

Massachusetts Regional Competitiveness Councils

Regional Competitiveness Profiles

Northeast, Southeast, and Cape & Island Regions

**Institute for Strategy and Competitiveness
Harvard Business School**

**Prepared for the
RCC Meetings
September 30, 2003**

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 2001, (World Economic Forum, 2001), "Clusters and the New Competitive Agenda for Companies and Governments" in On Competition (Harvard Business School Press, 1998), and the *Clusters of Innovation Initiative*, a joint effort of the Council on Competitiveness, Monitor Group, and Professor Porter. 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 Michael E. Porter.

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Introduction

Introduction

In February 2003, Governor Mitt Romney announced a plan to spur job growth in the region's of Massachusetts by tapping the expertise of area businesses, community and education leaders through the establishment of Regional Competitiveness Councils.

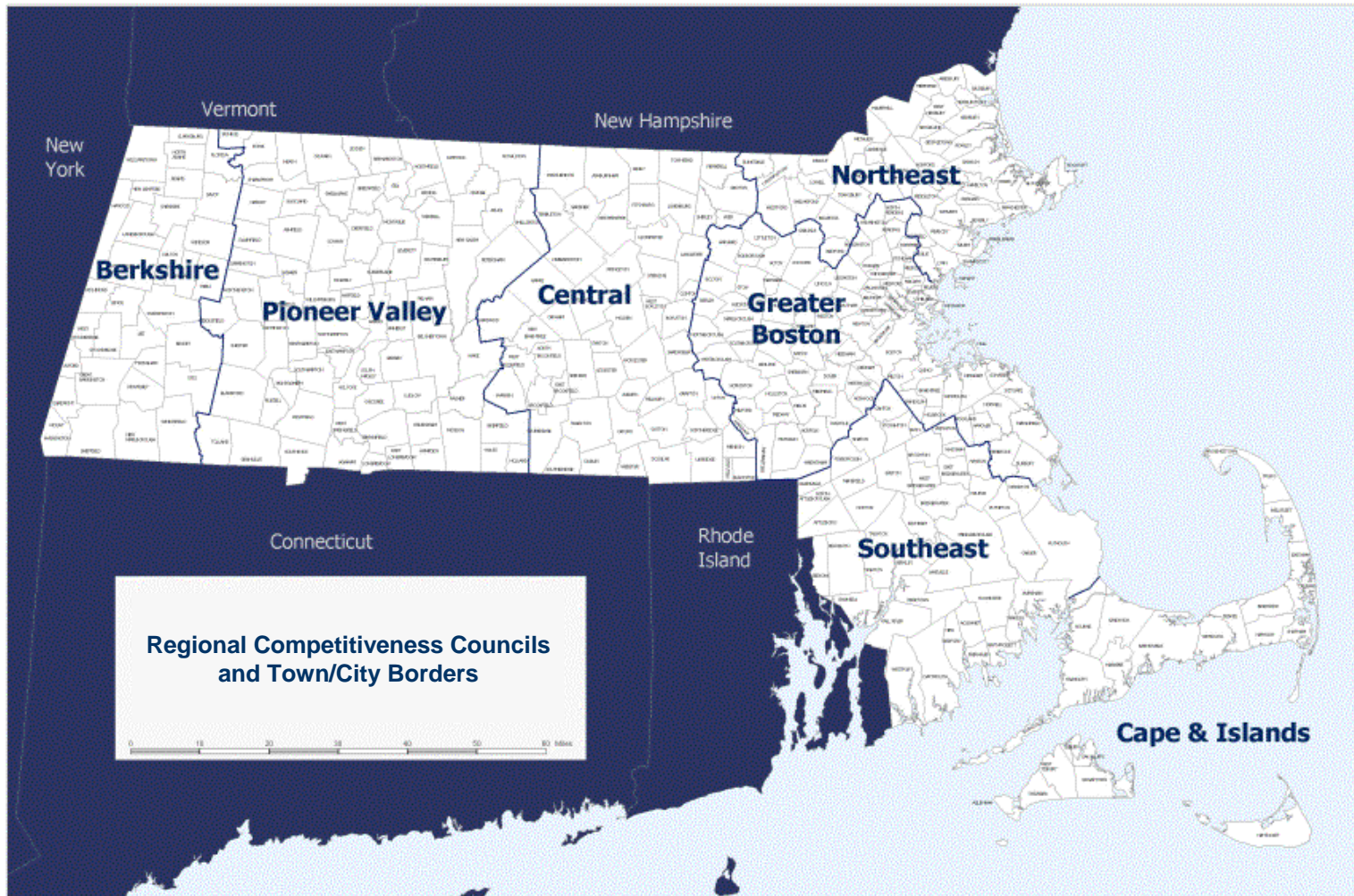
Romney, in naming the members of the regional councils, charged them with conducting an in-depth analysis of their region's economic climate; assessing local abilities to attract new companies; identifying which companies and jobs are currently at risk; and devising a strategy to turn a region's resources – human capital, infrastructure and financial investments – into the greatest economic opportunity.

Professor Michael E. Porter serves as a special adviser to the councils. These *Regional Competitiveness Profiles* have been prepared under his direction at Harvard's Institute for Strategy and Competitiveness. They are intended as a resource to assist the councils in their analyses of the regions.

This version of the *Regional Competitiveness Profiles* has been developed from data provided by the Massachusetts Department of Business and Technology to conform exactly to the geographies of the council regions. This version of the *Profiles* also includes entirely new data from surveys conducted in the regions to assess the local business environment. Our thanks to the Monitor Group for the contribution of their time to this work.

This document is available electronically at the Institute's web site, www.isc.hbs.edu.

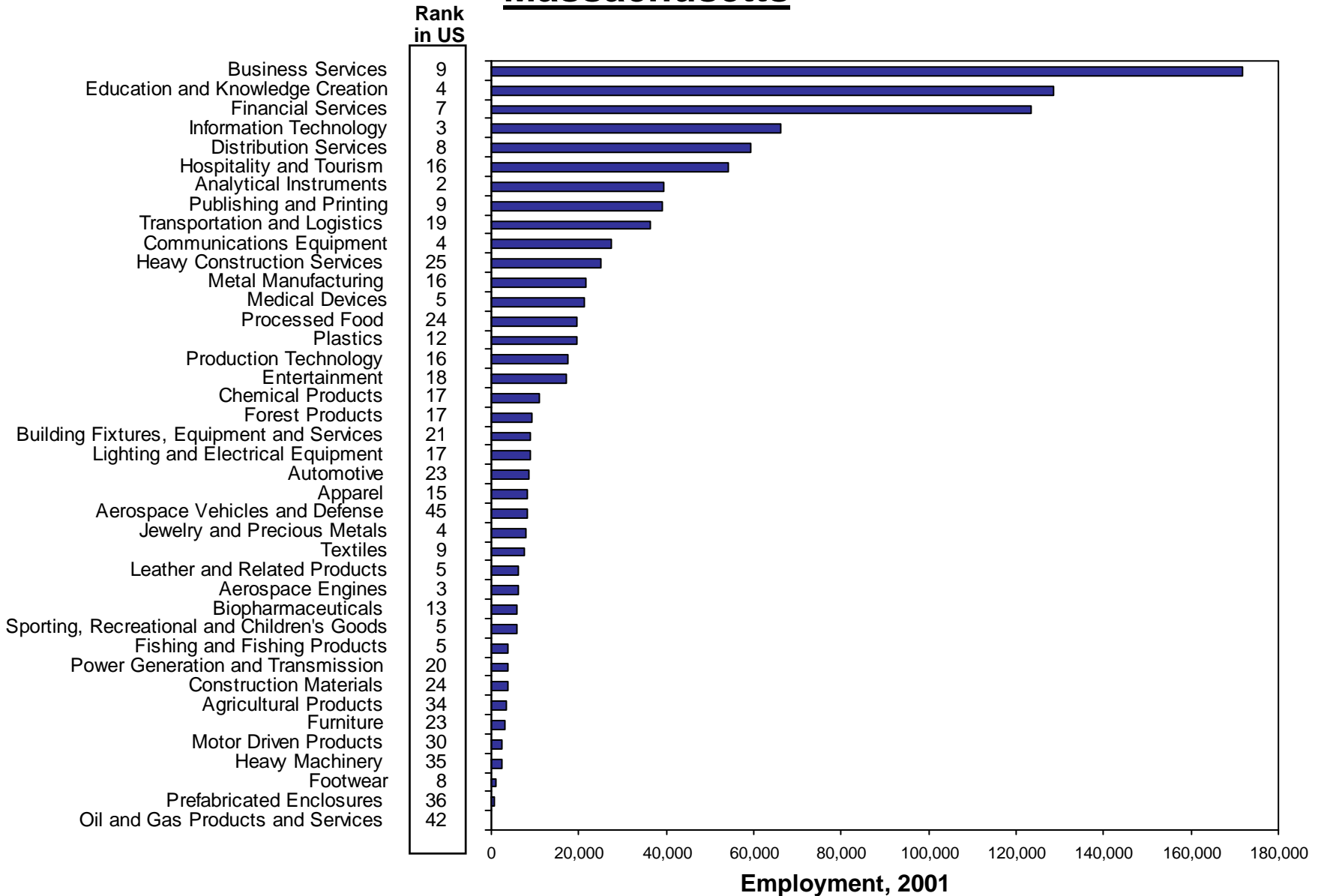
Massachusetts Regional Competitiveness Council Regions



State-wide Data

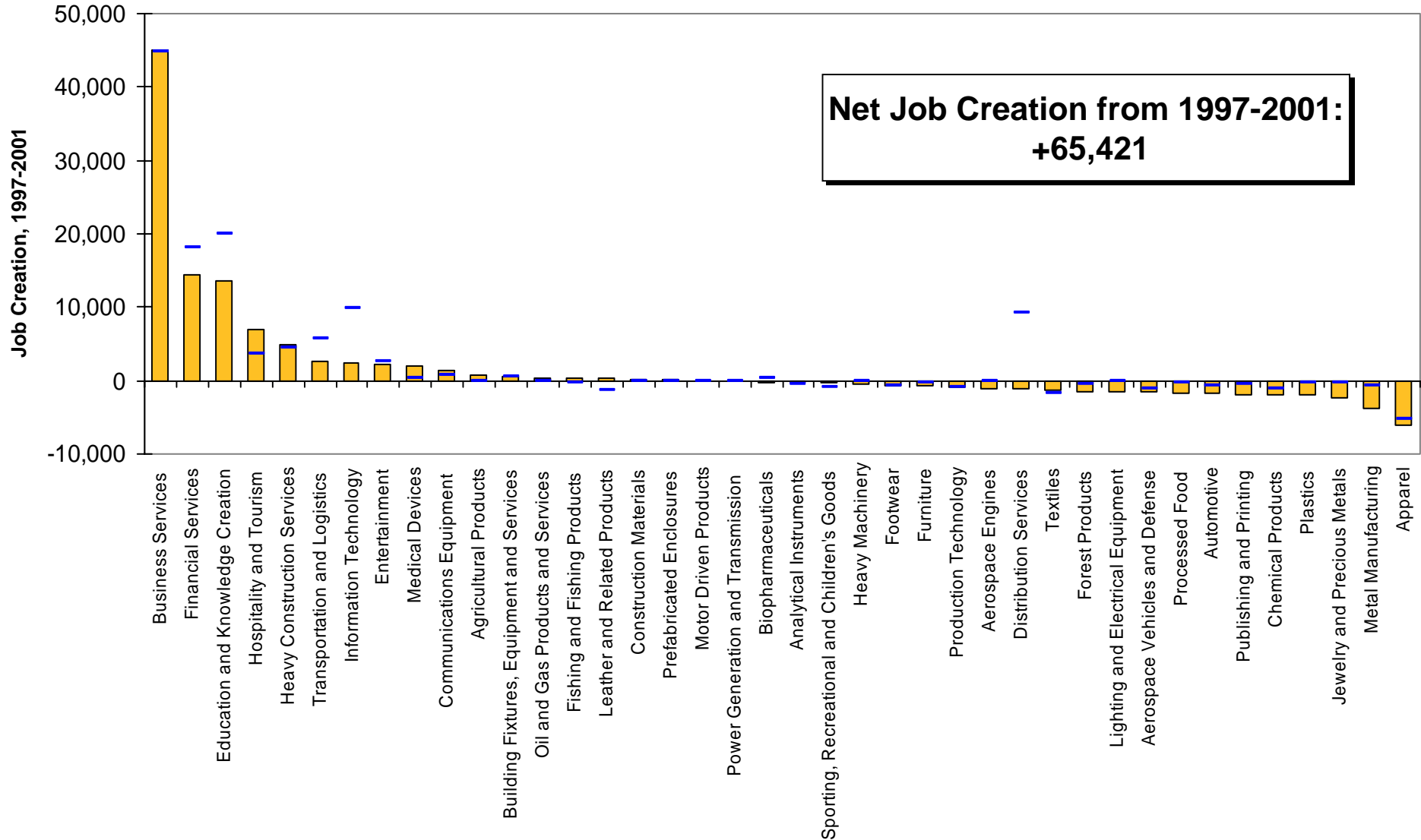
Employment By Traded Cluster

Massachusetts



Job Creation By Traded Cluster

Massachusetts, 1997-2001

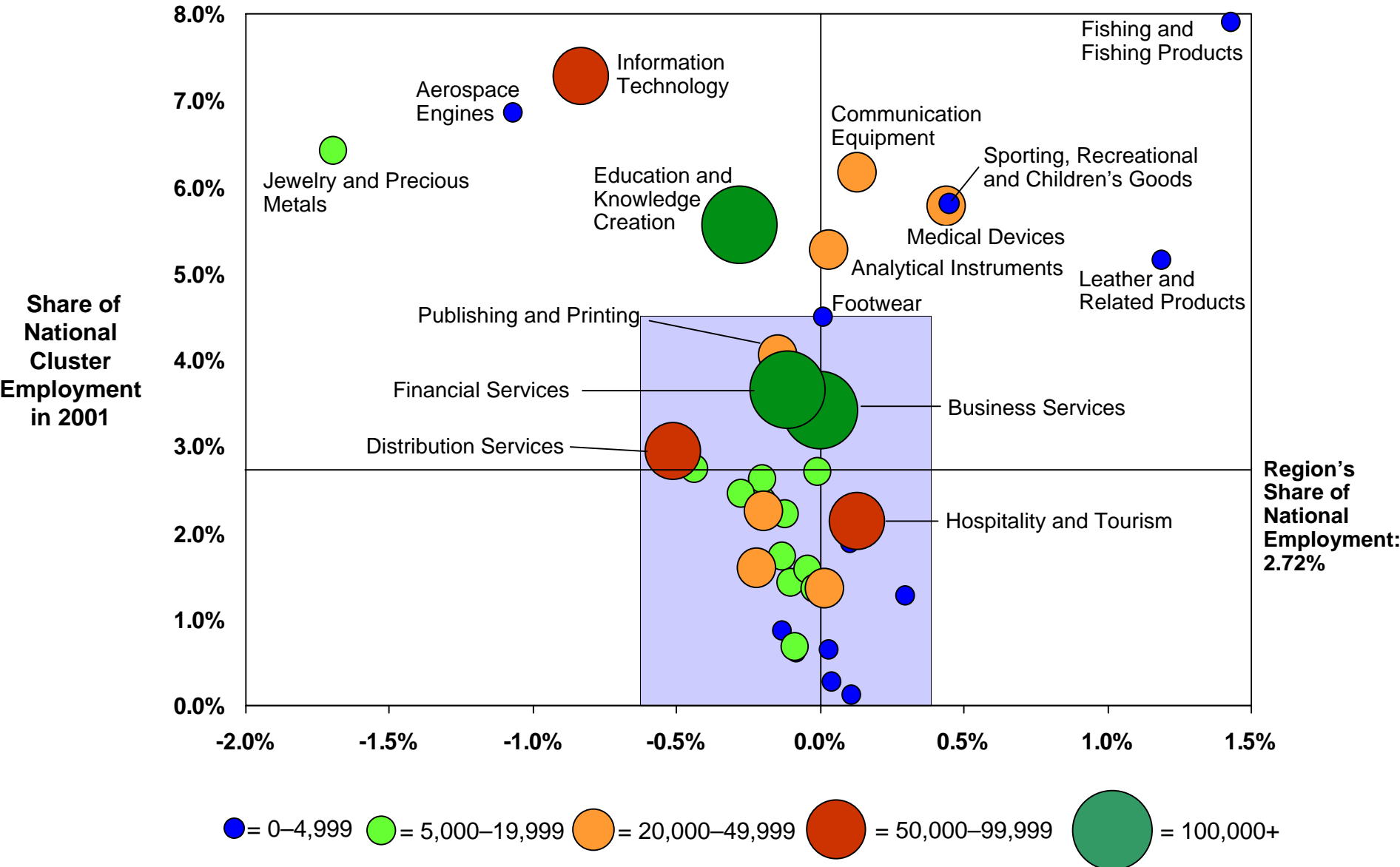


— Indicates expected job creation at rates achieved in national benchmark clusters, i.e. percent change in national benchmark times starting local employment.

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

Specialization By Traded Cluster

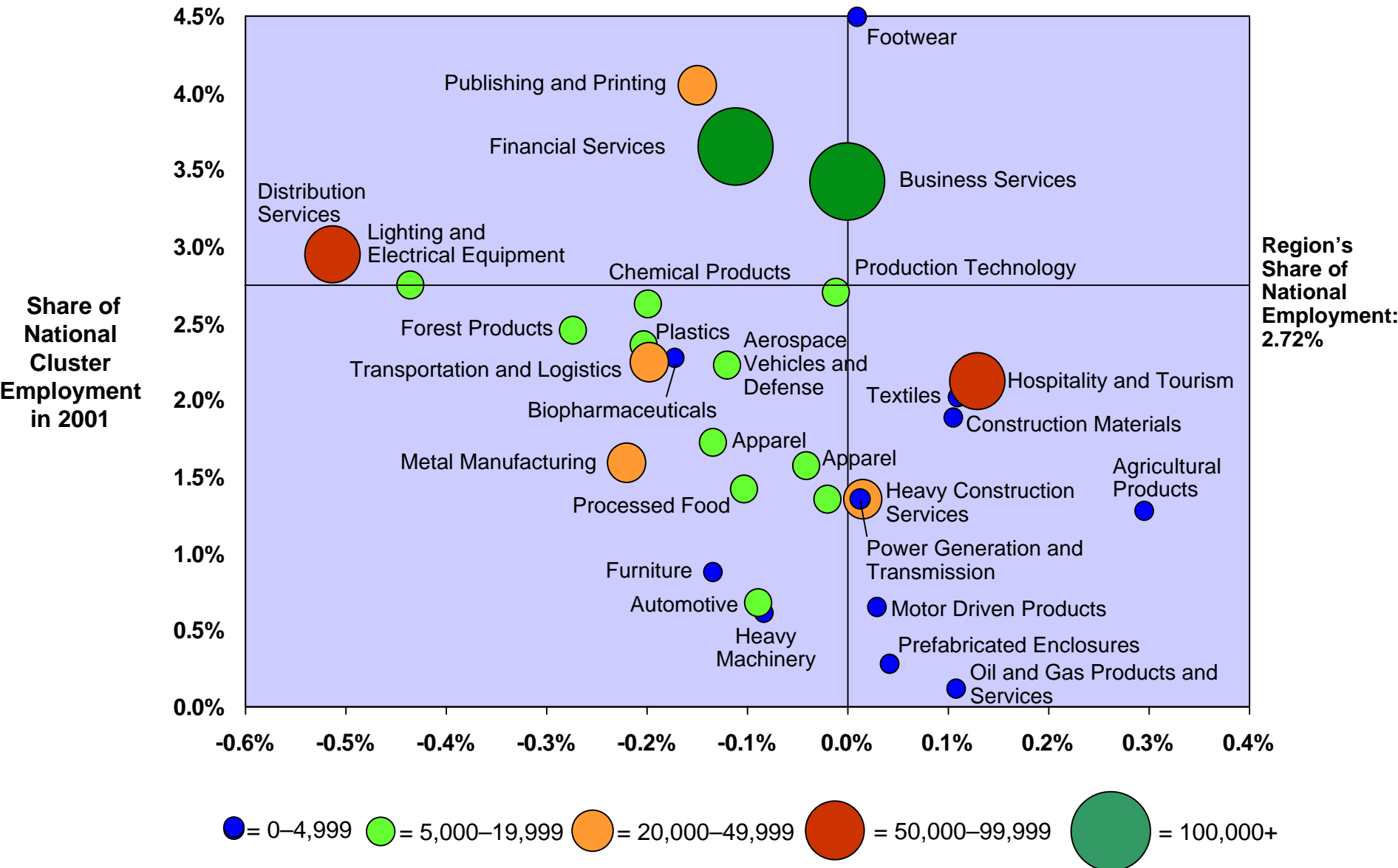
Massachusetts



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

Specialization By Traded Cluster

Massachusetts



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

Patents by Organization

Massachusetts

	Organization	Patents Issued from 1997 to 2001
1	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	518
2	MASSACHUSETTS GENERAL HOSPITAL CORPORATION	296
3	EMC CORPORATION	269
4	DIGITAL EQUIPMENT CORPORATION	261
5	POLAROID CORPORATION	213
6	ANALOG DEVICES, INC.	167
7	MILLENNIUM PHARMACEUTICALS, INC.	165
8	HARVARD COLLEGE, PRESIDENT AND FELLOWS	150
9	COMPAQ COMPUTER CORPORATION, INC.	147
10	SUN MICROSYSTEMS, INC.	143
11	BOSTON SCIENTIFIC CORPORATION	135
12	ACUSHNET COMPANY	130
13	GENETICS INSTITUTE, INC.	127
14	GILLETTE COMPANY	112
15	BRIGHAM AND WOMEN'S HOSPITAL	107
16	RAYTHEON COMPANY	101
17	GENERAL ELECTRIC COMPANY	99
18	HEWLETT-PACKARD COMPANY	96
19	CHILDREN'S MEDICAL CENTER CORPORATION	93
20	QUANTUM CORP. (CA)	93
21	COGNEX CORPORATION	90
22	DANA-FARBER CANCER INSTITUTE, INC.	90
23	JOHNSON & JOHNSON PROFESSIONAL INC.	90
24	BOSTON UNIVERSITY	84
25	SEPRACOR INC.	84

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

Leading Sub-Clusters by National Rank Massachusetts, 2001

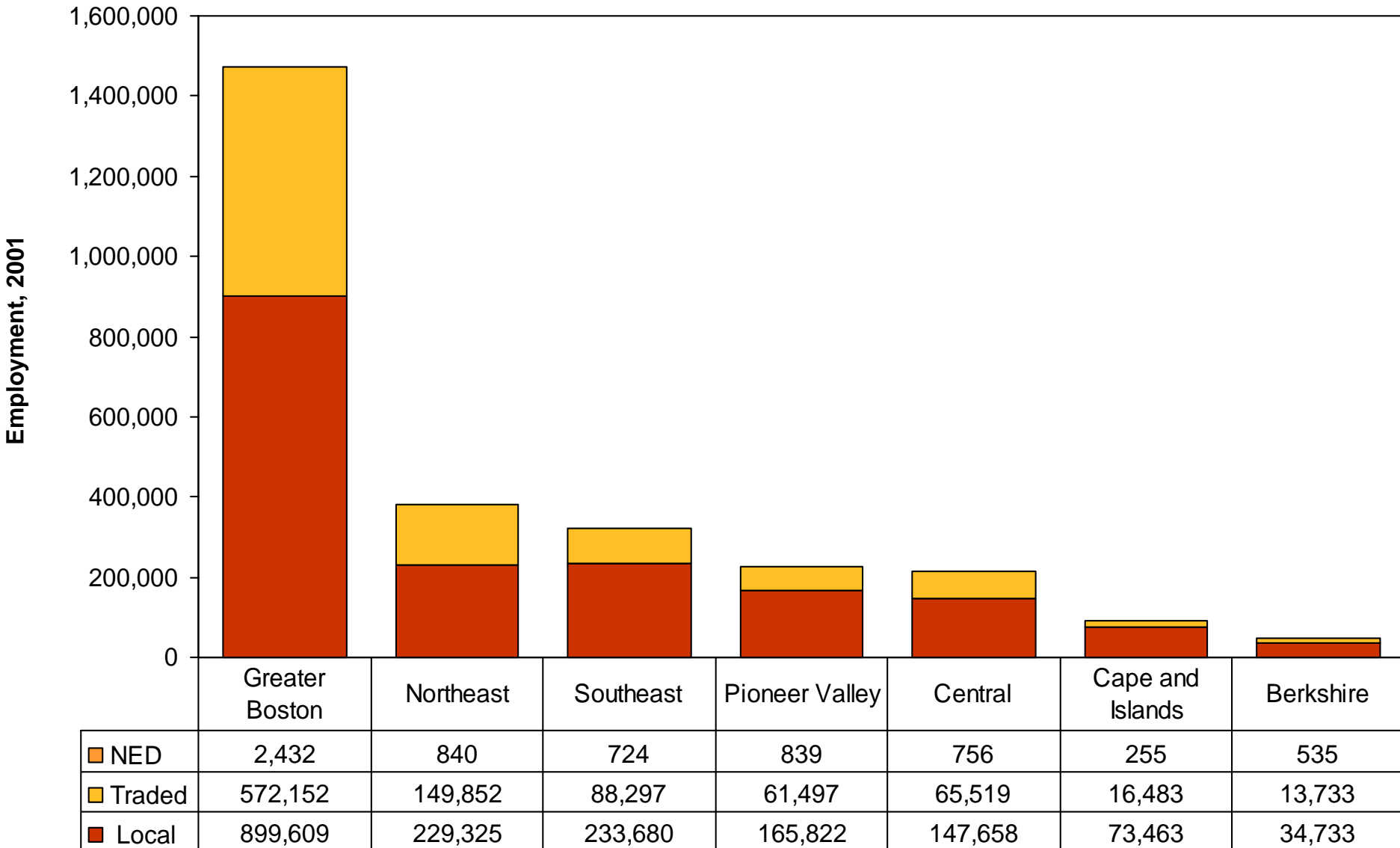
Cluster	Subcluster	National Rank	Share of National Employment	Employment
Business Services	Online Information Services	4	7.3	14,709
	Computer Programming	6	5.0	59,847
Education and Knowledge Creation	Educational Institutions	4	8.1	132,537
	Patent Owners and Lessors	6	6.8	1,710
	Research Organizations	3	6.3	31,665
Financial Services	Securities Brokers, Dealers and Exchanges	3	7.5	65,265
	Risk Capital Providers	5	5.2	2,021
	Depository Institutions	6	5.0	47,058
Information Technology	Software	3	7.6	26,882
Analytical Instruments	Optical Instruments	2	12.0	2,734
	Search and Navigation Equipment	3	9.9	17,458
	Process Instruments	2	9.1	17,239
	Laboratory Instruments	3	7.4	8,671
	Electronic Components	4	6.1	14,820
Publishing and Printing	Photographic Equipment and Supplies	3	8.1	4,008
	Paper Products	5	6.4	5,609
Communications Equipment	Communications Equipment	4	7.3	19,510
Metal Manufacturing	Saw Blades and Handsaws	2	20.8	1,750
Medical Devices	Medical Equipment	3	12.9	7,661
	Ophthalmic Goods	7	5.8	1,544
Chemical Products	Ammunition	1	18.5	1,184
Building Fixtures, Equipment and Services	Steam and Air-conditioning	3	10.7	175
Aerospace Engines	Precision Metal Products	4	11.3	1,093
	Aircraft Engines	3	9.3	7,500
Jewelry and Precious Metals	Cutlery	3	17.8	1,744
	Jewelry and Precious Metal Products	5	6.1	6,147
Textiles	Finishing Plants	6	5.2	981
Leather and Related Products	Coated Fabrics	2	12.2	1,066
	Related Products	4	6.2	4,768
Sporting, Recreational and Children's Goods	Games, Toys, and Children's Vehicles	7	8.0	1,751
Fishing and Fishing Products	Fish Products	5	5.9	2,073
	Fishing and Hunting	6	5.7	570
Footwear	Specialty Footwear	1	38.0	750
Oil and Gas Products and Services	Oil and Gas Trading	5	5.9	126

