



OXFORD

Gilles Duranton
Philippe Martin
Thierry Mayer
Florian Mayneris

THE ECONOMICS OF CLUSTERS

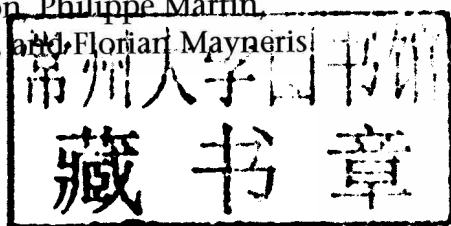
Lessons from the French Experience

STUDIES OF POLICY REFORM
CEPREMAP | CEPR | PSE

The Economics of Clusters

Lessons from the French
Experience

Gilles Duranton, Philippe Martin,
Thierry Mayer, and Florian Mayneris



OXFORD
UNIVERSITY PRESS

OXFORD

UNIVERSITY PRESS

Great Clarendon Street, Oxford OX2 6DP

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide in

Oxford New York

Auckland Cape Town Dar es Salaam Hong Kong Karachi

Kuala Lumpur Madrid Melbourne Mexico City Nairobi

New Delhi Shanghai Taipei Toronto

With offices in

Argentina Austria Brazil Chile Czech Republic France Greece

Guatemala Hungary Italy Japan Poland Portugal Singapore

South Korea Switzerland Thailand Turkey Ukraine Vietnam

Oxford is a registered trade mark of Oxford University Press
in the UK and in certain other countries

Published in the United States

by Oxford University Press Inc., New York

© CEPREMAP, 2010

The moral rights of the authors have been asserted

Database right Oxford University Press (maker)

First published 2010

Reprinted 2011

All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any means,
without the prior permission in writing of Oxford University Press,
or as expressly permitted by law, or under terms agreed with the appropriate
reprographics rights organization. Enquiries concerning reproduction
outside the scope of the above should be sent to the Rights Department,
Oxford University Press, at the address above

You must not circulate this book in any other binding or cover
and you must impose the same condition on any acquirer

British Library Cataloguing in Publication Data

Data available

Library of Congress Cataloging in Publication Data

Library of Congress Control Number: 2010936874

Typeset by SPI Publisher Services, Pondicherry, India

Printed in Great Britain

on acid-free paper by

MPG Books Group, Bodmin and King's Lynn

ISBN 978-0-19-959220-3

3 5 7 9 10 8 6 4 2

Acknowledgements

We thank Gordon Clark, Daniel Cohen, Pierre-Philippe Combes, Ed Glaeser, Henry Overman, Michael Pflüger, Frédéric Robert-Nicoud, William Strange, and Matt Turner for very helpful comments on earlier versions of this book.

Contents

1. Introduction	1
1.1. The resurgence of clusters and cluster policies	1
1.2. Not much existing analysis	6
1.3. Why France is interesting	10
1.4. A summary of what comes next	14
2. The Economic Rationale of Clusters and Cluster Policies	20
2.1. A very simple model of clusters	20
2.1.1. Clusters in the policy literature: what is the rationale?	20
2.1.2. Modelling clusters	27
2.1.3. The simple mechanics of clusters	33
2.1.4. What should cluster policies do?	41
2.2. Clusters in a more realistic world	51
2.2.1. Congestion and other frictions	51
2.2.2. Cluster policy in a dynamic setting	54
2.2.3. When cluster policies can turn ugly: political economy	59

Contents

2.3. Some elements towards local economic development policies	62
2.3.1. 'Pay more attention to the cost curve than the productivity curve'	62
2.3.2. 'Go for growth, sometimes'	64
2.3.3. 'Central governments, let them compete'	68
3. The Evolution of French Economic Geography	73
3.1. Gini and Ellison–Glaeser: definitions	73
3.2. The evolution of concentration in France during the past twenty years	75
3.3. What explains these evolutions?	77
3.3.1. Correlation coefficients	77
3.3.2. Graphical analysis	79
4. Measuring Economic Gains from Clusters	87
4.1. Does clustering make clusters prosperous?	87
4.1.1. How to measure clusters?	87
4.1.2. Cluster productivity benefits exist but are modest	93
4.1.3. The channels through which clustering benefits clusters	102
4.2. Methodology to assess the causal impact of agglomeration	107
4.3. Data and variables	111
4.3.1. The French annual business survey	111
4.3.2. The variables	112
4.3.3. Construction of the sample	115
4.3.4. Summary statistics	116

