Regional Competitiveness in Central Massachusetts

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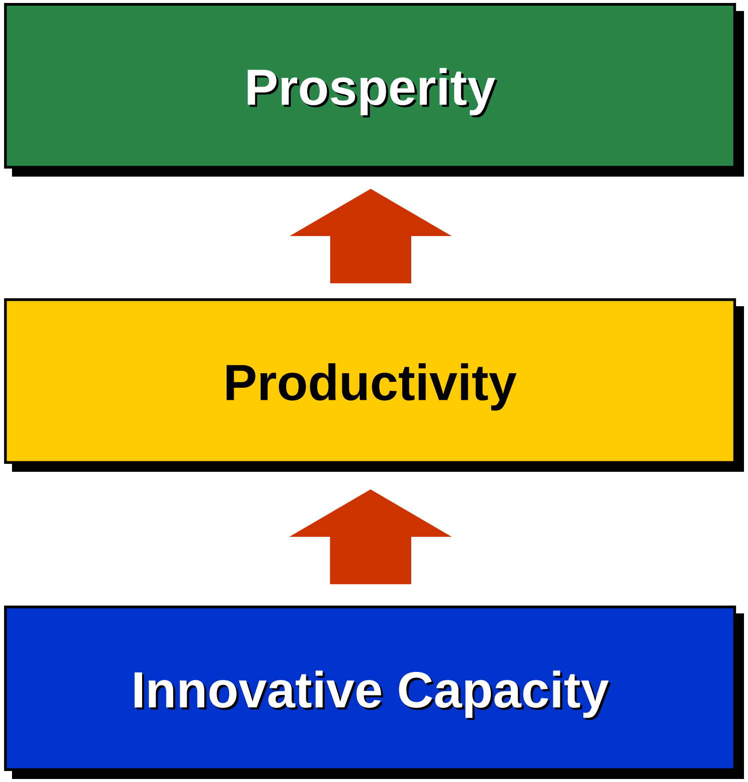
Sources of Prosperity



"Competitiveness"

- The most important sources of prosperity are **created** not inherited
- Productivity does not depend on **what** industries a region competes in, but on **how** it competes
- The prosperity of a region depends on the productivity of **all** its industries
- Innovation is vital for long-term increases in productivity

Productivity, Innovation, and the Business Environment

Context for Firm Strategy and Rivalry

- 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**

Factor (Input) Conditions

- **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

Demand Conditions

- **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

Related and Supporting Industries

- 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 or region evolves to support and encourage increasingly sophisticated ways of competing

Composition of Regional Economies

United States

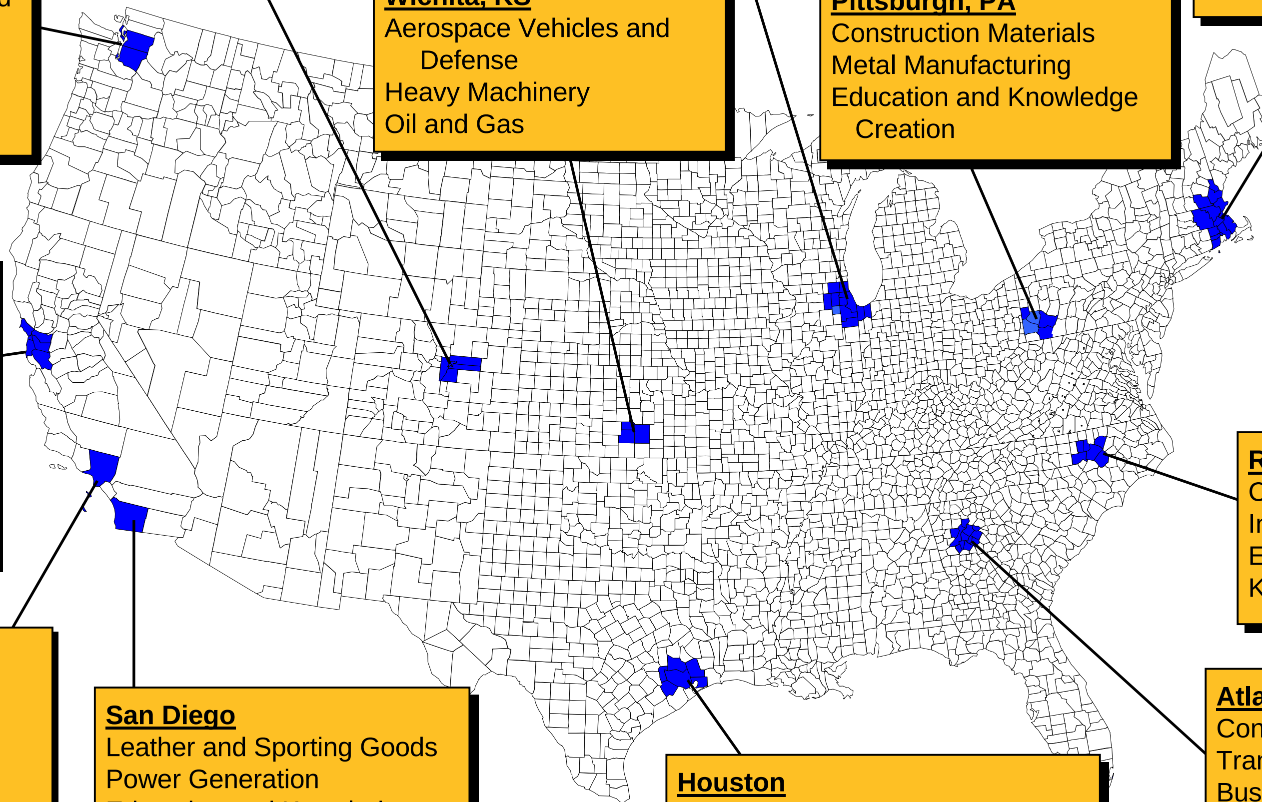
	Traded Clusters	Local Clusters	Natural Resource-Driven Industries
Share of Employment	31.6%	67.6%	0.8%
Employment Growth, 1990 to 2001	1.7%	2.8%	-1.0%
Average Wage	$46,596	$28,288	$33,245
Relative Wage	133.8	84.2	99.0
Wage Growth	5.0%	3.6%	1.9%
Relative Productivity	144.1	79.3	140.1
Patents per 10,000 Employees	21.3	1.3	7.0
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

Specialization of Regional Economies

Select U.S. Geographic Areas



Seattle-Bellevue-Everett, WA
Aerospace Vehicles and Defense
Fishing and Fishing Products
Analytical Instruments

Denver, CO
Leather and Sporting Goods
Oil and Gas
Aerospace Vehicles and Defense

Wichita, KS
Aerospace Vehicles and Defense
Heavy Machinery
Oil and Gas

Chicago
Communications Equipment
Processed Food
Heavy Machinery

Pittsburgh, PA
Construction Materials
Metal Manufacturing
Education and Knowledge Creation

Boston
Analytical Instruments
Education and Knowledge Creation
Communications Equipment

San Francisco-Oakland-San Jose Bay Area
Communications Equipment
Agricultural Products
Information Technology

Raleigh-Durham, NC
Communications Equipment
Information Technology
Education and Knowledge Creation

Los Angeles Area
Apparel
Building Fixtures, Equipment and Services
Entertainment

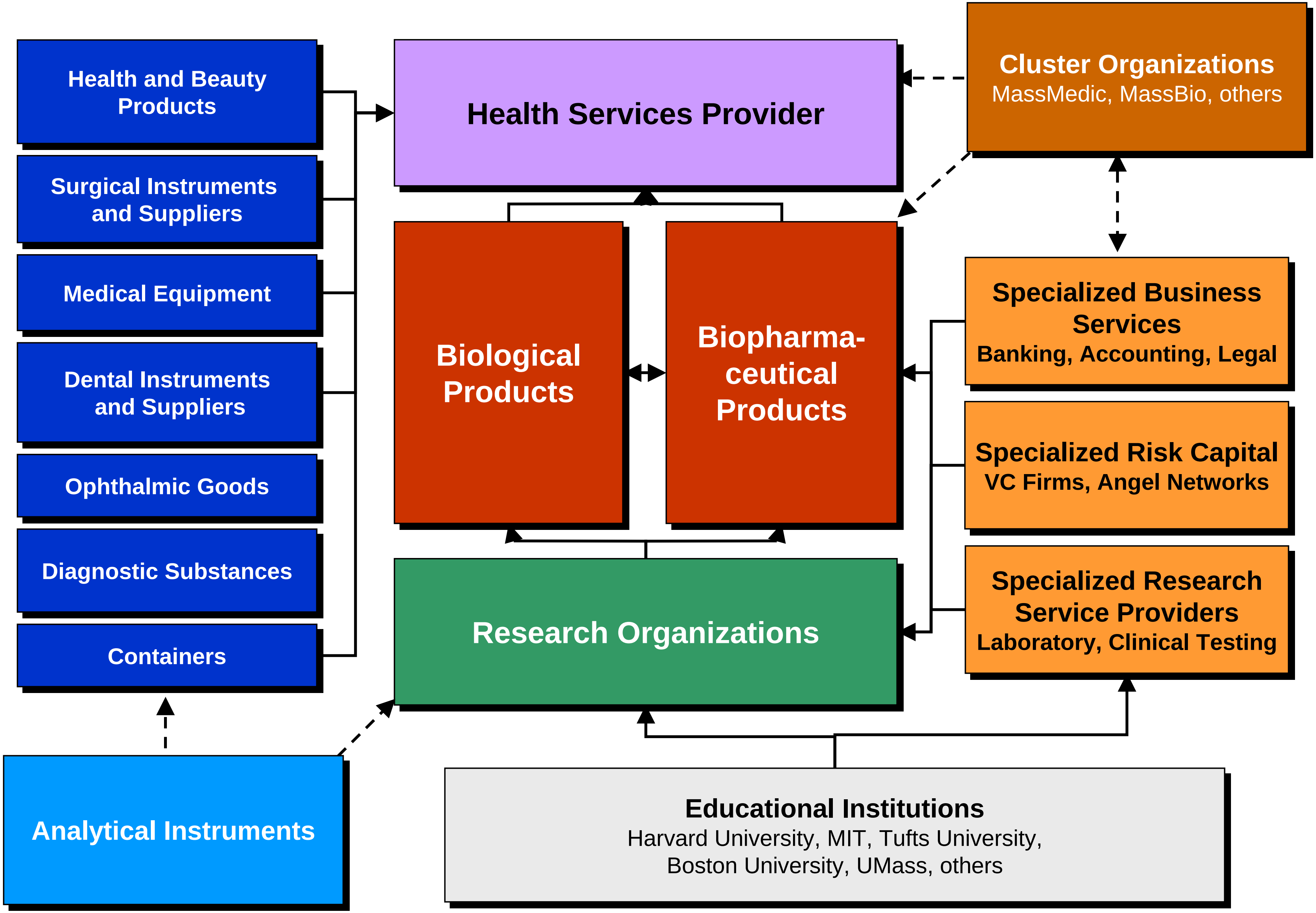
San Diego
Leather and Sporting Goods
Power Generation
Education and Knowledge Creation

Houston
Heavy Construction Services
Oil and Gas
Aerospace Vehicles and Defense

Atlanta, GA
Construction Materials
Transportation and Logistics
Business Services

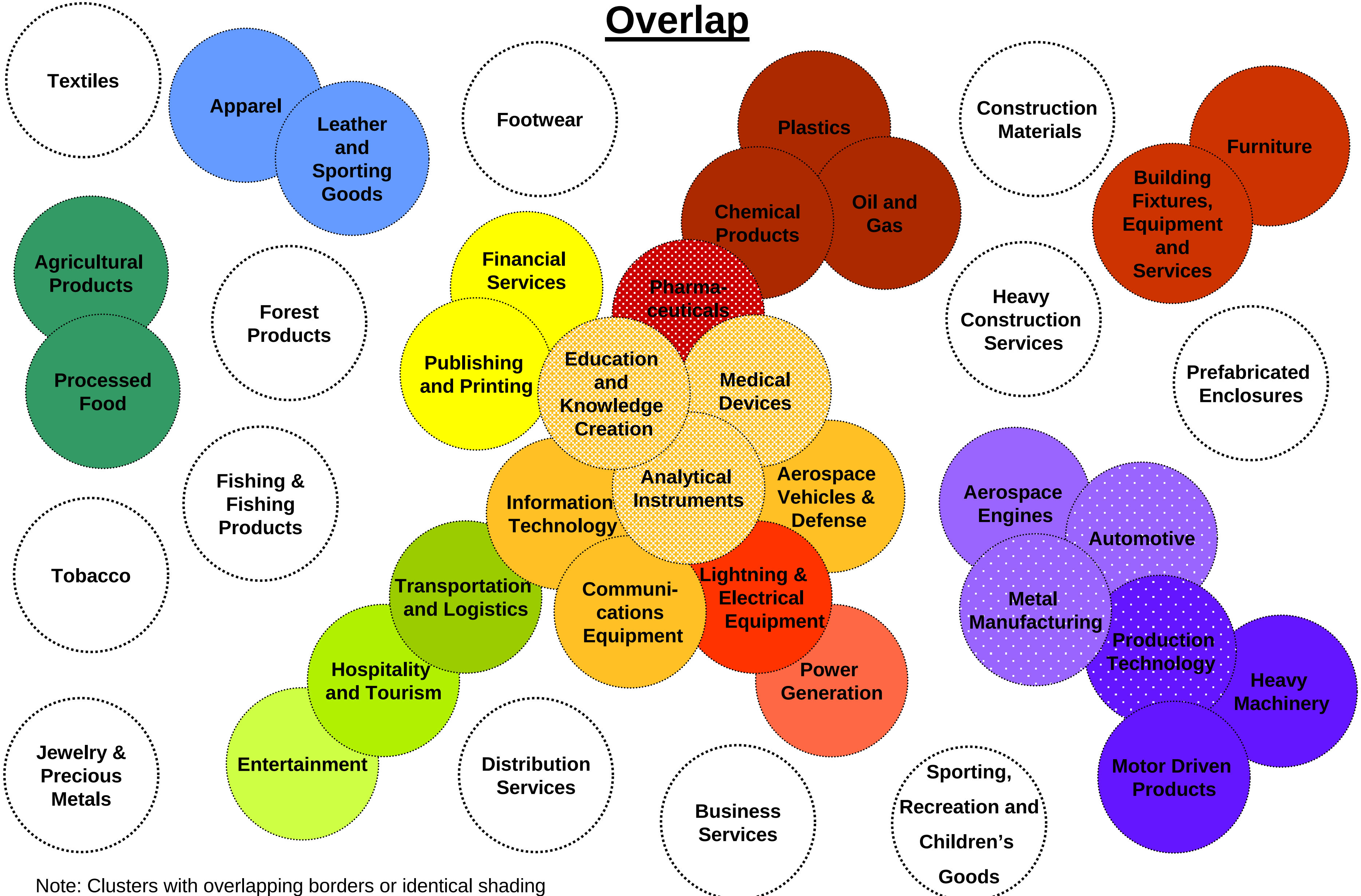
Note: Clusters listed are the three highest ranking clusters in terms of share of national employment
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Massachusetts Life Sciences Cluster