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

Regional Comparisons

Employment by Cluster Type

Massachusetts Regions

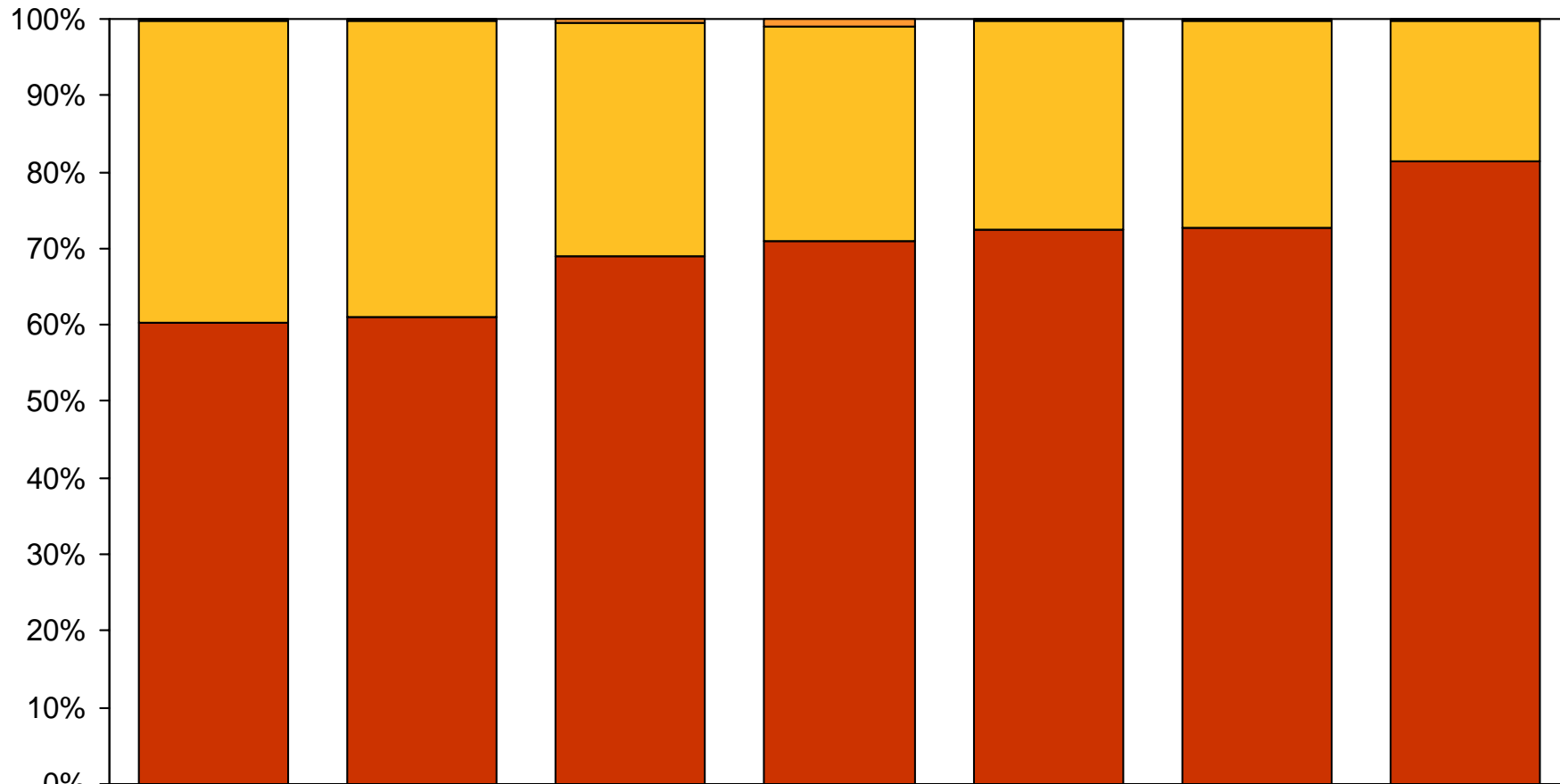


Data: private, non-agricultural employment. Note: Regional data does not total precisely to statewide data due to omissions for confidentiality in the regions.
 Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Employment by Cluster Type

Massachusetts Regions

Employment, 2001

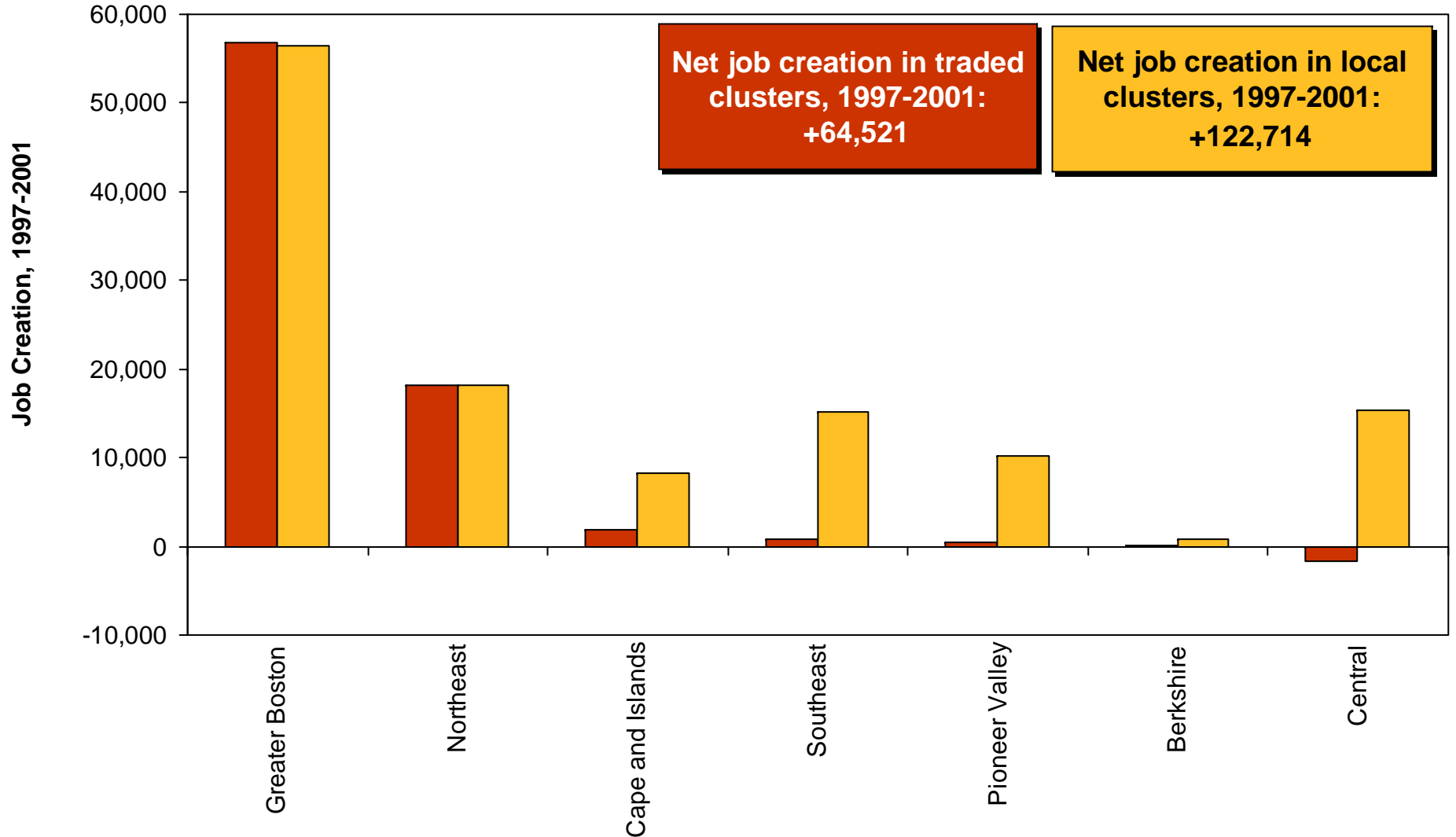


	Northeast	Greater Boston	Central	Berkshire	Southeast	Pioneer Valley	Cape and Islands
■ NED	0.20%	0.20%	0.40%	1.10%	0.20%	0.40%	0.30%
■ Traded	39.40%	38.80%	30.60%	28.00%	27.40%	27.00%	18.30%
■ Local	60.30%	61.00%	69.00%	70.90%	72.40%	72.70%	81.40%

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

Job Creation

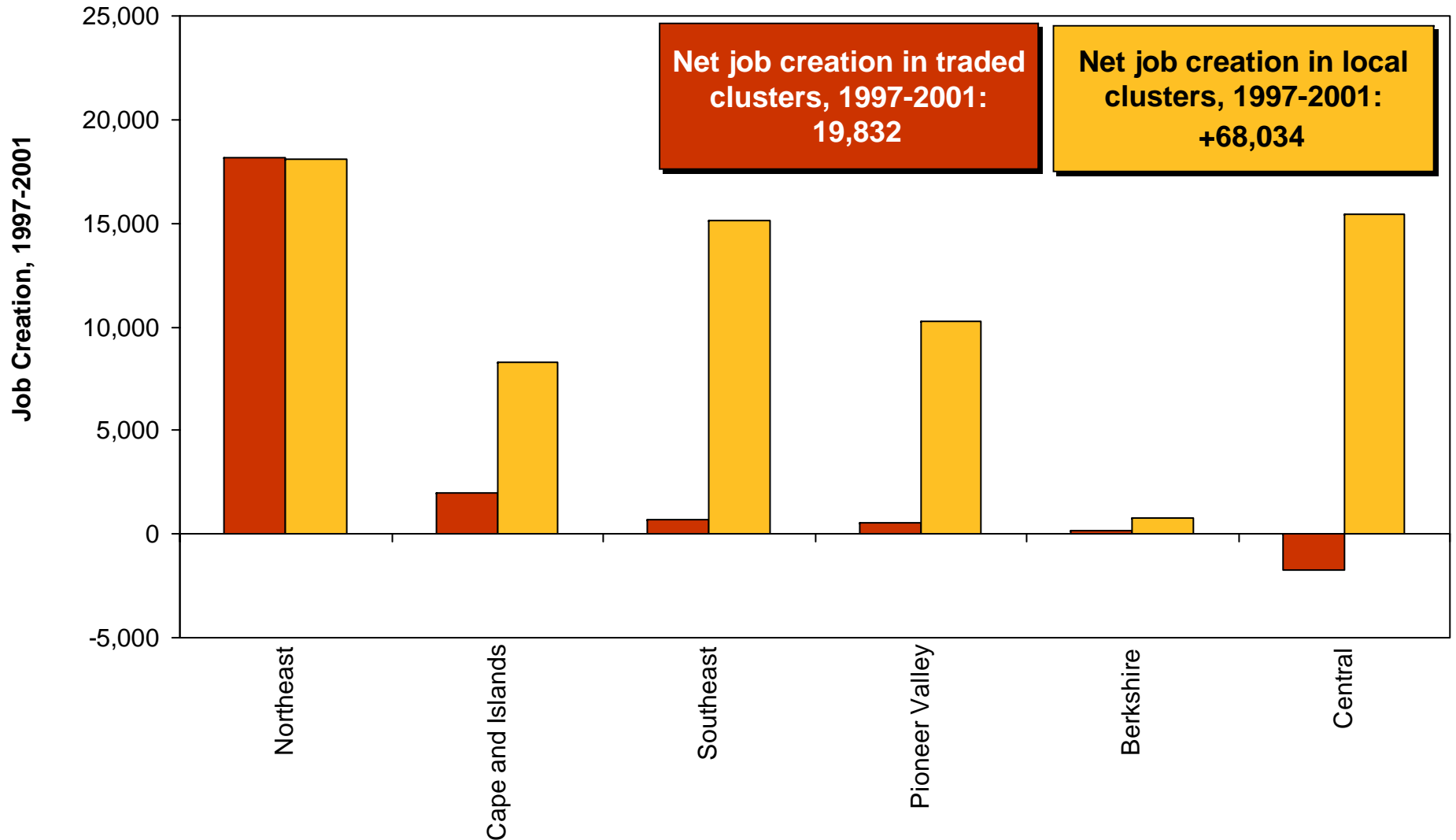
Massachusetts Regions



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

Job Creation

Massachusetts Regions, Less Greater Boston

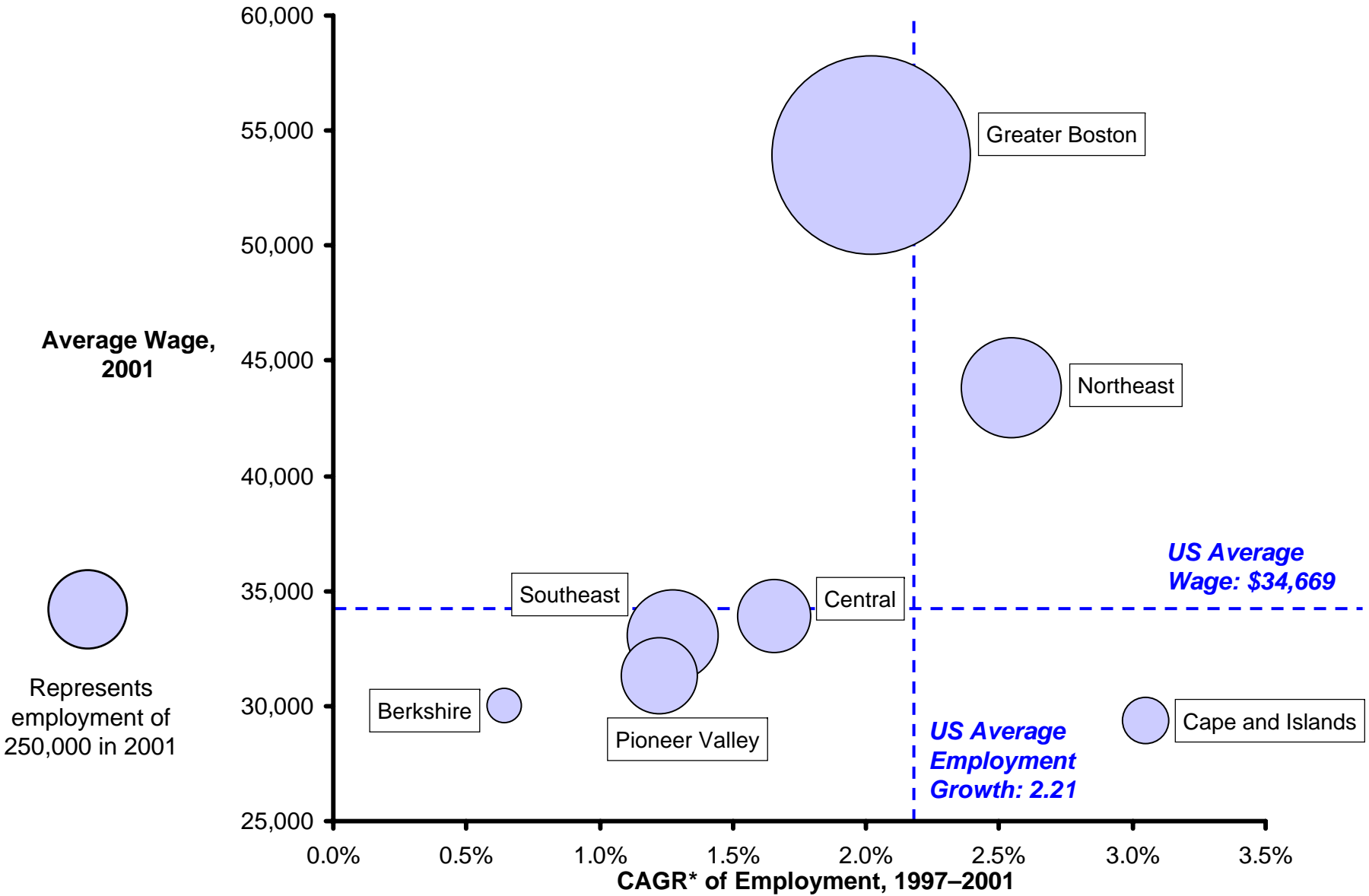


Data: private, non-agricultural employment.

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

Comparative Performance of Regions

Wages and Employment Growth



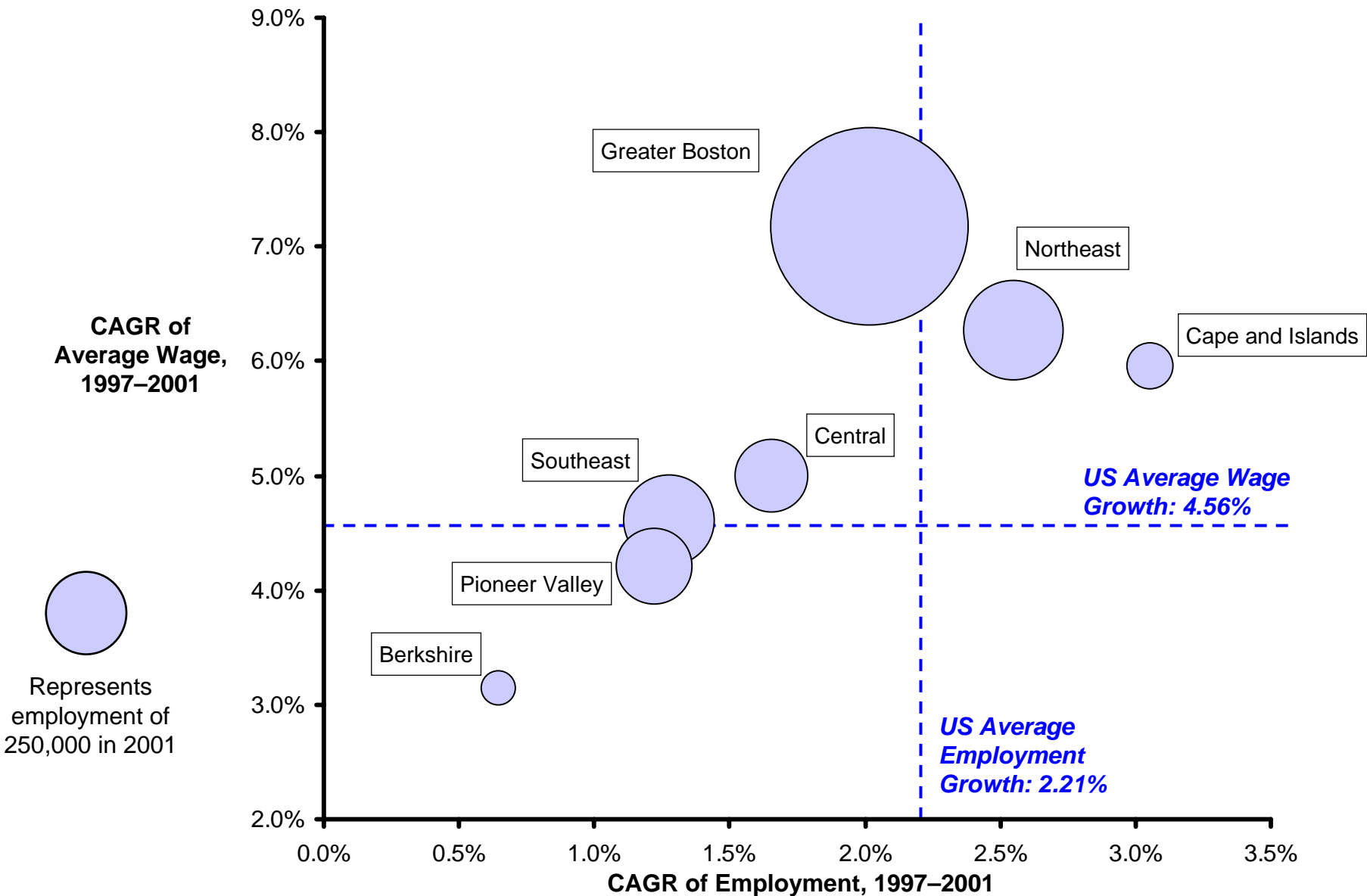
Data: private, non-agricultural employment

*CAGR = Compound Annual Growth Rate

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

Comparative Performance of Regions

Wage Growth and Employment Growth



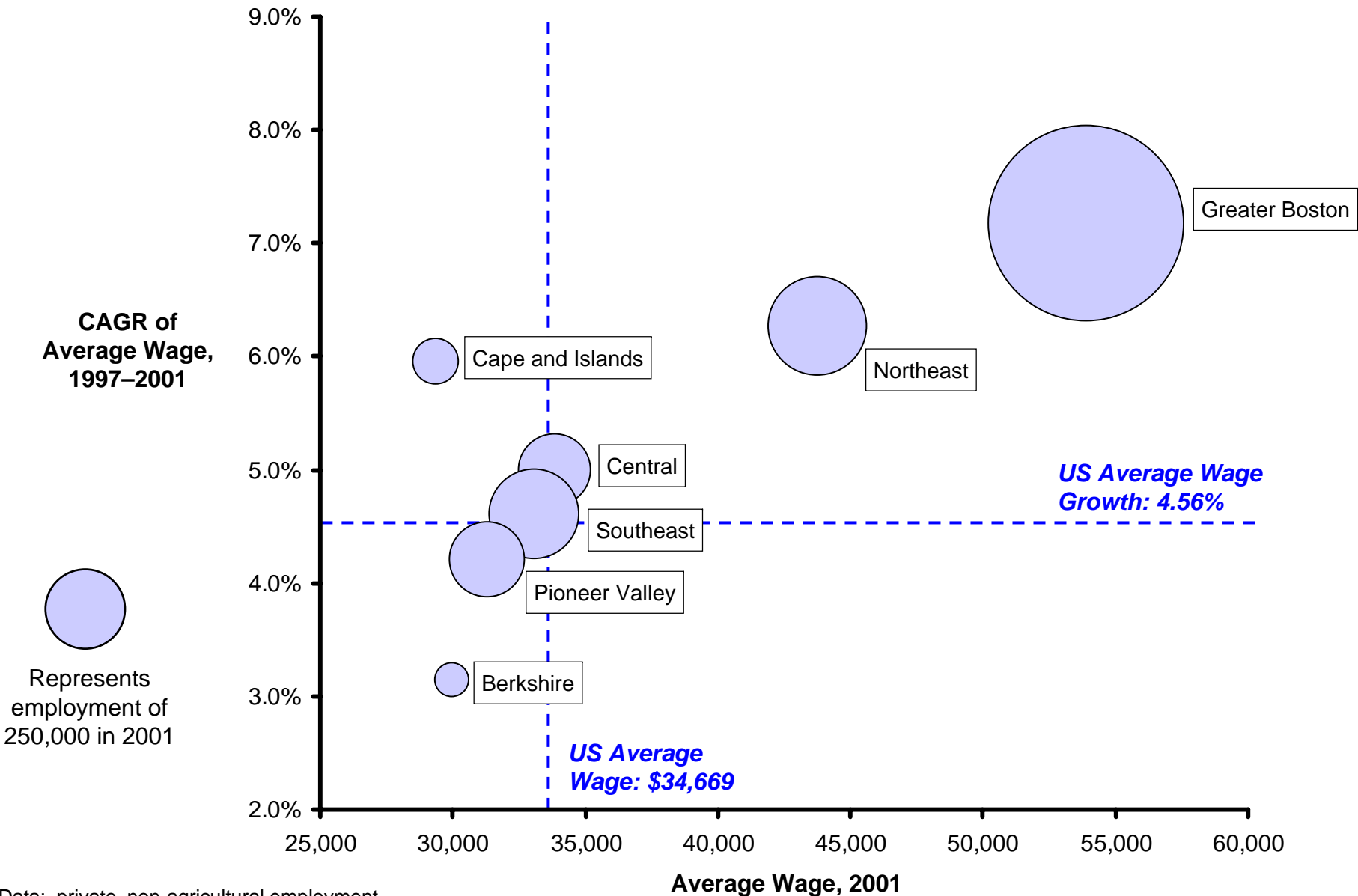
Data: private, non-agricultural employment

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

RCC Profiles - RB10

Comparative Performance of Regions

Wage Growth and Wages



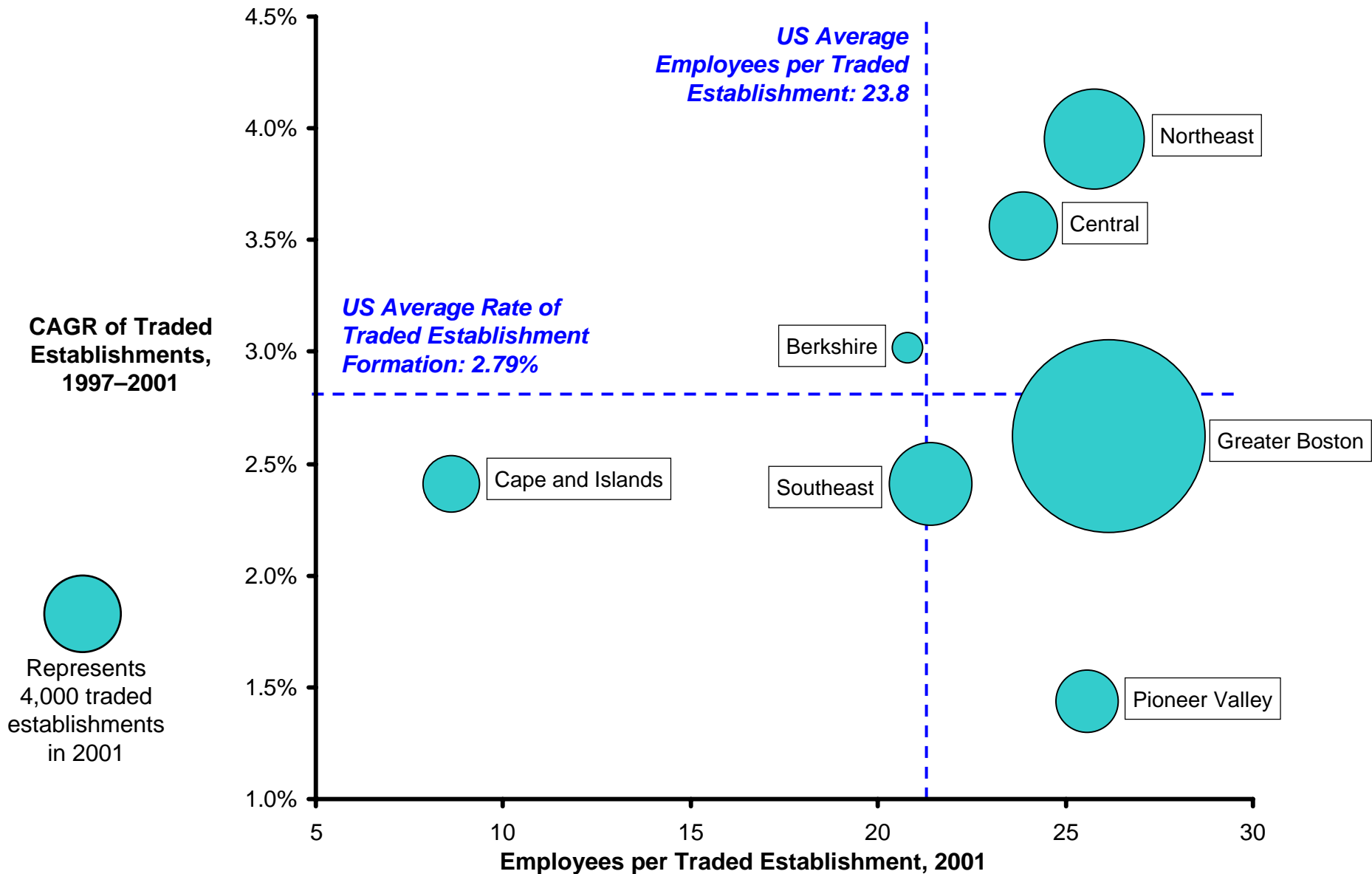
Data: private, non-agricultural employment

