

Cluster-Based Economic Development: What Have We Learned

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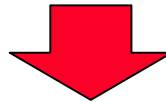
DTI
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This presentation draws on ideas from Professor Porter's articles and books, in particular, [The Competitive Advantage of Nations](#) (The Free Press, 1990), "The Microeconomic Foundations of Economic Development," in [The Global Competitiveness Report 2003](#), (World Economic Forum, 2003), "Clusters and the New Competitive Agenda for Companies and Governments" in [On Competition](#) (Harvard Business School Press, 1998), and the "Cluster Initiative Greenbook" by C Ketels, O Solvell, and G Lindqvist. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means - electronic, mechanical, photocopying, recording, or otherwise - without the permission of the author.

Additional information may be found at the website of the Institute for Strategy and Competitiveness, www.isc.hbs.edu

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**

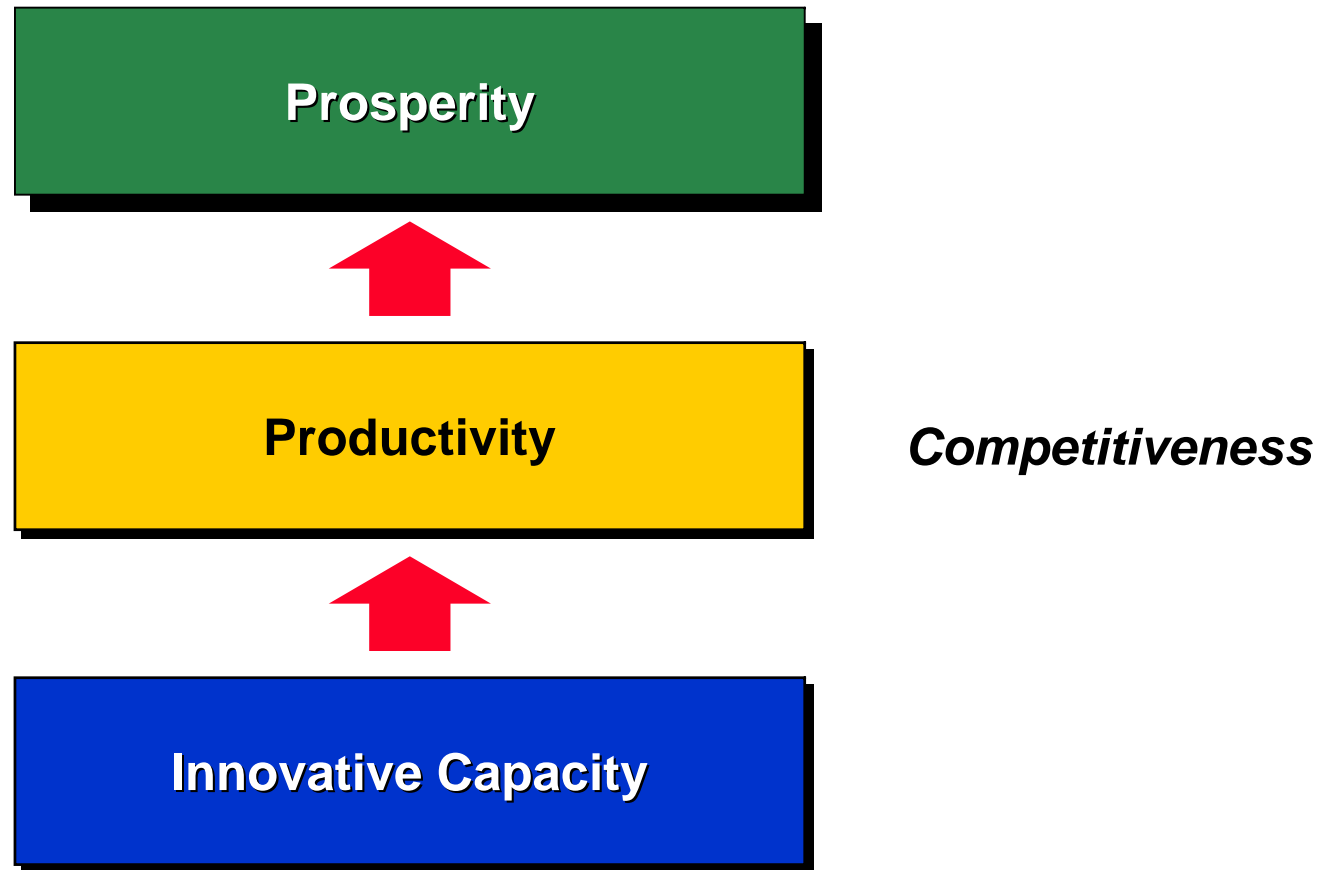
Cluster Research Entering a New Phase

- Research on clusters has made significant progress, developing a **consistent conceptual 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