Traded Clusters

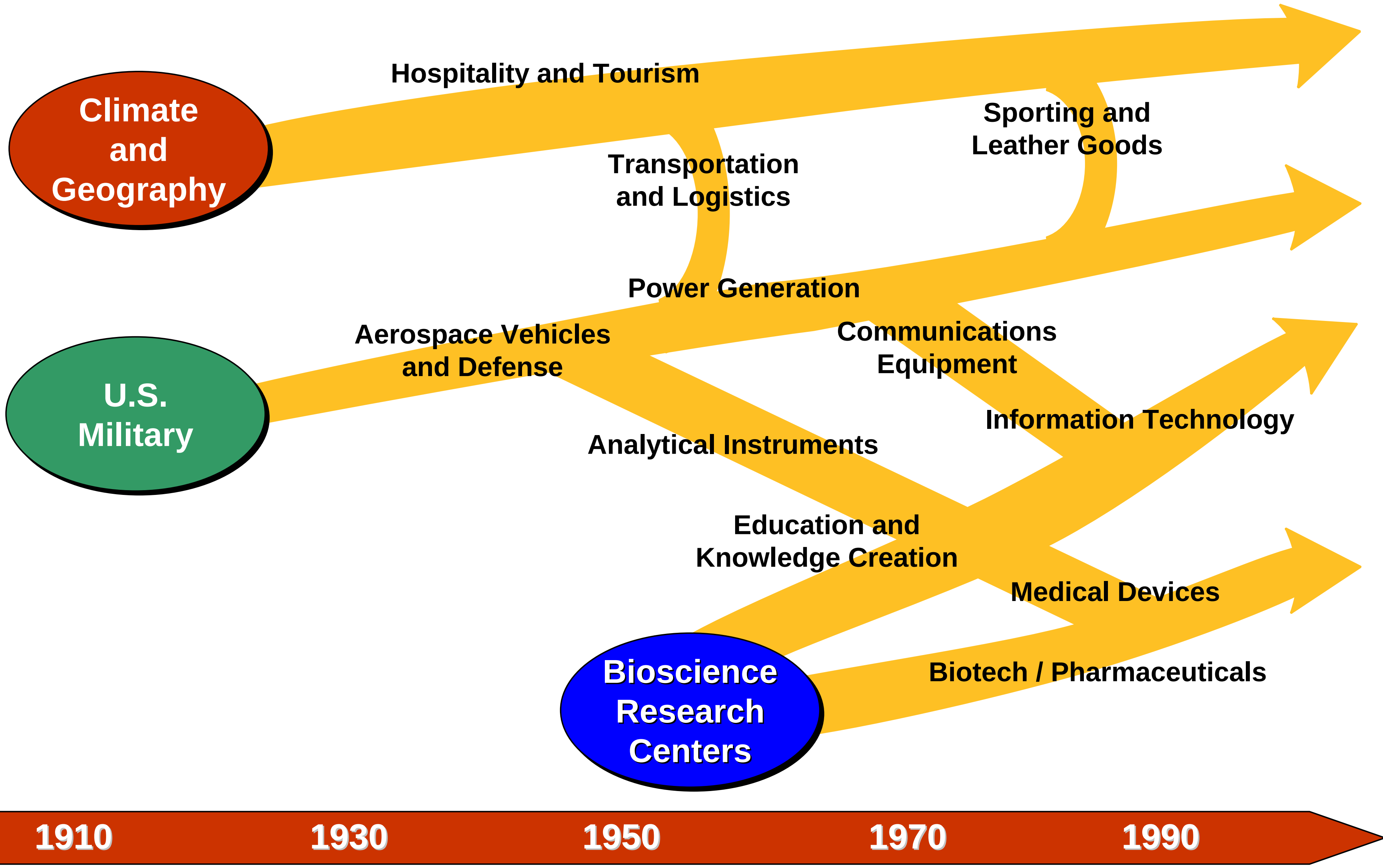
Overlap



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



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
- Venture Capital community
- University alumni

Economic Development Initiatives

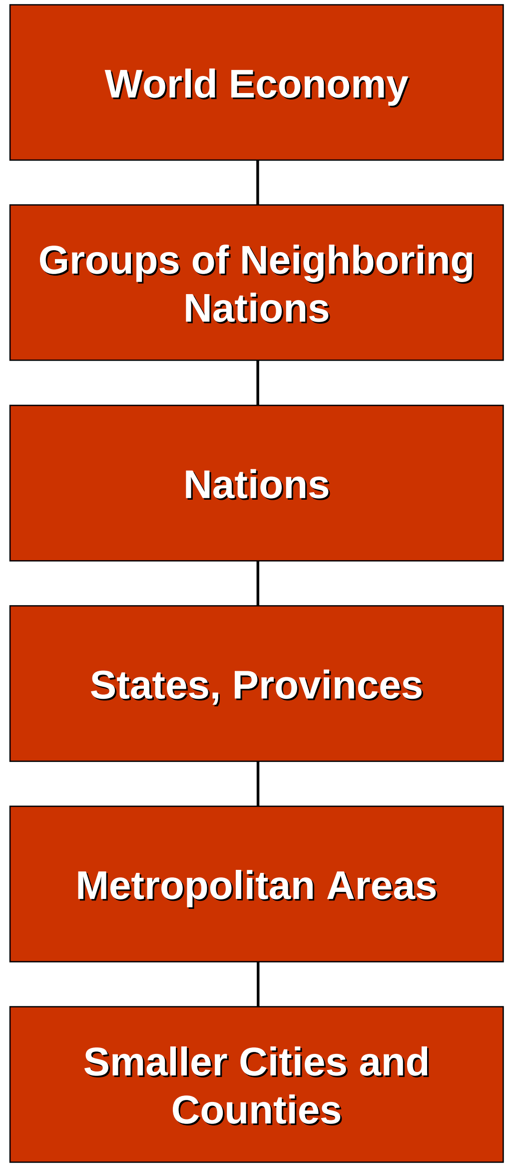
- Massachusetts Technology Collaborative
- Mass Biomedical Initiatives
- Mass Development
- Massachusetts Alliance for Economic Development

Joint Research Initiatives

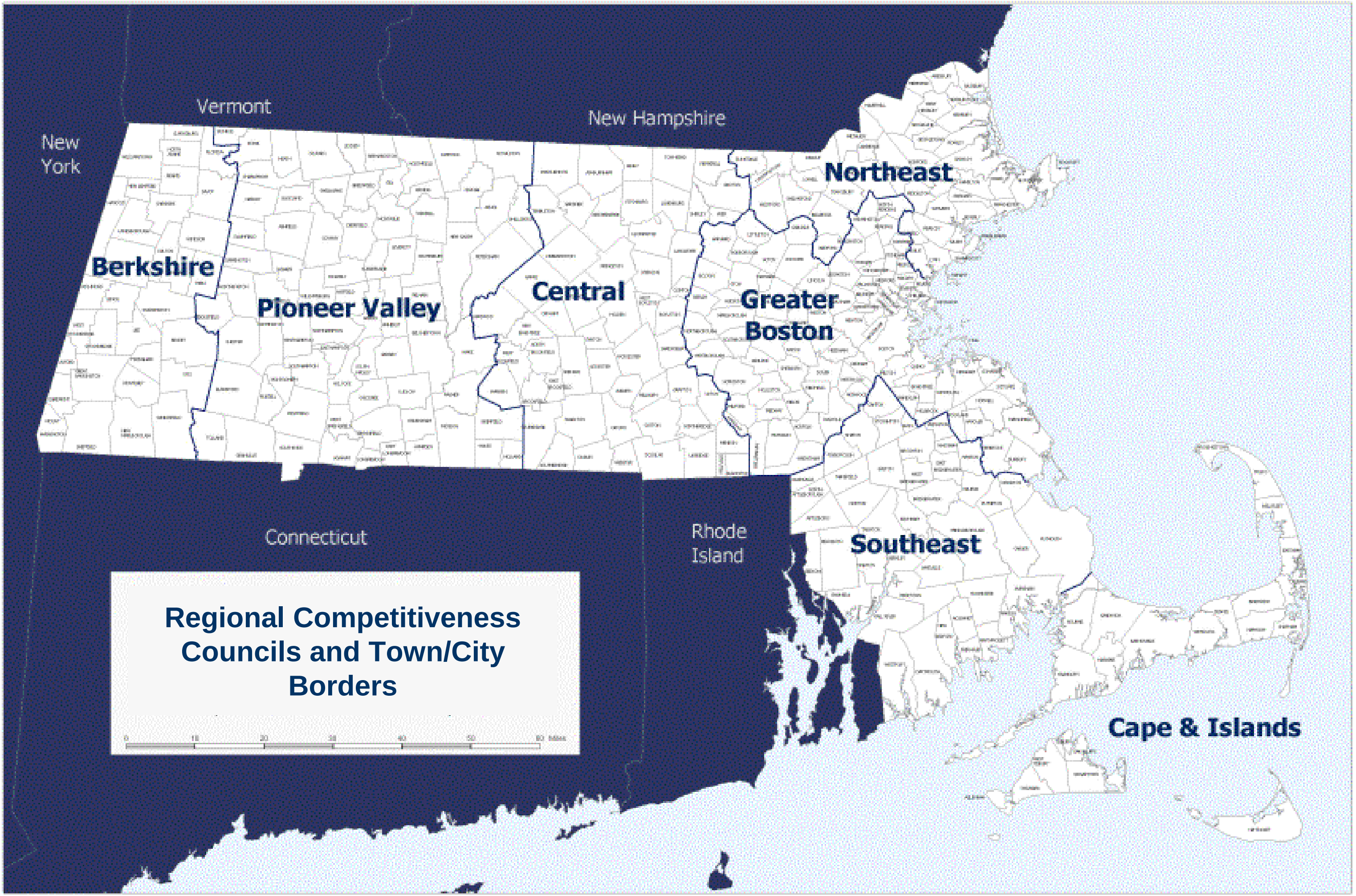
- New England Healthcare Institute
- Whitehead Institute For Biomedical Research
- Center for Integration of Medicine and Innovative Technology (CIMIT)

Influences on Competitiveness

Multiple Geographic Levels



Massachusetts Regional Competitiveness Council Regions



Regional Competitiveness

Central Massachusetts

- Foundations of Regional Competitiveness
- **Assessing the Competitiveness of Central Massachusetts**
- Action Agenda

Economic Performance

Central Massachusetts

- Wages in Central Massachusetts are at the state's average and have been growing at 5% annually over the last five years, higher than the U.S. average