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

RCC Profiles – RB10

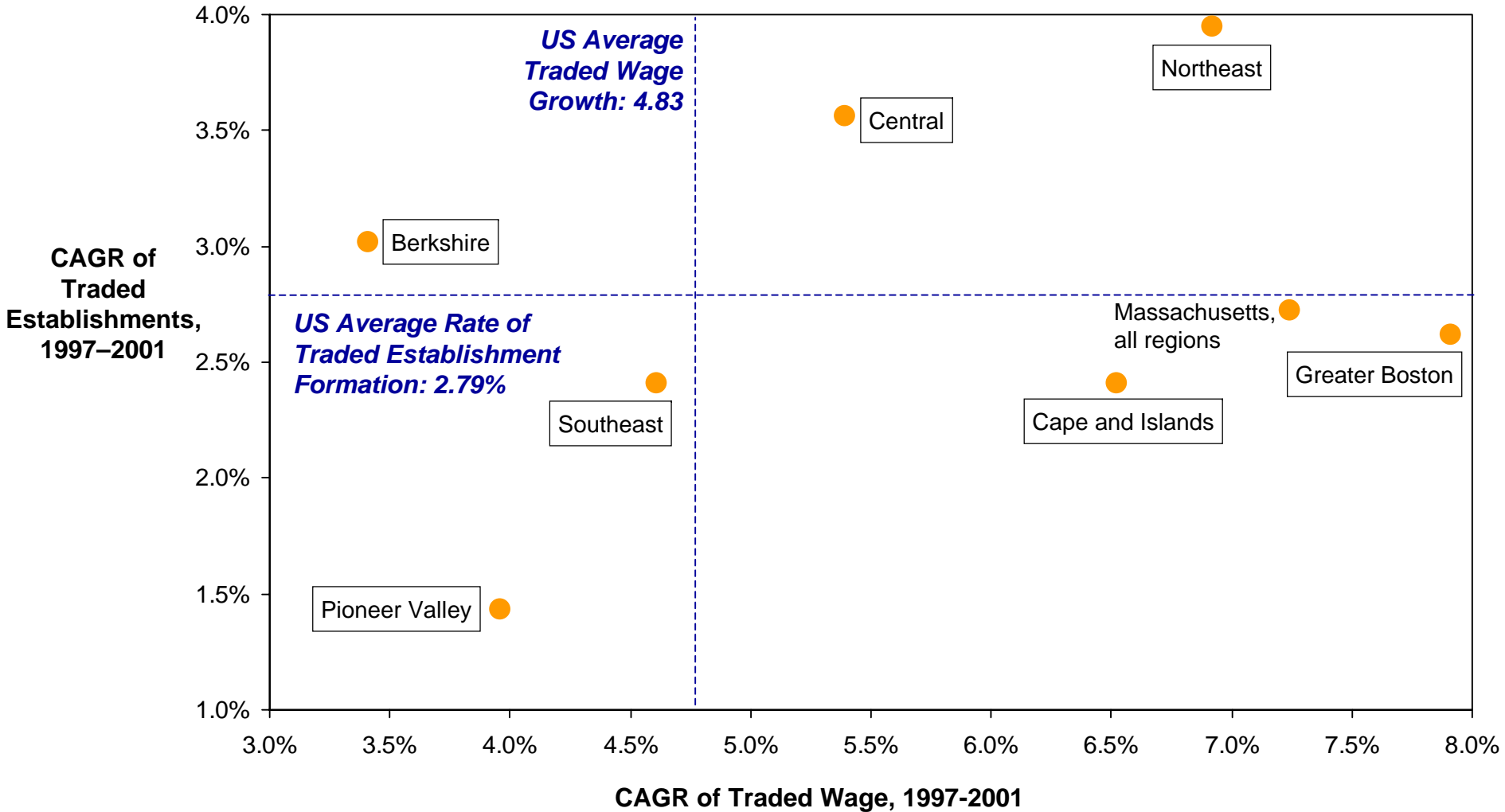
Comparative Performance of Regions

Establishment Formation in Traded Clusters



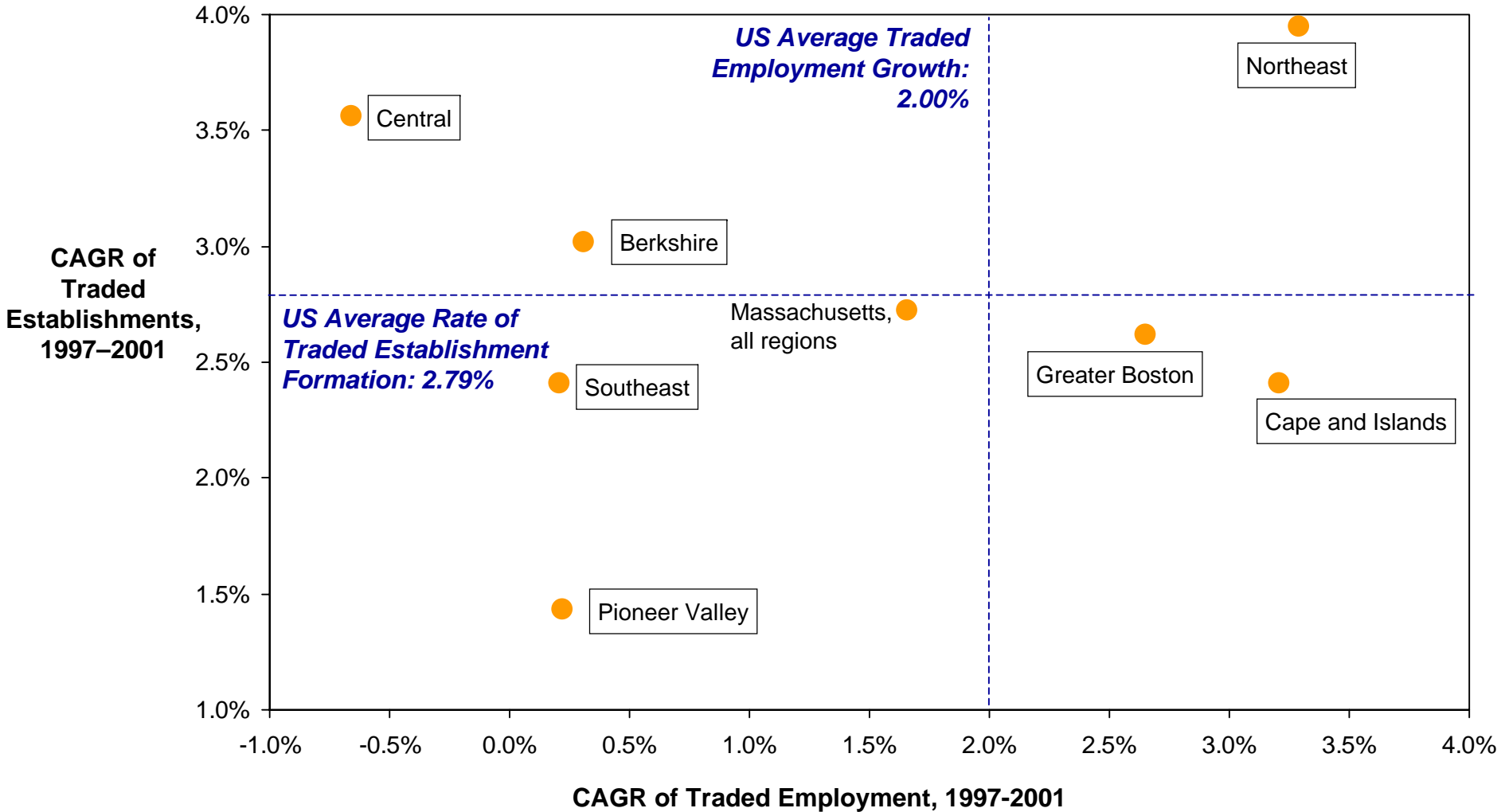
Comparative Performance of Regions

Establishment Formation in Traded Clusters



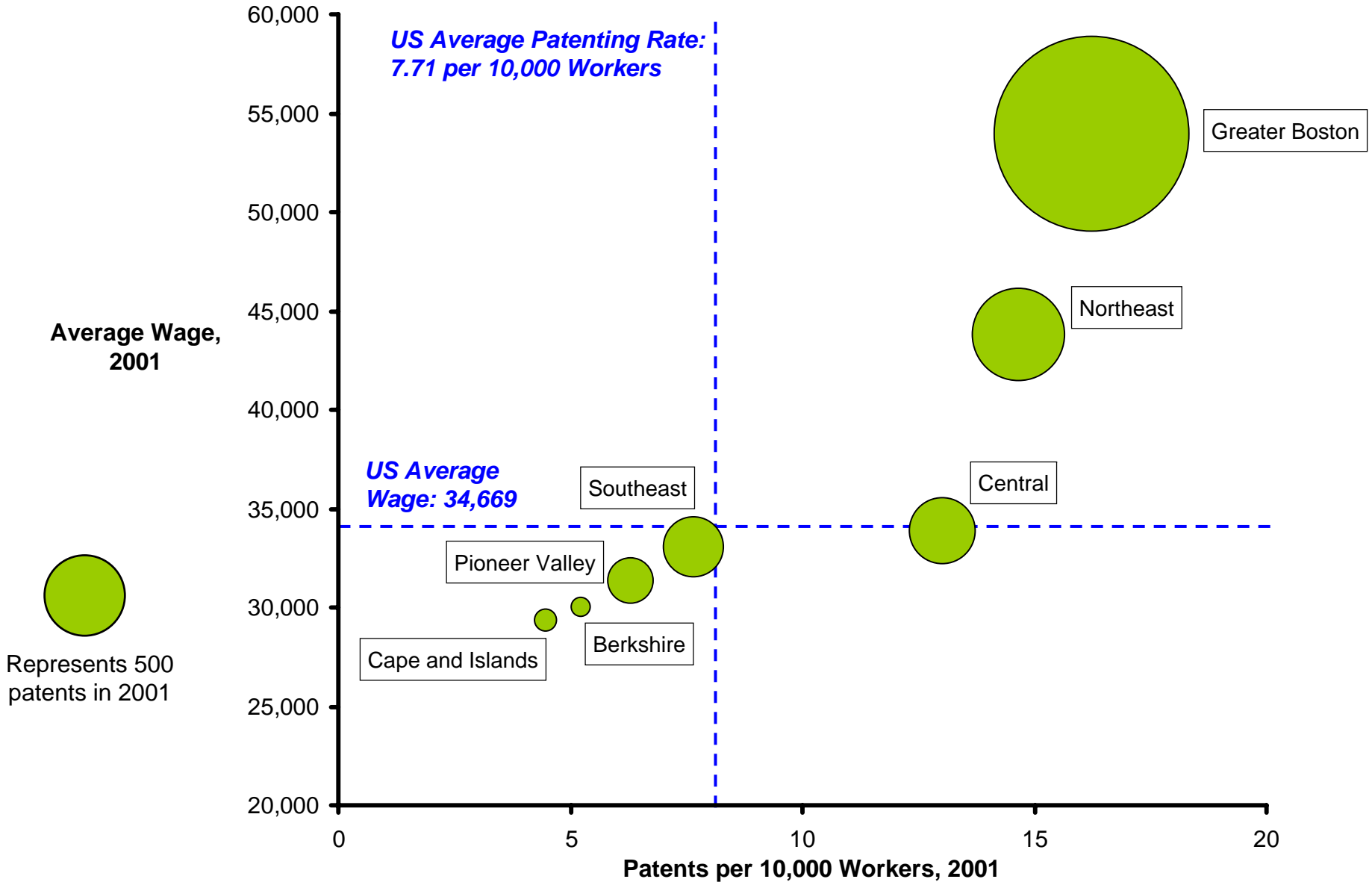
Comparative Performance of Regions

Establishment Formation, Traded Clusters



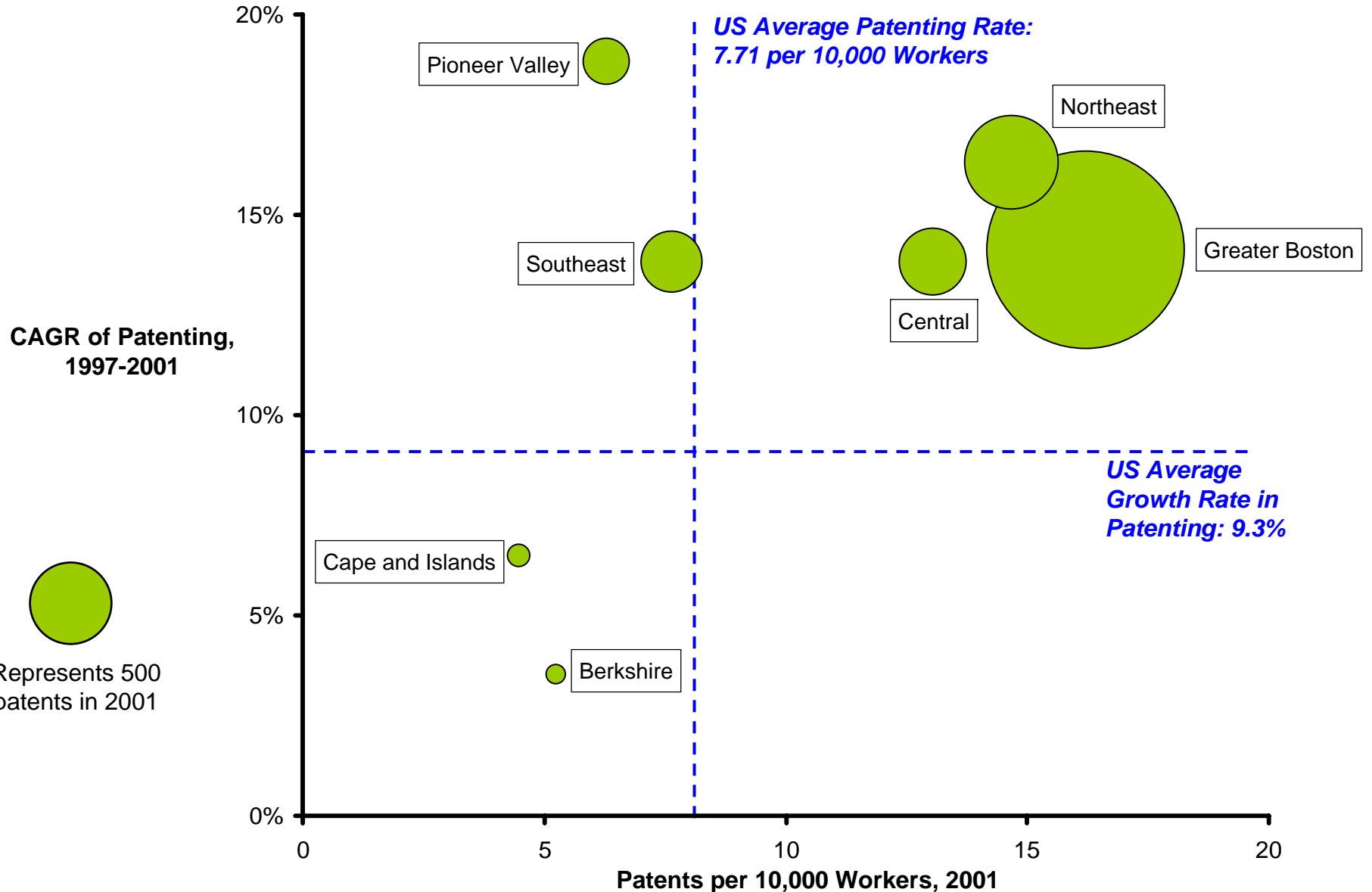
Comparative Performance of Regions

Wages and Patenting Rates



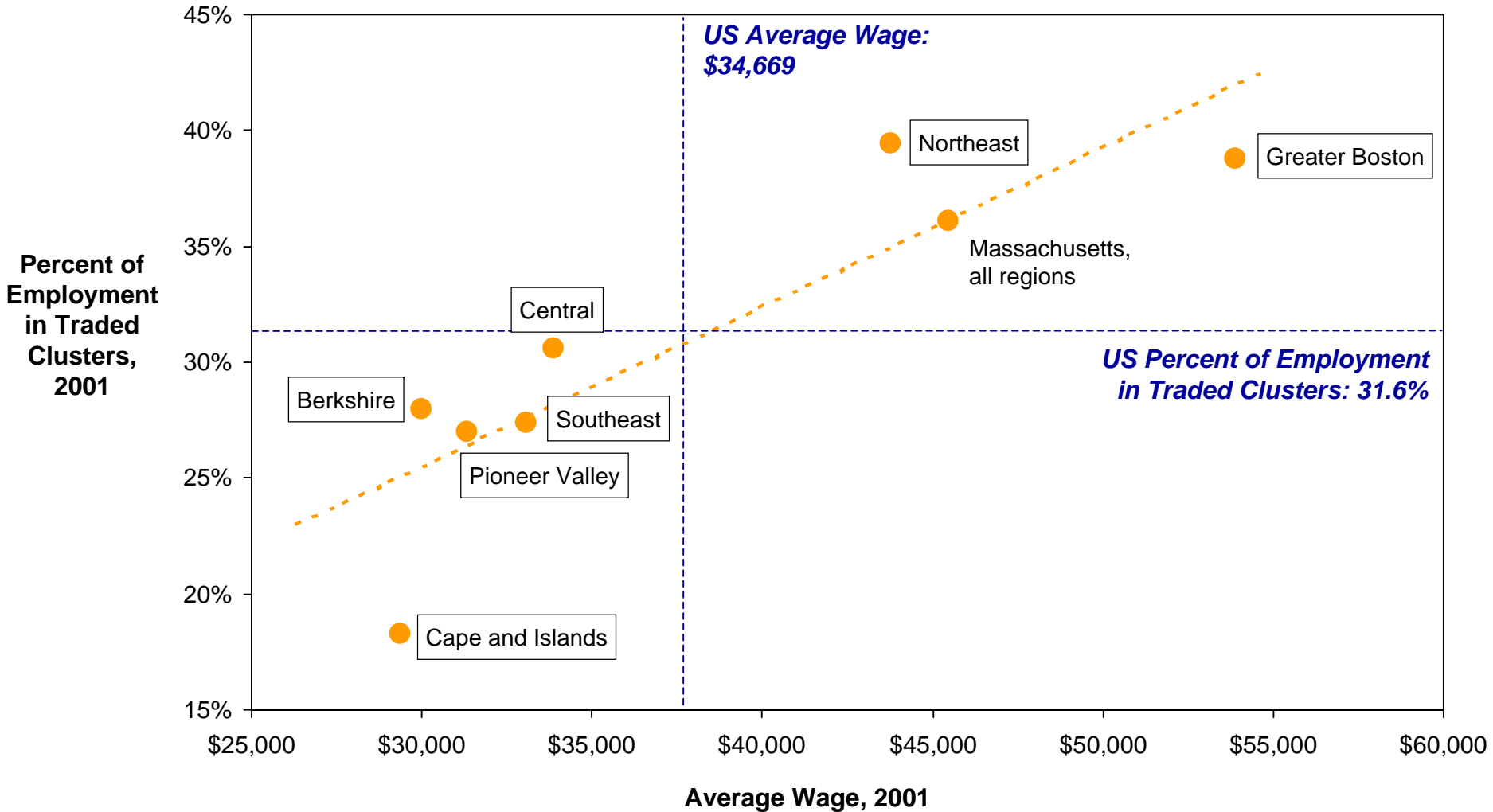
Comparative Performance of Regions

Wages and Patenting Rates



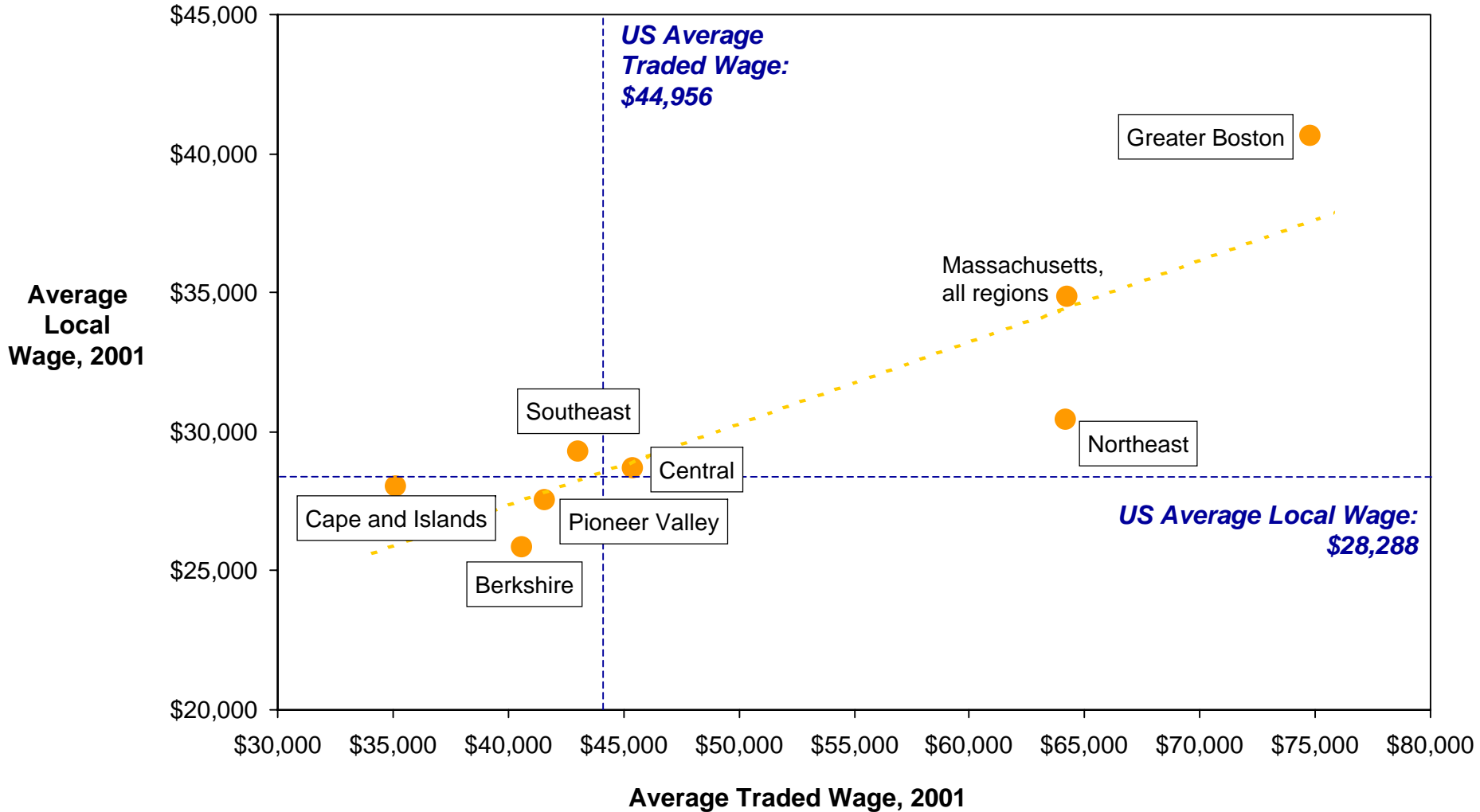
Composition of Employment by Traded and Local Industries

