



## **Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition**

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Economic policy, especially at the Federal level, has traditionally focused on opposite poles. On one extreme, policymakers have sought to improve the general business environment that affects all firms. This occurs through policies such as macroeconomic stabilization, tax policies to encourage saving, investment and R&D, public investments in colleges, universities and physical infrastructure, and antitrust regulations.<sup>1</sup> On the other extreme, policies have sought to benefit the competitiveness of individual firms and individual workers. There are many such policies, including loan guarantees from the Small Business Administration and the Export Import Bank, technical assistance programs, training support for qualifying workers, procurement policies targeting small businesses, and SBIR grants.

Traditionally, policies aimed at levels in between the general business environment and individual firms have been widely discredited, and rightly so. Industrial policy, which focuses on policy to support individual industries, is distortive and interventionist. Picking winners, and supporting them through subsidies and protection, rarely succeeds.

Another questionable policy focus has been on support for manufacturing, based on the dubious assertion that manufacturing activities have special importance for the economy. However, the distinction between manufacturing and services is increasingly blurred and arbitrary. Many manufacturing jobs require limited skills and are migrating to low wage locations. Today, it is not manufacturing that makes for good jobs, but the level and technology and skills involved.

Yet an important locus for economic policy, in between the general economy and individual firms and industries, has been largely ignored, especially at the Federal level. If we look closely at modern

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<sup>1</sup> Many Federal policies to address the general business environment are national in scope, such as Federal taxation and antitrust. Other policies are implemented through states or in some cases through localities, such as transportation infrastructure financing and workforce development. States have been gaining more discretion in recent decades in program implementation.



economies we observe another important economic unit, which is clusters.<sup>2</sup> Clusters are geographic concentrations of firms, suppliers, support services, specialized infrastructure, producers of related products, and specialized institutions (e.g., training programs and business associations) in a particular field. Clusters often involve a mix of manufacturing and services, and combine industries in different parts of traditional industrial classification systems. Clusters, then, as an economic unit are very different from sectors (such as manufacturing) or industries. Examples of U.S. clusters are money management in Boston, light aircraft in Wichita, entertainment in Los Angeles, information technology in Silicon Valley, and boat building in Maine. Clusters are a striking feature of every advanced economy.

Clusters are dense networks of interrelated firms that arise in a region because of powerful externalities and spillovers across firms (and various types of institutions) within the cluster. Clusters drive productivity and innovation. Firms that are located within a cluster can transact more efficiently, share technologies and knowledge more readily, operate more flexibly, start new businesses more easily, and perceive and implement innovations more rapidly. They can also efficiently access “public goods” such as pools of specialized skilled employees, specialized infrastructure, and the like. Because of the importance of physical proximity in reaping cluster benefits, clusters are often regional instead of national except in small countries such as Singapore.

The mix of clusters varies markedly across regions. Each regional economy has a relatively small number of traded clusters in which the region competes with other regions and countries. These clusters account for a major portion of the region’s traded goods and services. There is no national economy, then, but a set of regional economies with its own particular pattern of cluster specialization that trade with each other and the rest of the world. Such regional specialization drives productivity and productivity growth in the national economy. There is also growing evidence that regions with stronger clusters achieve better economic performance.<sup>3</sup>

Clusters represent an increasingly important economic unit, but one that has been all but ignored in policymaking at the Federal level in the United States. In this paper, I describe why clusters are a prominent feature of modern economies and why a role for public policy at the cluster level is justified by economic theory. Cluster-based policies should increasingly replace industry-level and firm-level policies, because cluster policy is more efficient, minimizes distortion to competition, and is better

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<sup>2</sup> For a description of the concept of clusters and their impact on competition, see Porter (1990) and (1998).

<sup>3</sup> The empirical literature on the role and impact of clusters is growing. See Feldman and Audretsch (1999); Swann et al., (1998); Porter (2004); and Delgado, Porter, and Stern (2008).



aligned with the nature of modern competition. I then sketch some implications of clusters for policy at the Federal level.

### **The Growing Role of Clusters in Competition**

Clusters have long been a feature of economic geography, but their influence on competition has grown with the shifting nature of competition and the restructuring of how companies operate. Competition in advanced economies is increasingly driven by knowledge and skill, as low cost labor resources are accessed in cheaper locations. Clusters play a fundamental role in knowledge creation, innovation, the accumulation of skills, and the development of pools of employees with specialized expertise.