Determinants of Productivity and Productivity Growth

Macroeconomic, Political, Legal, and Social
Context for Development

Microeconomic Foundations of Development

Sophistication
of Company
Operations and
Strategy

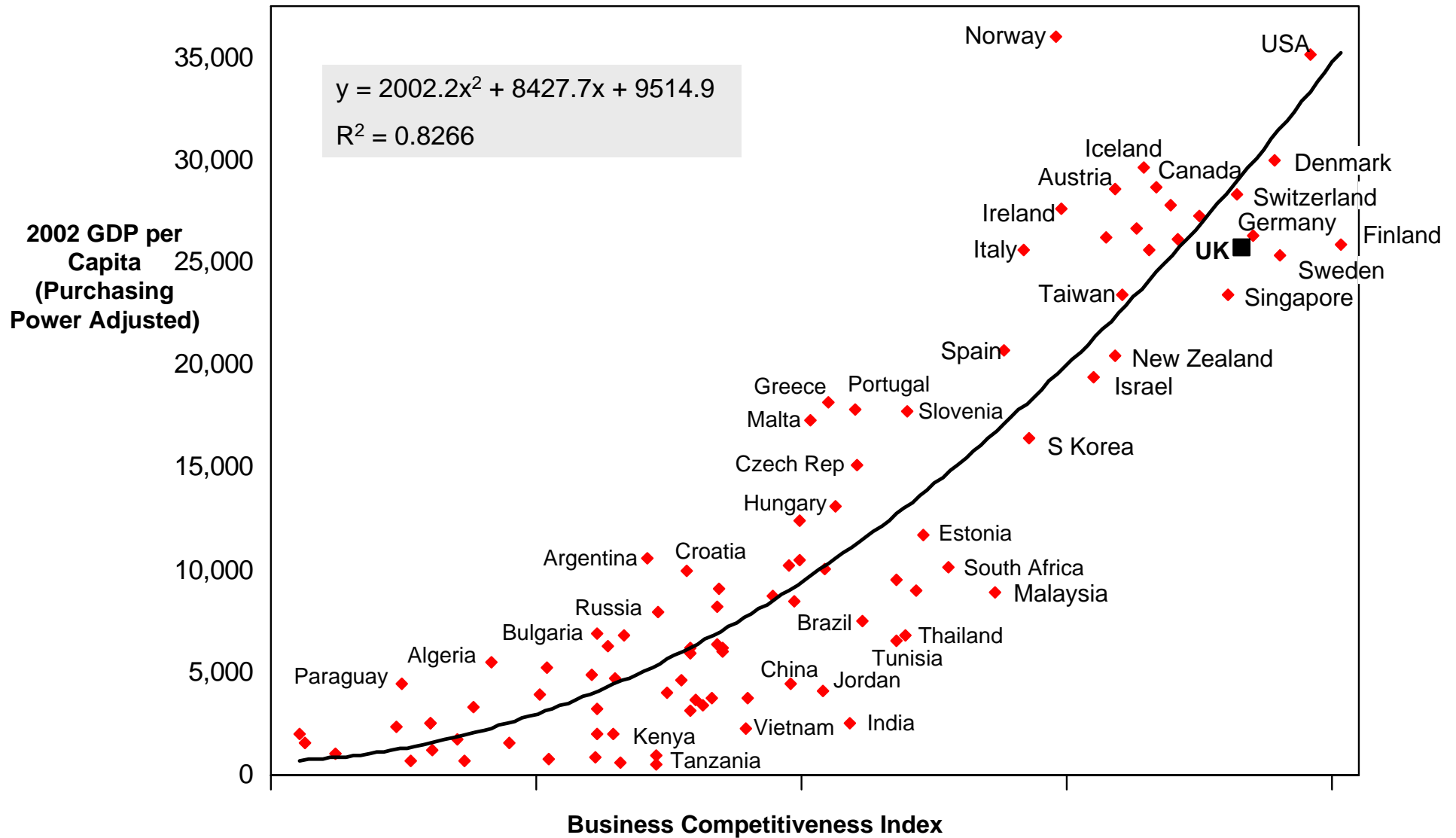


Quality of the
Microeconomic
Business
Environment

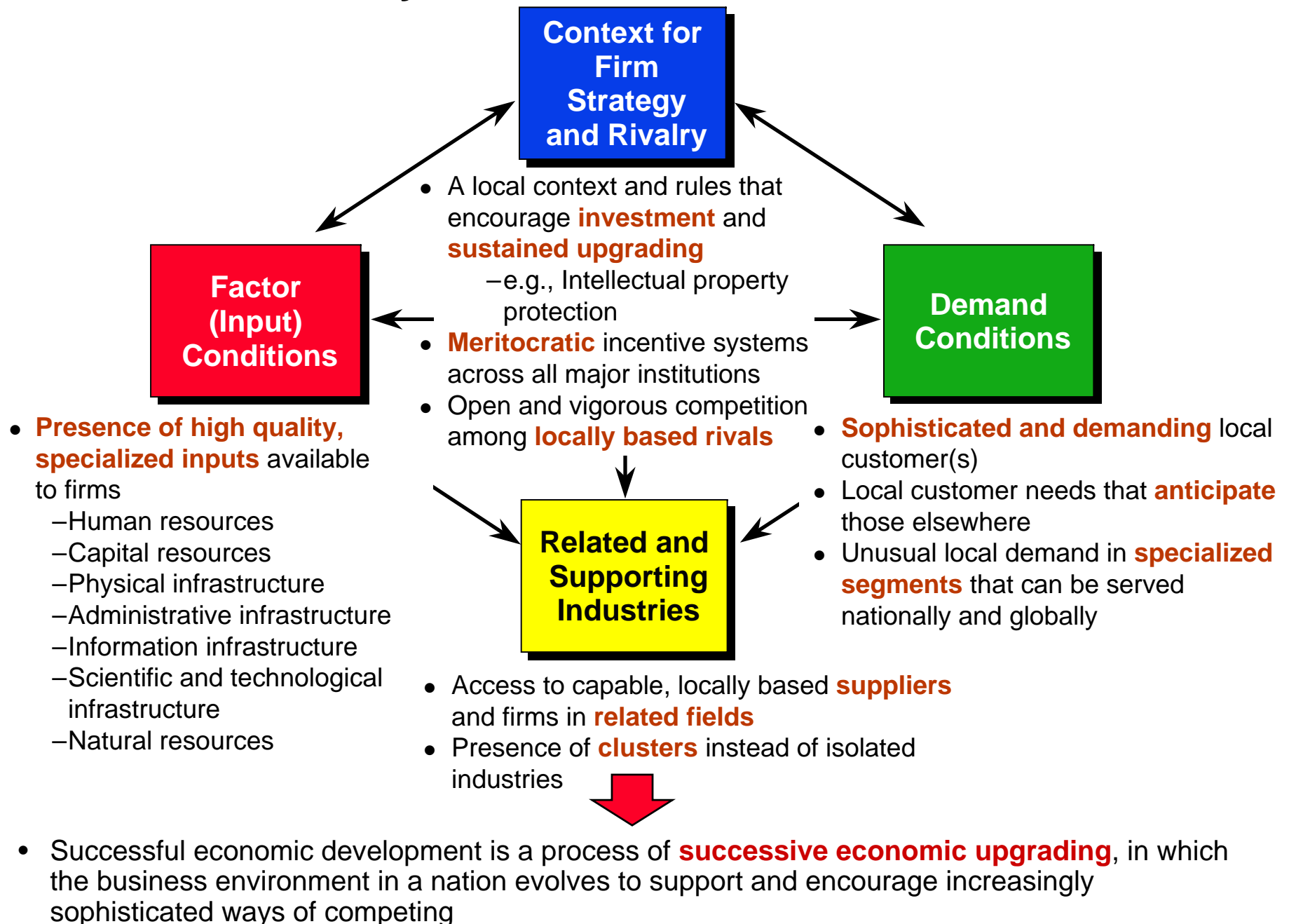
- A sound macroeconomic, political, legal, and social context creates the potential for competitiveness, **but is not sufficient**
- Competitiveness ultimately depends on improving the **microeconomic capability** of the economy and the **sophistication of local companies and local competition**

