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Abstract

In French border regions, the unemployment durations of *communes* increase with distance from the border to a threshold of about thirty kilometres, then slightly decrease after this threshold. Depending on the definition of exit from unemployment, differences in unemployment durations between border *communes* and those located around thirty kilometres from the border are one to eight months, while controlling for the labour force composition. In order to explain this "border effect", we first use a spatial autoregressive model estimated by maximum likelihood. Then we calculate residual durations of unemployment using a linear model estimated by ordinary least squares. The advantage of living near the border is mainly due to certain effects of social composition, especially the proportion of cross-border workers, who improve the quality of informational and relational networks. This scenario applies to *communes* close to Belgium, Luxembourg, Switzerland and Spain, but it seems less effectual near the borders with Germany and Italy.

Keywords: duration of unemployment, return to work, spatial disparities, border effect, spatial model.

JEL codes: C41, J64, R1

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INTRODUCTION[1]

As yet, few studies of the French labour market have taken a spatial dimension into account in their analysis. And yet, although employment policy is relatively uniform over the whole country, the diversity of local situations makes spatial analysis most desirable.

Recent works on the question of the return to work have shown that there are strong geographical disparities, whatever the scale used: at a national scale, strong contrasts exist between regions, but they can also be observed between different municipalities in the same *département* (county) or in the same employment area. It was to take this diversity into account, by evaluating the chances of leaving unemployment in each locality, that the SOLSTICE[2] model was developed. SOLSTICE constitutes an original system of geo-located observation: by using flow data, it allows to measure the average duration of job-searching, at the finest possible geographical level, that of the *commune* (municipality) or postcode. It uses data from the historical statistics file (FHS) of the *Pôle emploi* (national employment agency), from which one can calculate gross and net durations of unemployment. The gross durations are those observed for each locality, while the net durations are calculated so as to cancel out the labour force characteristics specific to each *commune*. Thus, net durations make the *communes* directly comparable with each other, by revealing the effect of locality *ceteris paribus*.

The work of Duguet, L'Horty and Sari (2008) using the SOLSTICE model brings to light wide spatial disparities related to location effects: each region is characterised by a strong dispersion of local durations of unemployment, which is little affected by changing the perspective from gross to net durations. In border regions, the regional maps of exit from unemployment suggest that these location effects are partly explained by the relative distance from the border. Pursuing that work, the purpose of the present study is specifically to analyse this "border effect". The aim is to determine the profile of net durations of unemployment according to the distance from the border, then to identify the mechanisms through which this distance influences the capacity of localities to favour the return to work. The study thus contributes to our understanding of the dynamics of the return to work in all the border regions of France, which represent more than one fifth of the national territory.

The study is divided into five parts. The first section presents the methodology adopted to evaluate locally the chances of leaving unemployment and to measure the distance from the border. It describes the four approaches to leaving unemployment used to calculate net durations and the two indicators of distance from the border that we have constructed. In the second section, we analyse the spatial disparities in net durations of unemployment in the border regions and draw up the profile of net durations according to distance from the border. In the third section, we then suggest the theoretical mechanisms likely to explain this profile, in other words to explain how the distance from the border influences the chances of leaving unemployment, for a given labour force composition. Finally, in the fourth and fifth sections, we empirically test the theoretical intuitions of the previous section. We start by carrying out

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[1] My particular thanks go to Yannick L'Horty and all the members of the CELESTE team for their comments and suggestions. I would also like to thank Ekaterina Kalugina for her careful and constructive reading of the first version of this paper.

[2] SOLSTICE (*Système d'Observation Localisée et de Simulation des Trajectoires d'Insertion, de Chômage et d'Emploi* - System of Localised Observation and Simulation of Integration, Unemployment and Employment Trajectories) is a model developed by the CELESTE team of the CEE (*Centre d'Etudes de l'Emploi* - Centre for Employment Studies).

regressions of the net durations of unemployment using a spatial autoregressive model estimated by *maximum likelihood*, by which we can control for spatial autocorrelation. We then calculate the net residual durations of unemployment using a linear model estimated by *ordinary least squares*, to measure the respective roles of the different explanatory variables of the model in explaining the "border effect". Intuitively, the aim is to identify the factors of explanation which, when they have been taken into account in the regressions, would cancel out the effect of distance from the border on durations of unemployment. The fourth section presents a global approach, considering the border regions as a whole. The fifth section adopts a more local approach, distinguishing between the border regions according to which neighbouring country they are close to.

1. SOURCES AND METHODS

1.1. Measuring the exit from unemployment

The data used are drawn from the complete version of the historical statistics file (FHS) of the *Pôle emploi* (the national employment agency). They allow us to follow, over three years, the trajectories of jobseekers who registered as unemployed between 1st July 2002 and 30th June 2003. All the unemployed registered at end of month in the categories 1, 2, 3 and 6, 7, 8 (whether or not they receive benefits) are taken into account. In this way, we follow three groups of jobseekers, incorporating jobseekers exercising a "reduced activity"[3]:

- categories 1 and 6: looking for long-term, full-time work;
- categories 2 and 7: looking for long-term, part-time work;
- categories 3 and 8: looking for a temporary (fixed-term) job.

We use two definitions to calculate the duration of unemployment, so as to take into account the more or less long-term nature of the exit from registered unemployment:

- *simple exits*: a jobseeker is considered to have left the list of unemployed if he/she is off the register for at least one month;
- *long-term exits*: a jobseeker is only considered to have left the list when he/she has been off the register for six months.

But exit from the *Pôle emploi* register is not easy to deal with, because not all the exits are due to a return to work, and not all the exits due to a return to work are declared. Each month, only about a quarter of the exits correspond to declared returns to work (according to the reasons for leaving the register recorded in the FHS file). However, the "*Sortants*" ("leavers") survey carried out every three months by the *Pôle emploi* and the Dares[4] indicates that half of the exits were actually the result of a return to work. To take this into account, we use two more or less extensive definitions:

[3] "Reduced activity" is a system where the registered unemployed can take temporary or part-time work while waiting to find a more suitable job. Jobseekers in the categories 1 to 3 exercised little or no reduced activity, while those in the categories 6 to 8 performed at least 78 hours of reduced activity per month. Since 2009, these categories have been presented in new statistical groupings (categories A, B and C).

[4] *Direction de l'Animation de la Recherche, des Etudes et des Statistiques* (Ministry of Labour, Employment and Health).

- *exits for all reasons*: all exits are taken into account, whatever the reason given in the FHS file (return to work, failure to sign on, being struck off the register, etc.);
- *exits for declared return to work*: only exits for which "declared return to work" is the reason recorded in the FHS file are considered.

By combining these different approaches, we can study the exit from unemployment from four different perspectives and delineate the reality of exit from the unemployment registers due to a return to work (table 1). The category of *simple exits for all reasons* corresponds to an "administrative" definition of exits, in the sense that it coincides fairly closely with the statistics regularly published by *Pôle emploi*. These exits tend to overestimate the return to work and can therefore be considered as a lower limit. *Long-term exits for declared return to work*, on the other hand, tend to underestimate the return to work and can therefore be considered as an upper limit.

Table 1. Four approaches to exits from unemployment

	Exits for all reasons	*Exits for declared return to work*
Simple exits	***Simple exits for all reasons*** All exits from the registers lasting at least one month are considered	***Simple exits for declared return to work*** Only exits lasting at least one month and declared to be due to a return to work are considered
Long-term exits	***Long-term exits for all reasons*** All exits from the registers lasting at least six months are considered	***Long-term exits for declared return to work*** Only exits lasting at least six months and declared to be due to a return to work are considered

1.2. Estimating durations of unemployment: gross duration and net duration

Once we have established these definitions, the data allow us to estimate models of duration with local fixed effects, while controlling for a large number of explanatory variables. These estimations are drawn from Duguet, Goujard and L'Horty (2009)[5].

The rate of exit from the *Pôle emploi* registers is modelled using a Weibull specification: it is a function of the time spent unemployed and the characteristics of the individual. The rates of exit and expectancies of duration on the *Pôle emploi* unemployment registers are calculated at the level of each *commune,* provided there are a sufficient number of observations in each locality. When a *commune* has at least one hundred resident jobseekers, the indicators are calculated at the level of that locality. If there are less than one hundred, the *commune* is grouped together with the other *communes* sharing the same postcode that also have less than one hundred jobseekers. The indicators are then calculated at the level of this postcode. If there are less than one hundred jobseekers for the whole postcode, the indicators are not calculated. This threshold of one hundred jobseekers ensures both good-quality estimations and a good coverage of the country.

[5] The estimation method is presented in detail in appendix 2 of Duguet, Goujard and L'Horty (2009).

The "gross duration" indicator corresponds to the average length of time for which people are registered unemployed in each *commune*. This indicator combines two effects: firstly, the capacity of the locality to facilitate the exit from unemployment, and secondly, the individual capacity of jobseekers to find a job, which is itself a function of their socio-economic characteristics (age, qualifications, skills, etc.). The "net duration" indicator is obtained by estimating a model with fixed effects at the level of each *commune*. In addition to the local fixed effects, this model includes all the socio-economic characteristics of the jobseekers: sex, age, nationality, family situation, number of children, highest qualification obtained, type of job contract sought, profession sought, reason for registering unemployed and situation with regard to the RMI (minimum social security benefit). Thus, the net duration corresponds to the duration that one would observe in the *commune* if this latter possessed the average socio-economic characteristics of its region, leaving the local fixed effects unchanged. By construction, the net duration cancels out all the differences in the composition of the labour force, because we impose the same value of socio-economic variables on all the localities within each region.

The net duration represents an effect of location *ceteris paribus*, because it is corrected for the individual characteristics of jobseekers, making the *communes* directly comparable with each other. This effect of locality can be broken down into several components: the most important is probably connected to the demand for labour (the presence of companies in each sector of activity, for example), but it also includes factors related to interactions with local economic agents (neighbourhood effects, peer effects) or the effect of employment measures specific to the *commune*.

1.3. Measuring the distance from the border

Using information drawn from three databases - the GEOFLA (administrative limits), Route 120 (the main French road network) and the RGC (geographical directory of *communes*) produced by the IGN - two measurements of distance "as the crow flies" are constructed: the minimum distance from the border and the distance from the nearest road border crossing (in kilometres). Each *commune* is identified geographically by the coordinates (latitude and longitude) of its centroid (which can be interpreted as a centre of gravity). The distance from the border is approximated, for each locality, by calculating the distance separating this locality from the nearest border locality.[6] So the border is defined by the centroids all of the border *communes*. The distance calculated is an orthodromic distance, which takes into account the spherical form of the Earth and so provides greater accuracy than the standard Euclidean distance. The distance from the border of *commune i*, with coordinates $(Lat_i, Long_i)$, can be calculated as follows:

$D_i = \min\left(D_{i,j}\right)$ for any *commune i* and any border *commune j*

where $D_{i,j}$ is the orthodromic distance separating the *commune*s *i* and *j*

and $D_{i,j} = \arccos\left(\cos(Lat_i) * \cos(Lat_j) * \cos(Long_j - Long_i) + \sin(Lat_i) * \sin(Lat_j)\right) * r$

where *r* is the radius of the Earth in kilometres, that is to say *r = 6378*.

[6] A border *commune* is one whose boundaries touch an international border.