4.4. The strength of agglomeration economies	119
4.4.1. Which type of agglomeration economies?	119
4.4.2. Is the impact of localization economies large?	120
4.5. Additional issues on localization economies	123
4.5.1. Employees, firms, or plants externalities?	123
4.5.2. Localization economies and distance	125
4.5.3. Agglomeration and knowledge spillovers	126
4.5.4. How are cluster benefits distributed?	129
4.6. Is there insufficient clustering?	130
4.6.1. Localization vs. congestion effects	131
4.6.2. Optimal vs. observed geography	133
5. Public Support for Clusters: A Case Study on French 'Local Productive Systems'	137
5.1. Introduction	137
5.2. Does policy affect location? A review	138
5.3. What are the 'Local Productive Systems'?	142
5.3.1. The policy	142
5.3.2. The data	143
5.3.3. Are LPS industries different?	145
5.3.4. Are LPS firms different?	147
5.3.5. How are LPS allocated?	149
5.4. Do firms gain from the LPS policy?	149
5.4.1. LPS and single-plant firms	153

Contents

5.4.2. Clusters and subsidies: does money matter?	157
5.4.3. LPS: additional issues	158
Conclusion	158
<i>References</i>	164
<i>Index</i>	175

1

Introduction

This book is about an old phenomenon that has recently caught the imagination and excitement of policy makers. Clusters are indeed nothing new. Some of the clusters like the City of London or Sheffield and Thiers's specialization into cutlery have been going on for hundreds of years. At least since Alfred Marshall's (1890) *Principles*, the tendency for industries to cluster in some areas and the economic benefits that come with this type of concentration have fascinated economists and geographers alike. However, it is only quite recently that policy makers joined the wave and began to include clusters in the set of instruments they can use for their industrial or regional policy agenda.

1.1 The resurgence of clusters and cluster policies

There are several reasons for this new popularity of cluster policies. The first is probably related to Silicon Valley's

iconic example. Following its success, clusters have come to be seen by many as the magical formula for regional development, innovation, and growth. European clusters may be less famous than the American ones, but several have developed on a similar model. The cluster of Cambridge (sometimes called SiliconFen) and the French cluster Minalogic in Grenoble are now well established in the fields of microelectronics and software, whereas the Biovalley (Strasbourg, Basle, and Freiburg), Stockholm, Munich, and Cambridge have become leading clusters in bio-technologies. Second, Porter's (1990) book on the competitive advantage of nations and his subsequent work have also been extremely influential and successful at promoting cluster policies.

Behind these two related impulses, we attribute the popularity of cluster initiatives to two deeper causes. First, 'traditional' industrial and regional policies have fallen into disrepute. To caricature the situation in many countries until the 1980s, there was a simple division of labour within the policy mix of countries. Industrial policy was in charge of boosting 'competitiveness', often by spurring the development of national champions. It was sometimes conflated with and complemented by science and technology policy. Regional policy, on the other hand, was concerned by equity consideration. For many years, the UK and France attempted to decentralize economic activity away from their main region of concentration, Greater London and Greater Paris, respectively. In Italy, there were sustained attempts at relocating economic activity from the prosperous North to the

impoverished South. Canada has tried to foster the development of its poorer maritime provinces, etc.

During the 1980s and 1990s, both sets of policies, industrial and regional, started to be viewed as failures. Industrial policy was costly and failed to transform national champions into world champions. Regional policy, however sustained, was seemingly unsuccessful at reducing regional disparities. Traditional industrial and regional policies were both abandoned or reduced to a minimum by the turn of the century. This apparent debacle of traditional instruments left a policy void.