At the same time, firms have migrated from vertically integrated structures, in which they perform most activities internally, to structures involving the outsourcing of many activities and functions to outside entities. Outsourcing includes not only traditional parts production, support services, and the like, but also contract manufacturing, managing IT systems, training, and even research and development. Outsourcing takes place not only to other firms but to non-business entities such as technical schools, university research units, and industry association programs.

Clusters consist not only of large firms, but have proliferated the opportunities for small and medium sized firms to fill important needs and niches in the cluster. Large firms continue to grow and internationalize, but the preponderance of job creation has been in smaller firms for the last several decades. Increasingly small and medium-size firms compete internationally, not just large ones.

Cluster networks span groups of tightly connected industries linked by supplier-buyer relationships, common technologies or skills, and other forms of externalities. Biopharmaceutical and skin care producers often co-locate in the same cluster locations, for example, because they draw on common skills, research programs, manufacturing needs, and packaging. Cluster externalities often extend across political boundaries to neighboring regions, which recent empirical evidence has verified.<sup>4</sup>

A given cluster may overlap with other clusters. For example, biopharmaceutical clusters, chemical clusters, and medical device clusters tend to locate in the same regions because of externalities in technology, sourcing, and other areas. Regions with a presence in overlapping clusters are more

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<sup>4</sup> See Delgado, Porter, and Stern (2008)



competitive, as new statistical research has demonstrated.<sup>5</sup> Also, diversification of regional economies often takes place as new clusters emerge related to clusters already present.

In an era of globalization, clusters have grown more, not less, important. Falling barriers to trade and investment have exposed more and more locations to competition, allowing strong clusters to grow stronger while ineffective locations lose position. Globalization neutralizes many sources of competitive advantage that can be sourced or accessed by any firm from a distance, such as cheap labor, raw materials, or generic technology. Paradoxically, this means that the advantages of clusters are **more important** in global competition, not less so. As firms depend more on outside firms, support services, and local institutions, it becomes more important to locate within a strong cluster to access benefits that are difficult for outsiders to tap.

Clusters normally arise at the level of regions or economic areas, not entire countries, because of the importance of proximity to cluster benefits. This is why regional economies have become a more crucial unit in understanding economic performance, and why regional economies specialize. Economic policy, then, must not just focus on the national level but the regional and local levels.

### **Measuring Clusters**

While the existence of clusters has been long recognized, the ability to systematically measure clusters and examine their influence on regional performance is relatively recent. Most work on clusters has utilized ad hoc cluster definition based on the judgment of the analyst. While this work has advanced our knowledge, new tools have been developed to define cluster boundaries and measure the overlaps among clusters more rigorously. The Cluster Mapping Project at Harvard Business School has utilized the locational correlation of employment in pairs of industries to define cluster boundaries across the entire economy.<sup>6</sup> The data reveal 41 clusters, each of which can be divided into a number of subclusters. The Cluster Mapping Project utilizes these definitions to map the cluster composition of every Economic Area in the U.S., and show how the mix and strength of clusters in each region has been changing. The data also allows an analysis of employment, employment growth, wage rates, and patenting by cluster for each region, as well as measures of overall regional performance.

