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Transition towards sustainable activities and firms location decisions

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Policy Recommendations

As our preliminary results show that structural changes towards more sustainable activities are very slow and only partially clustered, specific policy actions (i.e., land planning and incentives to certain activities) are required in order to boost the process.

Summary

This paper analyses location determinants of firms at local level focusing on role played by sustainability issues in shaping these decisions. The contribution to empirical literature is the identification of specific locational patterns driving decisions of sustainability-oriented firms. This is accomplished by using data for new firm entries in Catalan municipalities between 2004 and 2014. As there is a growing pressure towards specialisation in more sustainable activities, our results proxy future trends for firms' location patterns in many European countries.

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Introduction

Environmental policies are a growing concern for policies makers that affect a wide range of public dimensions, ranging from particulars to firms' activities. In this sense, apart from the role that public regulations play in terms of shaping technologies and production processes carried out by firms, these regulations also matter in terms of spatially relocation of economic activities. Concretely, there are quite a large number of contributions dealing with the effects of environmental regulations on FDI, being that firms tend to move across different geographical areas with heterogeneous environmental policies in order to avoid tighten regulations (List and Co, 2000). Undoubtedly, a relevant share of offshoring / backshoring decisions are driven by such environmental concerns, but this framework is no longer useful when we deal with geographical areas with homogeneous environmental regulations.

Environmental concerns are increasingly shared by firms aiming to contribute to social welfare in terms of sustainability in view of increasing worries regarding climate change and its consequences.

This paper is about this type of cases, municipalities of the same country with no relevant differences in terms of environmental policies (i.e., as there are no local attributions on that issue). In these cases, the switch to environmental-friendly activities is not only explained by policy decisions, but by spatial characteristics that favor some activities over others in view of asymmetries at industry level and act as location determinants.

In this sense, firms' location determinants have received an increased attention in recent years. Among these contributions we want to explore a new path that has received less attention until now. We refer to the way in which sustainability dimension and changing social attitudes in developed countries may boost firm creation (and, therefore, location) in these industries. As we hypothesize that not all territories have the same capacity to attract new firms, and not all firms locate following the same areas, giving priority to certain industries may benefit some areas.

Nowadays, sustainability is on the agendas of policy makers operating at different administrative levels at developed countries.

The switch to environmental-friendly activities is no only explained by policy decisions, but by spatial characteristics that favor some activities over others in view of asymmetries at industry level.

That applies for i) those of national governments, interested in the promotion of a sectorial transition towards greener industries and in the reduction of emissions for the whole economic activities; and for ii) those of regional and local governments interested in the attraction of these environmental friendly

activities. Nevertheless, these policies tend to be homogeneous at local level, so they cannot be hypothesized as having a role over firms decisions if these are among alternatives municipalities of the same institutional area (e.g., countries or regions). Additionally, environmental concerns are increasingly shared by firms aiming to contribute to social welfare in terms of sustainability (Bansal and Roth, 2000) in view of increasing worries regarding climate change and its consequences (Meek et al., 2010).

In this sense, there is empirical evidence suggesting that social norms related to environmental issues may have an effect over entry of environmentally responsible new firms (Meek et al., 2010).

Territories specialised in sustainability oriented industries increase market share of new entries.

Empirics: sustainability of industries

Before analyzing location patterns of firms at industry level it is necessary to provide a methodological approach to what is considered a sustainable industry. In this sense, there are three main constraints: the first one is that we do not have data at product level, but only at industry level for each firm; the second one is that we rely on NACE classification provided by Spanish Mercantile Register (at 3-digit level); and the third one is that there is no an "official" classification of sustainability to be followed. These limitations imply that i) we will only proxy sustainability in terms of available data in terms of the main industry in which the firm chooses to be registered, without taking into account specific technologies or production processes used by these firms, neither the individual actions undertaken to ensure a sustainable behavior; and that ii) our results are sensible to our measure of sustainability (i.e., potentially there is a certain bias).

Concretely, we depart from the Central Pollution Control Board classification (CPCB, 2016) that groups industries in terms of their environmental sustainability. The origin of this classification is to analyze their environmental effects (e.g., consumption of resources) in order to take public decisions regarding location of plants of these industries. Concretely, for each industry a pollution index ranging between 0 and 100 was calculated and, according to its score each industry was classified as red (score above 60), orange (score between 41 and 59), green (score between 21 and 40) and white (score up to 20).