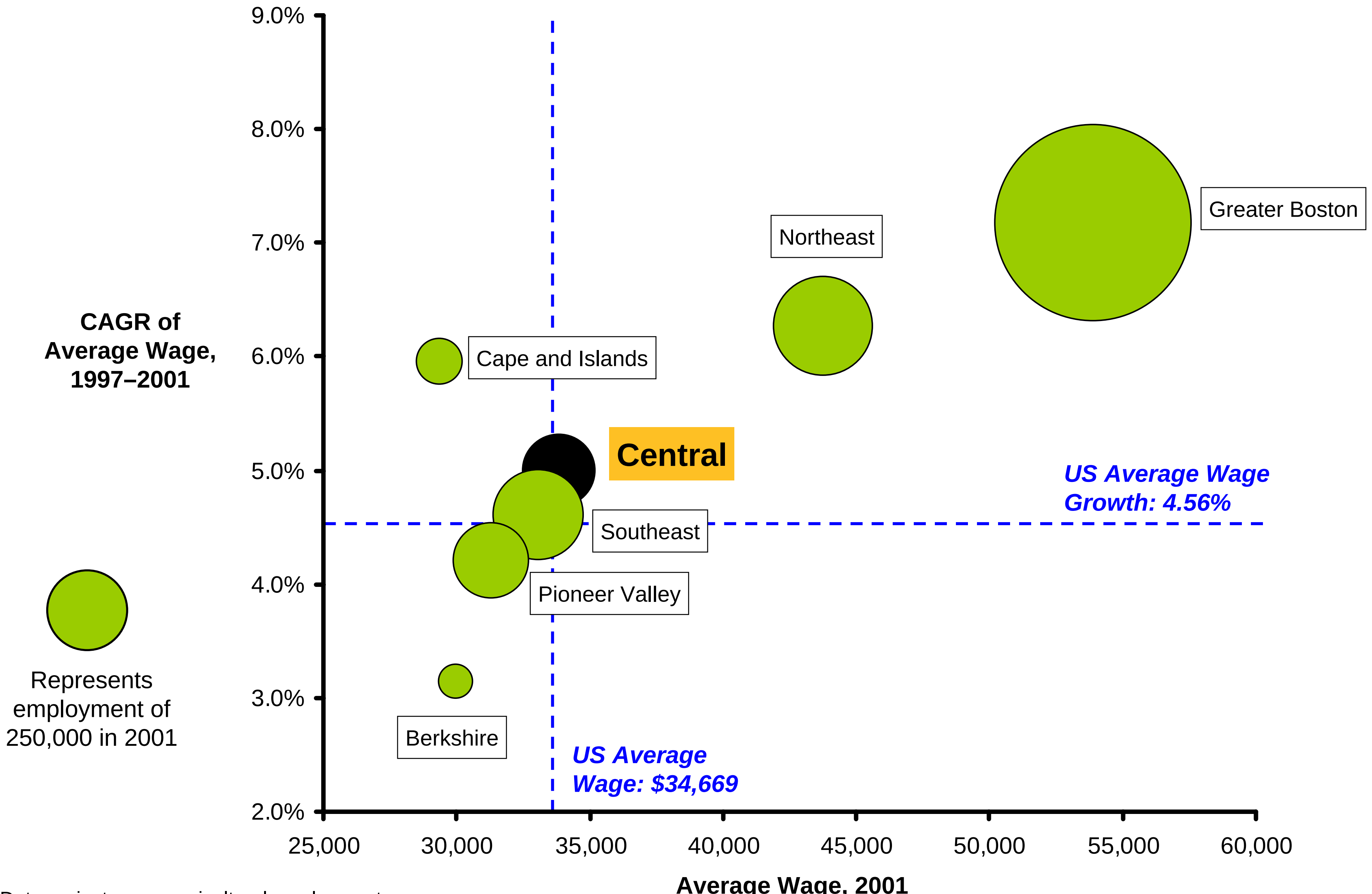
- Employment growth has over the last five years reached 1.7% annually, far below the US and Massachusetts average
  - Employment in traded cluster has even decreased, making Central Massachusetts the only region in the state with jobs losses in any broad group of clusters

- Establishment growth has outpaced the U.S. average and put the region among the leading Massachusetts regions

- Patenting rates of 13 patents per 10,000 employees in 2001 put the region far ahead of the national average and in the leading group of Massachusetts regions

Comparative Performance of Regions

Wage Growth and Wages

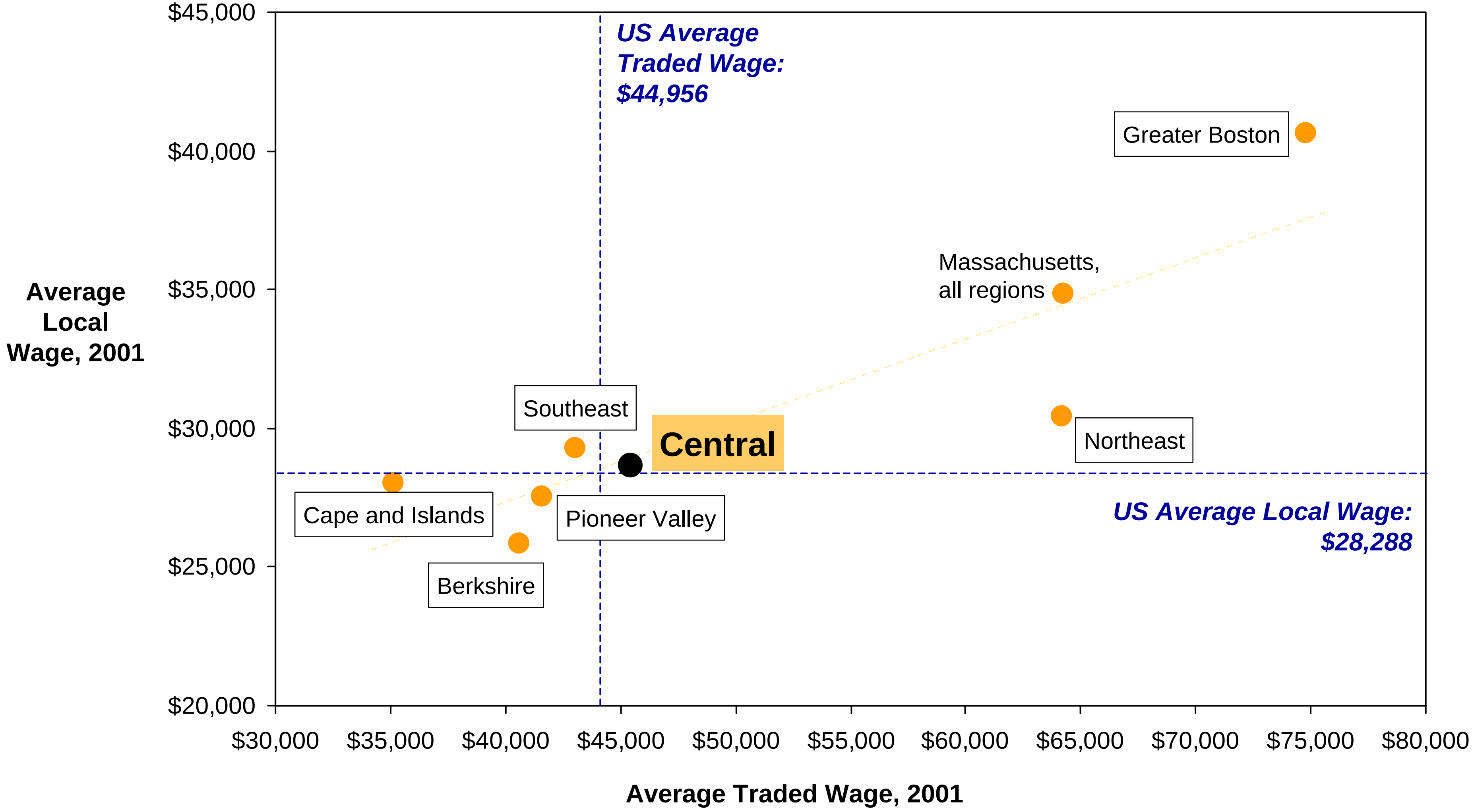


Data: private, non-agricultural employment

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Wages in Traded and Local Industries

Massachusetts Regions



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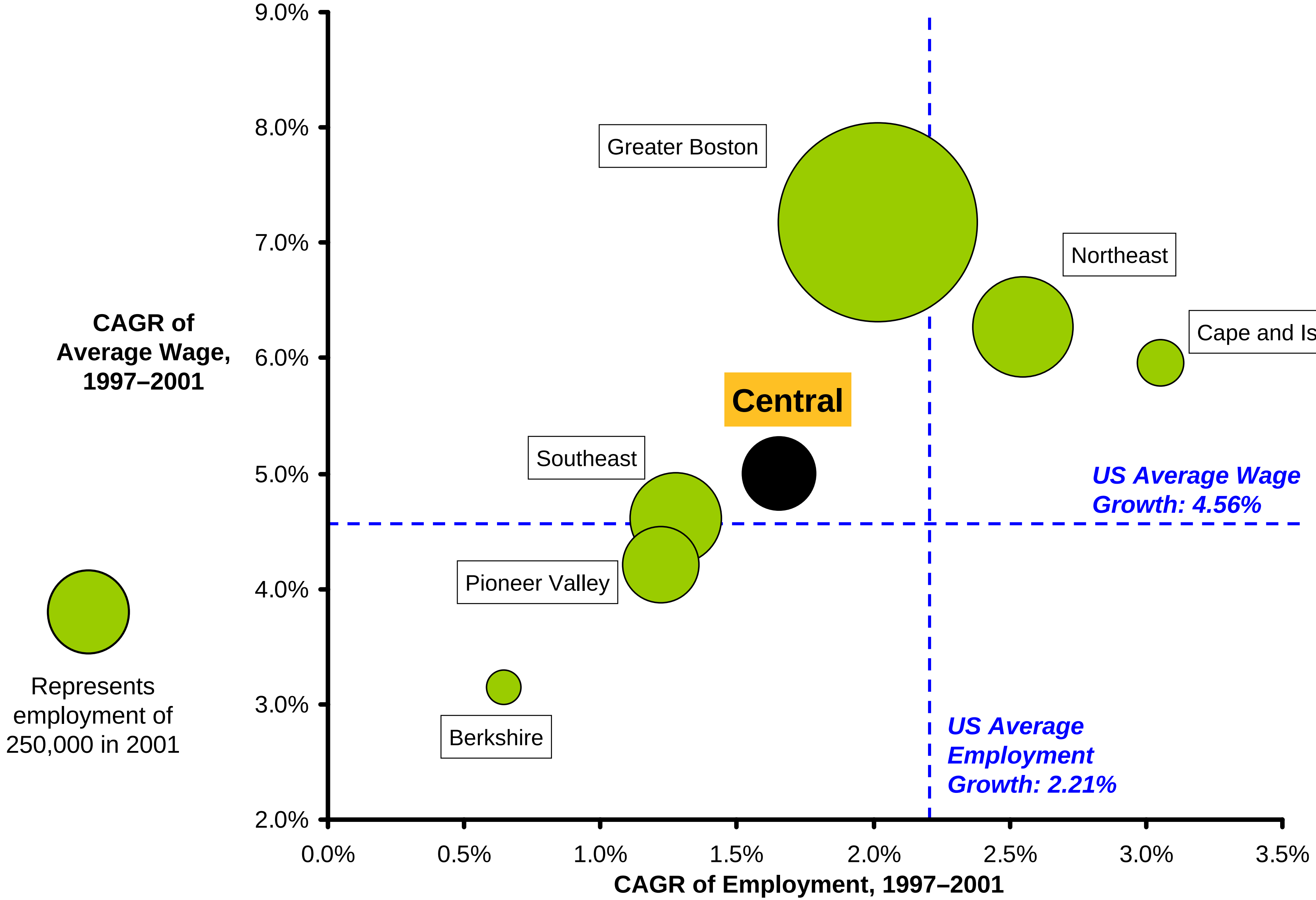
Comparative Performance of Regions

Wage Growth and Employment Growth



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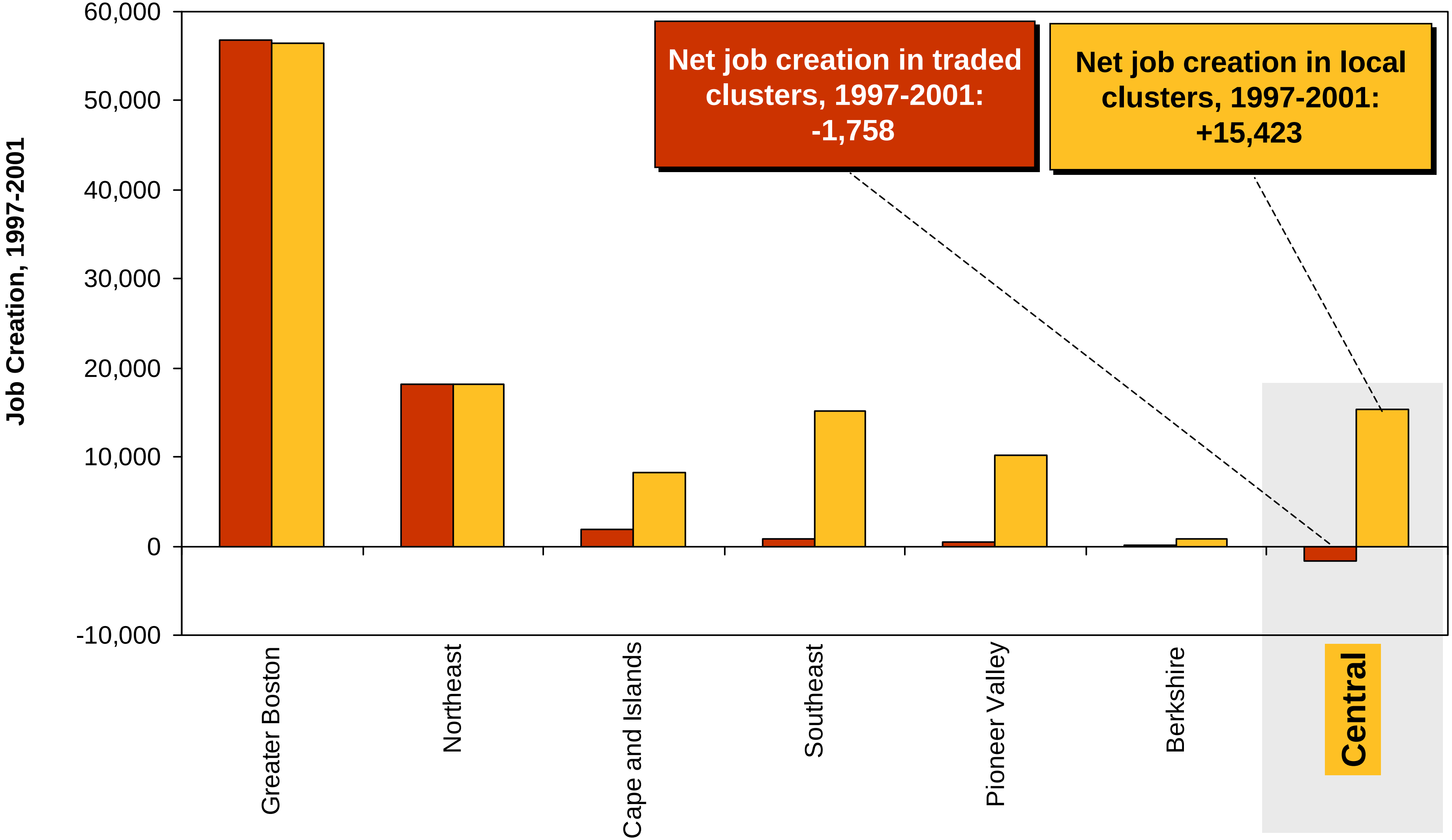
Job Creation

