**0.73**	**0.33**	0.22	*-0.29*	0.01	-0.07	*0.30*	**0.31**	-0.03	**0.69**	**0.35**	*0.29*
UE	**-0.33**	-0.02	1.00	0.23	*-0.27*	0.14	*-0.25*	*-0.26*	*-0.26*	**-0.49**	-0.14	-0.15	**-0.39**	*-0.29*	-0.05	0.15
FARMER	**-0.57**	**-0.34**	0.23	1.00	**-0.63**	**-0.53**	**-0.35**	-0.19	0.13	0.14	**-0.41**	**-0.34**	**-0.48**	**-0.62**	**-0.48**	-0.08
HIGH	**0.92**	**0.73**	*-0.27*	**-0.63**	1.00	0.18	**0.59**	-0.01	0.05	0.05	**0.59**	**0.57**	**0.35**	**0.75**	*0.30*	0.18
D_IND	0.02	**0.33**	0.14	**-0.53**	0.18	1.00	*-0.28*	-0.08	-0.11	*-0.25*	-0.08	-0.12	-0.03	**0.36**	**0.40**	*0.25*
D_CITY	**0.71**	0.22	*-0.25*	**-0.35**	**0.59**	*-0.28*	1.00	0.05	0.02	0.11	**0.71**	**0.71**	**0.46**	**0.40**	0.01	0.00
D_TOUR	0.03	*-0.29*	*-0.26*	-0.19	-0.01	-0.08	0.05	1.00	0.03	-0.05	-0.04	-0.10	0.13	-0.12	0.29	-0.15
DSEMPL	0.02	0.01	*-0.26*	0.13	0.05	-0.11	0.02	0.03	1.00	**0.52**	-0.03	0.01	0.09	0.04	-0.08	*0.29*
DLEMPL	0.10	-0.07	**-0.49**	0.14	0.05	*-0.25*	0.11	-0.05	**0.52**	1.00	-0.04	0.02	0.17	0.00	**-0.35**	0.07
DENSD	**0.65**	*0.30*	-0.14	**-0.41**	**0.59**	-0.08	**0.71**	-0.04	-0.03	-0.04	1.00	**0.99**	**0.35**	**0.48**	0.10	0.09
DENSK	**0.62**	**0.31**	-0.15	**-0.34**	**0.57**	-0.12	**0.71**	-0.10	0.01	0.02	**0.99**	1.00	**0.32**	**0.46**	0.04	0.12
DRENT	**0.53**	-0.03	**-0.39**	**-0.48**	**0.35**	-0.03	**0.46**	0.13	0.09	0.17	**0.35**	**0.32**	1.00	**0.50**	0.10	0.14
DWAGE	**0.70**	**0.69**	*-0.29*	**-0.62**	**0.75**	**0.36**	**0.40**	-0.12	0.04	0.00	**0.48**	**0.46**	**0.50**	1.00	**0.45**	**0.31**
APPRENT	0.19	**0.35**	-0.05	**-0.48**	*0.30*	**0.40**	0.01	*0.29*	-0.08	**-0.35**	0.10	0.04	0.10	**0.45**	1.00	0.12
GUEST	0.04	*0.29*	0.15	-0.08	0.18	*0.25*	0.00	-0.15	*0.29*	0.07	0.09	0.12	0.14	**0.31**	0.12	1.00
MANU	**-0.41**	-0.18	*0.25*	-0.01	**-0.40**	**0.39**	**-0.39**	**-0.36**	-0.09	-0.05	*-0.30*	*-0.29*	-0.17	-0.11	-0.04	-0.08
YOUNG	**-0.63**	**-0.96**	0.06	**0.43**	**-0.79**	**-0.36**	*-0.29*	*0.27*	-0.05	0.04	**-0.34**	**-0.34**	-0.02	**-0.67**	**-0.32**	**-0.32**
LDENSD	**0.75**	*0.30*	-0.21	**-0.73**	**0.70**	0.17	**0.67**	0.07	-0.14	-0.09	**0.78**	**0.73**	**0.58**	**0.62**	*0.28*	0.00
LDENSK	**0.72**	**0.44**	-0.19	**-0.42**	**0.70**	0.01	**0.68**	-0.28	0.02	0.17	**0.74**	**0.76**	**0.39**	**0.57**	-0.01	0.15
LRENT	**0.52**	-0.04	**-0.37**	**-0.49**	**0.35**	-0.01	**0.43**	0.15	0.08	0.15	**0.34**	**0.31**	**0.99**	**0.50**	0.11	0.14
LWAGE	**0.68**	**0.67**	*-0.29*	**-0.62**	**0.73**	**0.37**	**0.39**	-0.10	0.04	-0.01	**0.47**	**0.44**	**0.50**	**1.00**	**0.47**	**0.32**
