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1. Introduction

There is increasing interest in the role of economic geography in explaining differences in prosperity levels across locations (World Bank, 2009; Spence et al., 2009). Different strands of the academic literature have contributed to this debate. The New Economic Geography approach applies models with increasing returns and mobile factors to explain the emergence of regions with different density of economic activity (Royal Swedish Academy of Science, 2008). The work on clusters (Porter, 1990, 2008; Ketels, forthcoming) breaks this analysis down to the level of regional agglomerations of companies, research institutions, government agencies, and others in a specific area of business activity related through various knowledge and economic linkages. Related approaches have looked at regional innovation systems (Cooke, 1992; Gertler/Asheim, 2006), industrial districts (Becattini, 1990; Porter/Ketels, 2009), and locations home to a ‘creative class’ (Florida, 2003).

While there is widespread agreement that ‘geography matters’, there is little consensus on whether there is a case for policy. Arguments are made for (Porter, 2008, 2007) and against (Duranton, 2007); some authors acknowledge the theoretical case for intervention (Norman/Venables, 2004) but point out the complex implementation issues that render practical success unlikely (Venables, 2008). In the meantime, practitioners have made their choice: many governments have initiated cluster programs and numerous cluster initiatives have been created (Borras/Tsagdis, 2008; Oxford Research, 2008; Yusuf et al., 2008; Zeng, 2008; Davies, 2006; Pietrobelli/Rabelotti, 2006; Freser, 2005; Sölvell et al, 2003).

This article discusses the current state of the academic debate on cluster policy, providing an extensive but by no means exhaustive review of the quickly growing literature. The first part of the article summarizes the key findings about the existence and impact of clusters. It then reviews the work on the emergence and evolution of clusters, a topic particularly important for policy that ultimately aims to change the trajectory of such paths’. The second part of the article addresses the issue of cluster policy. It sets out by presenting the basic theoretical argument for cluster policy. It discusses two opposing understandings of how cluster policy should be conducted. Their different underlying definitions of what cluster policy is, it is argued, are at the heart of the different opinions about the use of cluster policy. The following discussion of actual cluster programs finds their vast majority to be very different from those that the critics have in mind. A final section then discusses issues of implementation that have a crucial influence on whether and when cluster policy is beneficial and how large these benefits might become.
2. Clusters as building blocks of a modern economy

2.1 Clusters and economic performance

Economic activity is distributed unequally across space. The density of overall economic density differs widely across geography, and has significant implications for productivity and prosperity across locations (World Bank, 2009; Porter, 2004). At the level of narrow industries, some are distributed across regions in line with the distribution of aggregate economic activity, while others deviate strongly from these overall patterns and concentrate heavily in a few locations (Porter, 2003). Furthermore, among the industries with strong geographic specialization identifiable groups of industries – clusters - tend to systematically co-locate in the same locations (ibid.). Regional economies end up with different specialization profiles reflecting the presence of those clusters that have located there.

Marshall (1890) was the first to argue that clusters emerge because of specific benefits that firms can enjoy from locating close to others engaged in related activities. The conceptual and empirical work on these benefits that drive divergence across regions has focused on three main mechanisms: First, there is the potential to attract more specialized suppliers and interact with them more efficiently (Amiti/Cameron, 2007). Second, there is a labor market that is deeper and provides more specialized skills (Eriksson/Lindgren, 2008; Huber, 2010). And third, there are knowledge spillovers through different channels that one can only tap into locally (Aharonson et al., 2007; Thompson, 2006; Audretsch/Feldmann, 2003). There is significant empirical evidence for each of these sources to matter (Ellison/Glaeser/Kerr, 2010; Dauth, 2010) with their relative weights driven by cluster-specific factors.

Countervailing effects hold the unfettered push towards co-location in clusters in check and drive convergence across regions. Competition for specialized labor and other inputs among companies in the same industry raises the cost levels within clusters. The intense rivalry with direct competitors in a cluster cuts into the margins that companies can charge. There is clear evidence that these factors matter as well, especially at the level of narrow industries (Braunerhjelm/Thulin, 2009; Delgado/Porter/Scott, 2010b). The tendency of economic activities to co-locate depends on the balance between these opposing forces. Clusters emerge where the forces for divergence dominate. Activities remain local when the forces for convergence dominate. Clusters typically account for about a third of total employment (U.S. Cluster Mapping Project, 2008; European Cluster Observatory, 2008).