Massachusetts Regions



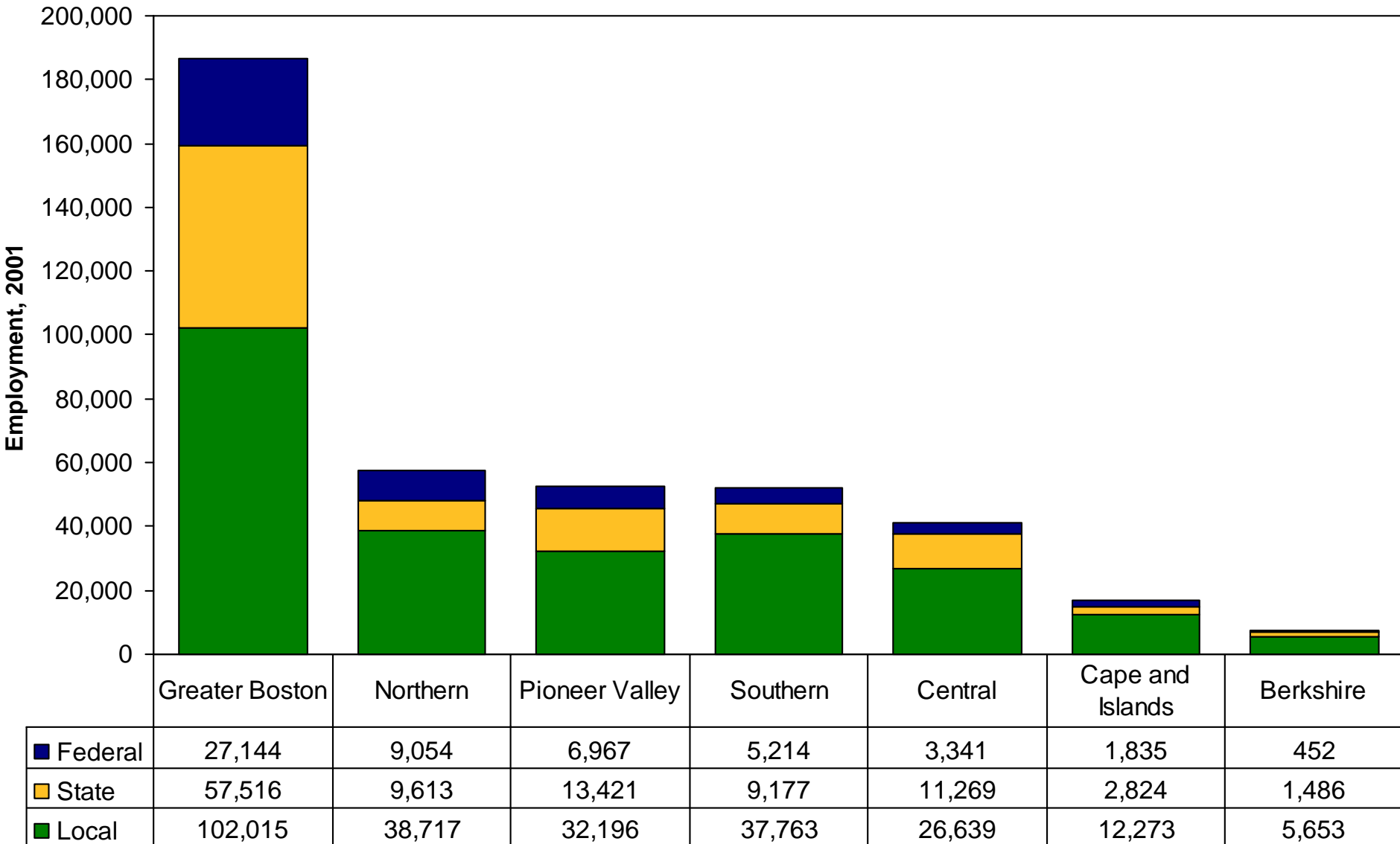
Wages in Traded and Local Industries

Massachusetts Regions

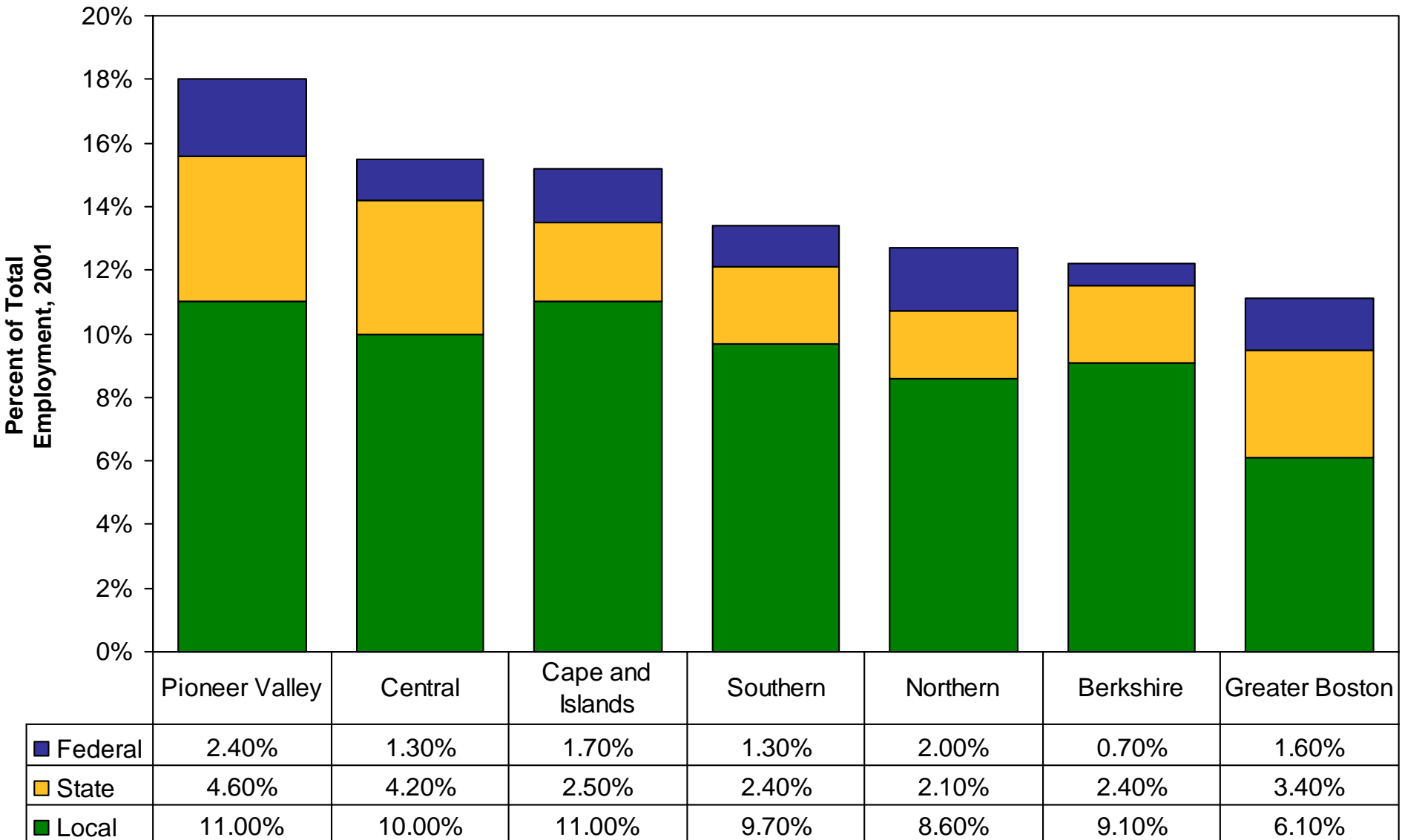


Government Employment

Government Employment Massachusetts Regions



Government Employment Massachusetts Regions



Employment in Sole Proprietorships

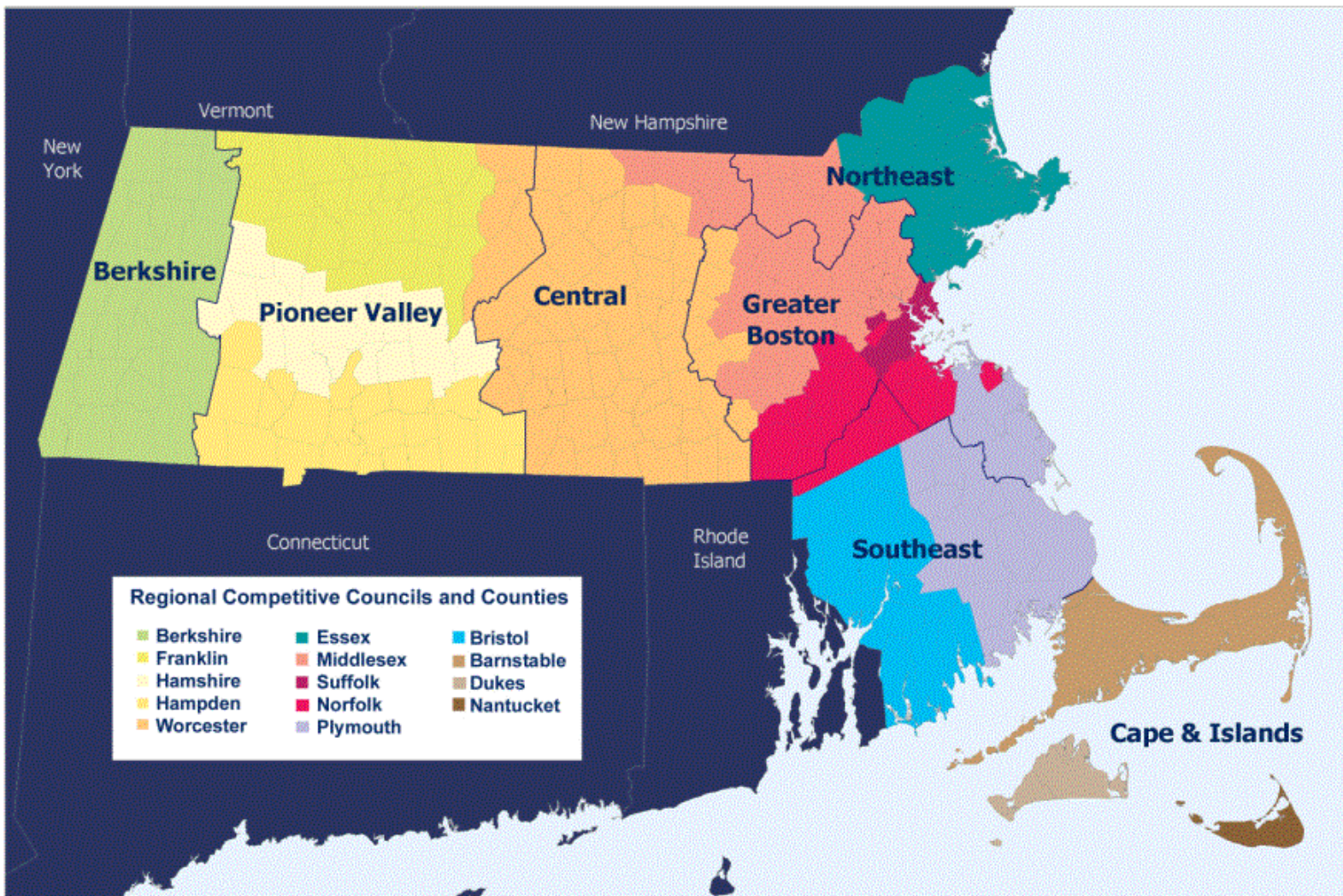
- Data on sole proprietorships are not available from a source that conforms to the Massachusetts RCC geographies. We have approximated the regions using counties.

<u>Region</u>	<u>Counties</u>
Berkshire	Berkshire
Pioneer Valley	Franklin, Hampshire, Hampden
Central	Worcester
Northeast	Essex
Greater Boston	Middlesex, Suffolk, Norfolk
Southeast	Plymouth, Suffolk
Cape and Islands	Barnstable, Dukes, Nantucket

- While other data have been presented according to the Institute's cluster definitions, data on sole proprietorships are categorized according to the North American Industry Classification System (NAICS) used by the Census department.

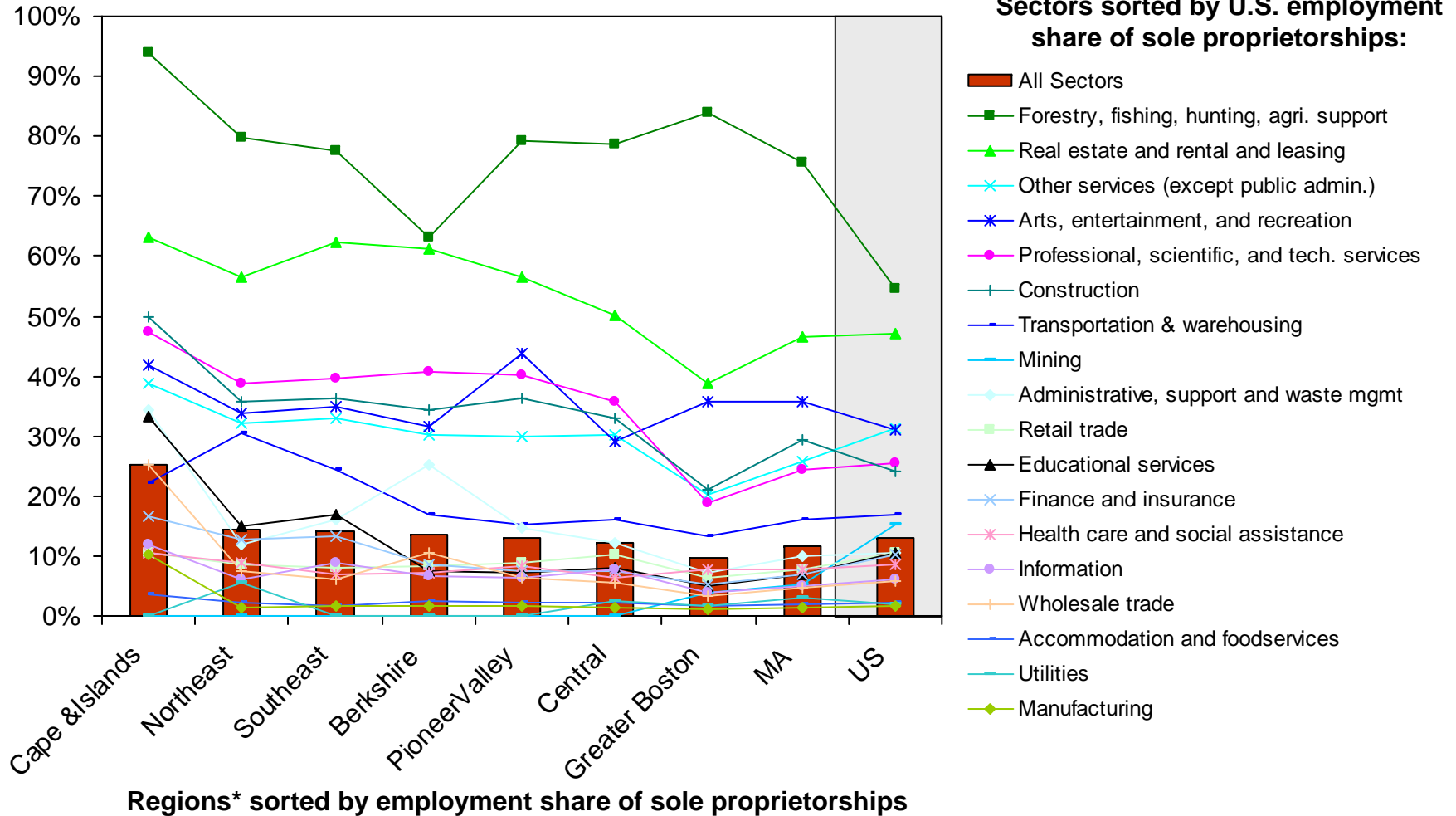
Massachusetts Regional Competitiveness Council Regions

Approximation by Counties



Sole Proprietorships

Share of Employment in Sole Proprietorships, 2001



- Sole proprietorships are, as agriculture and government employees, not included in the dataset available for the cluster mapping project

*Note: Data available on county basis only; the allocation to Massachusetts regions is only approximate

Sole Proprietorship Employment and Growth

NAICS Sectors, Employment 2001, CAGR 1998-2001

	Berkshire		Central		Pioneer Valley		MA		US	
All Sectors	9,045	0.5%	41,991	1.4%	37,648	0.5%	412,941	0.8%	16,979,498	2.6%
Forestry, fishing, hunting, agri. support	103	0.0	350	-0.3	453	0.2	5,427	-1.3	220,623	-0.7
Mining	N/A	N/A	N/A	N/A	0	N/A	96	5.0	87,699	2.5
Utilities	N/A	N/A	71	-15.8	0	N/A	424	-12.5	13,581	-2.5
Construction	1,348	1.8	6,397	1.0	5,016	1.8	54,157	0.5	2,067,266	2.7
Manufacturing	134	-7.3	806	-3.8	776	-3.1	5,992	-4.7	280,171	-1.9
Wholesale trade	151	1.1	927	-2.5	759	-4.3	8,034	-3.6	386,313	-1.1
Retail trade	804	-3.5	4,189	-0.5	3,429	-2.7	29,557	-2.0	1,738,854	-0.4
Transportation & warehousing	166	-2.5	1,238	2.2	1,074	4.3	13,849	2.0	764,708	4.9
Information	122	1.7	567	10.5	429	0.2	6,984	7.1	241,860	7.4
Finance and insurance	239	0.6	1,351	3.3	1,056	0.0	15,748	-1.1	714,897	0.3
Real estate and rental and leasing	838	3.2	3,583	4.0	3,242	3.3	40,769	3.6	1,791,570	4.6
Professional, scientific, and tech. services	1,389	-0.3	7,144	-0.7	6,034	-0.4	83,723	0.0	2,445,677	0.4
Administrative, support and waste mgmt	525	3.5	2,725	5.5	2,055	4.4	23,396	3.7	1,075,747	5.2
Educational services	290	10.7	1,145	10.1	1,306	3.2	12,275	6.8	305,448	7.8
Health care and social assistance	798	-3.5	3,651	-0.4	4,109	-2.1	38,263	0.0	1,381,729	5.2
Arts, entertainment, and recreation	728	5.3	1,796	2.2	2,515	3.1	25,204	2.6	804,626	4.1
Accommodation and foodservices	190	-2.5	500	0.9	495	0.0	4,714	2.1	225,970	4.4
Other services (except public admin.)	1,213	0.0	5,529	2.8	4,733	0.2	44,329	0.9	2,432,759	3.3

Note: Sole proprietorship employment is estimated from the number of establishments. Also includes some partnerships.

Source: US Census Bureau <http://www.census.gov/epcd/nonemployer/>

Sole Proprietorship Employment and Growth

NAICS Sectors, Employment 2001, CAGR 1998-2001

	Cape & Islands		Northeast		Southeast		MA		US	
All Sectors	27,821	1.7%	47,485	1.0%	58,088	0.9%	412,941	0.8%	16,979,498	2.6%
Forestry, fishing, hunting, agri. support	1,242	0.7	891	-4.4	1,729	-0.4	5,427	-1.3	220,623	-0.7
Mining	0	N/A	N/A	0.8	0	0.7	96	5.0	87,699	2.5
Utilities	0	-100	59	-5.7	0	-4.3	424	-12.5	13,581	-2.5
Construction	6,062	6.0	6,374	-1.2	9,955	-2.8	54,157	0.5	2,067,266	2.7
Manufacturing	392	-2.4	771	-1.1	1,004	-1.7	5,992	-4.7	280,171	-1.9
Wholesale trade	556	-2.5	1,119	2.8	1,330	2.7	8,034	-3.6	386,313	-1.1
Retail trade	1,899	-1.8	3,692	7.5	5,177	8.5	29,557	-2.0	1,738,854	-0.4
Transportation & warehousing	624	5.1	1,466	-2.2	2,194	2.9	13,849	2.0	764,708	4.9
Information	296	6.7	695	3.0	752	4.6	6,984	7.1	241,860	7.4
Finance and insurance	689	-7.1	1,593	-0.3	1,924	-0.1	15,748	-1.1	714,897	0.3
Real estate and rental and leasing	2,979	2.6	4,351	3.3	5,416	4.2	40,769	3.6	1,791,570	4.6
Professional, scientific, and tech. services	3,957	0.5	9,537	7.6	9,105	6.9	83,723	0.0	2,445,677	0.4
Administrative, support and waste mgmt	1,990	6.0	2,695	2.9	3,440	-2.1	23,396	3.7	1,075,747	5.2
Educational services	547	7.4	1,233	2.4	1,281	2.2	12,275	6.8	305,448	7.8
Health care and social assistance	1,687	1.0	4,292	4.1	4,190	4.2	38,263	0.0	1,381,729	5.2
Arts, entertainment, and recreation	1,740	4.4	2,619	1.9	2,612	1.2	25,204	2.6	804,626	4.1
Accommodation and foodservices	493	-6.5	524	1.0	607	0.9	4,714	2.1	225,970	4.4
Other services (except public admin.)	2,619	-55.0	5,564	-4.4	7,285	-0.4	44,329	0.9	2,432,759	3.3

Note: Sole proprietorship employment is estimated from the number of establishments. Also includes some partnerships.

Source: US Census Bureau <http://www.census.gov/epcd/nonemployer/>

Sole Proprietorship Share of Total Employment

NAICS Sectors, 2001

	Berkshire	Cape & Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	MA	US
All Sectors	13.6%	25.3%	12.3%	9.6%	14.3%	13.0%	14.2%	11.7%	12.9%
Forestry, fishing, hunting, agri. support	63.2	93.9	78.7	83.9	79.8	79.1	77.5	75.6	54.6
Mining	0.0	0.0	N/A	3.9	N/A	0.0	0.0	5.2	15.3
Utilities	0.0	0.0	2.5	1.6	5.6	0.0	0.0	3.0	2.0
Construction	34.4	50.0	33.1	21.1	35.7	36.2	36.2	29.4	24.2
Manufacturing	1.7	10.3	1.5	1.2	1.4	1.7	1.7	1.5	1.7
Wholesale trade	10.5	25.2	5.6	3.2	7.4	6.4	6.0	4.7	5.9
Retail trade	8.4	10.4	10.3	6.3	8.7	8.8	7.9	7.7	10.5
Transportation & warehousing	16.9	22.2	16.1	13.2	30.4	15.2	24.4	16.1	16.9
Information	6.7	11.8	7.7	4.0	6.2	6.5	9.0	5.1	6.1
Finance and insurance	8.7	16.7	7.4	5.4	12.7	7.4	13.4	6.8	10.3
Real estate and rental and leasing	61.2	63.2	50.2	38.8	56.5	56.4	62.3	46.4	47.1
Professional, scientific, and tech. services	40.7	47.5	35.8	18.9	38.9	40.3	39.7	24.5	25.5
Administrative, support and waste mgmt	25.3	34.3	12.3	7.1	12.0	14.7	16.1	9.9	10.6
Educational services	7.6	33.3	7.9	5.1	14.9	7.3	17.0	6.8	10.5
Health care and social assistance	7.3	10.5	6.5	7.7	9.0	8.4	7.0	7.8	8.7
Arts, entertainment, and recreation	31.6	41.7	29.2	35.7	33.9	43.8	35.0	35.7	31.1
Accommodation and foodservices	2.6	3.6	2.3	1.6	2.2	2.3	1.8	2.0	2.2
Other services (except public admin.)	30.2	38.8	30.3	20.1	32.1	30.0	32.9	25.9	31.2

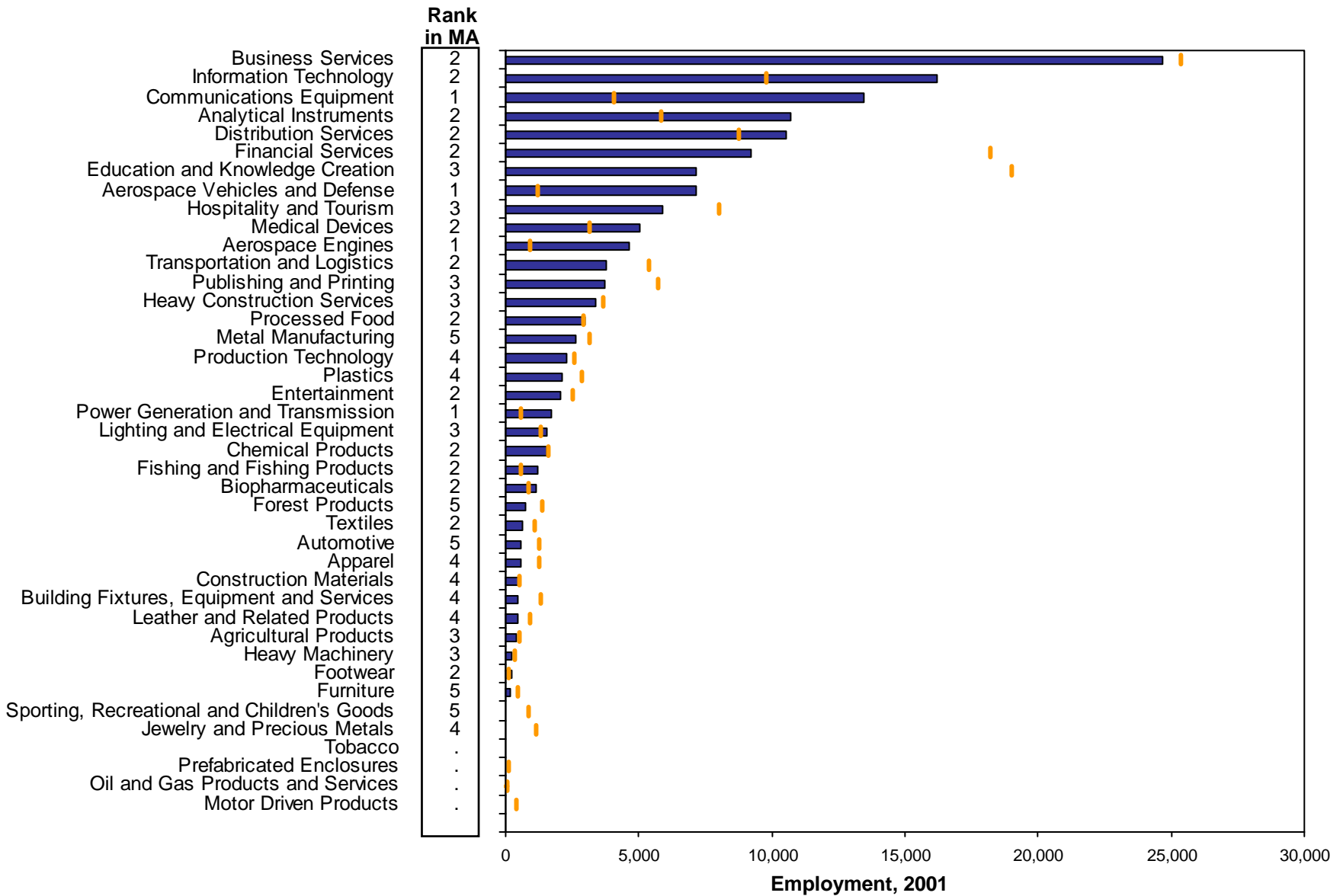
Note: Sole proprietorship employment is estimated from the number of establishments. Also includes some partnerships.

Source: US Census Bureau <http://www.census.gov/epcd/nonemployer/>

Northeast Region

Employment By Traded Cluster

Northeast Region

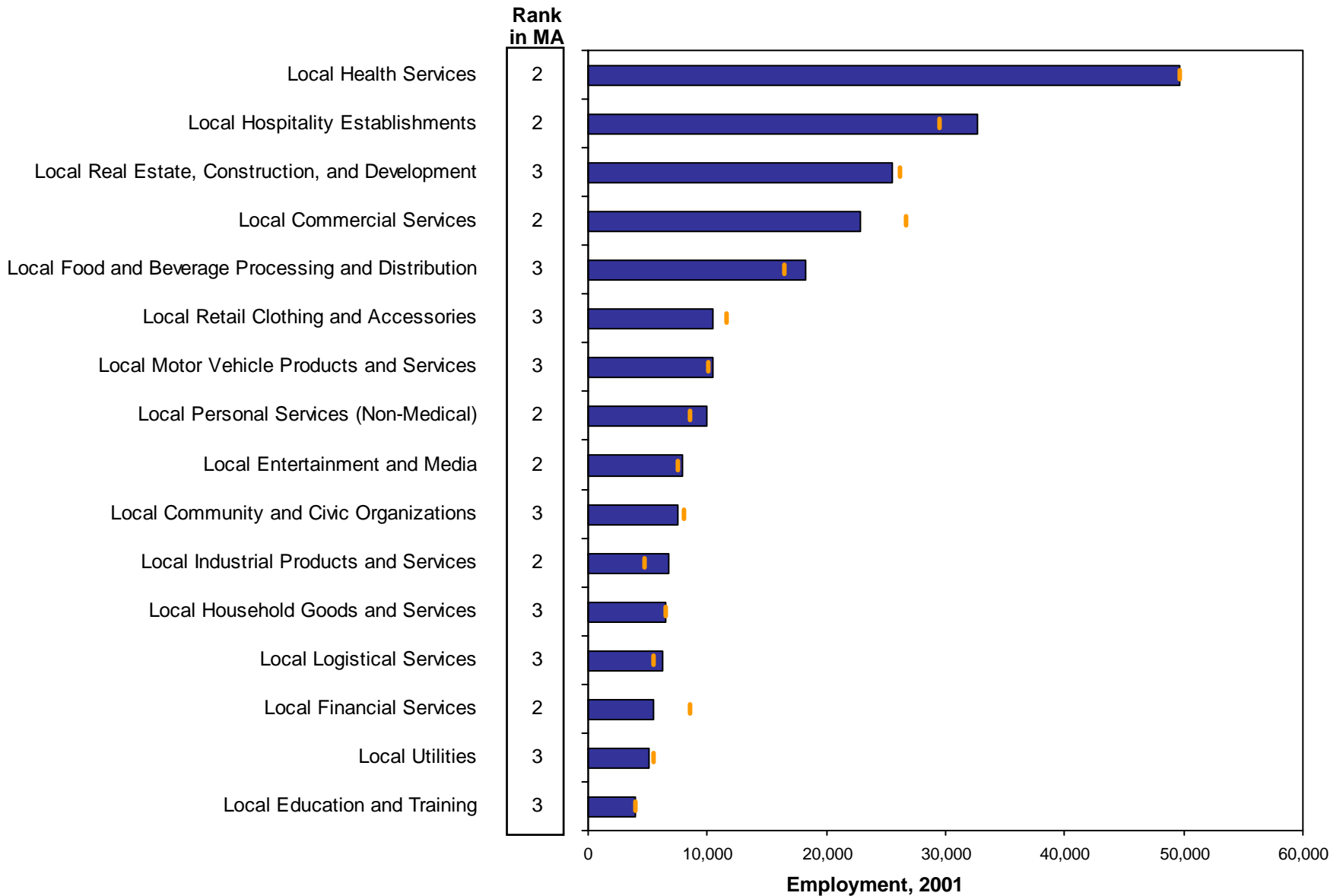


| - Indicates expected employment at rates in the **state benchmark** for traded clusters. Rank is across 7 state regions.

