

# DEMOGRAFIA DI IMPRESA E SVILUPPO REGIONALE

Daide PIACENTINO

*Università degli Studi di Palermo*



UNIVERSITÀ  
DEGLI STUDI  
DI PALERMO

Catania, 04-05-2017

# DEMOGRAFIA DI IMPRESA

1. ASPETTI  
SETTORIALI E  
SPAZIALI

2. EFFETTI SULLO  
SVILUPPO  
REGIONALE

3. DETERMINANTI

APPROCCIO DI ANALISI SPAZIALE



# The Role of Space in Economics

- Until about 30 years ago, economic theory has assumed all economic agents to be concentrated in one single and dimensionless point in space, and transportation and communication costs equal to zero;
- Topics of spatial economics (e.g. spatial concentration of economic activity) have typically left to a small group of scholars (regional science scholars).
- The so-called *New Economic Geography*, introduced by the 2008 Nobel Prize Paul Krugman (JPE 1991), has radically changed many economists' perspectives.

# New Economic Geography (NEG)

- From a theoretical perspective, the NEG introduces the space in theoretical economic models by combining notions from:
  - Industrial Organization: Monopolistic competition;
  - International Trade: Transport costs;
  - Economic Growth: Increasing Returns to Scale.
- The NEG model provided by Krugman combines a monopolistic competition model with iceberg-type transport cost and increasing returns to scale to show how large-scale agglomerations can emerge.
- From an empirical perspective, the NEG theory is stimulated by evidence of uneven spatial distribution of economic activity.

# Spatial Distribution of Economic Activity

- The NEG looks at the geography with new eyes!
- Traditional explanation for the distribution of economic activity across space is based on the concept of «first-nature geography» (i.e. climate, topology, resource endowment);
- The NEG is instead based on the concept of «second-nature geography» (i.e. the location of economic agents relative to one another in space);
- In other words, the NEG divides production factors in mobile and immobile. The mobile factors are influenced by centripetal and centrifugal forces which determine the agglomeration in a given location.

# Centripetal Forces

- The centripetal (agglomeration) forces, i.e. forces that pull economic activity towards locations of economic activity, are mainly due to:
  - *Backward and forward linkages*
  - *Skilled workers*
  - *Externalities (e.g. knowledge spillovers)*

Empirical Studies tend to show that effects of knowledge spillovers and the availability of specialised labour skills are more relevant for explaining small scale agglomeration (e.g. the City of London), while the effects of forward-backward linkages are more relevant for large scale agglomeration (e.g. pattern of location in Europe)

# Centrifugal Forces

- The centrifugal (dispersion) forces, i.e. forces that push economic activity away from existing centres, are mainly due to:
  - *Immobile factors (e.g. natural resources);*
  - *Negative externalities (e.g. a rise of the prices, congestion, etc.)*
- Also *Competition* between firms can represent a dispersion force. There is a trade off between a location in proximity of consumers at the price of a higher degree of competition and a location more distant from the centre in order to benefit from a lesser degree of competition but at the cost of losing access to a large concentrated market.

# The Role of Space in Firm Demography

- Of course, the spatial concentration/dispersion of economic activity is related with the firm demography (i.e the flows of firm entry and firm exit in the market).
- Therefore, the same forces of agglomeration and dispersion are drivers of:
  - **Firm entry** (e.g. large size market, skilled workers, knowledge spillovers);
  - **Firm exit** (e.g. negative externalities) .
- How may empirical analyses be controlled for the space? The answer is given by the spatial econometrics.



## **Decomposing regional business change at plant level in Italy: A novel spatial shift-share approach**

**Giuseppe Espa<sup>1</sup>, Danila Filippini<sup>2</sup>, Diego Giuliani<sup>1</sup>, Davide Piacentino<sup>3</sup>**

<sup>1</sup> Department of Economics and Management, University of Trento, Via Inama 5, 38100, Trento, Italy  
(e-mail: giuseppe.espa@economia.unitn.it, Diego.Giuliani@unitn.it)

<sup>2</sup> Italian National Institute of Statistics (ISTAT), Via dell'Oceano Pacifico 171, 00144 Rome, Italy  
(e-mail: dafilipp@istat.it)

<sup>3</sup> SEAS, University of Palermo, Viale delle Scienze, Edificio 13, 90128, Palermo, Italy  
(e-mail: davide.piacentino@unipa.it)



# Motivation (1): Accounting approach

- A plethora of literature focuses on the role of the regional economic environment in encouraging business change or, in more detail, the creation of new business (see, for a survey, Audretsch and Peña-Legazkuem, SBE 2012).
- However, reverse causality in the relationship between regional economic environment and business change has recently been highlighted.
- Recent literature suggests that results obtained by imposing a given causality direction in the above-mentioned relationship may even be misleading.
- To avoid these kinds of problems, we decide to use an **accounting approach** to investigate the regional dimension of business change.

# Motivation (2): Shift-Share analysis

- The literature also suggests that business change in a region is the result of combined spatial and sectoral effects.
- Audretsch and Keilbach (PiRS 2007) argue that, notwithstanding that fact that entrepreneurial capital (i.e. the capacity of a region to start up new firms) is locally embedded by definition, some differences across sectors may be relevant.
- Cheng (ARS 2011) argues that most previous literature overlooks the fact that business change may depend on three distinctive sources (macroeconomic fluctuations, industrial composition, and regional characteristics) and suggests identifying the specific influence of each source before investigating the regional dimension of business change.

## Motivation (3): Spatial approach

- While shift-share analysis in the traditional formulation does not account for interactions across neighbouring regions, a spatial version enables us to overcome this drawback.
- However, we find problems of interpretation of the neighbourhood influence in the past spatial shift-share versions.
- Therefore, we propose a new type of spatial shift-share decomposition.

# Shift-Share Analysis

A traditional shift-share analysis decomposes economic changes ( $EC$ ) in a region into three components:

$$EC = NS + IM + RS$$

where  $NS$ ,  $IM$  and  $RS$  refer to the **national share**, **industrial mix** and **regional-shift**, respectively.

In our case,  $EC$  is the difference over time of the number of plants in a specific region  $r$  (i.e. the **net business change**):

$$\Delta P_r = (P_{rT} - P_{rt})$$

# National Share

The  $NS$  measures the regional business change, under the assumption that the number of plants in the region has grown at the national rate, i.e.:

$$NS = \sum_i P_{irt} g_n; \quad g_n = \frac{P_{nT} - P_{nt}}{P_{nt}}$$

Where:

$P_{irt}$  is the number of plants in sector  $i$  of region  $r$  at initial year  $t$ ,

$g_n$  is the national rate of plant growth over the entire period,

$P_{nt}$  is the number of plants in the nation at initial year  $t$ .

# Industrial Mix

The  $IM$  is a measure of specialization at regional level, i.e.:

$$IM = \sum_i P_{irt} (g_{in} - g_n); \quad g_{in} = \frac{P_{inT} - P_{int}}{P_{int}}$$

Where:

$g_{in}$  is the national growth rate in sector  $i$  over the entire period,

$P_{int}$  is the number of plants in sector  $i$  in the nation at initial year  $t$ .

Therefore, if a region has a favourable distribution of industries, that region would be expected to have rapid growth in the number of its plants.

# Regional-shift

The  $RS$  measures the regional advantages or disadvantages which affect the performance of individual industries and, consequently, changes in the number of their plants:

$$RS = \sum_i P_{irt} (g_{ir} - g_{in}); \quad g_{ir} = \frac{P_{irT} - P_{irt}}{P_{irt}}$$

Where:

$g_{ir}$  is the growth rate in sector  $i$  in region  $r$  over the entire period,  
 $P_{irt}$  is the number of plants in sector  $i$  in region  $r$  at initial year  $t$ .

# Shift-share decomposition

To sum up, the net business change may be decomposed as follows:

$$\Delta P_r = (P_{rT} - P_{rt}) = \sum_i P_{irt} g_n + \sum_i P_{irt} (g_{in} - g_n) + \sum_i P_{irt} (g_{ir} - g_{in})$$

Shift-share analysis in the traditional formulation does not account for interactions across neighbouring regions.

A spatial version enables us to overcome this drawback.

# Spatial shift-share

Nazara and Hewings (2004) first introduced shift-share analysis with spatial structure, incorporating a spatial lag growth rate in the basic decomposition, as follows:

$$\Delta P_r = \sum_i P_{irt} g_n + \sum_i P_{irt} (\tilde{g}_{ir} - g_n) + \sum_i P_{irt} (g_{ir} - \tilde{g}_{ir})$$

$$\tilde{g}_{ir} = \frac{\sum_s w_{rs} P_{isT} - \sum_s w_{rs} P_{ist}}{\sum_s w_{rs} P_{ist}}$$

where  $w_{rs}$  is the element of row-standardised binary weight matrix  $\mathbf{W}$  and measures the intensity of interaction between region  $r$  and neighbouring region  $s$ .

The first component measures the **national effect (NS)**. The second component is a measure of the **neighbour-nation industry mix effect (NNIM)**. The third component is the **region-neighbour regional-shift effect (RNRS)**.

# Drawbacks

The decomposition proposed by Nazara and Hewings (2004) may produce misleading results at least for two reasons:

- It includes a combined effect (NNIM) which, measuring differences of more than one aspect at the same time, is typically characterised by problems of interpretation.
- The interpretation of the neighbourhood influence is generally based on the third term (RNRS). This may sometimes lead to a misinterpretation. For example, if the neighbourhood effect shows a positive value but the difference in performance between neighbours and nation is negative, the advantage of the region  $r$  is mainly due to individual factors rather than to neighbourhood influence.

# Our version of spatial shift-share

To overcome such drawbacks, we introduce a novel type of spatial decomposition built on four simple effects:

$$\Delta F_r = \underbrace{\sum_i F_{irt} g_n}_{\text{National effect (NS)}} + \underbrace{\sum_i F_{irt} (g_{in} - g_n)}_{\text{Industrial mix effect (IM)}} + \underbrace{\sum_i F_{irt} (\tilde{g}_{ir} - g_{in})}_{\text{Neighbour-nation regional-shift (NNRS)}} + \underbrace{\sum_i F_{irt} (g_{ir} - \tilde{g}_{ir})}_{\text{Region-neighbour regional-shift (RNRS)}}$$

Looking jointly at the two spatial effects (*NNRS* and *RNRS*), one can reduce the risk of misinterpretation of the neighbourhood influence.

# Neighbourhood effect in spatial shift-share analysis

<i>NNRS</i> <i>Neighbour-Nation Regional-Shift</i>	+	+	+
	(b) Regional Disadvantage	(a) Neighbourhood Advantage	+
-	-	(c) Neighbourhood Disadvantage	+
	-	(d) Regional Advantage	+
	-	-	
	<i>RNRS</i> <i>Region-Neighbour Regional-Shift</i>		



# Data

We use plant-level data collected by the Italian Institute of Statistics (ISTAT) in the *ASIA–Unità Locali* Business Register from 2004 to 2009.

Data aggregated at two spatial levels, NUTS-2 and NUTS-3 regions, and four macro-sectors of economic activity, (a) manufacturing, (b) construction, (c) trade, transportation and accommodation, and (d) other service activities.