As the industry classification was slightly different than the NACE 3-digit used in this study we adapted that classification (data is available upon request) and, for the sake of comprehension, renamed previous groups in terms of their sustainability profile: LOW (red), LOWMED (orange), MEDHIGH (green) and HIGH (white).

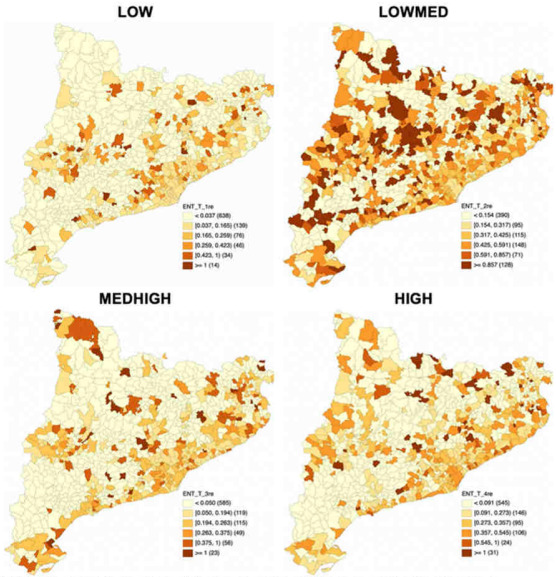
Empirics: methods

In this summarized document we do not aim to fully discuss the methodology to be used but, in general terms, we want to explore i) locational patterns of firms belonging to industries that differ in terms of sustainability: ii) existence of clusters of these industries; iii) changes in clustering over time; and iv) determinants of both locational and clustering patterns. In this sense, i) locational patterns will be analyzed from a descriptive point of view using maps at industry level and location quotients measuring relative concentration of industries at municipality level (i.e., values higher than 1 indicate relative concentration at municipality level, whilst values around 1 indicate the same industry concentration as in whole Catalonia); ii) clusters are identified using spatial autocorrelation measures such as local Morans' I (LISA) (Anselin, 1995); iii) changes in clustering over time will be analyzed using differential local Moran statistic; and iv) econometric specification using Count Data Models, in which firms' location decisions are hypothesized to be dependent on a vector of local characteristics (i.e., mostly measuring agglomeration economies).

Results

Distribution of entering firms in terms of their sustainability profile (i.e., according to the industry to which they belong to) shows a steady pattern across the whole period analyzed (2004-2014), as sectors 2 (LOWMED) and 4 (HIGH) alternate their predominance, being followed by sector 3 (MEDHIGH) and, at a considerable distance, sector 1 (LOW).

Figure 1. Relative specialisation of entries (2004-2013)



Note: data shows the local specialisation of entries relative to specialisation of entries in Catalonia.
Source: own elaboration.

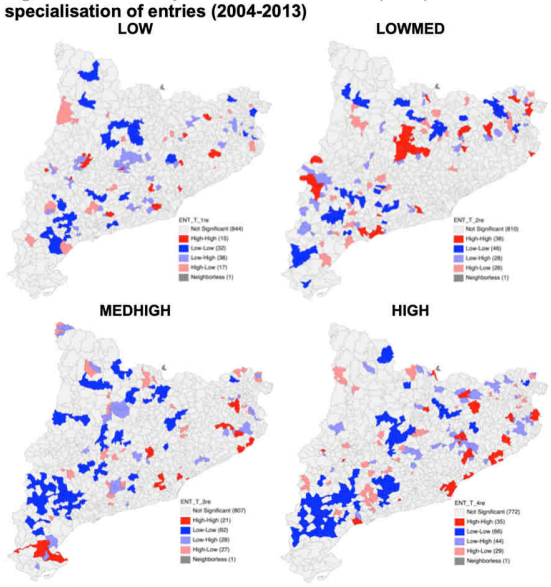
From a geographical point of view, most of entrants agglomerated in an around metropolitan area of Barcelona with unequal specialization levels (see Figure 1) as i) LOW industries tend to cluster in some small municipalities scattered inland and spatially disconnected among them, being that very few municipalities really specialize in these activities; ii) LOWMED industries have also an inland patterns but with stronger clusterisation patterns (i.e., there are some areas where municipalities specialized in these industries are close to each other) and with a larger number of municipalities specializing in them; iii) MEDHIGH show spatial patterns quite similar to those of LOW industries; and iv) HIGH industries show a pattern in which municipalities specializing in them locate at the Northern areas of Catalonia but without being very close to each other.

