Clusters, Innovation, and Competitiveness: New Findings and Implications for Policy

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The Changing Nature of International Competition

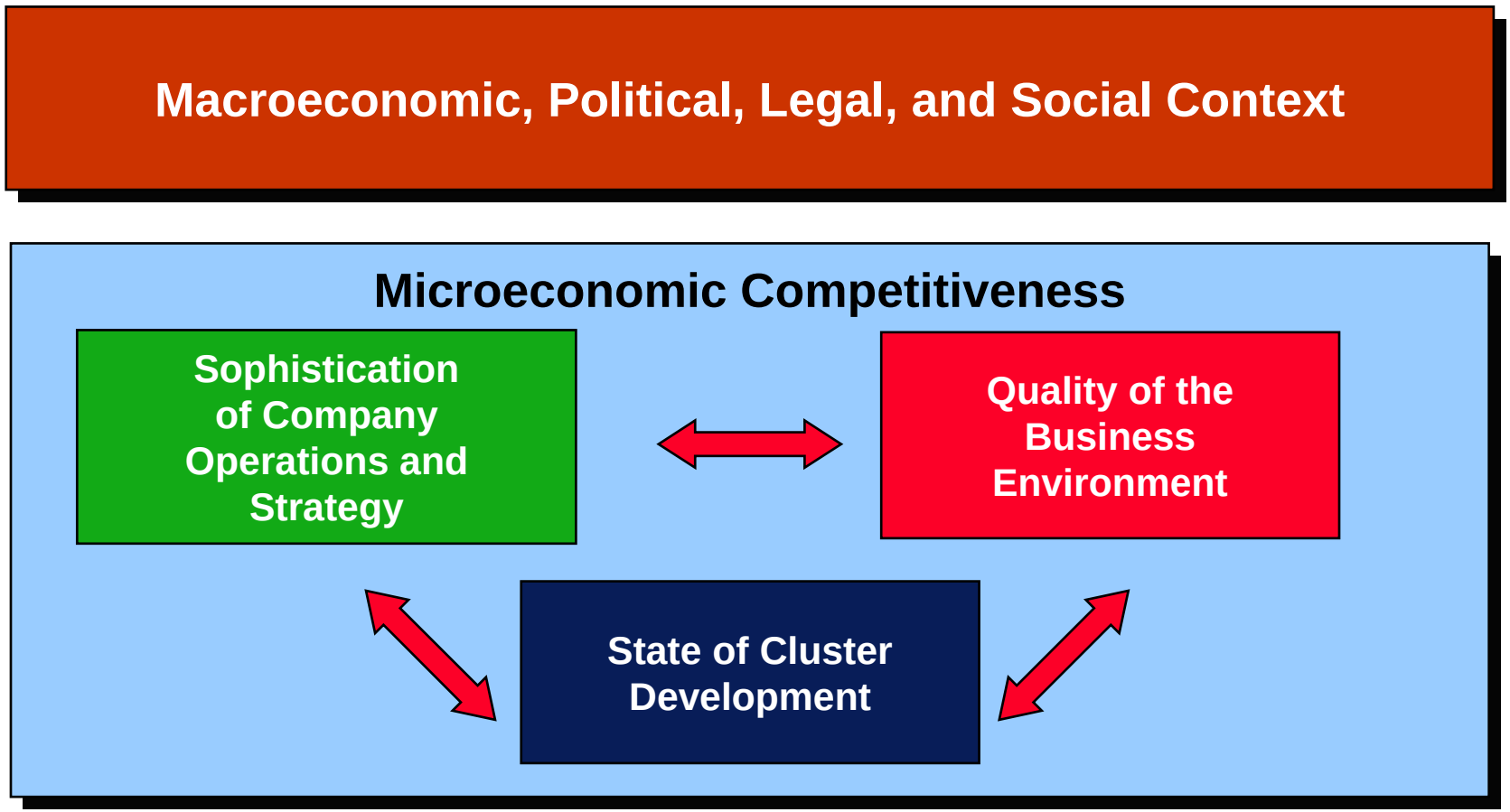
- Falling restraints to trade and investment
- Globalization of markets
- Globalization of value chains
- Shift from vertical integration to relying on outside suppliers, partners, and institutions
- Increasing knowledge and skill intensity of competition

- Nations and regions compete on becoming the **most productive** locations for business

Outline

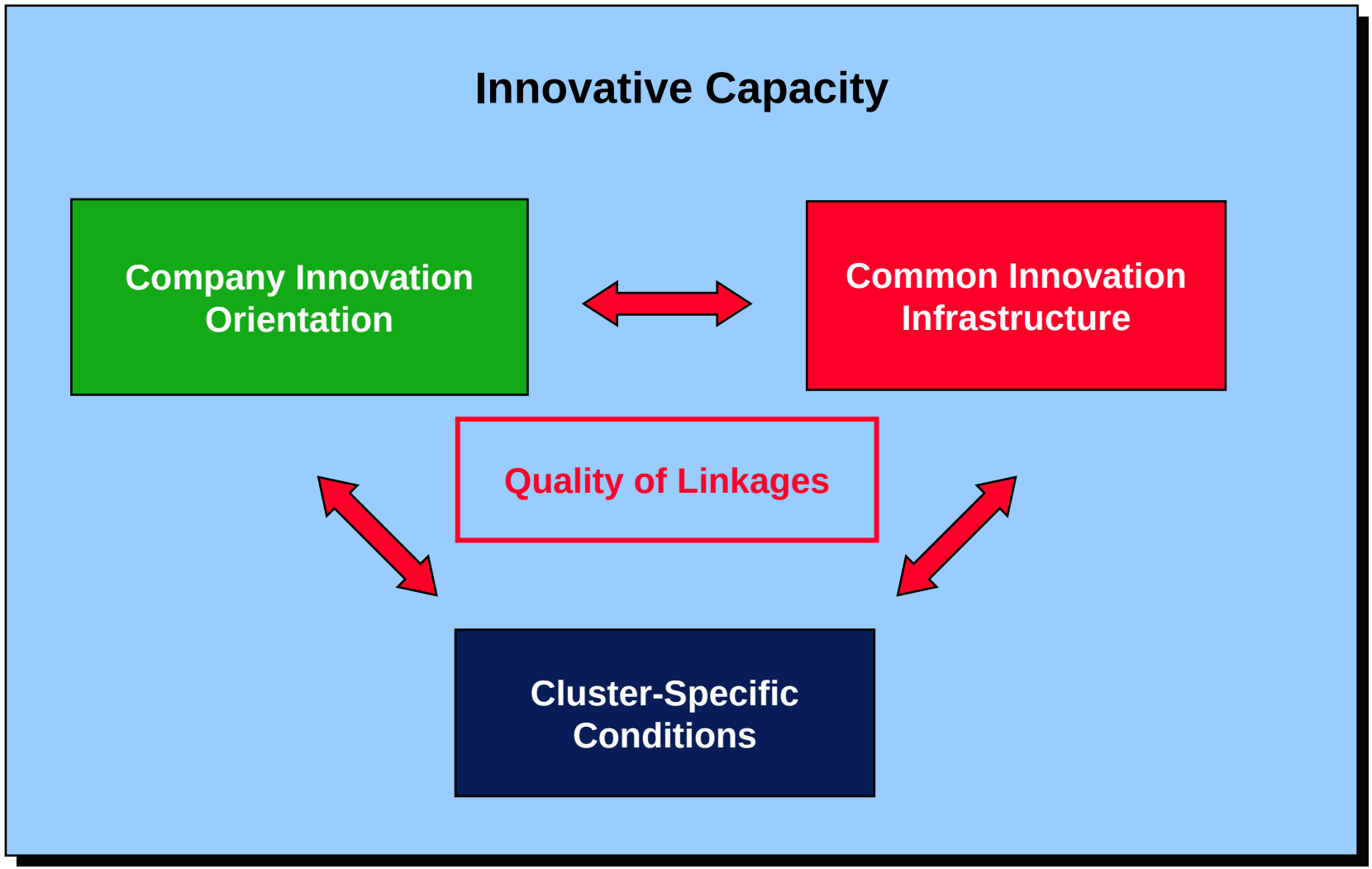
- The role of clusters in overall competitiveness
- How clusters work
- The impact of clusters on regional prosperity and innovation
- Cluster policy
- Some implications for Europe

Clusters and Competitiveness



Clusters and Innovation

Determinants of Innovative Capacity



What is a Cluster?

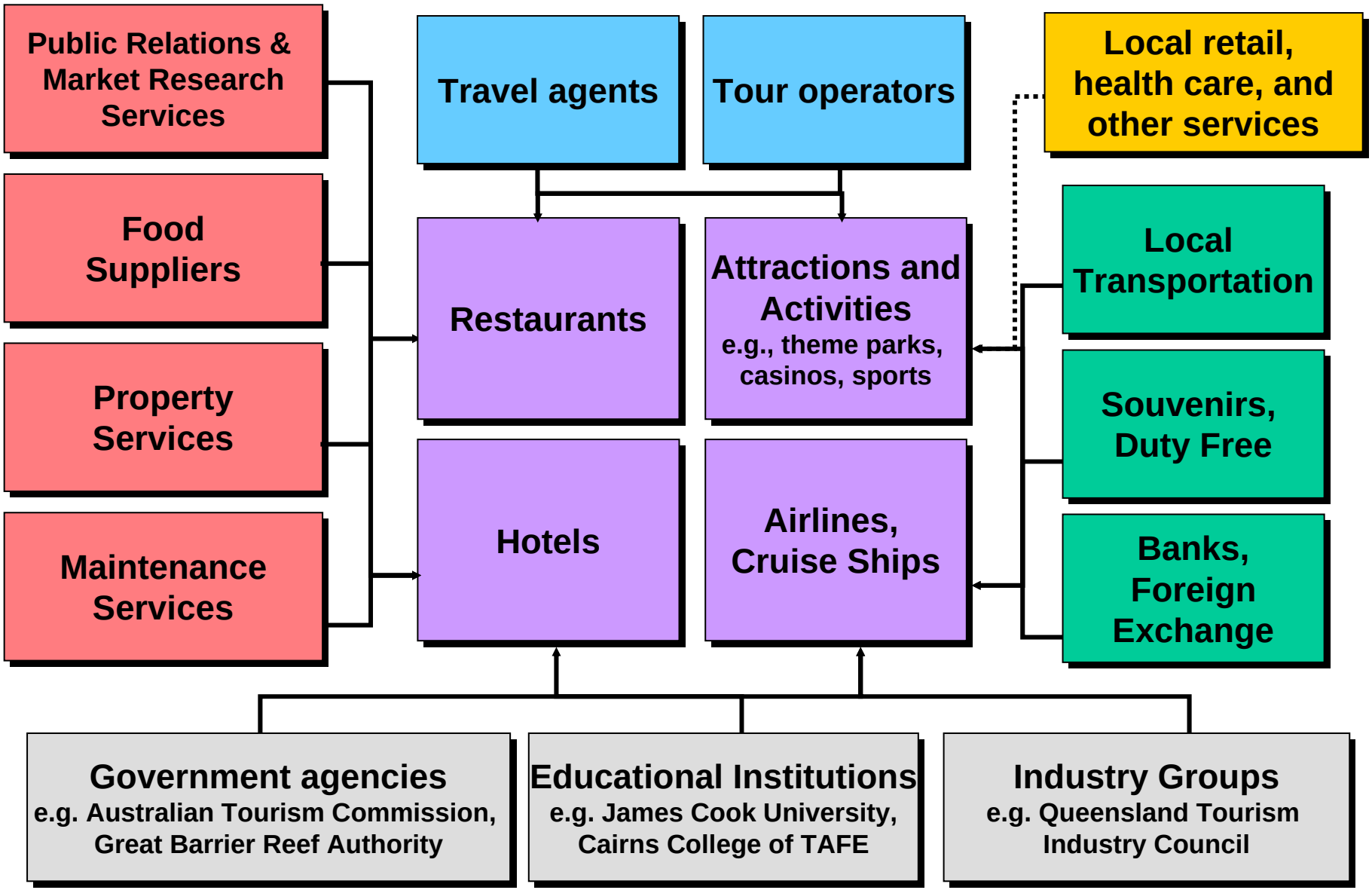
A geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities (external economies)