At yearly intervals, the *ASIA–Unità Locali* Business Register collects - at plant level and with the highest spatial and sectoral levels of disaggregation - statistical information which was previously available only once every ten years in the Economic Census.

# Descriptive analysis

Before including the neighbourhood effect within shift-share decomposition, a preliminary study of the spatial dependence of business change rate is necessary.

We use quantile maps of the Italian regions and spatial autocorrelation tests.

We look both at the entire period 2004-2009 and at the sub-period 2004-2007. In this way, we can provide evidence on the 2007 financial crisis.

With the aim of introducing the results in a straightforward manner, in both maps the quantiles refer to the same period, i.e. 2004-2009.

# Spatial weight matrix (1)

Spatial weight matrix  $W$  is the most common way of formalizing the structure of spatial proximity in areal data. A natural specification of this matrix does not exist, and the concept of spatial proximity must be arbitrarily introduced by researchers.

In the case of irregular areal data (such as administrative units), the proper concept of neighbourhood should be based on the distance between centroids at regional level. The distance-based neighbourhood definition commonly used in spatial econometrics literature is the critical cut-off neighbourhood, which defines two regions as neighbours if their distance is equal, or less than equal, to a certain fixed distance.

Obviously, the number of neighbours increases when the cut-off distance becomes higher. The selection of a cut-off distance is not based on common criteria but it is purely discretionary.

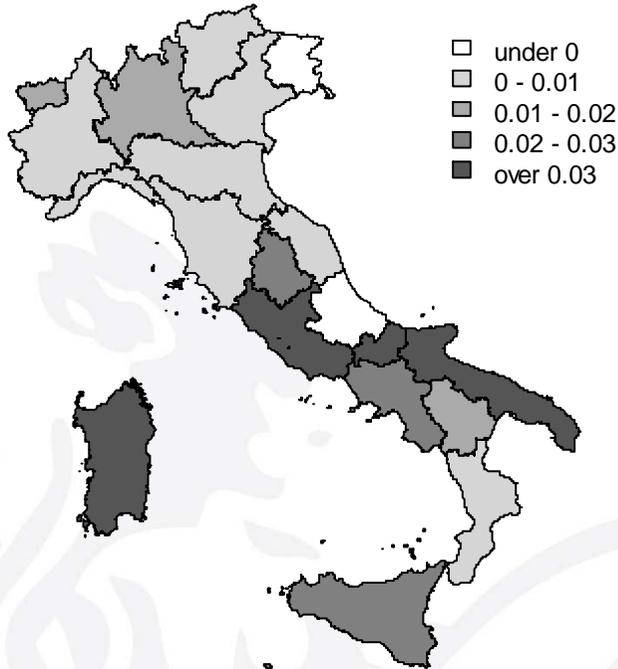
## Spatial weight matrix (2)

In our case, **the minimum cut-off distance**, which defines the lowest number of possible neighbours, is selected. This approach is based on a prudent selection criterion so that the risk of underestimating is higher than the risk of overestimating the neighbouring interactions.

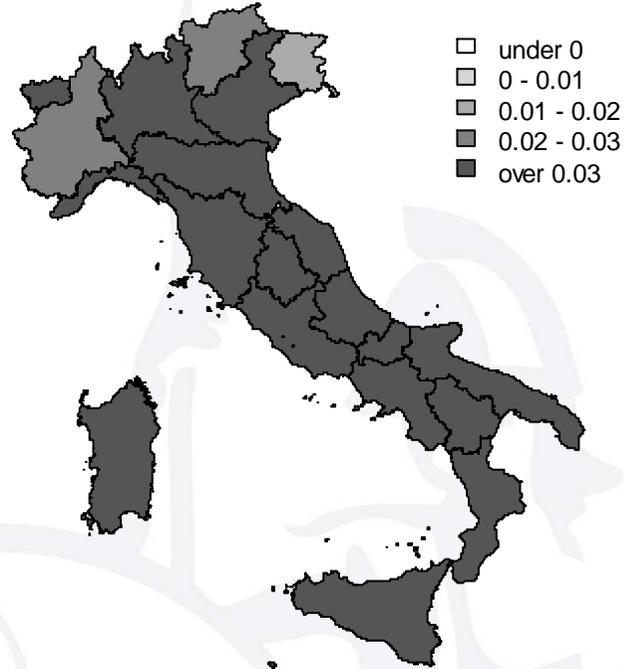
In Italy, the minimum distance is 380 km for NUTS-2 regions and 75 km for NUTS-3 regions. Increasing cut-off distances are also used to check for robustness: 400, 420 and 440 km for NUTS-2 regions and 95, 110, 120 and 150 km for NUTS-3 regions. The results begin significantly to change only at the farthest distance.

# Growth rate of plants (NUTS2 regions)

2004-2009



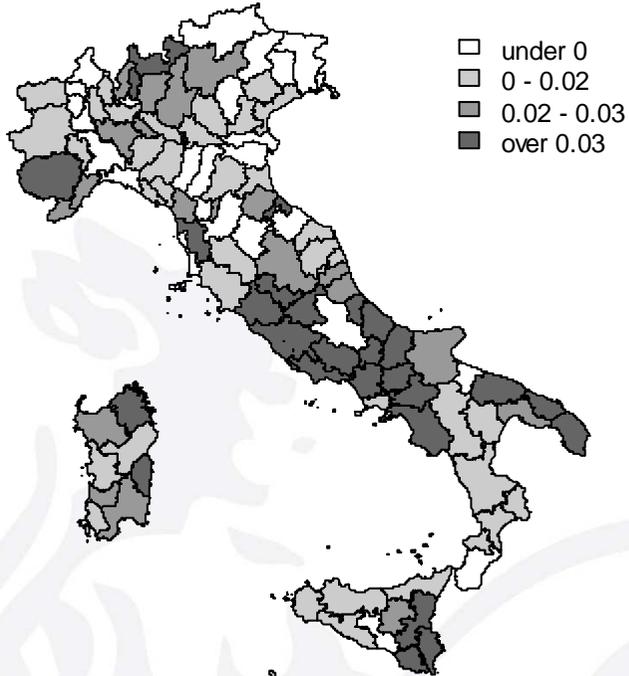
2004-2007



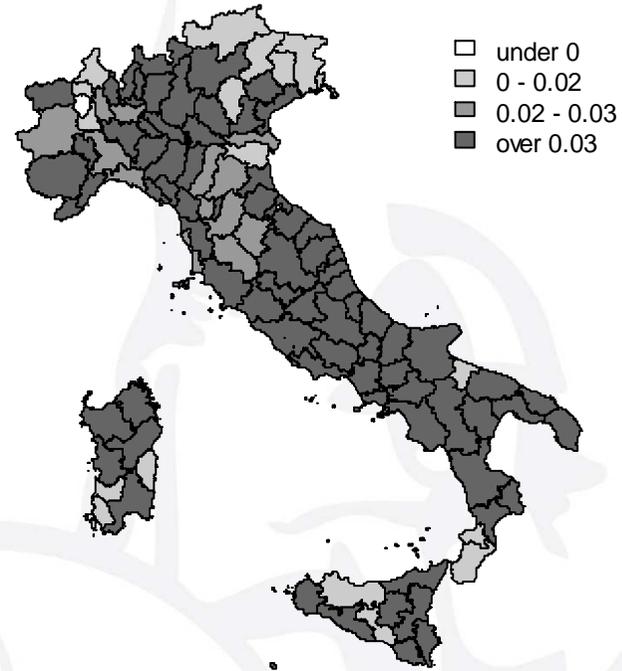
Critical cut-off distance (Km)	2004-2009			2004-2007		
	I	p-value (normality)	p-value (randomization)	I	p-value (normality)	p-value (randomization)
380	0.2234	0.0021	0.0017	0.3976	0.0000	0.0000
400	0.2096	0.0027	0.0023	0.3799	0.0000	0.0000
420	0.1567	0.0045	0.0038	0.2960	0.0000	0.0000
440	0.1339	0.0054	0.0046	0.2685	0.0000	0.0000

# Growth rate of plants (NUTS3 regions)

2004-2009



2004-2007



Critical cut-off distance (Km)	2004-2009			2004-2007		
	I	p-value (normality)	p-value (randomization)	I	p-value (normality)	p-value (randomization)
75	0.1420	0.0162	0.0123	0.4774	0.0000	0.0000
95	0.1082	0.0163	0.0124	0.4406	0.0000	0.0000
110	0.0981	0.0147	0.0110	0.4101	0.0000	0.0000
120	0.1019	0.0068	0.0048	0.3608	0.0000	0.0000
150	0.0807	0.0086	0.0062	0.3256	0.0000	0.0000

# Results from spatial shift-share

NUTS-2 regions	NUTS-3 regions	2004-2009					2004-2007				
		EC	NS	IM	NNRS	RNRS	EC	NS	IM	NNRS	RNRS
CENTRE-NORTH											
Piedmont		746.0	6199.2	174.3	-3260.0	-2367.5	9983.0	14851.2	333.3	-2967.5	-2234.0
	Torino	631.0	3195.8	1088.2	-5507.5	1854.4	5538.0	7656.1	699.4	-4042.3	1224.8
	Vercelli	-369.0	243.5	-51.3	-254.1	-307.1	280.0	583.3	-14.1	-304.5	15.3
	Novara	117.0	499.8	-26.3	-554.5	197.9	833.0	1197.4	4.8	-528.7	159.5
	Cuneo	1558.0	837.5	-328.0	407.5	641.0	1897.0	2006.3	-119.9	223.5	-212.9
	Asti	232.0	295.8	-82.3	-150.5	169.0	549.0	708.7	-23.2	-149.8	13.4
	Verbano-C-O	-263.0	233.2	-118.1	-170.2	-207.8	138.0	558.6	-56.5	-147.9	-216.1
	Biella	-860.0	287.2	-63.4	-288.2	-795.7	-78.0	688.1	-24.6	-227.6	-514.0
	Alessandria	-300.0	606.4	-244.5	-384.7	-277.2	826.0	1452.7	-132.6	-206.9	-287.2
Valle Aosta		187.0	215.0	129.7	-149.2	-8.4	446.0	515.1	108.4	-135.6	-41.9
	Aosta	187.0	215.0	129.7	-292.6	134.9	446.0	515.1	108.4	-226.1	48.6
Liguria		932.0	2370.0	947.3	-1096.1	-1289.3	5002.0	5677.8	609.0	-995.1	-289.7
	Imperia	444.0	330.7	66.6	283.2	-236.5	1013.0	792.2	67.8	15.7	137.3
	Savona	748.0	459.3	99.4	-290.2	479.5	1306.0	1100.2	90.3	-275.0	390.5
	Genova	-361.0	1263.2	736.6	-483.2	-1877.6	2094.0	3026.2	426.5	-356.7	-1002.0
	La Spezia	101.0	316.9	44.8	-268.0	7.3	589.0	759.2	24.4	-133.8	-60.8
Lombardy		14673.0	14660.7	6409.7	-9039.6	2642.2	31139.0	35122.0	4045.7	-6638.8	-1389.8
	Varese	776.0	1204.9	109.1	-1529.9	991.8	2713.0	2886.6	88.1	-1537.0	1275.2
	Como	1005.0	827.7	-75.7	-740.3	993.3	1610.0	1982.9	-15.8	-788.9	431.9
	Sondrio	460.0	246.5	-50.0	199.2	64.3	683.0	590.5	-11.6	42.4	61.7
	Milano	6228.0	5334.7	7486.9	-810.3	-5783.2	7774.0	12780.0	4189.0	553.1	-9748.1
	Bergamo	2339.0	1539.7	-119.5	-1040.0	1958.8	4037.0	3688.7	155.6	-1296.8	1489.6
	Brescia	3164.0	1839.7	-663.9	734.3	1254.0	4972.0	4407.3	-349.2	281.4	632.6
	Pavia	864.0	699.5	94.9	-902.6	972.2	2001.0	1675.9	85.3	-805.9	1045.7