Business Competitiveness Index 2003

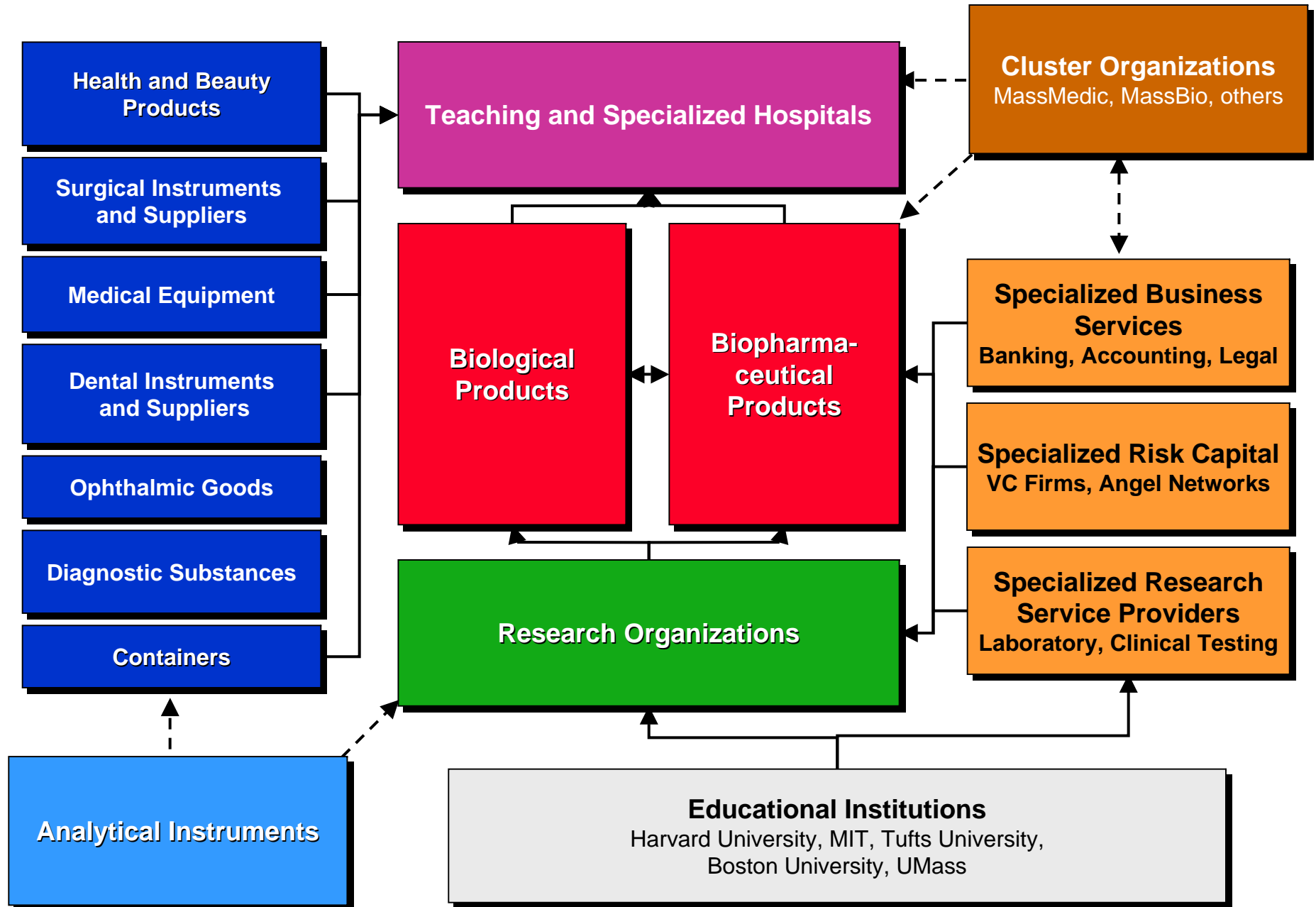
Relationship with GDP Per Capita



Productivity and the Business Environment



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

General Industry Associations

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

Economic Development Initiatives

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

University Initiatives

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

Informal networks

- Company alumni
- VC community
- University alumni

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

**Clusters
Exist**

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

**Clusters
Provide Economic Benefits**

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

**Cluster Development
Can Be Influenced**

- Theory and case evidence suggest impact of policy choices

**Cluster Development
Has Net Benefits**

- 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

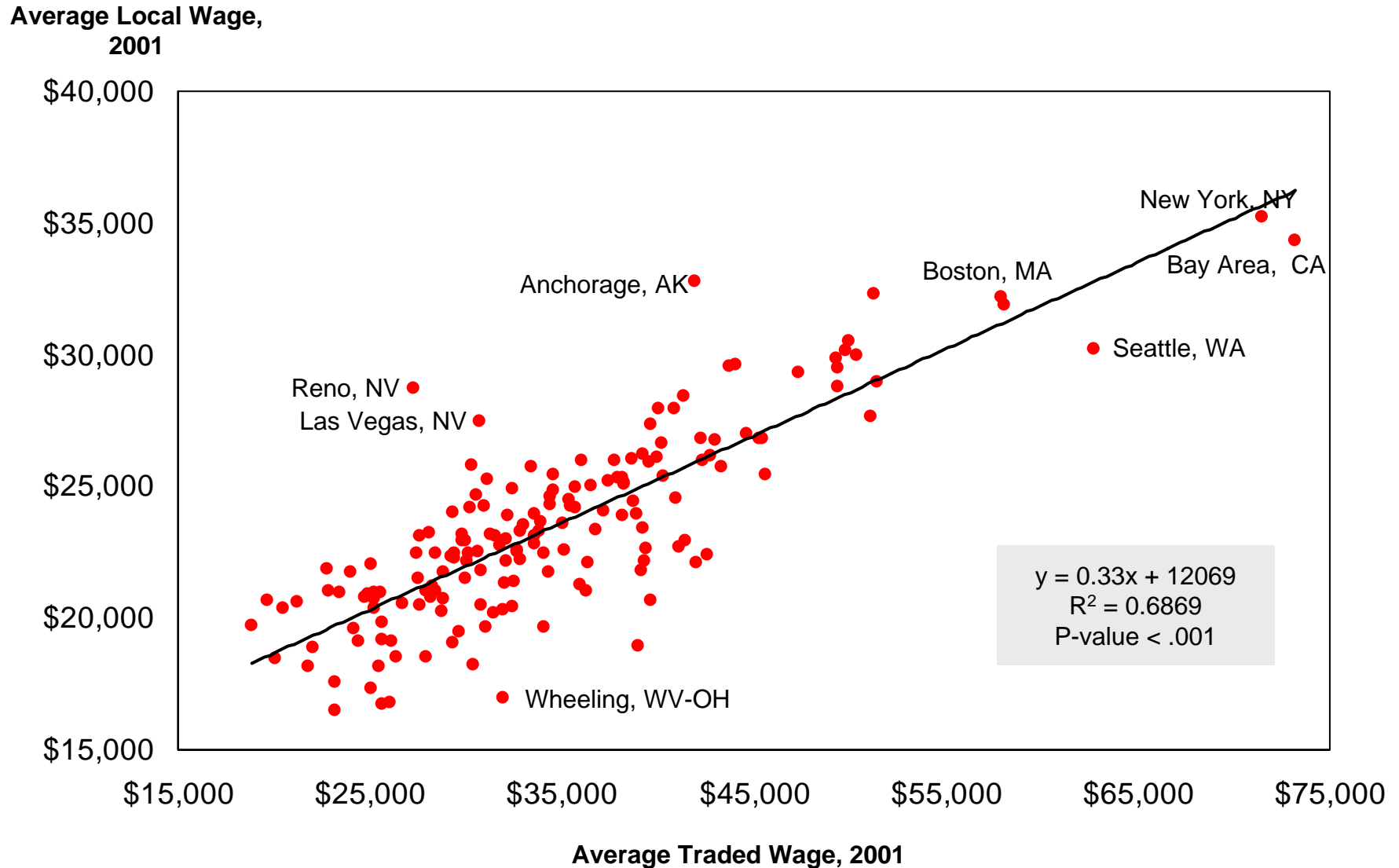
	Traded Clusters	Local Clusters	Natural Resource-Driven Industries
Share of Employment	31.6%	67.6%	0.8%
Employment Growth, 1990 to 2001	1.7%	2.8%	-1.0%
Average Wage	\$44,956	\$28,288	\$33,245
Relative Wage	133.8	84.2	99.0
Wage Growth	4.5%	3.7%	2.0%
Relative Productivity	144.1	79.3	140.1
Patents per 10,000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