- An end product industry or industries
- Downstream or channel industries
- Specialized suppliers
- Providers of specialized services
- Related industries (those with important shared activities, labor, technologies, channels, or common customers)
- Supporting Institutions: financial, training, trade associations, standard setting, research

- Clusters vs. industries
- Clusters vs. sectors

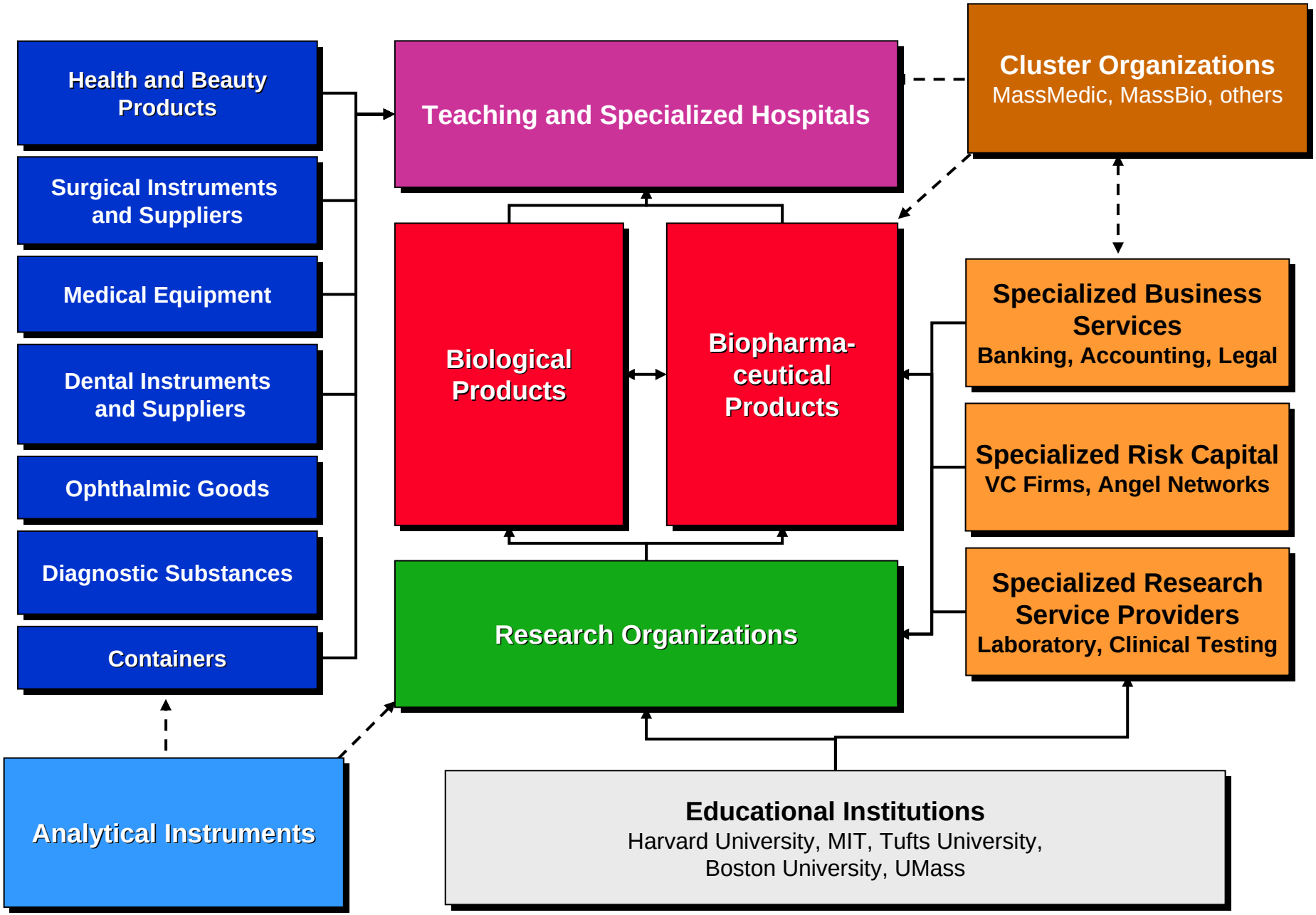
Enhancing Cluster Development

Tourism Cluster in Cairns, Australia



Sources: HBS student team research (2003) - Peter Tynan, Chai McConnell, Alexandra West, Jean Hayden

The Boston Life Sciences Cluster



Clusters and Competitiveness

- **Clusters Increase Productivity / Efficiency**
  - **Efficient access** to specialized inputs, services, employees, information, institutions, training programs, and other "public goods" (local outsourcing)
  - Ease of **coordination** and transactions across firms
  - Rapid **diffusion** of best practices
  - Ongoing, visible **performance comparisons** and strong incentives to improve vs. local rivals
  - Proximity of rivals encourages strategic differentiation
- **Clusters Stimulate and Enable Innovations**
  - Greater likelihood of **perceiving innovation opportunities** (e.g., unmet needs, sophisticated customers, combinations of services or technologies)
  - Presence of multiple suppliers and institutions to assist in **knowledge creation**
  - Ease of **experimentation** given locally available resources
- **Clusters Facilitate Commercialization and New Business Formation**
  - Opportunities for **new companies** and **new lines of established business** are more apparent
  - **Spinoffs and startups** are encouraged by the presence of other companies , commercial relationships, and concentrated demand
  - **Commercializing** new products and starting new companies is easier because of available skills, suppliers, etc.

- Clusters reflect the fundamental influence of **linkages and spill-overs** across firms and associated institutions in competition

Institutions for Collaboration

Selected Massachusetts Organizations, Life Sciences

Life Sciences Industry Associations

- Massachusetts Biotechnology Council
- Massachusetts Medical Device Industry Council
- Massachusetts Hospital Association

University Initiatives

- Harvard Biomedical Community
- MIT Enterprise Forum
- Biotech Club at Harvard Medical School
- Technology Transfer offices

General Industry Associations

- Associated Industries of Massachusetts
- Greater Boston Chamber of Commerce
- High Tech Council of Massachusetts

Informal networks

- Company alumni groups
- Venture capital community
- University alumni groups

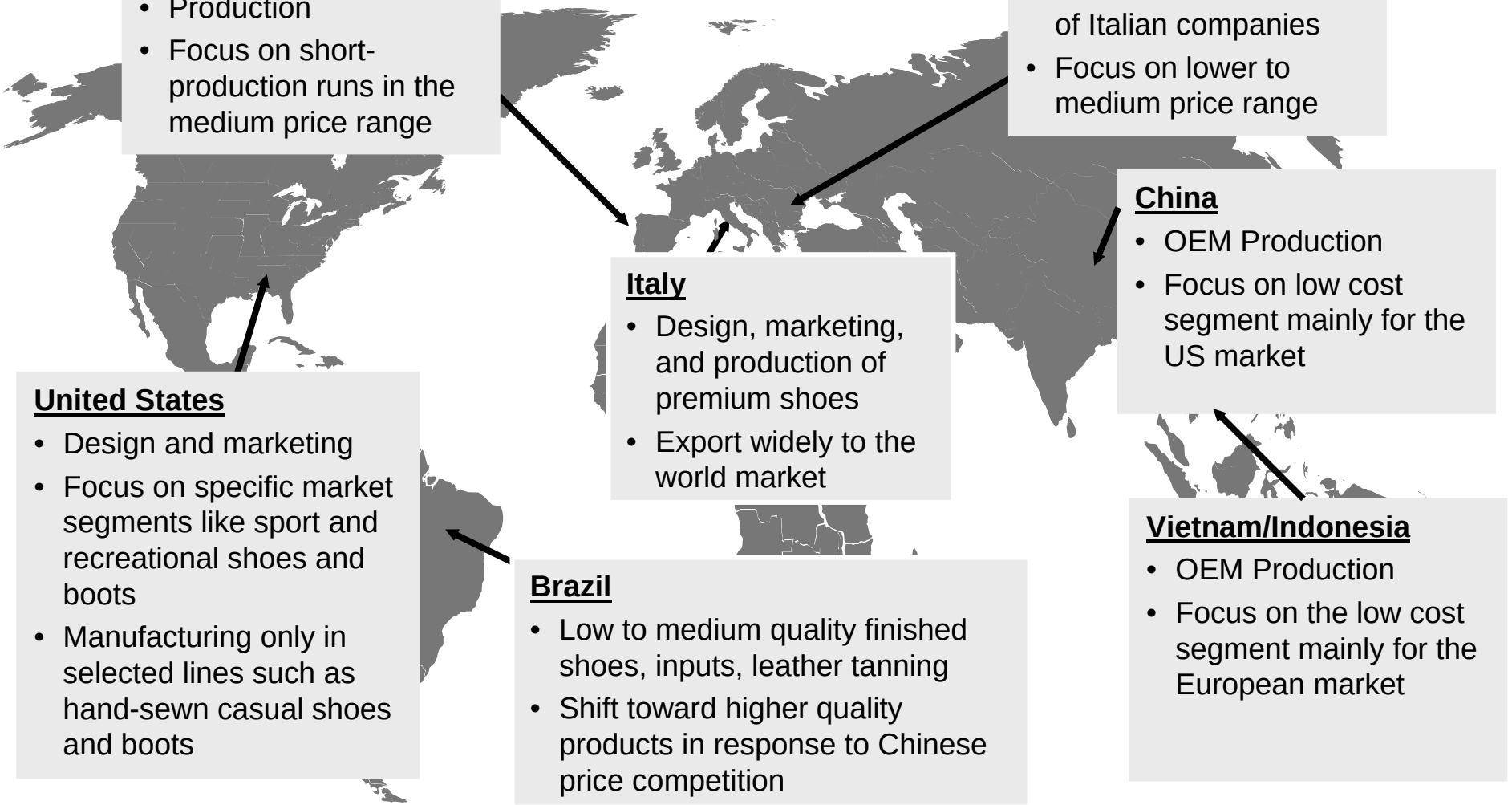
Economic Development Initiatives

- Massachusetts Technology Collaborative
- Mass Biomedical Initiatives
- Mass Development
- Massachusetts Alliance for Economic Development

Joint Research Initiatives

- New England Healthcare Institute
- Whitehead Institute For Biomedical Research
- Center for Integration of Medicine and Innovative Technology (CIMIT)

Cluster Specialization
Selected Footwear Clusters



Portugal
- Production
- Focus on short-production runs in the medium price range

Romania
- Production subsidiaries of Italian companies
- Focus on lower to medium price range

China
- OEM Production
- Focus on low cost segment mainly for the US market

Italy
- Design, marketing, and production of premium shoes
- Export widely to the world market

United States
- Design and marketing
- Focus on specific market segments like sport and recreational shoes and boots
- Manufacturing only in selected lines such as hand-sewn casual shoes and boots

