

## Motivation

It is well known that **individual characteristics affect employment status**. Holding a qualification and level of education both positively influence employment as explained by human capital theory<sup>1</sup>. Moreover, **discrimination** – based on gender, race, immigration status, age, and so on – could intensify the segregation process. Finally, **residential location** could also influence employment status. More specifically, such influence could operate through two channels: distance to jobs and local social interactions.

The first channel is mainly appraised through the “**spatial mismatch hypothesis**”<sup>2</sup>: residing in places far from employment centers and poorly connected with them has substantial consequences in terms of wage and unemployment levels<sup>3,4,5</sup>. The second channel of influence of residential location on employment outcomes is the **local social interactions**. Such interactions may be direct (peer effects)<sup>6</sup> or indirect (neighborhood effects)<sup>7,8</sup>. Of course, mimetic behaviors and peer pressure amplify these different factors.

Such phenomena have received considerable attention in the North American context but have come in for less study in European settings. In the French case, the focus is on Paris. Consequently, we take an interest in the France's third urban area namely the **urban area of Marseille – Aix-en-Provence**.

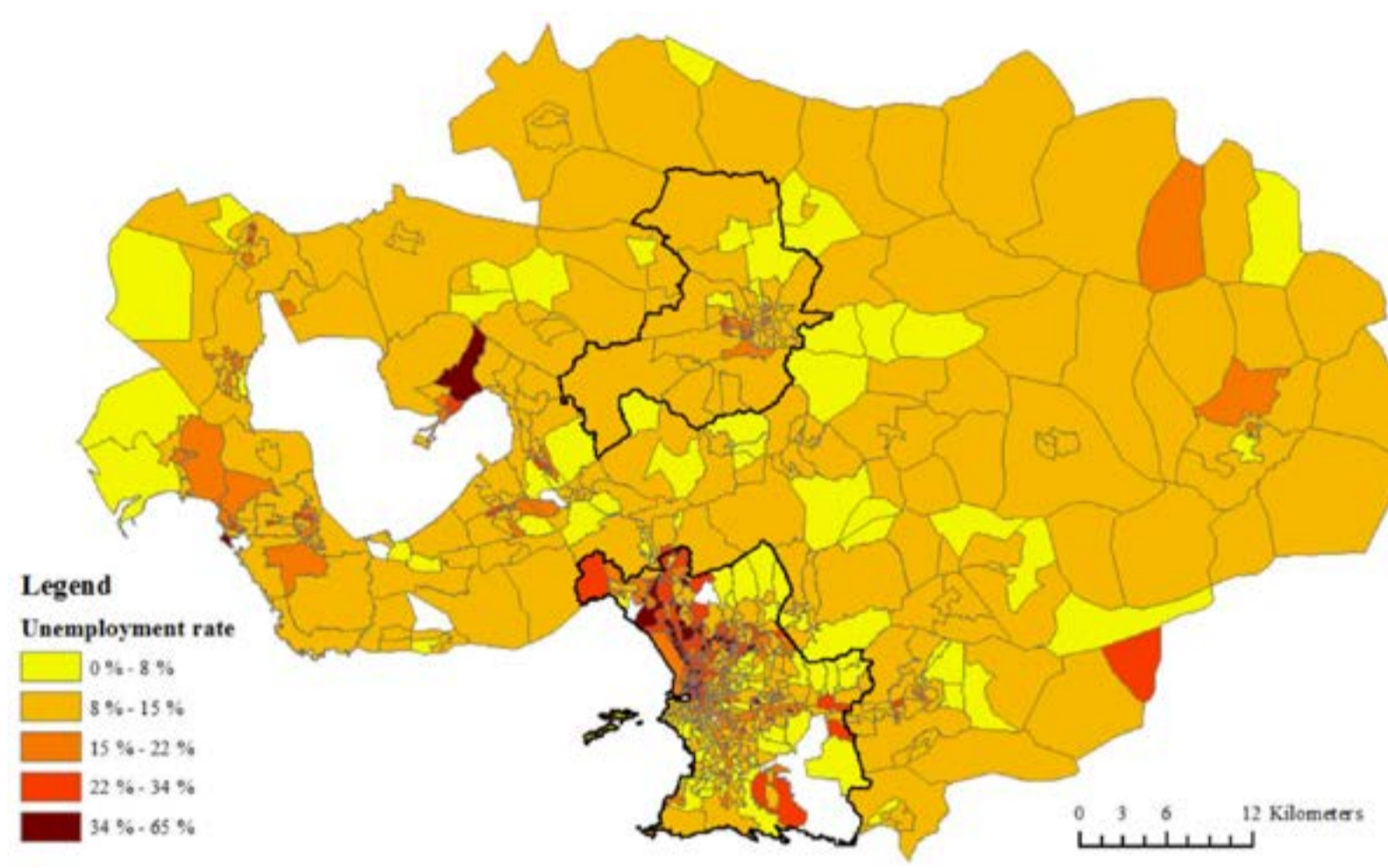


Figure 1. Unemployment rate at the census tract level in the urban area of Marseille – Aix-en-Provence

The study focuses on the urban area of Marseille – Aix-en-Provence which counts 742 IRISs. Tendencies shown on the map for unemployment are also observed for the distribution of median income or the percent of single-parent families. Consequently, some neighborhoods accumulate difficulties with a high unemployment rate, a high proportion of single-parent families, and a lower median income. The most salient example of this situation is Marseille's northern districts (“quartiers Nord”).

## Main objective and key idea

We study the effects of the spatial organization of the urban area of Marseille – Aix-en-Provence on unemployment there. The key ideas are the following:

- Urban Economics show that individuals sort themselves within a city according to their socioeconomic characteristics, leading to segregation phenomenon.
- The literature also stresses the problem of reverse causality: spatial organization of cities explain differences in socio-economic outcomes.

