Cluster-Based Economic Development: What Have We Learned

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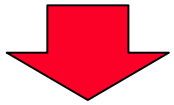
Why the Interest in Clusters?

- Clusters are becoming **increasingly popular** as a policy tool to boost economic development and competitiveness
- The interest in clusters is at least partly a response to the **weaknesses** of economic strategies pursued in the past
  - Strategies based on market opening and macroeconomic stabilization alone have over time tended to exhibit **falling returns**
  - Strategies based on market intervention and industrial policy have fared even worse, **undermining prosperity** over time

- Clusters are seen as a **market-based** approach to economic policy that develops **new roles** for government and companies, as well as for universities, research institutions, trade associations, and others

Cluster Policy in the UK

- UK competitiveness is entering a **new phase**
- The focus is shifting towards **building stronger microeconomic foundations** to take better advantage of open markets and stable macroeconomic conditions



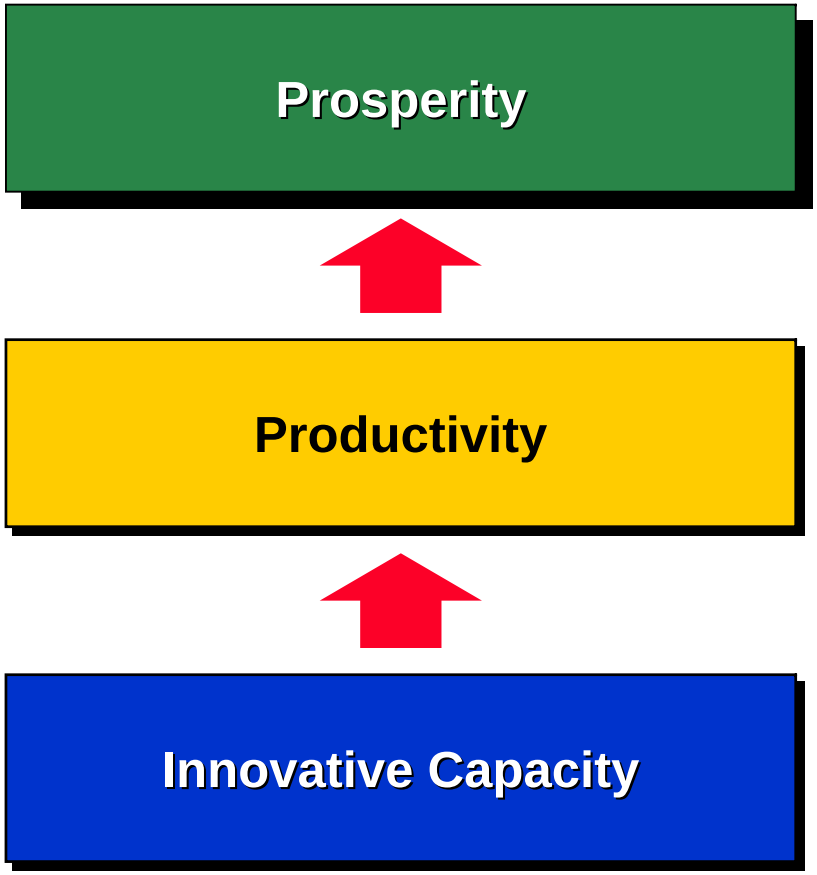
- Competitiveness and clusters have become an **established element** of DTI's strategy to upgrade UK competitiveness
- New institutions, especially the Regional Development Agencies (**RDA**s), have been created that push the agenda on the regional level
- Significant investments have been made in **collecting performance indicators**, **mapping clusters,** and **evaluating cluster policy**

Cluster Research Entering a New Phase

- Research on clusters has made significant progress, developing a **consistent conceptional framework** over the last decade
- Economic development practitioners increasingly look at the cluster concept as a **promising new policy approach**

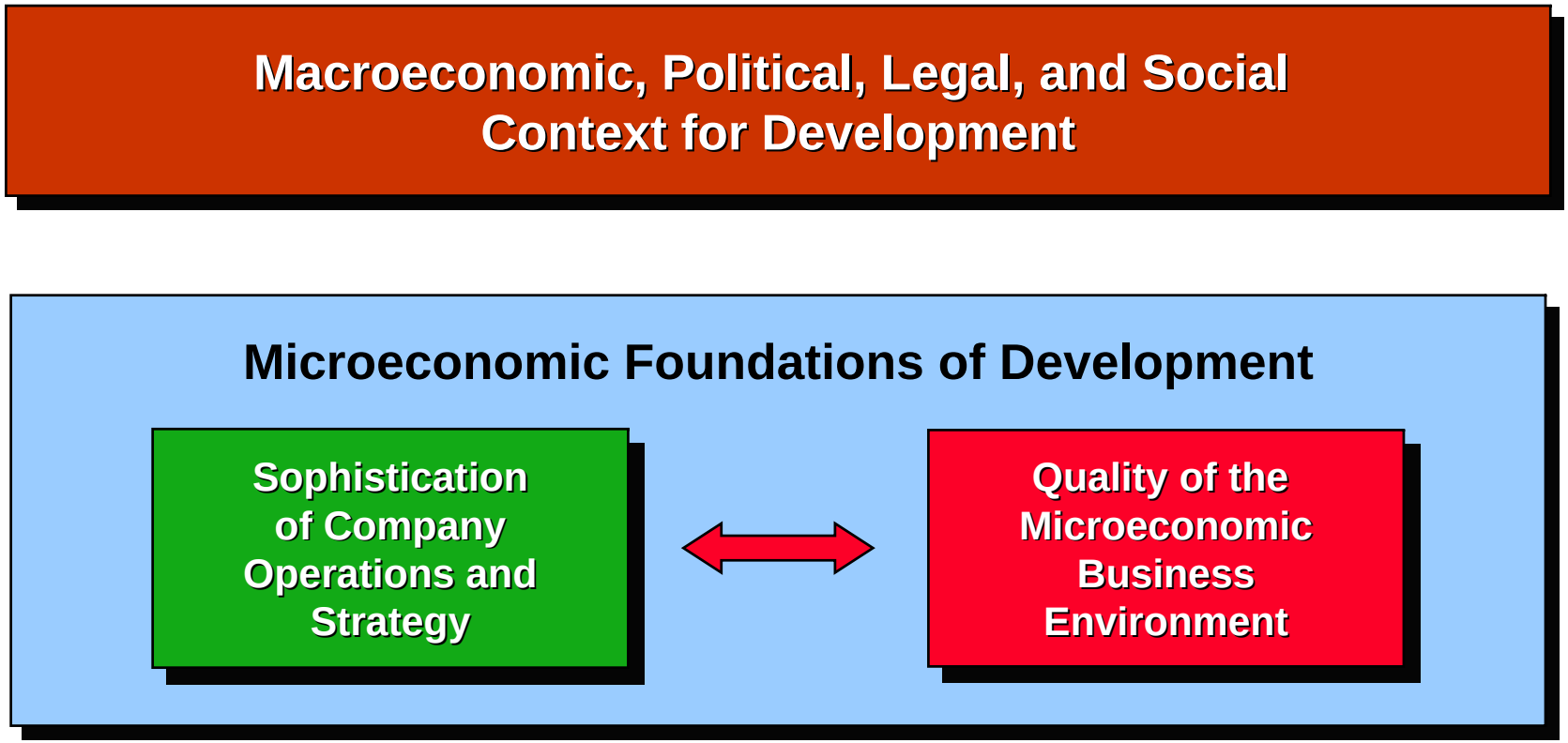
- Clusters are moving from being an experimental, innovative idea to the **mainstream** of research and policy
- The increased exposure puts new demands on the field
  - Moving from case studies to large scale data bases and **empirical** tests of theory-based hypotheses
  - Moving theory development from the focus on clusters as an empirical phenomenon to clusters as a **policy** approach