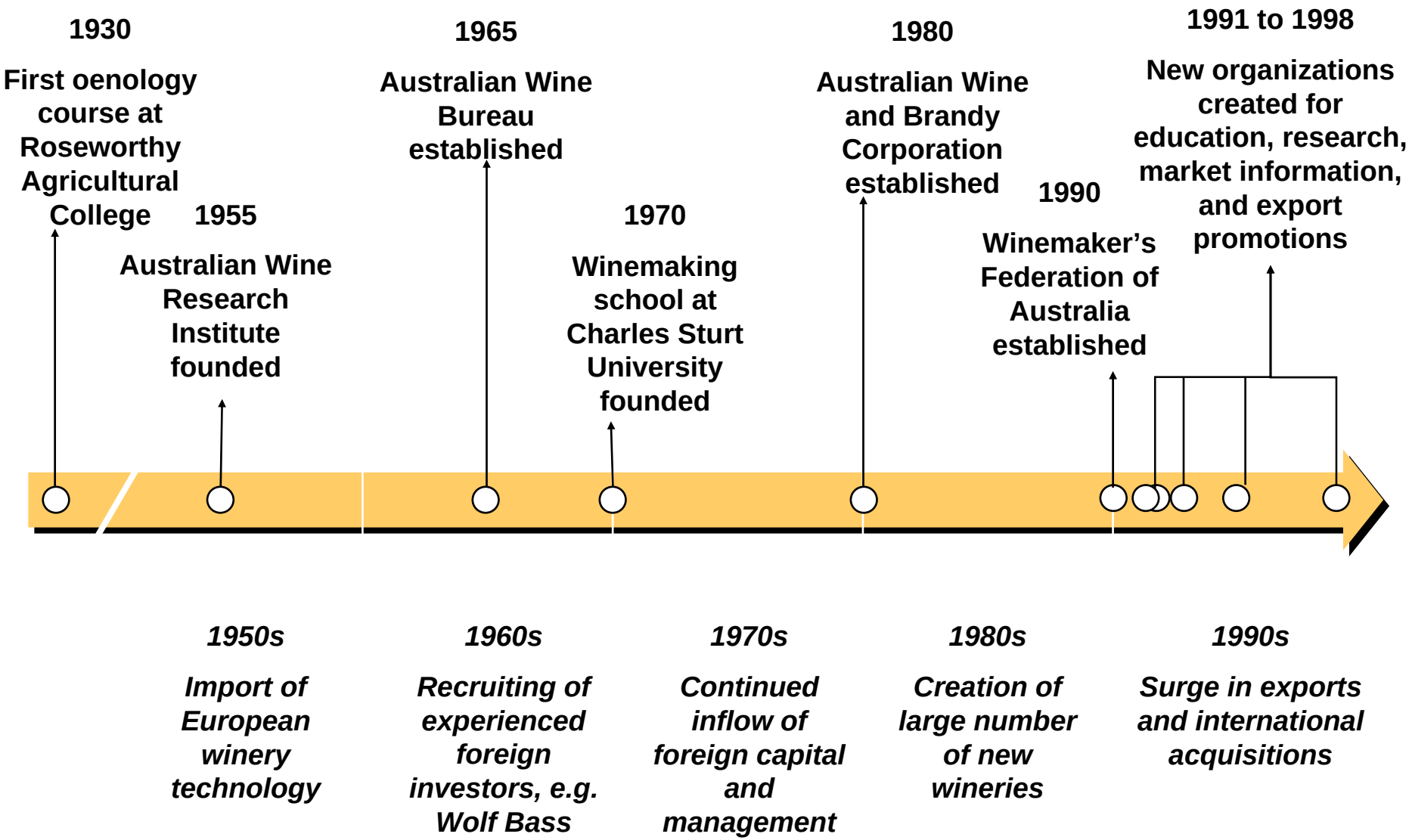
Brazil
- Low to medium quality finished shoes, inputs, leather tanning
- Shift toward higher quality products in response to Chinese price competition

Vietnam/Indonesia
- OEM Production
- Focus on the low cost segment mainly for the European market

Source: Research by HBS student teams in 2002 – Van Thi Huynh, Evan Lee, Kevin Newman, Nils Ole Oermann

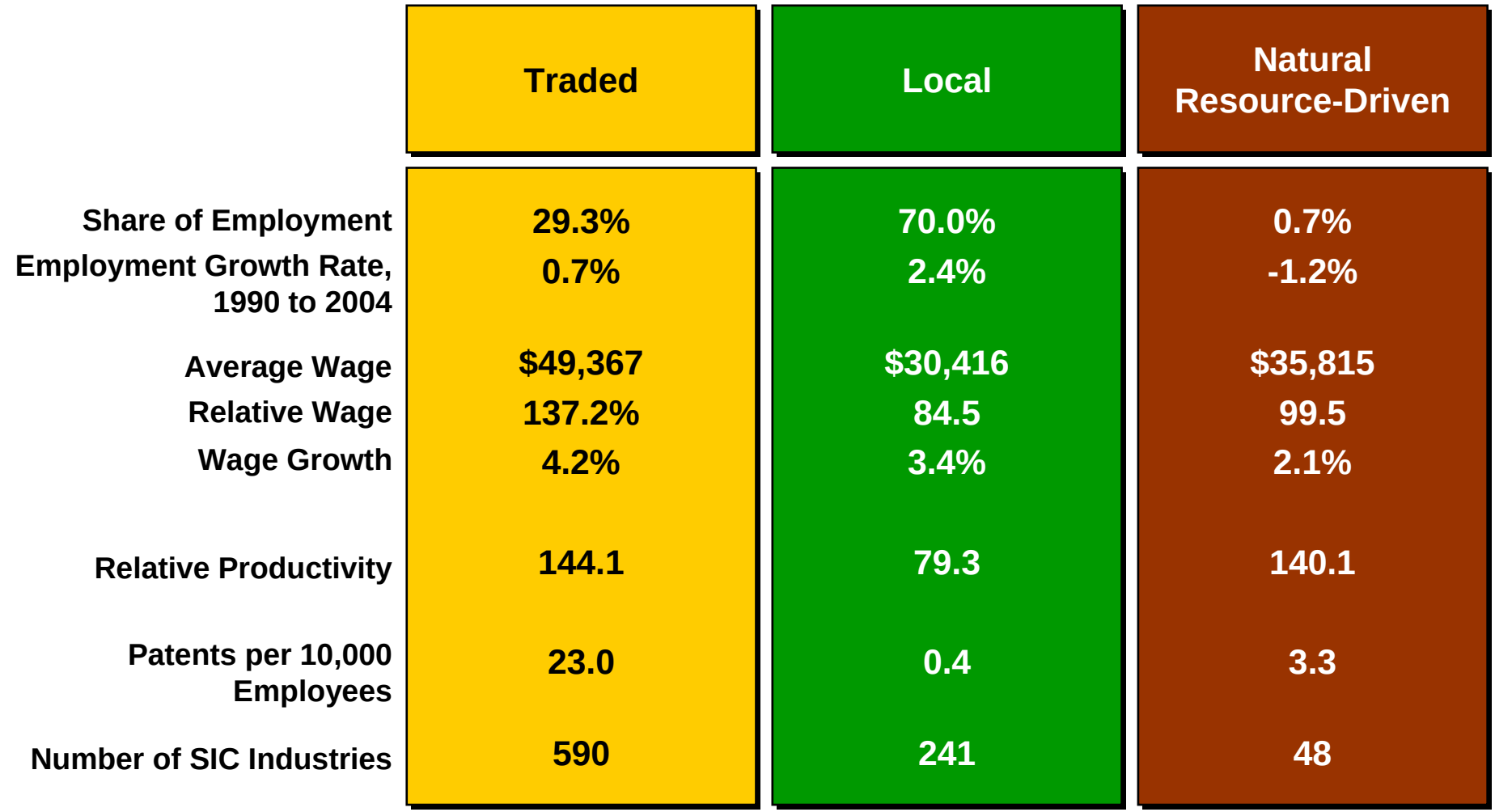
The Australian Wine Cluster

Milestones



Source: Michael E. Porter and Örjan Sölvell, The Australian Wine Cluster – Supplement, Harvard Business School Case Study, 2002

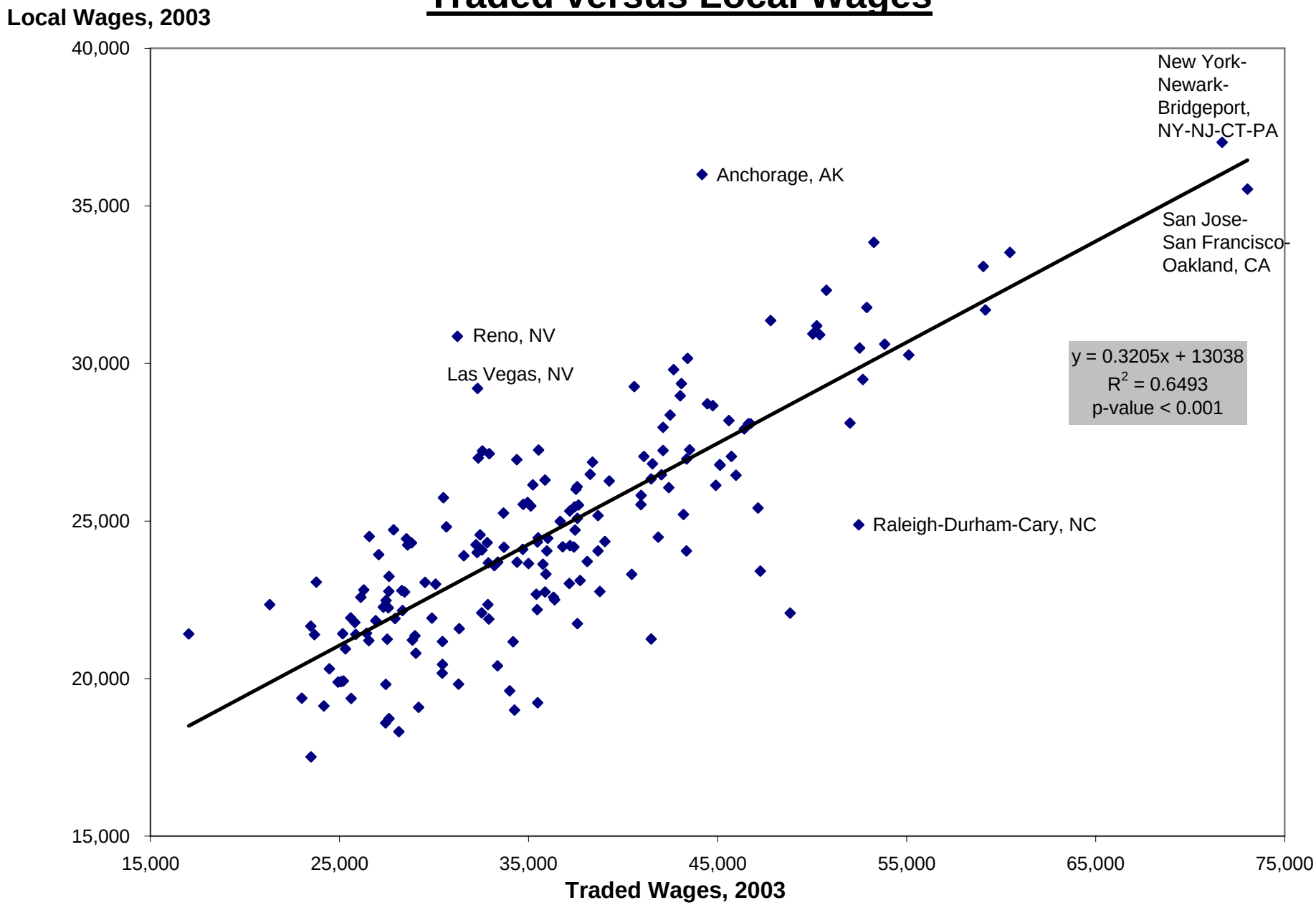
The Composition of Regional Economies
United States, 2004



Note: 2004 data, except relative productivity which uses 1997 data.
Source: Prof. Michael E. Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