The size of the cluster sector is largely a reflection of broad patterns in economic composition, especially the degree of service-orientation the economy has reached. The pattern of specialization within the cluster sector, however, turns out to be an important driver of economic performance. Regions with a presence of strong clusters, i.e. high levels of
specialization in groups of related industries, do better in terms of wages, FDI attraction, productivity, and prosperity (Porter, 2003; Bobonis/Shatz, 2007). While none of these studies prove causality, they are indicative of the close relationship between clusters and economic outcomes. Differences in cluster specialization could explain around one third of the difference in GDP per capita levels between the US and Europe (European Commission, 2007).

Clusters are obviously not the only driver of regional prosperity. A large body of literature argues that a broad range of fundamental factors, including the nature of institutions, the quality of factor conditions, the openness of markets and the geographic location itself, are critical (Gallup et al., 1998; Hall/Jones, 1999; Sachs/ Warner, 2002) The competitiveness approach (Porter, 1990) integrates clusters into a comprehensive framework building on these ideas. Clusters amplify the strengths that the fundamentals provide but are dependent on them and cannot substitute for their weaknesses.

In the economic geography literature, the pure size of economic activity in a region is discussed as another candidate to explain prosperity differences across regions. There are two varieties of this argument: One approach argues that cross-cluster spillovers are more important than within-cluster spillovers, so that absolute size and density instead of relative specialization...
matter most (Brülhart/Sbergami, 2008). Another approach argues that heterogeneity, i.e. the absence of specialization, in high-density urban regions is critical for ‘creativity’ (Florida, 2003; Jacobs, 1961). Both of these models suggest the emergence of a very unequal world, i.e. a few prosperous large regions (core/urban) and many poor small regions (periphery/rural). The cluster model is instead consistent with a world where all regions of similar fundamentals can reach similar levels of size and prosperity if they develop different specialization patterns.

A number of empirical studies look at all three dimensions, i.e. cluster specialization, the quality of economic fundamentals, and the degree of urbanization, and (Lall/Mengistae, 2005; Brülhart/Mathys, 2007; Carlino/Hunt, 2007; McDonland et al., 2007; Fritsch et al., 2008; DeGroot et al., 2008). There is no clear consensus across these studies but the overall evidence suggests that all three play an independent role. Looking at the two dimensions related to geography, there is some evidence that cross-cluster agglomeration remains the dominant force in developing economies, while it is losing power in advanced economies where cluster specialization plays an increasing role (Word Bank, 2009; Brülhart, 2009; Krugman, 2008). The Cluster specialization explains a significant share of prosperity differences among the EU-15, a group of broadly similar competitiveness, but is much less powerful among the EU-25, where differences in competitiveness are much stronger.

Recent studies indicate that specialization and diversification are not necessarily in conflict: The advantage of large metropolitan areas seems to be that they can combine both, i.e. due to their size create sufficient critical mass in individual clusters while supporting an overall portfolio of clusters that provides a breadth of knowledge and capabilities. And the advantage of diversification seems to be strongest when it happens in ‘related clusters’, i.e. in activities that share common aspects of knowledge or capabilities. High specialization in a narrow industry supports high levels and growth of productivity. Employment growth, however, is likely to occur in related industries within the cluster, not in the already highly present industry itself where competition for input factors drives up costs (Delgado et al., 2010a).

The positive impact of cluster strength on economic performance works through a number of distinct channels (Porter, 1998). Companies within clusters achieve higher levels of productivity (Boasson/MacPherson, 2001; Greenstone et al., 2010; Cho/Yamawaki, forthcoming). They can, because the presence of specialized suppliers and service providers reduces reaction times and the need to keep higher levels of working capital. They must, because the intense competition on input and end markets enforces a constant focus on efficiency improvements and the adoption of best practices. The effect of higher competition is felt not only by companies but also by employees that are seen to work longer hours in strong clusters (Rosenthal/Strange, 2008). Companies within clusters reach higher levels of innovation (Audretsch/Feldmann, 2003; Moreno et al., 2004; Fornahl et al., 2010). The cluster environment creates stronger pressure to
innovate, a richer source of relevant ideas, and lower costs of turning ideas into new products and services. There is emerging evidence that the impact of clusters is particularly strong on the commercial use of knowledge, not just the creation of knowledge (Sölvell/Protsiv, 2008). Clusters finally provide a beneficial environment for entrepreneurship. New companies are more reliant on external assets and capabilities than incumbents. This leads to higher levels of entry in cluster environments (Guiso/Schivardi, 2007; Freser et al.; 2008; Glaeser/Kerr, 2009). More importantly, survival rates and firm growth are higher in clusters as well (Audretsch/Dohse, 2007; Delgado at al., 2010a; Wennberg/Lindqvist, 2008).