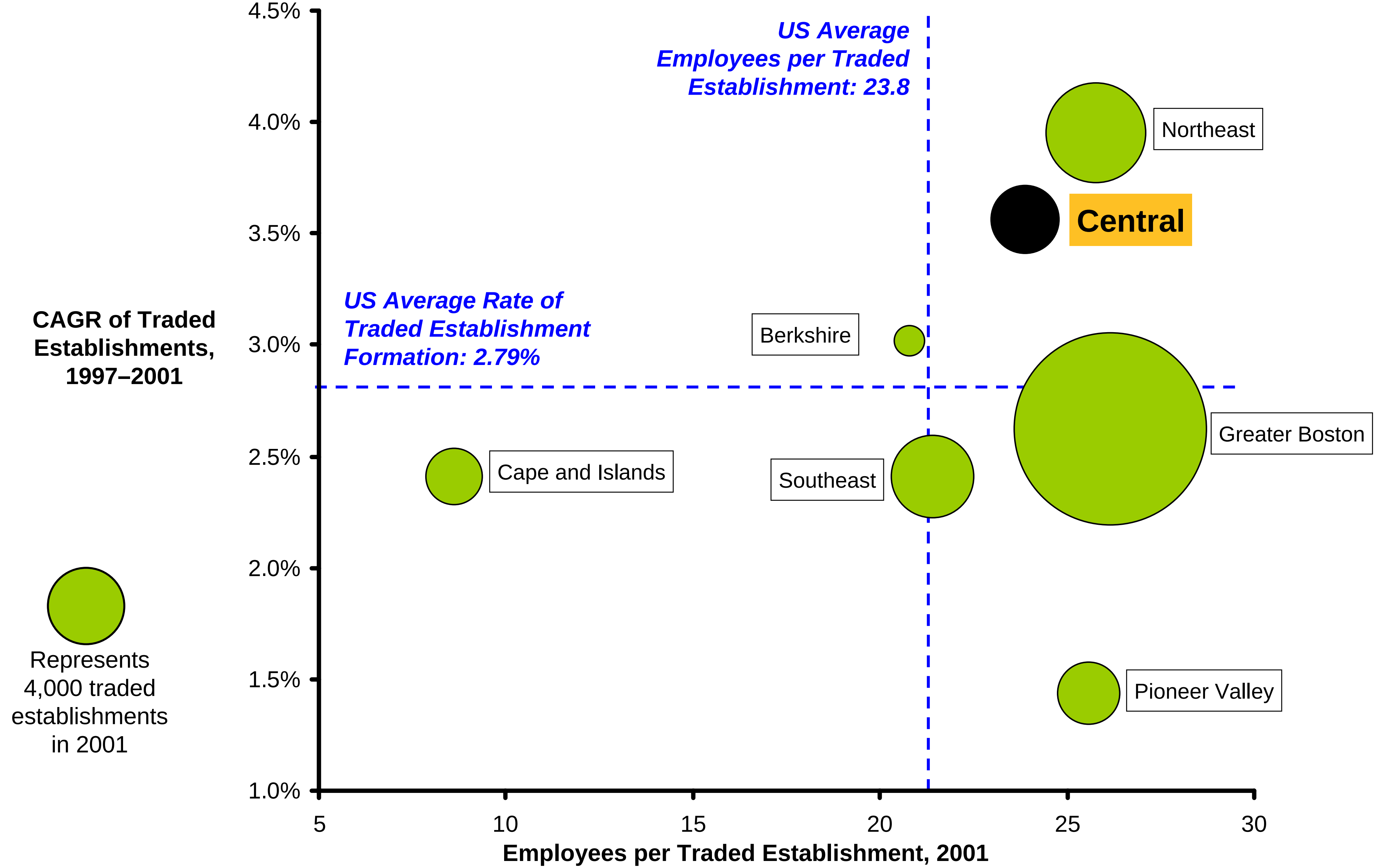
Massachusetts Regions



Data: private, non-agricultural employment. Note: Regional data does not total precisely to statewide data due to omissions for confidentiality in the regions.
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Comparative Performance of Regions

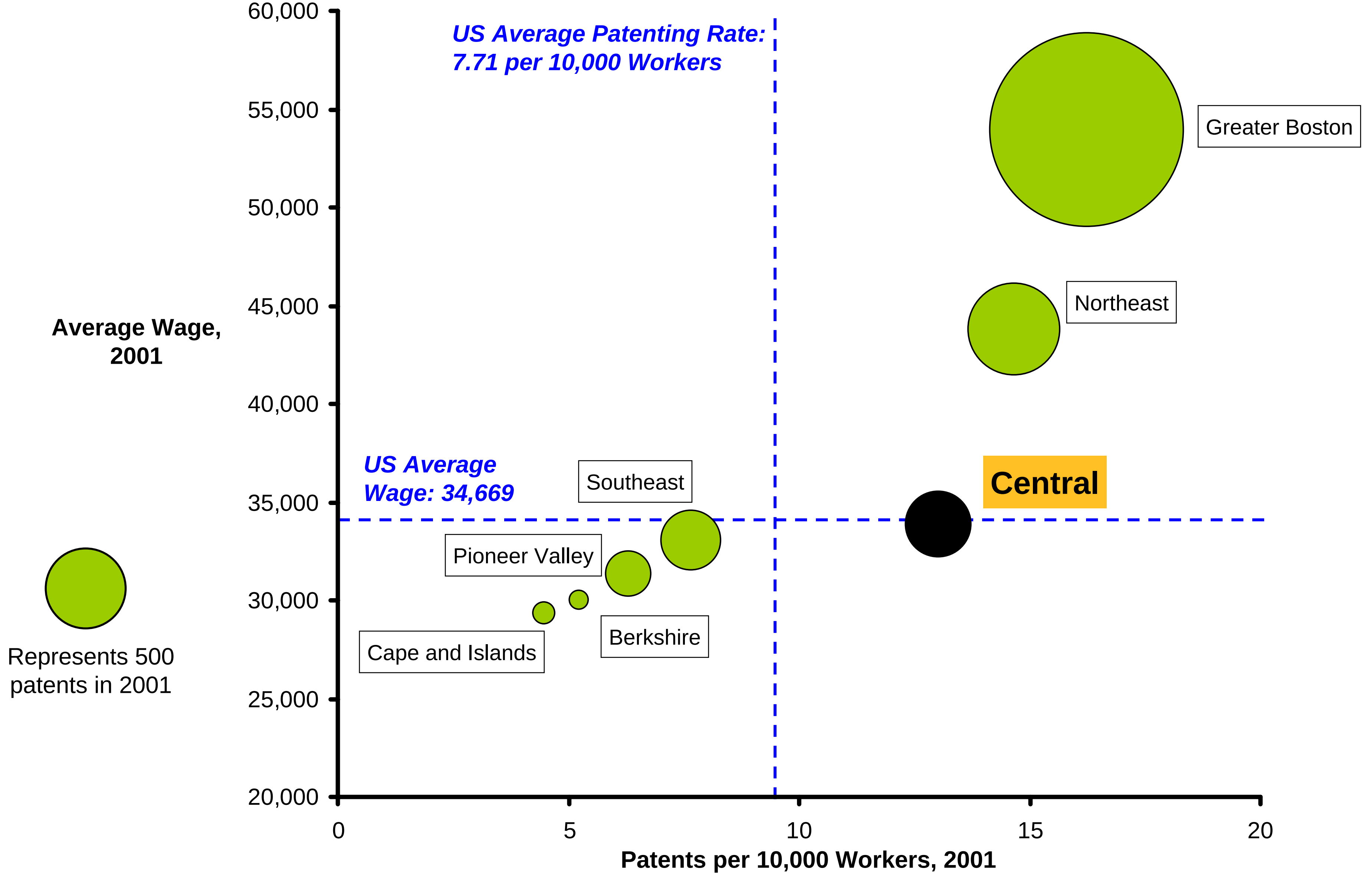
Establishment Formation in Traded Clusters



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Comparative Performance of Regions

Wages and Patenting Rates



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Patents by Organization

Central Region

	Organization	Patents Issued from 1997 to 2001
1	COMPAQ/DIGITAL EQUIPMENT CORPORATION	101
2	EMC CORPORATION	46
3	SAINT GOBAIN/NORTON INDUSTRIAL CERAMICS CORP.	41
4	QUANTUM CORP. (CA)	39
5	HYBRIDON, INC.	32
6	MORGAN CONSTRUCTION COMPANY	28
7	NORTON COMPANY	27
8	UNIVERSITY OF MASSACHUSETTS	21
9	UNIVERSITY OF MASSACHUSETTS MEDICAL CENTER	21
10	MACNEILL ENGINEERING COMPANY, INC.	20
11	SEPRACOR INC.	19
12	3COM CORPORATION	18
13	SUN MICROSYSTEMS, INC.	16
14	AMERICAN SUPERCONDUCTOR CORPORATION	14
15	RAYTHEON COMPANY	14
16	SHIPLEY COMPANY INC.	13
17	AVERY DENNISON CORPORATION	13
18	SIMPLEX TIME RECORDER COMPANY	11
19	GILLETTE COMPANY	11
20	CABOT SAFETY INTERMEDIATE CORPORATION	10
21	PIONEER CONSOLIDATED CORP.	8
22	BASF AKTIENGESELLSCHAFT	8
23	DATA GENERAL CORP.	8
24	POLAROID CORPORATION	7
25	WORCESTER POLYTECHNIC INSTITUTE	7
26	ALPHA BETA TECHNOLOGY, INC.	7
27	GENZYME CORPORATION	7
28	WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY, INC.	7
29	ANALOG DEVICES, INC.	7

Note: The USPTO assigns location based on the inventor's address rather than that of the institutional owner.
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

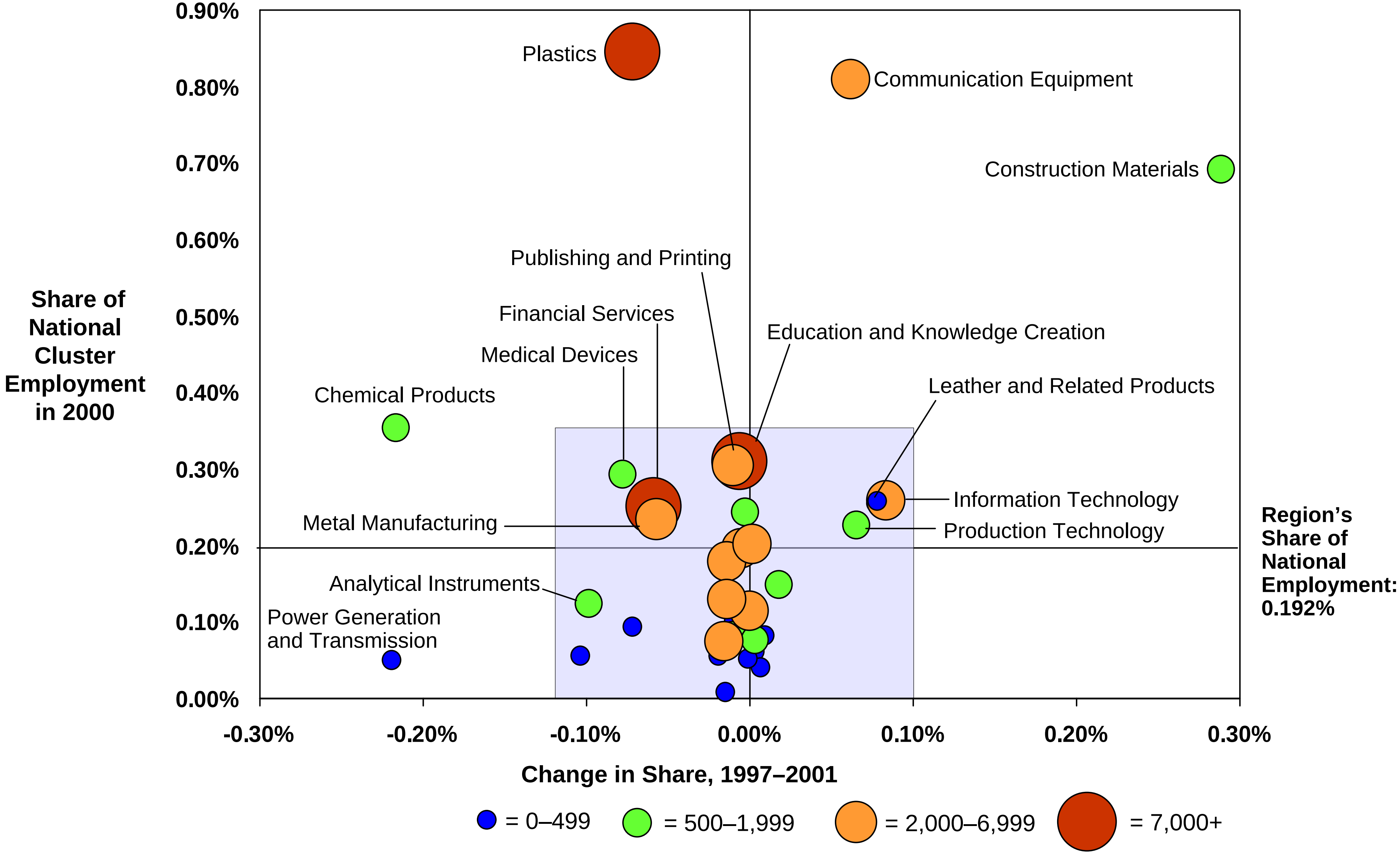
Composition

Central Massachusetts

- Central Massachusetts has as **strong position** with more than three times the employment expected given the region's size in three traded clusters
  - Plastics
  - Communication equipment
  - Construction materials
- Central Massachusetts is **losing employment and national position** in a number of manufacturing-dominated clusters
  - Chemical Products, Metal Manufacturing, Analytical Instruments, and Plastics
  - Information technology is the only cluster with significant size that added jobs and gained national share
- Among **local clusters**, the only broad segment of the region's economy to grow employment, local health services and local real estate accounted for more than 55% of all job creation
- Wages **lag** the Massachusetts average in all major clusters of the regional economy