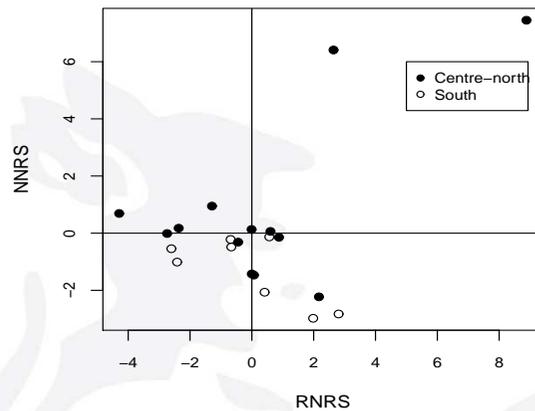
# First result

The national component (*NS*) is positive in each region. In other words, we find a common positive trend in the change of the number of plants, so that deviations from this trend are due to regional-shift (*NNRS* and *RNRS*) or industrial mix (*IM*) effects.

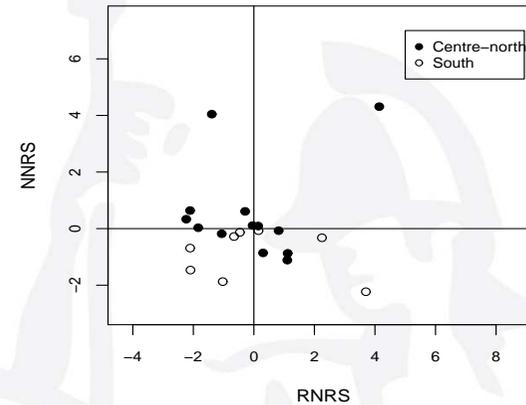
Considering the dualism of the Italian economy, we focus on comparisons between Central-Northern and Southern regions. We use scatter plots to examine spatial and industrial effects.

# Spatial components (NUTS2)

2004-2009



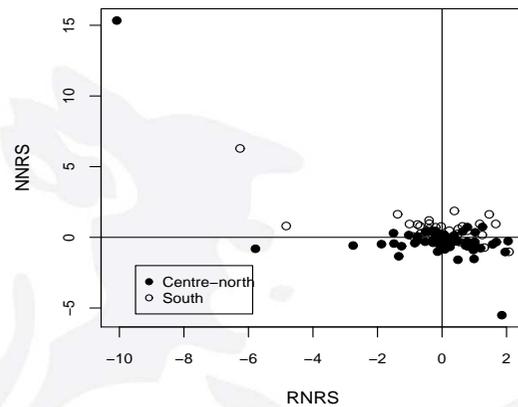
2004-2007



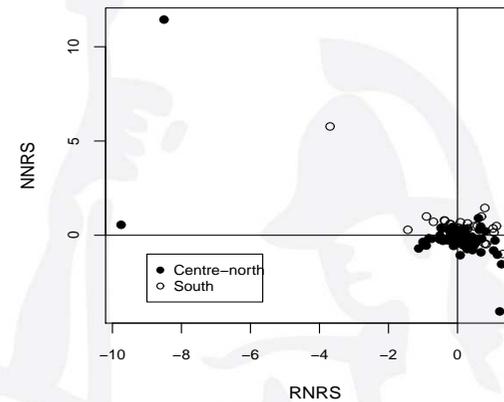
- Neighbourhood advantages only in few Central-Northern regions
- No particular difference between the two periods

# Spatial components (NUTS3)

2004-2009



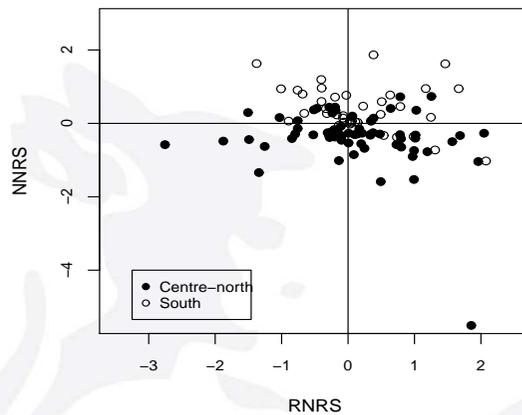
2004-2007



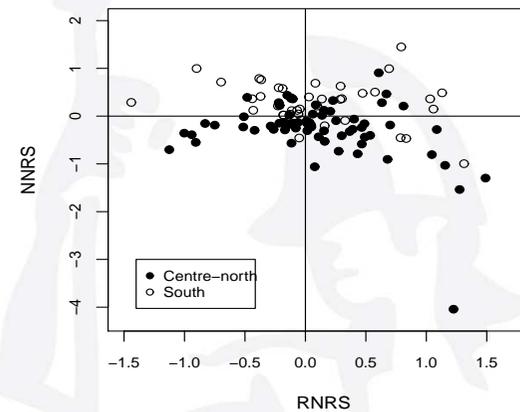
- The interpretation of results is facilitated if we exclude extreme values.

# Zoom on Spatial components (NUTS3)

2004-2009



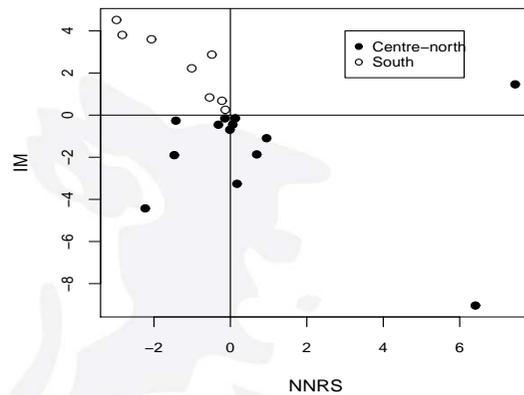
2004-2007



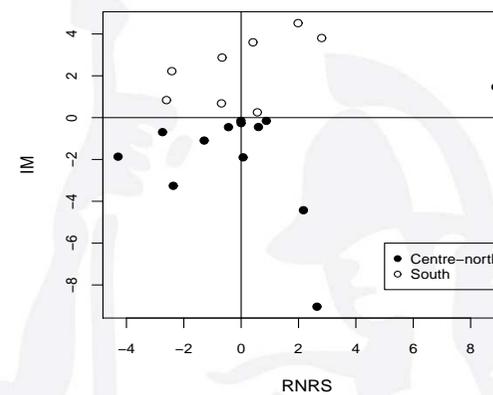
- Opposite results with respect to the case of NUTS2
- No particular difference between the two periods

# Spatial and industrial components (NUTS2)

2004-2009



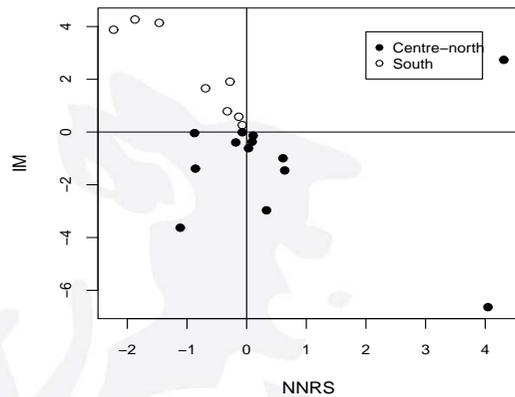
2004-2009



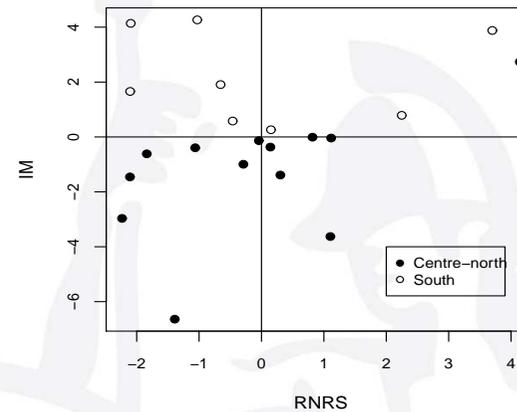
- Positive IM in the Southern regions

# Spatial and industrial components (NUTS2)

2004-2007



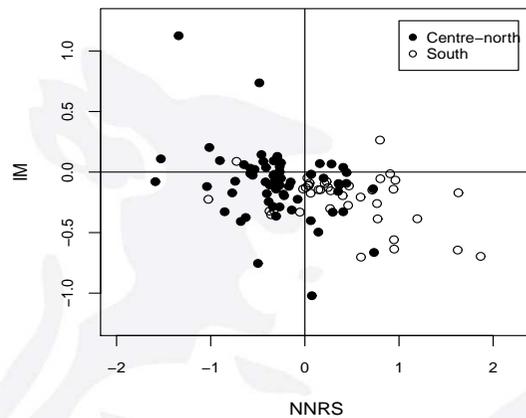
2004-2007



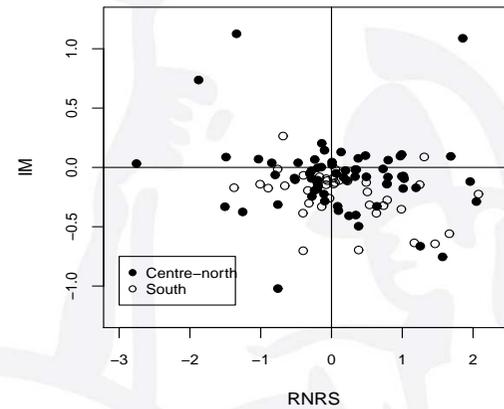
- No particular difference between the two periods

# Spatial and industrial components (NUTS3)

Zoom 2004-2009



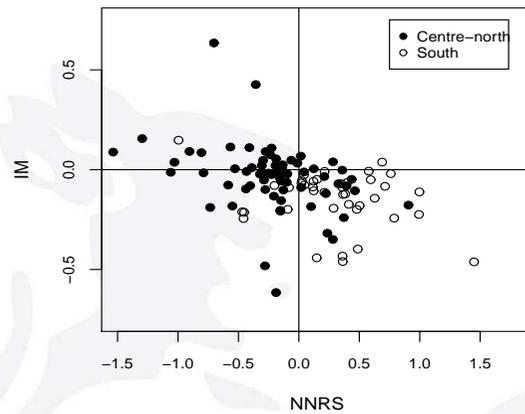
Zoom 2004-2009



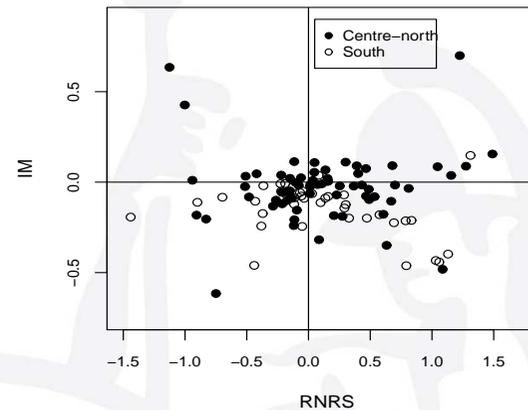
- Opposite results with respect to the case of NUTS2

# Spatial and industrial components (NUTS3)

Zoom 2004-2007



Zoom 2004-2007



- No particular difference between the two periods

# Final Results

First, the level of spatial aggregation greatly affects the results, manifesting evidence of Modifiable Areal Unit Problem (MAUP). Of course, we rely on results from the finest level of aggregation.