Drivers of Sustainable Prosperity



Competitiveness

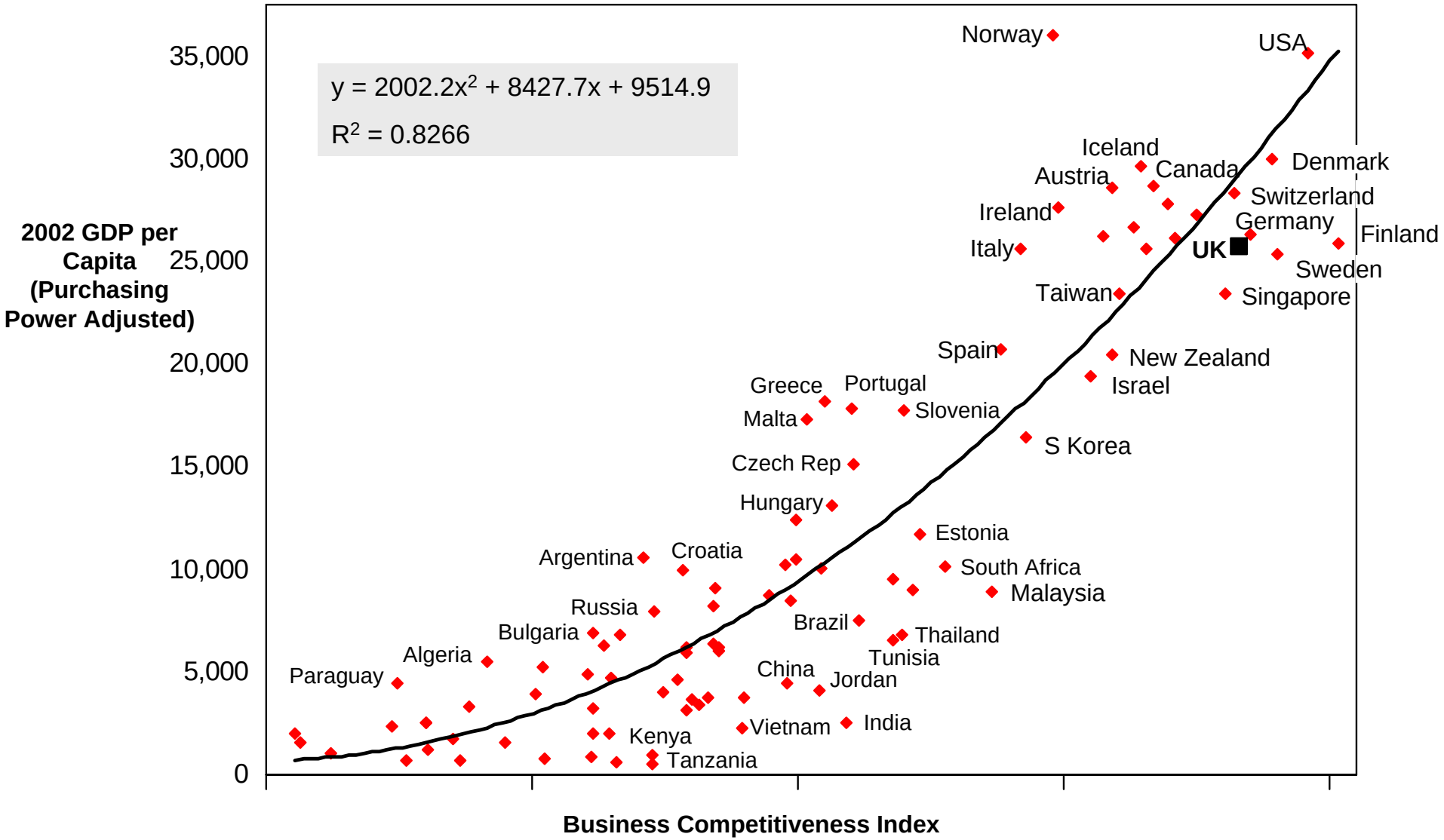
Determinants of Productivity and Productivity Growth



- A sound macroeconomic, political, legal, and social context creates the potential for competitiveness, **but is not sufficient**
- Competitiveness ultimately depends on improving the **microeconomic capability** of the economy and the **sophistication of local companies and local competition**

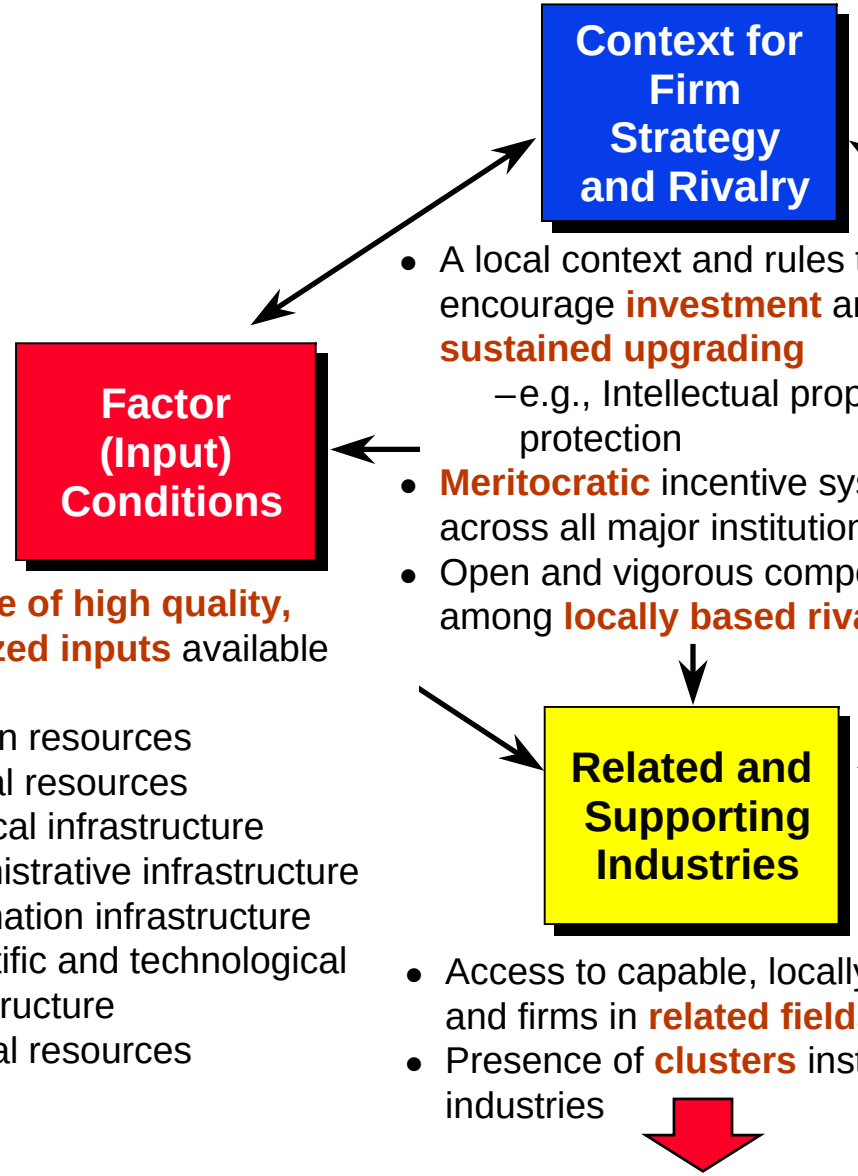
Business Competitiveness Index 2003

Relationship with GDP Per Capita



Source: Global Competitiveness Report 2003

Productivity and the Business Environment



- A local context and rules that encourage **investment** and **sustained upgrading**
  - e.g., Intellectual property protection
- **Meritocratic** incentive systems across all major institutions
- Open and vigorous competition among **locally based rivals**

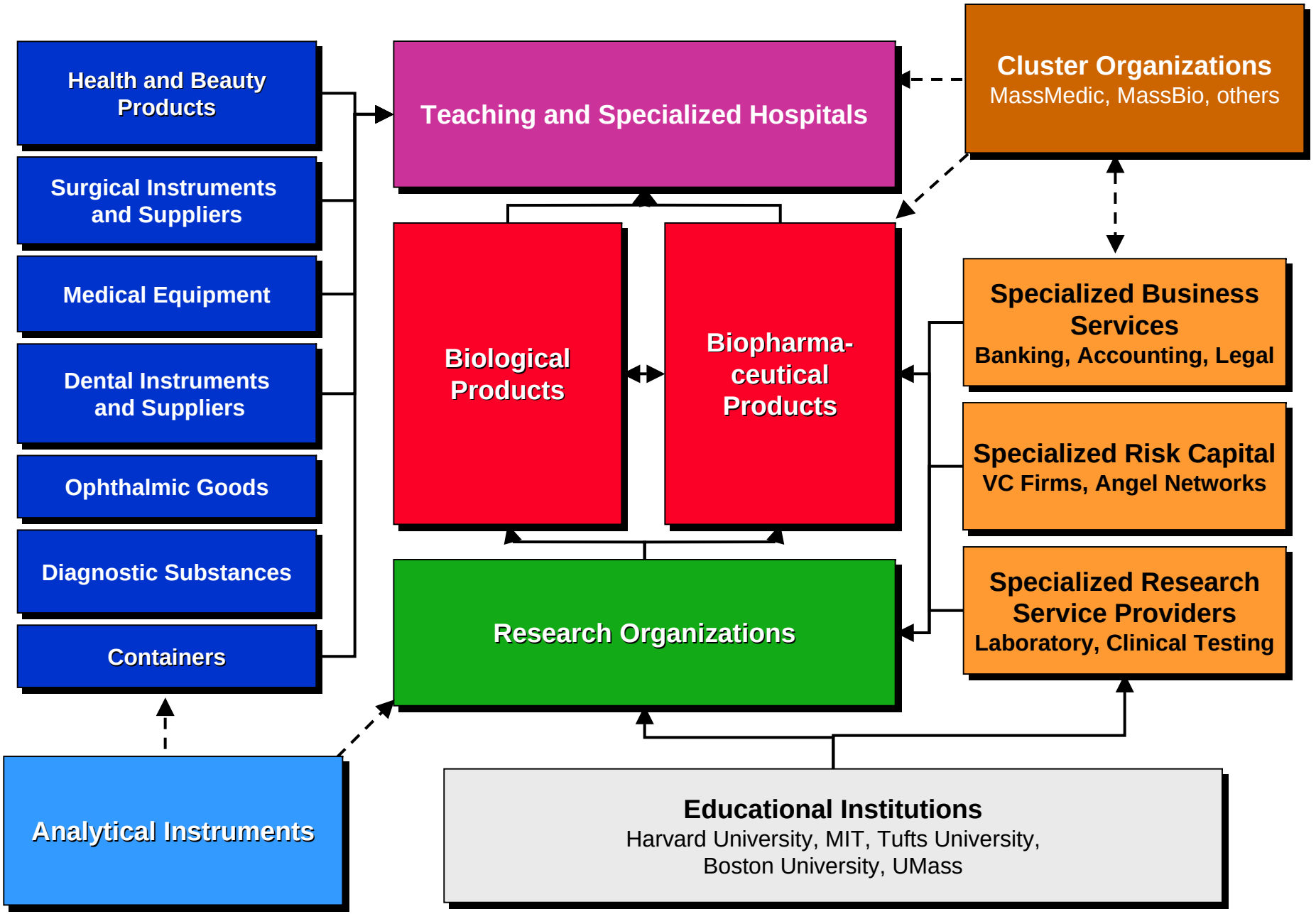
- **Presence of high quality, specialized inputs** available to firms
  - Human resources
  - Capital resources
  - Physical infrastructure
  - Administrative infrastructure
  - Information infrastructure
  - Scientific and technological infrastructure
  - Natural resources