2.2 Cluster evolution

Clusters exist and have an important impact on economic outcomes. But how they emerge? The knowledge about the processes of cluster evolution is still largely case-based. This literature suggests that clusters emerge where economic transactions across locations are feasible and there are location-specific factors that provide a nucleus for cluster development.

The first condition is crucial for cluster dynamics to become relevant but often neglected in policy discussions. Where trade across locations is inhibited, the productivity benefits of clusters are irrelevant and the seeds of cluster evolution have no opportunity to come to fruition. The much longer history of deep market integration in the US compared to Europe is very likely to be an important driver of the stronger cluster profile of many US regions. This also suggests that the reduction of trade barriers due to globalization is going to boost the role of clusters, even when individual clusters experienced everything from explosive growth to fast decline (Rabelotti, 2001): Incumbent clusters with strong inherent position grow as they can serve a larger market. Incumbent clusters that were the result of trade barriers and had only a relative advantage in serving a limited geographic market, however, come under increasing pressure. And new clusters grew where rising competitiveness and advantageous cost positions provide a platform to serve global markets. Quite tellingly, the outsourcing of economic activities to emerging economies has again taken place in clusters (Enright et al., 2005).
For the second condition, a number of different types of nuclei have been found to play a role. Endowments of natural resources or the geographic location close to trading routes often play an important role. Specific elements of the business environment, for example the presence of a strong university or unique local demand conditions, can trigger the development of a cluster (Braunerhjelm/Feldmann, 2006; Bresnahan/Gambardella, 2002). Individual companies, be it entrepreneurial start-ups or investments from elsewhere (Manning, 2008), can through spin-offs and the attraction of other companies ‘anchor’ clusters that may develop sufficient independent strength to survive the demise of the initial anchor (Treado/Giarratani, 2008). A factor that has attracted increasing attention is the role of existing clusters as a breeding ground for new clusters. There is strong evidence that new clusters register much stronger employment growth, if they are related to clusters already strong in a region (Delgado et al., 2010a). Consistent with these findings, the specialization profile of regions has been shown to develop in a path dependent process of related diversification (Neffke et al. 2009).

A growing literature looks at the life cycle of clusters (Bergmann, 2006). Many clusters seem to follow an s-shaped development path. After an (often long) phase of slow gestation a cluster reaches a size where cluster effects set in and growth accelerates. This growth than becomes self-reinforcing; cluster effects reach their full scale and growth explodes. Eventually, growth moderates as the cluster reaches its market potential and congestion effects become more
relevant. Some clusters then manage to reinvent themselves, finding a new market or technology to ignite a next phase of cluster dynamisms. Others, however, get locked into existing technologies and eventually shrink as their markets disappear or other clusters develop more dynamism (Saxenian, 1994; Maskell/Malmberg, 2007). This thinking finds its reflection in the work on regional economies (Audretsch et al., 2008).

The limitation of these existing studies is that they work well backwards, i.e. track the path of successful clusters, but have only limited predictive power, i.e. are able to identify clusters that eventually blossom already early in their life cycle. Many case studies suggest that the process of cluster development is complex and fragile (Feldman/Francis, 2004). Chance events might play a significant role, especially in the early stages of cluster evolution (Storper/Walker, 1989). The literature has identified a number of factors that spur cluster development. But there is no comprehensive model that integrates these factors. And there are virtually no robust empirical studies on their relative importance (Van der Linde, 2003, analysis a large number of case studies) or their sufficiency in triggering the growth of successful clusters. This creates a significant challenge for policy makers hoping to influence the emergence and development of clusters.
3. Cluster policy

Cluster research over the last twenty years has to a large degree focused on establishing clusters’ role in the market success of companies and the performance of regions. Not surprisingly, the evidence that clusters are important for economic success has attracted the interest of policy makers. But while there is an emerging consensus on the usefulness of clusters as an analytical tool, at least the academic discussion on cluster policy remains far from any consensus.