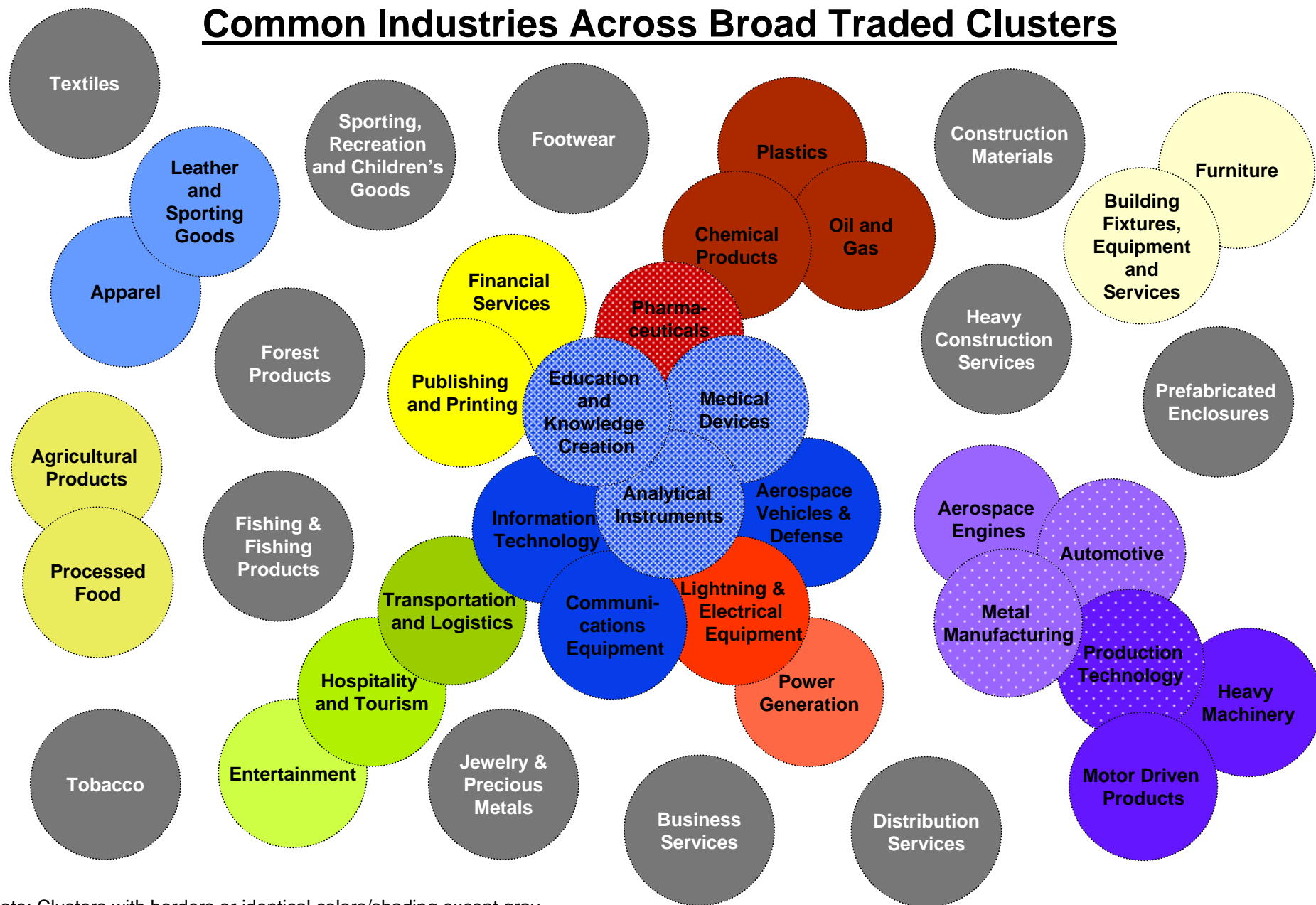
Local versus Traded Wages



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

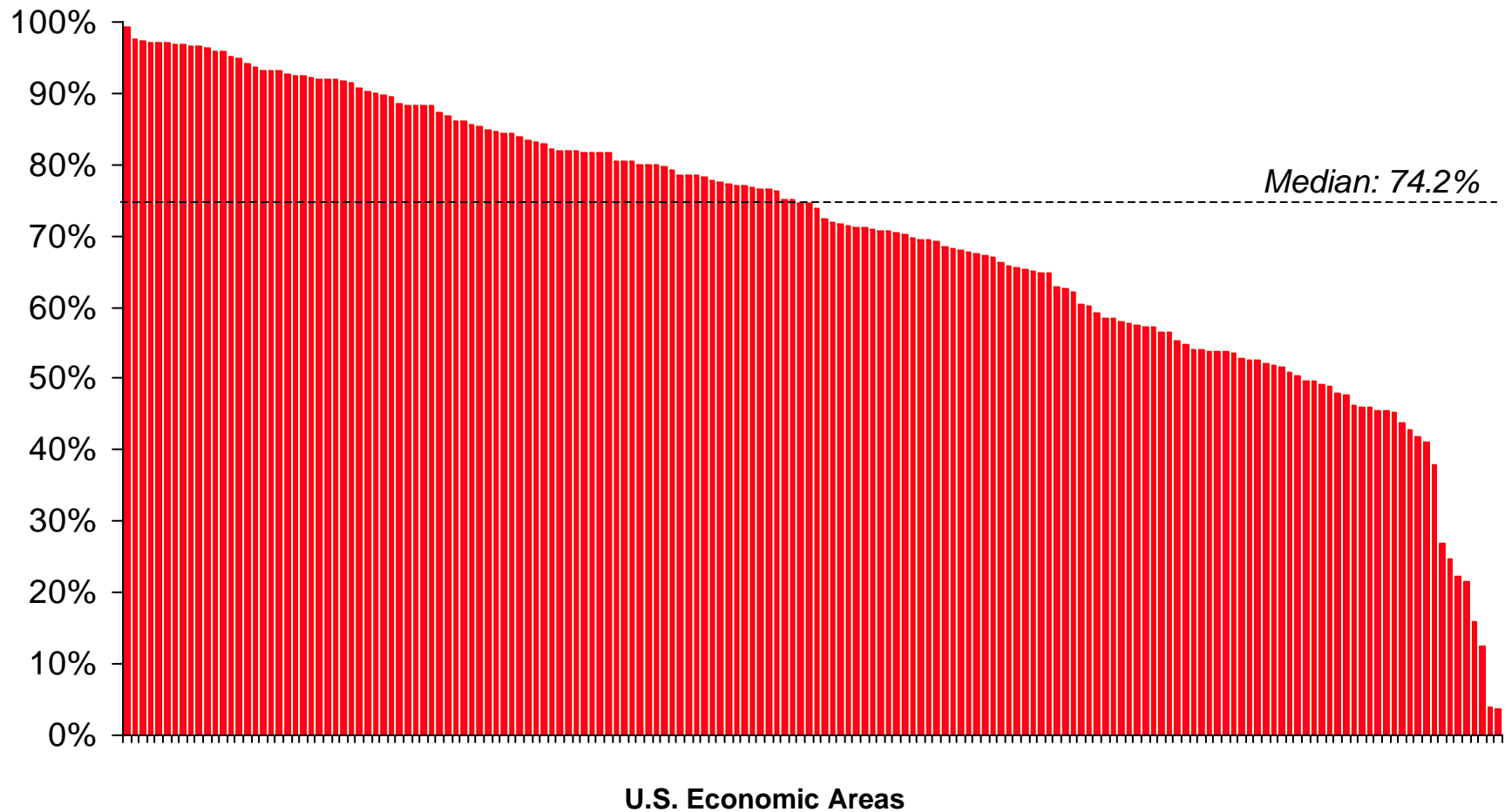


Note: Clusters with borders or identical colors/shading except gray have at least 20% overlap of industries by number in both directions