Second, we find evidence of a neighbourhood advantage in the Southern NUTS-3 regions and the opposite in the Central-Northern ones.

Third, we find evidence of positive industrial mix effects only in the Centre-North.

Fourth, the results seem to be robust regarding the period under analysis, as those for the shorter time-span of 2004-2007 confirm our conclusions with respect to the comparison between the Centre-North and the South of Italy.

# Conclusion

Net business change seems to be higher in the South. This result suggests more accurate investigation on the different flows of firm demography (entry and exit).

We find important differences between South and Centre-North in the decomposition of net business change.

The industrial composition seems to positively affect the business change in the Centre-North and negatively in the South. This is probably due to the lack of high-tech or knowledge-based firms in the South. For instance, in 2004, only 28% of plants (and 29% of workers) in the R&D sector were located in the South, and this percentage has decreased over a period of time.

# Conclusion

The business change in the South seems to be characterised by spatial advantages. This result suggests further investigation.

The research question to investigate could be:

**Is new business formation always good for regional development?**

# growth and change

*Growth and Change*

*Vol. 00 No. 00 (Month 2016), pp. 00–00*

DOI: 10.1111/grow.12172

## **Firm Demography and Regional Development: Evidence from Italy**

DAVIDE PIACENTINO, GIUSEPPE ESPA, DANILA FILIPPONI, AND DIEGO GIULIANI



# Literature background (1)

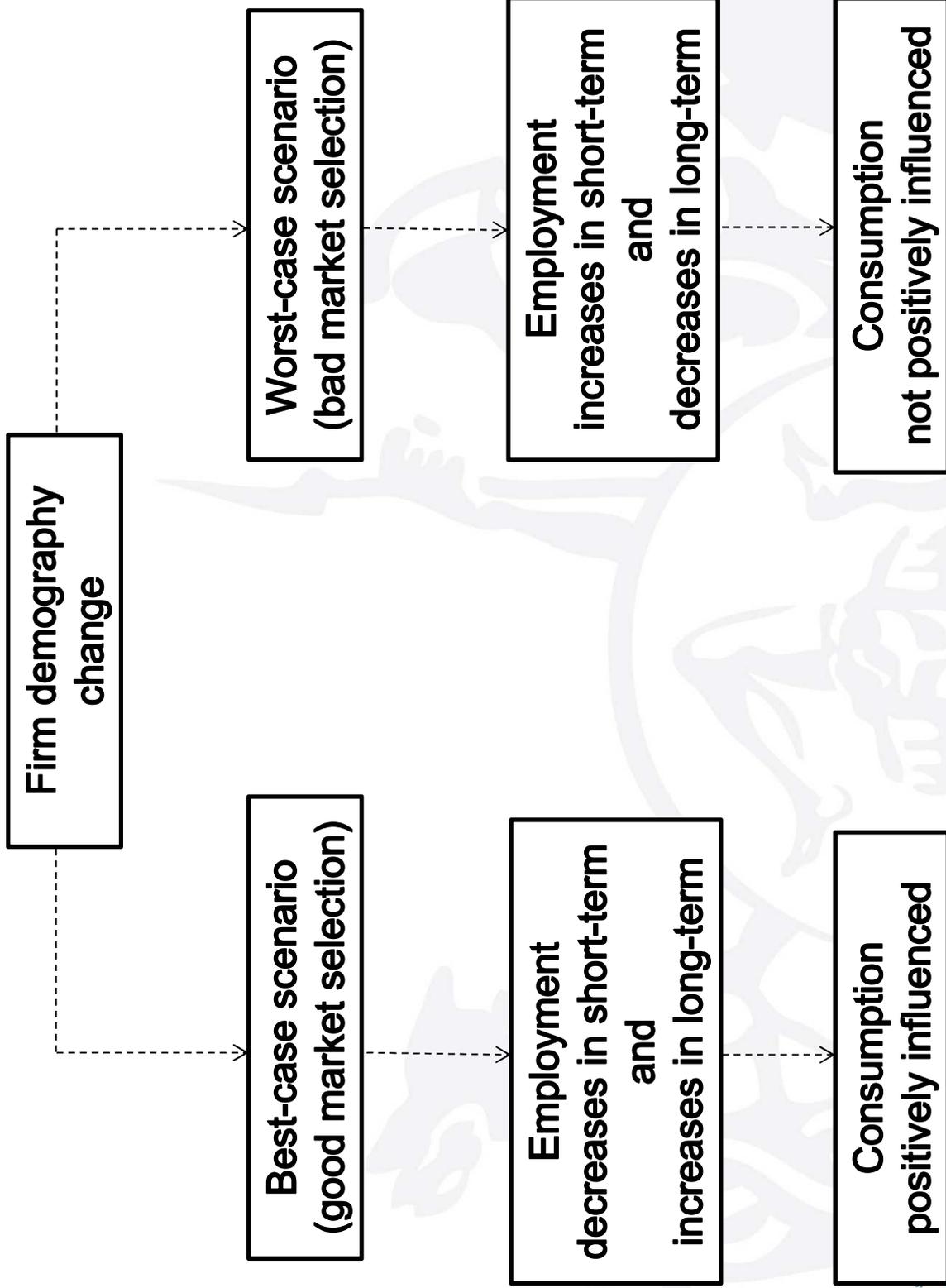
- Literature is mainly focused on the impact of regional socio-economic environment on new business formation.
- Looking at this literature, a question remains unanswered: **is new business formation always good for regional development?**
- In other words, the quality of new business formation, and not only the quantity, may affect regional development.
- A new stream of literature seems to be oriented towards this line and in particular it focuses the research on the indirect way by which new business formation may influence the regional development (Fritsch, SBE 2008).

## Literature background (2)

- The literature suggests that, if the market selection process is well-functioning, the effects of new business formation on the regional development may be negative in the short-term (direct effect) but positive in the long-term (indirect effect).
- From an empirical viewpoint, this may have important consequences due to the fact that employment change (i.e. a typical proxy of regional development in this type of studies) may be strongly affected by the indirect effect of new business formation. As a consequence, empirical evidence so far provided is not entirely clear.

# Our proposal (1)

- This article proposes to use the level of per capita consumption in goods and services of second necessity (i.e. a measure of material well-being or standard of living) as an alternative proxy of regional development.
- Details in the next slide!



# Our proposal (2)

- We look at the flows of both entry and exit. New business formation is only one face of firm demography change and it is plausible to expect that regional development is also affected by the other face, i.e. business survival.
- We look at the influence of specific components of firm demography on regional development by a decomposition of the two flows into spatial and sectoral components.

# Empirical strategy (1)

- We first decompose the growth rate of incumbent firms in order to isolate the contribution of the entry and exit flows:

$$g_{ir} = \frac{F_{irT} - F_{irt}}{F_{irt}} = \frac{(Entry_{irT} - Exit_{irT}) + \dots + (Entry_{irt+1} - Exit_{irt+1}) + F_{irt} - F_{irt}}{F_{irt}} =$$
$$\frac{(Entry_{irT} + \dots + Entry_{irt+1})}{F_{irt}} + \frac{(-Exit_{irT} - \dots - Exit_{irt+1})}{F_{irt}} = \frac{\sum(Entry_{ir})}{F_{irt}} + \frac{\sum(-Exit_{ir})}{F_{irt}} = g_{ir}^{entry} + g_{ir}^{exit}$$

- Then, we use a recent version of spatial shift-share analysis in order to measure the contribution of spatial and sectoral components.

## Empirical strategy (2)

- We adapt the spatial shift-share proposed by Espa et al. (2014) to our case:

$$\begin{aligned}\Delta F_r &= \sum (Entry_r) + \sum (-Exit_r) = \\ &= \left( \sum_i F_{irt} g_n^{entry} + \sum_i F_{irt} (g_{in}^{entry} - g_n^{entry}) + \sum_i F_{irt} (\tilde{g}_{ir}^{entry} - g_{in}^{entry}) + \sum_i F_{irt} (g_{ir}^{entry} - \tilde{g}_{ir}^{entry}) \right) + \\ &+ \left( \sum_i F_{irt} g_n^{exit} + \sum_i F_{irt} (g_{in}^{exit} - g_n^{exit}) + \sum_i F_{irt} (\tilde{g}_{ir}^{exit} - g_{in}^{exit}) + \sum_i F_{irt} (g_{ir}^{exit} - \tilde{g}_{ir}^{exit}) \right)\end{aligned}$$

- Where  $g^{entry}$  and  $g^{exit}$  measure the contribution of firm entry and firm exit to business change.