Practitioners, meanwhile, have over the last few years launched an impressive number of cluster policy programs. This revival, after a first wave of interest in the wake of Porter’s “Competitive Advantage of Nations” had lost steam (See Aranguren et al., 2006 on the experience of the Basque country, one of the early adopters of cluster policy), was driven largely by a growing frustration of policy makers with traditional approaches at a time when pressure to increase competitiveness was growing (Davies, 2007; Freser, 2005).

There is no widely accepted definition of cluster policy. We define cluster policy to include all efforts by governments, alone or in collaboration with companies, universities, and others, that are aimed at enhancing the competitiveness of clusters. This excludes efforts by other entities acting alone, for example pure private cluster initiatives, and general government policies that are not directed at clusters (but might affect them).

3.1 The theoretical motivation for cluster policy

Economists consider policy interventions as justified when specific conditions exists that reduce the ability of the normal market process to lead to optimal outcomes from an overall welfare perspective. Such ‘market failures’ provide the traditional motivation for economic policy. The local externalities that give rise to clusters create a number of such market failures:

- Coordination failures exist, because individual companies consider in their decisions, be it whether to locate in a cluster or what investments to undertake being there, only the impact on themselves, not on others.

- Information asymmetries exist, because even if the incentive problems of taking account if the impact of own actions on others could be managed, the knowledge necessary to make the right ‘social’ decision is dispersed among the many participants of the cluster.

- Path dependency exists, because decisions of cluster participants today affect the possible evolutionary path of the cluster in the future. Coordination failures and information
asymmetries in making these decisions thus have a dynamic dimension as well. And social and private discount rates might differ, creating an additional source of market failure.

Where cluster policy addresses market failures, it does not reduce global welfare. Under some assumptions, the free competition between rational governments in supporting clusters even leads to the best possible outcome, not a race to the bottom (Norman/Venables, 2004). While these arguments do not prescribe specific policy interventions, they give some guidance on the direction that cluster policy should take. Policy intervention should always target the market failure at the source. Policy can subsidize activities that are underprovided because of coordination failures or differences in discount factors. And policy can facilitate platforms for collective action to overcome coordination failures and informational asymmetries.

Policy approaches can be compared on both the impact that they generate, i.e. addressing the problem or market failure, and the costs they might create, i.e. distortions or government failure. Policies that target individual companies are highly effective but also very distortionary. Policies that target the entire economy have little if any distortionary effect but are often also not very effective. Policies targeted at individual industries come somewhere in the middle on both accounts. Cluster policy, however, offers a superior mix of benefits and costs. It is
organized around a group of industries that by definition have strong linkages. Targeting policy at them will thus not only be effective but even trigger additional benefits from positive spillovers that are induced. And while the policy is neutral within the cluster where competition for factors of production is the strongest, it is distortionary only relative to activities outside the cluster where by definition other skills and assets are needed. While some distortion remains, the approach promises a potentially better balance of effects.

In practice, efforts to address market failure are never perfect (Rodrik, 2008). They suffer from government failure in implementation (lack of knowledge to target the intervention, inability to provide incentive-neutral financing, political pressure by interest groups for beneficial treatment, etc.) and might have unintended side-effects, creating collateral costs that outweigh the benefits. This is also true for cluster policy and has led to a debate on whether cluster policy is useful or harmful.
3.2 The theoretical debate about cluster policy

In the academic debate, the strongest criticism of cluster policy does not come from researchers that claim that locational factors are irrelevant, but from economic geographers and others that fully support the view that locational factors are important. Some criticize the “fuzzy” nature of the cluster framework (Martin/Sunley, 2003). This criticism raises some important conceptual issues, but has little relation to the practical problems policy makers face when deciding on whether and how to implement cluster policy. It has also been challenged on more conceptual grounds (Benneworth and Henry, 2004; Motoyama, 2008).