Determinants of Regional Prosperity

Level versus Mix Effect, U.S. Regions

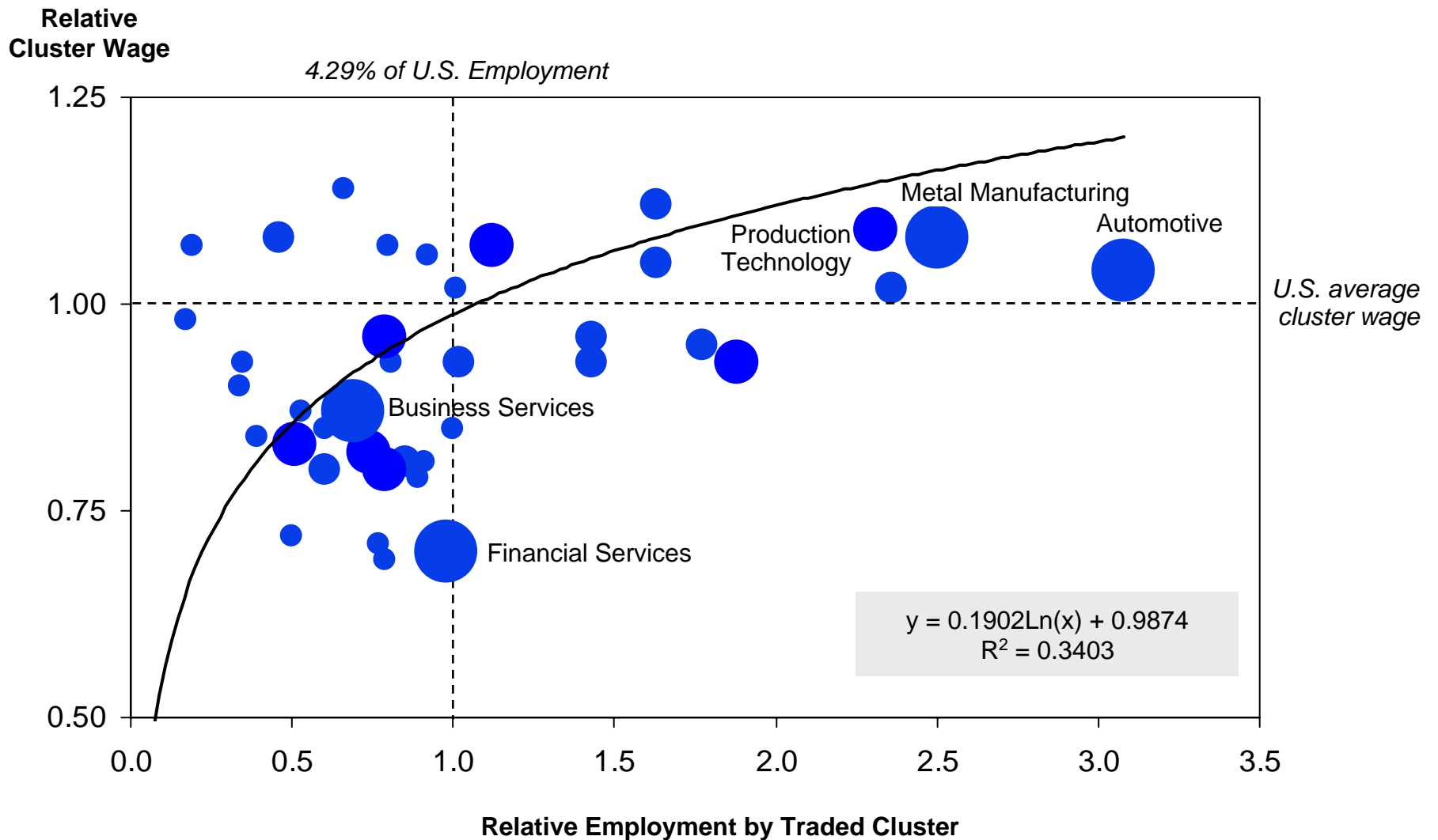
Cluster Wage Level Effect
as % of Wage Gap, 2001



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

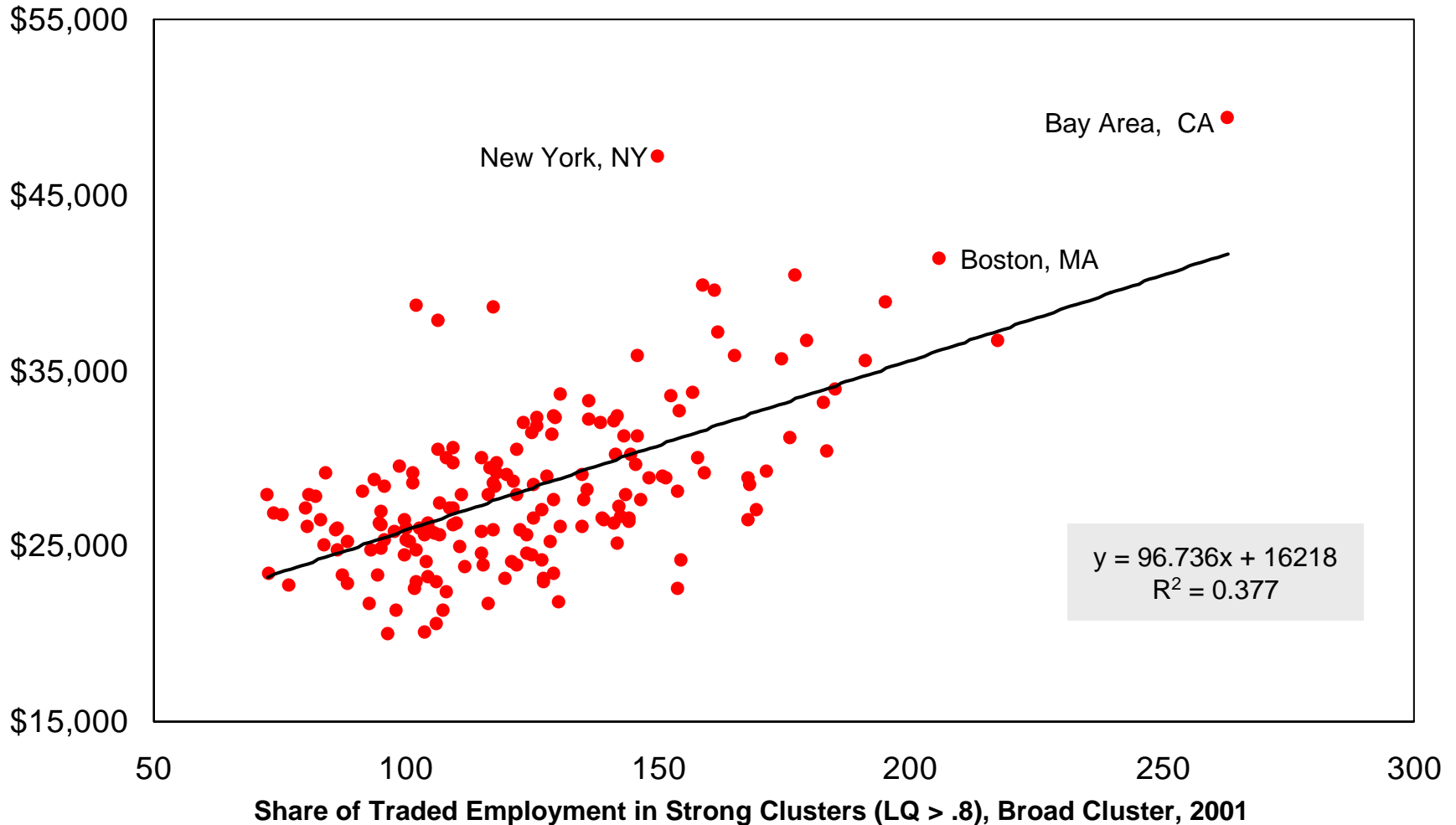


Note: Uses narrow cluster definitions to avoid overlap; bubble size proportional to employment bracket
 Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Determinants of Regional Prosperity