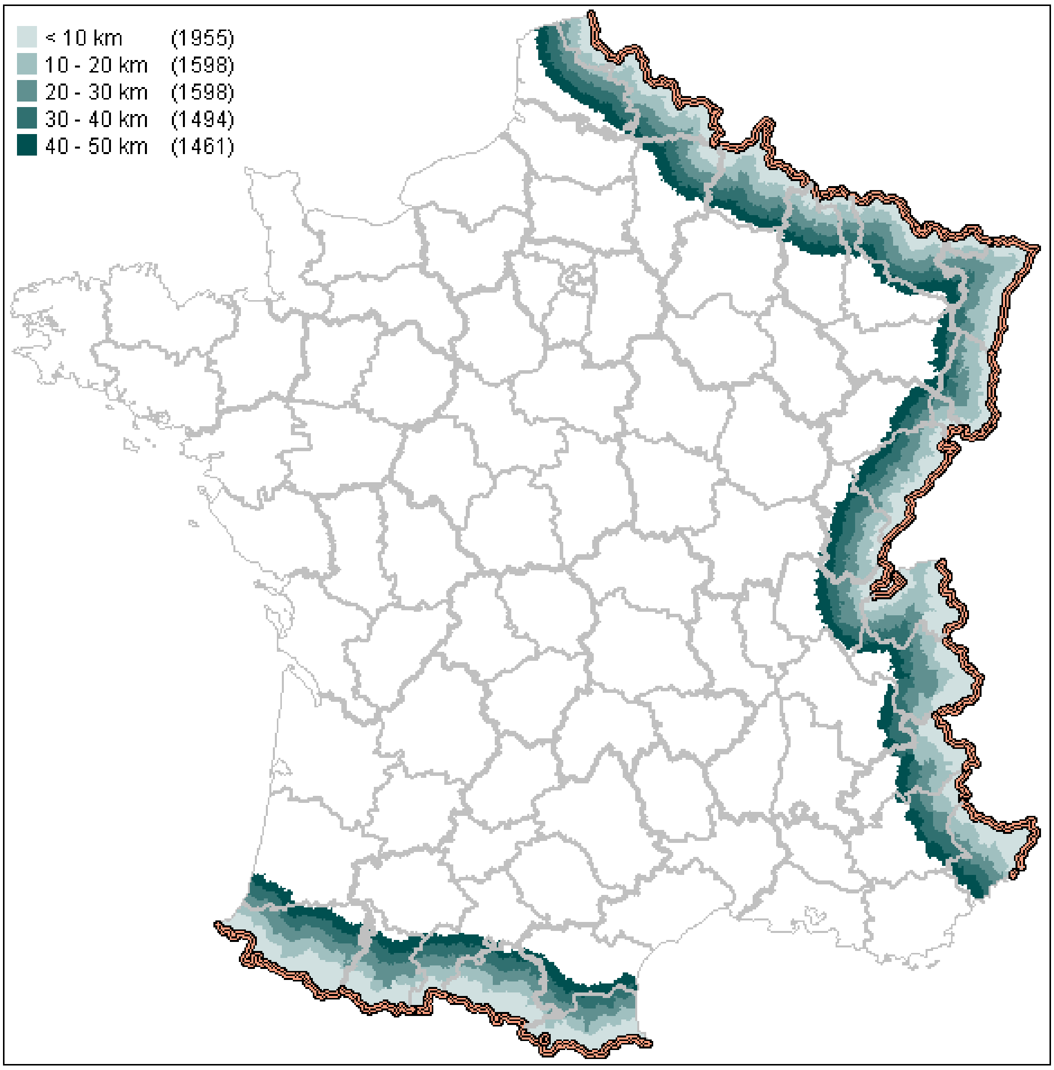
The distance from the nearest road border crossing is calculated in the same way. After identifying all the *communes* possessing a road border crossing point,[7] we calculate the distance separating each locality from the nearest road border crossing:

$$\overline{D}_i = \min\left(D_{i,k}\right) \text{ for any } commune\ i$$

and any border *commune* with a road border crossing *k*.

We identified nearly five hundred border *communes* in mainland France, spread over eleven regions. Nearly one in four of these *communes* (24 %) have at least one road border crossing towards a neighbouring country. Map 1 and table 2 present some descriptive details of the border *communes* and the distances of *communes* from the border. Only the *communes* located within a fifty-kilometre wide "border strip" were considered. This corresponds to a commuting distance that covers the vast majority of commutes: for 90 % of employees who leave their *commune* of residence to work, the distance between their home and their place of work is less than fifty kilometres (Baccaïni, Sémécurbe and Thomas, 2007). Moreover, the distance calculated is by construction lower than the actual distances travelled: the threshold of fifty kilometres therefore corresponds to a lower limit.

Map 1. Communes located less than 50 kilometres from a border



[7] Only the main roads were taken into account: these were identified using the Route 120 database produced by the IGN, recording 120,000 kilometres of main roads in the French network (motorways, national, regional and local links).

Table 2. Border communes and distance from the border

Border regions	$D_i = 0$	$\overline{D_i} = 0$	$D_i \leq 30$ km	$D_i \leq 50$ km
Nord-Pas-de-Calais	77	24	752	1160
Picardie	3	1	137	274
Champagne-Ardenne	43	8	314	444
Lorraine	78	18	718	1218
Alsace	70	16	810	903
Franche-Comté	47	9	666	1192
Rhône-Alpes	54	16	448	741
Provence-Alpes-Côte d'Azur	22	7	184	295
Languedoc-Roussillon	34	5	222	359
Midi-Pyrénées	38	2	613	997
Aquitaine	27	11	289	523
TOTAL communes	**493**	**117**	**5153**	**8106**

Reading the table: There are 77 border *communes* in the Nord-Pas-de-Calais region, of which 24 have a road border crossing point. 752 *communes* in this region are located less than 30 kilometres from the border and 1,160 at less than 50 kilometres.

Source: SOLSTICE, CEE calculations using GEOFLA, Route 120 and the IGN's RGC databases.

2. DISPARITIES IN THE DURATION OF UNEMPLOYMENT IN BORDER REGIONS

The twenty-two regional studies using SOLSTICE conducted by Duguet, L'Horty and Sari (2008) clearly bring to light the presence of location effects. Moving from gross durations to net durations does little to affect the differences in duration of unemployment between localities, which is only partly explained by the characteristics of the labour force. There is therefore a specific location effect, on top of the effect of jobseekers' individual characteristics. It is this specific location effect that is measured by the net duration of unemployment (at the level of the *commune* or postcode).

2.1. Spatial correlation between net durations of unemployment

In each region, the maps of the net durations of unemployment reveal the presence of large groups of *communes*, uniformly favourable or unfavourable to the return to work. This result suggests the existence of a spatial autocorrelation (or spatial dependence) of the net durations of unemployment. Spatial autocorrelation expresses itself in a statistical correlation between the values of a variable in a given place and the values of the same variable in other places: there is then a connection between the statistical proximity and the geographical proximity of the localities.

The Moran statistic provides an overall measure of spatial autocorrelation.[8] The autocorrelation is said to be positive when, for a given variable, the low values or high values

[8] The calculations relating to the measurement of spatial autocorrelation were made using the GeoDa programme.

of that variable tend to be concentrated in space. Conversely, it is said to be negative when each locality tends to have neighbours with very different values of the variable. The Moran's I index is calculated as follows:

$$I = \frac{N}{S_O} \cdot \frac{\sum_i \sum_j w_{ij} \left(X_i - \overline{X} \right)\left(X_j - \overline{X} \right)}{\sum_i \left(X_i - \overline{X} \right)^2}$$

where S_o is a scale factor equal to the sum of all the elements of *W*, the matrix of spatial weights of size (*N*,*N*), of which the characteristic element w_{ij} summarises the interactions between *communes i* and *j*.

The numerator of Moran's I can be interpreted as the covariance between neighbouring localities and the denominator as the total variance observed. A value of this index close to 1 means that there is strong positive autocorrelation and a value close to -1 means that there is strong negative autocorrelation. Table 3 shows the values of Moran's I of the net durations of unemployment for two types of neighbourhood matrices, for the index is sensitive to the spatial weight matrix that is chosen. Appendix 1 presents the four neighbourhood matrices used.

Table 3. Moran's I of net durations of unemployment

Moran's I (p-value)	Definition used for estimating net durations of unemployment			
Neighbourhood matrix	*Simple exits for all reasons*	*Simple exits for declared return to work*	*Long-term exits for all reasons*	*Long-term exits for declared return to work*
Contiguity criterion				
First-order queen	0.8563 (0.001)	0.9068 (0.001)	0.8166 (0.001)	0.8729 (0.001)
Second-order queen	0.8056 (0.001)	0.8677 (0.001)	0.7541 (0.001)	0.8234 (0.001)
Distance criterion				
5 closest neighbours	0.8616 (0.001)	0.9017 (0.001)	0.8264 (0.001)	0.8682 (0.001)
Neighbours within 10 km	0.7891 (0.001)	0.8449 (0.001)	0.7278 (0.001)	0.8044 (0.001)

Reading the table: With a first-order queen contiguity matrix and the definition of *simple exits for all reasons*, the Moran's I is significant at the level of 1% and takes the value of 0.8563.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

The index is positive and very high, whatever the type of matrix used and for all definitions of exit from unemployment: there is therefore highly positive overall spatial autocorrelation. This means that the *communes* with the highest (resp. lowest) durations of unemployment tend to be strongly concentrated in space. The overall spatial autocorrelation is stronger for the *simple exits* (more than one month) than for the *long-term exits* (more than six months); it is also stronger for *exits for declared return to work* than it is for *exits for all reasons*.[9]

[9] Using several types of neighbourhood matrices allows us to exclude the hypothesis of autocorrelation explained solely by a "postcode effect". Some communes have identical net durations of unemployment because they are grouped together with other communes sharing the same postcode. But the postcode cannot simultaneously correspond to the geographical proximity defined by all four 4 matrices. Moreover, these matrices are defined totally independently from existing administrative divisions.

The local version of Moran's statistic, LISA (local indicators of spatial autocorrelation), allows us to identify areas in which the spatial grouping of durations of unemployment is significant, specifying in each case whether it is a grouping of similar values (LISA > 0) or dissimilar values (LISA < 0). The LISA statistic is calculated as follows:

$$I_i = \frac{\left(X_i - \overline{X}\right)}{m_o} \cdot \sum_j w_{ij} \left(X_j - \overline{X}\right) \quad \text{with} \quad m_o = \frac{\sum_i \left(X_i - \overline{X}\right)^2}{N}$$