In terms of spatial autocorrelation of entries, preliminary results for global measures (Moran's I) suggest that there is no spatial autocorrelation

Although the lack of spatial autocorrelation suggests a spatial random pattern for firm entries, it could hide the existence of processes of local spatial autocorrelation in specific areas.

at local level, no matter the year or the industry (see Figure 2).

Figure 2. Local Spatial Autocorrelation (LISA) of Relative specialisation of entries (2004-2013)

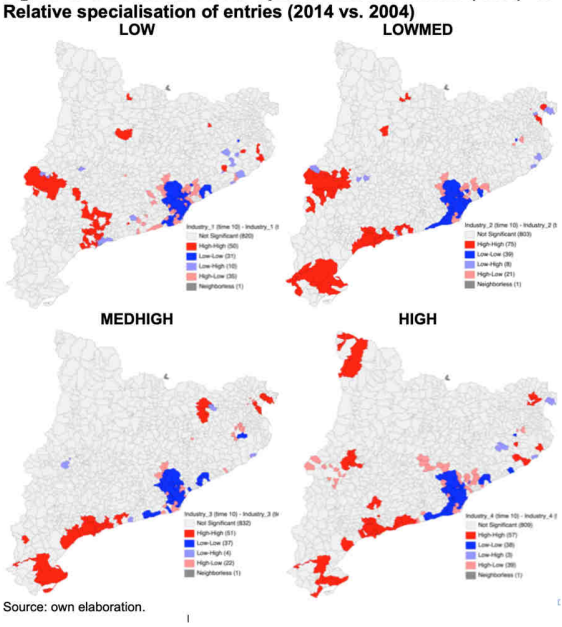


Source: own elaboration.

Local measures of spatial autocorrelation (LISA) show that for most of industries there is no empirical evidence of clustering, except that for LOWMED industries in, noticeably, three clusters at central Catalonia (9 municipalities), South of Lleida (6 municipalities) and at Camp de Tarragona metropolitan area (3 municipalities).

Changes in clustering (see Figure 3) are proxied using LISA methods in order to analyze whether local changes of entries at industry level move in the same/different direction than in neighbor areas. Results show a dual pattern for the four industries consisting on low-low locations at metropolitan area of Barcelona and high-high locations at the metropolitan areas of Camp de Tarragona and Lleida and, partially at Terres de l'Ebre region. Although results are quite similar, that de-concentration process is stronger for LOWMED industries.

Figure 3. Differential Local Spatial Autocorrelation (LISA) of Relative specialisation of entries (2014 vs. 2004)



Source: own elaboration.

Finally, results of econometric specification show slightly different effects across typologies of firm entries (see Table 1), although additional work is to be done in order to fully identify location determinants.

Agglomeration economies have a lower importance than expected over firms' decisions, as total employment has no effect over entries no matter the industry, density of manufacturing establishments attracts only LOW industries, population density has a positive and significant effect only for HIGH industries and, differently, income level per capita increases number of entries for all industries.

Table 1. Determinants of entries: baseline specification[a]

	ALL	LOW	LOWMED	MEDHIGH	HIGH
Employment	5.34e-05	1.67e-05	3.81e-05	4.16e-05	4.98e-05
	(6.51e-05)	(3.22e-05)	(4.84e-05)	(5.53e-05)	(5.86e-05)
Establishments	0.00944	0.0332***	0.0134	0.00697	-0.000689
	(0.0149)	(0.00824)	(0.0135)	(0.0165)	(0.0162)
Population	0.000216	-0.000100	0.000164	0.000261	0.000290*
	(0.000138)	(7.40e-05)	(0.000116)	(0.000169)	(0.000162)
Income	0.000136***	7.59e-05**	0.000105***	0.000142***	0.000144***
	(3.20e-05)	(2.97e-05)	(2.82e-05)	(3.72e-05)	(3.35e-05)
Distance	-3.64e-06	-1.13e-05***	-4.05e-06	-4.86e-06	-5.46e-06
	(3.76e-06)	(4.05e-06)	(3.85e-06)	(4.15e-06)	(4.01e-06)
Rail	0.893***	1.031***	0.942***	0.973***	0.847***
	(0.207)	(0.295)	(0.201)	(0.248)	(0.274)
Capital	1.217***	1.489***	1.251***	1.350***	1.356***
	(0.445)	(0.378)	(0.430)	(0.471)	(0.464)
Specialization	0.133	0.250***	0.116	0.0833	0.00452
	(0.0972)	(0.0895)	(0.0874)	(0.104)	(0.0984)
Waste	-0.00171	-0.00636***	-0.00147	-0.00132	-0.000812
	(0.00254)	(0.00215)	(0.00265)	(0.00314)	(0.00295)
Cons.	-0.286	-0.664	-0.609	-1.888**	-1.454*
	(0.748)	(0.710)	(0.711)	(0.920)	(0.790)
lnalpha	0.488***	0.196	0.337**	0.630***	0.709***
	(0.123)	(0.234)	(0.137)	(0.219)	(0.180)
N	941	941	941	941	941
Pseudo R-squared	0.143	0.194	0.157	0.180	0.177
ll	-2503	-1064	-1890	-1312	-1522