Specialization By Traded Cluster

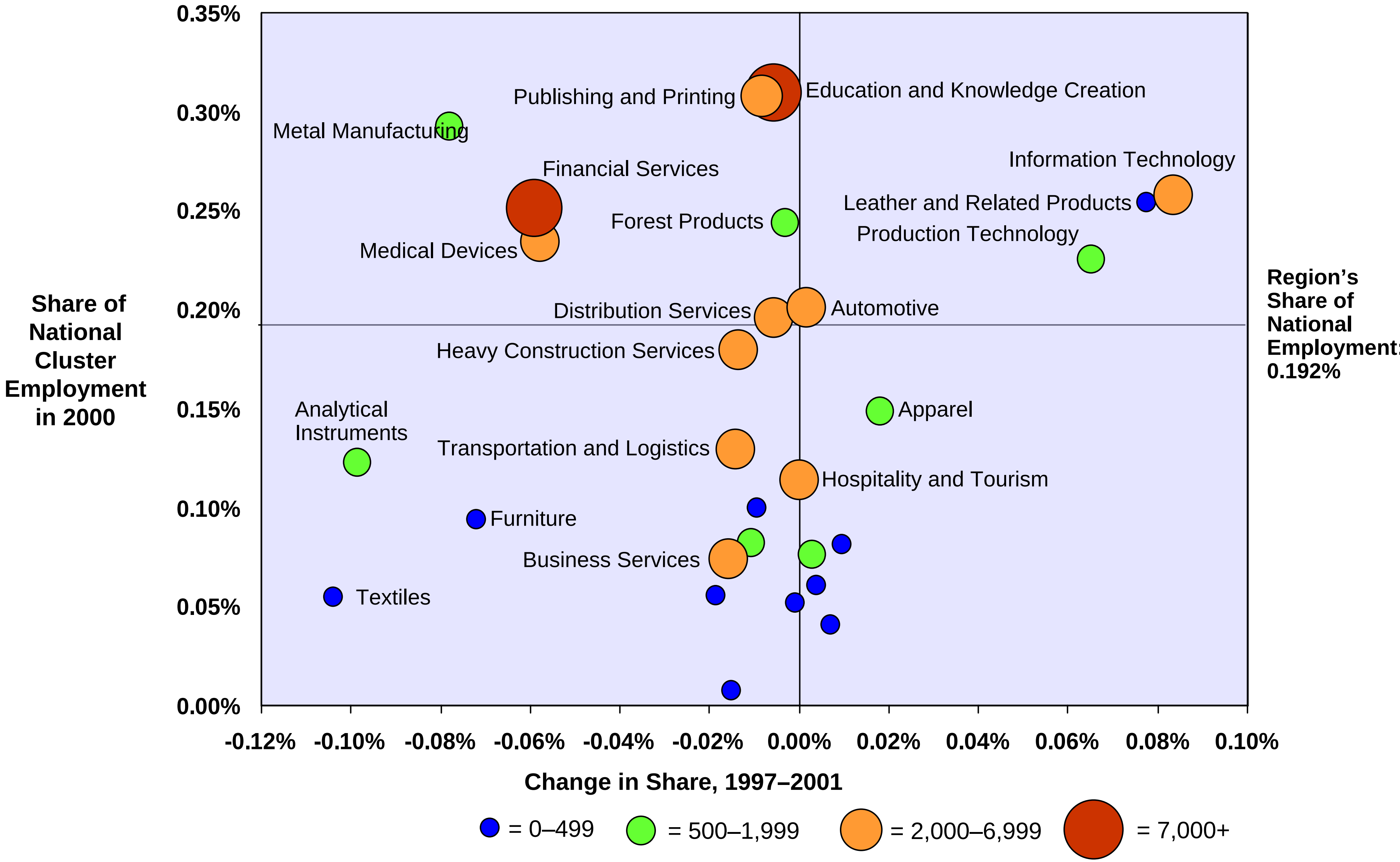
Central Region



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Specialization By Traded Cluster

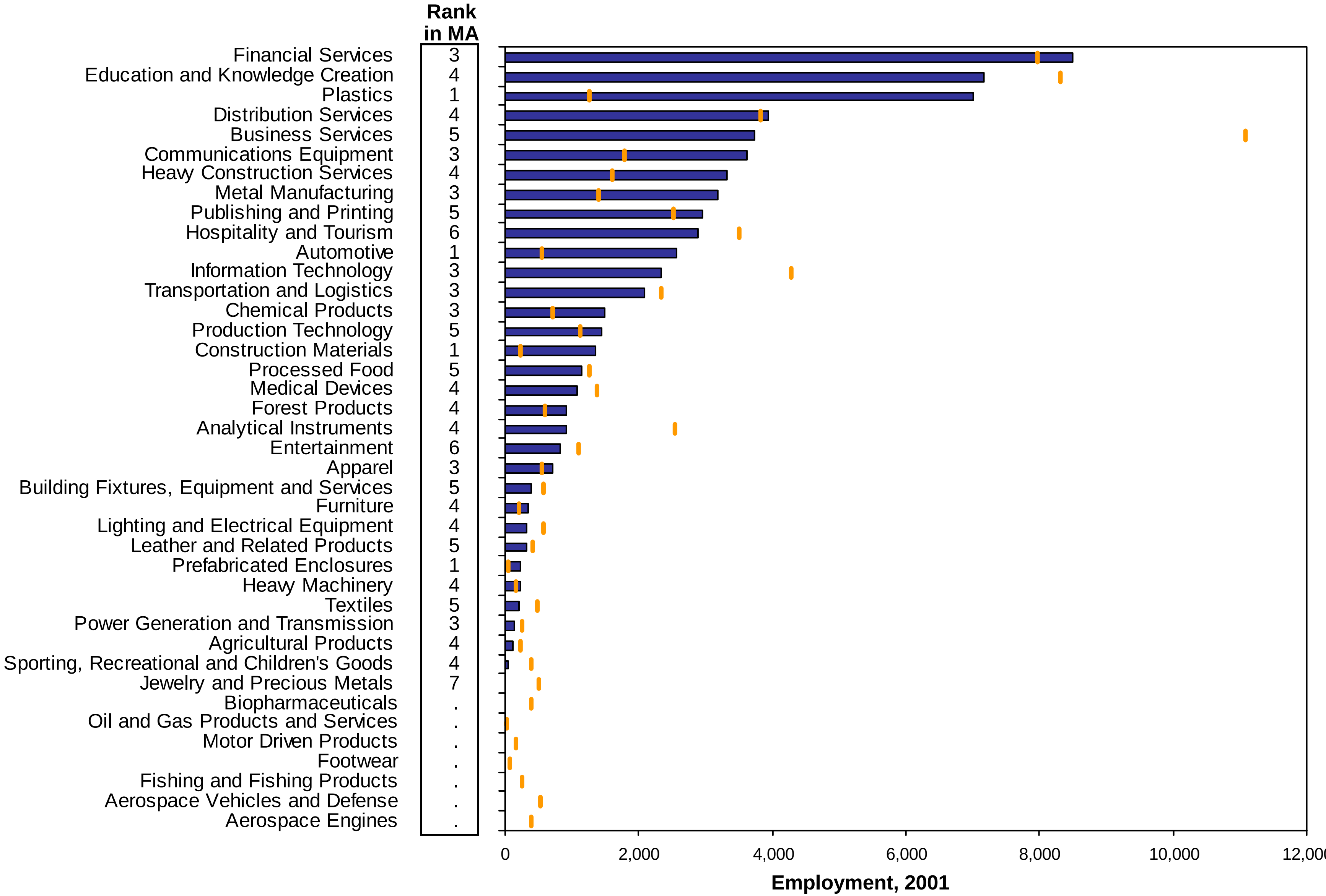
Central Region



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Employment By Traded Cluster

Central Region

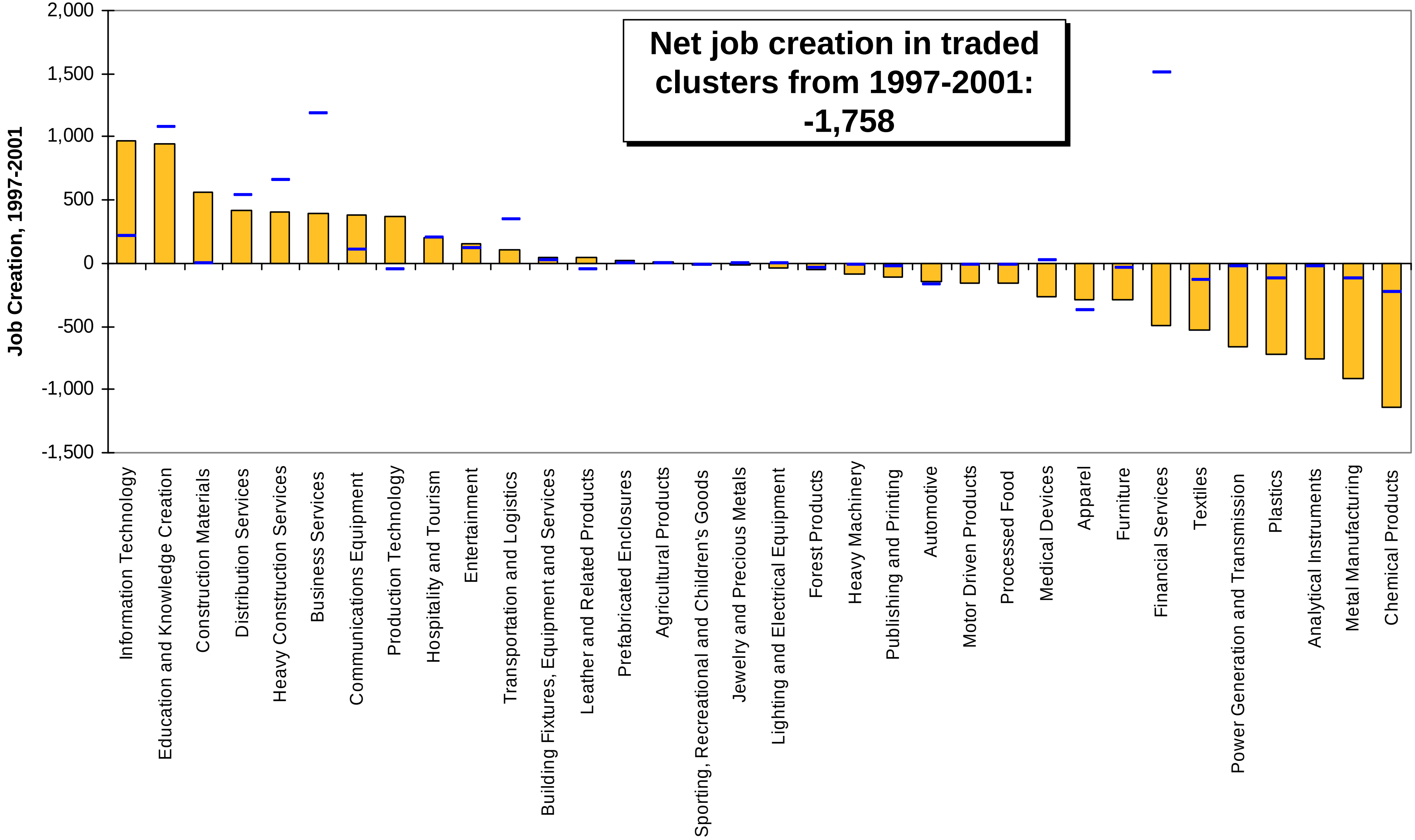


| - Indicates expected employment at rates in the **state benchmark** for traded clusters. Rank is across 7 state regions.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Job Creation By Traded Cluster