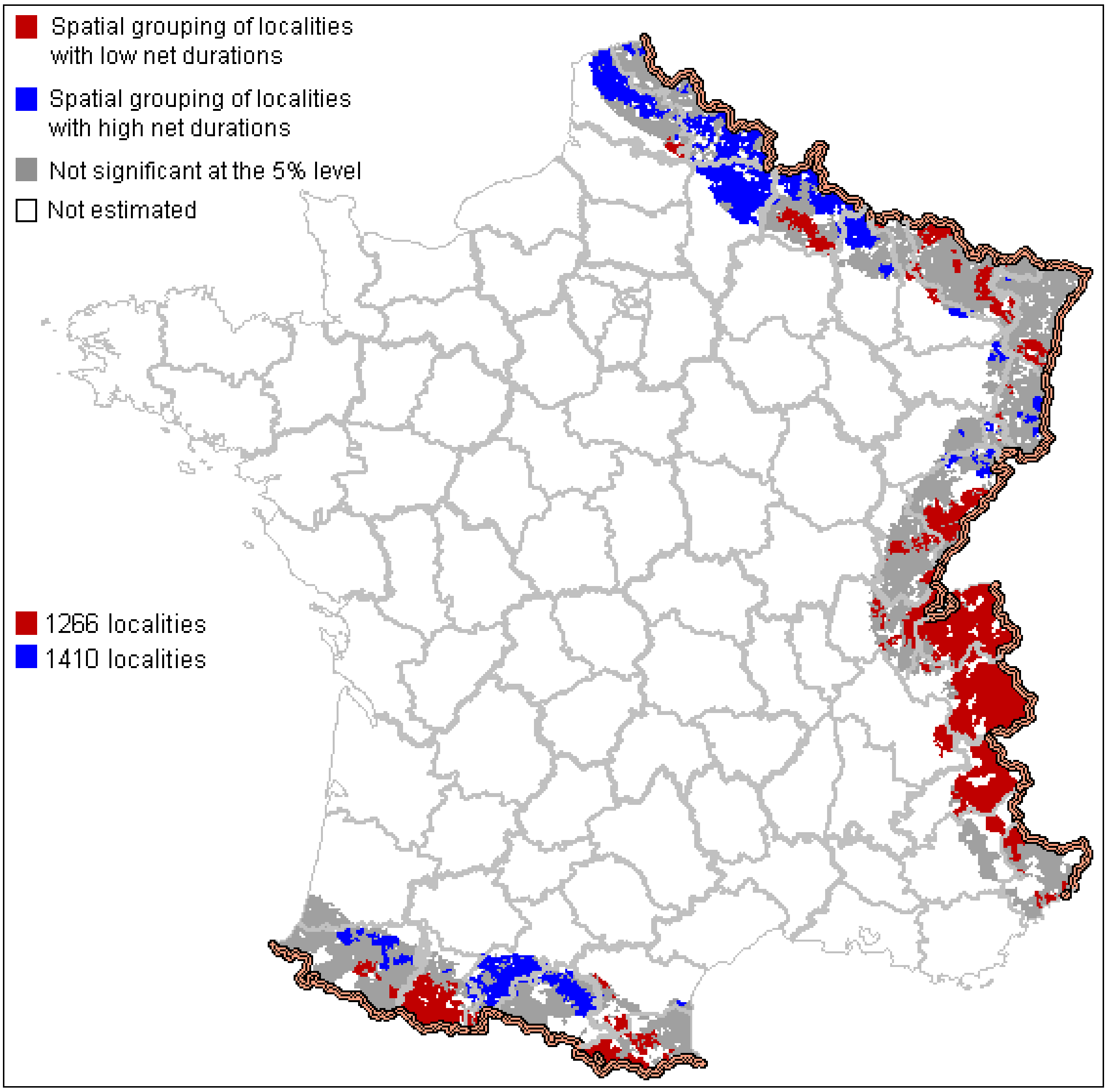
As the spatial weight matrices are standardised, the average of the local statistics I_i is equal to the overall statistic I. A positive LISA means that each locality has neighbours where the chances of returning to work are similar. A negative LISA, on the other hand, means that each locality has neighbours where the chances of returning to work are different. In fact, the latter situation is rarely observed: very few areas contain groups of *communes* with radically different durations of unemployment. On average, this is the case for 3% of the *communes* for which there is a significant spatial grouping (taking into consideration the four possible neighbourhood matrices and the four possible definitions of exit from unemployment). In every other case, the LISA is positive: this is illustrated in map 4, where the LISA statistic is applied to all the *communes* located less than fifty kilometres from the border.[10]

The regions Nord-Pas-de-Calais and Picardie are characterised by the presence of large areas comprising localities with high net durations of unemployment. In Champagne-Ardenne, the situation is more nuanced: there are concentrations of *communes* with long durations of unemployment (near the border) and areas characterised by short durations of unemployment (in the south of the Ardennes). This is also the case in Lorraine, Alsace and Franche-Comté. However, in these three regions, the groups of *communes* are more dispersed and the durations of unemployment are often shorter than in Champagne-Ardenne. In Rhône-Alpes, almost all the *communes* are involved in a phenomenon of local spatial dependence: most localities have a low net duration of unemployment and their neighbouring *communes* also have low durations of unemployment. This tendency extends as far as the north of the Provence-Alpes-Côte d'Azur region: localities in the Hautes-Alpes form a homogeneous area characterised by low net durations of unemployment. In the rest of the region, spatial groupings are rarely significant. Along the border with Spain, three groups of localities stand out. The first area, favourable to an exit from unemployment, comprises the *communes* of the south-west of the Languedoc-Roussillon region. The second, characterised by high durations of unemployment, comprises the localities of the south of Haute-Garonne and the north of Ariège. The third area comprises *communes* with low durations of unemployment located in the south-west of Hautes-Pyrénées.[11]

[10] In map 4, net durations are not considered to be high or low compared with a regional reference but compared with the average duration of unemployment of all the communes close to the border. Applying the LISA statistic in each region would give different results, because the distribution of net durations of unemployment taken into account would not be the same.

[11] Similar results are obtained when the other definitions of exit from unemployment are used: the significant spatial groupings are positioned in the same way. On the other hand, their perimeters vary with the neighbourhood matrix used: the broader the definition of geographical proximity, the more extensive the significant spatial groupings.

Map 4. Local spatial autocorrelation of net durations of unemployment



Reading the map: The zones in red are those in which there is significant spatial grouping of localities (at the 5% level) with low net durations of unemployment. The zones in blue are characterised by significant spatial grouping of localities with high net durations. The neighbourhood matrix used is first-order queen contiguity. The definition of exit from unemployment is *simple exits for all reasons*.

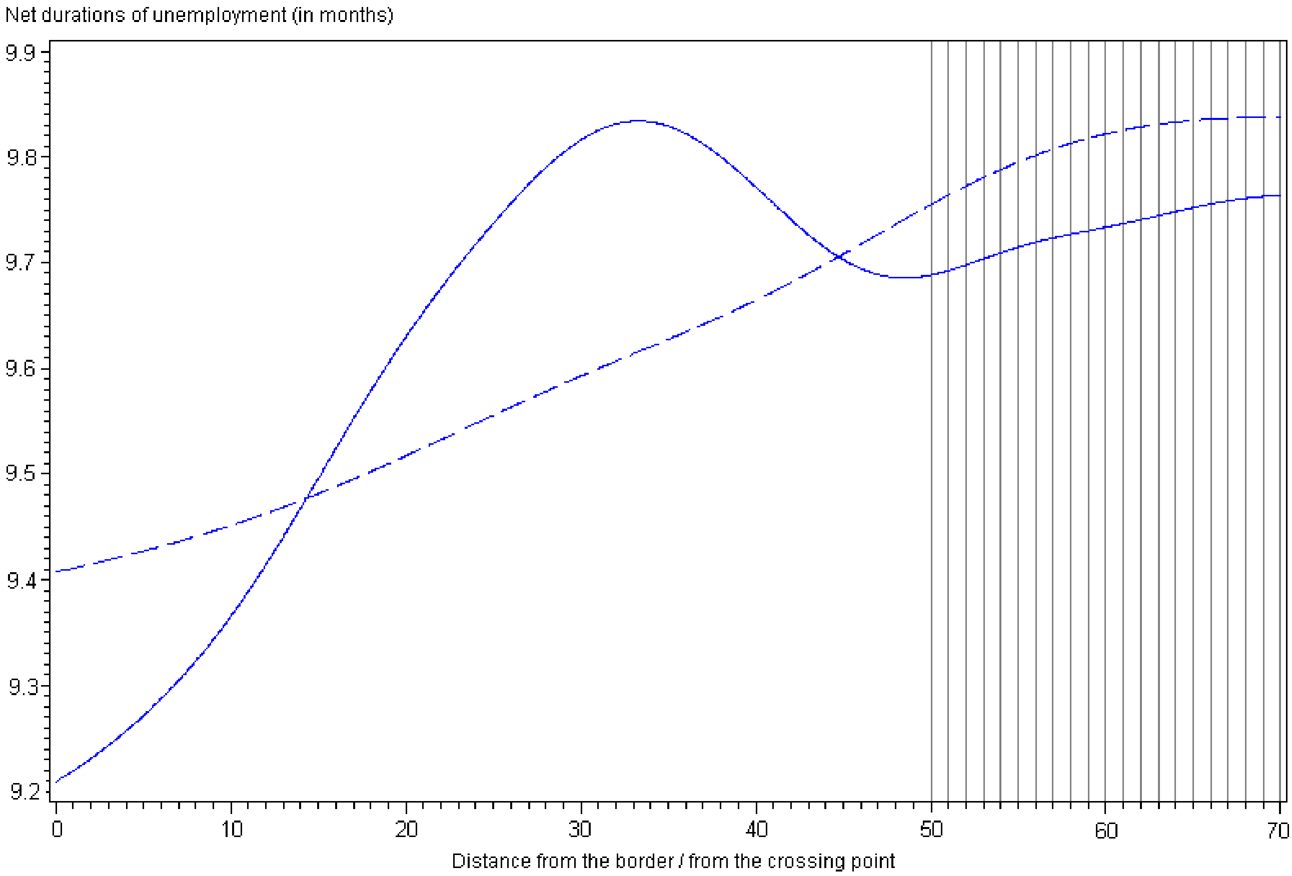
Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

2.2. Faster exit from unemployment close to the border

In the border regions, *communes* located near the border have, on average, lower net durations of unemployment than the other *communes* of the region (for all types of exits). This "border effect" is verified in all the regions except Nord-Pas-de-Calais, Picardie and Champagne-Ardenne, where the *communes* bordering Belgium do not appear to derive any advantage from their location (see appendix 2).

Graph 1 shows the form of the net duration of unemployment according to the distance from the border, for all regions taken together. The net duration increases with distance from the border, reaching a maximum between thirty and thirty-five kilometres, and then decreases slightly before levelling off. The difference in the durations of unemployment between border *communes* and *communes* further away from the border (thirty kilometres) varies according to the definition of exit from unemployment: it is between three weeks and a month for *exits for all reasons* and between five and eight months for *exits for declared return to work* (and always greater for *long-term exits* than for *simple exits*).

Graph 1. Net durations according to the distance from the border and from the crossing point



Reading the graph: Durations of unemployment are net (in months) and correspond to *simple exits for all reasons*. These are non-parametric estimations of average durations of unemployment (obtained using an Epanechnikov kernel and a variable window determined by cross-validation). The curve indicated by the continuous line represents the duration of unemployment as a function of the distance from the border and the curve shown by the dashed line represents the duration of unemployment as a function of the distance from the border crossing point.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

Taking the distance from the road border crossing as the basis for the estimation leads to a quite different result. The net duration of unemployment increases continuously with the distance from the crossing point and takes longer to reach a maximum and level off, between sixty and seventy kilometres (i.e. more than the maximum commuting distance of fifty kilometres fixed in this study). Moreover, the amplitude of the durations of unemployment between localities is smaller with this measure of distance, suggesting that it is less relevant than the simple distance from the border for explaining the disparities between *communes* in durations of unemployment. Consequently, in the following sections, we shall concentrate on the profile of net durations as a function of the distance from the border, without taking into account the presence or absence of road border crossings. We consider that it is the minimum distance from the border that best reflects the commuting distance from the border. This view point is supported by a shortcoming of the road border crossing criterion, in that it does not take into account all the border crossings, but only the main ones (those listed as part of the main French road network in the Route 120 database).

3. THE THEORETICAL INFLUENCE OF THE BORDER ON EXITS FROM UNEMPLOYMENT

Several mismatch mechanisms could explain why, *ceteris paribus*, the chances of leaving unemployment are greater in *communes* located near the border (as illustrated in graph 1).

3.1. Spatial mismatch

Spatial mismatch explains the spatial concentration and persistence of unemployment in terms of a problem of physical distance from jobs: a disconnection between places or residence and places of work. This mechanism was highlighted very early on by Kain (1968) and has often been used since then in urban economics to study phenomena of segregation.[12] It could very easily be applicable to the issue of employment in border regions. If companies have an interest in locating near the border, to exploit differences in legislation (tax rates or wage bills, for example) or simply to capture foreign demand, then the density of economic activity and the demand for labour should be greater near the border.[13] In that case, people living further away from the border will be deprived of certain job opportunities, because distance makes jobseeking less efficient and more costly, for at least two reasons. Firstly, the information available about vacant jobs decreases with the distance from those jobs: employers' recruitment methods are sometimes geographically limited (adverts placed in local newspapers, for instance) and it is harder for jobseekers to identify potential employers in more distant areas which they do not know so well. Secondly, long commuting distances generate time and money costs, which can dissuade jobseekers from prospecting or accepting a job offer that is too far-removed from their place of residence (Brueckner and Zenou, 2003).