Cluster Strength and Wage Levels, U.S. Regions

Average Regional
Wage, 2001

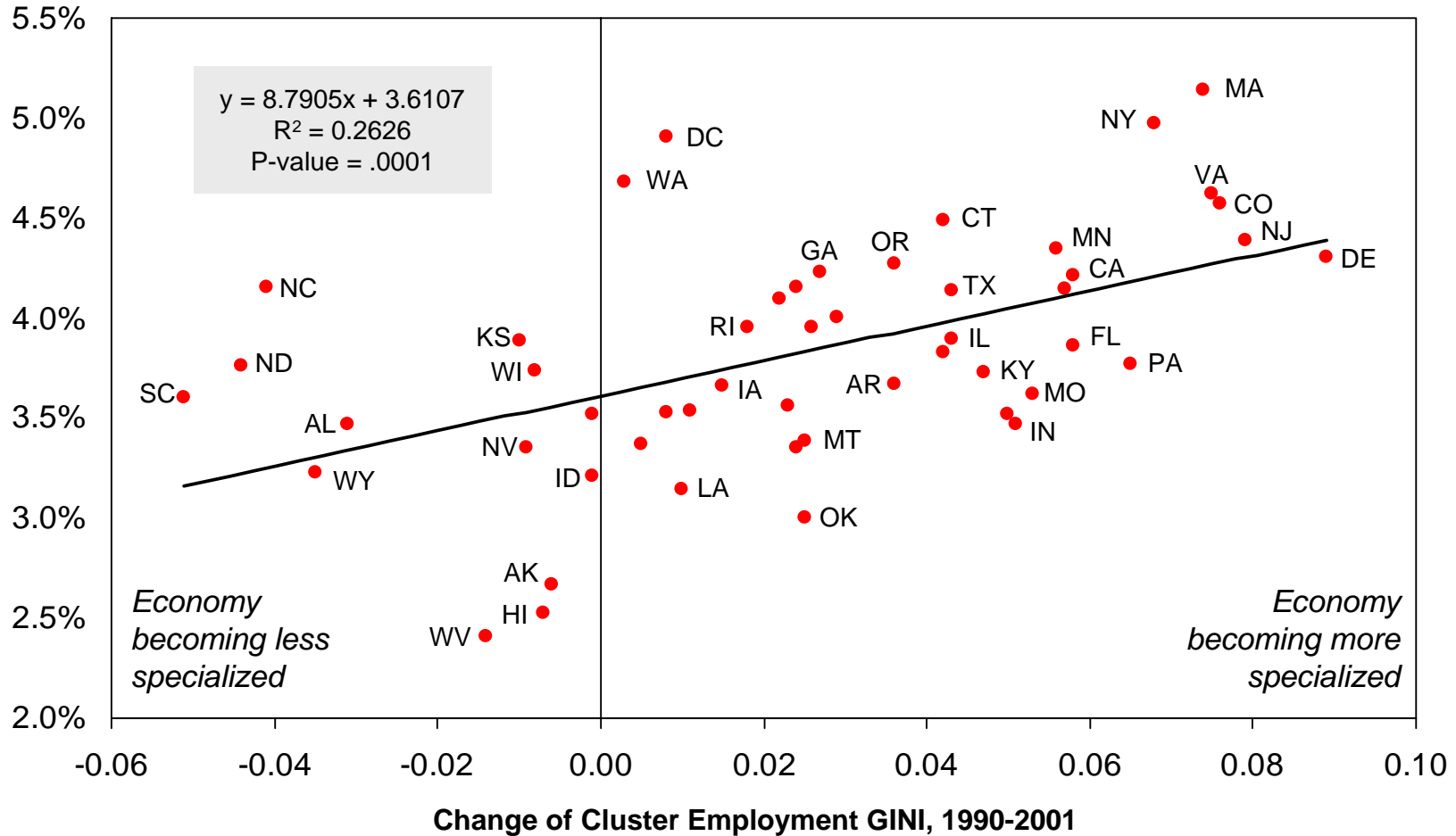


Source: County Business Patterns; Michael E. Porter, "The Economic Performance of Regions", *Regional Studies*, Vol. 37, 2003

Determinants of Regional Prosperity

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

Annual Regional Wage
Growth Rate, 1990-2001



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 R²): 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