In this context, the causal effect of the spatial organization of Marseille – Aix-en-Provence on the propensity to unemployment is analyzed with an emphasis on the interactions with neighboring districts.

## Data and methodology

Two **key datasets** are used:

- 2009 Census of Population (INSEE) at the individual level: main personal characteristics such as age, gender, employment status, education, and census tract of residence.
- Combination of 2009 Census of Population and of the FiLoSoFi data bases (INSEE), which provide information at the census tract level on three themes: employment, housing, and social composition.

**Methodology:**

- We follow the principles of Dujardin et al. (2008)<sup>9</sup> for Brussels.
- We go a step further by explicitly taking account the spatial pattern of census tracts in the city.

**Two-stages empirical strategy:**

- Identify the spatial structure of the area with factorial ecological methods.
- Determine the probability of employment of the individuals (SAR probit model).

## Estimations

Our model takes the general form of a SAR model<sup>10</sup>:

$$y^* = \rho W y^* + X\beta + \varepsilon \quad \varepsilon \sim N(0, \sigma_\varepsilon^2 I_n)$$

$$\text{With } y = 1 \text{ if } y^* > 0 \text{ and } y = 0 \text{ if } y^* \leq 0$$

The probit form implies that  $y$  is a binary vector of 0 and 1.  $y = 1$  when the individual is in employment and  $y = 0$  if unemployed.

$X$  is the explanatory vector which contains three types of information at the individual level : individual characteristics, neighborhood characteristics, an indicator of the geography of jobs.

- To solve the endogeneity issue, we restrict the sample to the youth (15-29) still living with their parents (24,336 individuals into 740 census tracts).
- The weight matrix describes the geographical interconnections between individuals. It is based on the criterion of a threshold distance. We consider that a 1 km perimeter around the residence is a good approximation of the living space, the space of influence of a person.
- A total of 5 433,956 links connect our 24,302 individuals. The average number of neighbors per individual is 223.6. The minimum number of neighbors is 6 and the maximum is 982.
- Estimation are made with the the Bayesian Markov Chain Monte Carlo method.

	Coefficient	Marginal effects		
		Direct	Indirect	Total
<b>Local density of employment</b>	11.1769 ***	4.0400 ***	0.5606 ***	4.6009 ***
<b>Residence neighborhood</b>				
Very well-off	Ref.	Ref.	Ref.	Ref.
Well-off	0.0149 NS	0.0054 NS	0.0007 NS	0.0061 NS
Intermediate	- 0.2401 ***	- 0.0868 ***	- 0.0120 ***	- 0.0988 ***
Deprived	- 0.2101 ***	- 0.0759 ***	- 0.0104 ***	- 0.0864 ***
Very deprived	- 0.4286 ***	- 0.1549 ***	- 0.0213 ***	- 0.1762 ***
<b>Individual characteristics</b>				
<i>Gender</i>				
Male	Ref.	Ref.	Ref.	Ref.
Female	- 0.0708 ***	- 0.0256 ***	- 0.0035 ***	- 0.0291 ***
<i>Education</i>				
Level I or II	Ref.	Ref.	Ref.	Ref.
Level III	0.2113 ***	0.0763 ***	0.0105 ***	0.0869 ***
Level IV	0.0039 NS	0.0014 NS	0.0002 NS	0.0016 NS
Level V	- 0.1396 ***	- 0.0504 ***	- 0.0069 ***	- 0.0574 ***
Level VI	- 0.5383 ***	- 0.1945 ***	- 0.0268 ***	- 0.2214 ***

## Key findings

We corroborate **standard results of labor economics**:

- Individual characteristics affect outcomes on Marseille – Aix-en-Provence.

The tools of spatial econometrics allow us to highlight **peer effect**:

- geographically close neighbors influence the employment outcomes at individual level.

The **spatial structure of Marseille – Aix-en-Provence impacts** the likelihood of employment:

- Residing in a deprived neighborhood increases the probability of being unemployed.
- Being surrounded by very deprived districts reduces the chance of having a job.
- The greater the density of jobs, the greater the likelihood of employment.

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## References

1. Becker, G., 1964. Human Capital Theory. Columbia University Press, New York.
2. Kain, J.F., 1992. The spatial mismatch hypothesis: three decades later. *Hous. Policy Debate* 3 (2), 371–392.
3. Brueckner, J., Zenou, Y., 2003. Space and unemployment: the labor market effects of spatial mismatch. *J. Labor Econ.* 21 (1), 242–262.
4. Ihlanfeldt, K., 1997. Information on the spatial distribution of job opportunities within metropolitan areas. *J. Urban Econ.* 41 (2), 218–242.
5. Wasmer, E., Zenou, Y., 2002. Does city structure affect job search and welfare? *J. Urban Econ.* 51 (3), 515–541.
6. Mansky, C.F., 2000. Economic analysis of social interactions. *J. Econ. Perspect.* 14 (3), 115–136.
7. Bénabou, R., 1993. Working of a city: location, education and production. *Q. J. Econ.* 108 (3), 619–652.
8. Durlauf, S., 2004. Neighborhood effects. In: Henderson, V., Thisse, J.F. (Eds.), *Handbook of Regional and Urban Economics: Cities and Geography* 4. Elsevier Science, Amsterdam, 2173–2242.
9. Dujardin, C., Selod, H., Thomas, I., 2008. Residential segregation and unemployment: the case of Brussels. *Urban Stud.* 45 (1), 89–113.
10. LeSage, J., Pace, R.K., 2009. *Introduction to Spatial Econometrics*. CRC Press, Boca Raton.