3.2. Skill mismatch

Regional specialization generates specific labour needs. These needs may be far-removed from the characteristics of the local labour pool, leading to a mismatch between the skills required by the employers and those offered by the jobseekers. This mechanism could also help to explain the difference in net durations of unemployment between localities according to their distance from the border. If the composition of employment is more diversified close to the border and/or different on each side of the border, then people living near the border will have access to a more varied supply of employment and are more likely to possess a sought-after skill that can be exploited locally on the labour market.

The model developed by Jackman, Layard and Savouri (1991), which measures mismatch unemployment by means of the dispersion of unemployment rates by skill level, provides an indicator of skill mismatch. This indicator, calculated in each locality i, corresponds to the semivariance of relative unemployment rates by skill level (blue-collar, white-collar, intermediate professions, managers). With u_{iq} denoting the unemployment rate among the active population of skill level q and u_i the overall unemployment rate of *commune* i, the JLS index can be written:

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[12] See Gobillon, Selod and Zenou (2007) for a review of the theoretical literature on spatial mismatch, and Ihlanfeldt and Sjoquist (1998) for a review of the empirical literature.

[13] See Niebuhr and Stiller (2002) for a review of the economic literature on border regions and border effects, and van Houtum (2000) for a review of the geographical literature.

$$JLS_i = \frac{1}{2} \cdot Var\left(\frac{u_{iq}}{u_i}\right)$$

A high value of this index signifies that there is a strong dispersion of unemployment rates by skill level within the *commune*, and therefore that the local labour market is more favourable (or unfavourable) to some skill levels than to others. A low value, on the contrary, signifies that the unemployment rates for blue-collar workers, white-collar workers, intermediate professions and managers are similar and therefore that these skill levels are equally sought-after locally.

3.3. Social mismatch

Social mismatch is characterised by the relegation of disadvantaged populations to certain districts. The geographical concentration of these populations can detract from their employability, especially for young people (Fitoussi, Laurent and Maurice, 2004). Firstly, because the concentration of disadvantaged populations impedes the accumulation of human capital: the concentration of pupils in difficulty increases the probability of academic failure and therefore affects the level of education of school-leavers. Secondly, because the environment of a district has an influence on the scale of social difficulties that the residents encounter (Crane, 1991), the propensity of young people to adopt deviant behaviour (dropping out of school, for example) is highly dependent on the proportion of individuals in the district who have already displayed such behaviour. Moreover, these social difficulties can lead to area-based discrimination, whereby employers may be reluctant to hire people from what they consider to be "bad" neighbourhoods (Duguet *et alii*, 2010). It is possible that the intensity of neighbourhood effects may vary with the distance from the border, for example, if the most disadvantaged jobseekers are relegated to localities furthest away from the border through wealth effects (housing costs, pressure on land, etc.).

Residential segregation also has a detrimental effect on the quality of the social networks that come into play in finding a job (Granovetter, 1974). In particular, a lot of job-seeking by young and unskilled people takes place through personal contacts (Fontaine, 2006). Consequently, the fact of living in an area with a high proportion of unemployed people reduces the opportunities of employment: there are fewer employed people around who might support a job application or provide professional contacts (Selod and Zenou, 2001). It is possible that social networks play a particularly important role in border areas, since the border entails legal, institutional, linguistic and cultural differences that can all raise obstacles to access to work. In that case, living among people who work abroad, just across the border, can provide better information about these foreign labour markets (thus increasing job opportunities) and reduce the potential obstacles of language, culture, etc. (thus making job opportunities more accessible). In other words, the proportion of cross-border workers can affect the permeability of the border.

4. COMPARISON WITH THE DATA: AN APPLICATION TO ALL THE BORDER REGIONS

In this section we seek to empirically test the theoretical effects described in the previous section. The aim is to identify the causes of the "border effect", in other words the positive effect of the proximity of the border on the chances of returning to work. The method consists in regressing the net durations of unemployment with explanatory variables (measuring the theoretical effects), but excluding distance from the border from these variables, to avoid capturing other effects (correlated to distance). In this way, we seek to explain a "pure" border effect: intuitively, this means finding the explanatory factors which, when they are taken into account in the regressions, result in the distance from the border having no effect on the durations of unemployment.

4.1. The data: net durations and characteristics of the communes

We consider the border regions as a whole, by selecting all the localities situated within fifty kilometres of an international border (map 1). Only the net durations are taken into account (estimated on FHS data using the SOLSTICE model), so that we can work with a given labour force composition and focus our attention on location effects. In all, 8,106 *communes* are concerned. However, because our estimation strategy includes a threshold of one hundred jobseekers, we have not estimated net durations for all of these *communes*. Thus, taking the broadest approach to exits from unemployment (*simple exits for all reasons*), for example, 6,896 *communes* can be taken into account, i.e. 85% of the initial total. Table 3 presents the number of observations associated with each of the four approaches to exits from unemployment.

We used the GEOFLA database to describe the borders, in other words to identify all the neighbouring regions of foreign countries[14] and then to associate each French *commune* with the nearest of these foreign regions (which could be a Belgian province, a German Land, an Italian region, etc.). In all, sixteen regions in six neighbouring European countries are taken into account. The other data are drawn from the 2006 population census (INSEE), which provides information on the characteristics of *communes* in terms of commuting, residential mobility, local employment structure and social composition.

Table 3. Number of observations according to the definition of exit from unemployment

	Definition used for estimating net durations of unemployment			
	Simple exits for all reasons	*Simple exits for declared return to work*	*Long-term exits for all reasons*	*Long-term exits for declared return to work*
Number of observations	6896	5765	6373	5090
Total n° of communes	8106	8106	8106	8106
Proportion	85%	71%	79%	63%

Reading the table: The average net durations of unemployment with the definition of *simple exits for declared return to work* was estimated for 5765 localities, i.e. 71% of the total.

4.2. The choice of econometric model

The purpose of the model is to explain net durations of unemployment by explanatory variables that take into account each of the mismatch mechanisms described in section 3. The

[14] The neighbouring regions of foreign countries generally correspond to level 2 regions in the European nomenclature of territorial units for statistics (NUTS 2). By definition, they have between 800,000 and 3 million inhabitants (the equivalent of French administrative regions).

choice of the specification depends on the presence or absence of spatial autocorrelation: in the presence of autocorrelation, the models of linear regression estimated by the *ordinary least squares* method (OLS) are unsatisfactory, because the hypothesis of independent observations is not verified (Le Gallo, 2002). Here, the application of a Moran's I test (on an OLS model) confirms the existence of spatial autocorrelation. It is therefore necessary to adopt a specification that allows us to deal with the interdependence of observations.

The first way to do this consists in introducing a spatially lagged dependent variable (average of the variable weighted by the spatial weight matrix) as the explanatory variable. This is what the spatial autoregressive (SAR) model does, which allows to model the neighbourhood externalities: the duration of unemployment in *commune i* is partly explained by the duration of unemployment in the neighbouring *communes* to *i*. The SAR is also characterised by the presence of a spatial multiplier effect and a spatial diffusion effect. The multiplier effect involves the explanatory variables: on average, the duration of unemployment y_i of the *commune i* is explained by the values of the explanatory variables specific to *i* but also by those of all the other *communes* (whether or not they are neighbours of *i*). The diffusion effect involves the error process: a random shock in *commune i* affects the duration of unemployment not only in that *commune i* but also in the other *communes*. These two effects decrease with increasing distance from *commune i* (box 1-A).

The second way to deal with the interdependence of observations consists in using an autoregressive error process. This is what the error autocorrelation model (SEM) does. This model is also characterised by a spatial diffusion effect that decreases with increasing distance. The detection of spatial error autocorrelation is usually interpreted as a problem of specification: certain effects that are not captured by the explanatory variables are present in the errors in the form of spatial autocorrelation. Thus, for example, the omission of relevant variables can generate spatially correlated errors. For that reason, this form of spatial dependence is sometimes referred to as "nuisance dependence" (box 1-B).

The comparison of Lagrange multiplier tests allows us to determine which is the more suitable spatial model, the SAR or the SEM (box 1-C). In the present case, the results of the tests vary according to the neighbourhood matrix used. With a first-order queen matrix, the SAR model is preferable, whereas with higher rank matrices (second-order queen or "neighbours within 10 kilometres"), the SEM model is preferable. Here we have decided to use an SAR model with a first-order queen matrix, in order to limit the size of the neighbourhood and thereby the explanatory weight of the spatial parameter introduced into the model. In this way, we allow the other explanatory variables more room to contribute to explaining the border effect.

Box 1. The SAR and SEM models

1-A. The spatial autoregressive model (SAR)

Formally, the SAR model is written:

$$\begin{cases} y = \delta W_y + X\beta + \varepsilon \\ \varepsilon \sim \mathrm{N}(0, \sigma^2 \mathrm{I}) \end{cases}$$

with *y* the dependent variable; W_y the spatially lagged dependent variable (for the weight matrix *W*); δ the autoregressive spatial parameter (indicating the intensity of interactions between the observations of *y*); *X* the matrix of dependent variables; β the vector of coefficients of the dependent variables, and ε the vector of errors.

With this model, the duration of unemployment y_i of *commune i* is partly explained by the durations of unemployment of its neighbours:

$$(W_y)_i = \sum_{i \neq j} w_{ij} y_j$$

As the spatial weight matrix W is standardised here, $(W_y)_i$ can be read as the average duration of unemployment of the neighbours of *commune i*. The presence of W_y allows us to “control” the spatial dependence in order to evaluate the impact of the other explanatory variables, or symmetrically to evaluate the spatial dependence by fixing the other explanatory variables. The vector of coefficients β can be estimated by the *maximum likelihood* method:

$$\hat{\beta}_{MV} = (X'X)^{-1} X'(X - \delta W) y = \hat{\beta}^{y}_{MCO} - \delta \hat{\beta}^{Wy}_{MCO}$$

where $\hat{\beta}^{y}_{MCO}$ corresponds to the OLS estimator of a regression of y on X and $\hat{\beta}^{Wy}_{MCO}$ to the OLS estimator of a regression of W_y on X.

1-B. The spatially correlated error model (SEM)

The SEM model is written as follows:

$$\begin{cases} y = X\beta + \varepsilon \\ \varepsilon = \lambda W \varepsilon + u \\ u \sim \mathrm{N}(0, \sigma^2 \mathrm{I}) \end{cases}$$

where λ represents the intensity of the interdependence between residual errors and u the error term (the other elements correspond to those defined above, in1-A).

Again, the vector of coefficients β can be estimated by the *maximum likelihood* method:

$$\hat{\beta}_{MV} = \left[(X - \lambda WX)'(X - \lambda WX)\right]^{-1} (X - \lambda WX)(y - \lambda Wy)$$

1-C. The Lagrange multiplier tests

The *SARMA* test consists in testing the joint null hypothesis of the parameters δ and λ. It allows us to detect an incorrect specification and the wrongful omission of a form of spatial dependence, but it says nothing about the type of autocorrelation that should be taken into account.

The *LMLAG* and *LMERR* tests are used to test respectively for the nullity of parameter δ in the SAR model and the nullity of parameter λ in the SEM model. But it is possible for the null hypothesis to be rejected in both cases (because of a problem known as the “mutual contamination” of the tests). It is then necessary to use a modified version of the tests, “robust” to an incorrect local specification, which allows to discriminate between the two types of spatial dependence. This is what the *RLMLAG* and *RLMERR* tests do: by comparing their significance (and possibly the test statistics) one can determine which of the two models (SAR or SEM) is more suitable. But it is possible for the choice of specification to remain tricky despite these tests. It is then useful to compare the results of the tests with different neighbourhood matrices. The choice can also be based on information criteria (AIC, BIC), choosing the model that minimizes the coefficient associated with the chosen criterion.

