



# THE GEOGRAPHY OF SCIENCE-INDUSTRY COLLABORATIONS: SIZE AND PROXIMITY EFFECTS

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# **THE GEOGRAPHY OF SCIENCE-INDUSTRY COLLABORATIONS: SIZE AND PROXIMITY EFFECTS**



*Toulouse, June 10-11th, 2010*



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# 1. Aims of the paper

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# Aims of the paper

- The geography of partnerships dedicated to innovation
- What are the determining factors of this geography?
- We focus here on the science-industry collaborations

# Aims of the paper

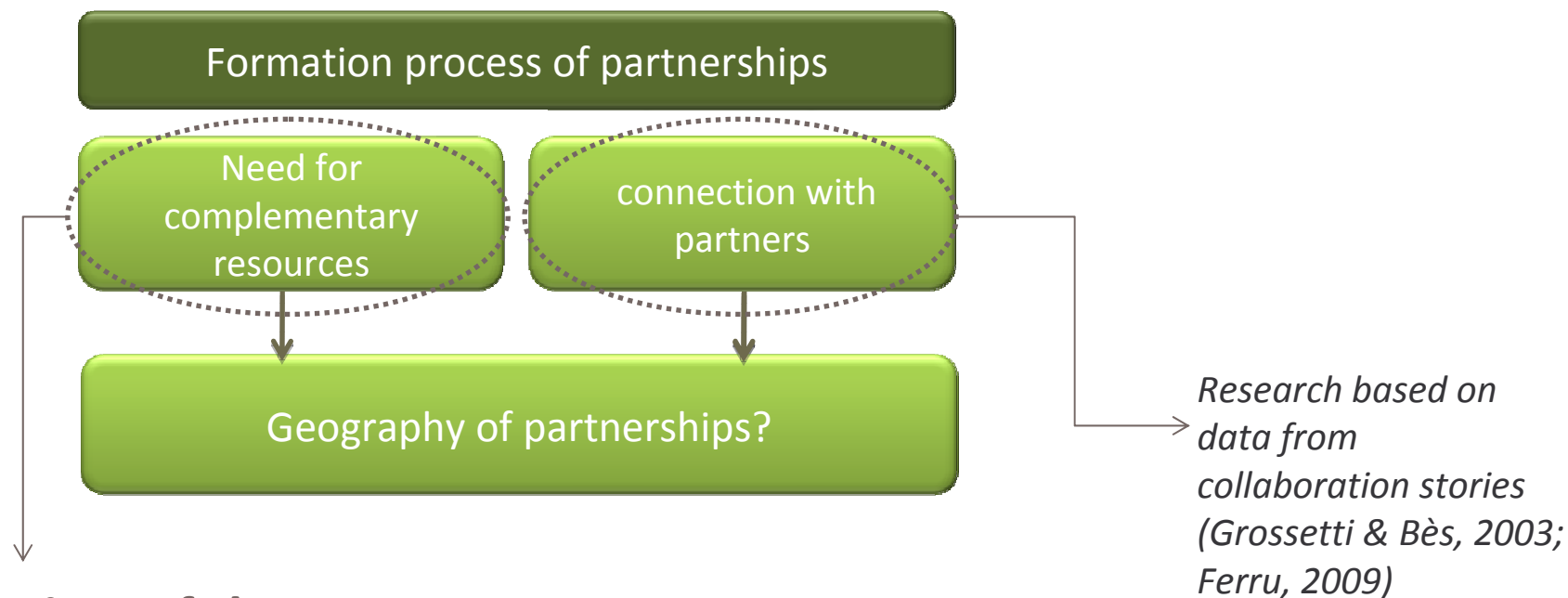
## **Main theoretical proposal**

- Knowledge spillovers: co-location of actors
- Evolutionist argumentation: tacit knowledge could be exchanged by face to face
- Empirical validations by the first studies

## **Empirical contestations**

- Data: tests of co-location
- Collaborations not only local and constraints linked to the exchange of tacit knowledge are reduced