- **Sophisticated and demanding** local customer(s)
- Local customer needs that **anticipate** those elsewhere
- Unusual local demand in **specialized segments** that can be served nationally and globally

- Access to capable, locally based **suppliers** and firms in **related fields**
- Presence of **clusters** instead of isolated industries

- Successful economic development is a process of **successive economic upgrading**, in which the business environment in a nation evolves to support and encourage increasingly sophisticated ways of competing

The Boston Life Sciences Cluster

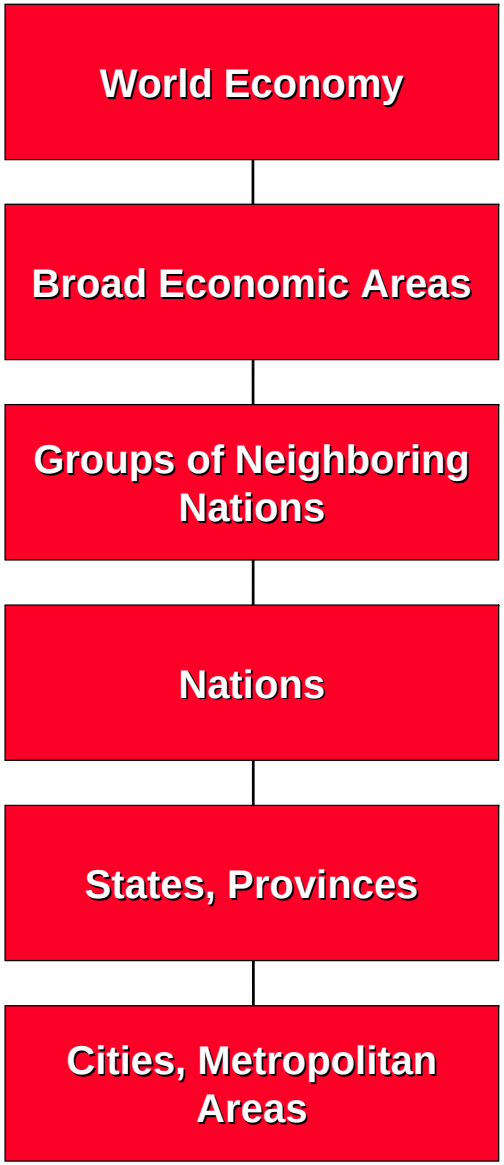


Levels of Clusters

- There is often an **array of clusters** at different locations in a given field, each with different levels of specialization and sophistication
- Global **innovation centers**, such as Silicon Valley in semiconductors, are few in number. If there are multiple innovation centers, they normally **specialize** in different market segments
- Other clusters focus on **manufacturing,** outsourced **service functions,** or play the role of **regional** assembly or service centers
- Firms based in the most advanced clusters often **seed or enhance clusters** in other locations in order to reduce the risk of a single site, access lower cost inputs, or better serve particular regional markets
- The challenge for an economy is to move from **isolated firms** to an array of **clusters**, and then to **upgrade the breadth and sophistication** of clusters to more advanced activities

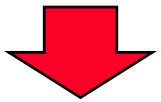
Influences on Competitiveness

Multiple Geographic Levels



Evolution of Regional Economies and Clusters

- Regional economies and their individual clusters develop slowly in an **evolutionary, path-dependent process**
- Some of the factors that drive this process are **inherited** or externally given (physical location, natural endowments, chance events)
- However, while these factors are important, they do **not** determine the evolutionary path of a regional economy or cluster

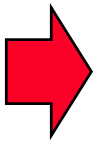


- **Choices**, such as the investment in specific assets or the decision for a particular regulation or policy, are important
  - Institutions are an important factor enabling regions to make and execute choices
- So are **entrepreneurial decisions**

Shifting Responsibilities for Economic Development

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

Institutions for Collaboration

Selected Massachusetts Organizations in 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
- VC community
- University alumni

Economic Development Initiatives

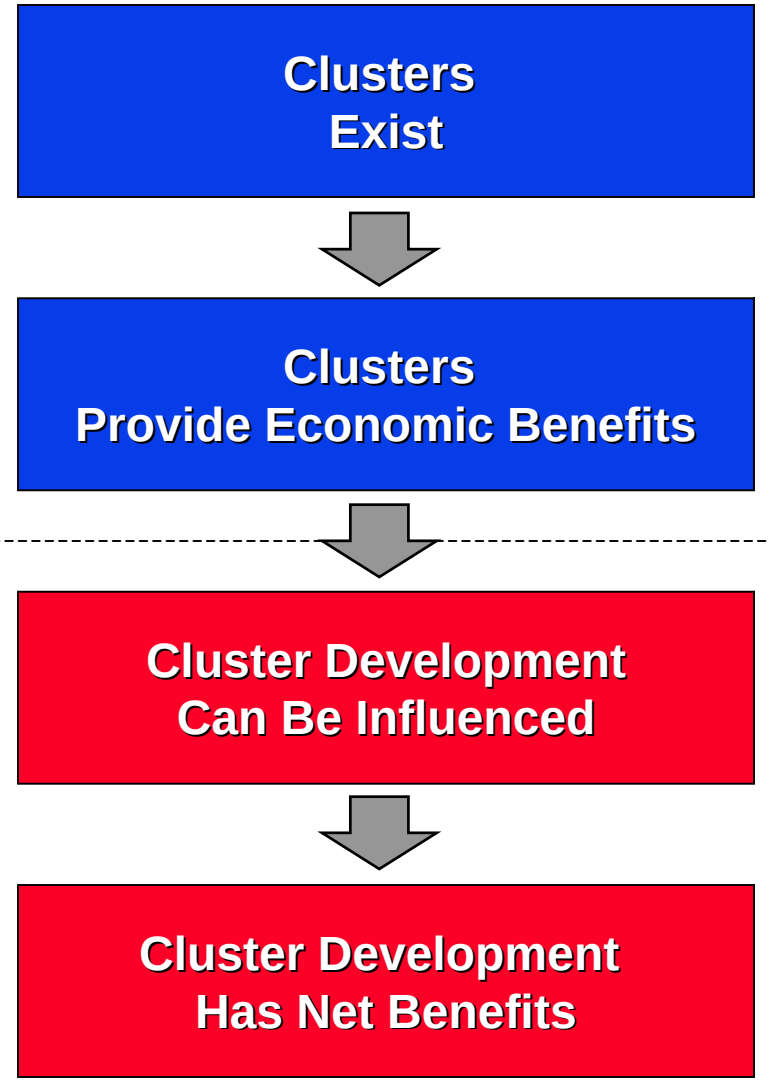
- Massachusetts Technology Collaborative
- Mass Biomedical Initiatives
- Mass Development
- Massachusetts Alliance for Economic Development

Joint Research Initiatives

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

Cluster-Based Economic Development

Key Hypotheses



- Extensive case evidence exists
- Economy-wide, systematic data in Canada, the U.S., and Sweden

- Case-based evidence on different dimensions of benefits
- U.S. data provides evidence on regional economic benefits

- Theory and case evidence suggest impact of policy choices

- Theory and case evidence suggest potential for net benefits

Cluster Initiatives

- Conceptual Foundations
- **Empirical Evidence on Clusters**
- Empirical Evidence on Cluster Initiatives: The Greenbook
- Implications for Cluster-Based Economic Development

Mapping Regional Clusters
Statistical Definition of Clusters

- Many previous studies have used **ad-hoc cluster definitions**, in some cases supported by input-output data
- The Cluster Mapping Project set out to delineate the boundaries of clusters **statistically**
  - Cluster boundaries are based on the actual patterns of co-location of industry employment across U.S. states
- The process of identifying cluster involves **two steps**:
  - Distinguishing local, traded, and natural-resource dependent industries
  - Grouping 590 traded industries into 41 traded clusters
- Findings and details of the methodology are available at the web site of the Institute for Strategy and Competitiveness www.isc.hbs.edu and in "Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003".