4.3. First results

Table 4 presents the estimations carried out using an SAR model and a first-order queen matrix in the case of *simple exits for all reasons*, for which we have the largest number of observations. Four groups of explanatory variables are progressively introduced to explain net durations of unemployment: variables concerning mobility and the accessibility of jobs (*spatial mismatch*), social composition and segregation (*social mismatch*), skills and the local employment structure (*skill mismatch*) and variables of geographical location.

The spatial autoregressive parameter δ is significant and largely positive, meaning that there are strong neighbourhood externalities (or "spillover effects") between the *communes*. The duration of unemployment of a given locality is strongly influenced by the durations of unemployment of the surrounding localities: the return to work is all the faster when the average duration of unemployment in the neighbouring localities is low.

The proportion of the active population working in their *commune* of residence can be interpreted as a local job density: the larger this share, the shorter the duration of unemployment, because there are more job opportunities near at hand. The share of the active population who walk to work also influences the duration of unemployment. This variable can be interpreted as an indicator of residential mobility: it may express the capacity of individuals to find housing close to their place of work (which presupposes the existence of a housing market that allows such mobility). However, this effect does not resist the introduction of the geographical indicators of model 5 (where it is no longer significant at the 10% level) and it should therefore be treated with reserve. The share of households owning at least two cars is an indicator of geographical mobility, expressing the degree of autonomy in terms of transport. This autonomy favours the return to work: those who have their own vehicle can cover a wider zone in their search for a job, and they can apply for jobs for which a vehicle is required. The share of households having moved in the last two years is another indicator of residential mobility, which can also reflect a form of local attractiveness and/or dynamism: newly-arrived households found some kind of incentive in their new location and they will consume local goods and services, thus contributing to local development. This form of mobility also has a favourable effect on the return to work. The share of home-owners in the *commune*, on the contrary, is intended to capture the effect of a form of residential inertia or constraint, in the sense that a home-owner is *a priori* less mobile than a tenant (Gobillon, 2001). But this variable is not significant: the share of owners appears to be neither favourable nor unfavourable to the exit from unemployment.

The estimations bring to light several effects of social composition/segregation. A larger share of unemployed people, people without qualifications and/or blue-collar households slows down the exit from unemployment, through neighbourhood, network and peer effects. On the contrary, a larger proportion of cross-border workers accelerates the return to work: the fact of being surrounded by people working in neighbouring regions improves the quality of information about foreign labour markets and removes obstacles (institutional, linguistic, etc.) to access to these markets.

The estimations do not reveal effects of skill mismatch. The JLS index of skill mismatch developed by Jackman, Layard and Savouri (1991), which measures the difference between the relative proportions of unemployed people by skill level, is not significant. In terms of the local employment structure, the results are not very significant: it only appears that a larger proportion of jobs in building tends to slightly improve the exit from unemployment. However, some of the effects that we are trying to measure are not taken into account, because we only observe what happens on the French side of the border.

Table 4. Spatial autoregressive model (SAR) with a first-order queen neighbourhood matrix

Regressions of net durations of unemployment: estimations using *maximum likelihood*					
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Constant	**1.633** (0.00)	**1.180** (0.00)	**1.192** (0.00)	**1.555** (0.00)	**1.752** (0.00)
Spatial autoregressive parameter δ	**0.889** (0.00)	**0.874** (0.00)	**0.866** (0.00)	**0.845** (0.00)	**0.832** (0.00)

Job accessibility - Mobility					
Share of active population working in their commune of residence	**-0.296** (0.05)	**-0.232** (0.93)	**-0.296** (0.15)	**-0.302** (0.17)	**-0.300** (0.20)
Share of active population walking to work	**-0.323** (1.52)	**-0.329** (1.33)	**-0.302** (2.96)	**-0.231** (9.84)	-0.213 (12.9)
Share of households with 2 or more cars	**-0.868** (0.00)	**-0.458** (0.01)	**-0.509** (0.00)	**-0.452** (0.04)	**-0.413** (0.14)
Share of households moved in last 2 years	**-0.734** (0.06)	**-0.570** (0.90)	**-0.614** (0.71)	**-0.477** (4.11)	**-0.443** (6.14)
Share of homeowners	0.006 (95.1)	0.150 (15.4)	0.148 (18.6)	0.087 (43.9)	0.087 (44.8)
Residential segregation – social composition					
Share of unemployment in active population		**1.683** (0.00)	**1.819** (0.00)	**1.346** (0.00)	**1.207** (0.00)
Share of over-15s without qualification		**0.435** (0.32)	**0.463** (0.25)	**0.540** (0.06)	**0.502** (0.16)
Share of active population working abroad		**-0.310** (0.01)	**-0.331** (0.00)	**-0.244** (0.34)	**-0.257** (0.28)
Share of blue-collar households		**0.221** (1.98)	**0.221** (2.87)	**0.200** (5.85)	**0.219** (3.91)
Share of white-collar households		-0.095 (52.9)	-0.170 (29.9)	-0.186 (25.7)	-0.188 (25.4)
Share of managerial households		0.055 (72.8)	0.114 (49.8)	0.118 (49.4)	0.022 (90.0)
Skill mismatch – local employment structure					
JLS mismatch index			0.001 (70.9)	0.001 (79.7)	0.001 (75.3)
Share of jobs in construction			**Ref.**	**Ref.**	**Ref.**
Share of jobs in farming			**0.129** (4.30)	0.073 (25.7)	0.080 (21.0)
Share of jobs in industry			0.101 (16.2)	0.101 (16.4)	0.101 (16.7)
Share of jobs in service sector			0.099 (10.8)	**0.106** (8.66)	0.086 (16.5)
Geographical indicators					
Belgium				**Ref.**	***Belgium***
Province of West Flanders					**Ref.**
Province of Hainaut					-0.004 (92.2)
Province of Namur					**-0.246** (0.01)
Province of Luxembourg					-0.057 (33.6)
Luxembourg				**-0.291** (0.00)	***Luxembourg***
Luxembourg					**-0.361** (0.00)
Germany				**-0.196** (0.00)	***Germany***
Land of Sarre					**-0.339** (0.00)
Land of Rhineland-Palatinate					**-0.278** (0.06)
Land of Bade Wurtemberg (North and South)					**-0.183** (0.03)
Switzerland				**-0.167** (0.00)	***Switzerland***
North: Neuchâtel - Jura					**-0.152** (0.16)
South: Vaud - Geneva - Valais					**-0.323** (0.00)
Italy				**-0.415** (0.00)	***Italy***
Aosta Valley					**-0.638** (0.00)
Piedmont					**-0.492** (0.00)
Liguria					**-0.325** (0.17)
Spain				**-0.064** (3.30)	***Spain***
Catalonia					-0.064 (18.8)
Aragon					**-0.265** (0.00)
Navarre - Basque Country					**-0.116** (4.32)
Number of observations	**6896**	**6896**	**6769**	**6769**	**6769**
Adjusted R^2	84.4	84.4	84.1	84.0	84.1
AIC	16815	16714	16570	16475	16420
BIC	16863	16803	16686	16625	16638

Reading the table: Coefficients significant at the 10% level are in bold print; the p-values are given in brackets and in percent.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi* and the 2006 INSEE census.

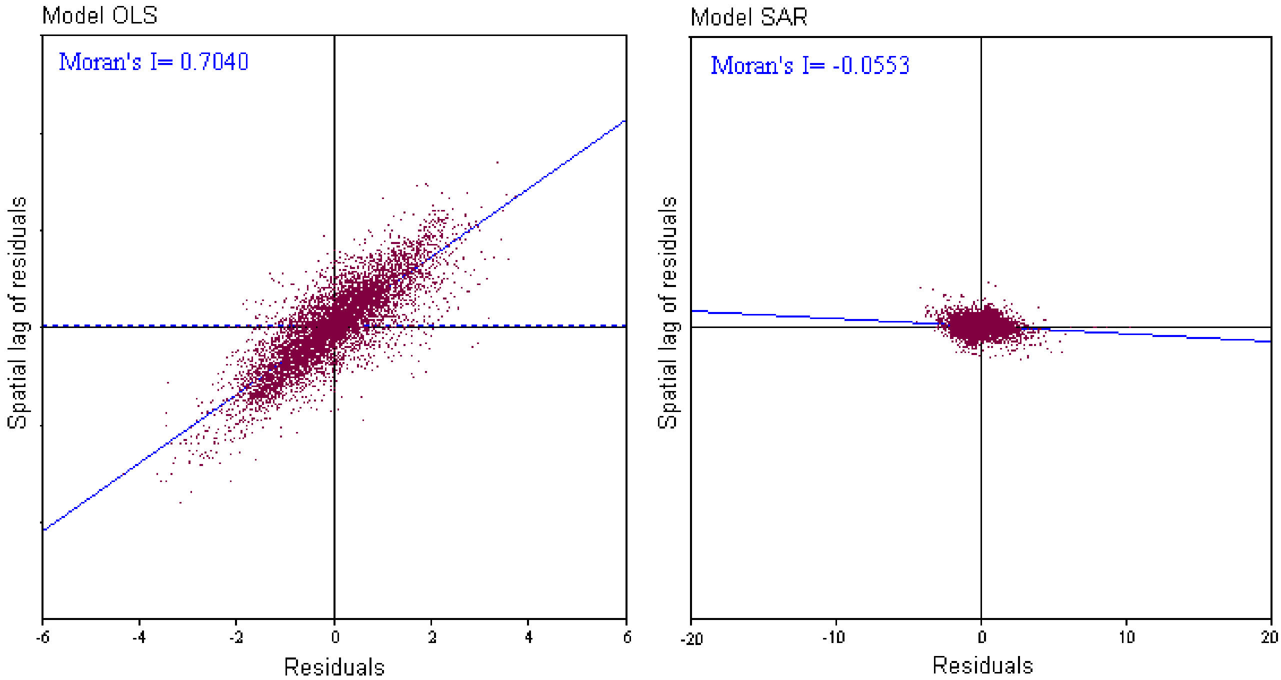
The purpose of the geographical indicators introduced into the model is to measure the effect of the proximity of a given country (model 4) or foreign region (model 5). Proximity to Belgium appears to be the least advantageous: the exit from unemployment in localities near Belgium is slower than it is in localities near Luxembourg, Germany, Switzerland, Italy and Spain. The regional indicators produce a similar result: proximity to West Flanders is less advantageous than proximity to the other European regions.

We obtain quite similar results when we adopt the other definitions of exit from unemployment. Whatever the definition used, the model brings to light strong neighbourhood externalities between localities: the spatial parameter is always significant and largely positive. The variables of social composition and segregation appear to be more robust to the definition of exit from unemployment than the variables of mobility and job accessibility. In particular, the share of unemployed people, the share of people without qualifications and the share cross-border workers are always significant at the 1% level. The variables measuring skill mismatch and the local employment structure, which are slightly significant with the definition *simple exits for all reasons*, are no longer significant with the other definitions of exit from unemployment (possibly because of the smaller number of observations). As for the geographical indicators, they confirm that proximity to the border with Belgium is less advantageous than proximity to borders with other countries.