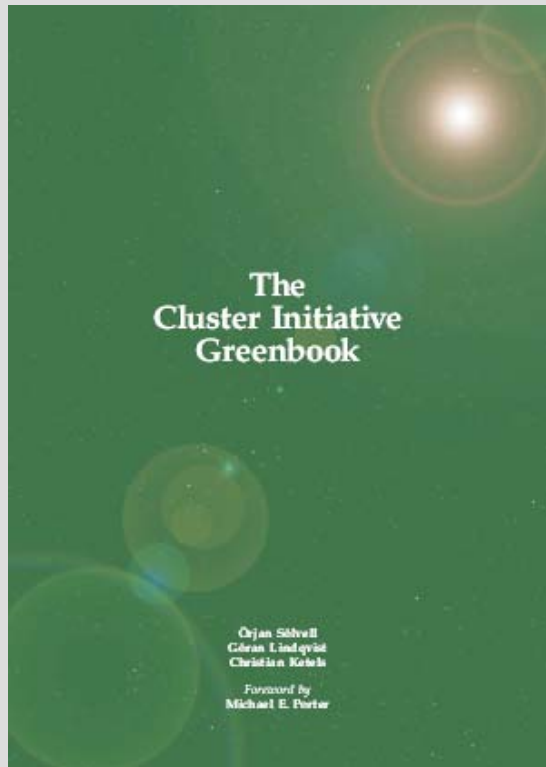
Cluster Initiatives

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

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

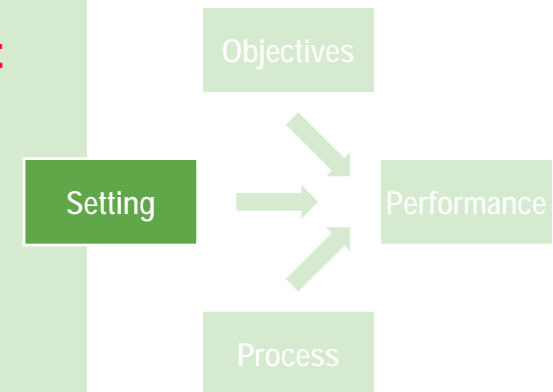
Context of the CI

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

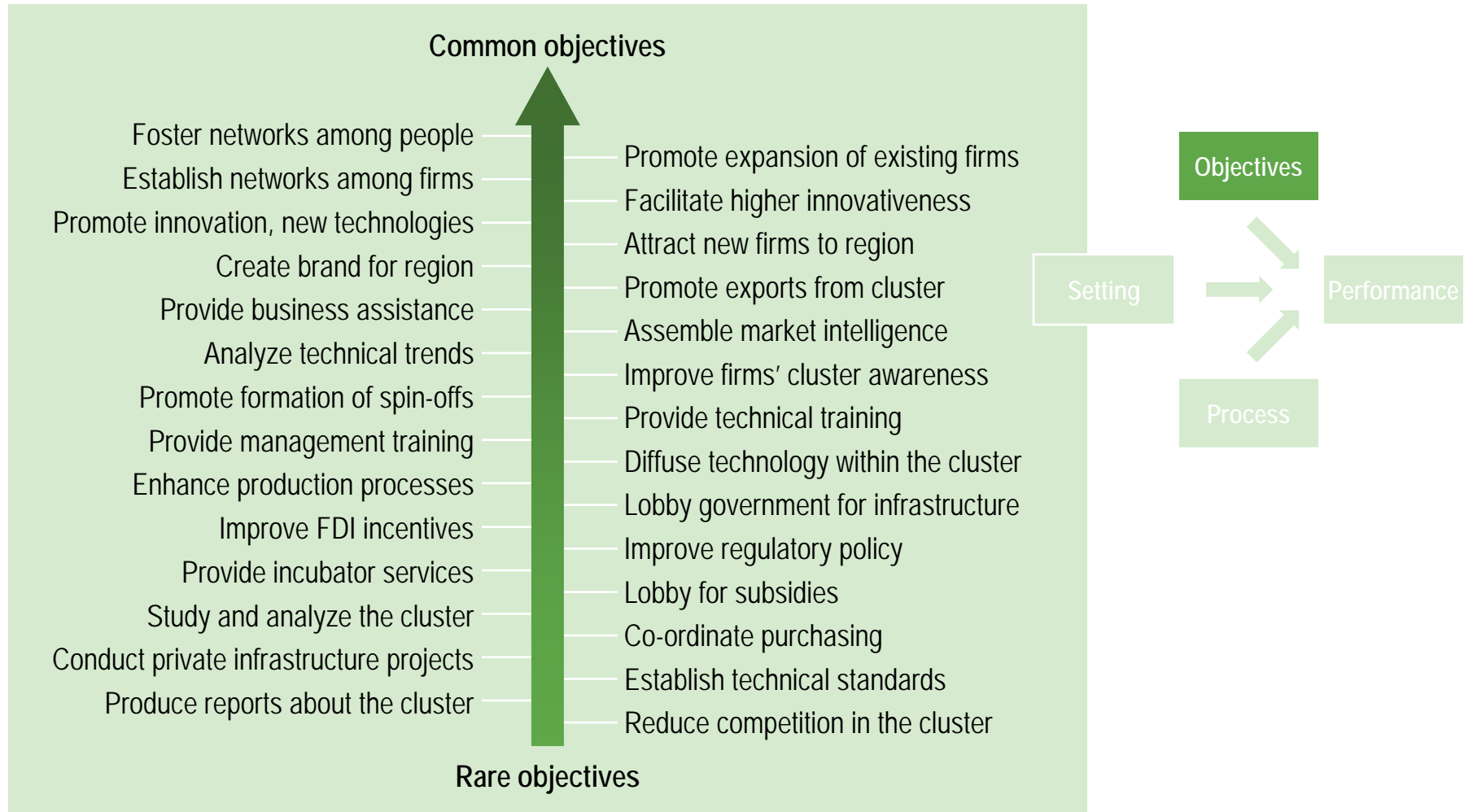
Findings

- 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



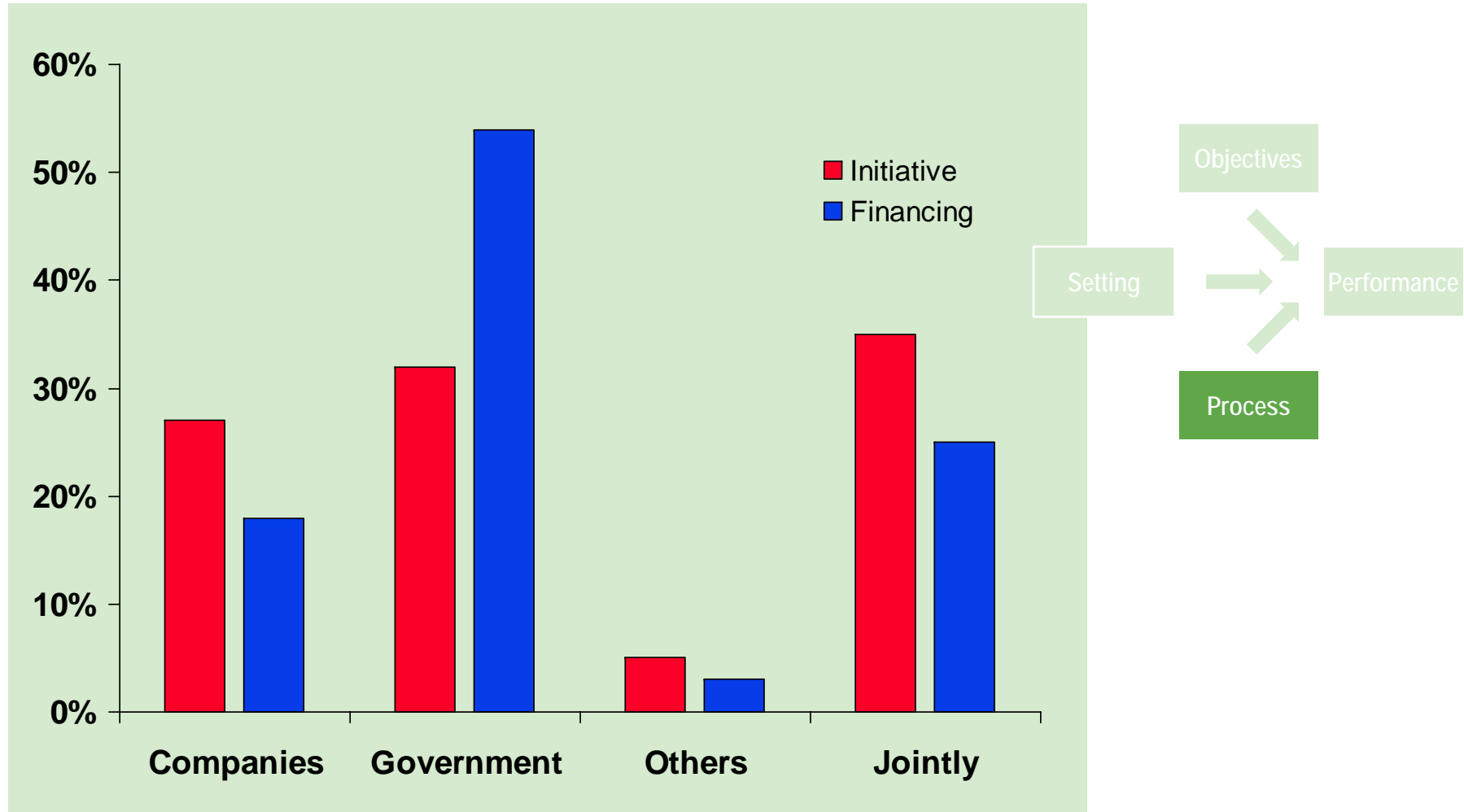
Cluster Initiative Assessment

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

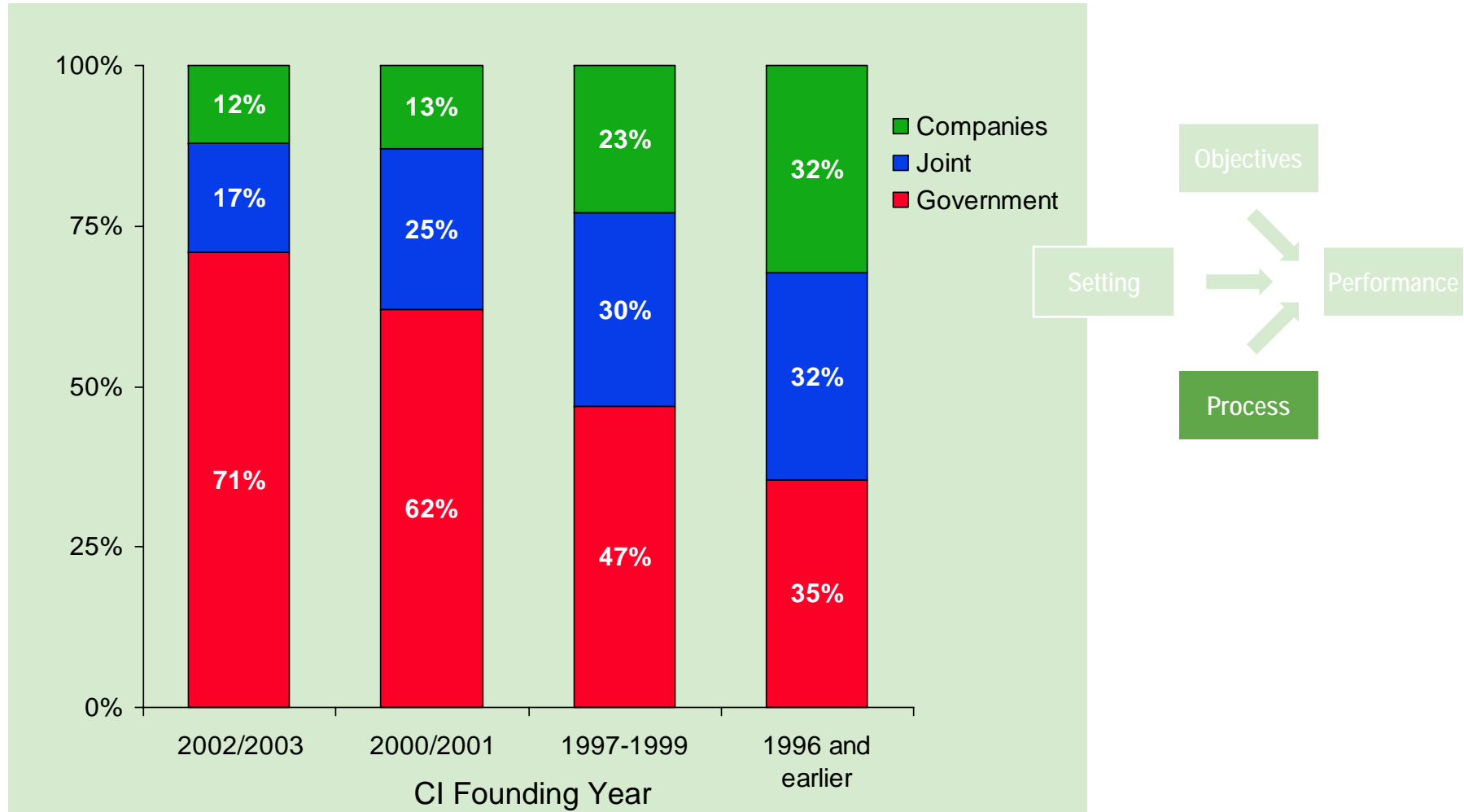
Cluster Initiative Assessment Roles



- 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

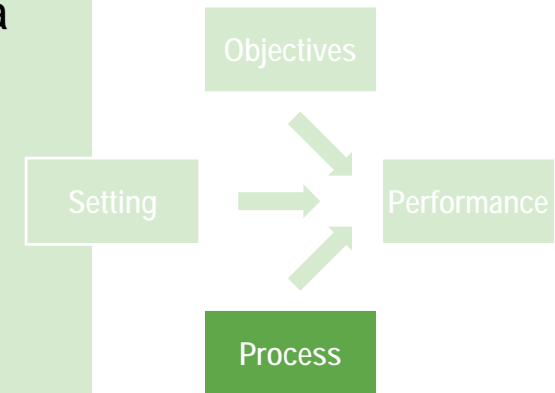
CI Facilitator and Office

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