# Aims of the paper



## Aims of the paper:

To assess the impact of resources constraints on the geography of partnerships and more generally structural effects

## Main issue:

To have relational database



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## 2. A proximist framework

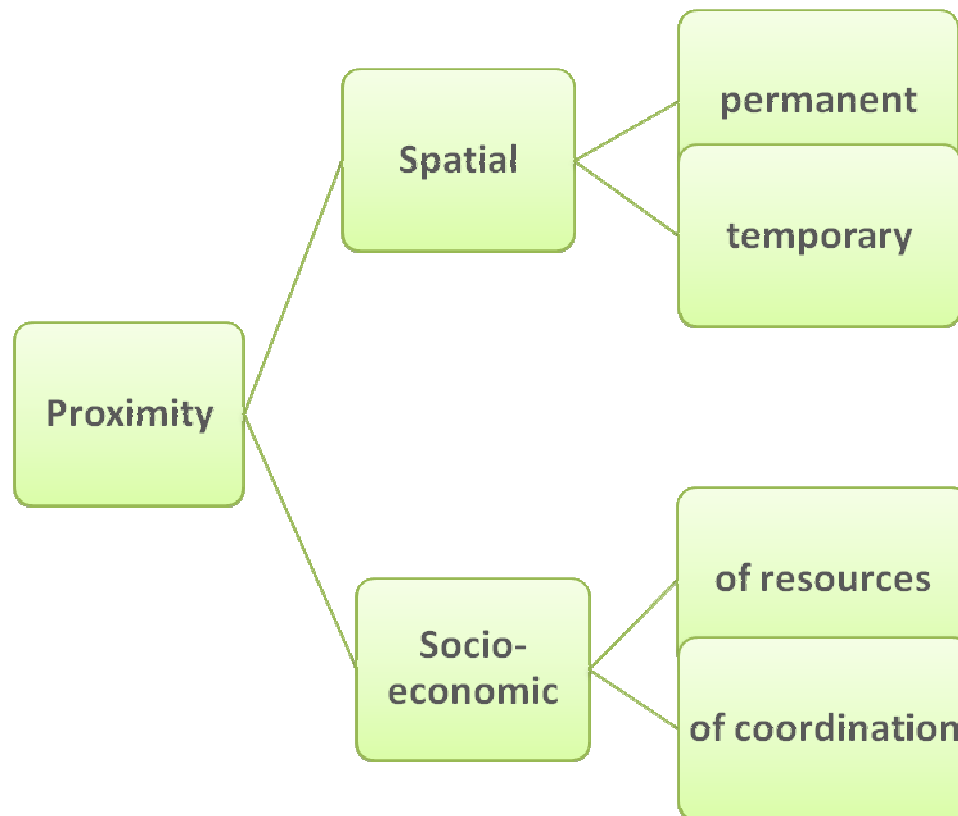
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# A proximist typology

- Our theoretical framework is based on the proximist typology developed by Bouba-Olga and Grossetti (2008)
- It allows to integrate the analysis of the construction of collaborations and to study both local and non local relationships
- They introduce a distinction between spatial proximity and socio-economic proximity



# A proximist typology



Capacity and constraints of ubiquity  
→ **Spatial proximity could be temporary**  
Choices of collaboration do not involve  
necessary choices of location

Project leaders look for complementary  
resources, not located everywhere  
→ **Geography of resources matters :**  
- size effects  
- specialisation effects



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## 3. Data and method

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# Data and method

- Gravity model
- Generalized tobit specification → two equations
  - Selection equation (probit): probability/tendancy that potential partners collaborate

$$d_{r_1, r_2}^* = a_0 + a_1 \ln X_{r_1} + a_2 \ln Y_{r_2} - a_3 D_{r_1, r_2} + a_4 \text{int ra}_{r_1, r_2} + a_5 QI_{r_1, r_2} + a_6 QS_{r_1, r_2} + u_{1t}$$