Second, and unlike traditional industrial and regional policies which are conducted only by the highest level of governments, cluster policies can be implemented by all levels of governments. Hence the 'market' for cluster policies is much larger than those for traditional regional and industrial policies. In the USA, where the federal government has traditionally been reluctant to conduct either industrial or regional policy, many sub-national jurisdictions have turned to cluster policy instead.

It should be clear however that cluster policies are not a modern reincarnation of traditional industrial and regional policies combined. There are two differences. First, unlike old-style regional policy, equity considerations are not officially the main concern of cluster policies. Quite the opposite, by actively pushing firms to cluster, this type of strategy could deprive poor regions of any chance to attract economic activities. Second, a cluster policy is more demanding in terms of information than traditional industrial policies are as it requires to

pick not only the 'right' industries but also the 'right' territories. It is interesting to note that one of the fathers of Silicon Valley, Frederick Terman, who was the vice-president of Stanford University, was unable to replicate this experiment in New Jersey a few years later when called upon by the Bell Laboratories (Leslie and Kargon 1996). There exists actually very few examples of public policies that were successful in promoting clusters.

We believe that bringing more economic analysis to the study of clusters is a worthwhile endeavour. Cluster building and cluster development are now widely viewed as key pillars of several public policies with diverse objectives ranging from local development to innovation and competitiveness. There are countless cluster initiatives and policy reports calling for cluster strategies. This movement in favour of cluster policies has impacted many European countries and regions in the last thirty years. For instance, the European Cluster Observatory provides detailed reports about cluster initiatives in more than thirty European countries.¹ The Spanish Basque country was a pioneer in that matter. At the end of the 1980s, the economic situation of the Spanish Basque country was very bleak, with old industries and a high level of unemployment above the Spanish average. In that context, the Basque government asked Michael Porter to make a territorial diagnosis in order to redefine the economic strategy of the region. At the beginning of the 1990s, a few 'priority' clusters were identified, some

¹ See <http://www.clusterobservatory.eu/>.

of them in traditional industries (machine tools, harbour activities, etc.) and some others in more leading-edge industries (aeronautics, ICT, etc.), on which local authorities concentrated on R&D projects, cooperative training programmes, etc. The Basque region improved its performance with respect to other Spanish regions in terms of employment and wealth. The Basque unemployment rate became significantly lower than the Spanish one in the second half of the 1990s. This success has been attributed to the cluster strategy, and the example of the Spanish Basque country is often cited by European advocates of cluster policies. The German federal government chose in 1999 a strategy more directly based on information-sharing. It created a label, the 'Kompetenznetze' (networks of competence), for the 'best' German clusters. The label allows members to benefit from advertising through the website <http://www.kompetenznetze.de> and from actions aimed at promoting relations between firms, scientists, and investors within and across industrial fields. In France, the Local Productive Systems policy, implemented at the end of the 1990s, attempted to favour collaborative projects between firms from the same industry and located in the same area; we present this policy in more detail in Chapter 5. Finally, in 2006 and 2008, the European Commission published two papers² in which it encouraged member states to integrate cluster strategies in their national innovation

² *Putting Knowledge into Practice: A Broad-Based Innovation Strategy for the EU*, COM(2006) 502 and *Towards World-Class Clusters in the European Union: Implementing the Broad-Based Innovation Strategy*, COM(2008) 652.

programmes. The Commission also commits to provide assistance to countries in terms of experience-sharing. Moreover, several instruments of the European Union aimed at financing innovation and regional policy are dedicated to clusters. These actions, sometimes very different in their contents and their scale, have in the end a non-negligible financial cost. This is the case for example of, *inter alia*, the French 'competitiveness clusters', a policy implemented for three years starting in 2005 and extended to 2009–11 (1.5 billion euros for each phase), the 'BioRegio' programme (75 million euros from 1995 to 2005), and the 'Innovative Regional Growth Cores' programme (150 million euros since 2001) in Germany or the 'Production Industries in London' initiative (15 million euros for 2006–8) and the 'Northwest regional economic Strategy' (45 billion euros in 2006–9) in the UK.