Others provide a more fundamental criticism of the motivation for cluster policy (Duranton, 2008) that turns out to be highly revealing for how the lack of a generally accepted definition of cluster policy continues to hamper the debate. To understand the different views on cluster policy, it is useful to go back to a simple diagram that relates agglomeration to competitiveness. The evidence discussed in chapter 2 points towards a positive relationship between the two, a fact that is generally accepted by critics as well as supporters of cluster policy (as discussed previously there are differences in the view on how strong this relationship is relative to other factors). But how should cluster policy intervene to move a location from a place at the bottom left to the top right? This is where the fundamental difference sets in:

![Diagram](Figure 5)

**Figure 5**

Two Perspectives on Cluster Development

**MORE**

(Agglomeration)

**BEFTER**

(Competitiveness)
One approach sees agglomeration as the central policy lever; as agglomeration rises, competitiveness will naturally follow as cluster effects set in. With agglomeration the ultimate goal, efforts to attract companies through incentives — from tax rebates to free infrastructure — naturally come to the forefront of the policy debate. Economic geography-based approaches, too, look at the effects of traditional tax, trade, and regional policies on agglomeration patterns (Baldwin et al., 2003). Dynamic ‘new economic geography’ models provide guidance on when and how these instruments should be used to have a maximum impact (Brenner, 2008, 2003): the process of agglomeration in these models is characterized by important break-points at which economic geography patterns are determined. For economic policy, this implies that intervention has to be early, i.e. at a time when the locational patterns of where a dominant cluster will be located has not been determined yet. And it has to be massive, i.e. it has to give such a meaningful boost that the location gains sufficient critical mass to be far ahead of all potential rivals. And it implies a critical role for identifying a small number of clusters on which economic development then hinges.

If large-scale targeted subsidies in the early phase of cluster emergence are the policies under discussion, should they be used? Not only critics of cluster policy come to a negative answer: such policies are likely to fail because they require an abundance of information and ability in the hands of the policy maker. And there is debate as to whether such policies could even have a sufficiently strong effect: Some find that as current economic geography is aligned with the fundamentals, policies that encourage a marginal company to change location have very limited impact on the productivity of other companies (Martin/Mayer/Mayneris, 2008). Others get opposite results with significant implications on the productivity of companies in the proximity of companies that changed location (Greenstone et al., 2010).

Another approach sees competitiveness as the central policy lever; as competitiveness rises, agglomeration will naturally increase as the cluster becomes more attractive for new entrants (Roriguez-Clare, 2005a). With competitiveness the ultimate goal, clusters become a process tool to design and implement policies more effectively, not an ultimate objective. The instruments then targeted at existing clusters are well known from innovation policy, regional policy, and enterprise policy. They are supplemented by actions that specifically support collaboration in their use and that create platforms for collaboration within an agglomeration. The competitiveness literature, including the insights on cluster evolution provide guidance on when and how to use these instruments that is radically different from the model cluster policy critics have in mind: The focus should be largely on agglomerations that have already passed the test of the early stages of development (Roriguez-Clare, 2005b). This indicates that the fundamental conditions for economic success are in place and active collaboration can become a ‘turbo’ for the use of strengths already in place. The focus of policy interventions should be on enabling collaboration and channeling existing resources in a different way, using moderate
amounts of new funding. Large new funds are not necessary and could be harmful by increasing the potential for distorting incentives. And while a selection of clusters is necessary to be able to deploy sufficient resources and attention on any one initiative, economic development is the result of many clusters in all regions flourishing, not just a few per country.

If these are the policies under discussion, should they be used? Even the critics of cluster policy have a slightly favorable view: Improvements in the fundamentals of competitiveness are a sensible goal and the suggested approach limits the downside. But they remain skeptical about whether cluster efforts can have a sufficiently strong impact on improving underlying competitiveness. Proponents of cluster policy, meanwhile, see enough evidence that such efforts can in fact lead to a much more meaningful improvement in the way policies for higher competitiveness are being conducted (Waits, 2000; Cortright, 2006; Mills et al., 2008; Porter, 2008).

There remains a fair amount of disagreement in the debate about cluster policies. At least part of this disagreement is related to a lack of effective communication between theoretical research and policy practice. This communication failure leads to a fundamental disconnect on what cluster policy is and how it is related to competitiveness upgrading. For many researchers, improving competitiveness is fundamentally an automatic process, driven by the self-interest of companies and politicians. For most practitioners, improving competitiveness is a complex challenge of identifying action priorities and mobilizing allies to implement them. Cluster policy can potentially give an answer to these real challenges that practitioners face, challenges that the critics assume will be taken care of automatically over time.

### 3.3 The practice of cluster policy

The number of cluster programs launched by governments around the world has exploded in the last few years. There is significant heterogeneity in objectives, tools, and — as far as can be already seen — results.