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

Employment By Local Cluster

Northeast Region

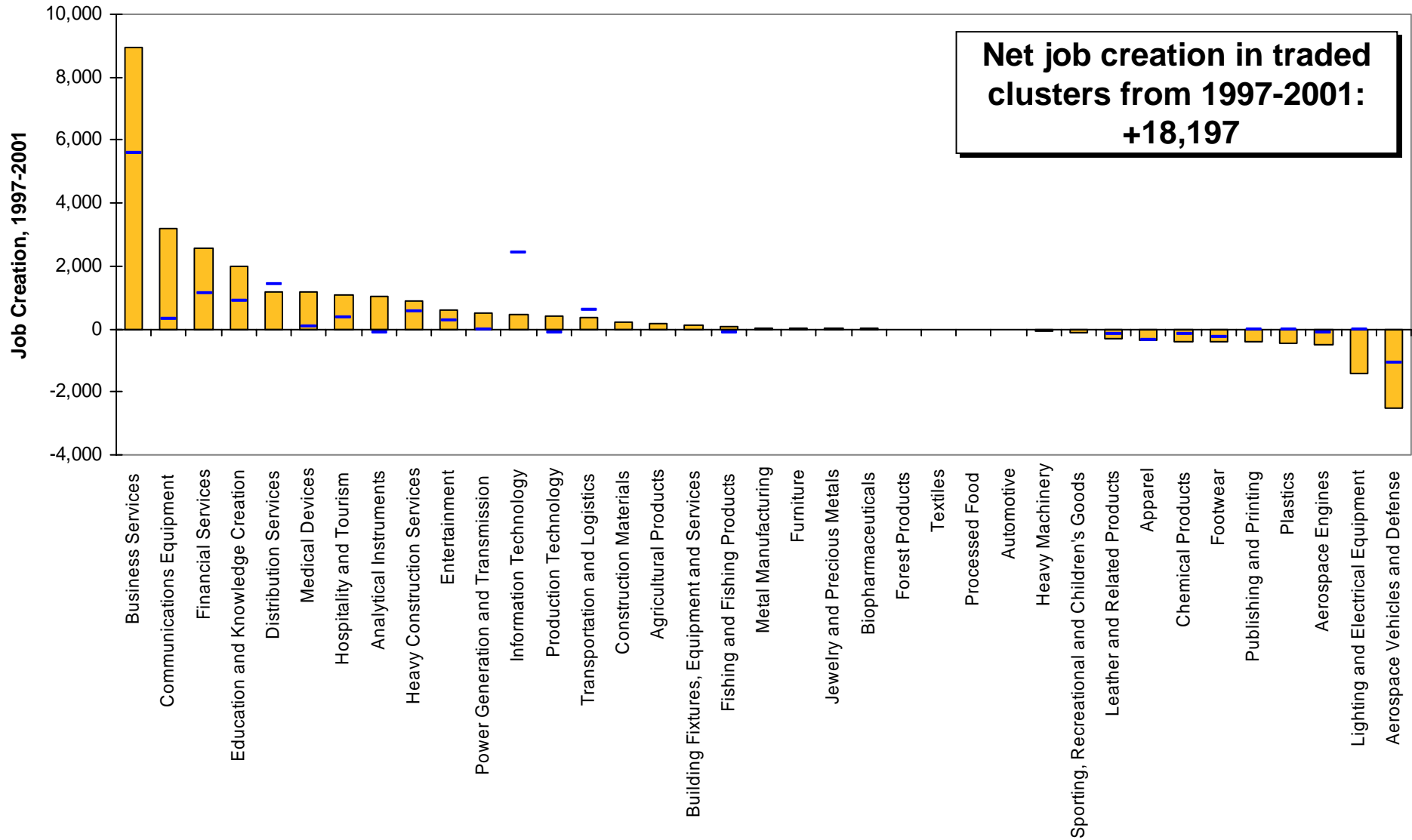


| - Indicates expected employment at rates in the **state benchmark** for local clusters. Rank is across 7 state regions.

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

Job Creation By Traded Cluster

Northeast Region

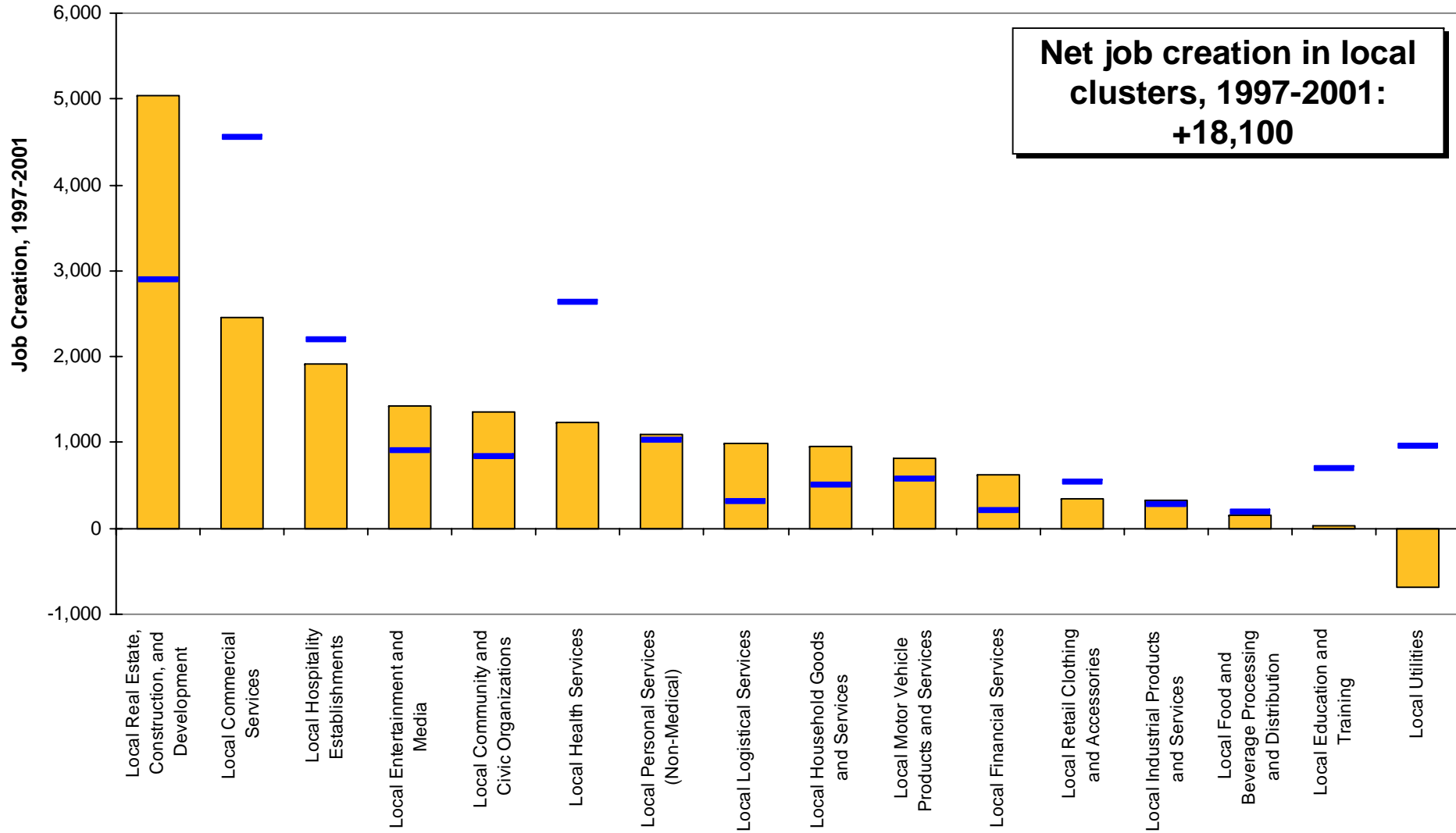


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

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

Job Creation By Local Cluster

Northeast Region

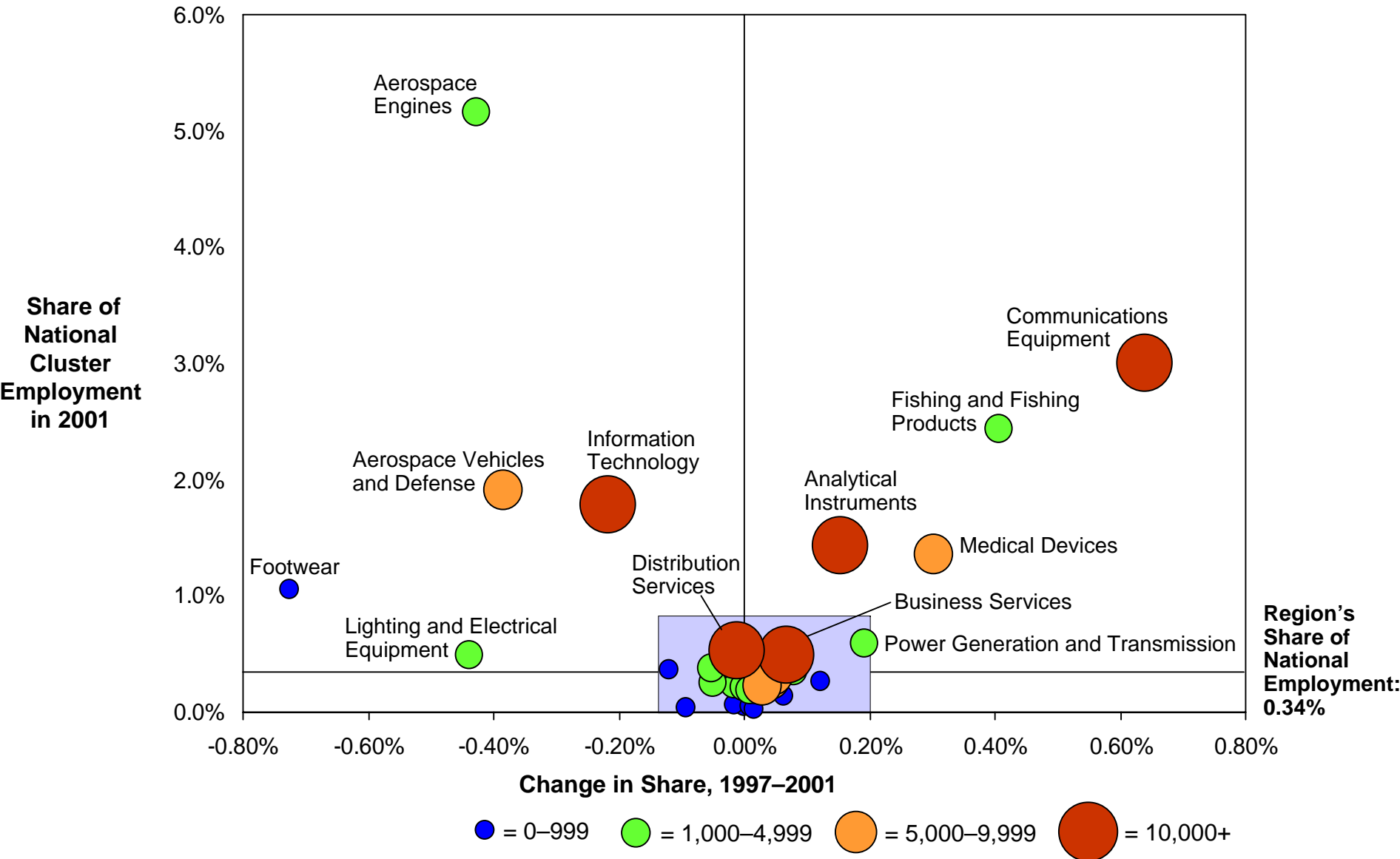


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

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

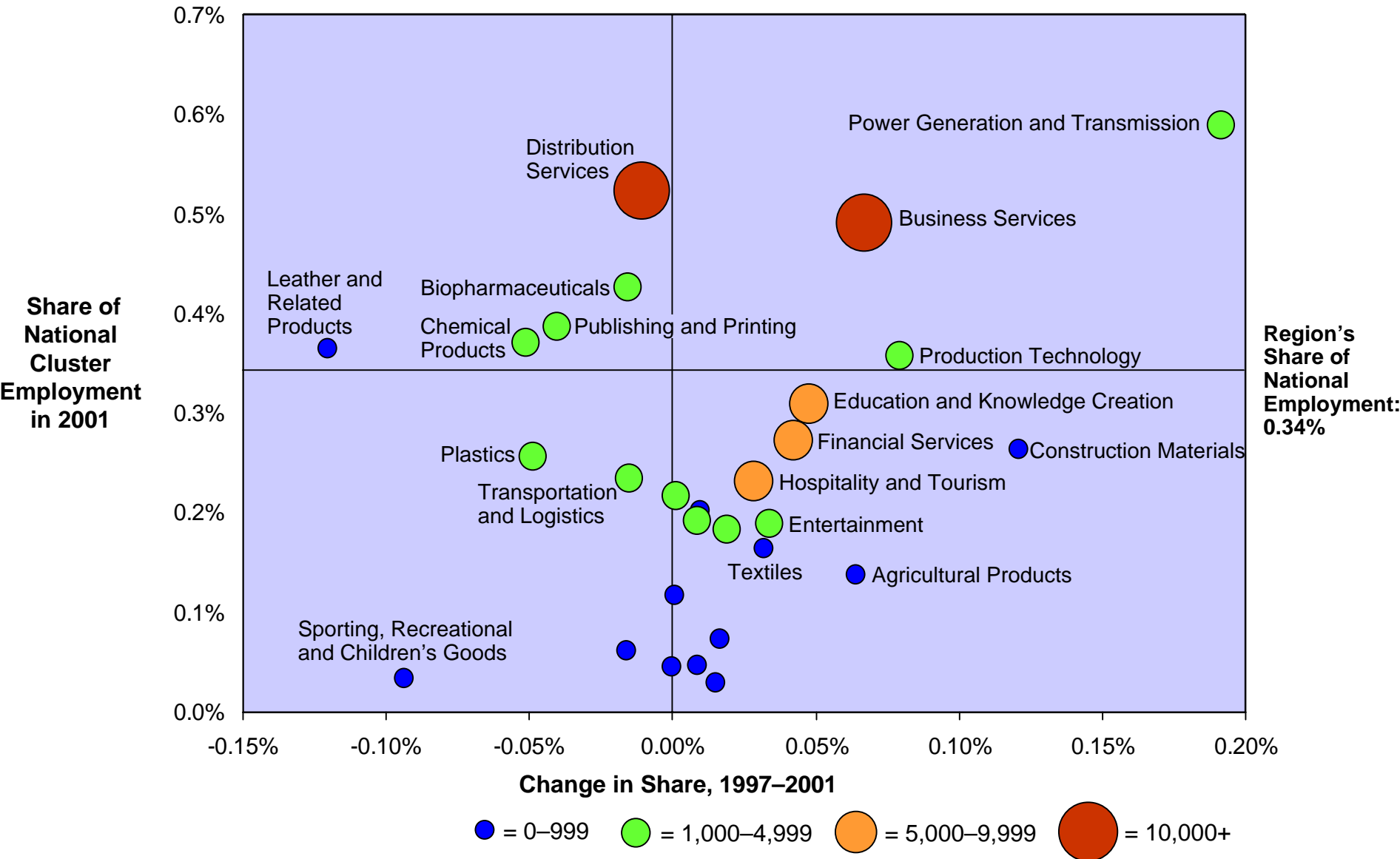
Specialization By Traded Cluster

Northeast Region



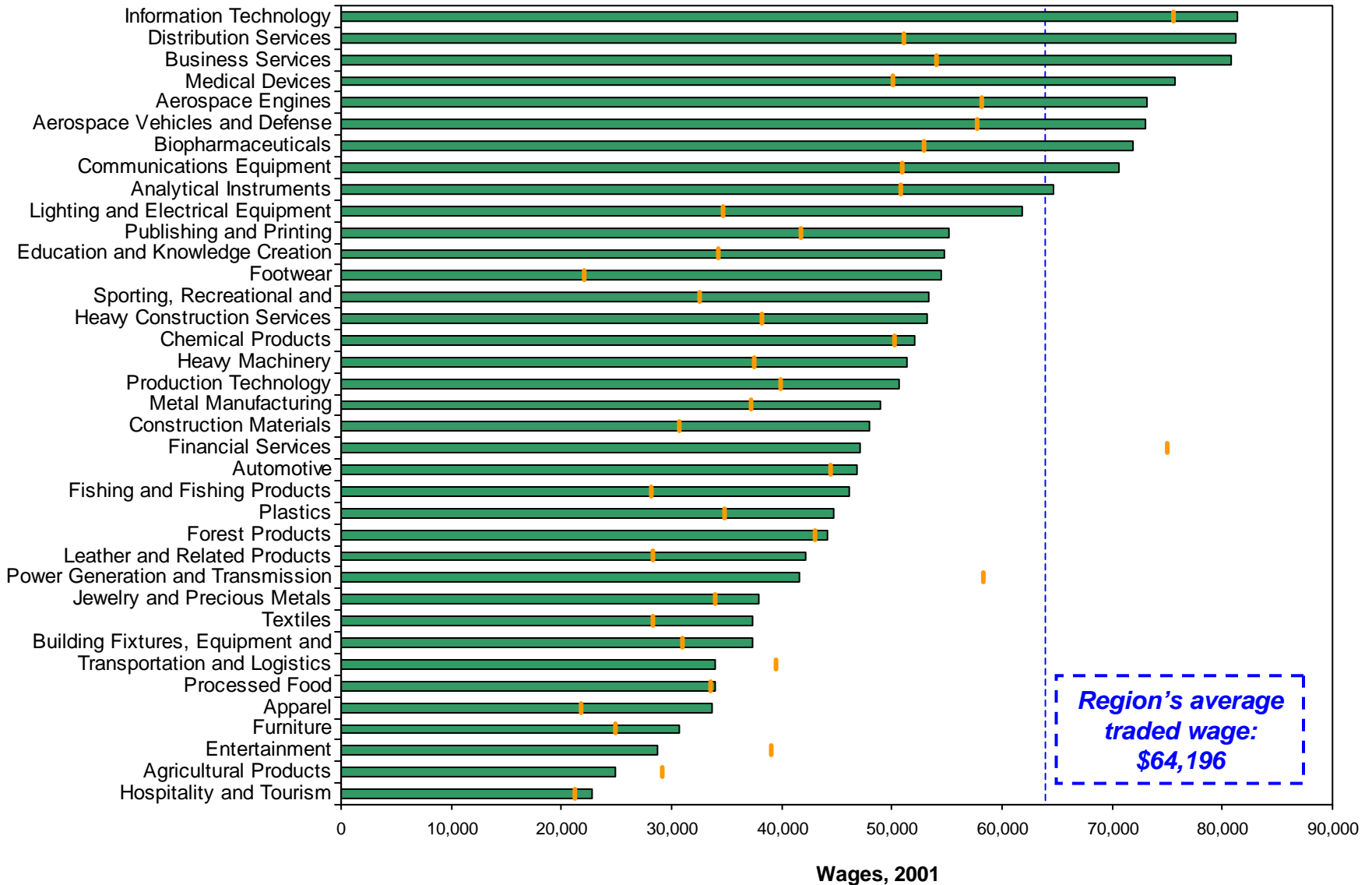
Specialization By Traded Cluster

Northeast Region



Wages By Traded Cluster

Northeast Region with US Benchmarks



*Region's average
traded wage:
\$64,196*

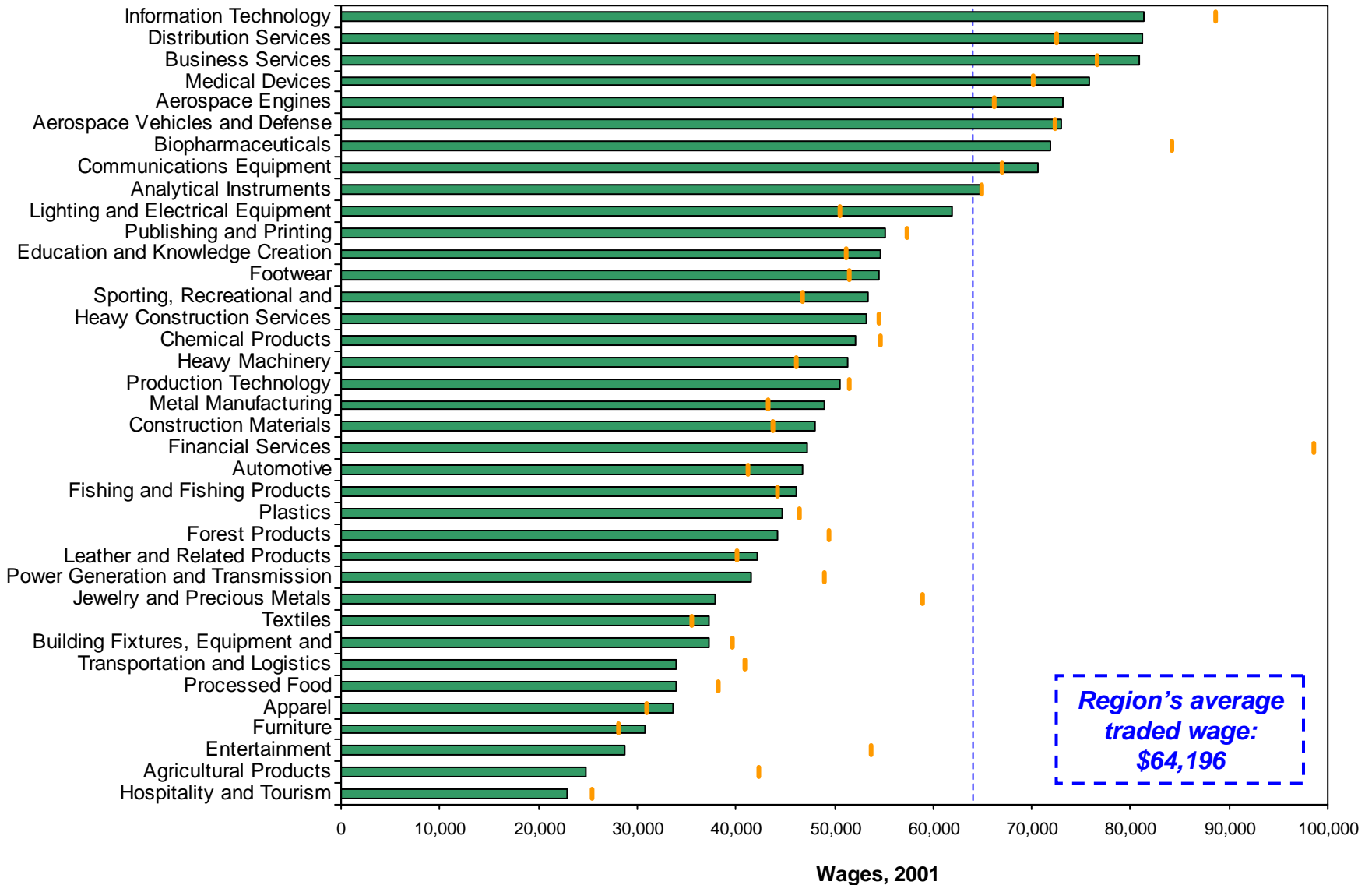
| - Indicates US average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Wages By Traded Cluster

Northeast Region with State Benchmarks



*Region's average
traded wage:
\$64,196*

| - Indicates Massachusetts average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

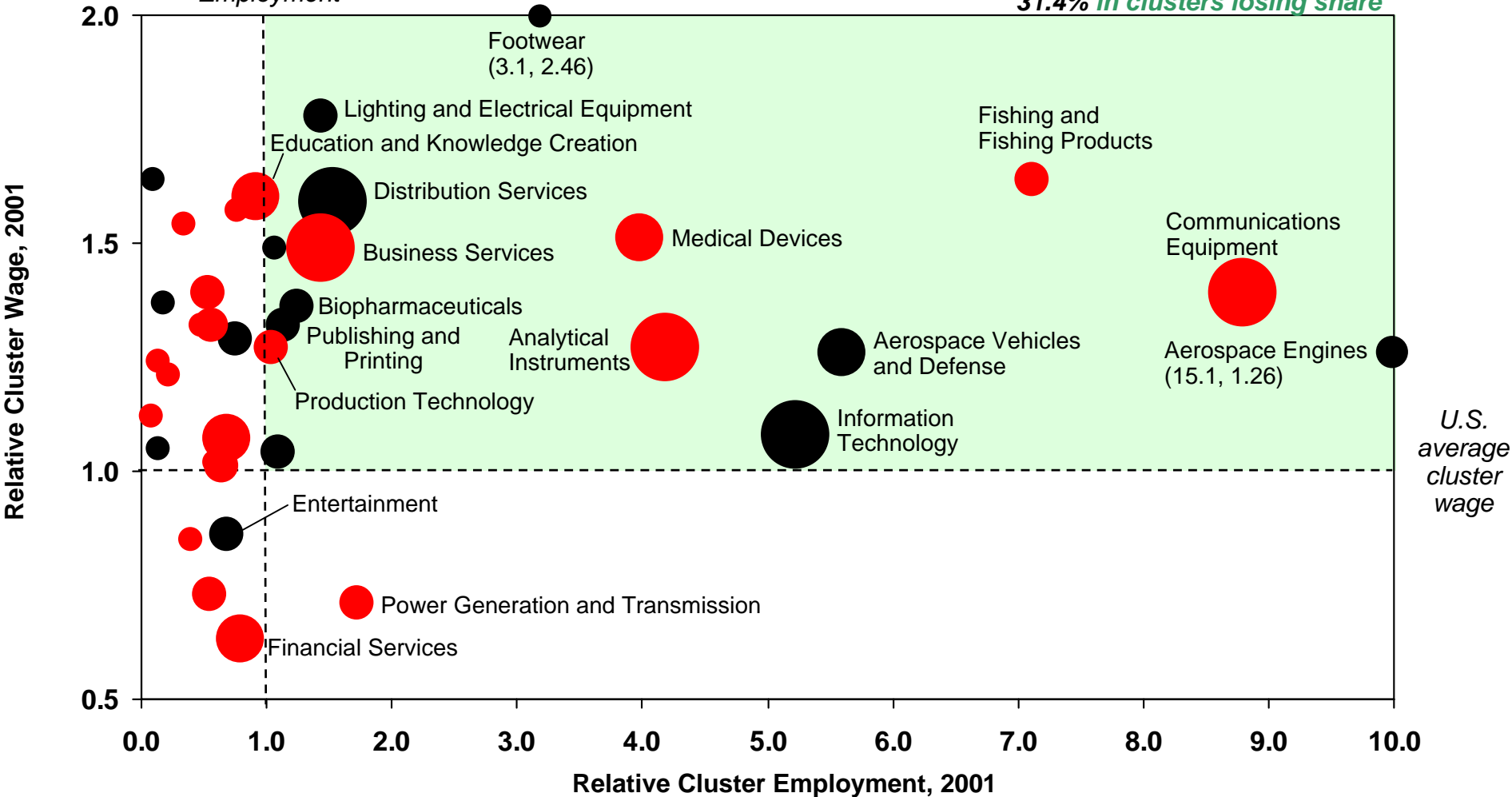
Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School

Relative Cluster Performance

Northeast Region

69.7% of traded employment
 38.3% in clusters gaining share
 31.4% in clusters losing share

0.34% of U.S.
 Employment



● = 0-999 ● = 1,000-4,999 ● = 5,000-9,999 ● = 10,000+

Red = Gaining Share
Black = Losing Share

Note: Data points that fall outside the graph are placed on the borders with their values given in parentheses (Employment, Wage)