1.2 Not much existing analysis

The analysis on clusters falls into one of three groups. First there are many 'policy' papers and reports on the subject. Among many, see for instance Department of the Environment, Transport, and the Regions (2000), Council on Competitiveness et al. (2001), Department of Trade and Industry (2001a), OECD (2001), European Commission (2003), Sölvell et al. (2003), Cortright (2006), and the many references therein. It is also possible to look at the papers of the recent TCI annual global conferences at <http://www.competitiveness.org/>.

This strand of literature is generally very favourable to cluster initiatives. As economists, our judgement on this literature is quite critical because proponents of cluster policies rarely call for a quantitative evaluation of the costs and benefits of these policies. The evaluation, when it exists, is usually a 'qualitative' and mostly descriptive exercise.

The second type of work on clusters is often done by geographers and sociologists. Their work is very useful to sharpen our understanding of how clusters work and what happens inside them. The path-breaking work on Italian 'industrial districts' edited in Pyke et al. (1990) provided numerous insights and a wealth of empirical evidence raising the awareness about clusters. This work has now developed into a large literature that has looked at hundreds of clusters (or closely related objects that are designated by different names) empirically and theorized on a variety of issues related to the benefits from clustering.

A complete review of this literature does not belong here. Interested readers could refer to, *inter alia*, Storper (1997), Maskell (2001), or Martin and Sunley (2003), for broad introductions. Here, it is enough to highlight that this literature mainly complements our work. A lot of the focus of geographers is on the detailed examination of the workings of clusters. The classic work of Saxenian (1994) on Silicon Valley is only the tip of a large series of case studies of clusters. One could also cite excellent work by Henry and Pinch on the British Motor Valley in a series of articles (see, for instance, Henry and Pinch

2000), etc. Related theoretical work is then used to theorize more broadly about the origins of the benefits from clustering. There is a strong emphasis on the benefits of proximity for the generation of new knowledge (Cooke 2001) and its circulation (Bathelt et al. 2004). To some extent, and along with the corresponding literature on those issues in economics (Duranton and Puga 2004), we use it as a foundation for some relationships within clusters that we do not fully explore.

Geographers also produced important insights for policy. Much of the cluster literature in geography rightly emphasizes two aspects. First, there seems to be a lot of heterogeneity, even among well-functioning clusters. Although this focus on the 'specific', as opposed to more general features of clusters, is sometimes viewed as a professional bias of geographers, it usefully cautions us about broad, one-size-fits-all policy proposals. Second, the benefits of clusters appear to rely on very subtle relationships that can take a broad variety of forms (Markusen 1996; Gordon and McCann 2000). Sometimes, they rely on competitive market interactions. At other times, they rely on non-market interactions, be they strong personal links or specific local institutions. These subtle advantages of existing clusters seem hard to replicate by policy. We return to this discussion below.

Despite these important insights, the geography literature is of limited interest for our purpose here. First, its focus is mostly on the benefits from concentration, which are often explored in great detail, whereas many

of the costs of concentration and the imperfect mobility of factors are simply not part of the analysis. Put differently, the approach of geographers is too 'partial equilibrium' whereas we need a more 'general equilibrium' focus (though Storper 1997 is an exception). Second, geographers do not usually quantify their findings and have a tendency to shy away from policy discussions (Markusen 2003). The purpose of our work is instead to provide policy-relevant quantifications of the costs and benefits of clusters.

Finally, economists have showed some renewed interests in issues surrounding the location of economic activity. This new impetus can be traced back to Krugman (1991) on the theory side and Glaeser et al. (1992) on the empirical side. The economic analysis of cities and clusters is mostly concerned with assessing the benefits of concentration of economic activity and clustering as they happen in the 'real world'. Even though this literature on the evaluation of agglomeration economies has interesting implications for economic policy, it does not offer to date an evaluation of cluster initiatives. What this body of work actually does is to broadly confirm the starting point of cluster policies: clustering brings economic gains. In particular, firms' performance improves when they are located close to other firms in the same sector. However, these gains are modest. Our analysis of the French case confirms both the existence of gains from clustering and the fact that they are quantitatively modest. Importantly, the fact that gains from clustering exist is a necessary but not a sufficient condition to