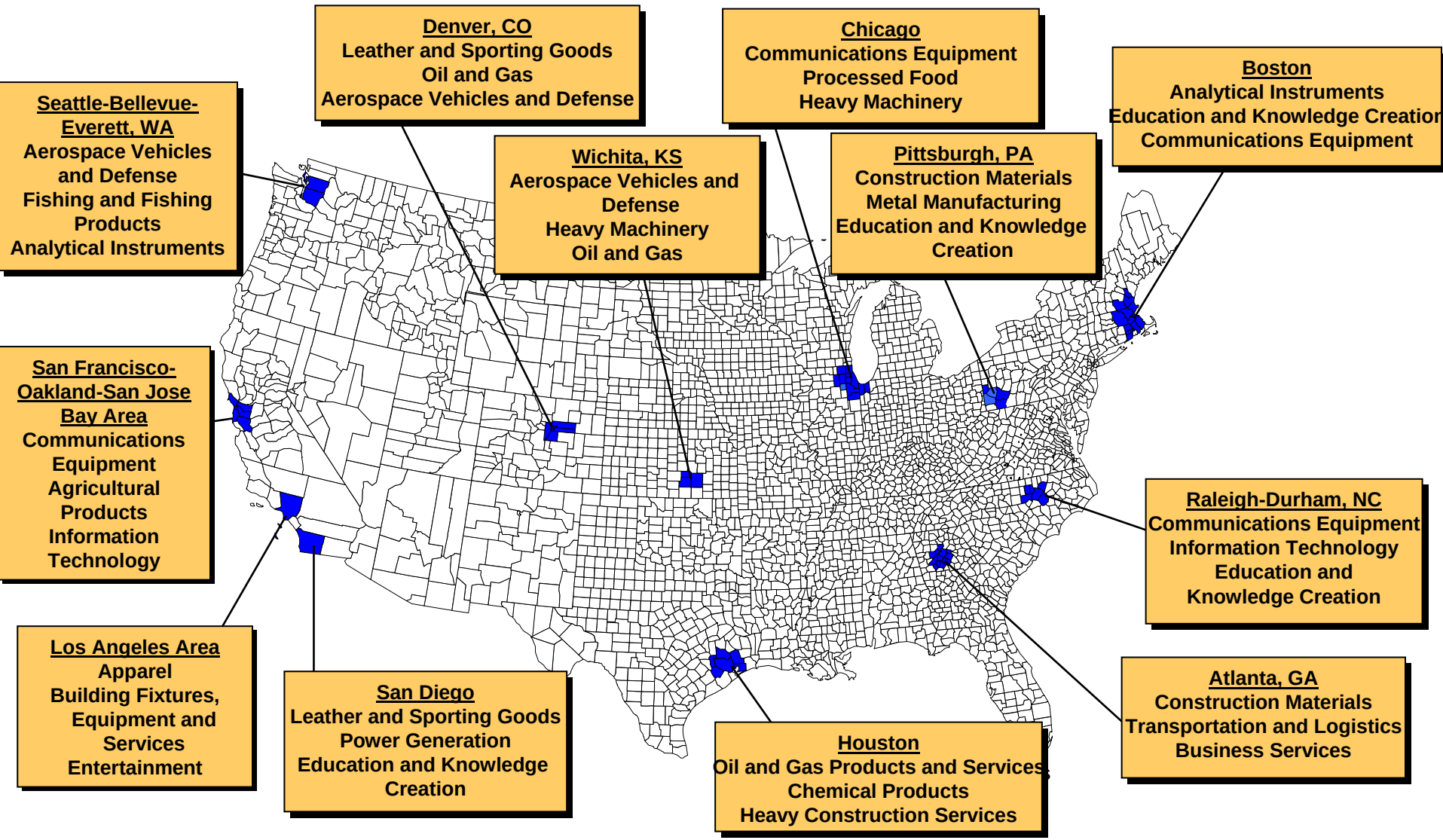
Broad Composition of Regional Economies

Traded versus Local Wages



Specialization of Regional Economies

Selected U.S. Geographic Areas

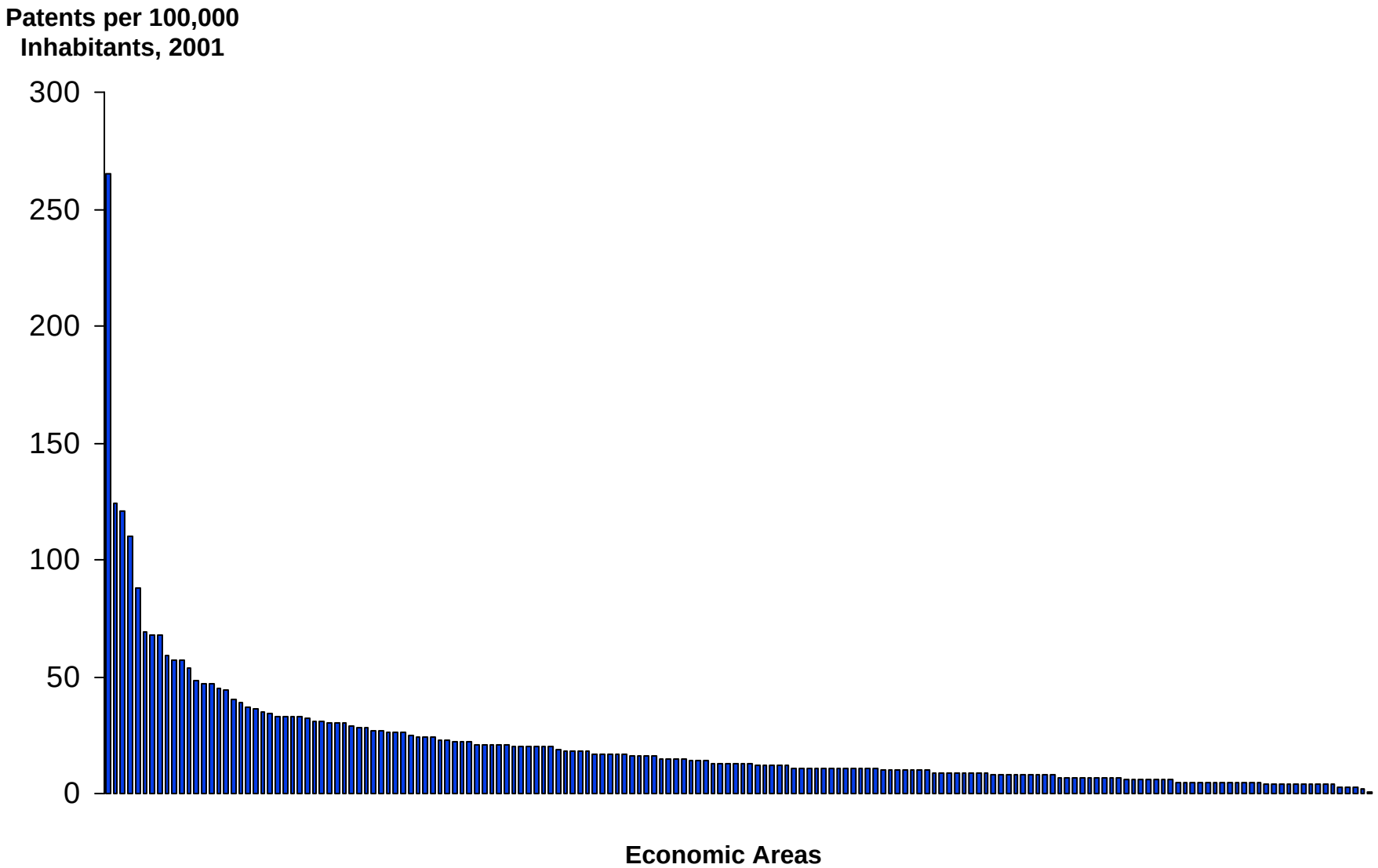


Note: Clusters listed are the three highest ranking clusters in terms of share of national employment.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 11/2006.

Innovation Performance of Regions

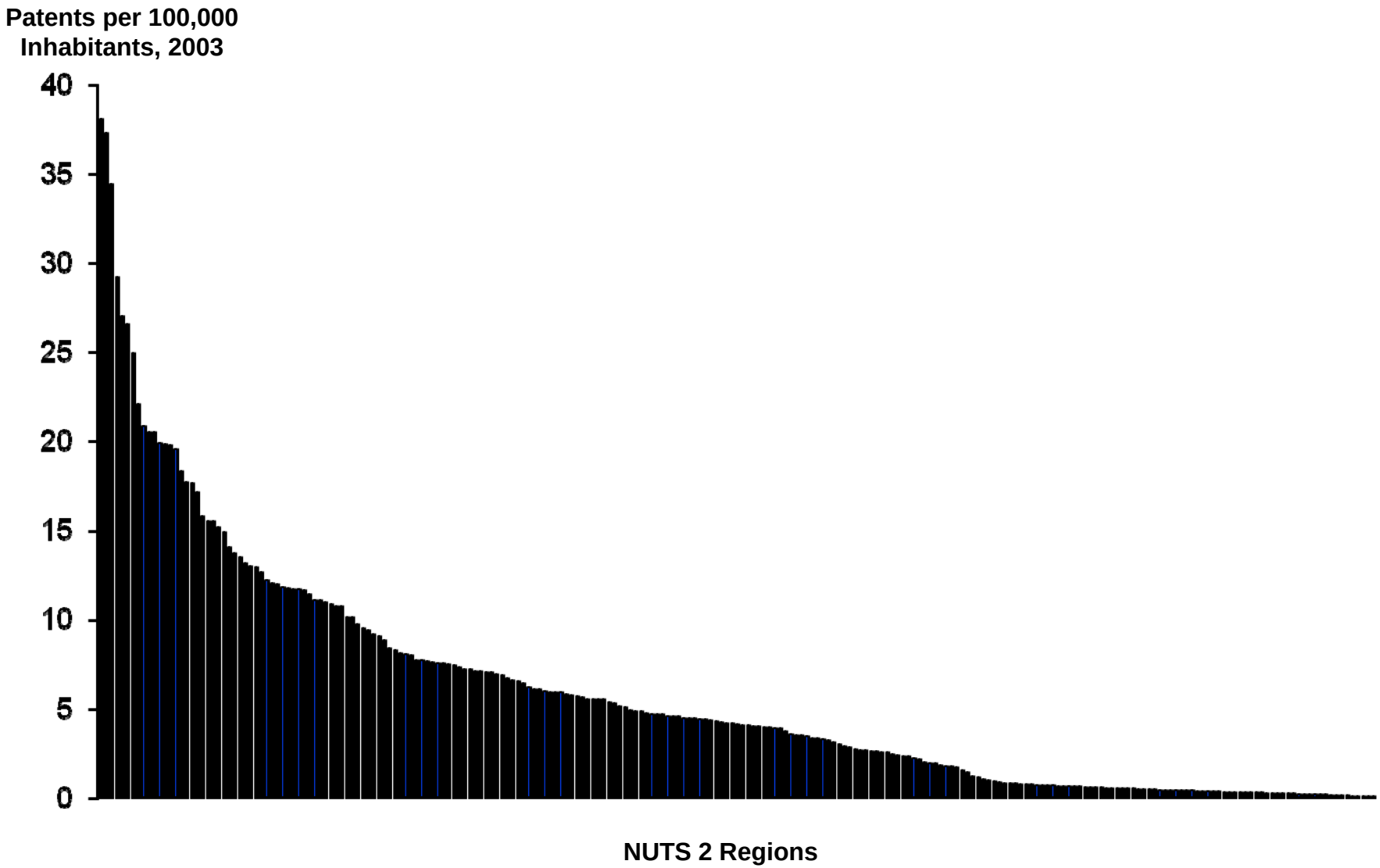
Patenting Intensity, U.S. Economic Areas



Source: U.S. Patent and Trademark Office; CHI Research; Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Innovation Performance of Regions

Patenting Intensity, European NUTS 2 Regions



Source: Eurostat (2008)