# Empirical strategy (3)

- We estimate the following model:

$$C = f(RNRS, NNRS, NNRS\_RNRS, IM, CONTROLS)$$

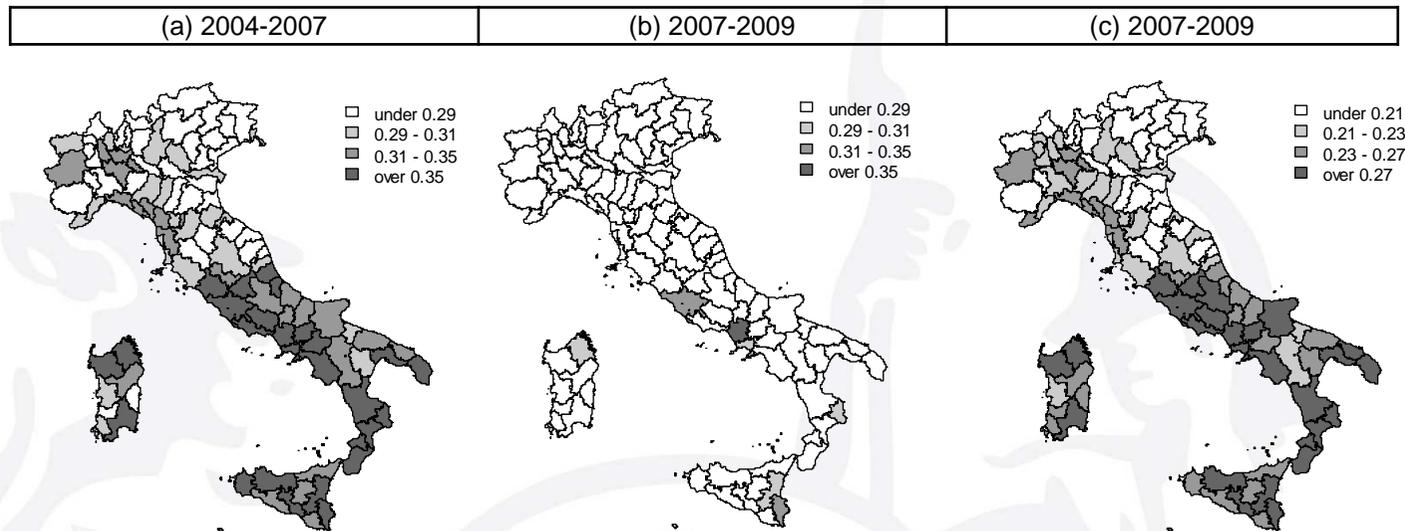
- Where C is the average value 2010-2012 of per capita consumption of second necessity;
- the shift-share variables are used to generate a set of dummy variable (i.e. the variable assumes value equal to one if the component manifests an advantage and zero otherwise).
- To be coherent with the fact that the dependent variable refers to a period after the crisis of 2007, the independent variables are measured over a period of time after the crisis (i.e. 2007-2009).
- As control variables, we use the population age structure and the level of education (average values for the periods 2009-2010 and 2008-2009 are considered respectively).

# Data

- We use an internationally comparable database on **Italian firm demography** managed by the Italian National Institute of Statistics (ISTAT).
- We specifically exploit data on firm entries and firm exits aggregated at NUTS-3 regional level and with reference to the period 2004-2009.
- Data on consumption are provided by The Guglielmo Tagliacarne Institute. These data are available for the period 2010-2012 and at the NUTS-3 level of spatial aggregation.

# Descriptive analysis

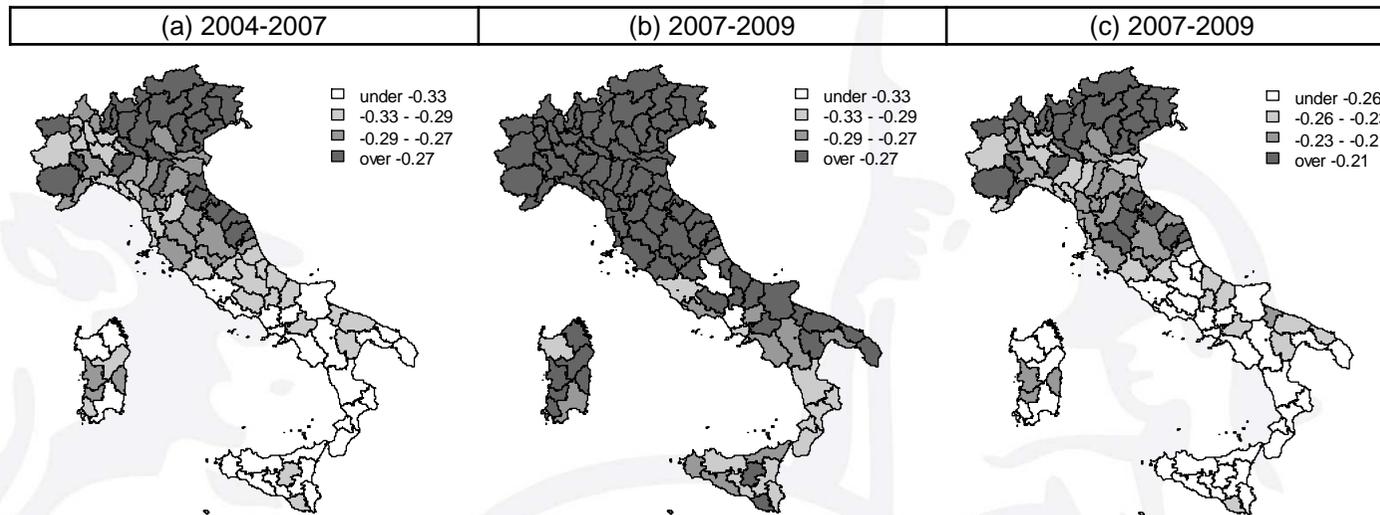
## Spatial distribution of firm entry rates. Italian NUTS-3 regions



- Southern regions with the highest rates of entries
- Evidence of spatial correlation
- Evidence of a common negative effect of 2007 crisis
- No changes in the spatial distribution after 2007 crisis

# Descriptive analysis

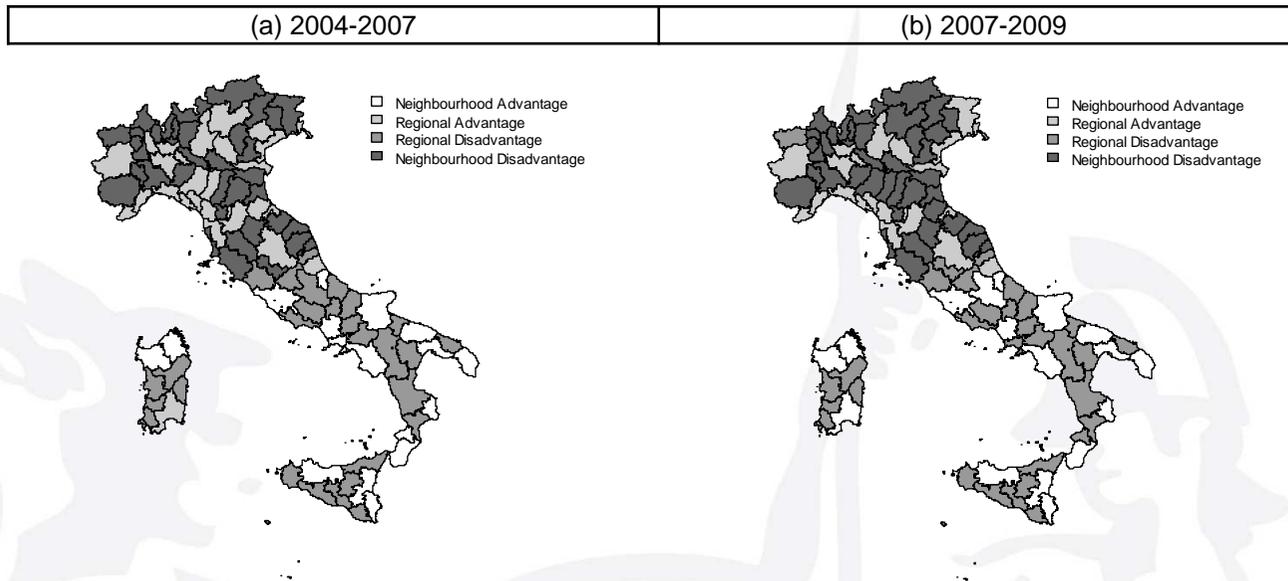
## Spatial distribution of firm exit rates. Italian NUTS-3 regions



- Southern regions with the highest rates of exits
- Evidence of spatial correlation
- Evidence of a common positive effect of 2007 crisis
- No changes in the spatial distribution after 2007 crisis

# Empirical results

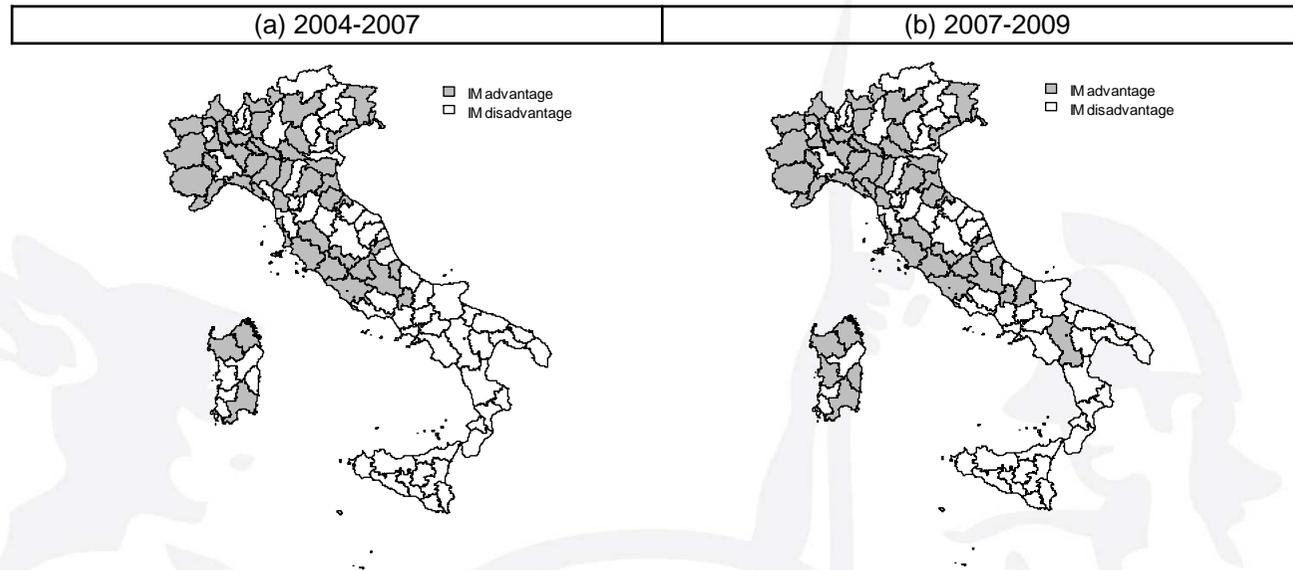
## The case of firm entry – Spatial Components



- Neighbourhood advantages are particularly localised in the South.
- Neighbourhood disadvantages are particularly localised in the Centre-North
- No changes in the spatial distribution after 2007 crisis