**Figure 1** shows a map of the U.S. which reveals the leading clusters for a selection of regions.

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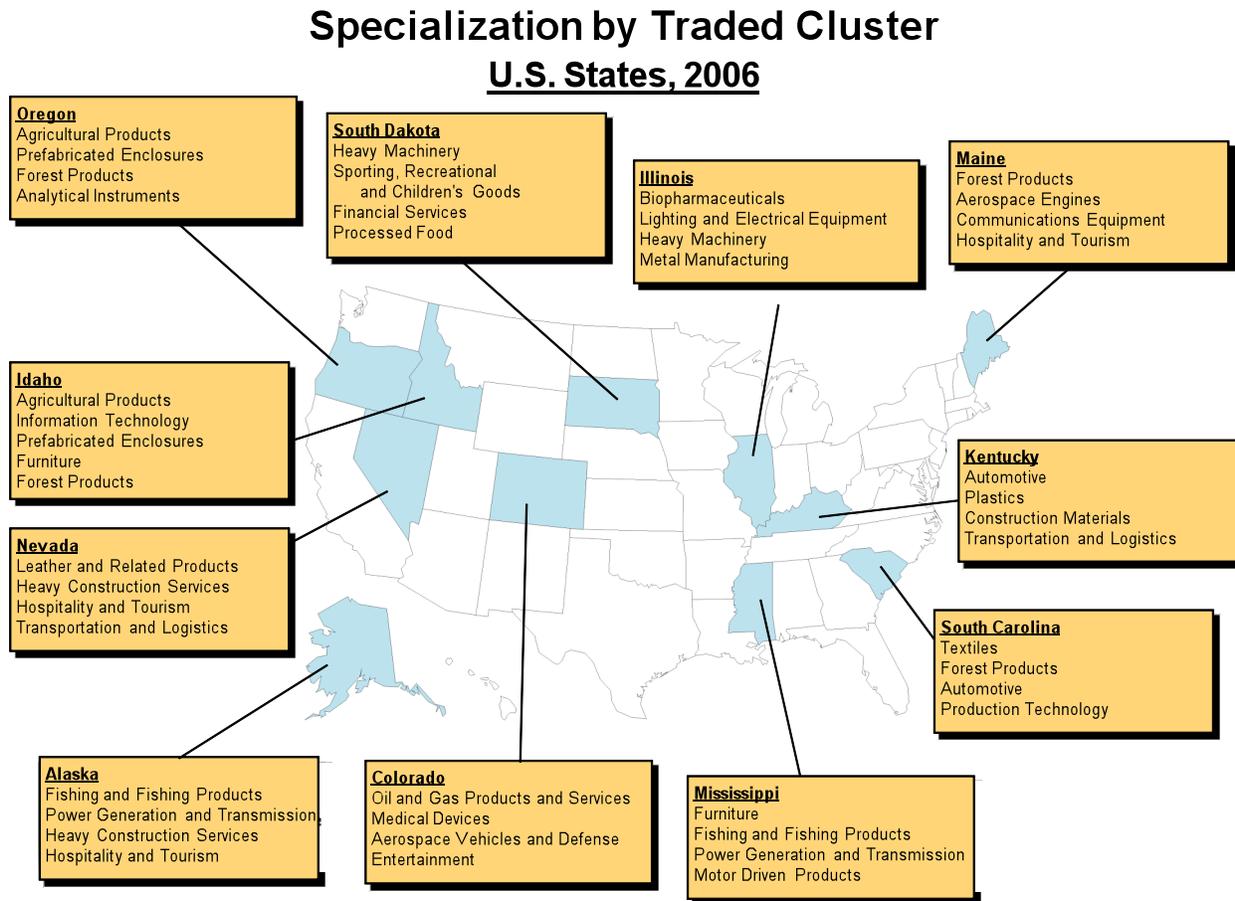
<sup>5</sup> See Delgado, Porter, and Stern (2008)

<sup>6</sup> For a description, see Porter (2003) and the Cluster Mapping Project at <http://www.isc.hbs.edu/cmp/index.html>.



On average, the top five clusters account for 52% of traded employment in Economic Areas. The average Economic Area has seven clusters with a location quotient of 1.5 (a measure of cluster strength) or above, signifying disproportionate representation of the cluster in the region.

Figure 1



These data allow a description of regional economic geography in the U.S. and an analysis of its causes. It also provides an objective definition of those clusters in which a particular region has a meaningful presence. This provides a sounder basis for cluster policy than previous ad hoc approaches.



While such data is currently available only for the U.S. and Canada, a less detailed cluster mapping of the European Community using consistent definitions is now available.<sup>7</sup> Similar efforts are underway or being planned in some other countries.

### **The Role of Public Policy in Clusters**

Clusters emerge spontaneously based on market forces, and the process of cluster formation will occur naturally as new firms form, suppliers develop, infrastructure investments respond to needs, specialized institutions grow, and established firms locate operations in growing cluster concentrations. Given such spontaneous economic processes responding to market signals, should clusters just be left alone to develop naturally?

Since clusters involve powerful externalities across firms in a location, and associated public goods, there is a strong rationale for public policy. In the presence of positive externalities, market failure will lead to underinvestment in specialized skills, scientific knowledge, and specialized infrastructure that benefits the entire cluster while increasing competition through lowering the barriers to entry of new firms. Public policy that provides rules and incentives for capturing external economies will improve productivity and, with it, job and wage growth.

Public policy at the cluster level should begin with information that identifies the existence of clusters, which can be obscured by standard industrial classification systems. Government has an important role in providing information about cluster composition, membership, employment, and performance. Such information will allow public policies and public investments to be aligned with business needs, based on the cluster presence in each location. This will make public policy more relevant and effective. Cluster information will also increase the efficiency of private sector investment and foster new business formation to capitalize on cluster presence and capabilities.