4.4. Explaining the “border effect”

Analysis of the residuals in the SAR model confirms that the spatial autoregressive parameter δ allows us to correct the spatial autocorrelation (graph 2). However, the disadvantage of this parameter is that on its own, it captures the vast majority of the effects that we want to measure, even if other significant explanatory variables exist. This makes it difficult to order these effects into a hierarchy and so to identify the causes of the positive impact of proximity to the border on the return to work. One possible approach consists in returning to the OLS model. This model does not specifically take spatial autocorrelation into account and is therefore not of such good quality as the SAR model. Nevertheless, there are two good reasons for using it here: firstly, we are not interested in interpreting the coefficients of the model *per se*, and secondly, the estimations of the OLS model do not call into question the significant effects obtained with the SAR model (appendix 3). The aim of using the OLS model is not to define precisely the contribution of each group of variables to the “border effect” but simply to provide orders of magnitude. To that end, we calculate the net residual durations of unemployment, which we represent as a function of the distance from the border. These residual durations correspond to the durations of unemployment that are not explained by the control variables taken into account in the regressions. It is by measuring the differences between these residual durations that we determine the contribution o each group of variables to the “border effect”.

Graph 2. Moran's I of the residuals of OLS and SAR models



Reading the graph: Moran's I applied to the residuals of the OLS model is 0.7040, signifying strong overall spatial autocorrelation. The index is -0.0553 for the residuals of the SAR model, of which the spatial autoregressive parameter allows us to eliminate the possibility of autocorrelation. The neighbourhood matrix used to calculate Moran's I is a first-order queen matrix and the definition of exit from unemployment is *simple exits for all reasons*.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

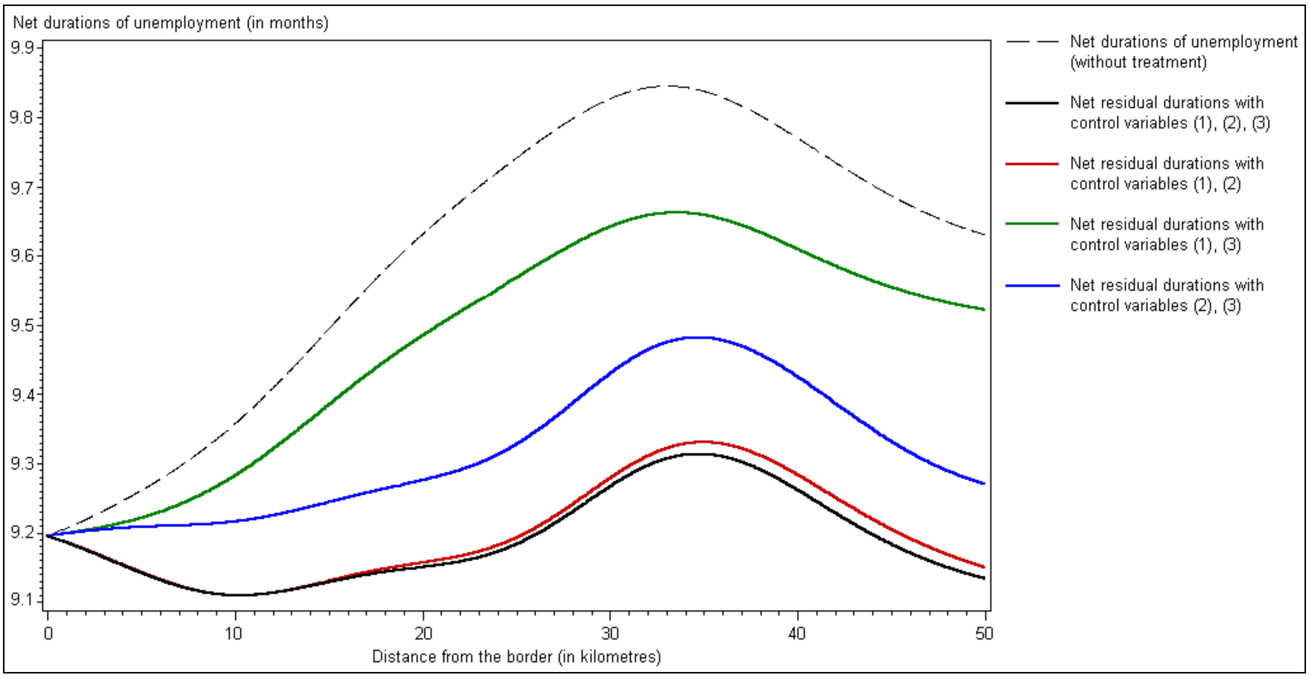
In graph 3, the curve shown by the dashed black line represents the net durations of unemployment before any treatment. The curve shown by the continuous black line represents the residual durations when we take into account the variables of mobility and job accessibility (1), social composition and segregation (2), and skill levels and local employment structure (3). The residual durations then correspond to the part of net durations which, in the OLS regressions, is not explained by any of these three types of variables. Taking into account the variables of type (1), (2) and (3) explains 70% of the pure "border effect": the amplitude of durations of unemployment as a function of the distance from the border falls from 0.7 months to 0.2 months (in the case of *simple exits for all reasons*). The curves shown in colour in graph 3 represent the net residual durations of unemployment when only two out of the three groups of variables are taken into account in the regressions. They allow us to determine, by comparison, the role played by each group of variables in explaining the border effect. The variables of social composition and segregation explain roughly 65% of the variations in the duration of unemployment according to the distance from the border. The variables of mobility and job accessibility explain about 30% and the variables relating to skill levels and the local employment structure explain slightly less than 5%. In the same way, we can determine the specific contribution of each of the variables of social composition and segregation in explaining the border effect: cross-border workers capture most of the effect ascribed to these variables of social composition and segregation (which explain about two-thirds of the pure "border effect").

This explanation of the border effect by the proportion of cross-border workers, i.e. by the effects of relational and informational networks, tallies with the profile of the net duration of unemployment as a function of the distance from the border. In the localities closest to the border, the high proportion of cross-border workers (about 20%) creates direct and permanent contacts with the neighbouring labour markets, which are an integral part of the job-seeking areas. This proportion then gradually decreases as the distance increases as far as thirty kilometres, where it levels out at a value close to zero: jobseekers then face the obstacles of legal, institutional and linguistic differences without benefiting from the proximity of people who work abroad. The border then acts essentially as a barrier that reduces the size of job-seeking areas, whence the maximum net duration of unemployment. Beyond thirty kilometres, the border no longer impedes on job-seeking areas, because it is beyond their perimeter, whence a reduction in the net duration of unemployment.

When we add geographical indicators (by country or by region) to the other explanatory variables during calculation of the residual durations, this has the effect of reducing the explained part of the border effect. This suggests that the geographical indicators of the model do not correspond to optimal geographical divisions and that certain explanatory factors are to be found within other perimeters.

All these results are robust to the definition of exit from unemployment. Whatever the approach chosen, the explanatory variables of the model (except the geographical indicators) have a strong flattening effect on the durations of unemployment as a function of the distance from the border. The variables explain 70% to 75% of the pure "border effect" in the case of *simple exits* and from 50% to 70% in the case of *long-term exits*. For the most part, it is the variables of social composition and segregation that explain the border effect, mainly through the proportion of cross-border workers. The variables of mobility and job accessibility also play an explanatory role, but this is fairly marginal. The other variables have no obvious effect.

Graph 3. Net residual durations of unemployment estimated by the OLS method



Reading the graph: The durations of unemployment are net, expressed in months and correspond to *simple exits for all reasons*. To facilitate comparisons, the net residual durations estimated by OLS are all adjusted to start from the same ordinate as the net durations before treatment.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

5. FROM GLOBAL TO LOCAL: A BORDER BY BORDER ANALYSIS

5.1. The local profiles of net durations as a function of the distance from the border

To determine whether the profile of net durations of unemployment as a function of distance from the border corresponds to a general profile (common to all the borders) or simply to an average profile (summing up the different local profiles), it is necessary to adopt a local approach. We therefore represent the profile of net durations according to the distance from the border with each neighbouring country (graphs 4-A and 4-C): we find that the net duration does indeed tend to increase with distance up to a threshold of twenty, thirty or forty kilometres, then to decrease beyond that threshold. This scenario can be observed for the *communes* bordering Belgium, Luxembourg, Switzerland and Spain (three-quarters of the *communes* studied). It only partly applies to *communes* bordering Italy, where the durations of unemployment increase continually with the distance. And it does not apply at all to the *communes* bordering Germany, where distance from the border has little effect on unemployment. Adopting the definition of *long-term exits* does not alter these results, except for *communes* near the Italian border, for which the distance from the border no longer has such a clear effect on the durations of unemployment. The Italian border effect therefore appears to be a "durability effect", which might be explained by the presence of seasonal activities related to mountain tourism.

The contrasts that exist between one border and another also concern the level and dispersion of durations of unemployment (table 5). Net durations are lowest near the Italian border and highest near the Belgian border. In terms of dispersion, the interquartile ratio of net durations lies between 1.16 for Luxembourg (1.18 for Germany) and 1.61 for Italy (with the definition of *simple exits for all reasons*). Changing from *simple exits* to *long-term exits* reduces this ratio, especially near to Italy. Generally speaking, the dispersion of durations is strongest in mountain zones: near the Italian border in the case of *simple exits* and near the Spanish border in the case of *long-term exits*.

Table 5. Net durations of unemployment by border

Borders	Communes		Net durations of unemployment (in months)			
	Observations	%	First quartile	Median	Third quartile	Interquartile ratio
Belgium	1872	23	9.5	11.0	12.0	1.26
Luxembourg	192	2	7.8	8.6	9.1	1.16
Germany	1321	16	8.4	9.2	9.7	1.18
Switzerland	1590	20	8.1	9.0	9.9	1.22
Italy	385	5	5.4	7.1	8.6	1.61
Spain	1536	19	8.6	9.9	10.9	1.27
TOTAL	6896	100	8.4	9.4	10.8	1.28

Reading the table: The durations of unemployment are net and correspond to *simple exits for all reasons*. For 1 872 *communes* (23% of the total), the border with Belgium is the nearest. Among these *communes*, one in two has a net duration of unemployment of less than 11 months.

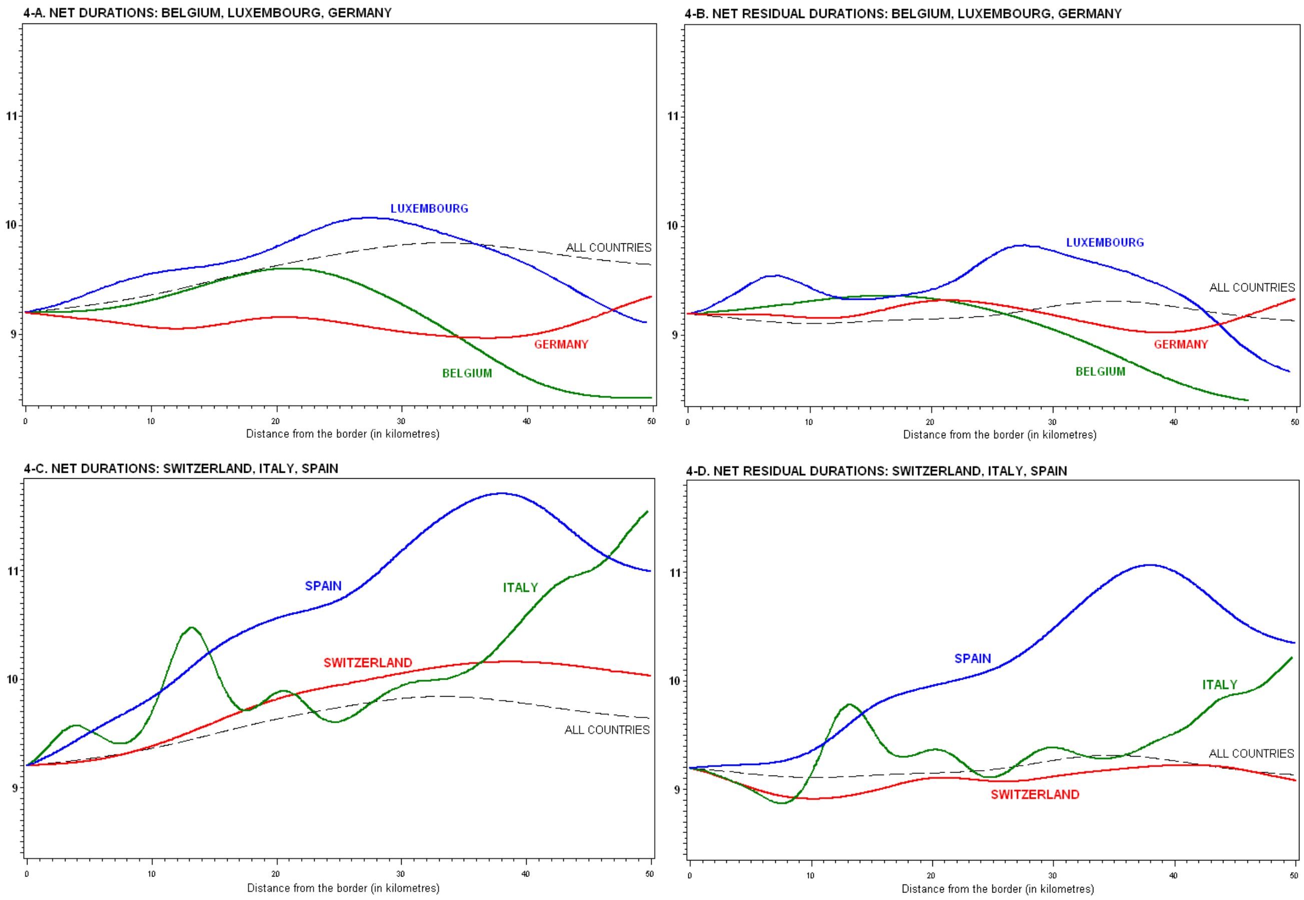
Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