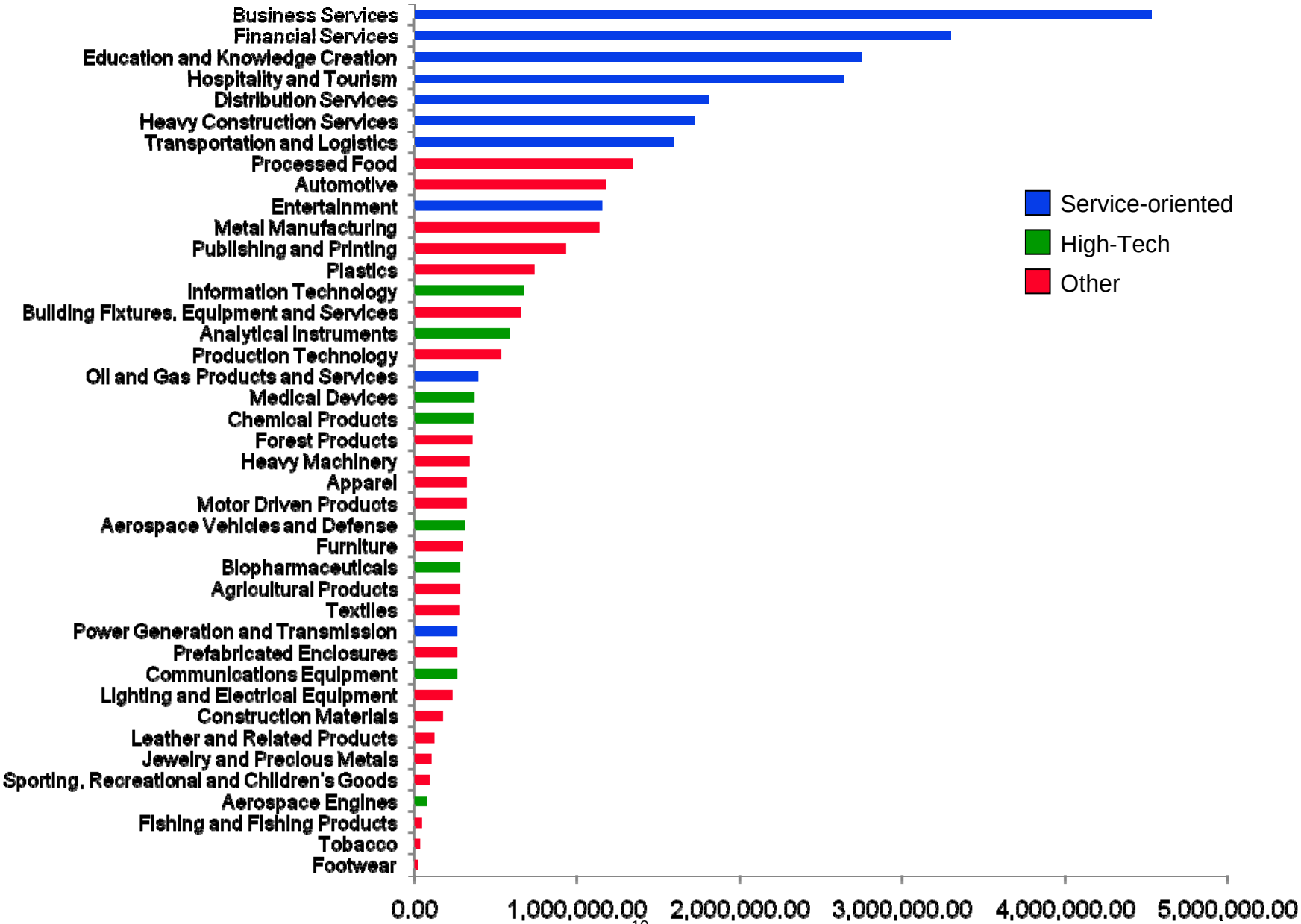
Automotive Cluster

Narrow Cluster Definition

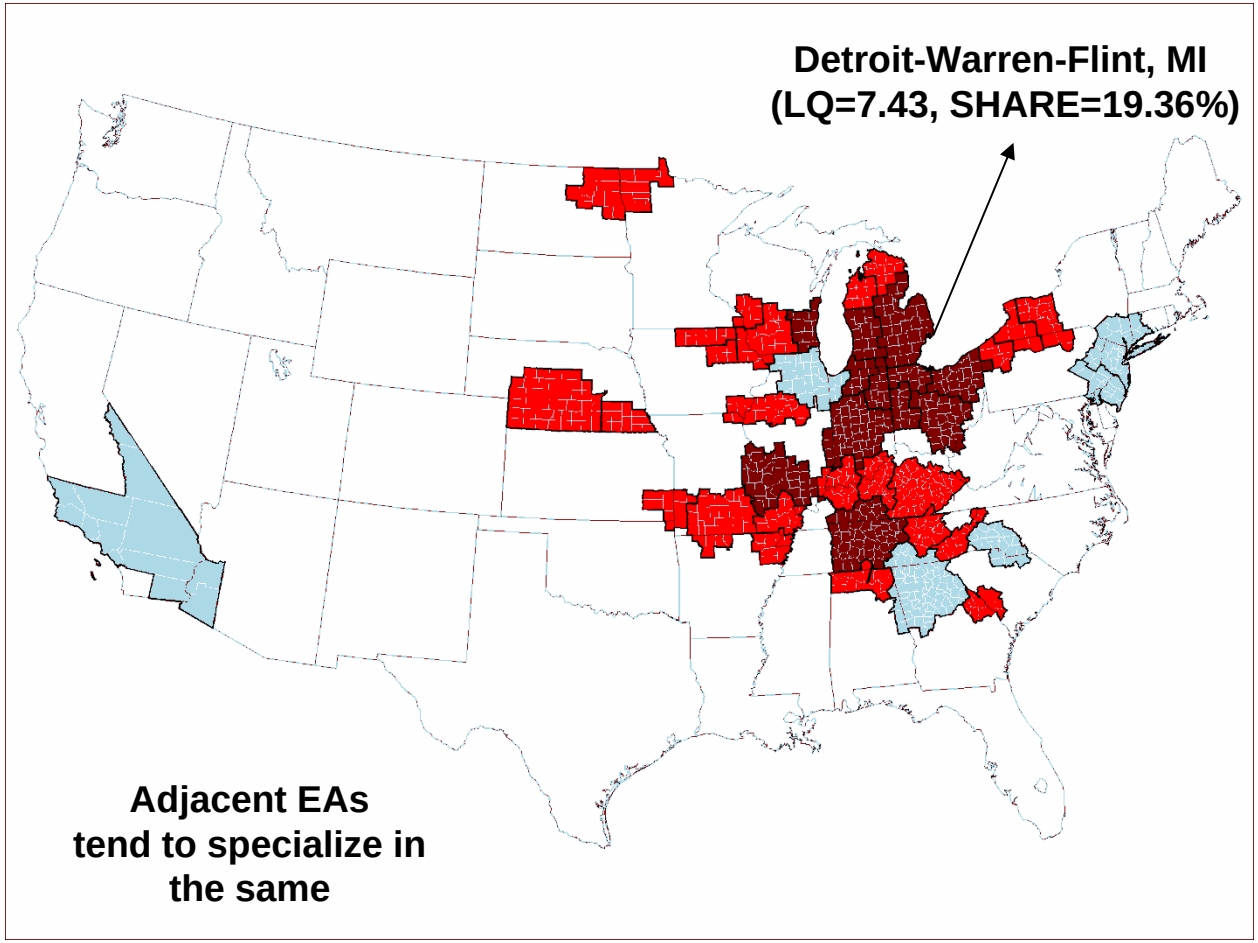
SUBCLUSTERS (16)	SIC	LABEL
Motor Vehicles	**3711**	**Motor vehicles and car bodies**
Automotive Parts	2396	Automotive and apparel trimmings
	3230	Products of purchased glass
	3592	Carburetors, pistons, rings, valves
	3714	Motor vehicle parts and accessories
	3824	Fluid meters and counting devices
Automotive Components	3052	Rubber and plastics hose and belting
	3061	Mechanical rubber goods
Forgings and Stampings	3322	Malleable iron foundries
	3465	Automotive stampings
Flat Glass	3210	Flat glass
Production Equipment	3544	Special dies, tools, jigs and fixtures
	3549	Metalworking machinery, n.e.c.
Small Vehicles and Trailers	3799	Transportation equipment, n.e.c.
Marine, Tank & Stationary Engines	3519	Internal combustion engines, n.e.c.

Traded Clusters By Employment

U.S., 2004



Automotive Clusters by Economic Areas, 1997

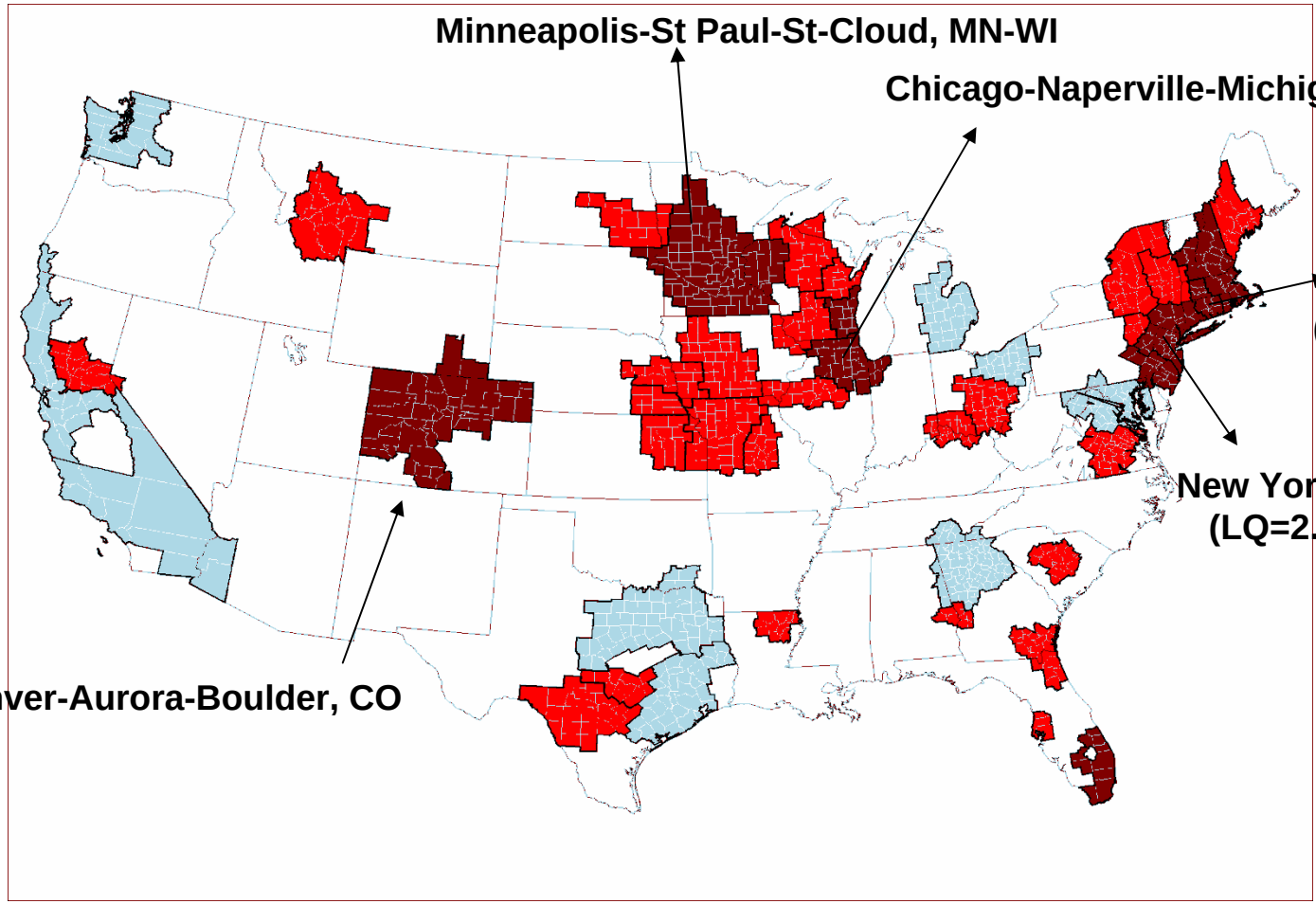


Regions with high share of US automotive employment (in top 10% of all regions; share>1.5%) & high cluster specialization (LQ>1.7)

Regions with high cluster specialization (LQ>1.7 ; $LQ_{c,r} > LQ_c$ 80-th Percentile)

