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Natural clusters: Why policies promoting agglomeration are unnecessary

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Governments spend heavily on industrial clusters. They are wasting their money if firms naturally cluster to reap agglomeration gains. This column presents evidence from France that questions policymakers' enthusiasm for promoting clusters.

Policymakers love to promote industrial clusters. Since the end of the 1980s, national and local governments in Germany, Brazil, Japan, South Korea, Spanish Basque country, and France, inter alia, have attempted to foster their development. And they haven't done it on the cheap – the French government recently devoted €1.5 billion to "competitiveness clusters". Why are politicians so keen on clusters and is the money well spent?

Agglomeration economies

Clusters are hot. "Location, competition, and economic development: Local clusters in a global economy" by Michael Porter (2000)[1], the leading figure of cluster strategies, is one of the most cited works of the last thirty years. Porter's definition of a cluster – "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" – mirrors what other economists call an agglomeration of a given industry.

The idea that firms perform better when located near other firms in the same sector is hardly new. In the late nineteenth century, Alfred Marshall identified the benefits of clusters or industrial districts[2], what economists now call "localisation economies". There are 3 main sources of agglomeration externalities, which were first analysed by Marshall and later rediscovered by Kenneth Arrow and Paul Romer as the Marshall-Arrow-Romer (MAR) externalities:

- Input externalities: concentration of producers in a given industry generates incentives for input suppliers to locate nearby. As a consequence, producers can share specialised services, save on transportation costs, or purchase inputs more efficiently.
- Labour market externalities: industrial clusters favour the creation of pools of specialised workers, who acquire cluster-specific skills valuable to the firms. Clusters could also improve the functioning of labour market through a better matching between employers and employees.

- Knowledge externalities: industrial clusters facilitate the exchange of information and knowledge and seem to be a form of organisation particularly favourable to technological and knowledge spillovers.

Agglomeration economies are not restricted to intra-sectoral externalities. Geographic concentration offers many potential inter-industry spillover benefits, as documented, for example, in Jane Jacobs' seminal work on the benefits of urban diversity.[3] Economic geography thus suggests a variety of possible gains from agglomeration, and economists have worked to identify how and when different intrasectoral and inter-sectoral forces shape economic activity.

Policy evaluation

The existence of gains from agglomeration does not mean that clusters should be subsidised. There are too many good things in the world to subsidise them all. Spending public money to foster clusters is only wise if there is evidence that public policy might tap into significant unrealised gains from agglomeration.

Thus, advocates of cluster policies need to address two questions.

1. How large are the gains from agglomeration? In particular, how much does the productivity of a firm increase when other firms from the same sector decide to locate nearby?
2. Do firms internalise these gains when making their location decisions? In particular, are "natural" clusters too small?

Empirical findings

We tackle these two questions in recent research, using French firm-level data from 1996 to 2004.[4] Our findings?

In a nutshell, agglomeration economies do exist. Their size, however, is nothing miraculous and firms internalise a substantial share of these gains when making their location choices. As a result, the observed clustering of firms in France is not obviously suboptimal, and so not obviously in need of big subsidies.

We are obviously not the first to quantify gains from agglomeration. The survey of Rosenthal and Strange (2004)[5] mentions many empirical studies on agglomeration economies. In these studies, the doubling of the size a cluster (generally measured as employment of a given sector in a given region) leads to a productivity gain between 3% and 8%.

But the estimation of agglomeration economies is difficult. Agglomerated areas may simply enjoy better endowments (public infrastructure, climate etc.) and therefore attract more productive firms. Naïve estimate would thus overestimate the benefits of agglomeration. Moreover, most studies use aggregate data, whereas theory invites us to assess the impact of geographic agglomeration of activities at the firm level. Our use of firm-level panel data

allows us to appropriately address endogeneity concerns and measure agglomeration externalities in a manner very close to the micro theories.

Vernon Henderson, who was the first to use plant-level data, found a positive and significant elasticity of 8% in the American high tech industry.[6] Using our much larger dataset for the whole manufacturing sector, we find a smaller elasticity: a 10% increase of employment in neighbouring firms of the same industry increases a firm productivity by around 0.4-0.5%. Proponents of clusters are thus right that gains exist, but their enthusiasm should be tamed; these effects are not very large.