5.2. Explaining local border effects

To explain local border effects, we reapply the method used to explain the overall border effect, consisting in estimating net residual durations of unemployment by OLS and then comparing them. We can then represent the profile of these net residual durations according to the distance from the border with each neighbouring country (graphs 4-B and 4-D).

Whatever the border, the three explanatory factors taken into consideration (mobility and job accessibility, social composition and segregation, skill levels and local employment structure) do indeed explain part of the increase in net durations with distance (in the case of *simple exits for all reasons*). It is generally the variables of social composition and segregation that have the strongest explanatory power, and among these variables, the strongest is the proportion of cross-border workers. This can be observed near the borders with Belgium, Luxembourg, Switzerland and Italy. The situation is slightly different near the border with Spain, where it is the variables of mobility and job accessibility that are most responsible for flattening the profile of net durations as a function of distance. But even in this case, the variables of social composition and segregation play an important role. Lastly, the particular profile observed for *communes* bordering Germany, the net durations of which vary little with distance, does not allow us to rank the explanatory factors in order of importance.

Graph 4. Comparison of net durations and net residual durations of unemployment



Reading the graphs: The durations of unemployment are net (in months) and correspond to *simple exits for all reasons*. The two graphs on the left represent net durations of employment and the two graphs on the right net residual durations of unemployment as a function of the distance from the border. To facilitate comparisons, the durations are all adjusted to start from the same ordinate (that of net durations before treatment, all borders taken together).

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi*.

Although many of the results are common to several borders, there remain some strong contrasts. The model can explain most of the border effect in the case of Switzerland, for example, but very little in the case of Spain. Moreover, the results for each border are not all equally robust to the chosen definition of exit from unemployment: they are more fragile for the German and Italian borders. It would therefore be interesting to deepen the local analysis further by studying each border really specifically.

CONCLUSIONS

Durations of unemployment increase with the distance of a *commune* from the border up to a threshold of thirty kilometres, then decrease slightly beyond this threshold, even when we control for the individual characteristics of jobseekers. This "border effect" is explained essentially by an effect of social composition, based on the proportion of cross-border workers in a jobseeker's entourage. The higher this proportion is, the better the quality of the relational and informational networks of the jobseekers, thus improving their capacity to surmount the legal, institutional, linguistic and cultural obstacles created by the border. The factors of mobility and job accessibility (spatial mismatch) also help to explain the border effect, but to a lesser degree. Finally, factors related to skills and the local employment structure (skill mismatch) only play a very small role in explaining the profile of durations of unemployment as a function of the distance from the border. However, not all of the skill mismatch effects are measured, because we only observe what happens on the French side of the border. Furthermore, the geographical indicators considered (neighbouring countries and neighbouring European regions) do not represent optimal geographical divisions for analysis of the border effect, suggesting that other explanatory factors must be sought within different perimeters.

These average results, applicable to the border regions taken as a whole, are often confirmed locally, when we adopt a border-by-border approach (for each neighbouring country). The local profiles of durations of unemployment according to the distance from the border are quite varied, but remain largely in keeping with the average profile. In the case of the borders with Belgium, Luxembourg and Switzerland, the explanation of local border effects gives rise to the same hierarchy of factors as the overall analysis: factors of social composition are predominant, with the proportion of cross-border workers playing a central role, followed by factors of mobility and job accessibility. In the case of the Spanish border, it is the physical distance from jobs that most explains the border effect, but the proportion of cross-border workers still plays an important role. Lastly, the borders with Germany and Italy do not lend themselves to the same interpretation: in the case of Germany there is no real border effect and in the case of Italy the results are quite sensitive to the definition of exit from unemployment.

Generally speaking, the diversity of local situations and the specificities of each border call for a more detailed local analysis. In particular, it would be interesting to create *ad hoc* geographical divisions (independent of all administrative partitions) in order to study the stability of results along each of the borders, and then to complete the analysis with local illustrations.

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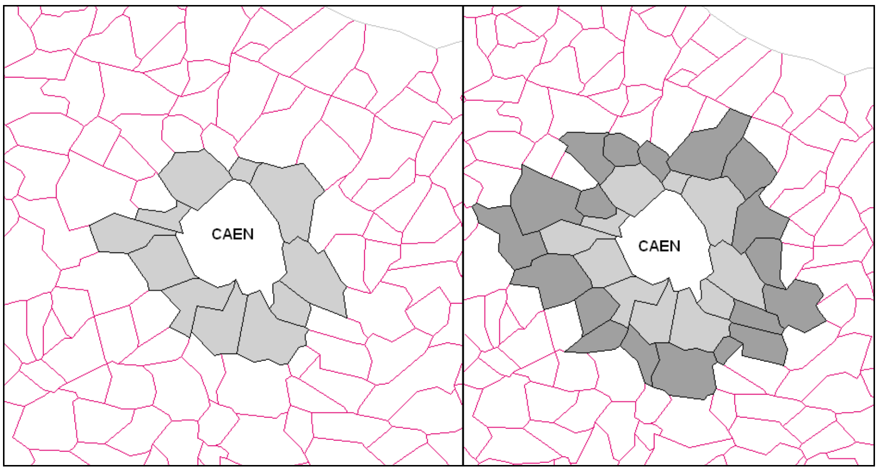
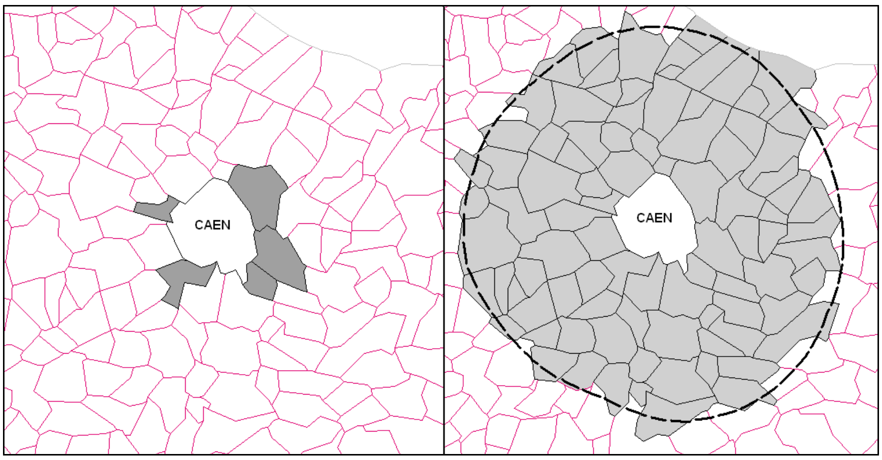
Appendix 1. The spatial weight matrices

The purpose of the weight matrices (W) is to take into account the interactions between spatial units. These are square matrices of size (N,N) of which the diagonal terms are zero and the non-diagonal term w_{ij} is all the greater when the effect of observation j on observation i is large. There are two main families of neighbourhood matrices: those based on a criterion of contiguity and those based on a criterion of distance. The two “queen” type matrices used in the study are based on the criterion of contiguity, which consists in sharing a common border. Thus, two *communes* i and j are said to be contiguous to the k^{th} order when k is the minimum number of borders that must be crossed to get from i to j. The queen type matrix is the one that gives the broadest definition of border: if we equate each *commune* to one square, then two *communes* are contiguous when they share a side or an apex (maps 1-A and 1-B). With a first-order queen matrix, each *commune* generally has five to seven neighbours. With a second-order queen matrix, each *commune* has fifteen to twenty neighbours (with wide local variety). The other two matrices are based on a criterion of distance, summing up the intensity of interactions between spatial units. The first, “5 nearest neighbours”, associates with each *commune* its five nearest neighbours in terms of distance (from centroid to centroid). The second, “neighbours within 10 km” associates with each *commune* all the *communes* within a radius of ten kilometres, usually producing from twenty-five to thirty neighbours (maps 2-A and 2-B).

1-A. “first-order queen” **1-B. “second-order queen”**



2-A. 5 “nearest neighbours” **2-B. “neighbours within 10 km”**



Appendix 2. Communes near the border compared with their region

Nord-Pas-de-Calais

Durations in months	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	10.62 9.37 9.67	11.44 9.94 10.92	12.30 11.84 12.18
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	29.17 22.64 23.98	37.68 25.00 31.38	46.39 34.25 40.64
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	10.11 8.89 9.31	10.98 9.65 10.48	11.81 11.27 11.49
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	32.92 24.57 26.47	40.31 27.67 34.69	46.87 40.02 43.08
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	15.76 14.74 15.11	17.31 15.62 16.41	18.44 17.48 18.05
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	39.59 36.70 37.05	50.89 39.02 43.66	61.44 49.04 54.31
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	15.55 14.70 15.15	16.97 15.60 16.38	18.23 17.18 17.82
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	48.16 42.27 43.30	55.94 46.82 51.77	65.41 55.51 60.67

Picardie

Durations in months	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.36 10.52 10.64	14.30 11.54 11.59	15.32 12.38 12.66
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	53.87 30.01 30.16	71.15 35.49 36.80	73.94 47.29 48.24
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.80 9.71 9.75	13.98 10.85 10.90	14.50 11.82 12.11
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	51.27 33.07 33.21	64.65 38.44 40.20	73.07 47.43 50.43
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	18.51 15.35 15.44	20.78 16.58 16.72	21.91 18.38 18.54
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	68.61 40.35 41.52	101.56 50.82 52.24	103.88 62.22 64.16
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	17.92 14.73 14.91	20.28 16.35 16.53	21.24 17.92 18.03
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	73.04 48.11 48.28	97.71 57.82 59.10	107.78 70.30 71.96