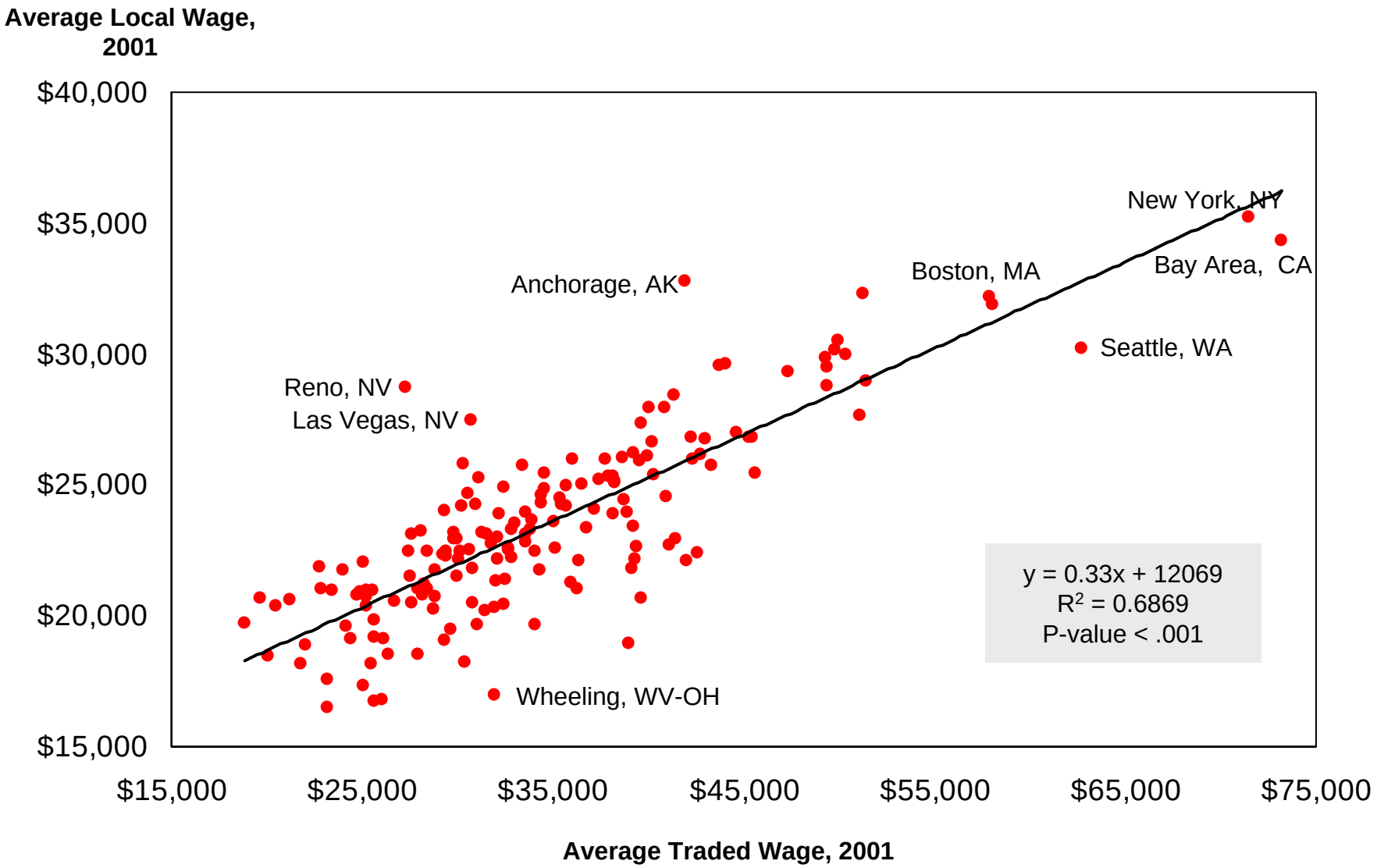
Composition of Regional Economies
United States, 2001

	Traded Clusters	Local Clusters	Natural Resource-Driven Industries
Share of Employment	31.6%	67.6%	0.8%
Employment Growth, 1990 to 2001	1.7%	2.8%	-1.0%
Average Wage	$44,956	$28,288	$33,245
Relative Wage	133.8	84.2	99.0
Wage Growth	4.5%	3.7%	2.0%
Relative Productivity	144.1	79.3	140.1
Patents per 10,000 Employees	21.7	1.3	7.2
Number of SIC Industries	590	241	48

Note: 2001 data, except relative productivity which is 1997 data.
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Broad Composition of Regional Economies

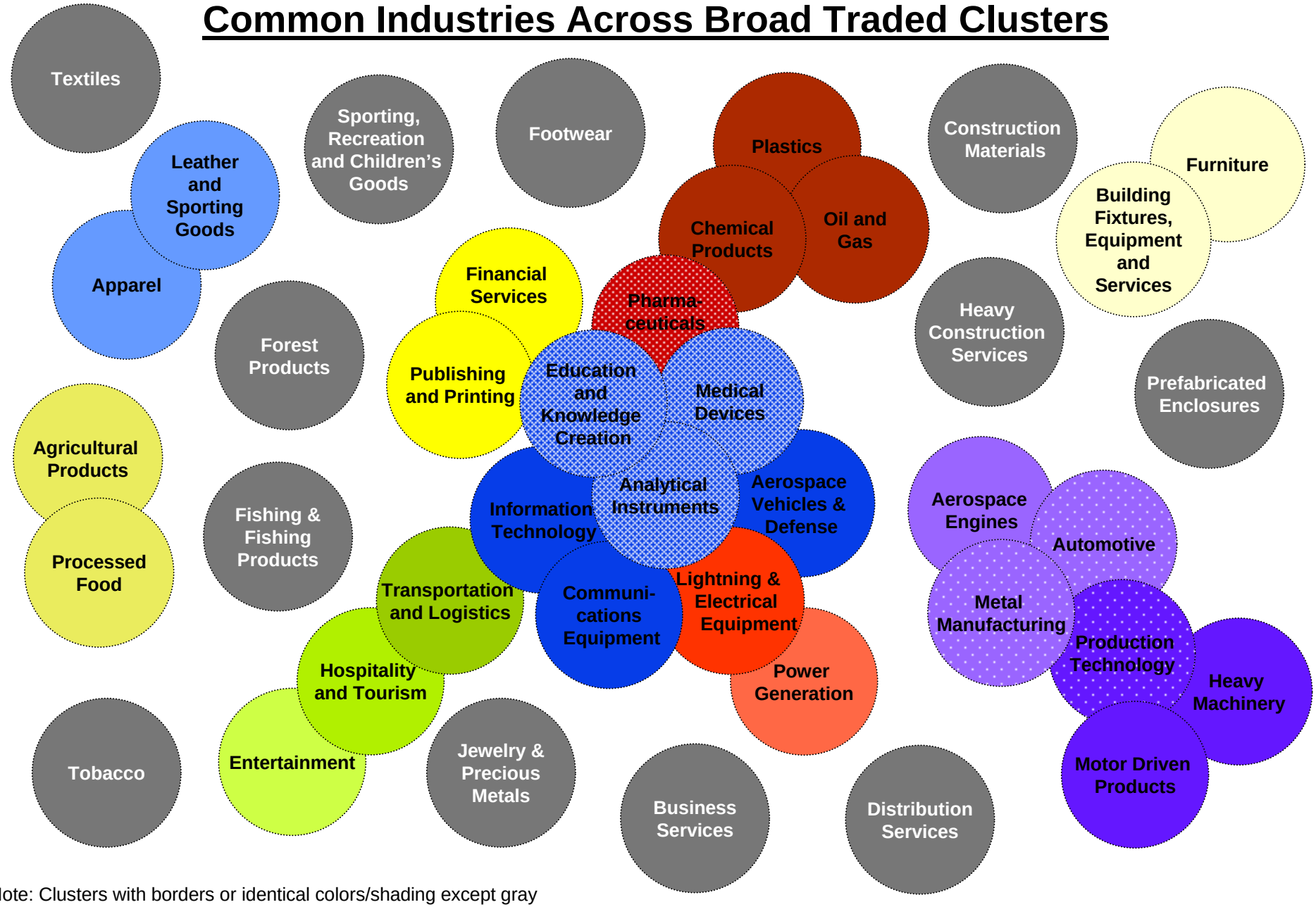
Local versus Traded Wages



Source: County Business Patterns; Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Cluster Overlap in the United States Economy

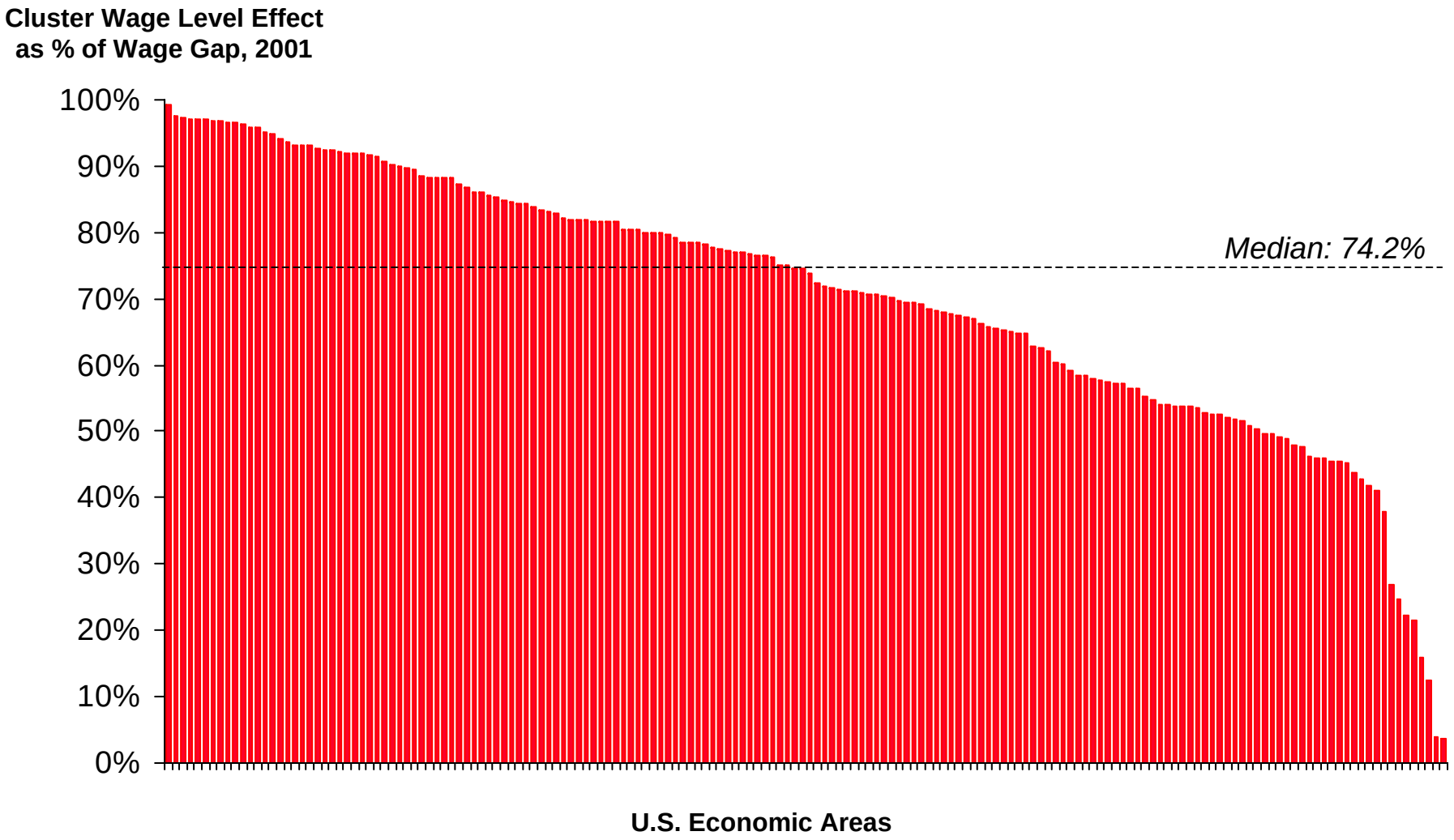
Common Industries Across Broad Traded Clusters