Weak clusters with large employment size in high population areas

Financial Services Clusters by Economic Areas, 1997



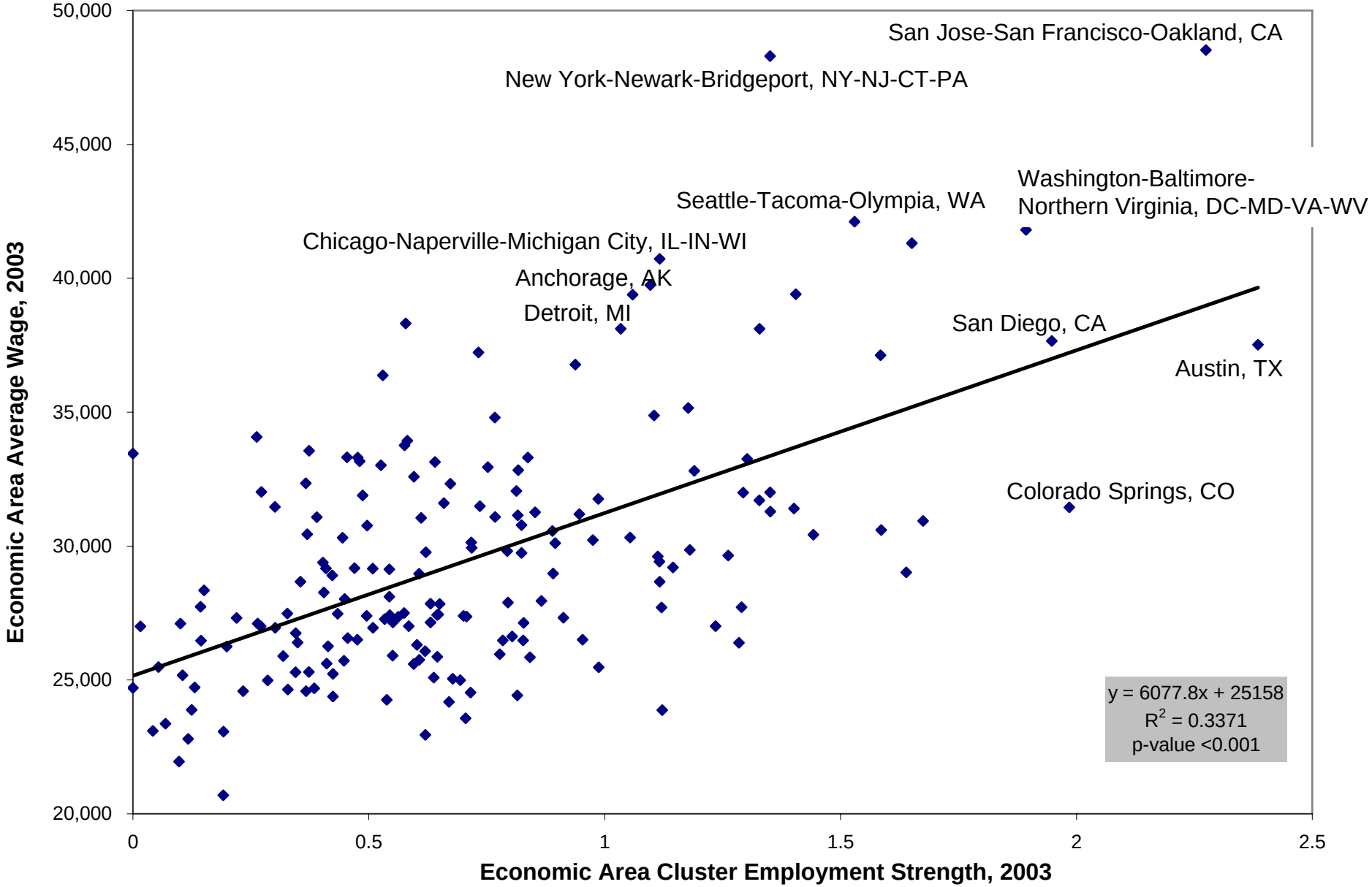
Regions with high share of US financial services employment (in top 10% of all regions; share>2.5%) & high cluster specialization (LQ>1.01)

Regions with high cluster specialization (LQ>1.03 ; $LQ_{c,r} > LQ_c$ 80-th Percentile)

Weak clusters with large employment size in high population areas

Cluster Employment Strength and Wages

U.S. Economic Areas



Note: Cluster strength is measured as share of regional traded employment in strong clusters (weighting by the overlap among the strong clusters.) See Delgado, Porter Stern 2007.

Automotive Cluster

Broad Cluster Definition

NARROW CLUSTER DEFINITION

SUBCLUSTERS (16)	SIC	LABEL
Motor Vehicles	**3711**	**Motor vehicles and car bodies**
Automotive Parts	2396	Automotive and apparel trimmings
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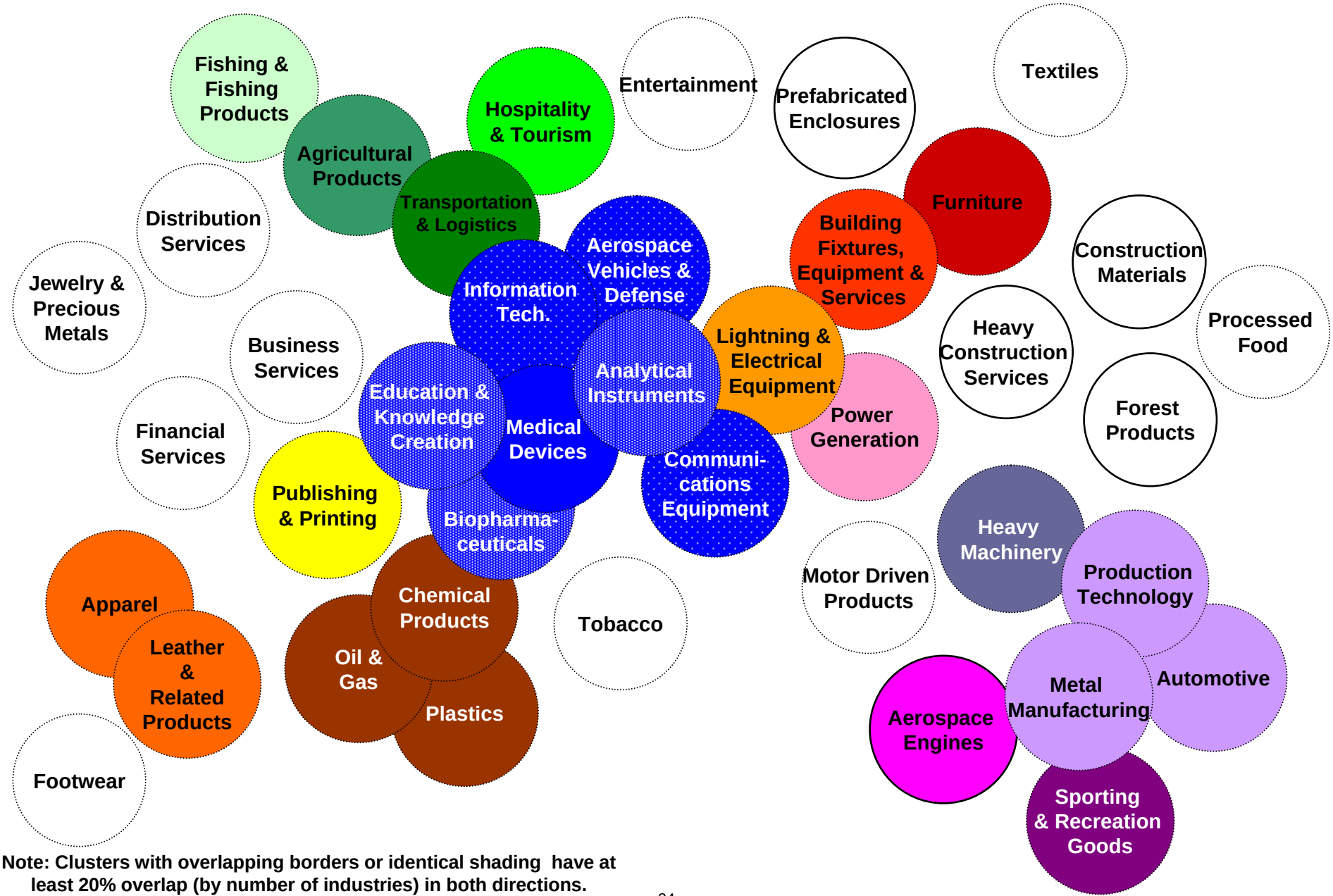
Small Vehicles and Trailers	3799	Transportation equipment, n.e.c.
Marine, Tank & Stationary Engines	3519	Internal combustion engines, n.e.c.
Related Parts	3364	Nonferrous die-casting, except aluminum
	3452	Bolts, nuts, rivets, and washers
	3493	Steel springs, except wire
	3495	Wire springs
	3562	Ball and roller bearings
	3566	Speed changers, drives, and gears
	3641	Electric lamps
Motors and Generators	3621	Motors and generators
Related Vehicles	3795	Tanks and tank components
Metal Processing	3316	Cold finishing of steel shapes
	3398	Metal heat treating
Machine Tools	3541	Machine tools, metal cutting types
	3542	Machine tools, metal forming types
	3545	Machine tool accessories
Related Process Machinery	3543	Industrial patterns
	3548	Welding apparatus
Industrial Trucks and Tractors	3537	Industrial trucks and tractors
Die-castings	3363	Aluminum die-castings

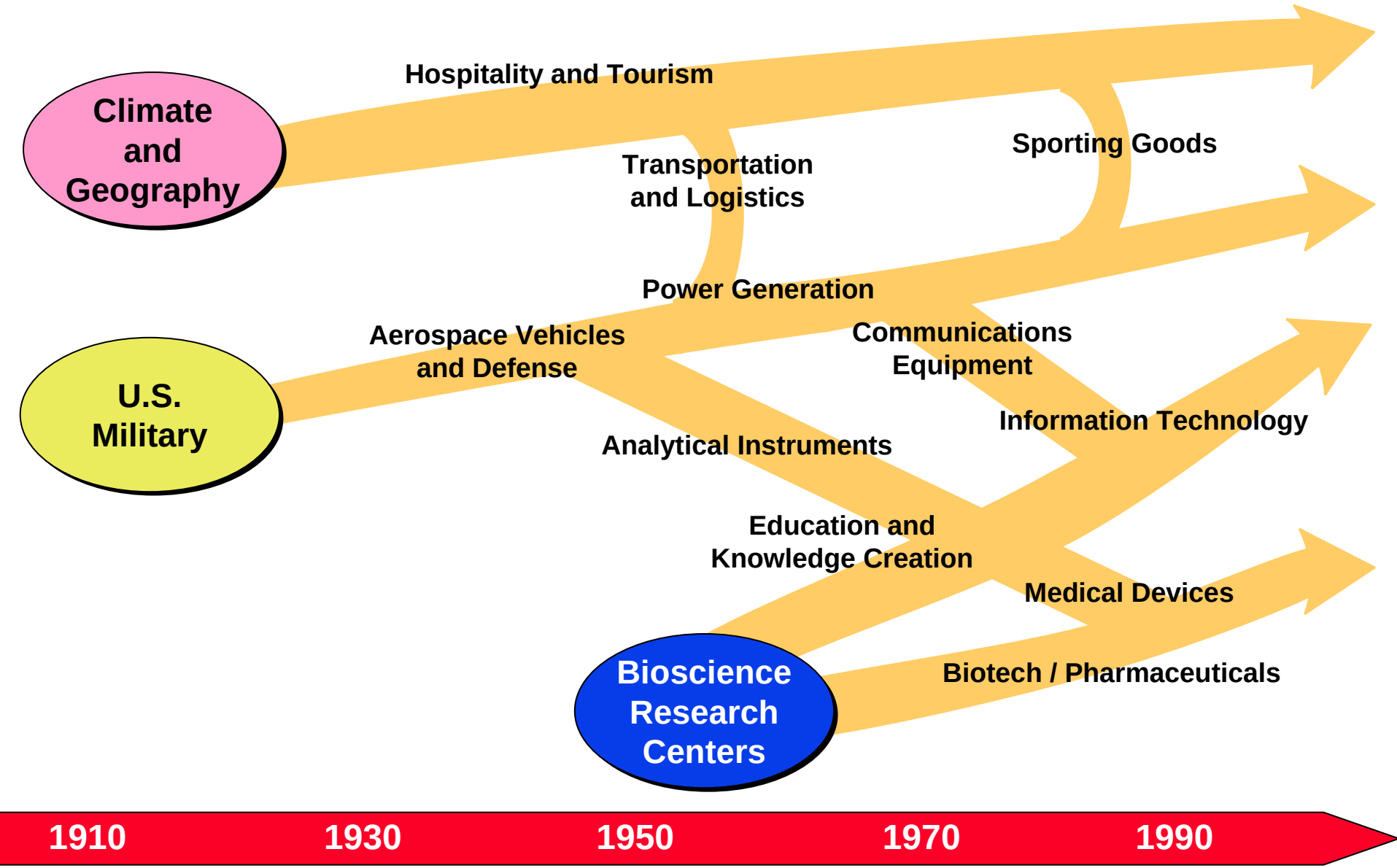
Linkages Across Clusters



Note: Clusters with overlapping borders or identical shading have at least 20% overlap (by number of industries) in both directions.