LEASE	**0.51**	0.23	0.05	**-0.67**	**0.48**	*0.30*	**0.52**	-0.02	*-0.26*	**-0.33**	**0.68**	**0.62**	**0.43**	**0.58**	**0.40**	-0.04
NOEDU	**-0.74**	**-0.66**	0.22	**0.69**	**-0.82**	**-0.33**	**-0.42**	-0.18	0.02	0.17	**-0.46**	**-0.41**	**-0.33**	**-0.75**	**-0.79**	-0.16
SERVICE	**0.62**	**0.35**	**-0.38**	*-0.30*	**0.60**	-0.05	**0.39**	**0.34**	0.13	0.07	**0.39**	**0.36**	**0.43**	**0.43**	0.22	0.11
RENT	**0.53**	-0.03	**-0.39**	**-0.48**	**0.35**	-0.03	**0.46**	0.13	0.09	0.17	**0.35**	**0.32**	**1.00**	**0.50**	0.10	0.14
ENTREPR	**-0.50**	**-0.48**	-0.05	**0.45**	**-0.49**	*-0.28*	**-0.37**	**0.40**	0.21	0.09	**-0.39**	**-0.38**	-0.23	**-0.56**	*-0.26*	0.10
TOUR	*-0.24*	**-0.37**	*-0.26*	-0.03	-0.24	-0.05	-0.20	**0.61**	0.05	-0.12	-0.19	*-0.25*	0.09	*-0.24*	0.11	0.00
WAGE	**0.70**	**0.69**	*-0.29*	**-0.62**	**0.75**	**0.36**	**0.40**	-0.12	0.04	0.00	**0.48**	**0.46**	**0.50**	**1.00**	**0.45**	**0.31**
ENTNOTU	-0.13	0.09	0.00	0.17	-0.06	0.06	-0.22	-0.11	0.11	0.00	-0.12	-0.11	-0.21	-0.11	-0.13	0.19
DENTRE	-0.13	-0.05	0.06	0.17	-0.18	-0.17	-0.05	0.18	0.11	0.04	-0.20	-0.19	0.02	-0.11	0.09	0.08

Note: Bold values indicate 1%-significance, slanted values indicate 5%-significance.

Appendix 2/continued: Correlation Coefficients between variables

	MANU	YOUNG	LDENSD	LDENSK	LRENT	LWAGE	LEASE	NOEDU	SERVICE	RENT	ENTREPR	TOUR	WAGE	NTNOTU	DENTRE
ACAD	**-0.41**	**-0.63**	**0.75**	**0.72**	**0.52**	**0.68**	**0.51**	**-0.74**	**0.62**	**0.53**	**-0.50**	*-0.24*	**0.70**	-0.13	-0.13
OLD	-0.18	**-0.96**	*0.30*	**0.44**	-0.04	**0.67**	0.23	**-0.66**	**0.35**	-0.03	**-0.48**	**-0.37**	**0.69**	0.09	-0.05
UE	*0.25*	0.06	-0.21	-0.19	**-0.37**	*-0.29*	**0.05**	0.22	**-0.38**	**-0.39**	-0.05	*-0.26*	*-0.29*	0.00	0.06
FARMER	-0.01	**0.43**	**-0.73**	**-0.42**	**-0.49**	**-0.62**	**-0.67**	**0.69**	**-0.30**	**-0.48**	**0.45**	-0.03	**-0.62**	0.17	0.17
HIGH	**-0.40**	**-0.79**	**0.70**	**0.70**	**0.35**	**0.73**	**0.48**	**-0.82**	**0.60**	**0.35**	**-0.49**	-0.24	**0.75**	-0.06	-0.18
D_IND	**0.39**	**-0.36**	0.17	0.01	-0.01	**0.37**	*0.30*	**-0.33**	-0.05	-0.03	*-0.28*	-0.05	**0.36**	0.06	-0.17
D_CITY	**-0.39**	*-0.29*	**0.67**	**0.68**	**0.43**	**0.39**	**0.52**	**-0.42**	**0.39**	**0.46**	**-0.37**	-0.20	**0.40**	-0.22	-0.05
D_TOUR	**-0.36**	*0.27*	0.07	*-0.28*	0.15	-0.10	-0.02	-0.18	**0.34**	0.13	**0.40**	**0.61**	-0.12	-0.11	0.18
DSEMPL	-0.09	-0.05	-0.14	0.02	0.08	0.04	*-0.26*	0.02	0.13	0.09	0.21	0.05	0.04	0.11	0.11
DLEMPL	-0.05	0.04	-0.09	0.17	0.15	-0.01	**-0.33**	0.17	0.07	0.17	0.09	-0.12	0.00	0.00	0.04