Most cluster programs, especially in advanced economies, pursue traditional economic policy objectives in new ways:

- The field in which cluster programs have been most widely adopted is *innovation policy*. France (Pole de Competitivite), Germany (Spitzencluster), Japan (Industrial Cluster Program - METI, Knowledge Cluster Initiative – MEXT), Sweden (Vinnvaxt), and most recently the US (i6 Challenge program) have launched efforts in this direction, all trying to foster leading innovation clusters in the respective country. The Chilean cluster program (run by InnovaChile Corfo) is an example of a similar program in an emerging
economy. Many of them are open to all types of clusters, while some focus on specific categories like Biotech (German BioRegio competition) or Energy (US E-RIC program).

- A close second is **regional policy**, where the main objective is to spur regional growth. Examples include the RDA cluster efforts in the UK, the multiple cluster programs of German and Austrian states, and the SBA Regional Innovation Cluster program in the US. These programs are focused on mobilizing all clusters that can contribute to a region’s prosperity, not only those that are the most competitive.

- A third, more heterogeneous, group includes programs that aim to upgrade company sophistication, mainly for **SMEs**. The German Competence Networks program falls broadly in this category. A range of EU-supported efforts aims at helping SMEs to internationalize. Many programs funded by aid organizations in developing and emerging countries, for example the IADB cluster program in Colombia or the SEBRAE’s cluster program in Minas Gerais (Brazil), are of a similar nature, often with a specific focus on enhancing exports (Ketels et al., 2006).

- Then there are specific programs where clusters have been used as an organizing principle in other areas, for example the WIRED program in the US on **workforce skill development** or Invest:Sweden’s or ProsperAr’s (Argentina) cluster approach to **investment attraction**.

- A final, quite different group includes efforts that aim to drive **diversification** through the development of new clusters. Examples include the cluster program in Saudi-Arabia, the cluster efforts in many of the Gulf countries, and many similar efforts in Asia, from Singapore to China. There are also numerous efforts in regions across the OECD to create new “high tech” clusters, with the most popular targets having shifted from IT to life sciences to “creative” and clean energy clusters.

Cluster programs differ significantly in the tools they use, not only their objectives. This is also the dimension in the contrasts to traditional policy approaches are often more pronounced:

- The vast majority of programs rely on **financing of specific activities conducted in the cluster**. In advanced economies, these financing structures differ in two important ways from traditional policies: First, many of them require the creation of a cluster initiative structure to be eligible for funding. There is no funding for individual companies. Second, an increasing number allocates money in competitive process. There are no criteria that if met lead to automatic eligibility for government support. All of the innovation policy-related efforts mentioned above follow this model. The regional programs listed also require cluster collaboration structures but not all of them have a strong competitive element. In emerging economies, the approach is often quite
different: Funding, directed credit, or tax incentives are provided to companies in target sectors, much as in traditional industrial policy programs. Many Asian countries but also OECD regions with ambitious plans to attract new clusters have used this approach.

- Another group of programs provides or supports cluster management. Especially the Austrian and some of the German state-level programs operate in this way. In Germany, the program for regional development was specifically changed to allow the funding of cluster management activities. The EU has recently started to launch a number of efforts directed at improving cluster management practice through training, networking, and the provision of tools for cluster managers. Many of these programs are designed to enable a better of the financing schemes discussed above.

- The final group of programs offers direct support in the form of infrastructure, other input factors, or specific regulatory environments relevant to specific clusters. This is one of the preferred instruments in countries and regions that aim to attract new clusters. Dubai, for example, has made extensive use of free zones (finance, media, semiconductors, etc.). Singapore’s Biopolis, too, provides physical infrastructure as well as other incentives.

While cluster programs are getting better understood, there is still painfully little systematic data on their impact. The limited quantitative evidence points to moderate positive effects (Engel/Henrik, 2004; Dohse, 2007; Christensen et al., 2007; Dohse/Stähler, 2008; Falk et al., 2008; Fromholt-Eisebith/Eisebith, 2008). The reviews of individual programs tend to find positive returns for the participants and an increased capacity for joint action (see, for example, the review of the Swedish Vinnvaext program by Cooke et al., 2007) but strong economic results are hard to pin down. Successful cluster development is to a large degree a function of strong economic fundamentals and a significant existing co-location of related activities (Lindqvist et al., 2003). Cluster programs can supplement strong fundamentals and affect cluster development, but are very unlikely to create clusters on their own (Konakayama/Chen, 2007; Meier zu Köcker, 2008; Sölvell, 2008; Wolfe, 2008).