Notes: [a] The dependent variable is the number of entries
*** Significance at 1%, ** significance at 5% and * significance at 10%. Standard errors between brackets.
Source: Own elaboration

Geography only matters for LOW industries, as larger is the distance from Barcelona smaller is the count of new firms. This is an interesting result that highlights advantages of agglomeration in large metropolitan areas. Transport is also an important determinant, as having a rail station at the municipality increases number of entries from all industries (although the effect is bigger for LOW industries). Institutional issues are also important, as demonstrated by the variable Capital that identifies municipalities that are county capitals. Environmental values matter only for LOW industries, as higher is the local effort in waste separate collection lower is the count of new firms belonging to LOW industries, but this effect is not significant (although negative) for the rest of industries.

Additional policy interventions should be designed in order to faster global transition towards more sustainable economic activities.

Policy Implications

Results from this paper indicate that although there is a growing public concern about sustainability issues, firm entries in developed countries still include an important number of activities belonging to less sustainable industries. This is of key importance as global changes in terms of moving towards more sustainable activities include not only the way in which goods and services are provided, but also the profile of activities, typology of inputs and production processes carried out by firms.

As data from this paper suggests that changes are slower than expected, additional policy interventions should be implemented in order to faster global transition towards more sustainable economic activities. These interventions may imply i) incentives to attract entries of more sustainable activities both in a direct (e.g., subsidies, tax burdens, etc.) and in an indirect way (e.g., local and regional infrastructures); but also ii) regulatory restrictions to prevent the location of new plants of specific targeted industries (e.g., those belonging to LOW industries).

To sum up, our preliminary results show that structural changes towards more sustainable activities are very slow, only partially clustered, and do require specific policy actions in order to boost the process.

Conclusions

This paper has analyzed the spatial distribution of entering firms in Catalan municipalities through the period 2004-2014 focusing on the sustainability dimension of the industries to which these firms belong. Concretely, we have built up a sustainability classification and we have grouped entering firms into 4 groups using a NACE 2-digit classification: LOW, LOWMED, MEDHIGH and HIGH.

Overall, our results show that i) there is a clear agglomeration of entries in and around main metropolitan areas, especially in Barcelona; ii) the sustainability profile of entries is quite steady during the whole period, although location shares of firms from less sustainable industries decrease; iii) specialization patterns from a spatial point of view are unclear; iv) even if local clusters of entries at industry level are so scarce, there are some geographical regularities that indicate common entry patterns for areas larger than municipalities; and v) there are some areas (noticeably at the metropolitan area of Reus-Tarragona) where clustering of entries increases at the same time that it decreases at the metropolitan area of Barcelona no matter the industry.

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References

Anselin, L. (1995): "Local Indicators of Spatial Association - LISA", *Geographical Analysis* **27 (2)**: 93-115.

Bansal, O. and Roth, K. (2000): "Why companies go green: a model of ecological responsiveness", *The Academy of Management Journal* **43 (4)**: 717-736.

CPCB (2016): Final Document on Revised Classification of Industrial Sectors Under Red. Orange, Green and White Categories, Central Pollution Control Board: Delhi.

Meek, W.R.; Pacheco, D.F. and York, J.G. (2010): "The impact of social norms on entrepreneurial action: Evidence from the environmental entrepreneurship context", *Journal of Business Venturing* **25**: 493-509.

List, J.A. and Co, C.Y. (2000): "The Effects of Environmental Regulations on Foreign Direct Investment", *Journal of Environmental Economics and Management* **40**: 1-20.