Champagne-Ardenne

Durations in months	**Territories**	**Lower quartile**	**Median**	**Upper quartile**
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	10.42 9.44 9.56	11.73 10.35 10.48	12.26 11.07 11.41
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	31.37 22.55 22.67	34.34 27.15 28.71	44.93 31.12 32.34
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	9.84 8.73 8.93	11.05 9.44 9.62	11.83 10.02 10.30
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	34.81 23.38 24.00	38.07 27.15 28.17	49.99 31.97 33.35
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	14.93 13.97 14.49	17.33 15.30 15.38	18.10 16.45 17.17
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	43.66 33.08 34.88	55.45 39.63 41.18	60.48 46.58 48.85
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	14.34 13.62 13.72	16.27 14.72 14.81	17.65 15.41 15.77
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	51.46 37.51 38.48	57.97 43.92 45.87	68.30 49.01 52.01

Lorraine

Durations in months	**Territories**	**Lower quartile**	**Median**	**Upper quartile**
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	9.28 9.50 9.46	9.86 10.36 10.20	10.84 11.01 10.99
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	18.61 22.78 21.87	23.05 27.24 25.65	27.04 32.20 30.84
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.39 8.82 8.62	9.07 9.45 9.38	9.84 10.28 10.22
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	19.42 22.93 21.44	22.79 26.08 25.79	27.76 32.66 30.26
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	14.54 14.39 14.39	15.18 15.33 15.23	16.63 16.90 16.90
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	31.59 34.29 33.73	37.07 43.15 40.60	46.05 48.69 47.94
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.42 13.90 13.78	14.59 15.22 15.01	15.34 16.10 16.02
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	35.59 36.77 36.21	40.16 44.82 43.23	47.59 51.96 50.52

Alsace*

Durations in months Alsa	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	9.76 9.32 9.71	10.36 10.35 10.36	11.04 10.90 10.97
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	20.50 21.18 20.64	23.81 26.04 23.90	26.49 27.29 26.49
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.80 8.76 8.76	9.38 9.35 9.36	10.04 9.94 10.04
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	20.55 20.61 20.61	23.87 25.51 23.87	25.85 27.89 26.01
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	14.03 13.65 14.02	14.66 15.76 14.70	15.76 15.79 15.79
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	27.60 34.25 27.60	30.96 39.63 31.70	35.25 41.89 37.34
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.37 13.17 13.37	14.06 14.49 14.06	14.59 15.28 14.63
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	30.18 37.56 30.18	32.85 40.79 33.06	35.71 41.23 36.64

* Durations of unemployment in Alsace must be treated with caution as regards the comparison between territories, because 90% of the communes in Alsace are located within 30 kilometres of the border. Consequently, average durations of unemployment at the level of the region are necessarily very close to the average durations recorded for the 90% of communes near the border.

Franche-Comté

Durations in months	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	9.27 9.42 9.42	10.33 10.12 10.33	11.07 11.19 11.18
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	23.01 25.96 25.60	28.48 30.32 30.32	34.74 35.34 35.05
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.28 8.77 8.46	9.09 9.17 9.17	10.21 10.25 10.25
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	22.68 27.61 25.08	28.84 29.62 29.53	35.42 33.72 34.36
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.73 13.34 13.36	14.80 14.60 14.60	16.05 15.60 15.84
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	31.98 34.14 34.14	39.03 41.99 40.44	51.45 49.23 49.23
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.43 12.82 12.59	13.76 14.04 14.04	14.91 14.72 14.75
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	36.08 39.74 39.38	41.00 43.59 43.59	52.17 52.10 52.10

Rhône-Alpes

Durations in months	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	6.25 9.09 8.77	8.43 9.93 9.62	8.84 10.67 10.43
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	7.11 16.91 15.66	14.45 20.62 19.15	15.59 24.60 23.71
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	6.01 8.25 7.92	7.30 8.92 8.71	7.87 9.75 9.49
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.62 16.29 14.84	12.37 19.30 18.28	14.11 23.64 22.45
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	11.85 13.27 12.96	12.66 14.29 14.03	13.76 15.61 15.39
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	19.29 25.44 24.07	23.01 28.92 27.53	24.86 36.78 34.62
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	10.87 12.47 12.19	11.70 13.62 13.40	13.01 14.85 14.67
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	20.36 26.32 25.31	23.07 30.27 28.50	25.83 36.34 34.50

Provence-Alpes-Côte d'Azur

Durations in months	Territories	Lower quartile	Median	Upper quartile
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	6.46 9.76 9.25	8.98 10.37 10.12	10.26 11.08 10.96
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	7.55 24.04 23.42	17.99 28.69 27.07	26.85 35.17 34.33
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	6.48 8.64 8.51	8.34 9.50 9.21	8.86 10.14 10.01
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	11.74 23.59 21.99	18.55 28.16 27.26	22.39 33.97 32.23
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.84 14.43 14.13	14.10 15.46 15.30	15.89 16.37 16.29
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	25.82 37.10 35.48	30.12 42.67 41.02	38.99 53.14 51.07
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.60 13.67 13.37	13.25 14.73 14.54	14.84 15.81 15.62
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	31.31 39.65 37.43	33.87 45.80 43.72	37.43 54.64 54.02

Languedoc-Roussillon

Durations in months L-R	**Territories**	**Lower quartile**	**Median**	**Upper quartile**
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.48 9.92 9.64	9.08 11.03 10.63	9.63 12.11 11.93
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	17.21 29.52 24.90	20.79 35.07 33.32	24.20 42.17 40.55
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	7.67 8.92 8.52	8.29 10.09 9.80	8.90 10.78 10.66
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	17.93 26.95 24.98	22.05 33.85 32.49	23.50 40.78 38.54
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.76 14.93 14.64	14.06 16.00 15.70	15.06 17.50 17.24
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	30.81 43.43 39.98	33.77 51.57 50.32	35.13 58.18 58.18
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.16 14.17 13.91	13.50 15.36 15.04	14.68 16.53 16.29
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	33.63 44.48 42.19	36.26 52.54 51.17	38.15 58.37 57.17

Midi-Pyrénées

Durations in months MP	**Territories**	**Lower quartile**	**Median**	**Upper quartile**
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.01 10.55 10.41	11.36 11.61 11.52	12.30 12.83 12.74
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	11.55 30.52 28.30	25.01 38.29 38.07	49.18 47.16 47.16
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	7.89 9.44 9.30	10.22 10.42 10.39	11.07 11.37 11.28
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	14.08 30.22 26.81	25.93 36.83 35.18	43.91 45.60 45.60
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.03 15.25 15.07	16.73 16.96 16.96	18.45 18.54 15.51
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	21.58 45.77 43.70	46.18 55.04 54.53	72.16 63.20 65.93
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	12.79 14.26 14.19	16.07 15.78 15.83	17.52 17.10 17.26
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	23.51 48.35 43.52	45.06 57.19 57.19	68.61 66.03 66.72

Aquitaine

Durations in months	**Territories**	**Lower quartile**	**Median**	**Upper quartile**
Gross duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	9.08 10.44 10.16	9.66 11.08 10.97	10.62 12.04 11.95
Gross duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	20.36 28.54 27.48	23.34 32.54 31.96	28.96 36.57 35.70
Net duration – *simple exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	8.73 9.56 9.35	9.22 10.23 10.15	9.51 11.00 10.91
Net duration – *simple exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	21.74 27.27 26.13	23.03 31.27 31.13	30.01 34.91 34.71
Gross duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.67 15.02 14.88	14.53 16.24 16.01	15.19 17.41 17.27
Gross duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	28.21 38.99 37.37	36.80 44.40 43.11	38.75 50.38 50.08
Net duration – *long-term exits for all reasons*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	13.12 14.34 14.12	13.61 15.56 15.32	14.54 16.51 16.46
Net duration – *long-term exits for declared return to work*	Communes with ***Di*** ≤ 30 km Communes with ***Di*** > 30 km Whole region	32.57 39.44 38.50	36.98 44.91 44.09	43.37 50.24 48.79

Appendix 3. Model estimated by *ordinary least squares* (OLS)

Regressions of net durations of unemployment: estimations by *ordinary least squares*					
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Constant	**12.01** (0.00)	**8.367** (0.00)	**8.024** (0.00)	**9.393** (0.00)	**9.711** (0.00)
Job accessibility - Mobility					
Share of actives working in their commune	**-2.307** (0.00)	**-1.863** (0.00)	**-2.070** (0.00)	**-1.617** (0.00)	**-1.451** (0.00)
Share of actives walking to work	**-1.967** (0.00)	**-1.809** (0.00)	**-1.786** (0.00)	**-1.123** (0.01)	**-0.953** (0.04)
Share of households with 2 or more cars	**-5.425** (0.00)	**-2.290** (0.00)	**-2.359** (0.00)	**-1.192** (0.00)	**-0.971** (0.01)
Share of households having moved in last 2 years	**-4.961** (0.00)	**-3.463** (0.00)	**-3.660** (0.00)	**-1.749** (0.02)	**-1.223** (0.67)
Share of home-owners	**1.616** (0.00)	**2.200** (0.00)	**2.015** (0.00)	**1.229** (0.00)	**1.171** (0.00)
Social composition - segregation					
Share of unemployed in active population		**10.66** (0.00)	**11.11** (0.00)	**6.591** (0.00)	**5.337** (0.00)
Share of over-15s with no qualifications		**2.902** (0.00)	**2.813** (0.00)	**2.772** (0.00)	**2.230** (0.00)
Share of cross-border workers		**-2.126** (0.00)	**-2.176** (0.00)	**-1.319** (0.00)	**-1.245** (0.00)
Share of blue-collar households		**0.675** (0.15)	**0.844** (0.01)	0.312 (13.9)	**0.419** (3.80)
Share of white-collar households		**-0.962** (0.45)	**-0.715** (4.70)	**-0.898** (0.62)	**-0.870** (0.56)
Share of managerial households		0.378 (28.4)	**0.830** (2.54)	0.382 (26.7)	-0.209 (52.9)
Skill mismatch – local employment structure					
JLS skill mismatch index			0.005 (21.5)	0.004 (29.4)	0.004 (23.1)
Share of jobs in building			**Ref.**	**Ref.**	**Ref.**
Share of jobs in farming			**0.823** (0.00)	**0.304** (1.77)	**0.337** (0.59)
Share of jobs in industry			**0.669** (0.00)	**0.580** (0.01)	**0.541** (0.01)
Share of jobs in services			**0.388** (0.42)	**0.352** (0.43)	**0.226** (5.48)
Geographical indicators					
Belgium				**Ref.**	***Belgium***
Province of West Flanders					**Ref.**
Province of Hainaut					0.123 (14.8)
Province of Namur					**-1.113** (0.00)
Province of Luxembourg					**-0.400** (0.04)
Luxembourg				**-1.952** (0.00)	***Luxembourg***
Luxembourg					**-2.108** (0.00)
Germany				**-1.444** (0.00)	***Germany***
Land of Sarre					**-1.977** (0.00)
Land of Rhineland-Palatinate					**-1.562** (0.00)
Land of Bade Wurtemberg (North and South)					**-1.255** (0.00)
Switzerland				**-1.354** (0.00)	***Switzerland***
North: Neuchatel - Jura					**-1.029** (0.00)
South: Vaud - Geneva - Valais					**-2.077** (0.00)
Italy				**-2.872** (0.00)	***Italy***
Aosta Valley					**-3.842** (0.00)
Piedmont					**-3.091** (0.00)
Liguria					**-1.800** (0.00)
Spain				**-0.773** (0.00)	***Spain***
Catalonia					**-0.678** (0.00)
Aragon					**-1.776** (0.00)
Navarre - Basque Country					**-0.771** (0.00)
Number of observations	**6896**	**6896**	**6769**	**6769**	**6769**
Adjusted R^2	10.6	21.5	22.8	36.4	42.1
AIC	27135	26241	25671	24367	23732
BIC	27176	26323	25780	24510	23943

Reading the table: Coefficients significant at the 10% level are in bold type; the p-values are in brackets and in percent.

Source: SOLSTICE, CEE estimations based on the historical statistics file of *Pôle emploi* and the 2006 INSEE census.

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