-Output equation : intensity/number of such collaborations

With the same significant endogeneous variables

# Data and method

- Original database : informations about CIFRE contracts during the period 1997-2006 (around 8 000 data)

Economic size	Relative GDP (1997-2006)
Scientific size	Relative number of state researchers (1997-2006)
Spatial proximity	Contiguity matrix
Sectoral proximity	Matrix of similarity with the VA by sector in 1999
Scientific proximity	Matrix of similarity with DIRD by scientific domain in 1999

Based on the **Aquino Index** : With  $Q_{ij} = \frac{\sum_k |v_{ik} - v_{jk}|}{2}$   
And  $v_{ik} = \frac{X_{ik}}{X_i}$   $v_{jk} = \frac{X_{jk}}{X_j}$

→ **Index of dissimilarity**

(tends to 1: great difference between regions)



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## 4. Main results

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# Results (1) : Probit specification

$$\hat{d}_{r_1, r_2}^* = -0,14 + 0,98 \ln X_{r_1} + 0,75 \ln Y_{r_2} - 0,30 D_{r_1, r_2} + 5,38 \text{int } ra_{r_1, r_2} + 0,21 QI_{r_1, r_2} - 1,08 QS_{r_1, r_2}$$

(0,72)   (0,00)   (0,00)   (0,00)   (0,97)   (0,57)   (0,65)

- Economic and scientific resources & spatial distance are heavily significant ; they have the expected sign.
- Proximity measures and the dummy Intra are not significant

## Results (2) : probabilities to collaborate

$$P(d_{r_1, r_2} = 1) = \Phi(0,98 \ln X_{r_1} + 0,75 \ln Y_{r_2} - 0,30 D_{r_1, r_2})$$

**Probabilities according to each variables**

	Mimimum value	Average value	Maximum value
$\ln X_{r_1}$	0,474	0,878	0,999
$\ln Y_{r_2}$	0,466	0,878	0,999
$D_{r_1, r_2}$	0,970	0,878	0,536

## Results (2) - Probabilities to collaborate

**Probabilities to collaborate with two disadvantageous and one average situations**

	Probability
$\ln X_{r_1}$ and $\ln Y_{r_2}$ minimum	0,094
$\ln X_{r_1}$ minimum and $D_{r_1, r_2}$ maximum	0,126
$\ln Y_{r_2}$ minimum and $D_{r_1, r_2}$ maximum	0,122



## Results (3) – generalized tobit

$$\hat{d}_{r_1, r_2}^* = -0,94 + 1,73 \ln X_{r1} + 0,98 \ln Y_{r2} - 0,37 D_{r_1, r_2}$$

(0,00)   (0,00)   (0,00)   (0,00)

$$\begin{cases} d_{r_1, r_2} = 1 & \text{if } d_{r_1, r_2}^* > 0 \\ d_{r_1, r_2} = 0 & \text{if } d_{r_1, r_2}^* \leq 0 \end{cases} ,$$

$$\ln \hat{C}_{r_1, r_2}^* = -0,72 + 1,32 \ln X_{r1} + 0,75 \ln Y_{r2} - 0,28 D_{r_1, r_2} + 2,70 \text{int ra}_{r_1, r_2} + 0,001 QI_{r_1, r_2} - 0,001 QS_{r_1, r_2} ,$$

(0,00)   (0,00)   (0,00)   (0,00)   (0,00)   (0,91)   (0,99)

$$\begin{cases} C_{r_1, r_2} = C_{r_1, r_2}^* & \text{if } d_{r_1, r_2}^* > 0 \\ C_{r_1, r_2} = 0 & \text{if } d_{r_1, r_2}^* \leq 0 \end{cases} .$$



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## 5. Extensions

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# Extensions

- Possibility to integrate new variables to measure scientific and sectoral proximities
- Necessity to reply this gravity model on other database (forthcoming, Dime september)



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