The Evolution of Regional Economies

San Diego



Clusters and Regional Prosperity
Recent Findings

Higher Regional Job Growth, Wages, and Patenting

- Specialization in **strong clusters**
- **Breadth** of positions within clusters
- Positions in **related clusters**
- Region‘s clusters also present in **neighboring regions**

Not significant

- Positions in High-Tech versus other clusters

Source: Porter/Stern/Delgado (2007), Porter, (2003)

The Process of Economic Development
Shifting Roles and Responsibilities

Old Model

- **Government** drives economic development through policy decisions and incentives

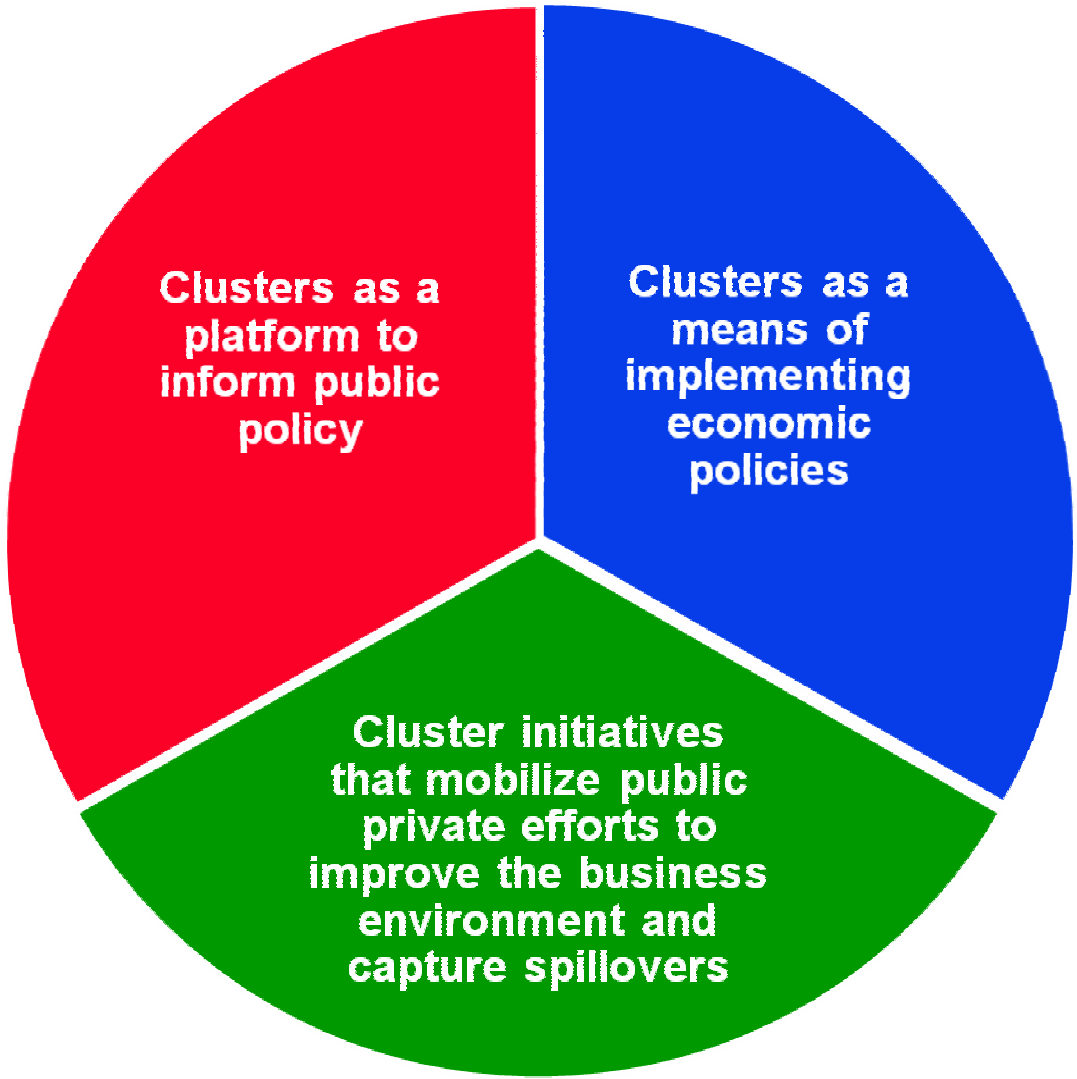
New Model

- Economic development is a **collaborative process** involving government at multiple levels, companies, teaching and research institutions, and institutions for collaboration

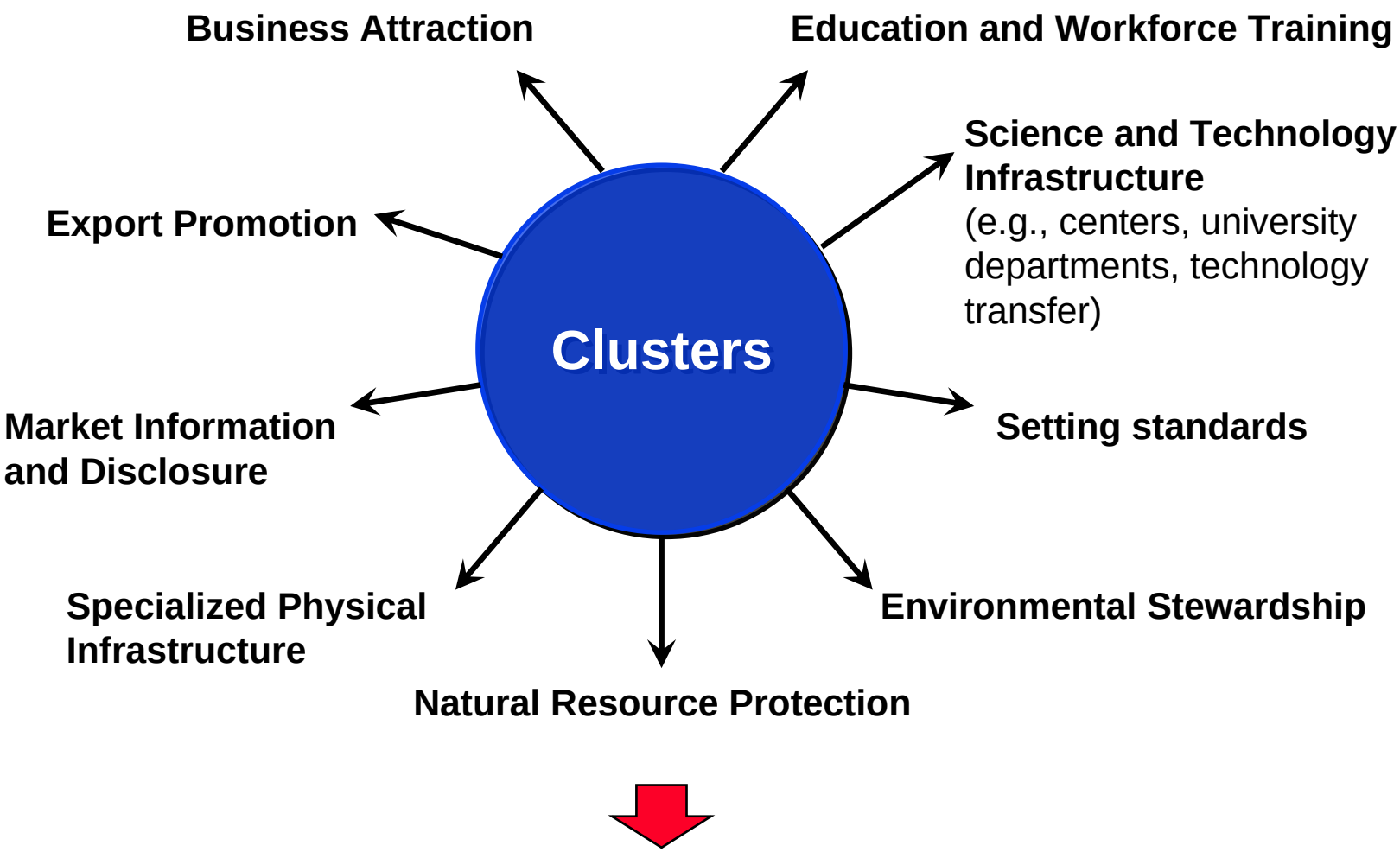
- Competitiveness must be a **bottoms-up process** in which many individuals, companies, and institutions take responsibility
- Clusters provide a platform to address the **specific barriers** companies face in a given market, not just general challenges all companies are exposed to

Clusters and Economic Policy

Dimensions



Clusters and the Implementation of Economic Policy

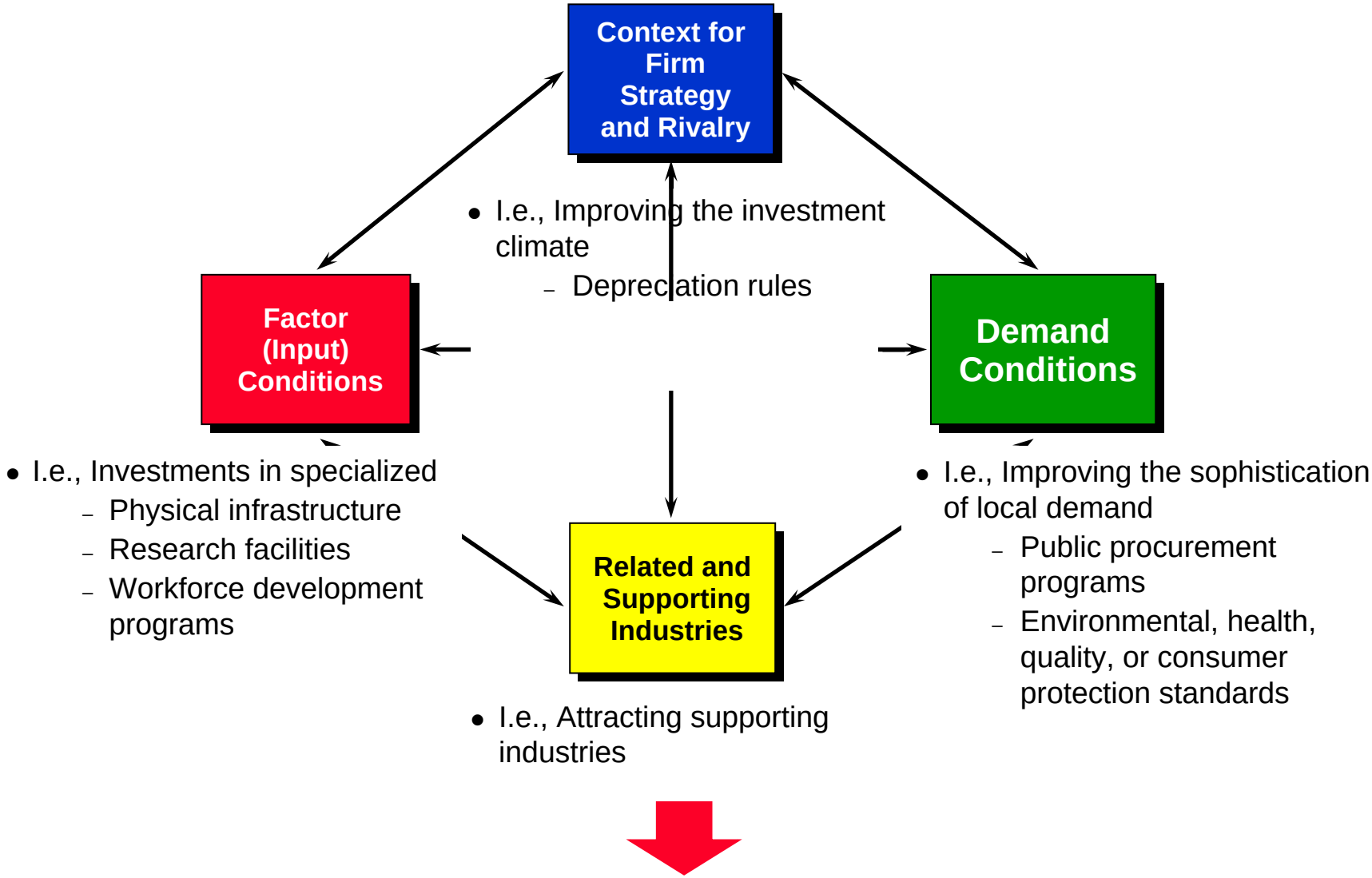


- Clusters provide a framework for **formulating and implementing** effective public policies and making public investments to foster economic development