Note: Clusters with borders or identical colors/shading except gray have at least 20% overlap of industries by number in both directions

Determinants of Regional Prosperity

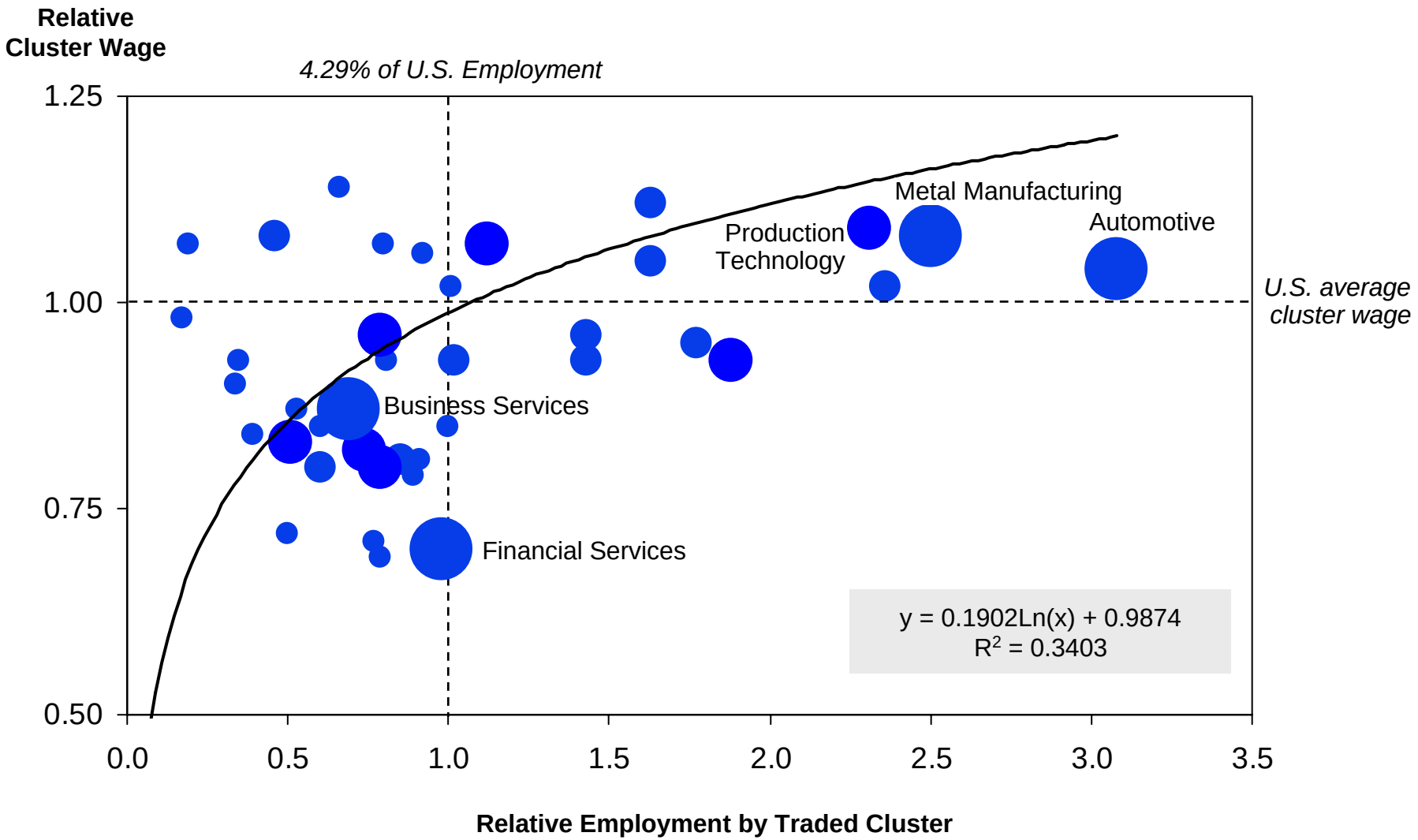
Level versus Mix Effect, U.S. Regions



Source: County Business Patterns; Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Traded Cluster Specialization and Relative Wage Levels

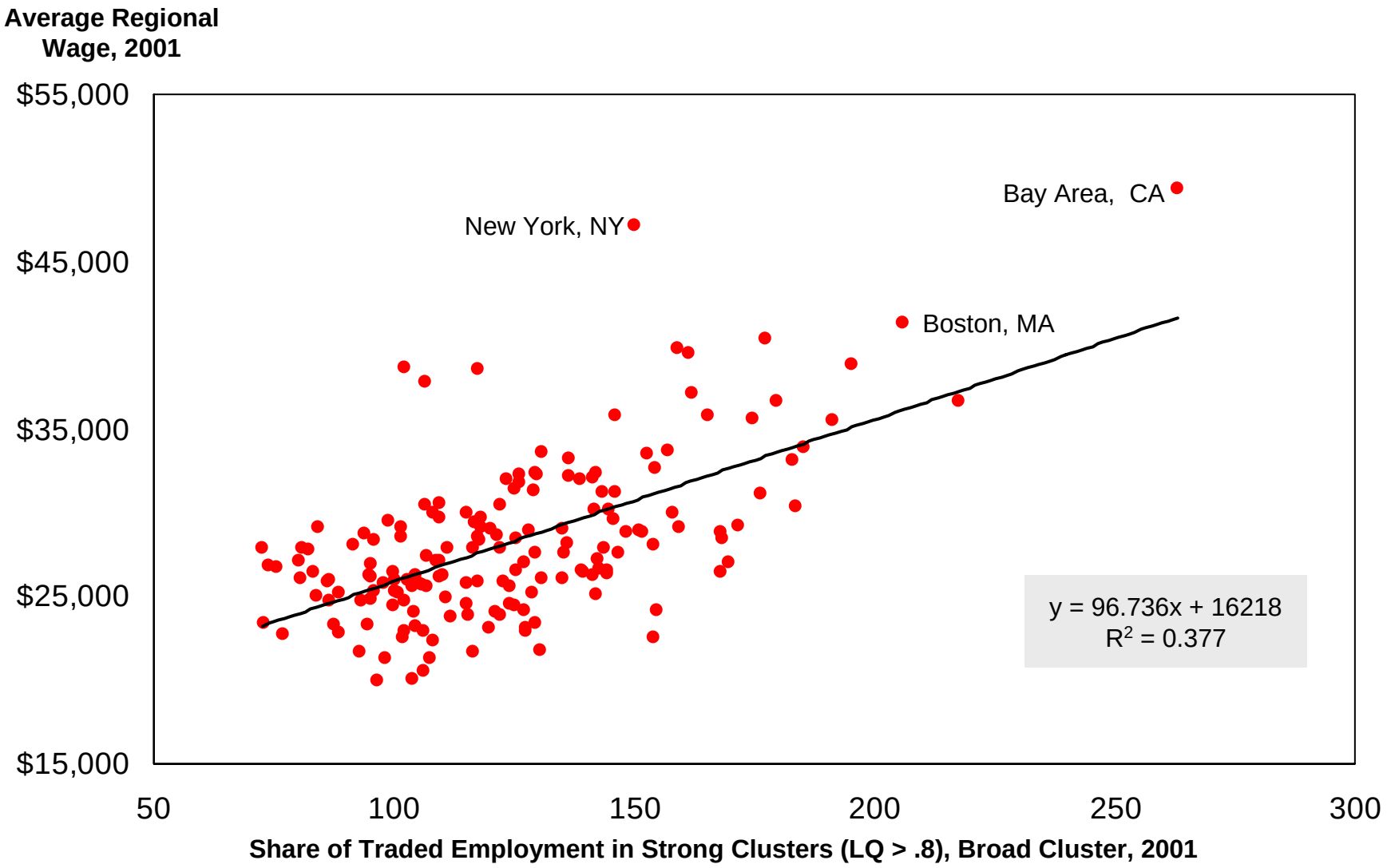
Ohio, 2001



Note: Uses narrow cluster definitions to avoid overlap; bubble size proportional to employment bracket
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Determinants of Regional Prosperity