Another potential role for government in cluster development is to convene cluster participants if private sector institutions have not already arisen to do so. Once organized, government agencies need to become active participants in dialogs with cluster participants to understand constraints to productivity and identify gaps and weaknesses in public policy that need to be addressed.

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<sup>7</sup> European Cluster Observatory, "European Cluster Observatory," European Cluster Observatory Web site, <http://www.clusterobservatory.eu/>, accessed December 2008.



Another dimension of cluster policy is incentives to spur collective investment by cluster participants in assets that benefit many cluster participants, such as university research centers, community college curricula, or testing facilities. In some cases, public investment areas involving cluster externalities benefitting cluster participants are justified.

Public policy at the cluster level, in contrast to the industry or firm level, avoids the inefficiencies, moral hazard, potential distortions, and dubious rationale of many narrowly targeted policies such as loan guarantees for particular firms, or single industry technical assistance programs. The case for a public role in training, for example, is much stronger at the cluster level than at the industry or firm level because training investments will benefit numerous firms with little risk of distorting competition.<sup>8</sup>

Cluster-based policies, unlike sectoral or industrial policies, are **neutral** with regard to industry or type of economic activity. In cluster theory, all clusters are good. Enhancing cluster externalities and spillovers will increase productivity and prosperity in **any** cluster. Hence government should not choose among clusters but create policies that support upgrading in every cluster present in a location. Cluster policy is thus fundamentally different from sectoral or industrial policy, whose fatal flaw is their focus on favoring particular types of economic activity, picking winners, and attempting to artificially bias competition in favor of a particular country or region. Cluster-based policy also mitigates against the collusion risk present in industrial policy because of the involvement in clusters of suppliers, customers, and other actors rather than just competing firms in a single product area.

### **Implications of Clusters for Federal Policy**

There is also a strong rationale for cluster-based economic development policies at the Federal level, in addition to at the regional level. A cluster approach will foster positive cluster externalities, and allow Federal policies to be implemented more effectively by better connecting them to actual state and local economies. In addition, Federal policy based on cluster principles will reinforce economic specialization across states and regions, increasing productivity and productivity growth. Thus, cluster-based policies reinforce a positive sum competition across states and regions, rather than the current approach where Federal investments can distort economic geography through subsidies or political influence.

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<sup>8</sup> Note that there is a rationale for public investment in training even at the firm level because trained workers may leave an individual firm but benefit the economy as a whole. Here, firms will underinvest in training from society's viewpoint.



Cluster-based Federal policy should embody the following principles:

1. Avoid Policies Oriented Towards Individual Firms and Industries

Unless there are compelling market failures at the firm level, such as the well known incentive for individual firms to underinvest in technology, Federal and even state policies targeted at the level of individual firms are to be avoided. They will be inefficient, producing limited benefits and involving high implementation costs. They run grave risks of introducing subsidies and other market distortions into competition. Policy at the industry level shares many of these problems, while failing to address the linkages across industries and institutions that drive productivity. Industry-based policies can also limit competition and foster collusion. In cluster-based policies, collusion is checked by the participation of suppliers, channels, independent institutions, and other actors, that will police anticompetitive actions by any one group.

2. Use Clusters as an Integrating Approach to Federal Economic Policy

Currently, there are disparate, uncoordinated Federal economic policies covering a wide array of discrete policy areas. Clusters provide an integrating mechanism for bringing these policies and programs together in a strategy for improving competitiveness. Policy design and coordination can be improved substantially.

3. Organize the Implementation of Federal Economic Programs Around Clusters

There are numerous Federal economic development policies and programs such as workforce development, export promotion, investment attraction, infrastructure investment, product regulation, and others. Such programs have been appropriately criticized as often fragmented, duplicative, and inefficient. Federal economic development programs will be more effective and efficient if they are restructured so as to be implemented using the cluster model. Each cluster has different needs that a generic program will fail to address. Also, a cluster-based program implementation approach will lead to spillover benefits for many more firms than programs targeting a single firm or small group of firms.

Cluster-based program implementation improves effectiveness by aligning choices with the true needs of the clusters in each region. A cluster-based workforce training system, for example, will train workers to



fill actual jobs in the cluster and meet the actual skill needs of these jobs. This demand-driven approach stands in stark contrast to today's supply-driven training system, organized and governed heavily by training providers. In a cluster-based workforce development model, workers will also be equipped to seek employment in multiple firms in many parts of the cluster, in contrast to training programs that subsidize training in individual firms. This same rationale for a cluster approach applies to most types of economic development programs.