Central Region

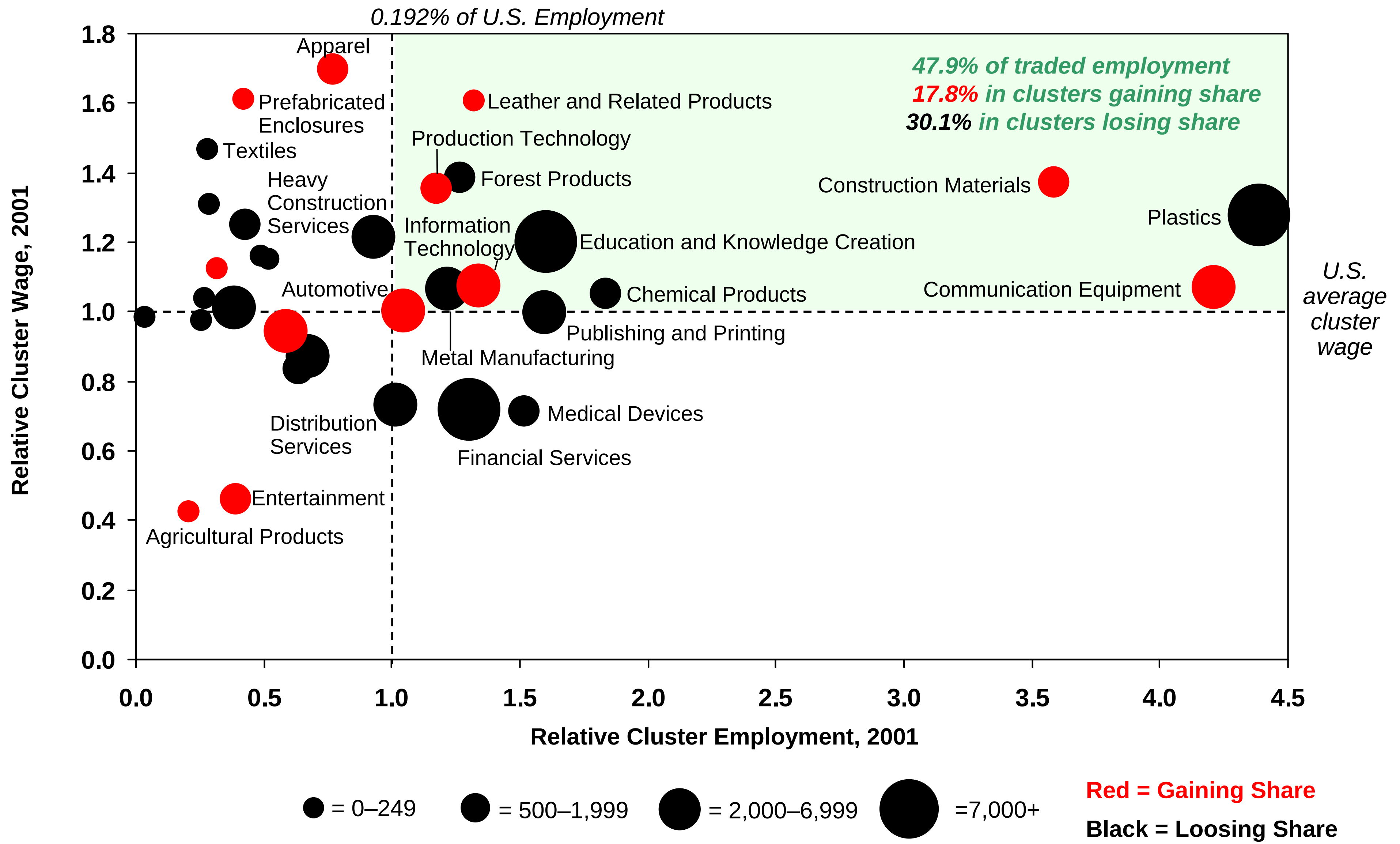


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Relative Cluster Performance

Central Region

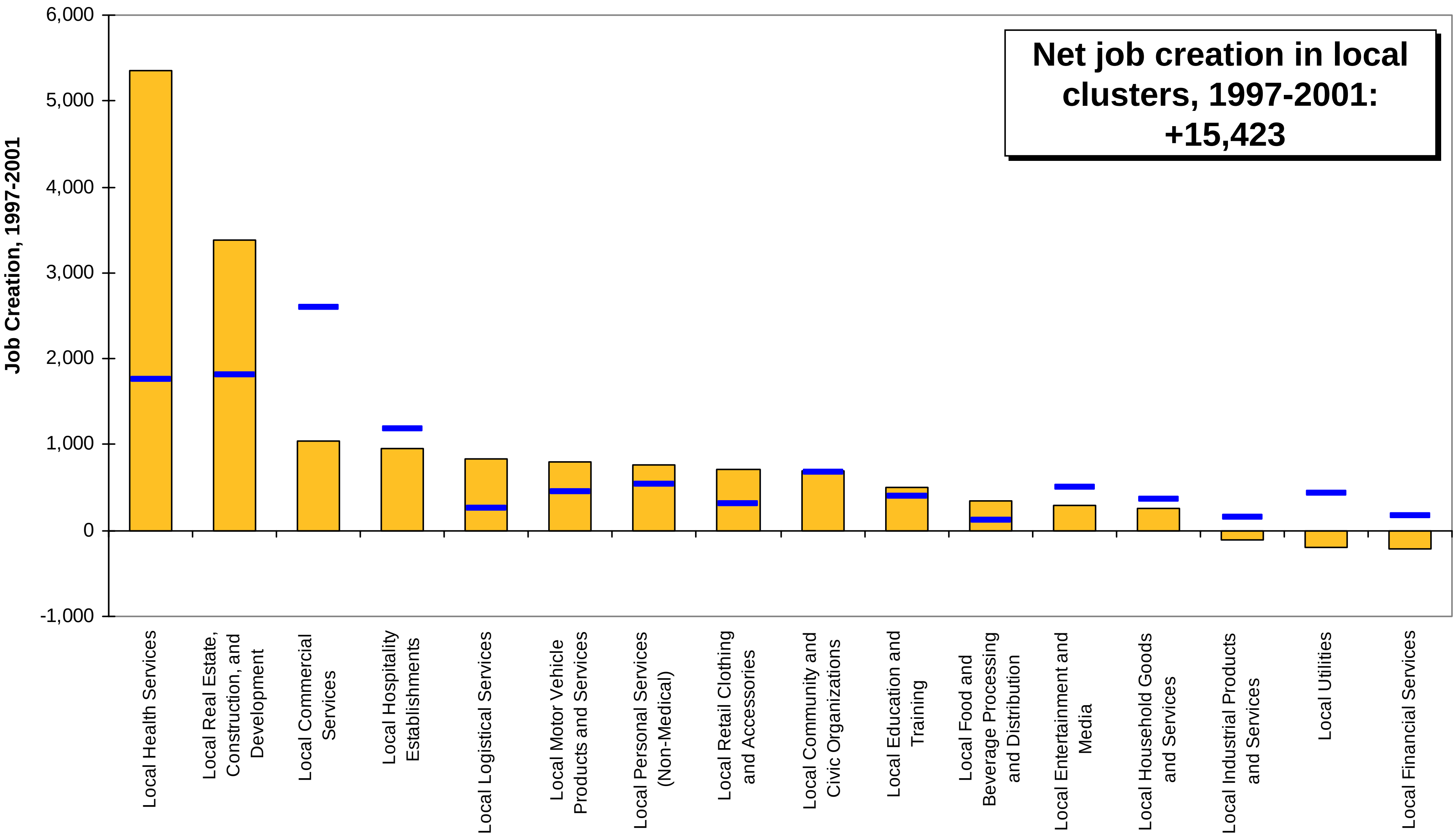


Note: US wage and employment benchmarks

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Job Creation By Local Cluster

Central Region

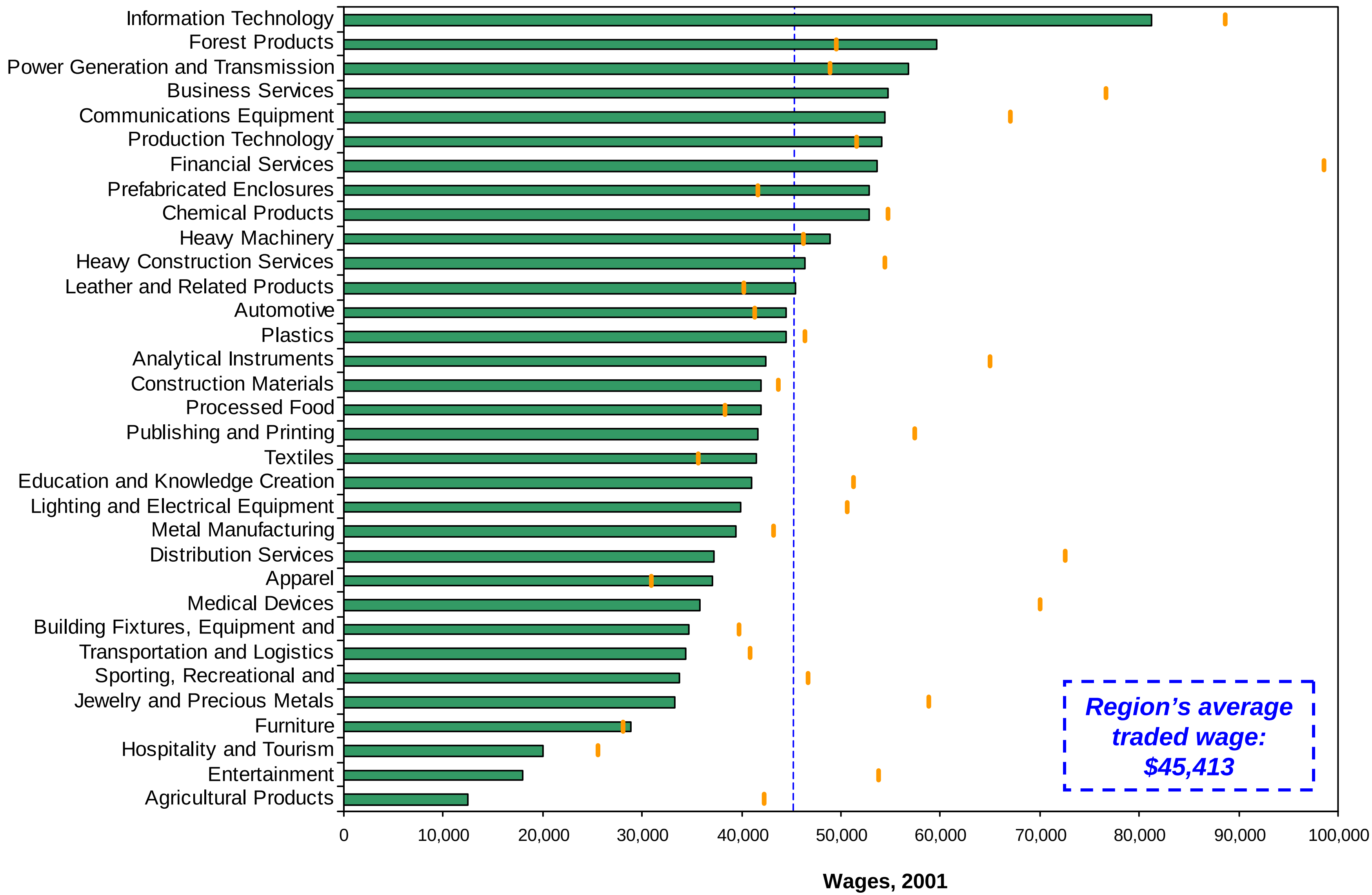


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Wages By Traded Cluster

Central Region with State Benchmarks



| - Indicates Massachusetts average wage in the cluster.