Principles of Cluster Policy

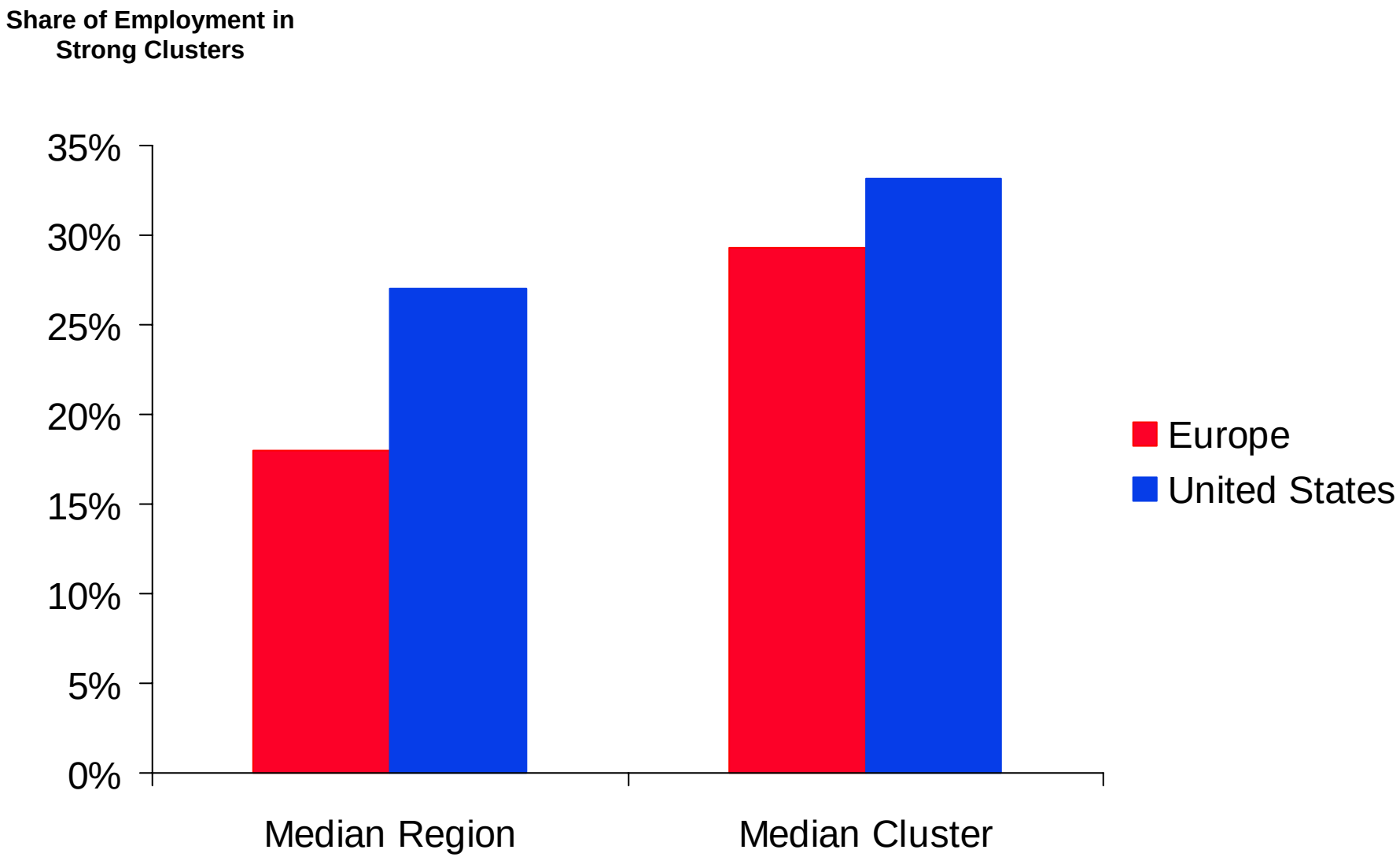
- **Neutral** across clusters
- Enhancing productivity of **multiple firms/institutions**
- Facilitating/capturing **linkages and externalities**
- Facilitating the flow of **information/knowledge** across actors
- Engaging the **private sector**, not just government
- Preserving and enhancing market **competition**, not retarding it

Improving the Cluster-Specific Business Environment



- Policies need to have an **impact on productivity and innovation**, not just transfer money
- Policies need to change the environment for **many companies in the cluster**, not just a few

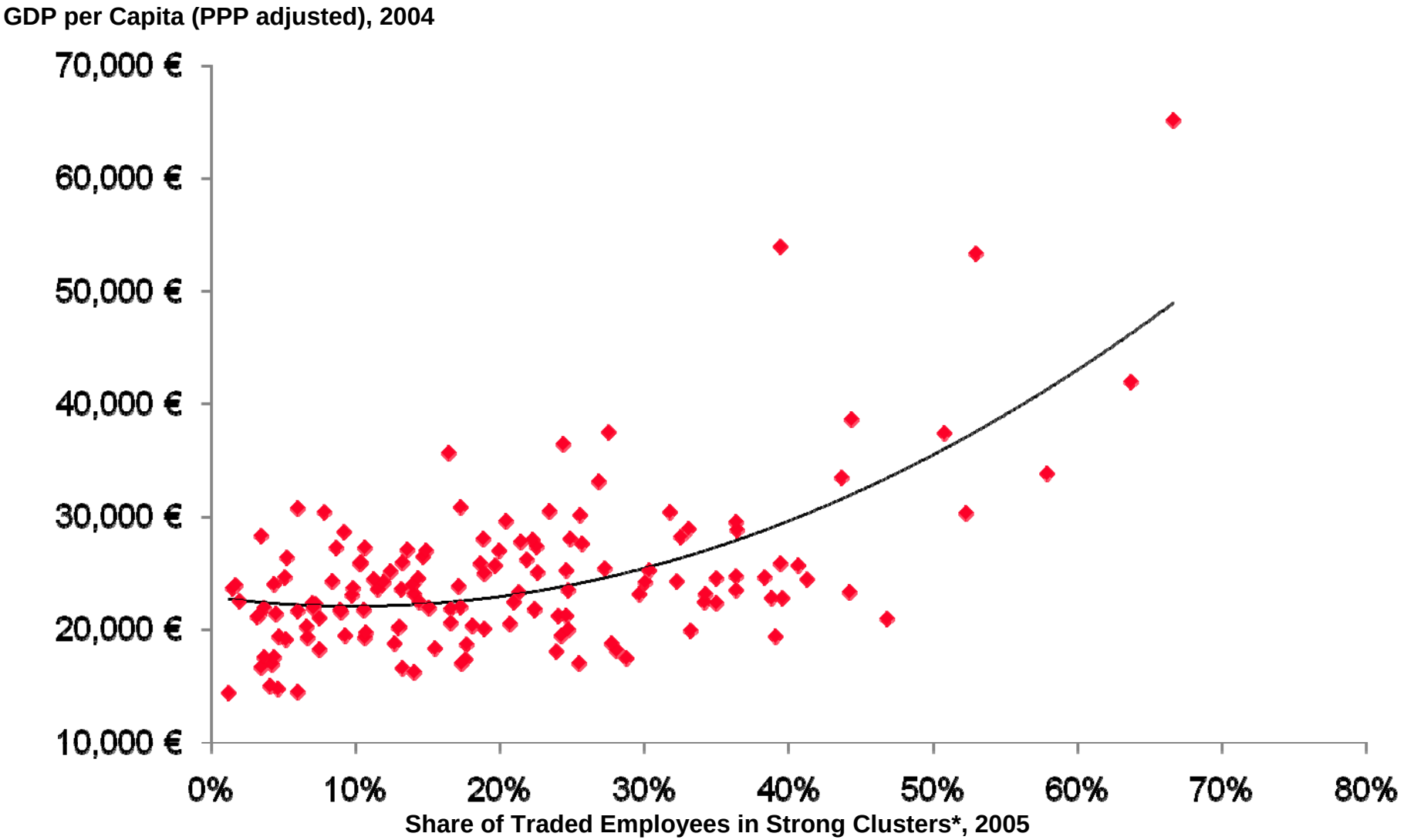
Cluster Strength in Europe versus the United States



Source: European Clusterobservatory

Clusters and European Regional Prosperity

Cluster Strength and Prosperity, EU-15 NUTS 2 Regions



Note: Strong clusters defined by LQ>2; NUTS Regions excluding Portugal and Greece.
Source: European Cluster Observatory. ISC/CSC cluster codes 1.0, dataset 20070510

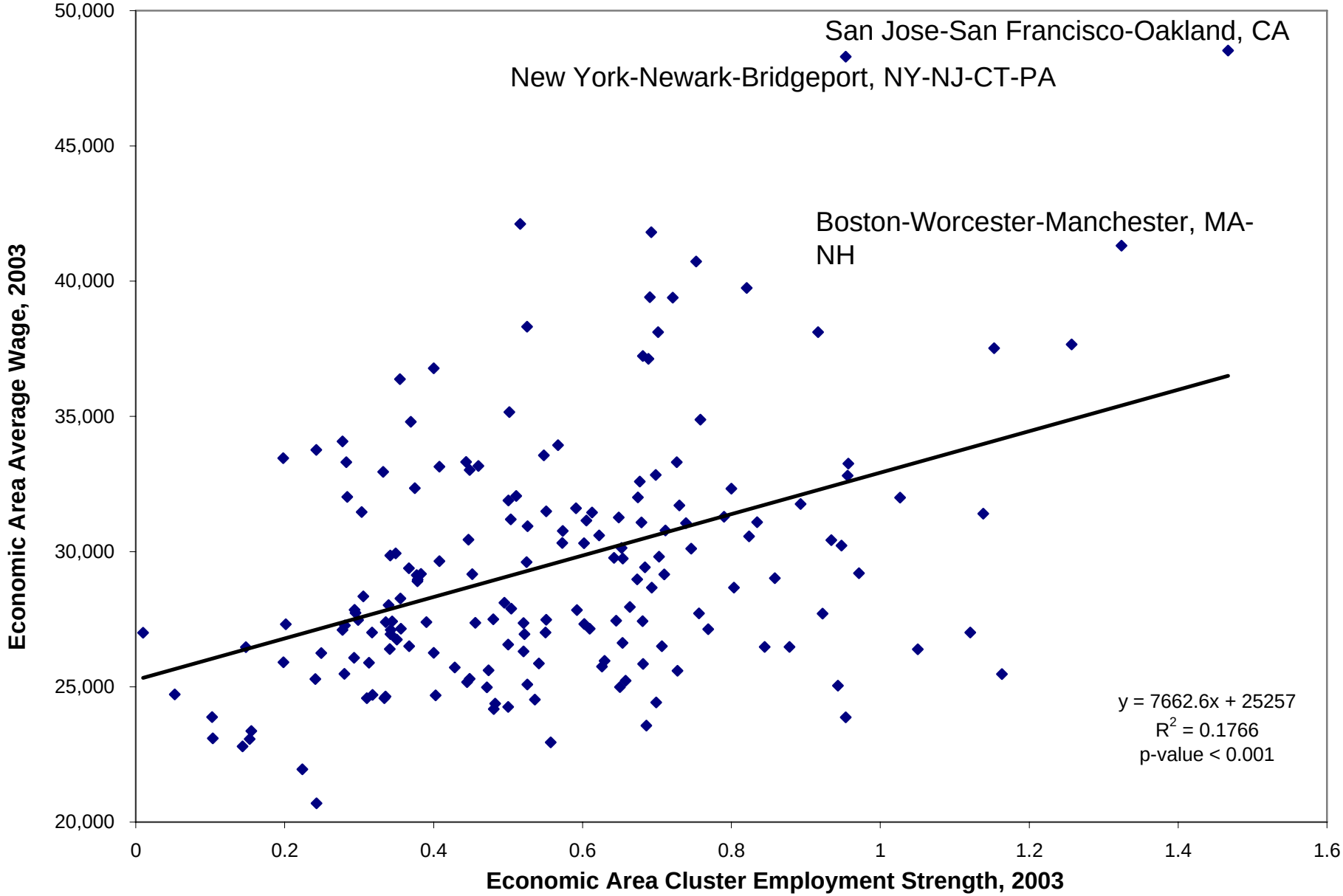
Implications for Europe

- Specialization in a set of clusters what drives competitiveness and innovation, not homogenization
- Limited regional specialization is an important determinant of Europe's lagging competitiveness
- Further integration of European markets is essential to enable a more efficient economic geography and stronger clusters
- Government can be an important actor in European cluster policy but government must play the right role
  - Government must act as **facilitator**, not the driver
  - Government responsibilities for cluster development should be allocated across geographic levels, with a focus on the **regional level**
  - European support for cluster development must be based on **competitive principles**

Back-Up

Cluster Employment Strength and Wages

U.S. Economic Areas



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