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

Patents by Organization

Northeast Region

	Organization	Patents Issued from 1997 to 2001
1	ANALOG DEVICES, INC.	62
2	GENERAL ELECTRIC COMPANY	59
3	OSRAM SYLVANIA INC.	43
4	HEWLETT-PACKARD COMPANY	42
5	ANALOGIC CORPORATION	37
6	POLAROID CORPORATION	35
7	SUN MICROSYSTEMS, INC.	34
8	EATON CORPORATION	27
9	AGFA CORPORATION	27
10	NEW ENGLAND BIOLABS, INC.	27
11	DIGITAL EQUIPMENT CORPORATION	25
12	WHITAKER CORPORATION	24
13	AGFA DIVISION, BAYER CORPORATION	22
14	RAYTHEON COMPANY	21
15	C. R. BARD, INC.	19
16	UNIVERSITY OF MASSACHUSETTS	19
17	SPEEDLINE TECHNOLOGIES, INC.	18
18	GENETICS INSTITUTE, INC.	18
19	GELTEX PHARMACEUTICALS, INC.	18
20	LUCENT TECHNOLOGIES INC.	18
21	AVID TECHNOLOGY, INC.	17
22	NORTEL NETWORKS CORPORATION	16
23	CABOT CORPORATION	16
24	BROOKS AUTOMATION INC.	15
25	MILLENNIUM PHARMACEUTICALS, INC.	15
26	MILLIPORE CORPORATION	14

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

Leading Sub-Clusters by Location Quotient

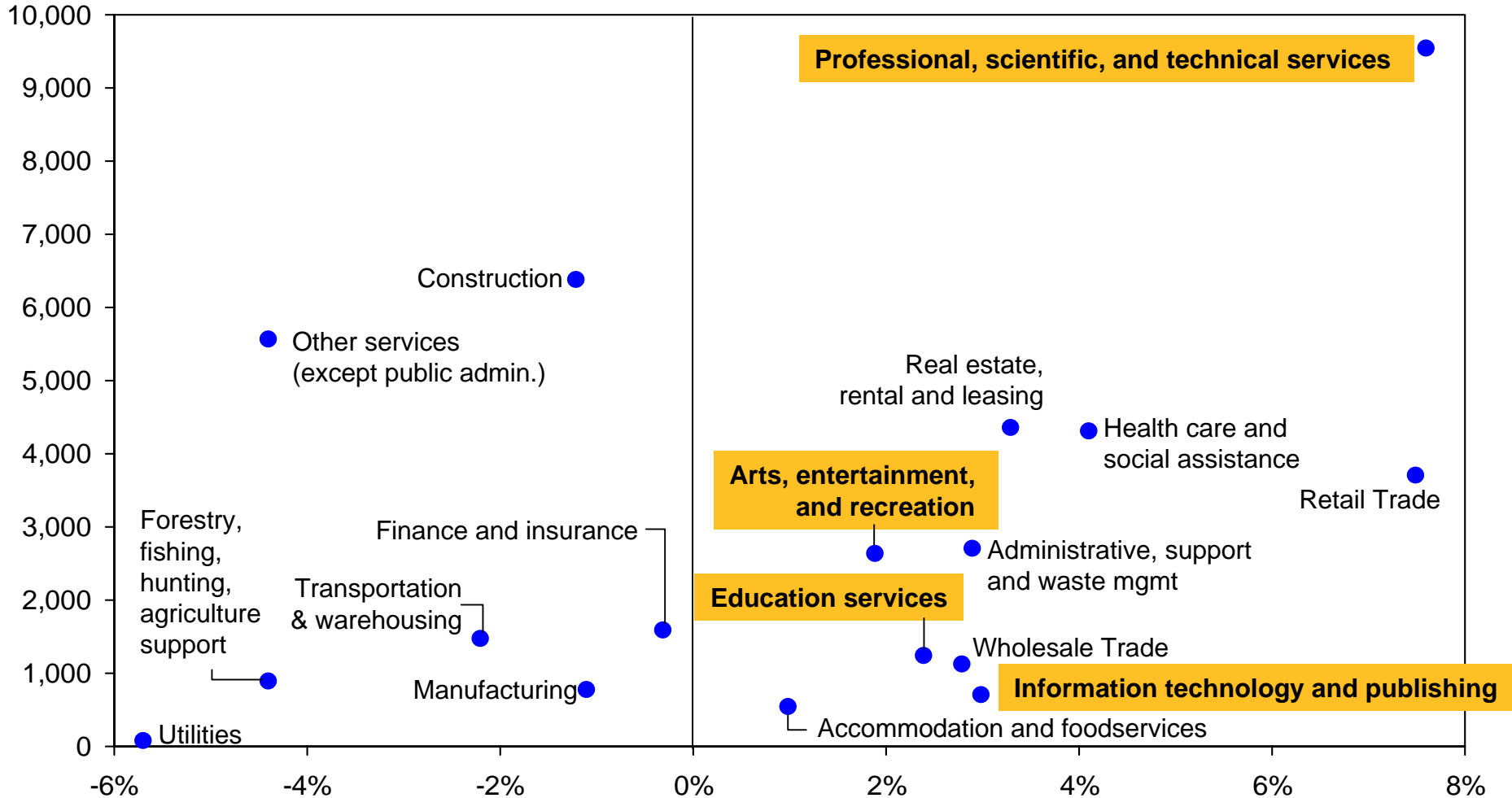
Northeast Region, 2001

Cluster	Subcluster	Location Quotient	Share of National Employment	Rank among Massachusetts Regions	Employment
Business Services	Laundry Services	5.47	1.87%	2	264
	Computer Programming	2.23	0.76%	2	9,045
Information Technology	Computers	21.37	7.30%	1	5,294
	Electronic Components and Assemblies	4.31	1.47%	2	4,489
	Software	4.08	1.39%	2	4,924
	Peripherals	3.65	1.25%	2	1,514
Communications Equipment	Specialty Office Machines	12.52	4.28%	2	879
	Communications Equipment	10.75	3.67%	1	9,776
	Electrical and Electronic Components	5.06	1.73%	1	2,785
Analytical Instruments	Optical Instruments	9.34	3.19%	2	727
	Laboratory Instruments	8.23	2.81%	2	3,308
	Process Instruments	7.50	2.56%	1	4,844
Financial Services	Passenger Car Leasing	4.05	1.38%	1	133
Aerospace Vehicles and Defense	Missiles and Space Vehicles	30.29	10.35%	1	7,074
Medical Devices	Medical Equipment	14.83	5.07%	1	3,017
	Biological Products	4.60	1.57%	1	402
	Surgical Instruments and Supplies	2.39	0.82%	3	1,605
Aerospace Engines	Aircraft Engines	16.93	5.78%	1	4,640
Transportation and Logistics	Trucking Terminal	72.79	24.86%	1	146
Processed Food	Milk and Frozen Desserts	2.99	1.02%	2	781
Metal Manufacturing	General Industrial Machinery	6.07	2.07%	1	1,030
Production Technology	Process Machinery	3.36	1.15%	2	928
Entertainment	Entertainment Equipment	3.66	1.25%	2	556
Power Generation and Transmission	Transformers	17.12	5.85%	1	1,514
	Porcelain, Carbon and Graphite Components	2.94	1.01%	1	194
Lighting and Electrical Equipment	Electric Lamps	15.32	5.23%	1	692
Chemical Products	Leather Tanning and Finishing	3.82	1.30%	1	151
	Special Packaging	2.75	0.94%	3	101
	Packaged Chemical Products	2.70	0.92%	2	820
Fishing and Fishing Products	Fish Products	7.81	2.67%	1	937
	Fishing and Hunting	7.71	2.63%	2	262
Leather Products	Coated Fabrics	13.13	4.49%	2	393
Footwear	Specialty Footwear	31.56	10.78%	2	213

Sole Proprietorship Employment and Growth

Northeast Region

Sole Proprietorship
Employment
2001



Compound Annual Growth Rate (CAGR) of Sole Proprietorship Employment, 1998-2001

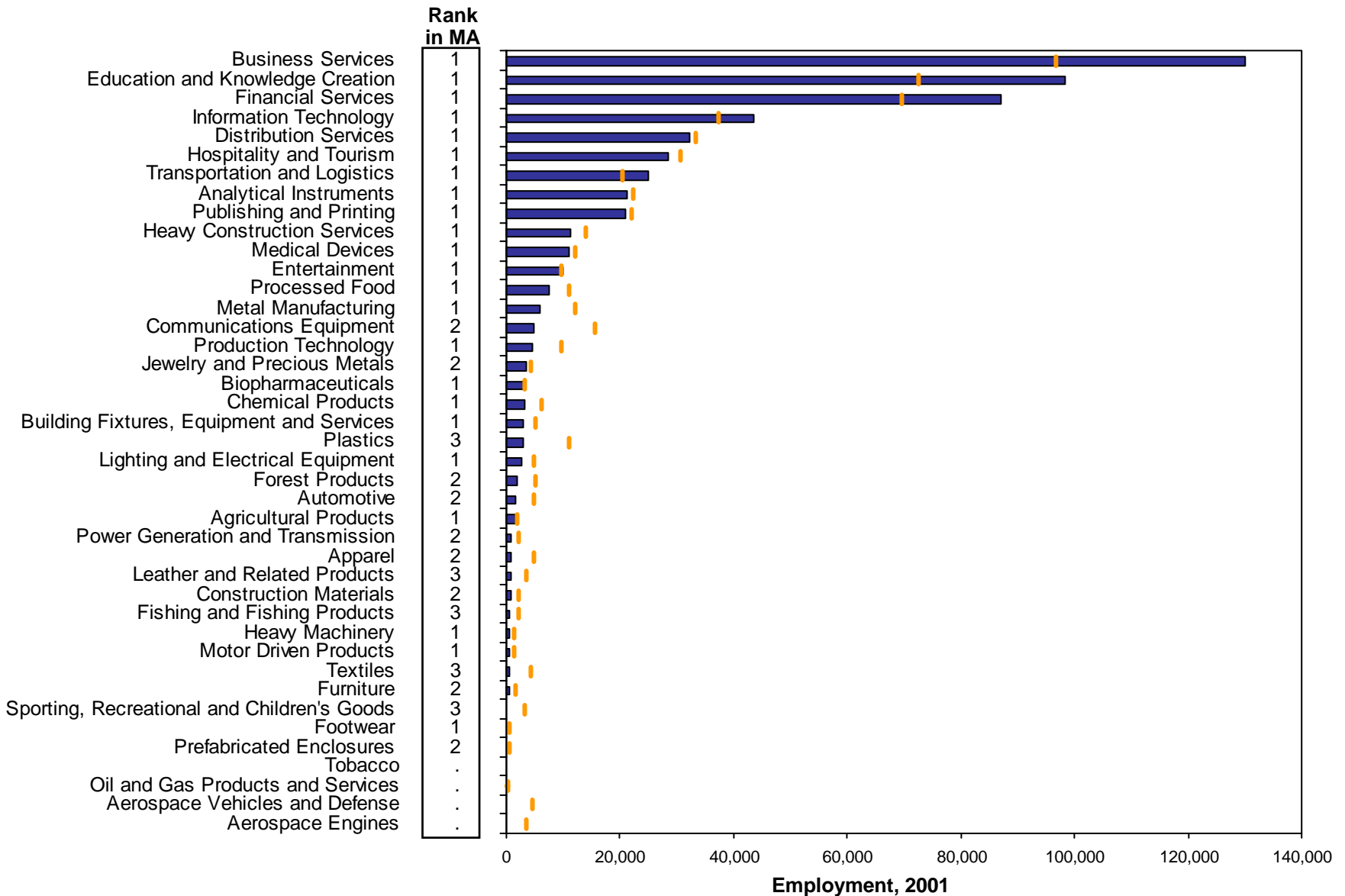
Note: Data available on county basis only; the allocation to Massachusetts regions is only approximate.

Source: U.S. Census Bureau, Nonemployer Statistics

Greater Boston Region

Employment By Traded Cluster

Greater Boston Region

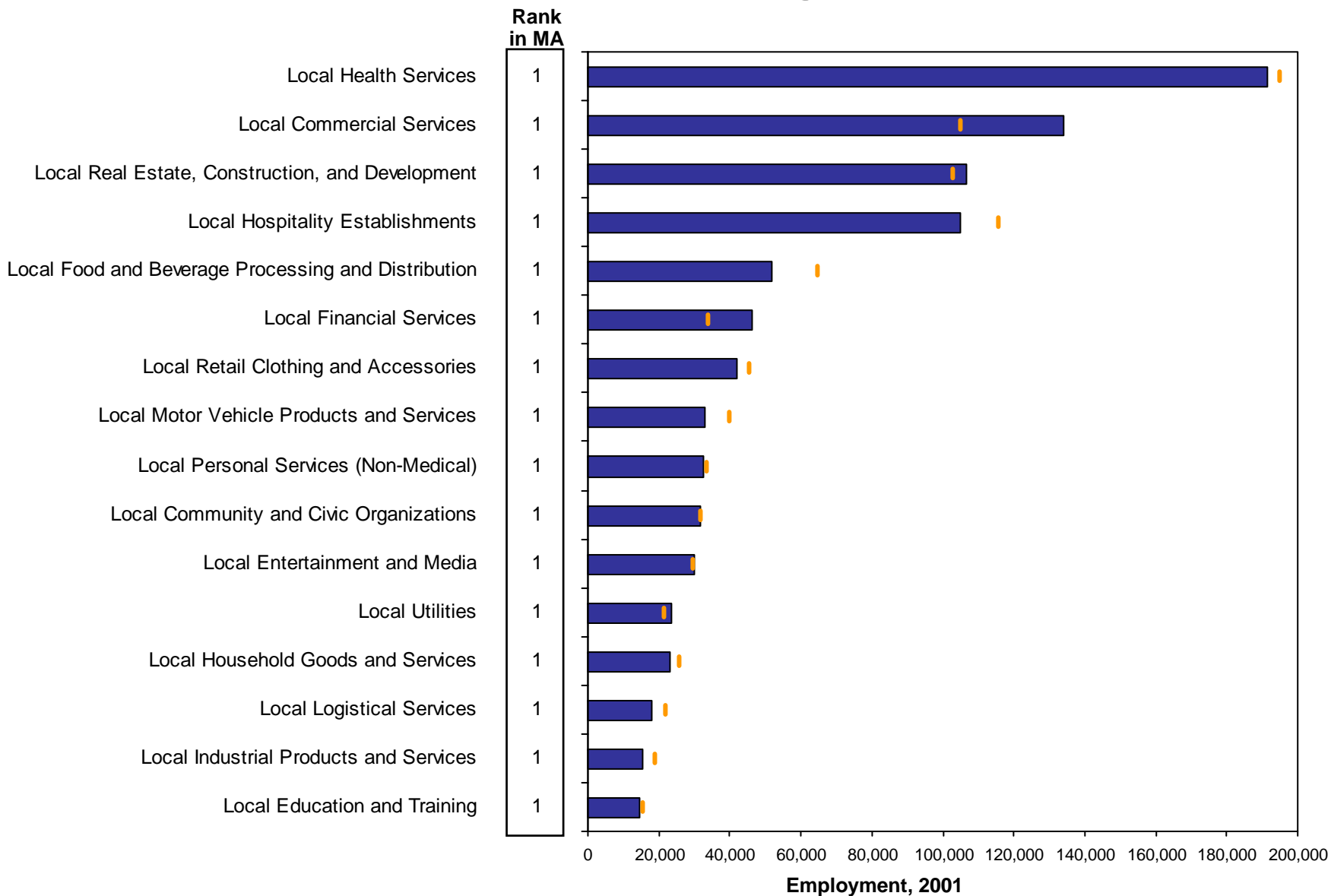


| - Indicates expected employment at rates in the **state benchmark** for traded clusters. Rank is across 7 state regions.

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

Employment By Local Cluster

Greater Boston Region

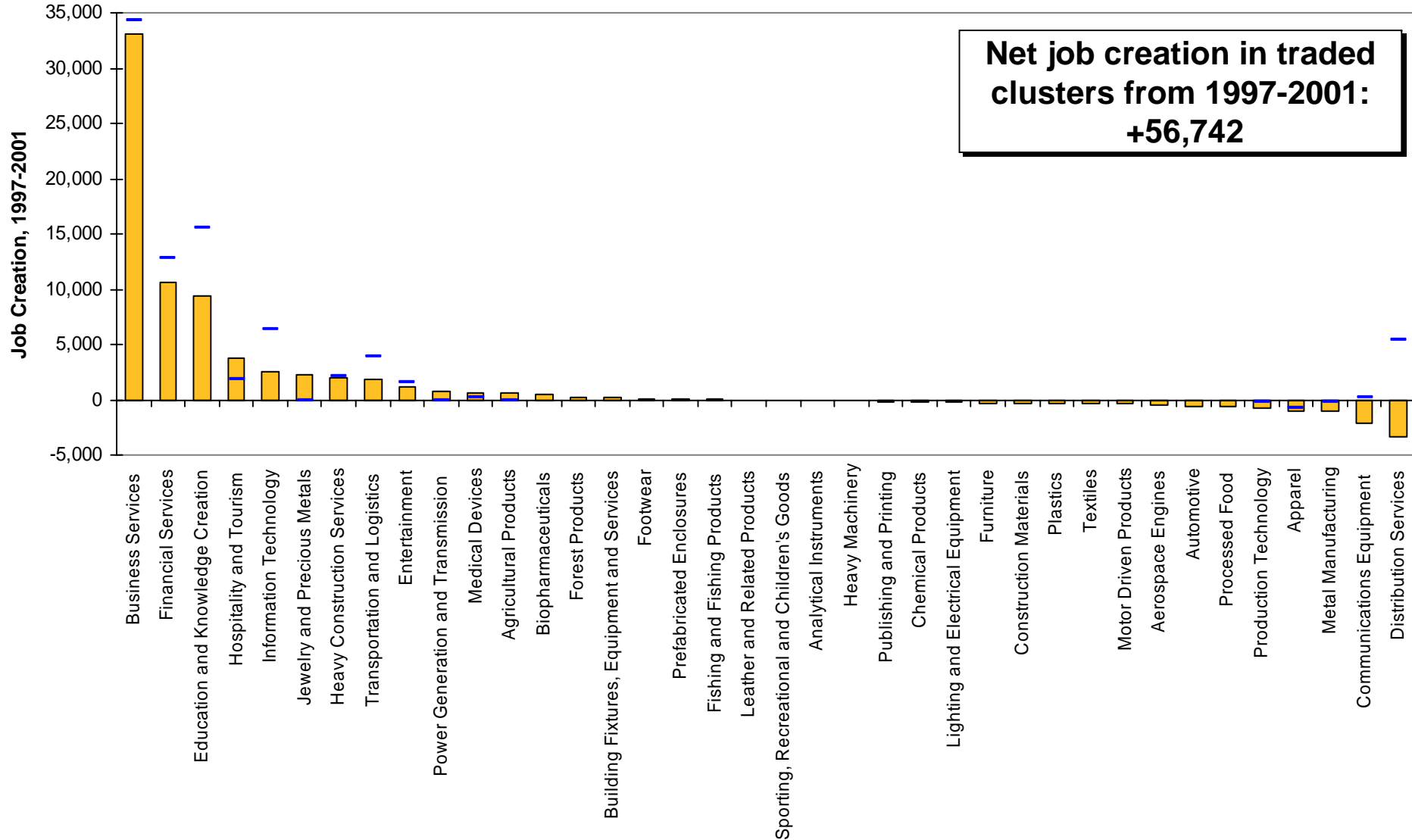


| - Indicates expected employment at rates in the **state benchmark** for local clusters. Rank is across 7 state regions.