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Leading Sub-Clusters by Location Quotient

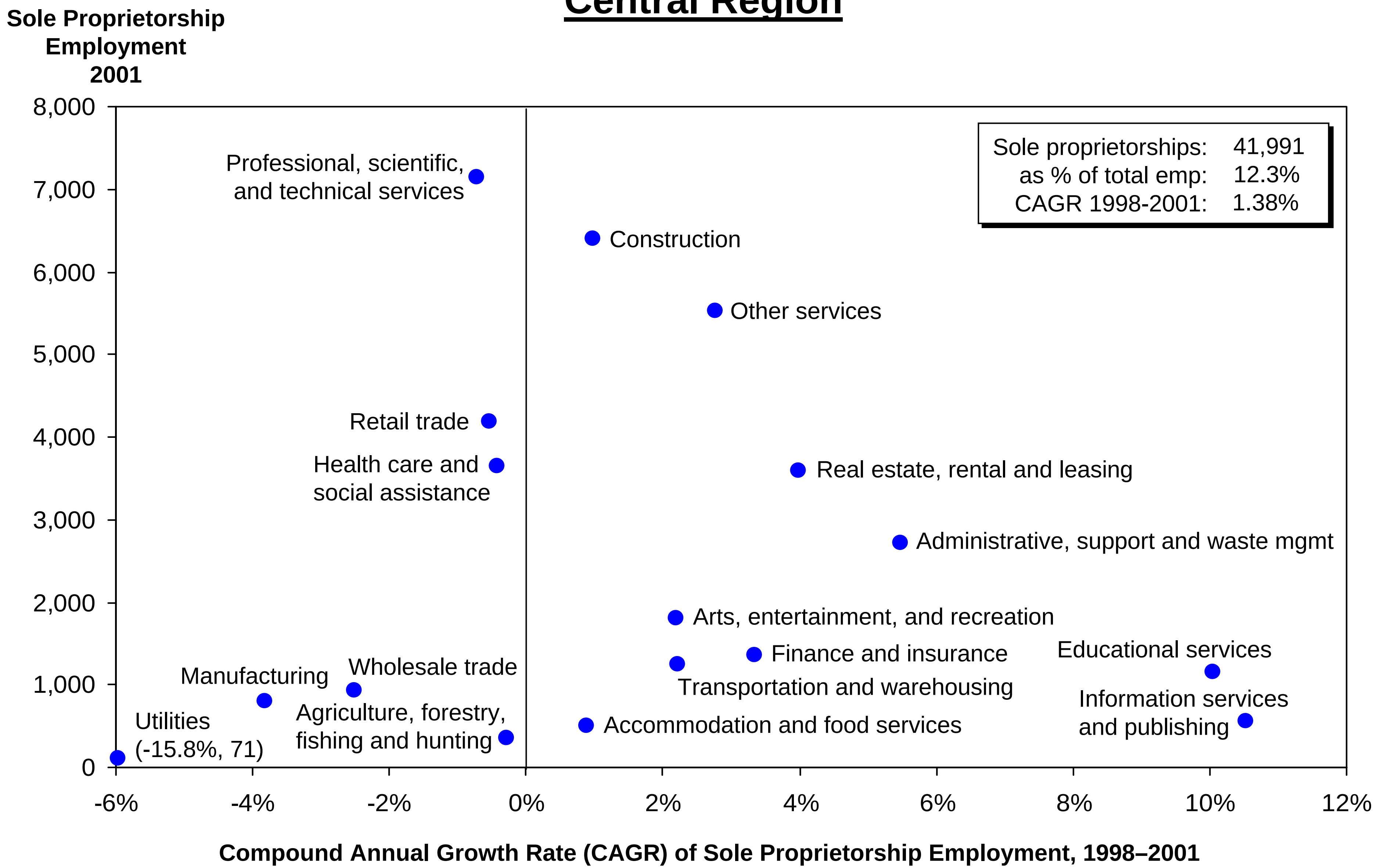
Central Region, 2001

Cluster	Subcluster	Location Quotient	Share of National Employment	Rank among Massachusetts Regions	Employment
Financial Services	Insurance Products	2.57	0.49%	2	5,925
Education and Knowledge Creation	Educational Facilities	2.63	0.51%	2	746
Plastics	Synthetic Rubber	6.87	1.32%	2	152
	Plastic Products	4.93	0.95%	1	5,791
	Plastic Materials and Resins	3.42	0.66%	2	1,032
Distribution Services	Apparel and Accessories Wholesaling	2.91	0.56%	3	1,228
Communications Equipment	Specialty Office Machines	46.97	9.03%	1	1,857
	Electrical and Electronic Components	5.71	1.10%	3	1,768
Heavy Construction Services	Fabricated Metal Structures and Piping	2.24	0.43%	1	869
Metal Manufacturing	Saw Blades and Handsaws	21.98	4.23%	2	356
	Wire and Springs	3.71	0.71%	1	653
	Precision Metal Products	3.16	0.61%	1	688
	General Industrial Machinery	1.74	0.33%	3	166
Publishing and Printing	Paper Products	4.49	0.86%	3	754
	Printing Services	3.64	0.70%	2	1,804
Automotive	Production Equipment	6.68	1.28%	1	1,748
Information Technology	Peripherals	3.00	0.58%	3	701
	Electronic Components and Assemblies	2.52	0.48%	3	1,477
Chemical Products	Other Processed Chemicals	8.16	1.57%	1	1,484
Production Technology	Fabricated Plate Work	3.21	0.62%	1	499
	Process Machinery	2.19	0.42%	3	341
	Ball and Roller Bearings	2.18	0.42%	1	140
	Machine Tools and Accessories	2.09	0.40%	3	344
Construction Materials	Tile, Brick and Glass	9.09	1.75%	1	909
	Rubber Products	2.95	0.57%	4	280
Medical Devices	Ophthalmic Goods	20.20	3.88%	1	1,039
Analytical Instruments	Optical Instruments	10.34	1.99%	3	453
Forest Products	Paper Industries Machinery	5.88	1.13%	3	149
	Paper Mills	1.70	0.33%	2	770
Apparel	Knitting and Finishing Mills	4.31	0.83%	2	721
Leather Products	Coated Fabrics	5.76	1.11%	4	97
Textiles	Specialty Fabric Processing	2.71	0.52%	3	64
Power Generation and Transmission	Turbines and Turbine Generators	4.20	0.81%	1	143

Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Sole Proprietorship Employment and Growth

Central Region



Note: Data available on county basis only; the allocation to Massachusetts regions is only approximate.
Source: U.S. Census Bureau, Nonemployer Statistics

Business Environment

Central Massachusetts

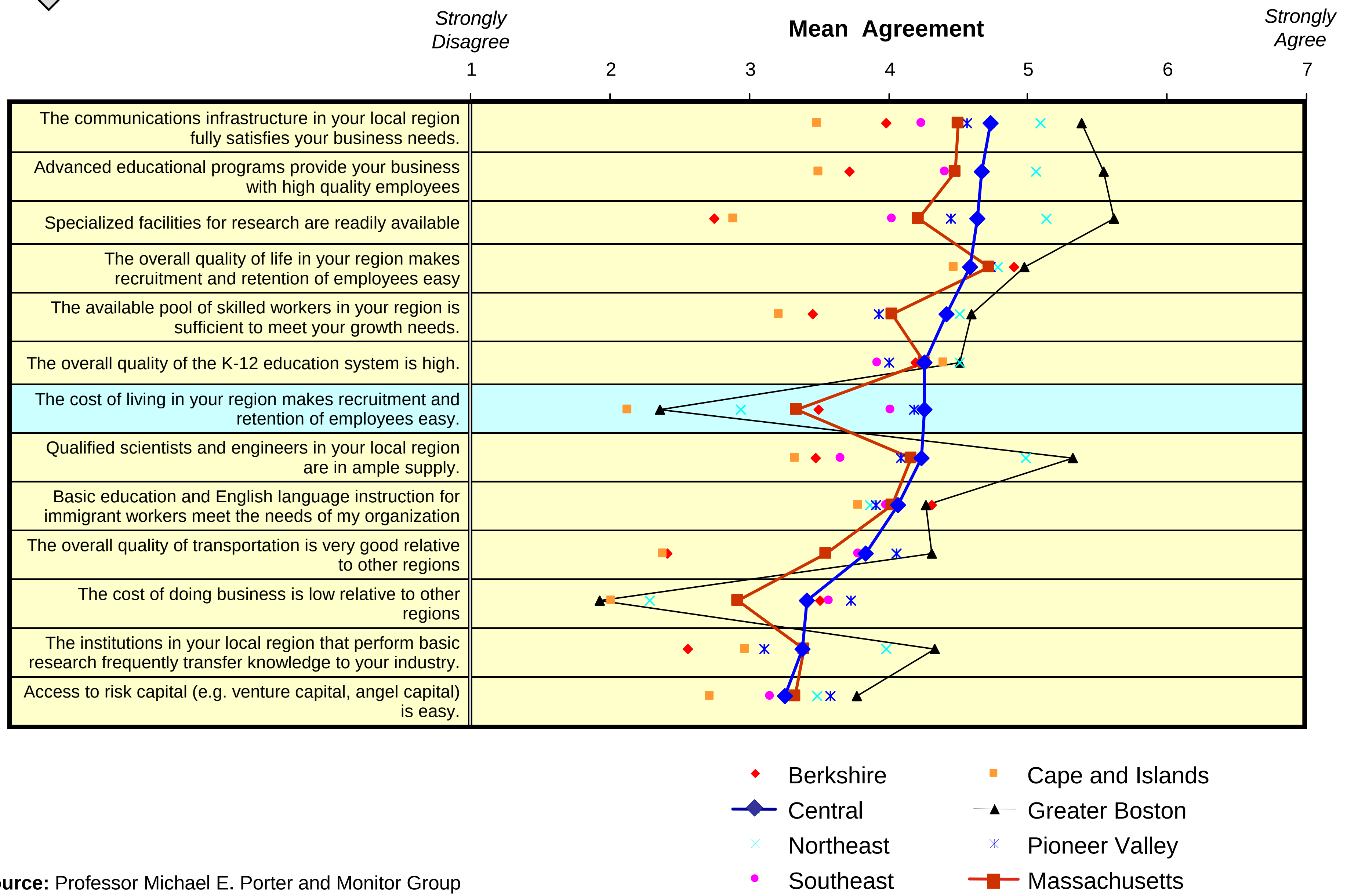
- The Business environment in the Central region is seen in most dimensions to **match** or slightly exceed the Massachusetts average
  - **Cost of living** and **cost of doing business** are seen as the strongest advantages relative to the rest of the state; **labor force skills** also receive high grades
  - The level of **local competition** in Central Massachusetts, however, is perceived as lower than in the other regions of the state; **cluster linkages** are not seen to currently contribute to regional success

- While companies are overall satisfied with their location in Central Massachusetts, they rank the region **low** in attractiveness for the industry compared to other parts of the state

- Priorities for government in the Central region mirror the Massachusetts average on most dimensions
  - Relatively higher importance is seen in the **attraction of suppliers and service providers** to the region