A cluster approach also allows Federal, state and local economic development efforts to be coordinated. To facilitate cluster-based policy implementation, economic development agencies at the Federal, state, and local levels should incorporate clusters into their organizational structures instead of organizing solely around generic policies and program functions. Staff should be assigned to develop expertise in particular clusters to allow for deeper information exchange and better understanding of company needs and priorities.

#### 4. Use Cluster Designation as a Qualifying Criterion For Incentives For Collective Private Investments

Because clusters involve productivity-enhancing externalities, there is a clear case for providing incentives for collective private investments in assets benefiting a cluster, and to set policies to facilitate the organization of such collective investments. This rationale is similar to the case of Business Improvement Districts, in which local governments have created a structure to allow many businesses and other organizations operating in a particular community to pool their investments in security, beautification, infrastructure, and the like.

While individual firms will have some incentives to make investments in cluster assets, these incentives will only be large enough to lead to actual investments for very large firms. A public role in organizing collective investments and providing incentives is justified. Investments could include such areas as cluster institutions, environmental remediation programs, standards setting and certification organizations, shared infrastructure, and many others.

One Federal policy approach to enabling and incenting cluster-based collective investment at the Federal level is the following:



**Certify Designated Clusters.** Cluster groups could voluntarily seek qualification as “Designated Clusters” based on a number of criteria:

- The presence of a minimum concentration of firms and economic activity in a relevant economic region. The region could cut across county, municipal or state boundaries.
- Participation in an organized cluster group including broad representation of cluster participants including end product producers, service providers, component suppliers, logistical vendors, distributors, etc. No single type of firm should dominate.
- Membership in the cluster group of a minimum number of associated institutions such as community colleges, universities, training providers, and others
- The existence of a formal cluster convening organization which is inclusive of most cluster participants<sup>9</sup>

Cluster groups would self form in any field, and region. Any such group, including multiple groups in the same cluster but located in different geographic regions, could apply for certification as Designated Clusters.

Quantitative criteria for minimum cluster size and other metrics needed to qualify for Designated Cluster status could be set using data from the Cluster Mapping Project, taking into account the size of the region. However, qualification rules should also allow for clusters not meeting the quantitative criteria to apply based on special circumstances. New clusters can form which are not yet reflected in the data, and the North American Industrial Classification System, with which data is collected, is imperfect and may not properly distinguish industry boundaries.

**Cluster Planning Grants.** Designated Clusters would qualify to compete for Federal matching funding for planning, market data collection, competitive assessment, and other approved collective planning activities. Cluster planning grants, which could cover one or two years, would require matching funds by

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<sup>9</sup> Membership and dues structure would not unduly benefit one class of firms or exclusive participants such as small firms.



cluster participants. Funds would be raised using an equitable process that did not unduly exclude participants.

Cluster Planning Grants would be awarded based on a competitive process based on the merits of the Designated Cluster proposal and the group's commitment and track record in implementation. The Department of Commerce, or another designated agency, would conduct the selection process.

**Cluster-Based Program Awards.** There are a variety of existing Federal programs awarding money for training (Department of Labor), economic development projects (EDA), and numerous other areas. A Designated Cluster could compete for matching grants in existing programs, or in a new program designed to encourage collective pre-competitive investment. Examples of areas for investment include green technology grants, environmental remediation, cluster infrastructure, standards setting labs, export marketing, and others.

Cluster group participants would be required to raise matching funding for such projects privately, with rules to ensure reasonable access to the project by small and large companies as well as non-business institutions. The outputs of cluster activities would be open to all cluster group members.

The responsible Federal agencies for each program, or a new program, would select Designated Clusters to receive the awards, based on standards covering the merit of the proposal and the commitment (and track record) of the cluster group to implement its plan. This general approach was embodied in the WIRED grants awarded by the Department of Labor, and the model can be extended to virtually all existing Federal economic development programs.

## **Summary**

Clusters are an important economic unit in the modern economy. Cluster-based policies have begun to play a prominent role at the state and regional level, and in other nations, but have been all but absent at the Federal level in the U.S. A selective Federal role in cluster-based policy will make Federal economic policy more effective and better utilize the scarce resources available. Federal leadership in cluster-based policy would also encourage cluster-based approaches at the state and local level.



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