# Empirical results

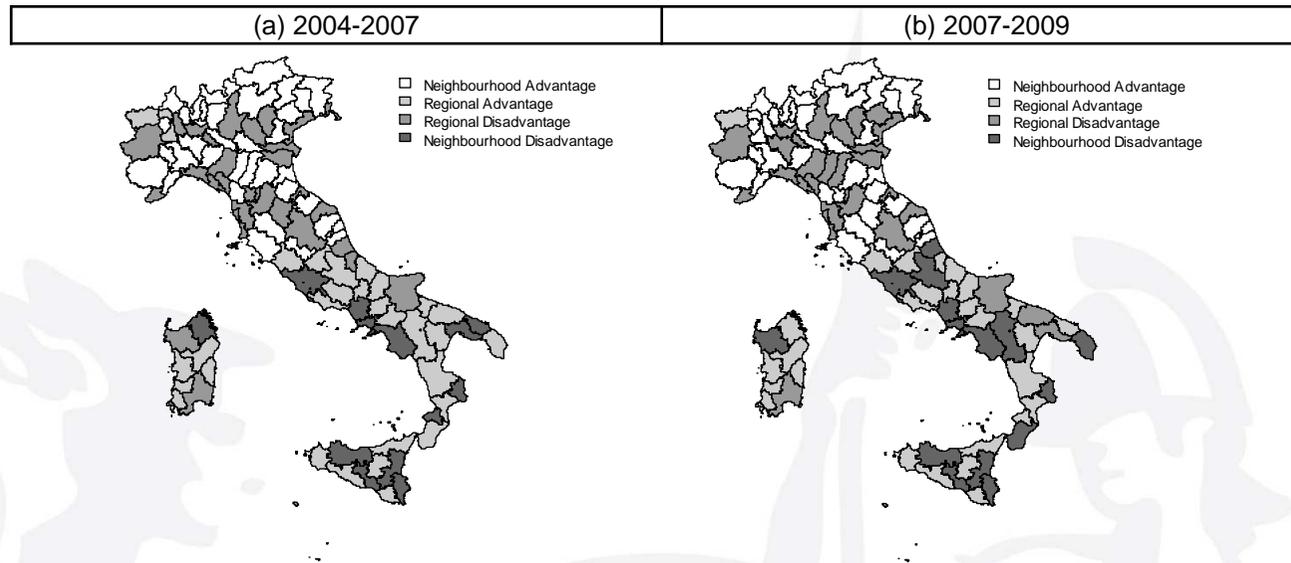
## The case of firm entry – Sectoral Component



- Industrial mix advantages are particularly localised in the Centre-North.
- Industrial mix disadvantages are particularly localised in the South
- No changes in the spatial distribution after 2007 crisis

# Empirical results

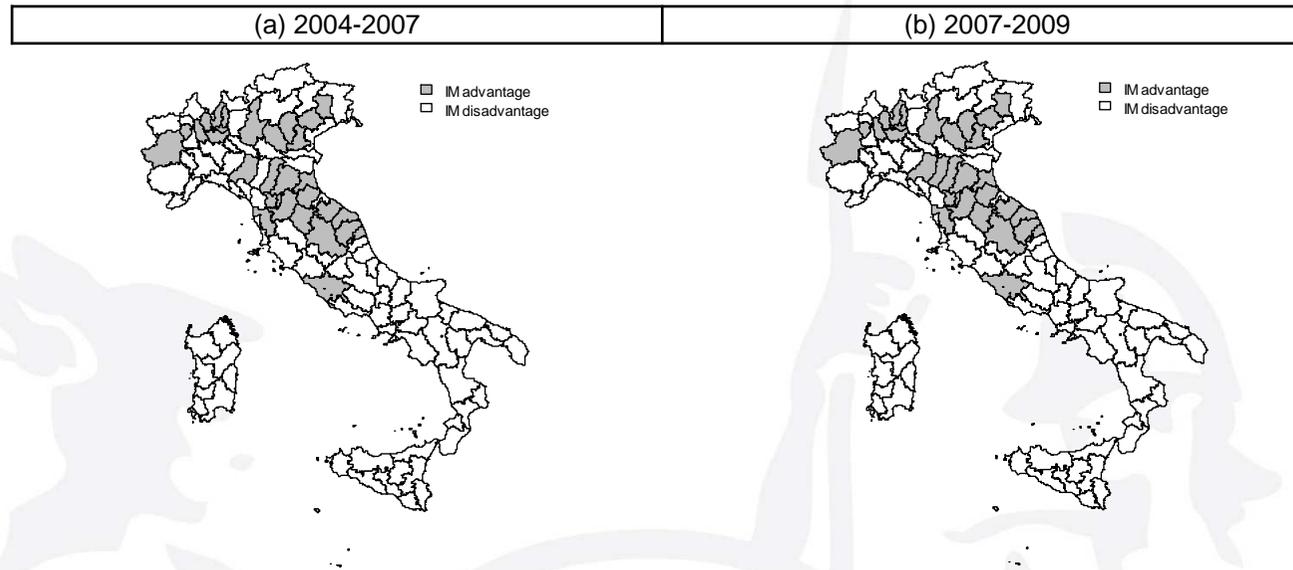
## The case of firm exit – Spatial Components



- Neighbourhood advantages are particularly localised in the Centre-North
- Neighbourhood disadvantages are particularly localised in the South
- No changes in the spatial distribution after 2007 crisis

# Empirical results

## The case of firm exit – Sectoral Component



- Industrial mix advantages are particularly localised in the Centre-North
- Industrial mix disadvantages are particularly localised in the South
- No changes in the spatial distribution after 2007 crisis

# Preliminary Results

- The results in terms of regional distribution of spatial and sectoral effects do not change relevantly in consequence of the 2007 crisis.
- We can exclude that the highest firm entry rates in the South depends on sectoral advantages (i.e. a favourable industrial composition), so that they probably are due to spatial aspects. This last result may be connected to the fact that the South also manifests the highest firm exit rates.
- The rest of Italy exhibits lower firm entry rates but also better firm survival performance. These results probably depend on the better industrial composition in terms of both firm entry and exit, besides neighbourhood advantages in terms of barriers to firm exit.

# Remark

- The analysis gives evidence in support of the common opinion that the industry is structured on relatively more performing sectors in the Central-Northern area of Italy so that the firm demography is more stable over time (less entries but also less exits).
- On other hand, the Southern industry is based on relatively less performing sectors and this is reflected in the instability of its firm demography (more entries but also more exits).

## Effect of firm demography components on per capita consumption

	(1)	(2)	(3)
entry_rnrs0709	-0.045 (0.031)		-0.053* (0.031)
entry_nnrs0709	<b>-0.352***</b> (0.032)		<b>-0.341***</b> (0.032)
entry_nnrs_rnrs0709	<b>0.090*</b> (0.048)		<b>0.087*</b> (0.049)
entry_im0709	<b>0.108***</b> (0.026)		<b>0.082***</b> (0.028)
exit_rnrs0709		-0.028 (0.049)	
exit_nnrs0709		<b>0.185***</b> (0.051)	
exit_nnrs_rnrs0709		0.070 (0.060)	
exit_im0709		<b>0.088**</b> (0.038)	
Interaction Variables			
inter_rnrs0709			0.086 (0.058)
inter_nnrs0709			-0.014 (0.052)
inter_im0709			<b>0.079*</b> (0.043)
Control Variables	<i>omitted</i>	<i>omitted</i>	<i>omitted</i>
Constant	14.549*** (3.088)	12.323*** (4.194)	13.786*** (3.109)
Observations	107	107	107
R-squared	0.744	0.608	0.757
Breusch-Pagan test	7.139	8.262	8.428



# Results: Firm Entry

- Regional development is significantly and positively affected only by neighbourhood and sectoral advantages.
- Advantages related to specific characteristics of the region are not significant.
- Advantages related to the neighbourhood context, independently of regional performance, negatively affect regional development.
- This last evidence can be interpreted as a negative impact of competition among neighbours when the specific region is not highly performing.

# Results: Firm Exit

- Regional development is strongly affected by sectoral advantages while is not affected by advantages related to specific characteristics of the region.
- Contrary to the previous case, advantages related to the neighbourhood context are not significant, while they significantly and positively influence regional development when neighbourhood context is considered as independent of regional performance.
- This last evidence suggests the presence of positive spatial spillovers independent of regional performance.

# Results: Interaction

- The evidence of a significant and positive effect of the interaction between firm entry and firm exit is found only for the sectoral component.
- This means that the impact of sectoral advantages in terms of new business formation on regional development is reinforced when the same region is also characterised by sectoral advantages in terms of firm survival.

# Conclusion

- The quality of new business formation plays an important role for regional development.
- For example, if regional new business is strategically set up in highly performing sectors, it is likely that also firm survival will be high, and thus regional development will be positively affected.
- This seems to be the case of new business formation in Central and Northern areas of Italy. An opposite situation seems to have occurred in the Southern regions.

# Policy implication

- One can suggest to the policy-maker that it is not important to encourage a generic new business formation in lagging areas, like the South of Italy, but the crucial point should be to encourage a strategic new business formation so that one can expect positive returns in terms of firm survival performance and, as a consequence, in terms of regional development.
- Therefore, the evidence here provided suggests that new business formation without a specific industrial strategy for regional development should be avoided. Unfortunately, this has not occurred in the South of Italy, where subsidies have been granted to firms without defining specific industrial policies.



Contents lists available at ScienceDirect

Spatial Statistics

journal homepage: [www.elsevier.com/locate/spasta](http://www.elsevier.com/locate/spasta)



## A spatial analysis of new business formation: Replicative vs innovative behaviour

Davide Piacentino<sup>a,\*</sup>, Filippa Bono<sup>a</sup>, Maria Francesca Cracolici<sup>a</sup>, Diego Giuliani<sup>b</sup>

<sup>a</sup> Department of Economics, Business and Statistics, University of Palermo, V.le delle Scienze Ed.13, 90128 Palermo, Italy

<sup>b</sup> Department of Economics and Management, University of Trento, via Inama 5, 38122 Trento, Italy



UNIVERSITÀ  
DEGLI STUDI  
DI PALERMO

# MOTIVATION 1

## *Spatial Analysis of New Business Formation*

- ❑ In empirical literature, New Business Formation (NBF) has been traditionally investigated from an industrial perspective, where new firms are assumed to be homogeneously distributed over space. (e.g. Orr, 1974). However, a similar hypothesis can barely be confirmed by empirical analyses.
- ❑ Since the nineties, the spatial (mostly regional) dimension of new business formation has increasingly drawn the attention of empirical scholars (e.g. Audretsch and Fritsch, 1994, Garofoli, 1994; etc.).
- ❑ Recent studies are focused on:
  - ❑ the **urban dimension** (e.g. Delfmann et al, 2014; Faggio and Silva, 2014; etc.);
  - ❑ the **neighborhood effect** (e.g. Delfmann et al, 2014; Levratto, 2015, etc.).

# AIM 1

- ❑ Looking at **urbanization**:

- ❑ as determinant of NBF.

- ❑ but also in the relation between NBF and other main determinants.

- ❑ Looking at **neighborhood effect**:

- ❑ spatial dependence in NBF.

- ❑ spatial dependence in determinants of NBF.