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

Job Creation By Traded Cluster

Greater Boston Region

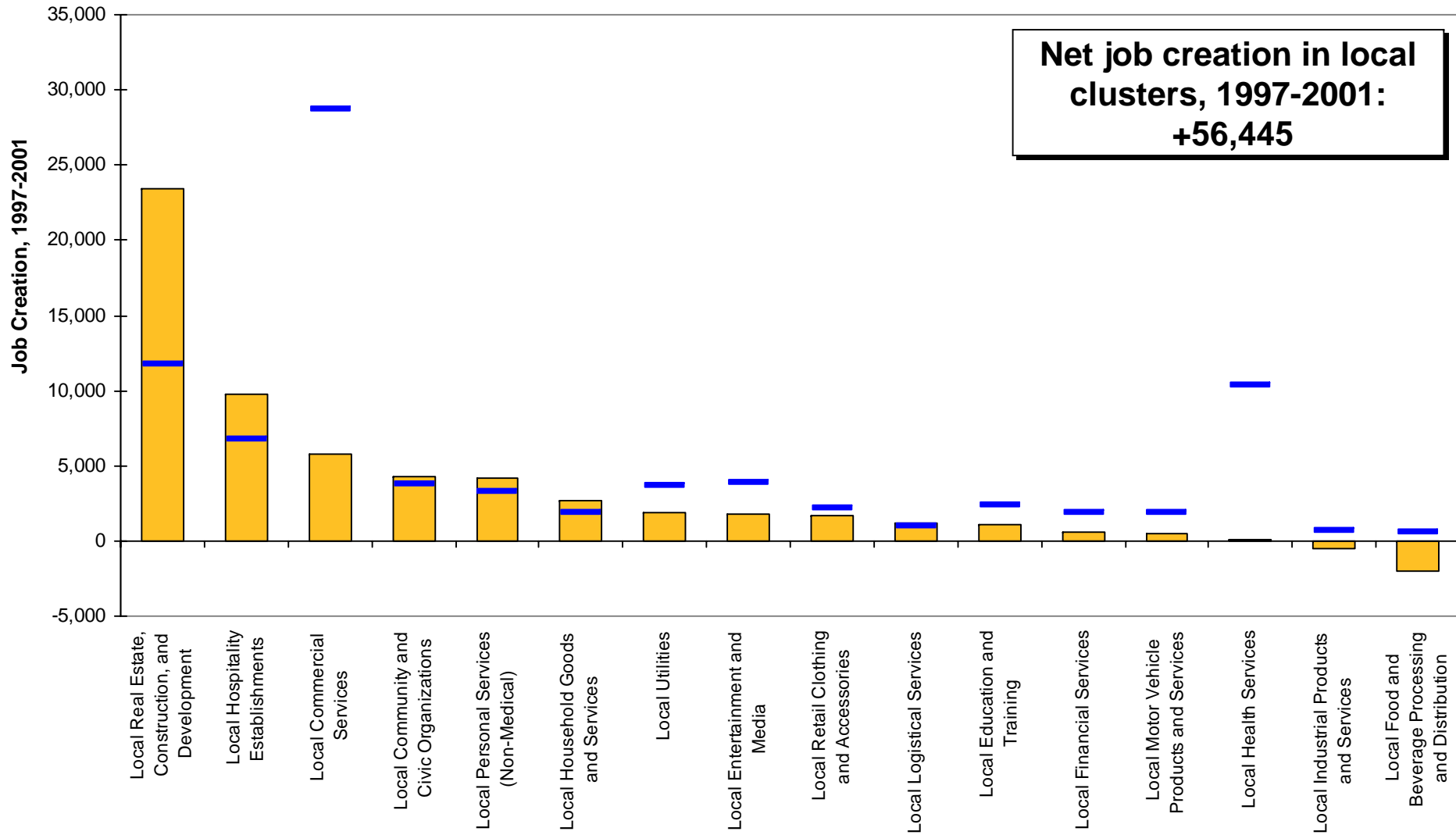


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

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

Job Creation By Local Cluster

Greater Boston Region

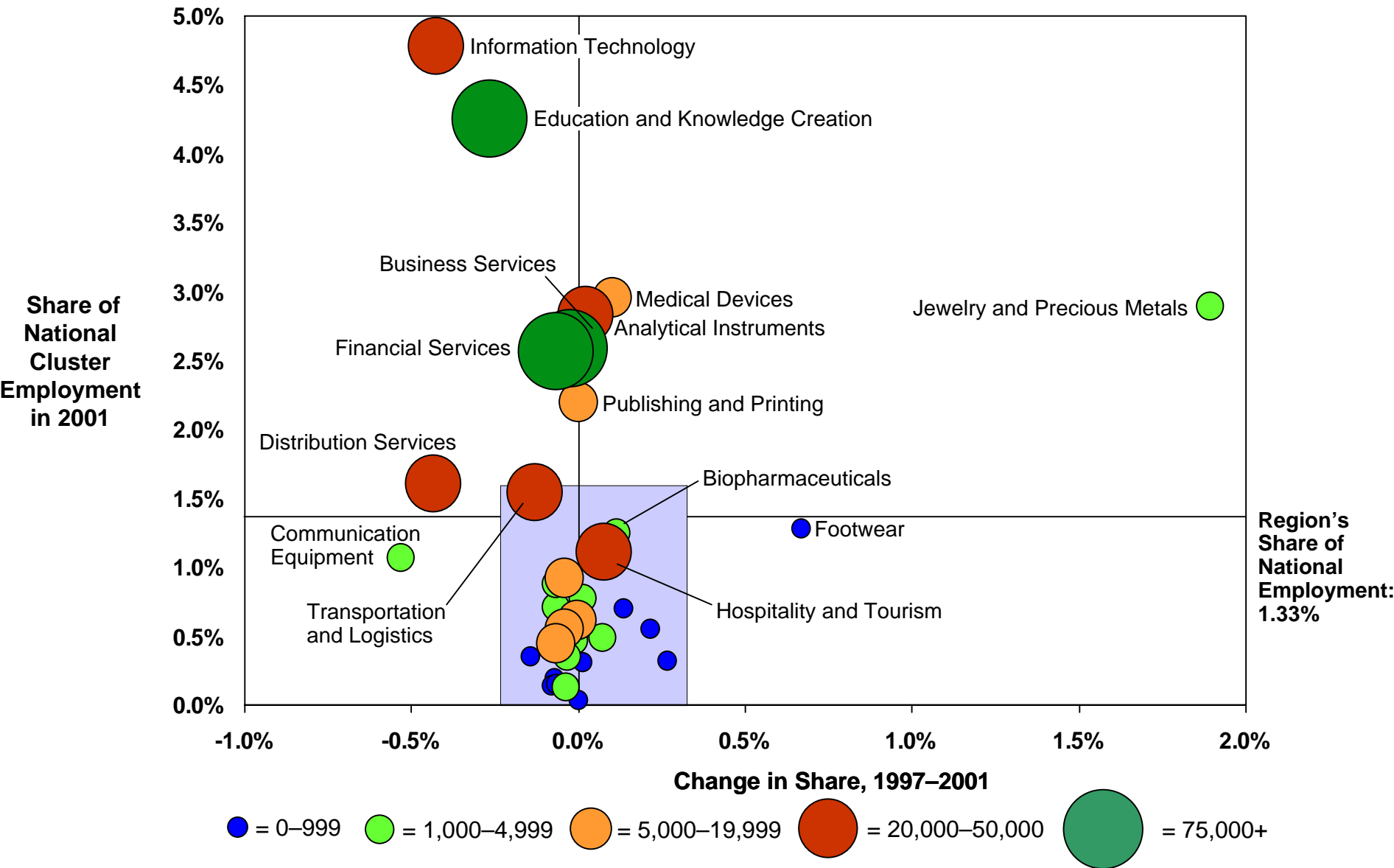


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

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

Specialization By Traded Cluster

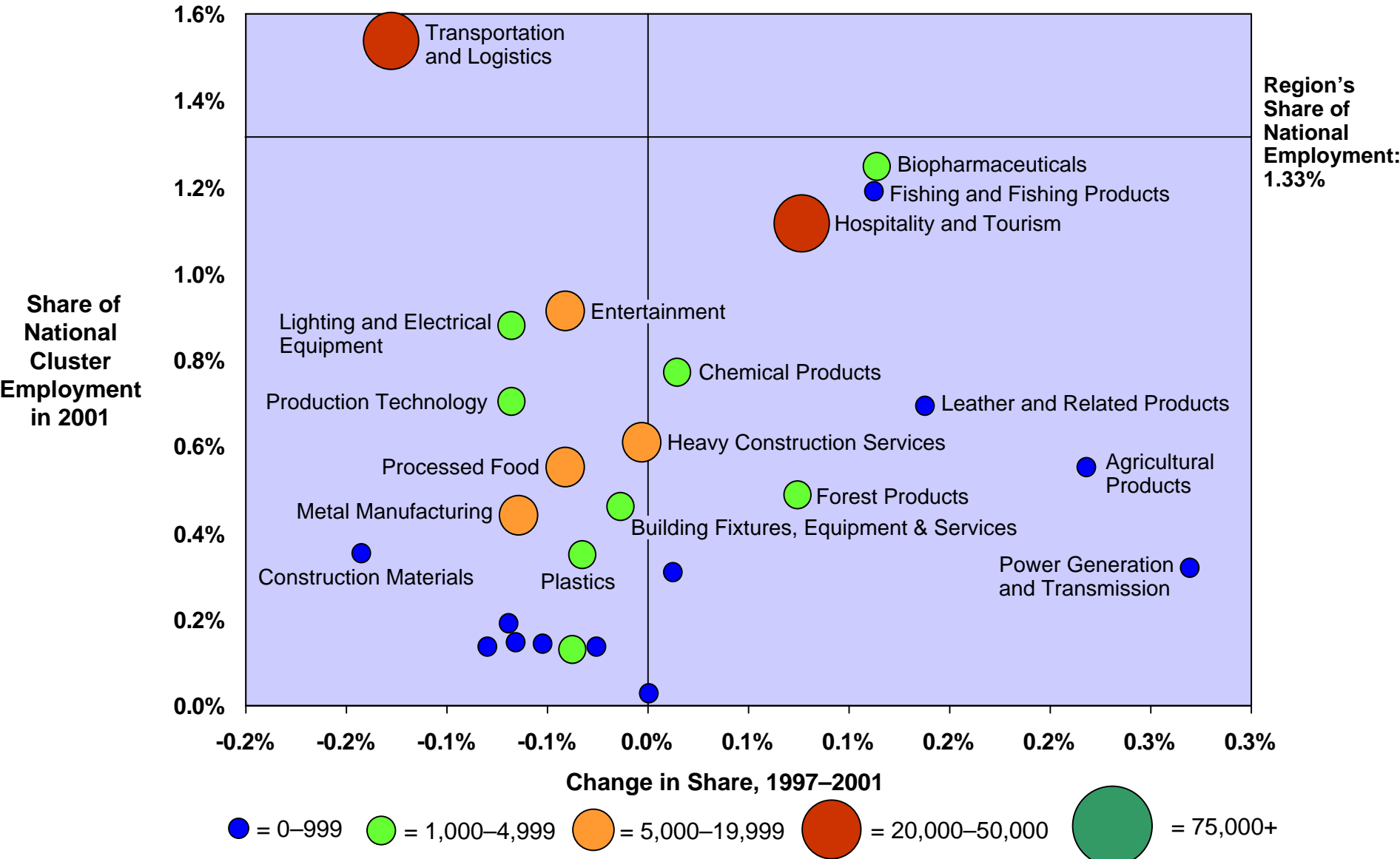
Greater Boston Region



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

Specialization By Traded Cluster

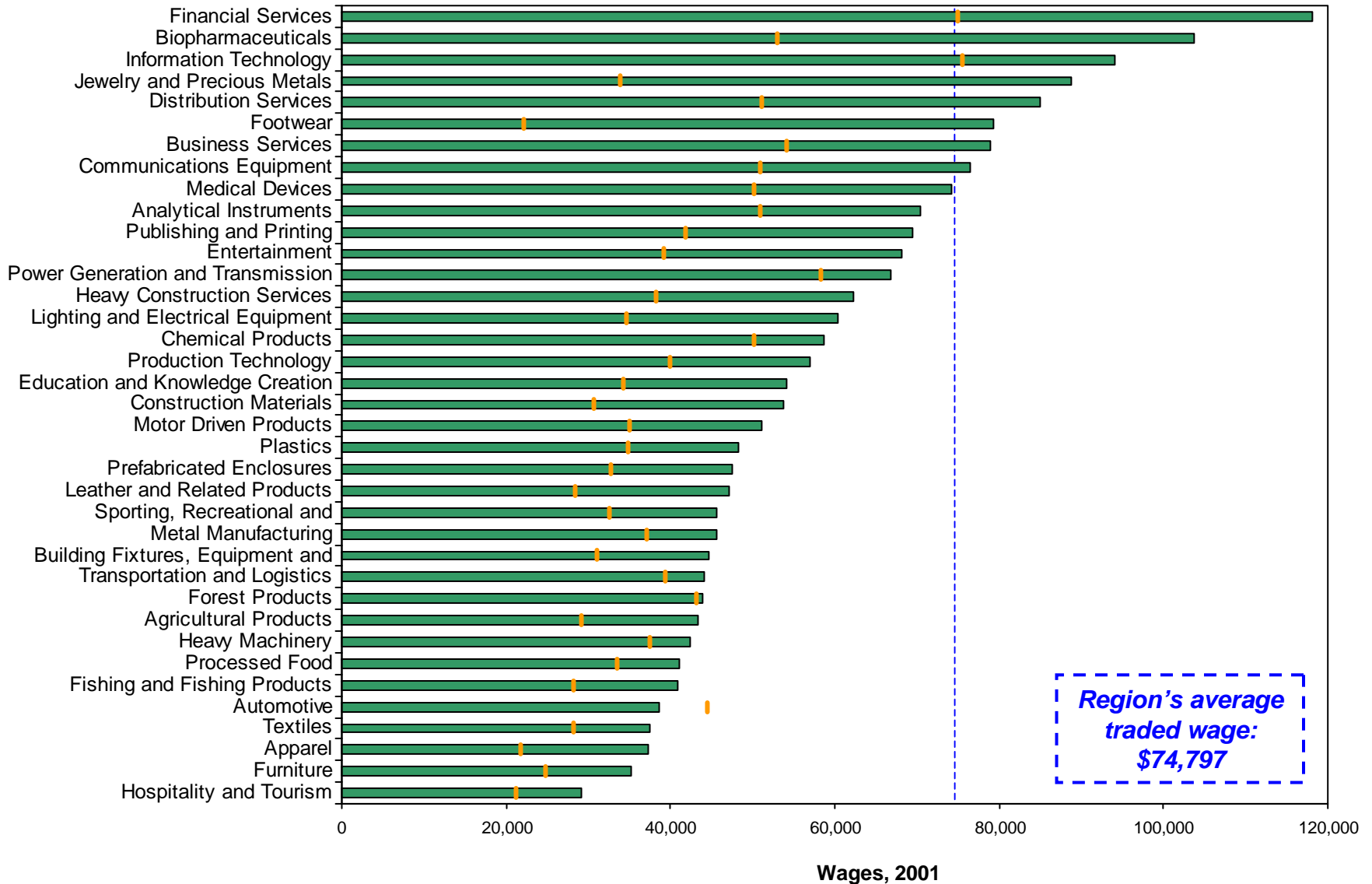
Greater Boston Region



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

Wages By Traded Cluster

Greater Boston Region with US Benchmarks



*Region's average
traded wage:
\$74,797*

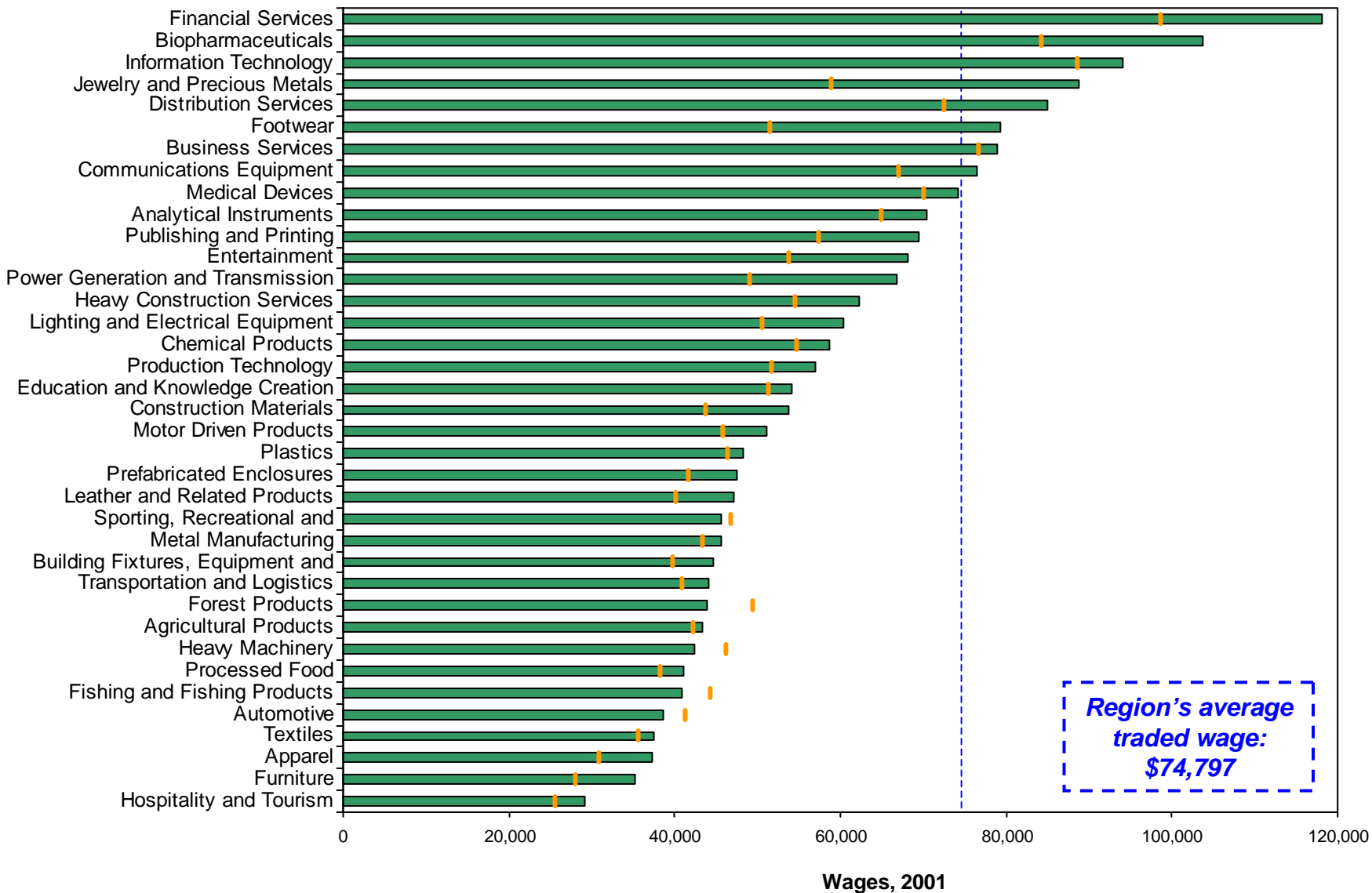
| - Indicates US average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Wages By Traded Cluster

Greater Boston Region with State Benchmarks



*Region's average
traded wage:
\$74,797*

| - Indicates Massachusetts average wage in the cluster.

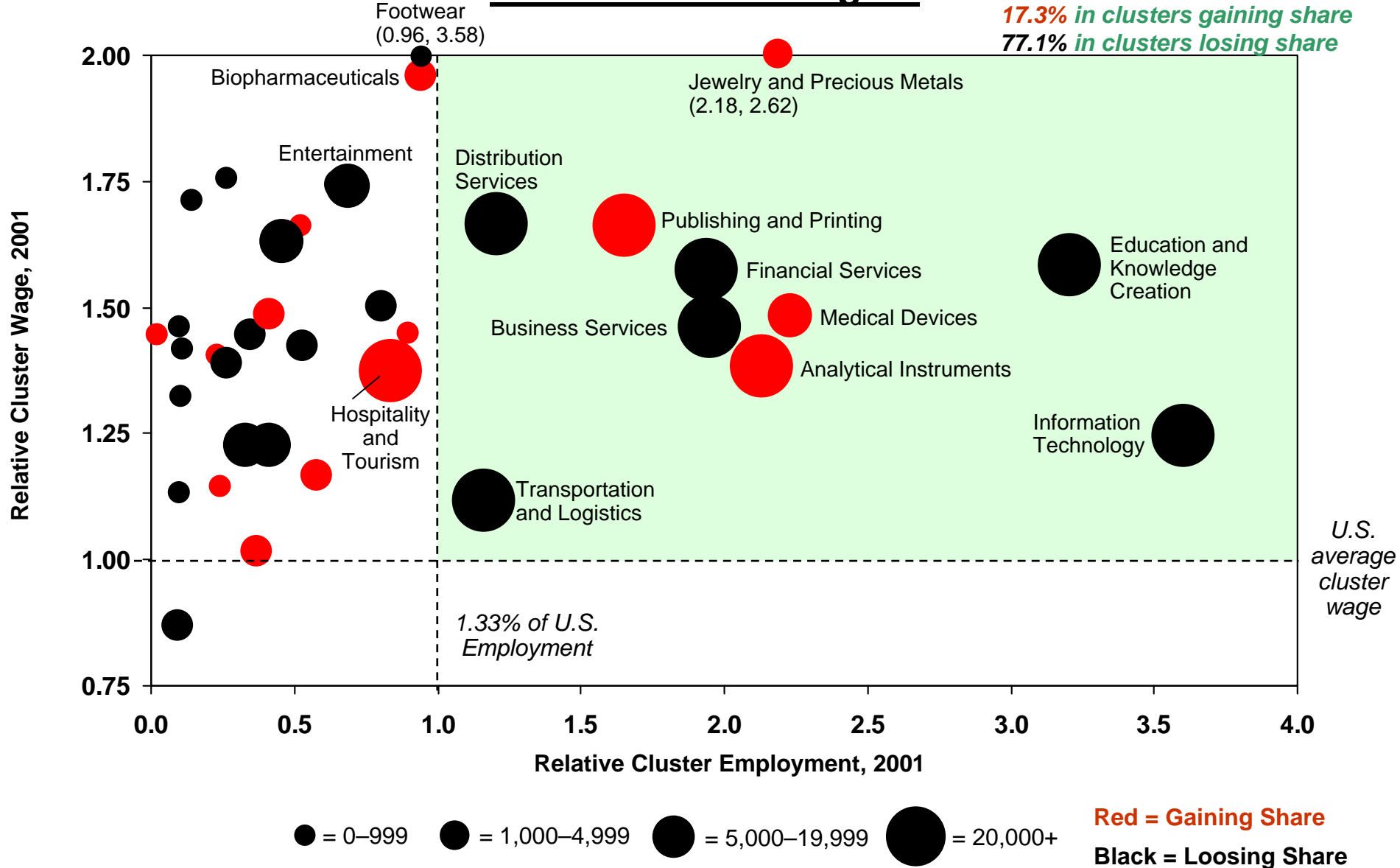
Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Relative Cluster Performance

Greater Boston Region

94.4% of traded employment
 17.3% in clusters gaining share
 77.1% in clusters losing share



Note: Data points that fall outside the graph are placed on the borders with their values given in parentheses (Employment, Wage)

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

Patents by Organization

Greater Boston Region

	Organization	Patents Issued from 1997 to 2001
1	HARVARD AFFILIATED HOSPITALS	628
2	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	492
3	COMPAQ / DEC	297
4	EMC CORPORATION	217
5	POLAROID CORPORATION	175
6	HARVARD COLLEGE, PRESIDENT AND FELLOWS	144
7	MILLENNIUM PHARMACEUTICALS, INC.	143
8	GILLETTE COMPANY	126
9	BOSTON SCIENTIFIC CORPORATION	117
10	GENETICS INSTITUTE, INC.	109
11	ANALOG DEVICES, INC.	96
12	SUN MICROSYSTEMS, INC.	95
13	COGNEX CORPORATION	84
14	BOSTON UNIVERSITY	74
15	SEPRACOR INC.	73
16	QUANTUM CORP. (CA)	69
17	RAYTHEON COMPANY	69
18	VERTEX PHARMACEUTICALS, INC.	67
19	MITSUBISHI	59
20	GENZYME CORPORATION	59
21	CHARLES STARK DRAPER LABORATORY, INC.	53
22	SHIPLEY COMPANY INC.	50
23	3COM CORPORATION	47
24	NORTHEASTERN UNIVERSITY	46
25	ANALOGIC CORPORATION	46
26	HEWLETT-PACKARD COMPANY	45
27	FUJITSU NETWORK COMMUNICATIONS, INC.	45
28	MOTOROLA, INC.	45
29	CABOT CORPORATION	44
30	UNITED STATES OF AMERICA, AIR FORCE	42
31	WHITEHEAD INSTITUTE FOR BIOMEDICAL RESEARCH	40

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

Leading Sub-Clusters by Location Quotient

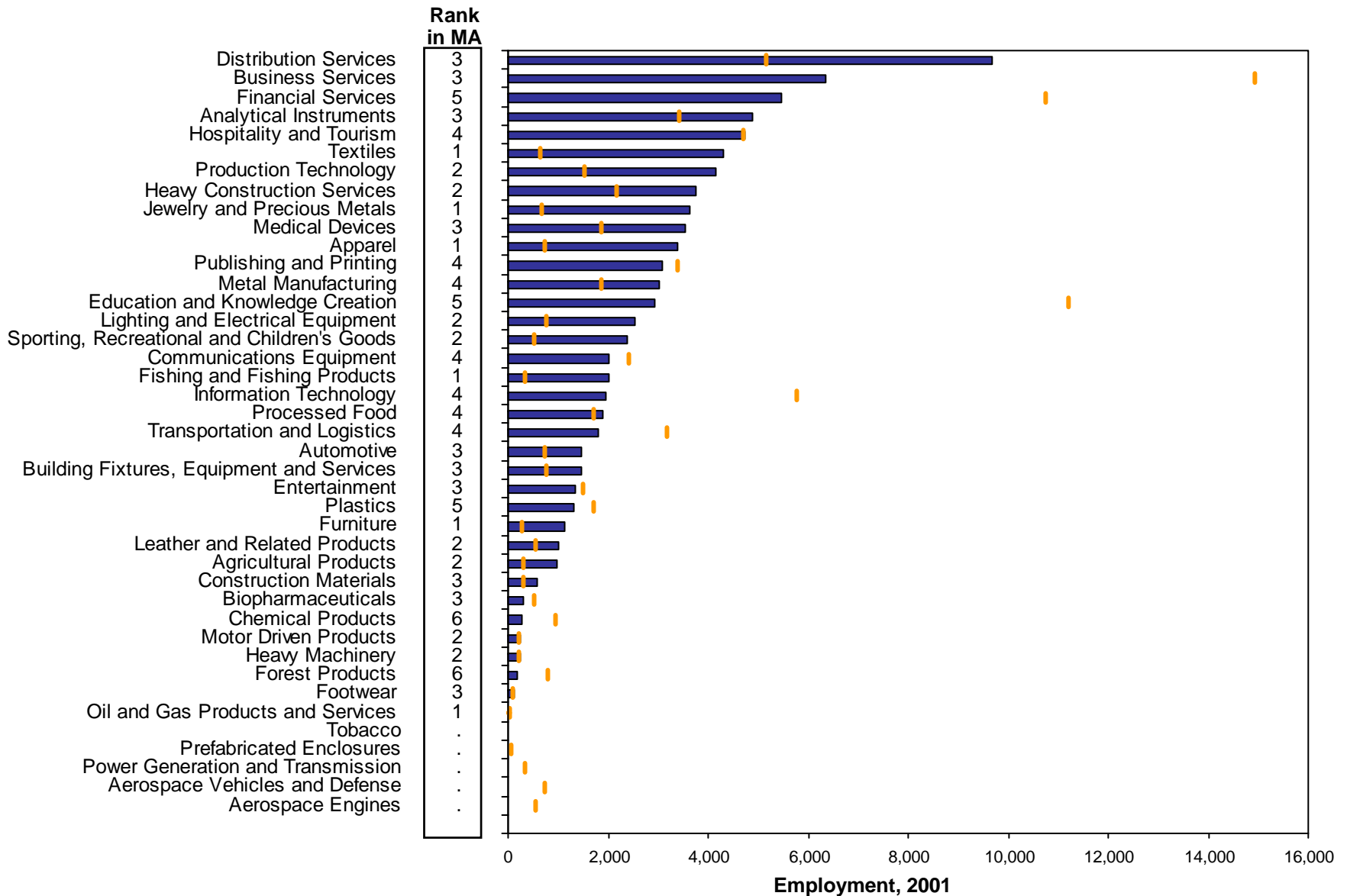
Greater Boston Region, 2001

Cluster	Subcluster	Location Quotient	Share of National Employment	Rank among Massachusetts Regions	Employment
Business Services	Laundry Services	5.69	7.54%	1	1,066
	Computer Programming	2.88	3.81%	1	45,232
	Marketing Related Services	2.48	3.28%	1	7,281
	Online Information Services	2.36	3.12%	1	6,309
	Management Consulting	1.92	2.54%	1	32,246
	Photocopying	1.90	2.52%	1	2,087
Education and Knowledge Creation	Research Organizations	3.92	5.19%	1	25,956
	Educational Institutions	3.20	4.23%	1	69,394
Financial Services	Investment Funds	27.67	36.67%	1	1,404
	Securities Brokers, Dealers and Exchanges	4.07	5.39%	1	46,873
Information Technology	Peripherals	6.59	8.74%	1	10,605
	Software	4.13	5.47%	1	19,321
	Computers	3.92	5.19%	2	3,766
	Electronic Components and Assemblies	2.27	3.00%	1	9,159
Hospitality and Tourism	Water Passenger Transportation	1.89	2.51%	1	649
Transportation and Logistics	Trucking Terminal	5.40	7.15%	2	42
Analytical Instruments	Laboratory Instruments	4.81	6.37%	1	7,497
	Optical Instruments	2.47	3.27%	1	745
	Search and Navigation Equipment	2.15	2.85%	1	5,021
Publishing and Printing	Photographic Equipment and Supplies	3.97	5.26%	1	2,592
	Publishing	2.84	3.77%	1	11,891
	News Syndicates	2.25	2.98%	1	364
Medical Devices	Diagnostic Substances	4.83	6.40%	1	2,759
	Surgical Instruments and Supplies	2.60	3.45%	1	6,775
Entertainment	Entertainment Equipment	4.88	6.47%	1	2,882
Metal Manufacturing	Primary Metal Products	4.13	5.47%	1	471
	Environmental Controls	3.57	4.73%	1	936
Jewelry and Precious Metals	Cutlery	23.04	30.54%	1	2,996
Chemical Products	Treated Garments	21.32	28.25%	1	365
Building Fixtures, Equipment and Services	Steam and Air-conditioning	4.58	6.07%	1	99
Power Generation and Transmission	Electronic Capacitors	3.02	4.00%	1	729
Leather Products	Coated Fabrics	5.12	6.78%	1	594
Footwear	Specialty Footwear	9.51	12.60%	1	249

Southeast Region

Employment By Traded Cluster

Southeast Region

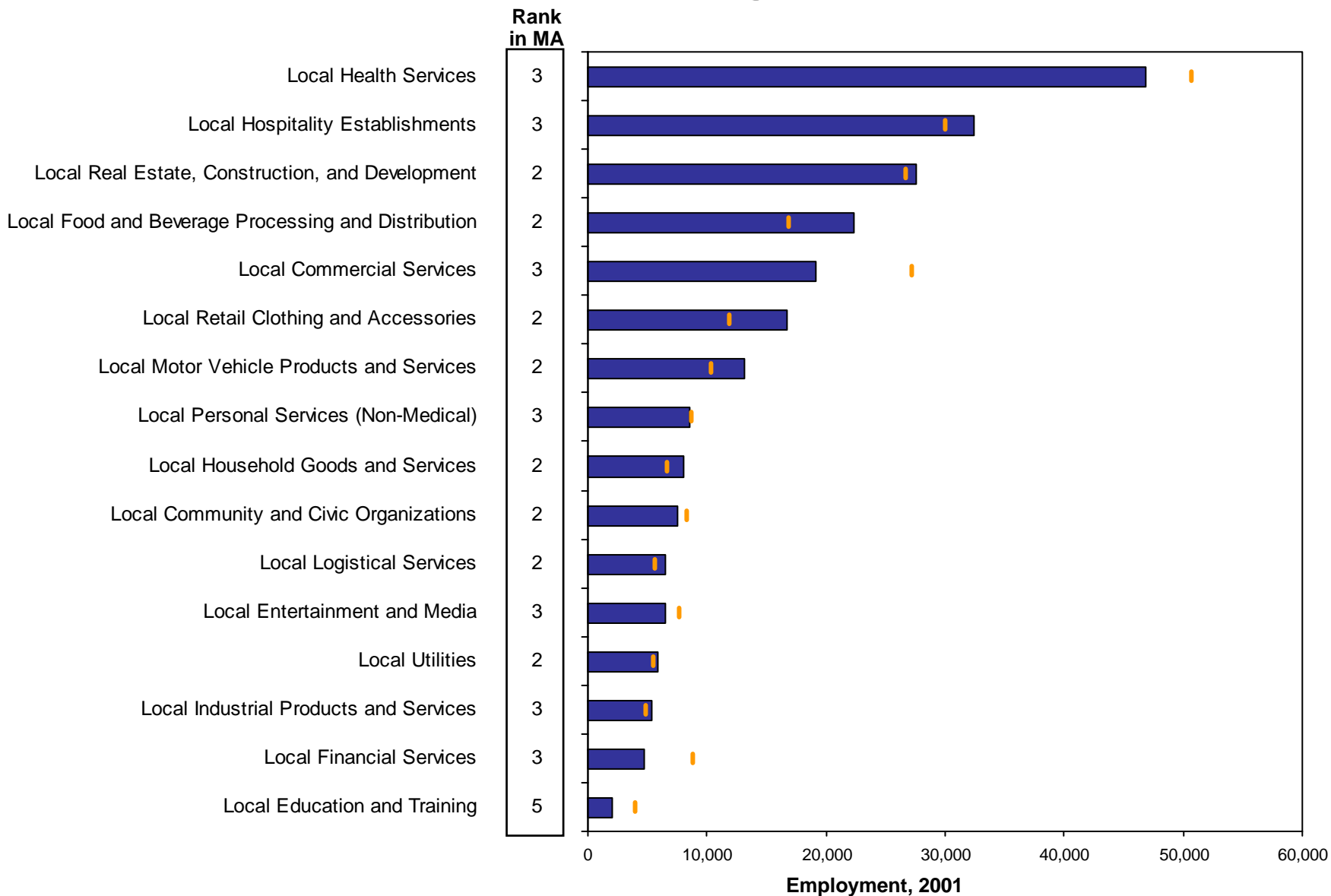


| - Indicates expected employment at rates in the **state benchmark** for traded clusters. Rank is across 7 state regions.