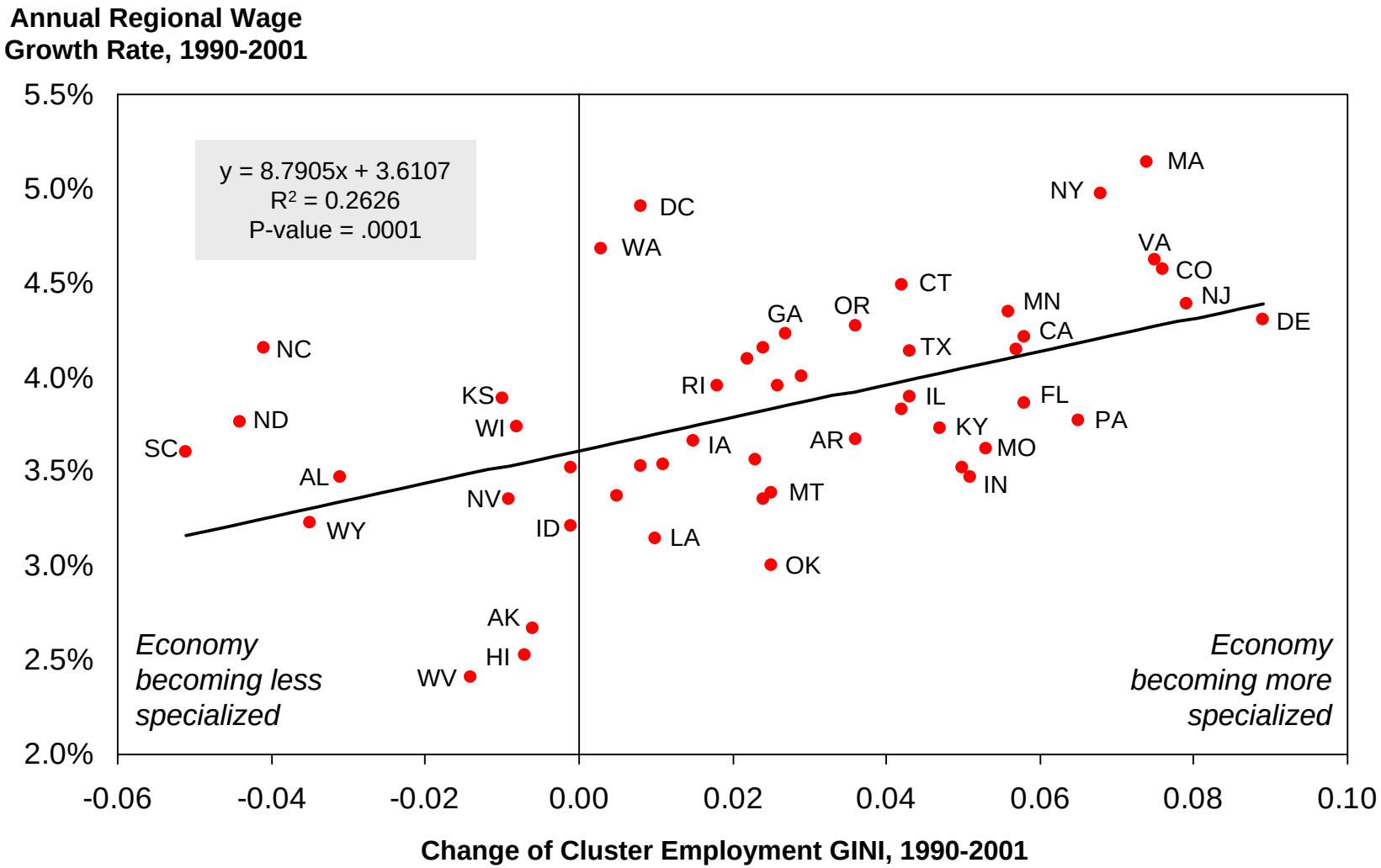
Cluster Strength and Wage Levels, U.S. Regions



Source: County Business Patterns; Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Determinants of Regional Prosperity

Change in Cluster Specialization and Wage Growth, U.S. States



Source: County Business Patterns; Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Explaining Average Regional Wages
Multiple Regression Model

Dependent variable: Regional Average Wage

Independent Variable	Effect
• Total regional employment	Positive, significant
• Patents per capita	Positive, significant
• Patentor concentration	Negative, significant
• Share of strong clusters in regional employment	Positive, significant
• Cluster breadth	Positive, significant

Explained Variation (adjusted R^2): 72.8%

Note: Regression uses 2001 data for 172 U.S. economic areas
Source: Michael E. Porter, The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Cluster Initiatives

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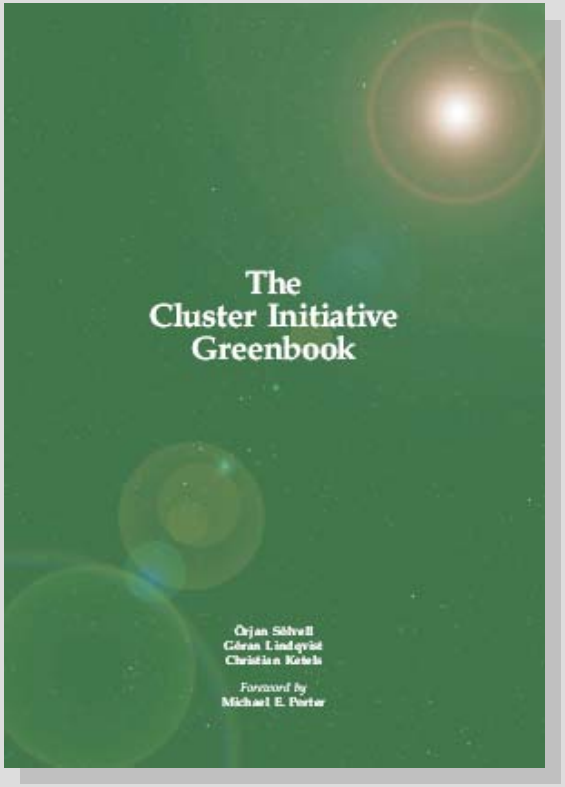
Cluster Initiatives
The Greenbook

- Cluster initiatives are coalitions of companies, government agencies, and other institutions for joint action to upgrade a cluster's competitiveness
  - Relatively new policy approach
  - Most current evidence is based on case studies



Free download at www.cluster-research.org

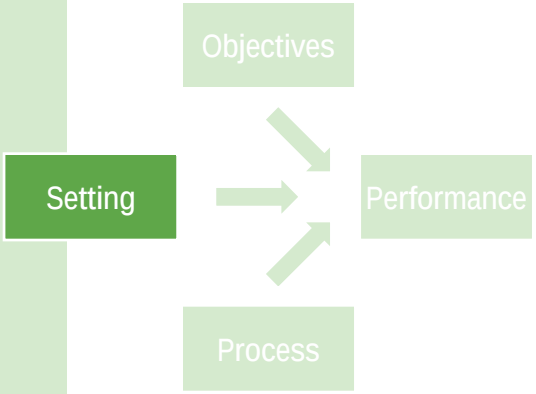
The Cluster Initiative Greenbook

- First ever quantitative look at a 250+ cluster initiatives
  - Sponsored by Vinnova (Swedish government agency) for the 6th Annual Conference of the The Competitiveness Institute
- Collects data on key characteristics of cluster initiatives (CI) connected to performance
  - *Objectives;* what does the CI aim to do
  - *Process;* how is the CI organized to achieve its objectives
  - *Setting;* what are the characteristics of the cluster and its environment

Cluster Initiative Assessment
Context of the CI

Categories

- To describe the setting in which the cluster initiative operates, we look at the overall **business environment** and the characteristics of the **cluster** served

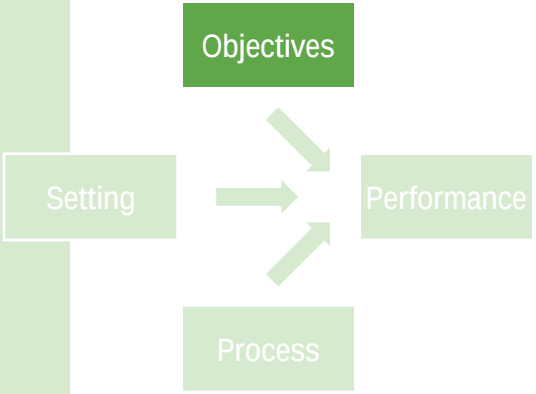


Findings

- There is significant variance in the responses, but some clear patterns emerge
  - Most of the CI's operate in a context of **strong regional governments** focused on **innovation**
  - Most of the clusters served have an **important role** in their region or nation
  - The level of heterogeneity among the context CI's face is highest in the level of **trust** towards government, the **level of competition** within the cluster, and the **age** of the cluster