DENSD	*-0.30*	**-0.34**	**0.78**	**0.74**	**0.34**	**0.47**	**0.68**	**-0.46**	**0.39**	**0.35**	**-0.39**	-0.19	**0.48**	-0.12	-0.20
DENSK	*-0.29*	**-0.34**	**0.73**	**0.76**	**0.31**	**0.44**	**0.62**	**-0.41**	**0.36**	**0.32**	**-0.38**	*-0.25*	**0.46**	-0.11	-0.19
DRENT	-0.17	-0.02	**0.58**	**0.39**	**0.99**	**0.50**	**0.43**	**-0.33**	**0.43**	**1.00**	-0.23	0.09	**0.50**	-0.21	0.02
DWAGE	-0.11	**-0.67**	**0.62**	**0.57**	**0.50**	**1.00**	**0.58**	**-0.75**	**0.43**	**0.50**	**-0.56**	*-0.24*	**1.00**	-0.11	-0.11
APPRENT	-0.04	**-0.32**	*0.28*	-0.01	0.11	**0.47**	**0.40**	**-0.79**	0.22	0.10	*-0.26*	0.11	**0.45**	-0.13	0.09
GUEST	-0.08	**-0.32**	0.00	0.15	0.14	**0.32**	-0.04	-0.16	0.11	0.14	0.10	0.00	**0.31**	0.19	0.08
MANU	1.00	0.23	-0.19	-0.17	-0.15	-0.10	0.04	*0.28*	**-0.77**	-0.17	*-0.28*	**-0.37**	-0.11	-0.06	-0.08
YOUNG	0.23	1.00	**-0.37**	**-0.51**	0.00	**-0.65**	*-0.27*	**0.67**	**-0.39**	-0.02	**0.45**	**0.32**	**-0.67**	-0.09	0.09
LDENSD	-0.19	**-0.37**	1.00	**0.81**	**0.59**	**0.62**	**0.82**	**-0.64**	**0.42**	**0.58**	**-0.57**	-0.16	**0.62**	**-0.32**	-0.09
LDENSK	-0.17	**-0.51**	**0.81**	1.00	**0.38**	**0.56**	**0.57**	**-0.45**	**0.33**	**0.39**	**-0.63**	**-0.50**	**0.57**	*-0.28*	-0.06
LRENT	-0.15	0.00	**0.59**	**0.38**	1.00	**0.50**	**0.45**	**-0.33**	**0.41**	**0.99**	*-0.24*	0.09	**0.50**	-0.22	0.01
LWAGE	-0.10	**-0.65**	**0.62**	**0.56**	**0.50**	1.00	**0.59**	**-0.75**	**0.41**	**0.50**	**-0.56**	-0.23	**1.00**	-0.12	-0.11
LEASE	0.04	*-0.27*	**0.82**	**0.57**	**0.45**	**0.59**	1.00	**-0.56**	0.20	**0.43**	**-0.62**	-0.22	**0.58**	*-0.25*	*-0.25*
NOEDU	*0.28*	**0.67**	**-0.64**	**-0.45**	**-0.33**	**-0.75**	**-0.56**	1.00	**-0.53**	**-0.33**	**0.48**	0.09	**-0.75**	0.14	0.05
SERVICE	**-0.77**	**-0.39**	**0.42**	**0.33**	**0.41**	**0.41**	0.20	**-0.53**	1.00	**0.43**	0.02	*0.30*	**0.43**	-0.02	0.03
RENT	-0.17	-0.02	**0.58**	**0.39**	**0.99**	**0.50**	**0.43**	**-0.33**	**0.43**	1.00	-0.23	0.09	**0.50**	-0.21	0.02
ENTREPR	*-0.28*	**0.45**	**-0.57**	**-0.63**	*-0.24*	**-0.56**	**-0.62**	**0.48**	0.02	-0.23	1.00	**0.73**	**-0.56**	**0.50**	0.05
TOUR	**-0.37**	**0.32**	-0.16	**-0.50**	0.09	-0.23	-0.22	0.09	*0.30*	0.09	**0.73**	1.00	*-0.24*	0.20	0.04
WAGE	-0.11	**-0.67**	**0.62**	**0.57**	**0.50**	**1.00**	**0.58**	**-0.75**	**0.43**	**0.50**	**-0.56**	*-0.24*	1.00	-0.11	-0.11
ENTNOTU	-0.06	-0.09	-0.32	-0.28	-0.22	-0.12	-0.25	0.14	-0.02	-0.21	**0.50**	0.20	-0.11	1.00	**-0.54**
DENTRE	-0.08	0.09	-0.09	-0.06	0.01	-0.11	-0.25	0.05	0.03	0.02	0.05	0.04	-0.11	**-0.54**	1.00

Note: Bold values indicate 1%-significance, slanted values indicate 5%-significance.