While there is no dramatic empirical evidence of the effectiveness of cluster programs, programs that have steered free off attempts to create clusters seemed to have fared at least as well as the traditional policy programs governments use. Compared to this real benchmark instead of the theoretical benchmark of an ideal policy, cluster programs have come out relatively well. Consistent with this view, the cluster policy debate among practitioners has in the last few years shifted from a focus on whether to launch programs to how to organize them (see, for example, High Level Advisory Group on Clusters, 2008).
3.4 Challenges in the practice of cluster policy

Practitioners and policy makers discuss many details of how cluster programs should be designed. The effective engagement of the private sector, the combination of local with global linkages, and the measurement of impact are often mentioned as key questions. In this section three particular issues are discussed, that have broader conceptual importance and require a practical answer in terms of appropriate cluster program design.

A first challenge is how to scale up the impact of cluster programs. Simple arithmetic suggests that working with one cluster in a region, even if the cluster is a large one, is unlikely to generate economic outcomes that are meaningful for an overall regional economy. The average regional cluster accounts for about 1% of total employment in a region (European Cluster Observatory, 2008), larger clusters maybe up to five times as much. Upgrading one such cluster will tend to have only a moderate impact on the regional economy at large. There are a number of ideas for how cluster policy can be designed to affect the wider regional economy (Pietrobelli/Rabelotti, 2004; High Level Advisory Group on Clusters, 2008; Ketels, 2009). Locations should take a portfolio perspective on their cluster efforts, addressing the different needs of clusters at different stages of development and leveraging the linkages across clusters. They should leverage the experience of the cluster efforts for economy-wide improvements. And locations should integrate their cluster efforts into a broader economic strategy that identifies the specific value that the location provides relative to its peers.

A second challenge is how to spur the development of new clusters. The evidence discussed so far indicates that cluster programs work best for strong established clusters. But the limitations of a cluster policy limited to “strengthening the existing strengths” is obvious for less advanced economies and regions in a process of structural change (Ketels/Memedovic, 2008; Landabaso, 2001). A number of recent papers suggest that diversification efforts are more likely to succeed, if they are designed to leverage the presence of existing clusters for a push into related fields (Hausmann/Klinger, 2007; Delgado et al., 2010a). These ideas have informed a discussion about ‘smart specialization’ as a new concept for regional policy in Europe (Foray et al., 2009), which suggests using existing cluster structures provide the basis for the development of region-specific development strategies. Identifying the potential for new economic activities is seen as a role that only companies can play. The significant positive external benefits that it generates provide theoretical motivation for governments to support this discovery process (see more broadly also Lin/Monga, 2010).

A third challenge is when to use cluster programs versus more traditional policy approaches focused on cross-cutting framework conditions. The evidence discussed so far indicates that cluster programs work best, if the fundamentals in the economy are strong. But in emerging and developing economies there are almost by definition significant weaknesses in these
4. Conclusions

Cluster policy is a field under dynamic development where the clarity of the conceptual discussion has not always kept pace with the efforts of practitioners. While there is an emerging consensus of the role of clusters in the modern economy, the discussion on a workable theory of cluster policy is still very much ongoing. The absence of a consensus on the usefulness of cluster policy is to a large degree the consequence of confusion about what cluster policy actually is. If cluster policy is understood as a tool to artificially change the nature of economic geography, there are many conceptual and practical arguments against its use. If, however, cluster policy is seen as a way to leverage existing agglomerations as platforms for collaboration to enhance cluster dynamics and as more effective channels to deliver economic policies, it has much potential.

Whether or not cluster policy can fulfill this potential, is not only a matter of achieving more clarity in a conceptual debate that is too often conducted in the parallel worlds of different, isolated research traditions. It also depends on the way cluster policy is implemented in practice. The number of efforts to improve the actual practice of cluster management and cluster policy design has increased significantly over the last few years. Academic research has to a large degree been too detached from the reality of the problems practitioners face to be of much help.

Further progress in the cluster policy debate will have to be driven by more data. For clusters, there is now an increasing amount of quantitative data that have enabled a new wave of empirical research. For cluster policy, there is nothing comparable. The impact assessments that exist look at individual cases one-by-one and tend to be focused on improving the specific policy program in place, not on broader learnings about better cluster policy. This is a start, but more has to follow.
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