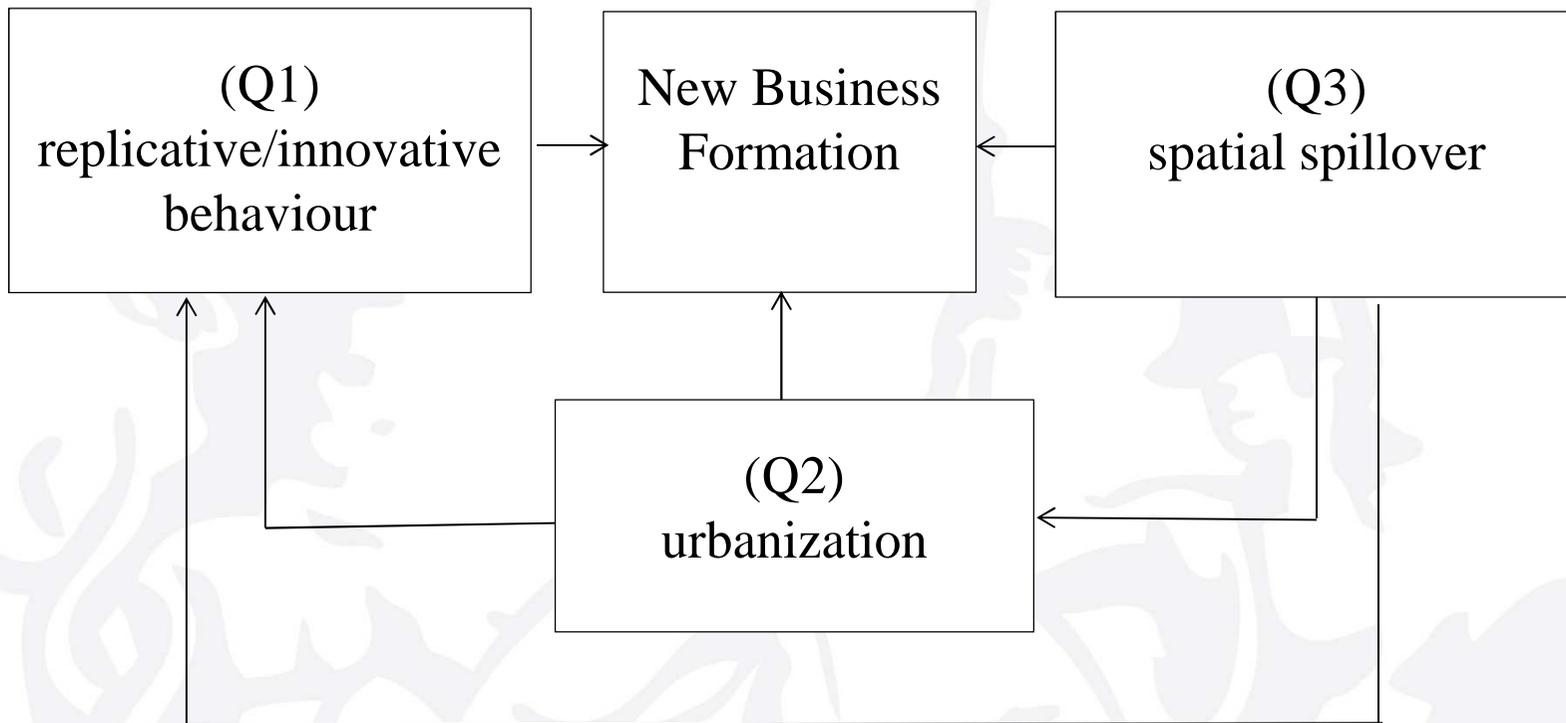
# MOTIVATION 2

## *Replicative vs Innovative Behaviour*

- ❑ Baumol (2005) defines:
  - ❑ replicative the entrepreneur who sets up a new firm to respond to the local demand and a growing population;
  - ❑ innovative the entrepreneur who sets up a new firm with the aid of a new product or some other innovation.
- ❑ **Product Life Cycle Theory** suggests a linkage with urbanization (Klepper, 1996, Duranton and Puga, 2001):
  - ❑ new innovative firms are mainly created in large metropolitan areas where there is an innovating environment and skilled labour;
  - ❑ once products have reached maturity, production is decentralized toward smaller cities where firms can benefit from lower costs.

## AIM 2

- Looking at replicative and innovative behaviour in NBF
- Looking at the relationship between “entrepreneurial mission” of NBF and urbanization
- Expected results:
  - both replicative and innovative behaviours generate NBF but they are influenced by the degree of urbanization:
    - replicative behaviour predominantly observed in lower urbanized areas;
    - innovative behaviour predominantly observed in higher urbanized areas.



# MODEL SPECIFICATION

$$BR = \alpha i_N + \beta Pop + \lambda Inn + \vartheta Urb + \gamma PopUrb + \rho InnUrb + \delta Controls + \varepsilon$$

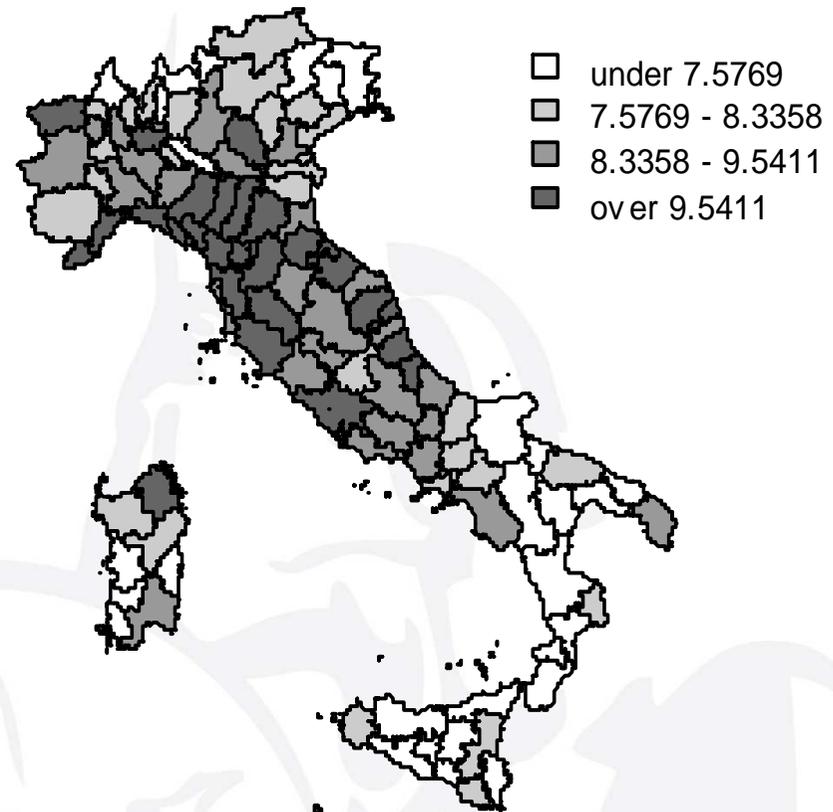
Dependent variables	Period
<b>Birth Rate of Firms (BR):</b> Number of new firms per thousand people (15-65 age)	2004-2007 (average)
Independent variables	Period
<b>Local Demand (Pop):</b> Population change	2002-2005 (growth)
<b>Innovative Environment (Inn):</b> Patents per million people	2002-2005 (average)
<b>Urbanization (Urb):</b> Population per square km	2002

**NOTES:** (1) data spatially aggregated at NUTS-3 level; (2) data are collected by ISTAT.

# PRELIMINARY EVIDENCE

## *Birth Rate of Firms*

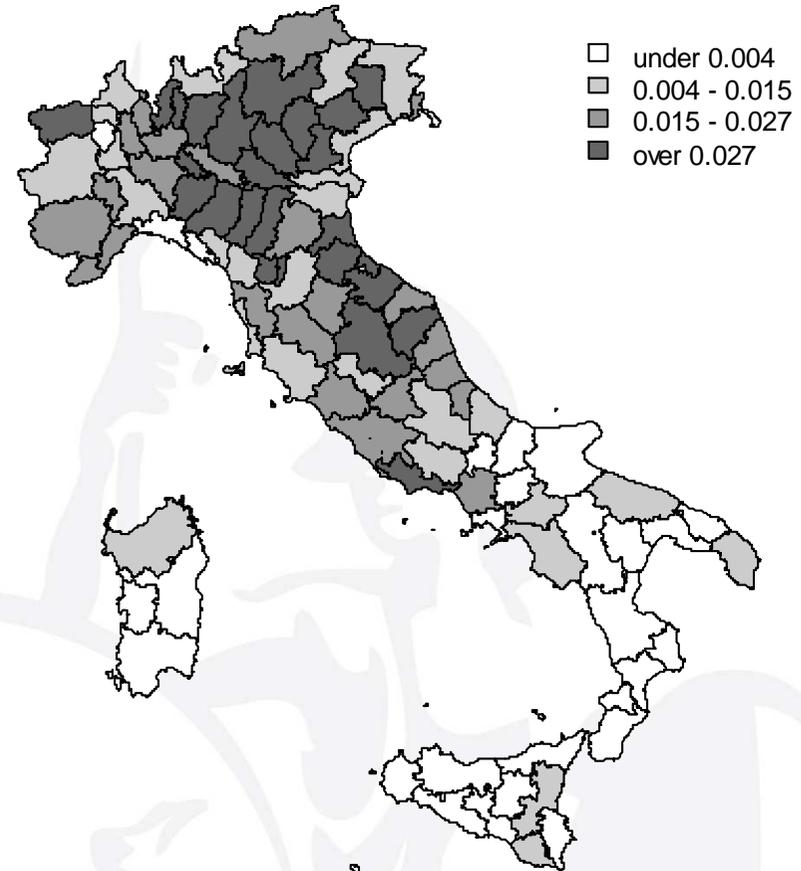
- ❑ Significant spatial dependence is present
- ❑ Lower rates in the South (1qr: 70% Southern regions)
- ❑ Higher rates in the Centre-North (4qr: 92% Ce-No regions)



# PRELIMINARY EVIDENCE

## *Population Change*

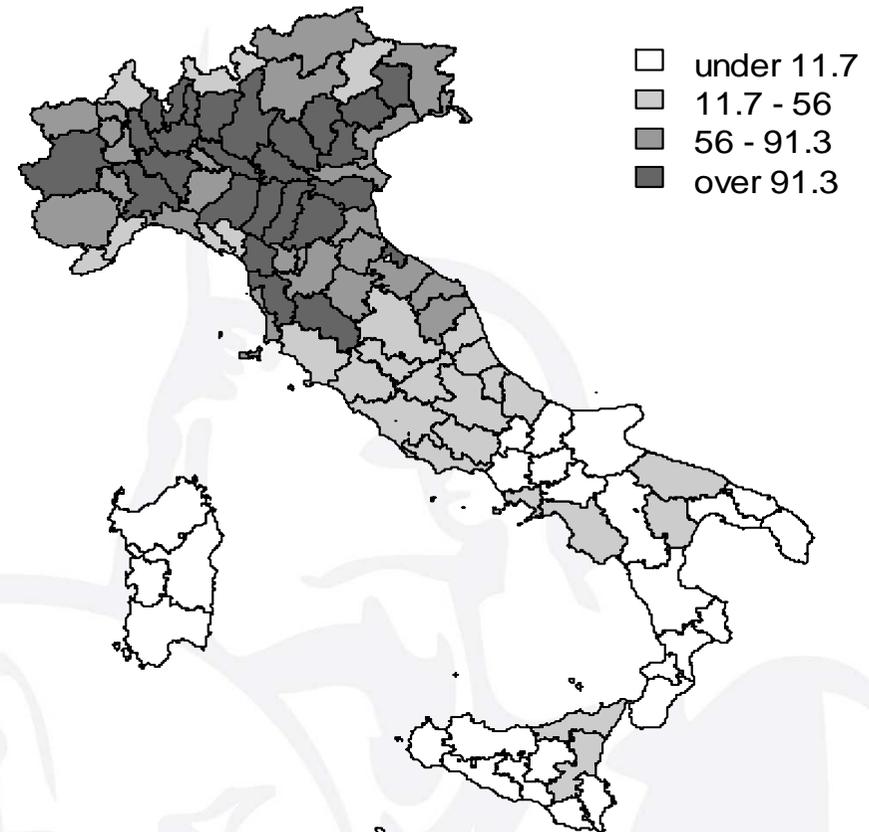
- ❑ Significant spatial dependence is present
- ❑ Lower changes in the South  
(1qr: 85% Southern regions)
- ❑ Higher changes in the Centre-North  
(4qr: 77% Northern regions )