Setting

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

Objectives

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

Process

- 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

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Emerging Implications

Implications for cluster initiatives

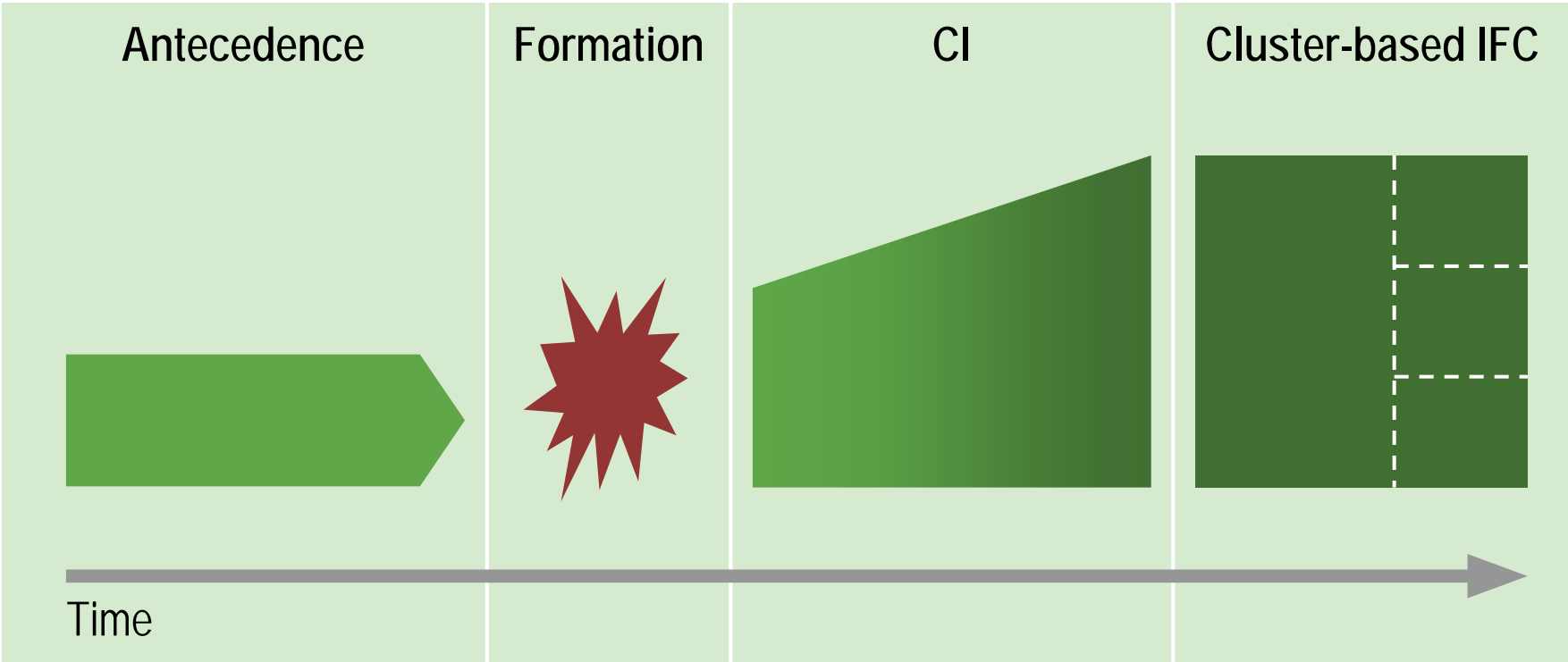
- Managing the Cluster Initiative Life Cycle
- Professionalizing Cluster Initiatives

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

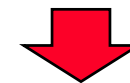
- Targets areas of perceived **market demand**
- Is driven by **public sector intervention**
- Requires sustained **financial commitment** by the public sector
- High **failure rate**



- **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