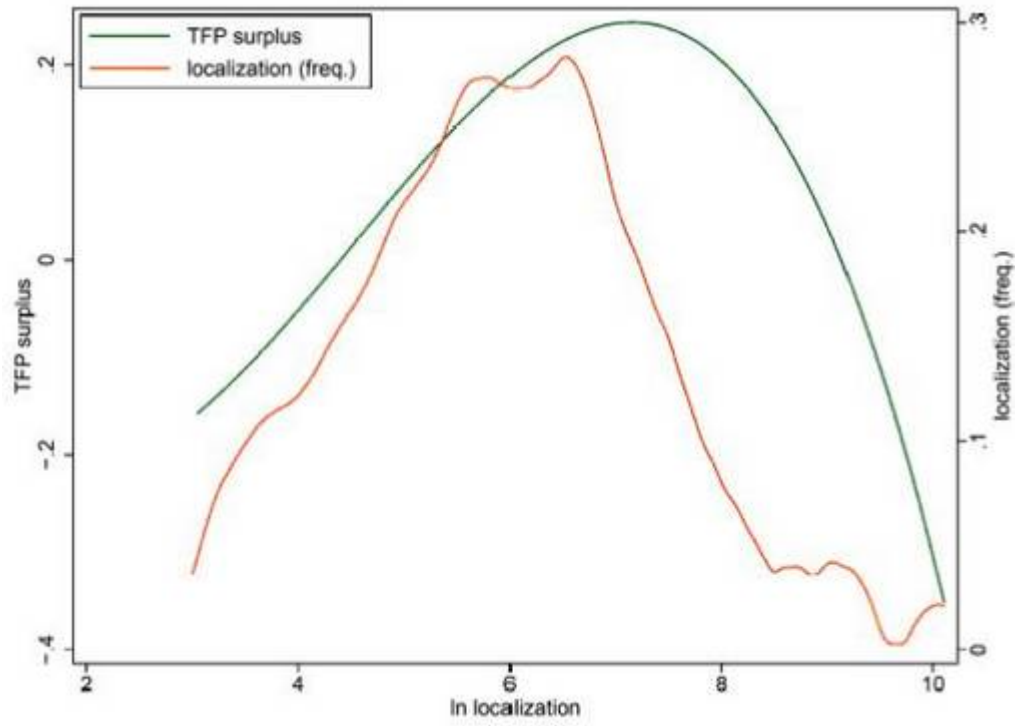
Nonetheless, evidence of agglomeration gains has important implications for several policy debates on the economic geography of Europe, in particular with respect to regional policies. Agglomeration has positive economic benefits in terms of productivity. Hence, policies that attempt to foster more dispersion of economic activities in order to reduce regional inequalities, in particular inside countries, have efficiency costs.

Is policy intervention required?

Do market forces deliver clusters that are the appropriate size to capture these gains from agglomeration? While agglomeration provides productivity gains, there are also congestion costs (such as the saturation of transport infrastructure, rising land rents, pollution etc.), which must necessarily dominate at some level of agglomeration. If this were not the case, one would conclude that the observed geography, where all firms of the same sector are not located in the same region, is vastly suboptimal.

In fact, we find that the relationship between productivity gains and agglomeration is bell-shaped and we are able to estimate the peak agglomeration that maximises the productivity gains[7]. Our estimate for the French Employment areas (there are 341 employment areas in continental France) is the grey line in Figure 1.[8]

Figure 1. Localisation economies



Given our estimate, a French firm would maximise its total factor productivity gain (TFP) by locating in a French employment area hosting about 1270 employees of the same sector. When we compare the estimated distribution of productivity gains with the observed distribution of firms in France (shown in red on the same graph), there is strikingly little difference between the two. This suggests that firms do internalise gains from clusters when they make their location choices.

A more precise examination of the data confirms that hypothesis. A firm relocating from the observed peak (650 employees in the same sector and employment area) to the optimal point would enjoy productivity gains of only about 2%. These numbers suggest that clusters may be a bit too small but there are no large economic gains to reap by drastically altering French economic geography. Firms do internalise the gains of clustering and it is easy to understand why: a firm moving from a location with no other workers to a location with 650 employees in the same sector (the peak of the observed distribution in France) would gain 25% in TFP. However, going to an "over-crowded" area (with more than 9000 employees) would eliminate these TFP gains. Economic geography matters a lot – and firms know it.

Conclusions

Our results suggest that the starting point of cluster-policy advocates is right – clusters do bring economic benefits – but their conclusion is not. The reason is simple. Firms take into account most of those benefits in their location choice. Costly public interventions aimed at increasing the size of clusters is not a policy that is supported by the French evidence. Whether cluster policies can, for a given size of clusters, improve collaboration, the exchange of information and knowledge externalities between firms remains to be tested.

Footnotes

1 Porter (2004), "Location, Competition, and Economic Development: Local Clusters in a Global Economy," *Economic Development Quarterly* 14(1): 15-34.

2 Marshall, A. (1890): *Principles of Economics*. Macmillan, London.

3 Jacobs, J. (1969): *The Economy of Cities*, Random House.

4 Martin, P. and T. Mayer and F. Mayneris (2008), "Spatial concentration and firm-level productivity in France", CEPR DP 6858.

5 Rosenthal, S. S., and W. C. Strange (2004): "Evidence on the nature and sources of agglomeration economies," in Handbook of Regional and Urban Economics, ed. by J. V. Henderson, and J. F. Thisse, vol. 4 of *Handbook of Regional and Urban Economics*, chap. 49, pp. 2119-2171. Elsevier

6 Henderson, J. V. (2003) : "Marshall's scale economies," *Journal of Urban Economics*, 53(1), 1-28.

7 Au and Henderson (2006) analyze this question for Chinese cities and also find a bell-shaped curve: "Are Chinese Cities Too Small?," *Review of Economic Studies*, 73(3), 549-576.

8 The horizontal axis that shows the number of workers in the same area and the same sector as the firm is in logarithmic scale. On the vertical axis, the TFP gain is relative to the average firm.

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