# PRELIMINARY EVIDENCE

## *Patens per million people*

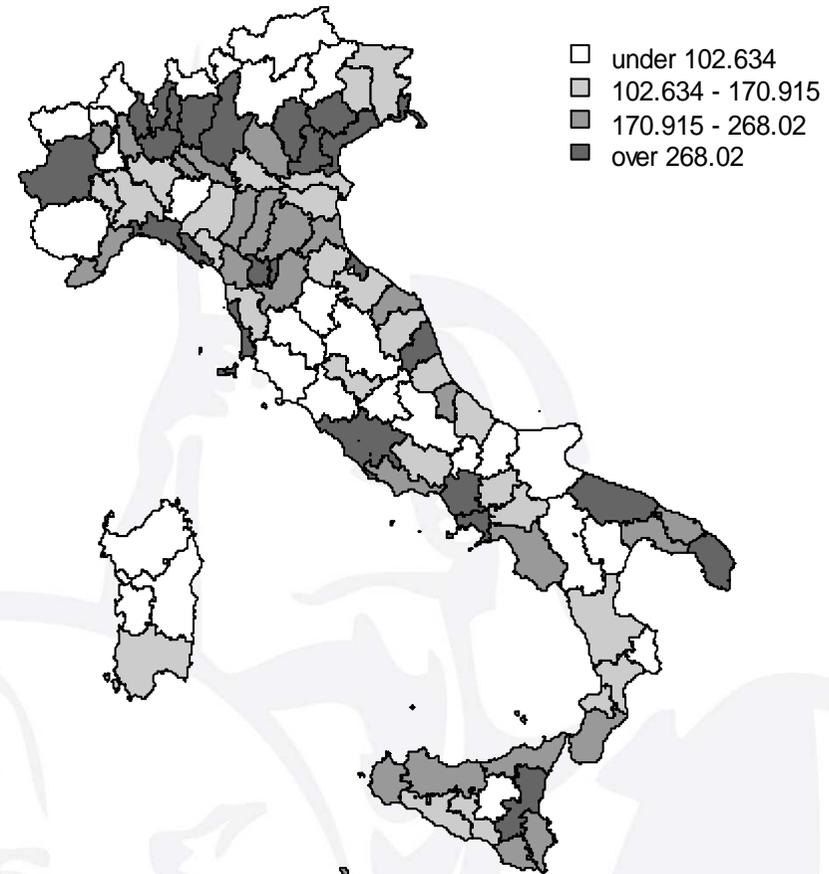
- ❑ Significant spatial dependence is present
- ❑ High innovative regions (76%) in the North
- ❑ Low innovative regions (70%) in the South



# PRELIMINARY EVIDENCE

## *Urbanization*

- ❑ Spatial dependence is present but not significant
- ❑ The geography is more complex.  
(1qr: 42% Southern regions )  
(4qr: 64% Northern regions )
- ❑ Influence of big cities



# CONTROL VARIABLES

Variable	Expected signs
AGE Difference between the growth rate of each age-class and the reference (35-50 age-class). Average 2004-2007. Source: Istat	Negative wrt reference
EDUCATION The inverse of school dropouts rate. Average 2004-2006. Source: Istat	Positive
UNEMPLOYMENT Unemployment rate. Average 2002-2005 Source: Istat	Ambiguous
SPECIALIZATION Specialization index. Average 2002-2005 Source: Istat	Ambiguous
SERVICES Services endowment. Average 2002-2005. Source: Istat	Positive
COMMUNTING Commuting rate. Year 2001. Source: Istat	Positive
PARTICIPATION Voter turnout in the 2001 referendum	Positive

# ECONOMETRIC STRATEGY

- ❑ The explorative analysis suggests us to use spatial econometric models and, after the proper diagnostics, we decide to employ the **Spatial Durbin Model (SDM)**.
- ❑ SDM includes both the spatial lag of the dependent variable,  $Wy$ , and the spatial lag of the independent variables,  $WX$ :

$$y = \rho Wy + X\beta + WX\theta + \varepsilon$$

$$\varepsilon \sim N(0, \sigma^2 I_n)$$

- ❑ where  $y$  is the regional birth rate of firms,  $X$  is the matrix of independent variables and  $W$  is a conventional spatial matrix.
- ❑  $\rho$  parameter measures the influence of new firms located in neighbouring regions;  $\beta$  and  $\theta$  parameters measure the influence of covariates and the influence of spatially lagged covariates.

# ECONOMETRIC STRATEGY

- ❑ The  $\beta$  and  $\theta$  parameters cannot be interpreted as marginal effects in the SDM.
- ❑ Direct and indirect effects can be obtained from estimates (LeSage and Pace, 2009), where:
  - ❑ **direct effect** is the average impact of a change of a covariate in a generic unit  $i$  on the dependent variable of the same unit.
  - ❑ **indirect effect** is the average impact on the dependent variable of a specific unit  $i$  due to a change of a covariate in all neighboring units.

# Main Variables

Dependent variable:	Col. 1	Col. 2	Col. 3	Col. 4
Birth rate of firms (BR)	OLS		SDM	
		Direct	Indirect	Total
<b>Population change (Pop)</b>				
Pop1quart	Reference	Reference	Reference	Reference
Pop2quart	0.055 (0.077)	-0.033	-0.042	-0.075
Pop3quart	0.090 (0.091)	0.021	-0.368	-0.347
Pop4quart	0.183 (0.112)	-0.093	<b>-0.788**</b>	-0.881**
<b>Innovation (Inn)</b>				
Low	Reference	Reference	Reference	Reference
High	-0.009 (0.079)	<b>0.199***</b>	<b>0.522*</b>	0.720**
<b>Urbanization (Urb)</b>				
Urb1quart	Reference	Reference	Reference	Reference
Urb2quart	-0.022 (0.066)	0.029	-0.191	-0.161
Urb3quart	-0.025 (0.065)	0.045	0.125	0.170
Urb4quart	0.146 (0.092)	<b>0.212***</b>	<b>0.727**</b>	0.939**
N	103	103	103	103
R2	0.483	$\rho$		<b>0.343***</b>
LM $_{\rho}$	27.279***	LR test spatial lag		59.200***
LM $_{\rho}^r$	17.148***	LR test spatial error		56.273***
LM $_{\lambda}$	12.113***	Spatial Breusch–Pagan test		59.159
LM $_{\lambda}^r$	1.983			



# Interaction Variables

Dependent variable: Birth rate of firms (BR)	Col. 1	Col. 2	Col. 3	Col. 4
	OLS	SDM		
		Direct	Indirect	Total
<i>Interaction Pop:Urb</i>				
Pop2quart:Urb2quart	0.149 (0.104)	<b>0.147*</b>	0.290	0.437
Pop3quart:Urb2quart	0.190 (0.117)	<b>0.257**</b>	<b>1.038***</b>	1.295***
Pop4quart:Urb2quart	0.135 (0.158)	<b>0.333**</b>	<b>1.424***</b>	1.758***
Pop2quart:Urb3quart	0.131 (0.101)	0.203***	0.034	0.237
Pop3quart:Urb3quart	0.069 (0.107)	0.126	0.502*	0.627*
Pop4quart:Urb3quart	-0.077 (0.131)	0.217	0.457	0.674
Pop2quart:Urb4quart	-0.082 (0.117)	0.062	-0.592	-0.530
Pop3quart:Urb4quart	-0.022 (0.126)	0.082	-0.178	-0.096
Pop4quart:Urb4quart	-0.079 (0.159)	0.155	0.090	0.246
<i>Interaction Urb:Inn</i>				
Urb2quart:High	-0.143 (0.103)	<b>-0.274***</b>	<b>-1.079***</b>	-1.353***
Urb3quart:High	0.088 (0.096)	-0.108	-0.341	-0.449
Urb4quart:High	0.008 (0.102)	-0.099	-0.326	-0.425



# Control Variables

Dependent variable: Birth rate of firms (BR)	Col. 1	Col. 2	Col. 3	Col. 4
	OLS		SDM	
		Direct	Indirect	Total
<i>Control variables</i>				
Age_class(Under15)	1.089 (0.826)	1.226	1.565	2.791
Age_class(15-25)	-1.630 (1.007)	-0.647	-5.710**	-6.356**
Age_class(25-35)	-0.180 (0.807)	0.015	1.318	1.332
Age_class(35-50)	<i>Reference</i>	<i>Reference</i>	<i>Reference</i>	<i>Reference</i>
Age_class(50-65)	1.124 (1.025)	<b>1.421*</b>	<b>8.559***</b>	9.979***
Age_class(Over65)	-3.160 (0.967)***	<b>-2.174**</b>	<b>-6.907**</b>	-9.081***
Education	-0.005 (0.054)	0.014	<b>0.238**</b>	0.252*
Unemployment	0.008 (0.070)	-0.009	<b>-0.360*</b>	-0.368
Specialization	0.096 (0.077)	0.027	-0.071	-0.044
Services	0.380 (0.148)**	<b>0.434***</b>	0.531	0.964*
Commuting	-0.014 (0.024)	<b>0.044*</b>	-0.011	0.032
Participation	0.110 (0.206)	-0.244	0.226	-0.018



# RESULTS

## □ Question 1 – *Replicative/Innovative Behaviour*

- NBF is significantly stimulated by **Innovation** (patents), but not by **Local Demand** (population change).

## □ Question 2 - *Urbanization*

- **Urbanization** affects the relationship between NFC and determinants here investigated:
  - positive effects of Local Demand for lower levels of urbanization.
  - negative effects of Innovation for lower level of urbanization.

# RESULTS

## □ Question 3 – *Spatial Spillover*

- Significant evidence of spatial dependence in NBF
- Negative influence of neighboring regions with high population change.
- Positive influence of neighboring regions with high innovative environment
- Positive influence of neighboring regions with high urbanization

# CONCLUSION

- ❑ NBF is a phenomenon of “spatial nature”
- ❑ Evidence of both replicative and innovative behaviour in NBF are found but with important differences depending on the degree of urbanization.
- ❑ Replicative behaviour (therefore, local demand impulse) seems to be significant only for lower urbanized areas.
- ❑ Innovative behaviour seems to be independent on urbanization. However, some obstacles to NBF can be met when regions are lowly urbanised.
- ❑ NBF policy should consider the urban context to which it refers. Debate on place-based vs placed-neutral regional policies (Barca *et al.*, 2012).

**Thank you for attention!**

*davide.piacentino@unipa.it*



UNIVERSITÀ  
DEGLI STUDI  
DI PALERMO