Cluster Initiative Assessment

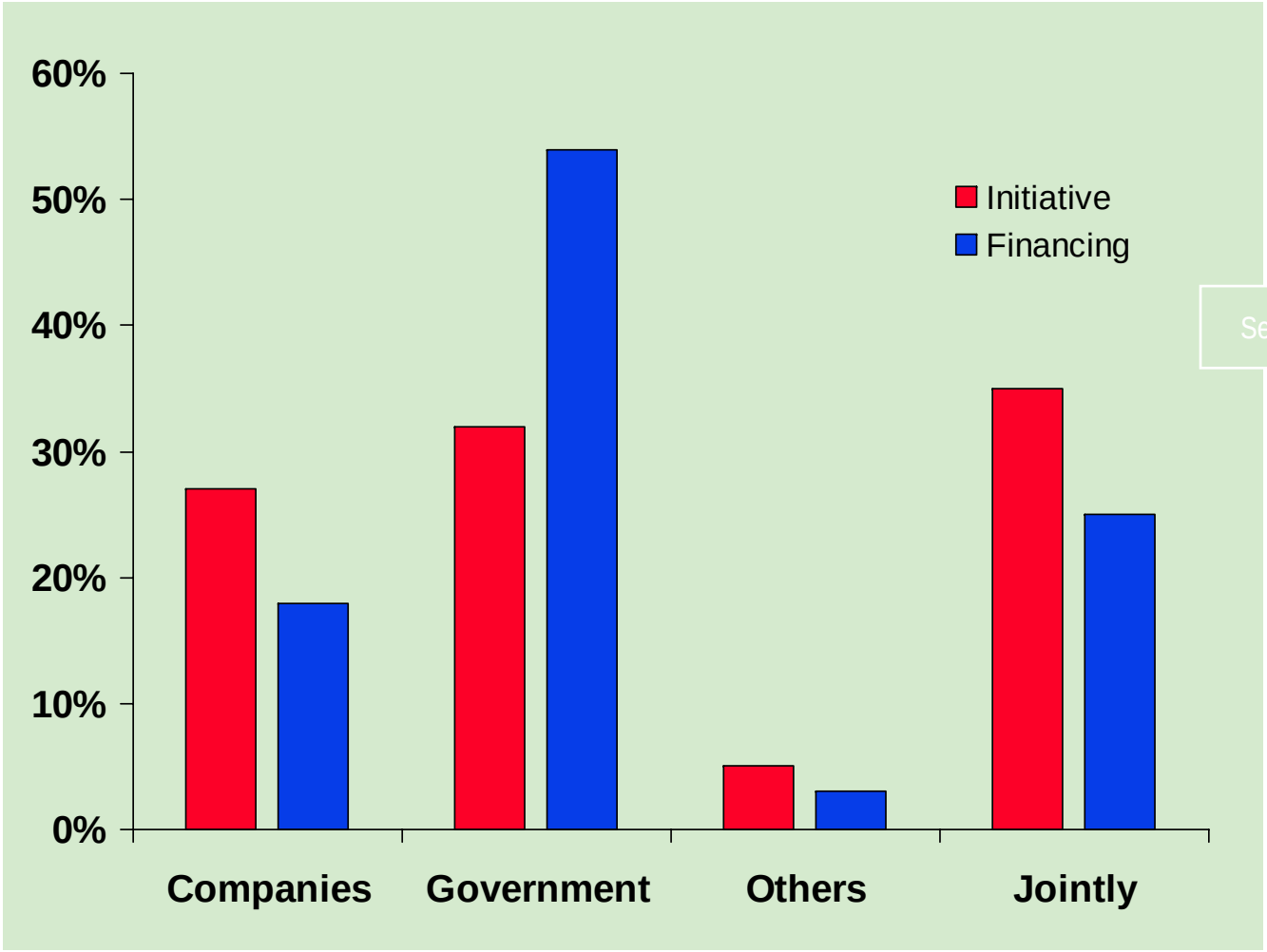
Objectives and Activity Areas of the CI

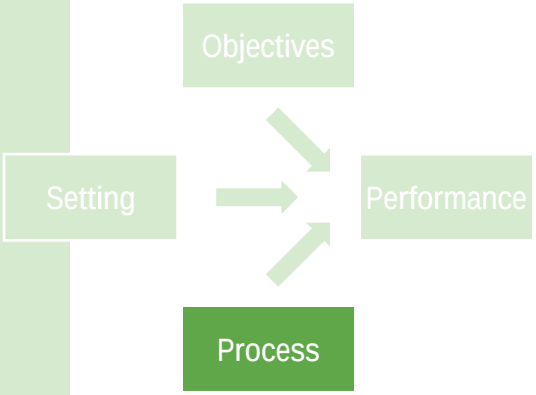


- On average, CI's are pursuing 15 objectives/activity areas
- Almost 50% of the CI's pursue between 13 and 20 objectives

Cluster Initiative Assessment

Roles

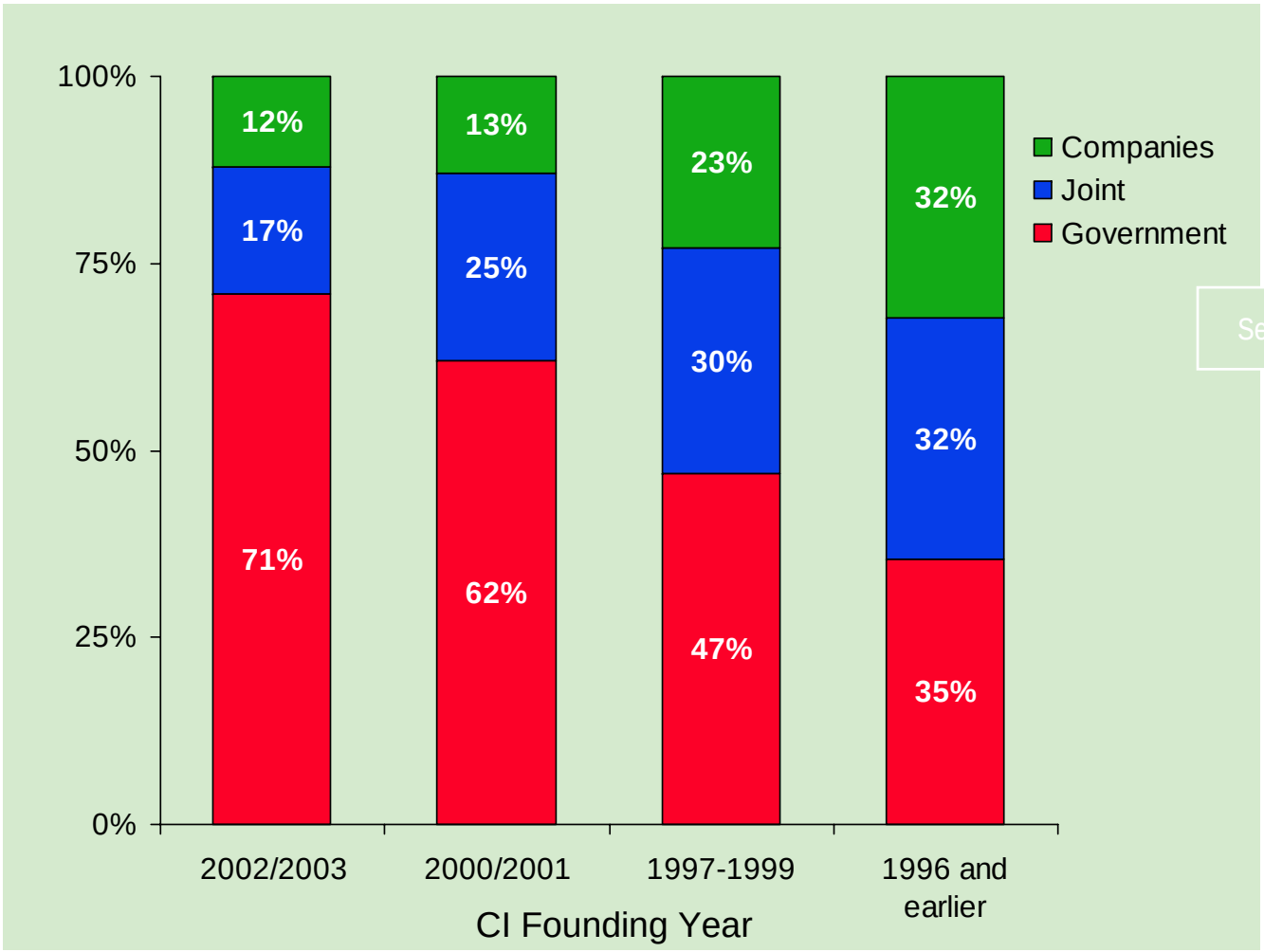


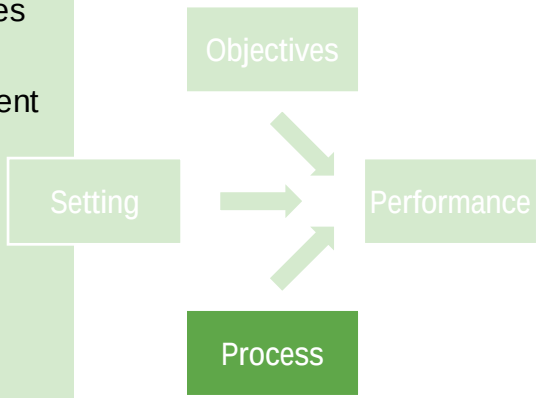


- Companies are the most influential participants in 70% of the CI's
- There is significant heterogeneity in the role of government

Cluster Initiative Assessment

Financing by CI Starting Year





- While financing patterns change, the objectives tend to remain stable

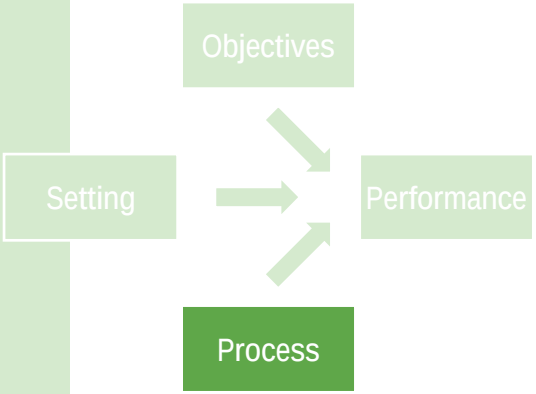
Cluster Initiative Assessment
CI Facilitator and Office

Cluster Initiative Facilitator

- 90% of all CI's responding have a CI facilitator playing a central role in leading the effort
- More than 50% of the CI facilitators come from companies, with the rest equally from government and specialized consultancies