Regional Comparisons

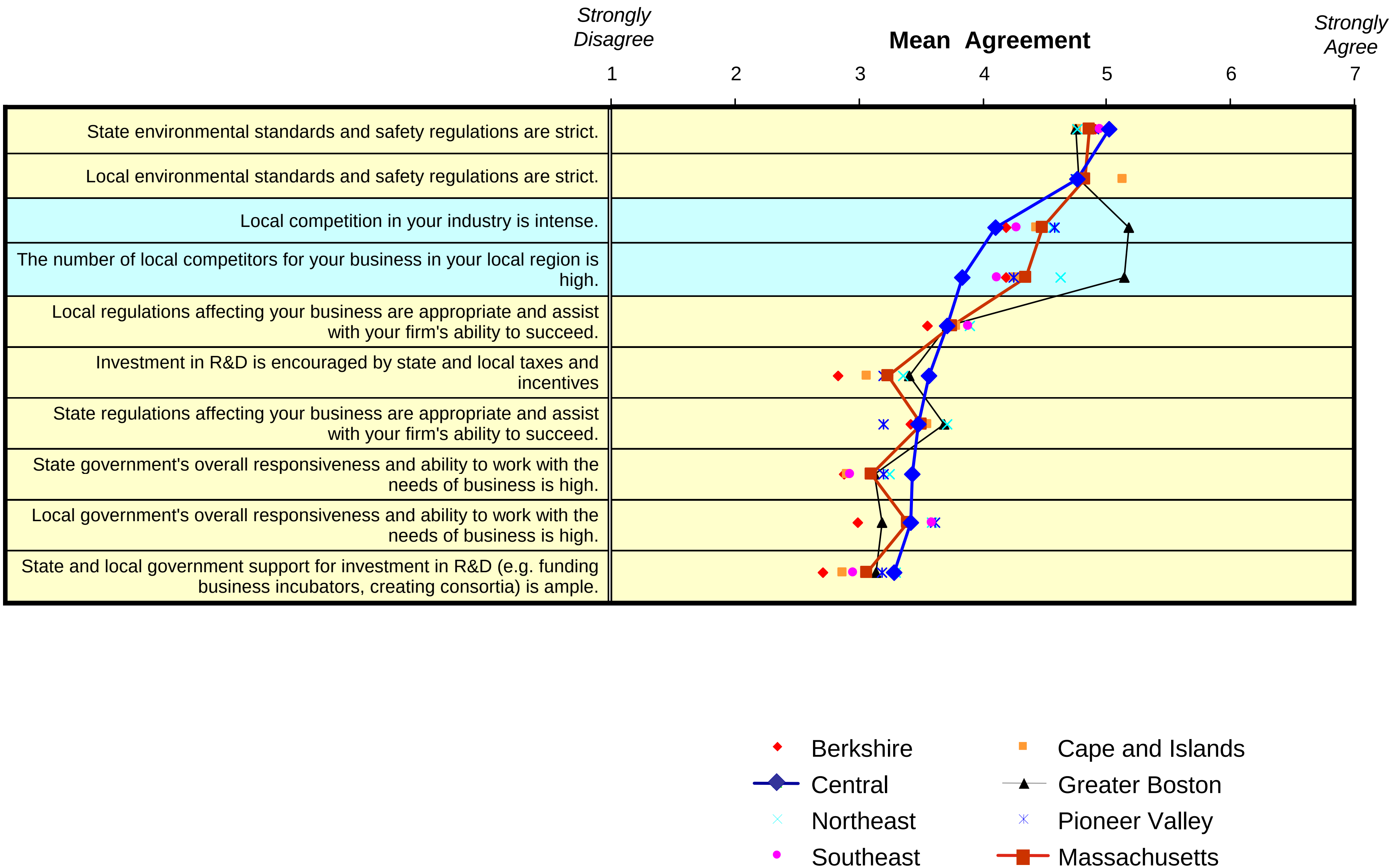
Availability of Inputs



Source: Professor Michael E. Porter and Monitor Group

Regional Comparisons

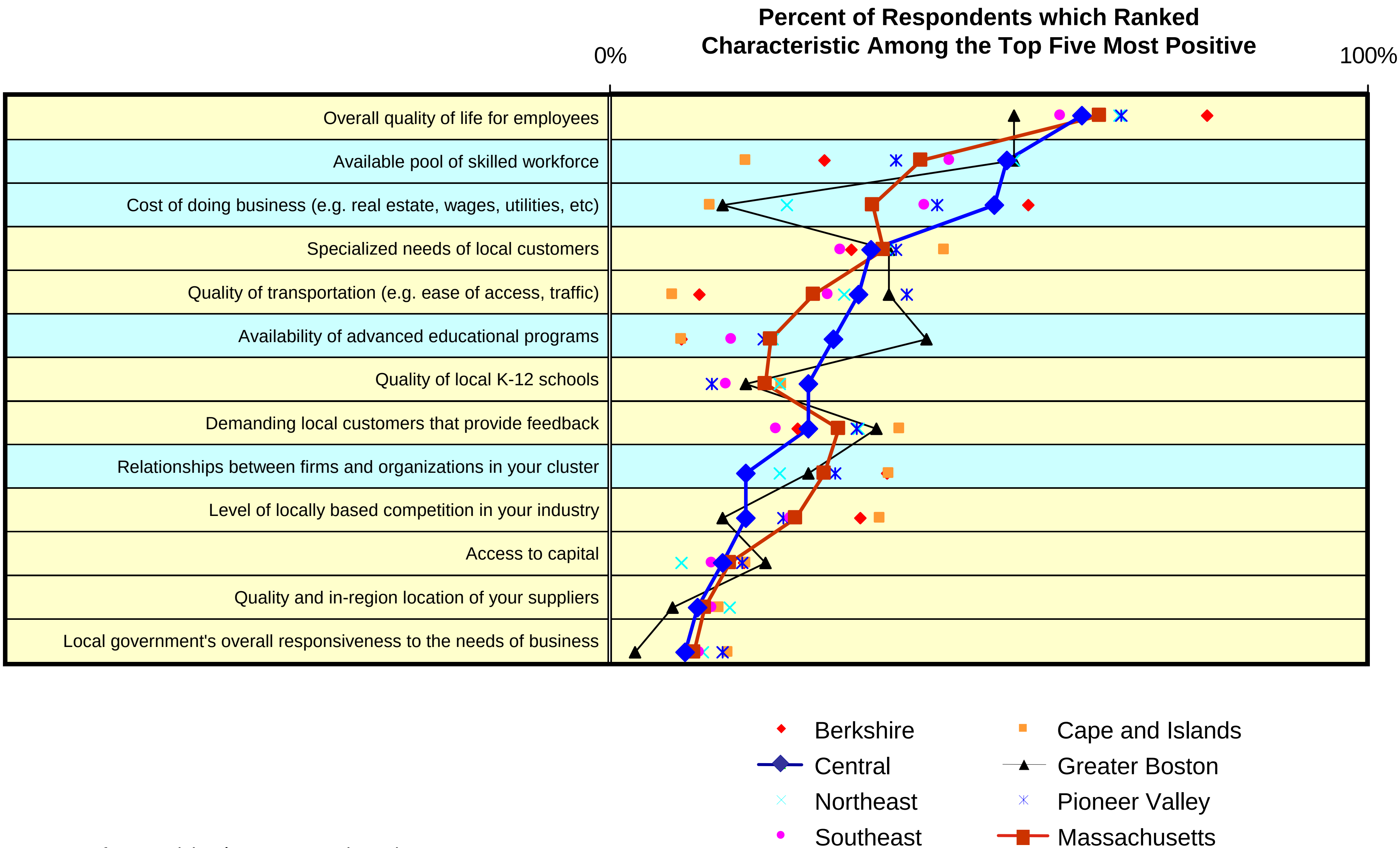
Rules and Incentives Governing Investment and Competition



Source: Professor Michael E. Porter and Monitor Group

Regional Comparisons

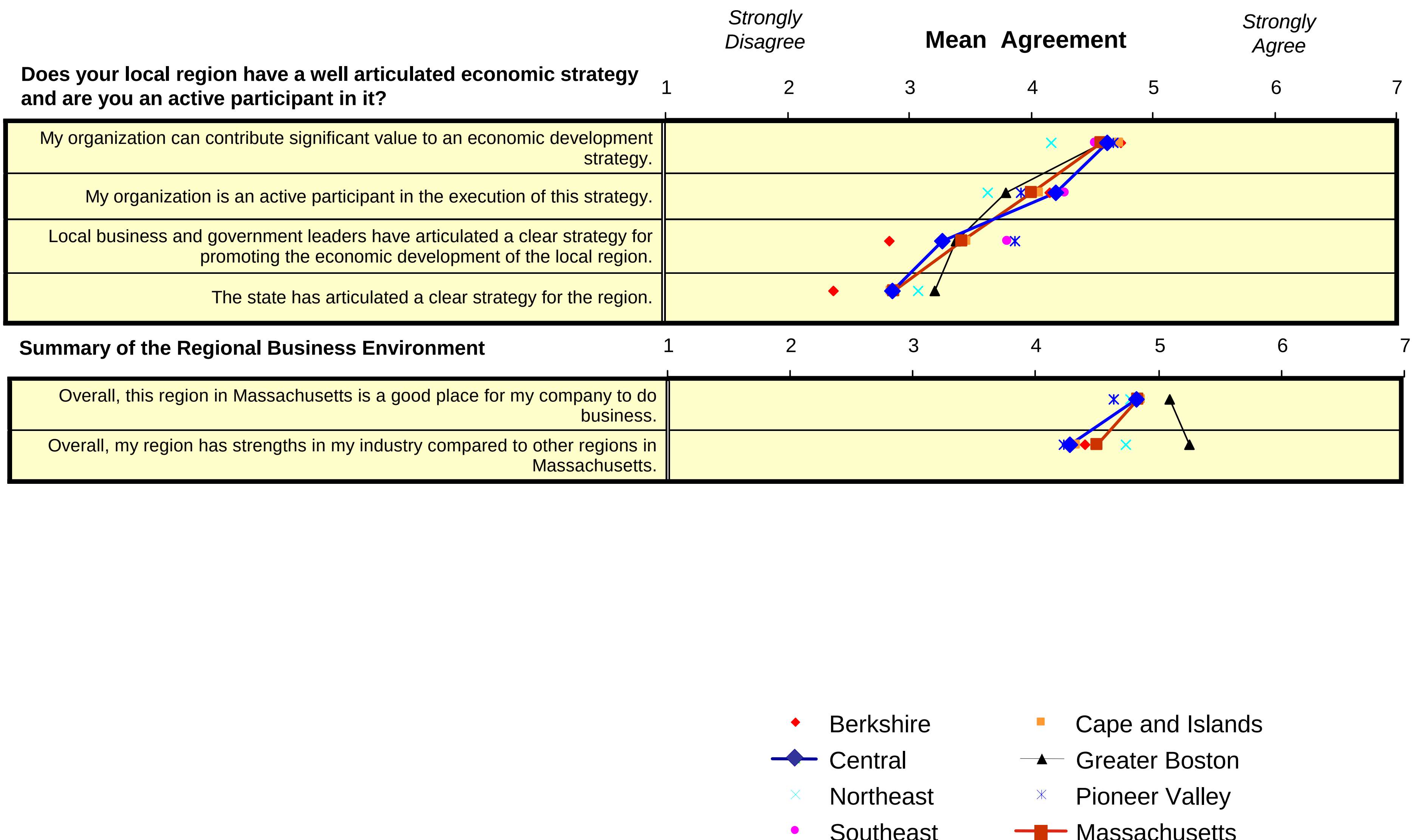
Positive Impact on the Local Business Environment



Source: Professor Michael E. Porter and Monitor Group

Regional Comparisons

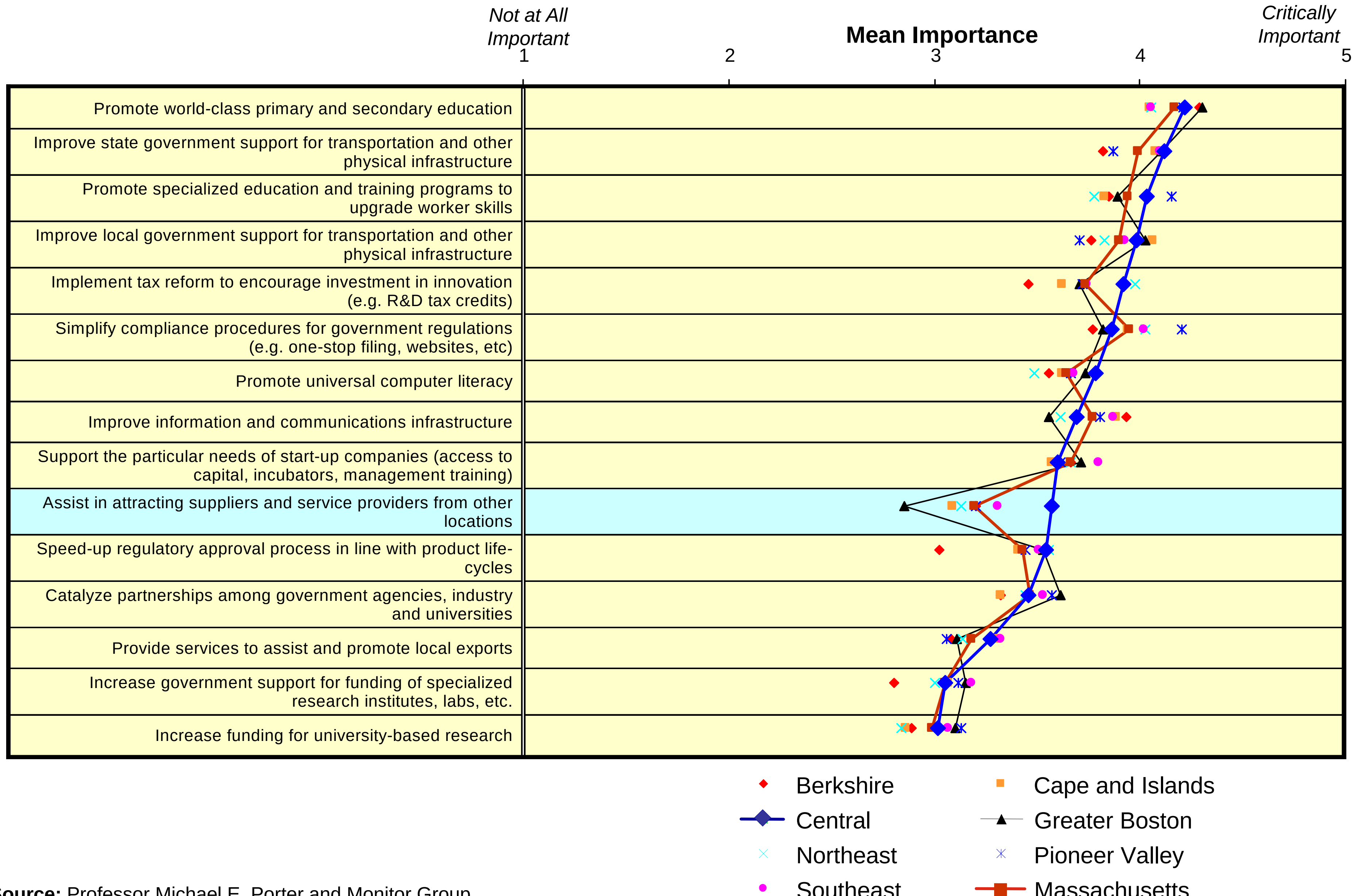
Regional Strategy & Summary of the Regional Business Environment



Source: Professor Michael E. Porter and Monitor Group

Regional Comparisons

Priorities for Government



Source: Professor Michael E. Porter and Monitor Group

Regional Competitiveness

Central Massachusetts

- Foundations of Regional Competitiveness
- Assessing the Competitiveness of Central Massachusetts
- **Action Agenda**

Shifting Responsibilities for Economic Development

Old Model	New Model
• **Government** drives economic development through policy decisions and incentives	• Economic development is a **collaborative process** involving government at multiple levels, companies, teaching and research institutions, and institutions for collaboration

Role of the Private Sector in Economic Development

- A company's competitive advantage is partly the result of the **local environment**
- Company membership in a cluster offers **collective benefits**
- Private investment in **"public goods"** is justified

- Take an **active role** in upgrading the local infrastructure
- Nurture **local suppliers** and attract new supplier investments
- Work closely with local **educational and research institutions** to upgrade **quality and create specialized programs addressing cluster needs**
- Provide government with **information** and **substantive input** on regulatory issues and constraints bearing on cluster development
- Focus **corporate philanthropy** on enhancing the local business environment

- An important role for **trade associations**
  - Greater influence
  - Cost sharing

Public / Private Cooperation in Cluster Upgrading

Minnesota's Medical Device Cluster

Context for Firm Strategy and Rivalry

- Aggressive **trade associations** (Medical Alley Association, High Tech Council)
- Effective **global marketing** of the cluster and of Minnesota as the "The Great State of Health"
- Full-time **"Health Care Industry Specialist"** in the department of Trade and Economic Development

Factor (Input) Conditions

- Joint development of **vocational-technical college curricula** with the medical device industry
- Minnesota **Project Outreach** exposes businesses to resources available at university and state government agencies
- Active medical technology licensing through **University of Minnesota**
- State-formed Greater Minnesota Corp. to **finance applied research**, invest in new products, and assist in technology transfer

Demand Conditions

- State sanctioned **reimbursement policies** to enable easier adoption and reimbursement for innovative products

Related and Supporting Industries

Towards an Action Agenda for the Central Region

- Mount **cluster development** efforts for established and emerging traded clusters
  - Use targeted investment attraction efforts
- Develop a **distinct strategic profile** for the region, leveraging its geographical position in proximity to Greater Boston
  - Strengthen the business environment strategically in areas central to the region's strategic profile