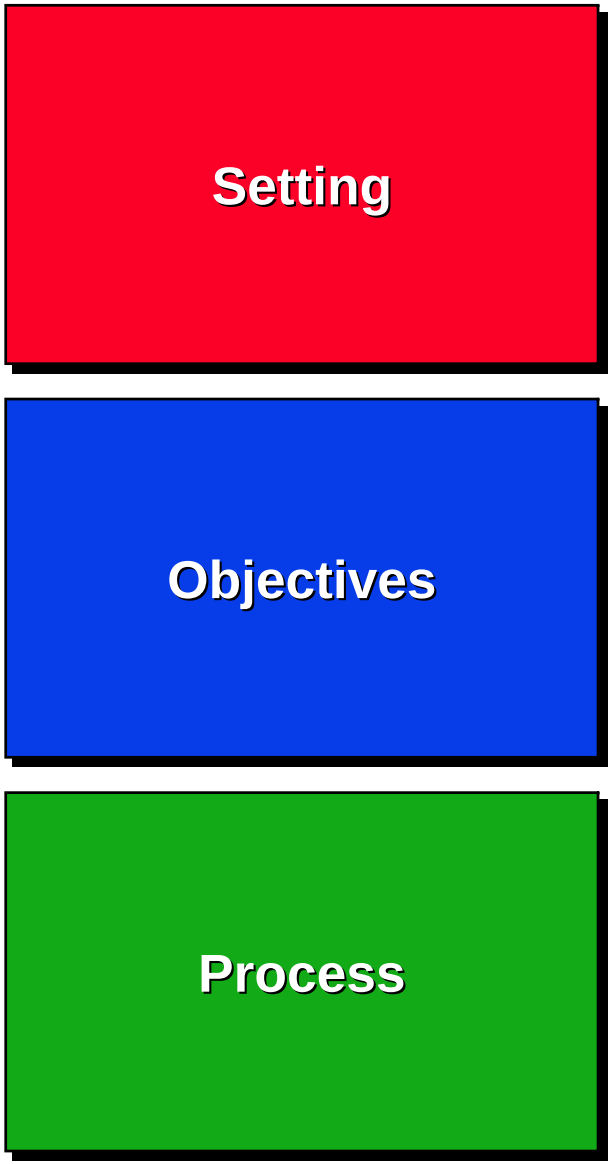
CI Infrastructure

- More than 75% of all CI's have organized task-forces to address specific issues
- About 70% of all CI's have relationships to other cluster initiatives in their region or economic field
- Less than 70% of the CI's have an own office, and the large majority have budget shortages



- A significant minority of about 40% of CI's report dependence on one key individual and a lack of sustainability without continued outside support

Drivers of Cluster Initiative Success



- Strong business environment
- Trust in government
- Strong regional government
- Cluster strength

- Broad range of objectives
- Objectives selected based on cluster's specific needs
- *No significant effect of special objectives*

- CI Facilitator with cluster insight
- CI has office and significant budget
- CI has clear strategy and measurable goals
- *No negative effect of government financing*
- *Negative effect of limiting participation*

Ongoing Empirical Research

Business Environment quality

- Continuous upgrading of data on national business environments
  - Global Competitiveness Report, www.weforum.org
- Collection of data on regional business environments
  - Studies in selected U.S. regions in the *Clusters of Innovation*-project (www.compete.org)

Cluster

- Develop cluster data at the national level using trade patterns
  - Launch of new data website at www.isc.hbs.edu
- Roll out of the methodology outside the United States
  - Canada, 2001 (www.competeprosper.ca)
  - Sweden, 2003 (www.cluster-research.org)

Cluster policy

- Collection of data on the impact of cluster policies on cluster-specific business environments
  - *Cluster Competitiveness Report* offered by the "Fundacio Clusters I Competitivitat" (www.clustercompetitiveness.org)

Cluster Initiatives

- Conceptual Foundations
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- **Implications for Cluster-Based Economic Development**

Emerging Implications

Implications for cluster initiatives

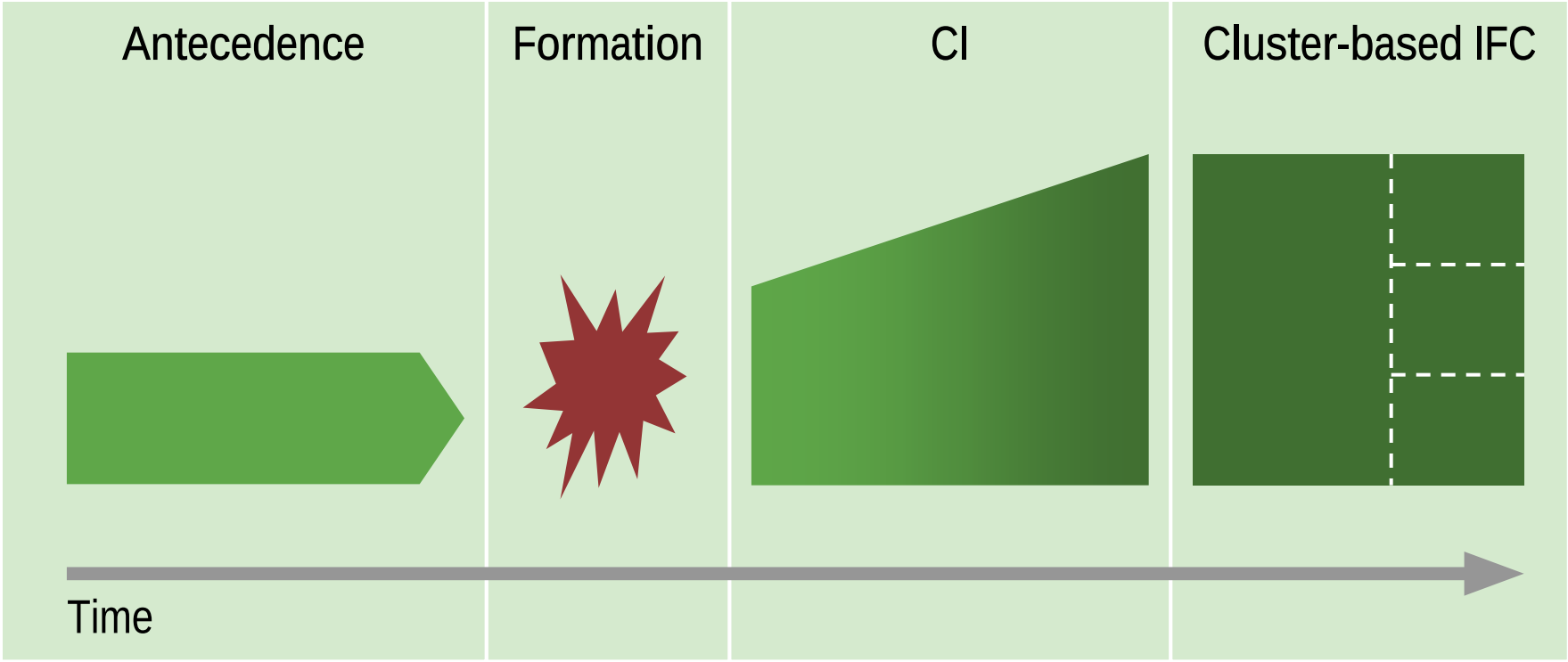
- Managing the Cluster Initiative Life Cycle
- Professionalizing Cluster Initiatives

Implications for economic development strategies

- Cluster initiatives organize policies; they are not a new policy
- Cluster creation versus cluster activation
- Clusters and regional economic strategy

Implications for UK cluster policy

The Life Cycle of a Cluster Initiative



Professionalizing Cluster Initiatives

- The foundations of Cluster Initiatives' strategies and structures need to be improved as clusters enter the **mainstream** of economic policy in many regions

- Activities need to be based on a consistent **conceptual framework** of the drivers of the cluster's performance, shared across the cluster
- A CI's strategy needs to build on the **unique** circumstances of the cluster, not copying of successful clusters elsewhere
- A CI needs a sound **organizational structure** with a sufficient infrastructure and financing
- **Data** creation and analysis needs to be a central in supporting decisions about CI activities and in measuring impact

Cluster – A New Economic Policy Tool?

- In some cases, cluster initiatives are organized as an **additional policy area** within the government's economic development organization

However

- Clusters are better understood as an effective **process** to identify, prioritize, and act upon barriers to higher cluster performance
  - **Everything matters** for microeconomic competitiveness
  - It is not enough for policies too be generically "good"; they need to be the **most appropriate** in the specific situation

Different Approaches to Cluster Development

Cluster Creation

- Targets areas of perceived **market demand**
- Is driven by **public sector intervention**
- Requires sustained **financial commitment** by the public sector
- High **failure rate**

- **Deepens** the dependence on public sector intervention

Cluster Activation

- Leverages **existing assets**, history, and geographic location
- Builds on **coalition** of private and public sector actors
- Requires sustained **participation** by all actors
- Level of success is increasing over **time**; quick returns are possible

- **Transforms** the roles of private and public sector

The Role of Clusters in Economic Development

Overview

- Clusters are **critical engines** in the economic structure of national and regional economies
- Clusters can **identify fundamental challenges** in the national or regional business environment
- Clusters provide new **roles** for government, companies, and other institutions in economic development

However

- Cluster initiatives alone are less effective, if they are not part of a **overarching approach** to improve competitiveness on the national and/or regional level
- An overall strategy to improve a country's or region's **competitiveness** depends on progress in two dimensions
  - Cross-cluster issues affecting the whole economy
  - Clusters

Implications for UK Cluster Policy

Strategy

- Cluster initiatives need to be integrated into consistent **regional economic strategies**
- Strategies need to reflect the **unique circumstances** in a cluster or region

Process

- Regional competitiveness efforts need to focus on winning **leaders with strong regional positions** that can succeed in mobilizing the private sector
  - RDAs are a relatively young institutions and are not led by elected officials; they will need time to be perceived as ultimate decision makers
  - Private sector leaders are, especially in the short run, critical to really drive and direct the efforts

Data

- Cluster initiatives need effective data and expertise to be effective
  - Past **cluster mapping** efforts in the UK seem to have been insufficient to provide actionable data for cluster identification and evaluation
  - There is lack of consistent **data on regional business environments** and the **impact of existing cluster efforts**

UK Competitiveness Entering A New Phase
The Role of Cluster-Based Policies

- The UK is moving from competing as an **efficient** location to do business in Europe to become a base for competing on **innovation**
- Cluster-based strategies are an important tool to drive the **transition of policy** and to establish a **new public-private policy process**

- The UK can and needs to set more **ambitious goals** for its cluster-based economic policies
  - Use clusters to gain **leverage** for a broader competitiveness strategy redefining what this country stands for in international competition
  - Aim to become a **leader** in the practice of modern cluster-based policies defining their shape and applying and developing new tools