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

Employment By Local Cluster

Southeast Region

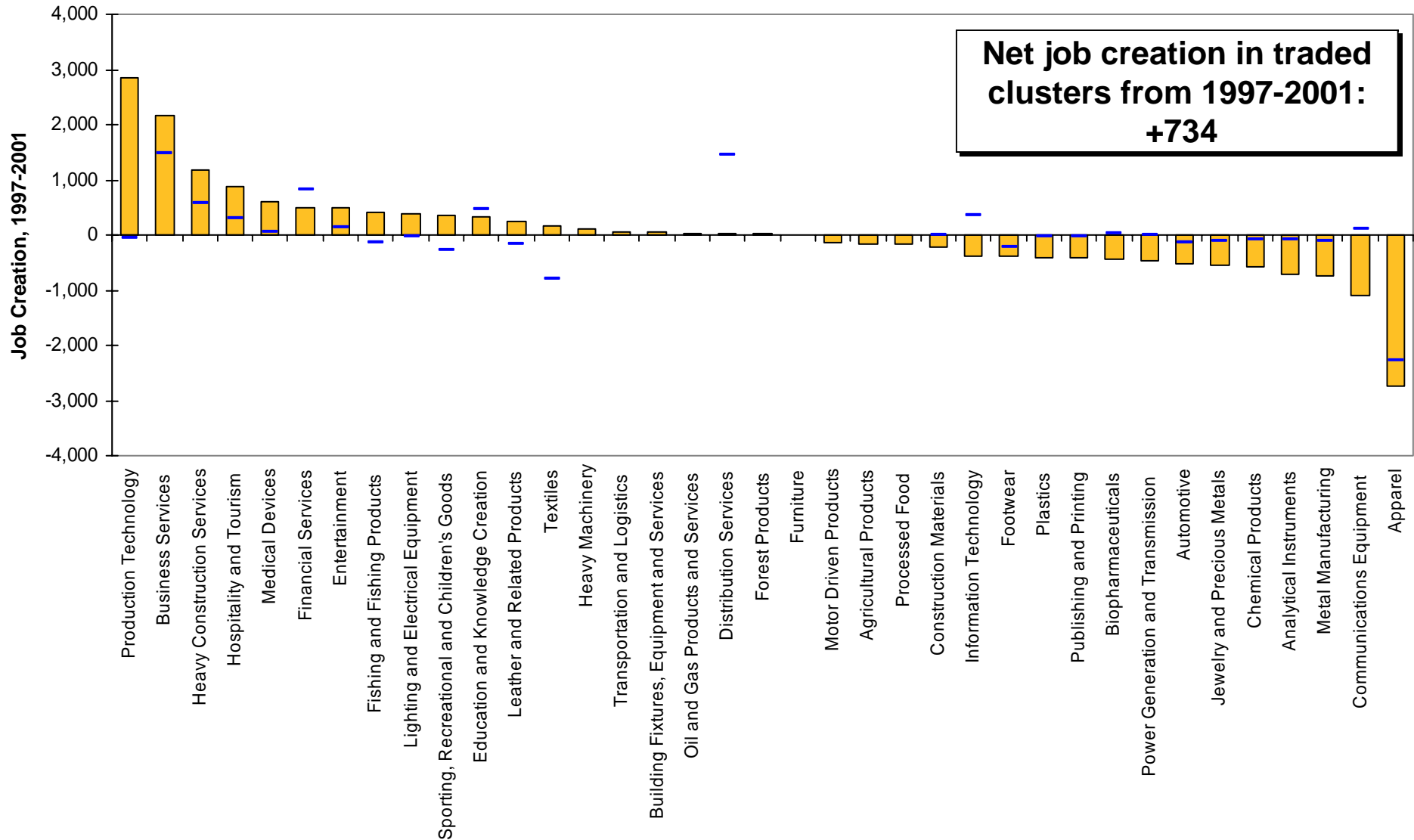


|- Indicates expected employment at rates in the **state benchmark** for local clusters. Rank is across 7 state regions.

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

Job Creation By Traded Cluster

Southeast Region

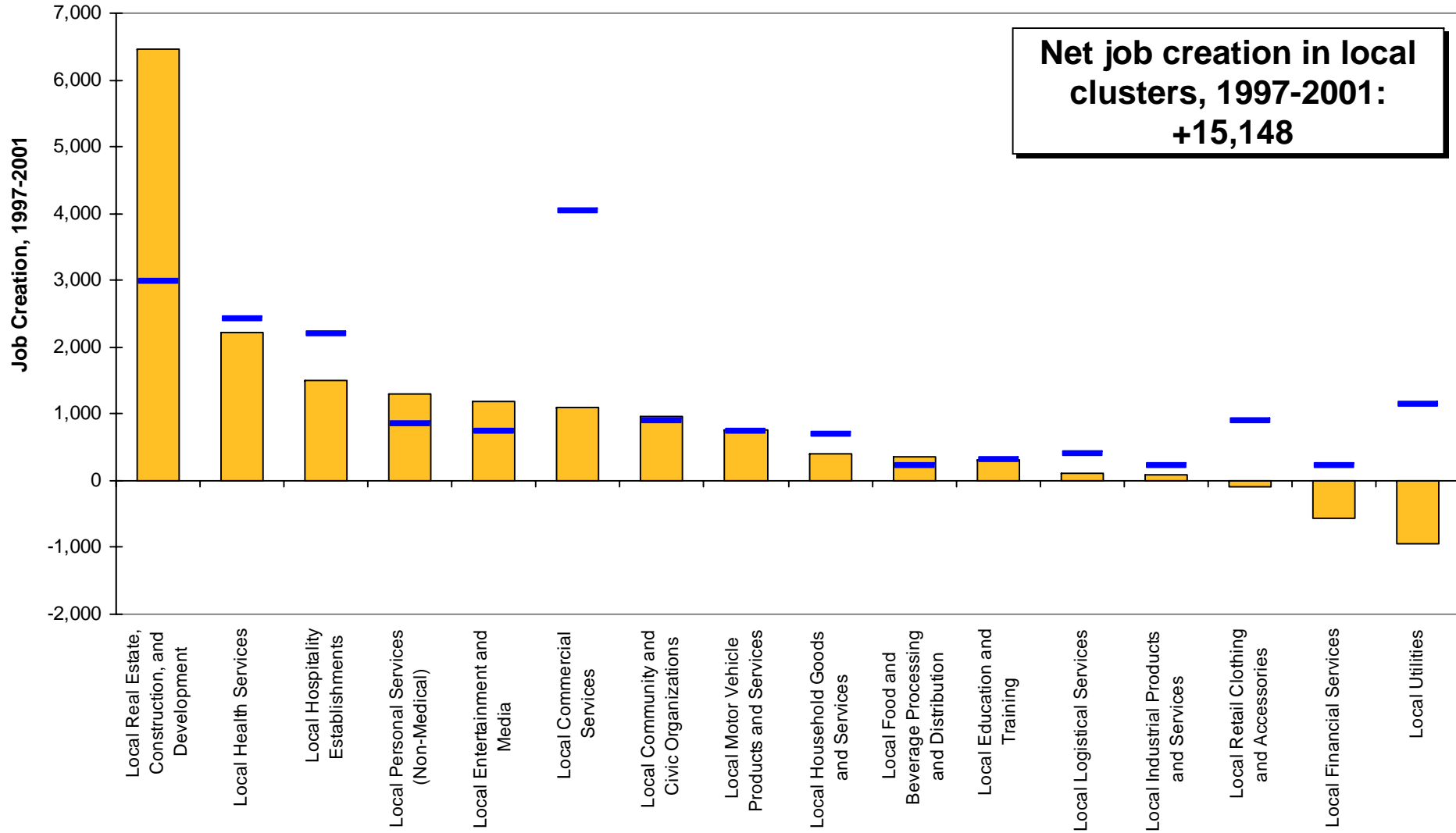


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment

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

Job Creation By Local Cluster

Southeast Region

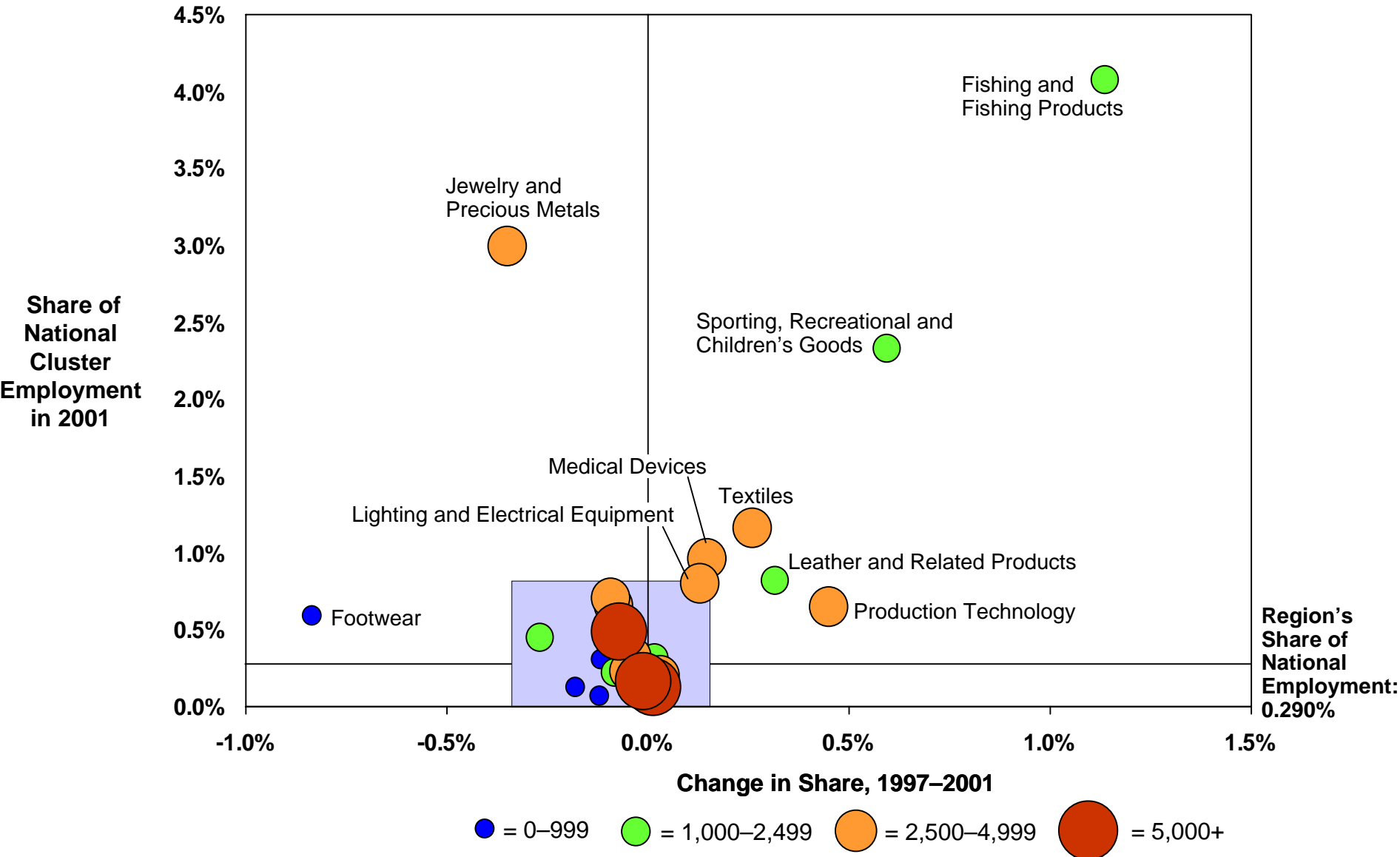


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment

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

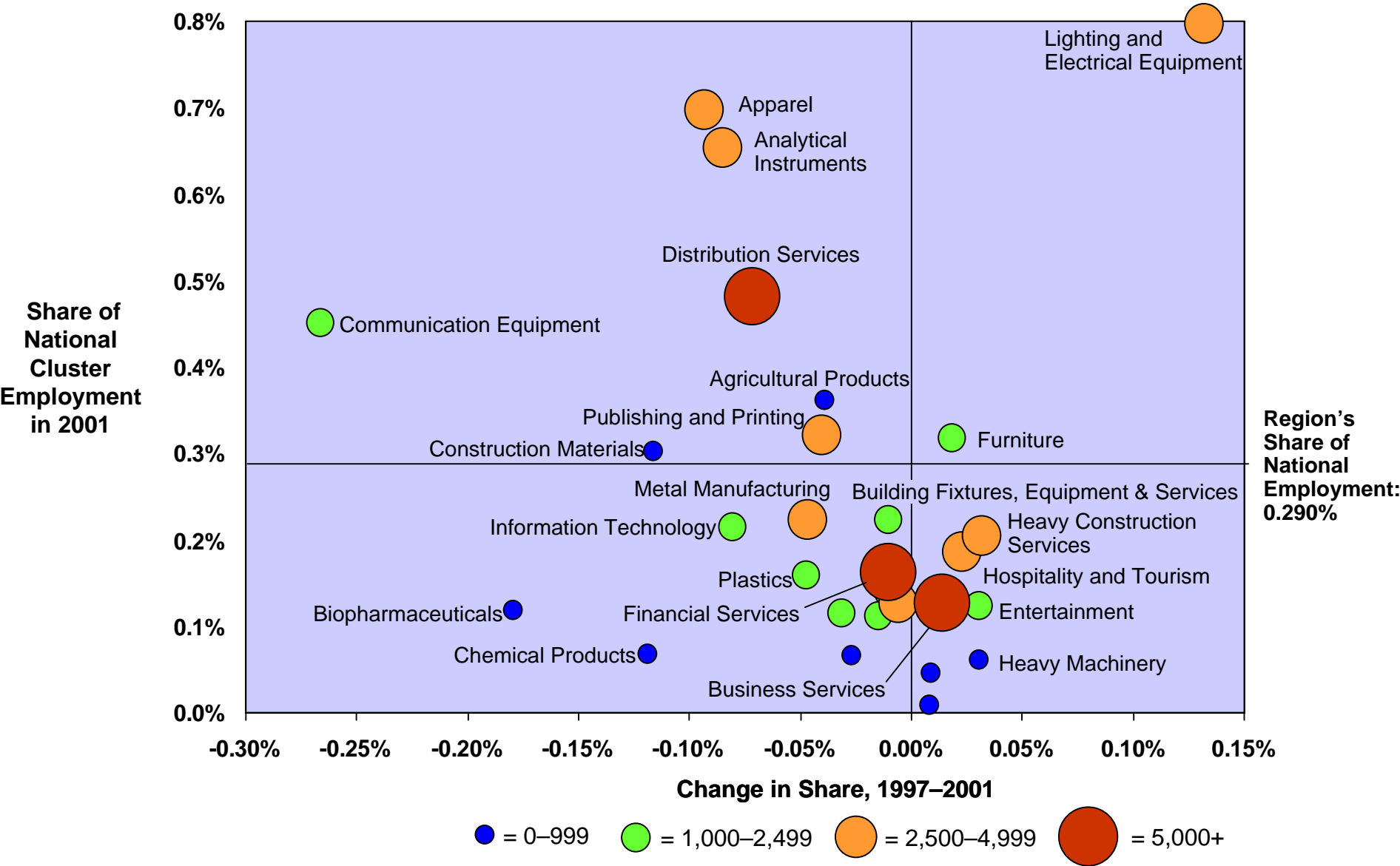
Specialization By Traded Cluster

Southeast Region



Specialization By Traded Cluster

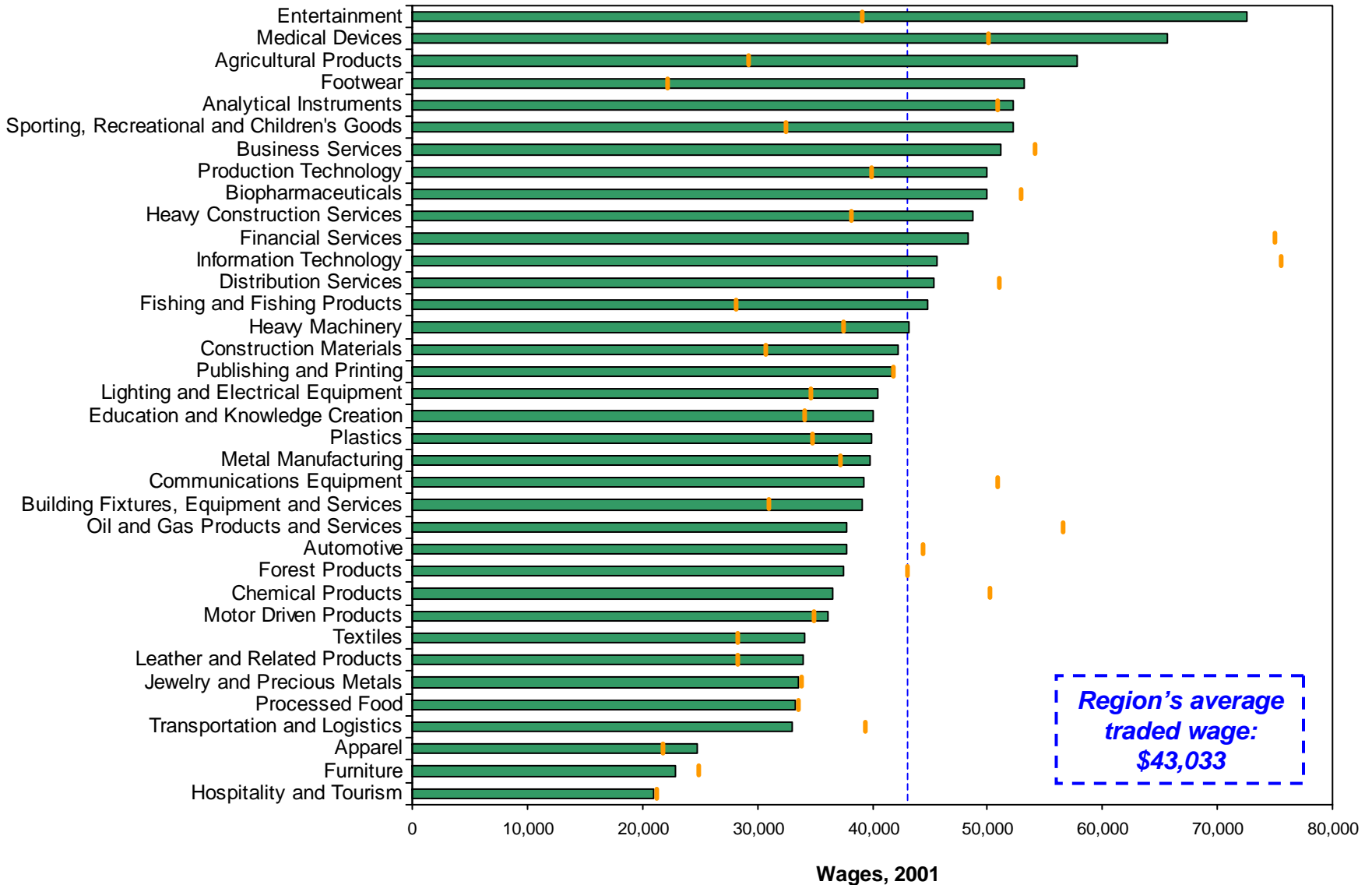
Southeast Region



Source: Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School
 RCC Profiles - RB10

Wages By Traded Cluster

Southeast Region with US Benchmarks



*Region's average
traded wage:
\$43,033*

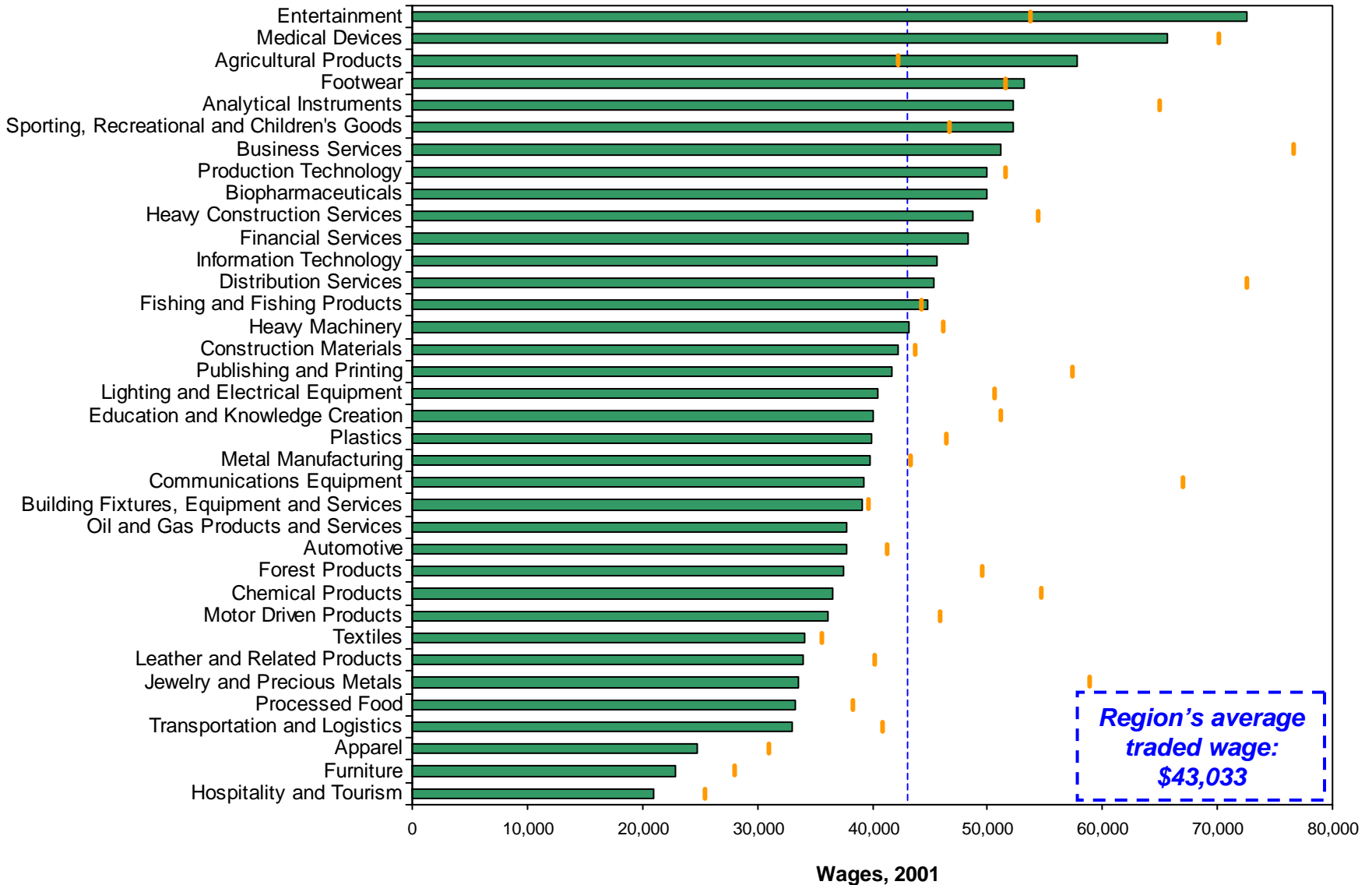
| - Indicates US average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Wages By Traded Cluster

Southeast Region with State Benchmarks



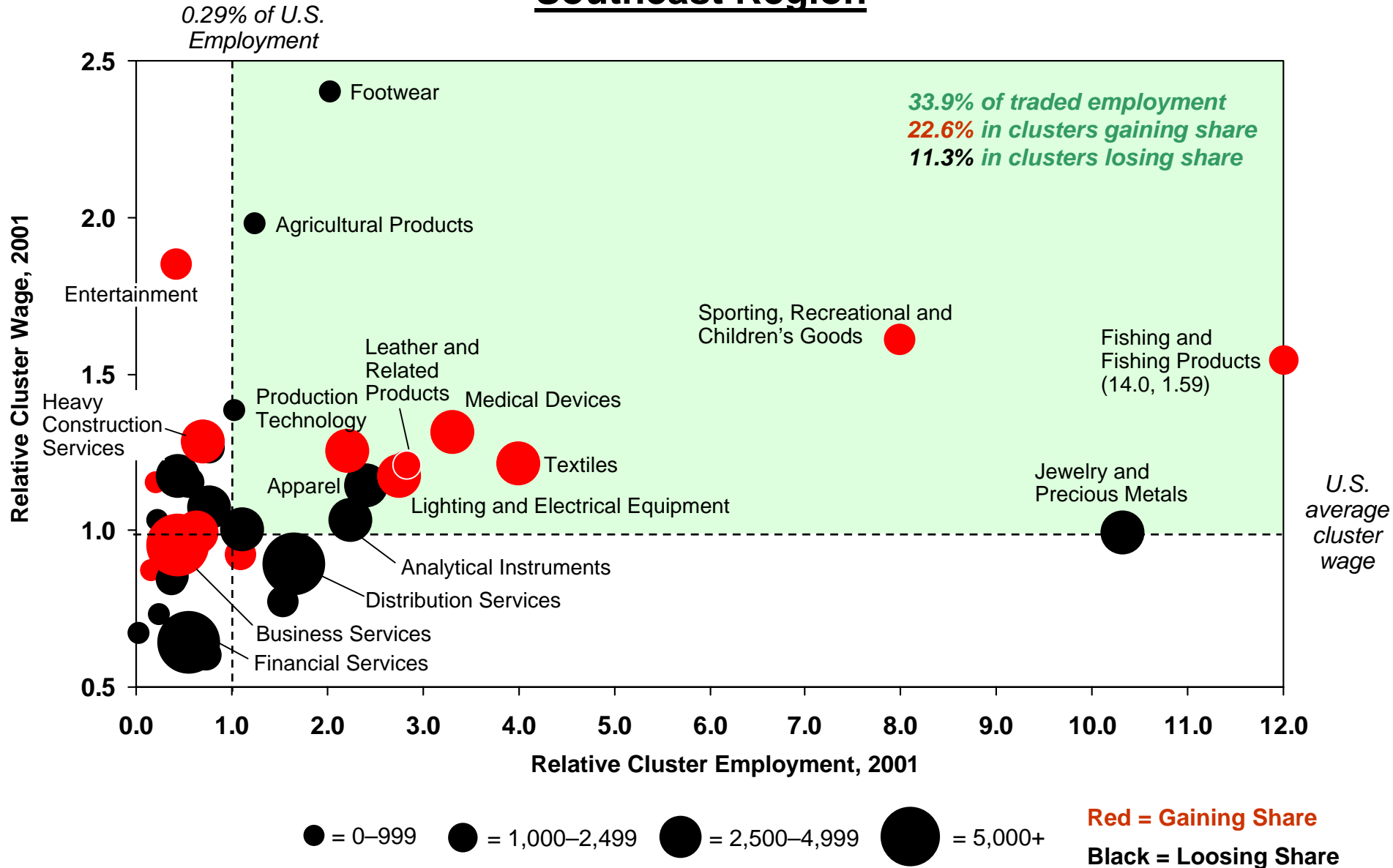
| - Indicates Massachusetts average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Relative Cluster Performance

Southeast Region



Note: Data points that fall outside the graph are placed on the borders with their values given in parentheses (Employment, Wage)

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

Patents by Organization

Southeast Region

	Organization	Patents Issued from 1997 to 2001
1	ACUSHNET COMPANY	115
2	JOHNSON & JOHNSON PROFESSIONAL INC.	61
3	TEXAS INSTRUMENTS, INCORPORATED	49
4	FOXBORO COMPANY	37
5	GILLETTE COMPANY	27
6	UNITED STATES OF AMERICA, NAVY	26
7	DEPUY ORTHOPAEDICS, INC.	18
8	MOTOROLA, INC.	17
9	KOPIN CORPORATION	16
10	AVERY DENNISON CORPORATION	15
11	EMC CORPORATION	14
12	BOSTON SCIENTIFIC CORPORATION	11
13	ETHICON ENDO-SURGERY	11
14	POLAROID CORPORATION	11
15	HOLIDAY HOUSEWARES, INC.	10
16	REEBOK INTERNATIONAL, LTD.	9
17	PLC MEDICAL SYSTEMS, INC.	9
18	DRESSER INDUSTRIES, INC.	9
19	WATERS INVESTMENTS LIMITED	9
20	SCI-MED LIFE SYSTEMS, INC.	9
21	SUN MICROSYSTEMS, INC.	8
22	DURACELL INC.	7
23	MEDICAL & SCIENTIFIC, INC.	7
24	CHIRON DIAGNOSTICS CORPORATION	7
25	THOMAS & BETTS INTERNATIONAL, INC.	7
26	TNCO, 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

Leading Sub-Clusters by Location Quotient

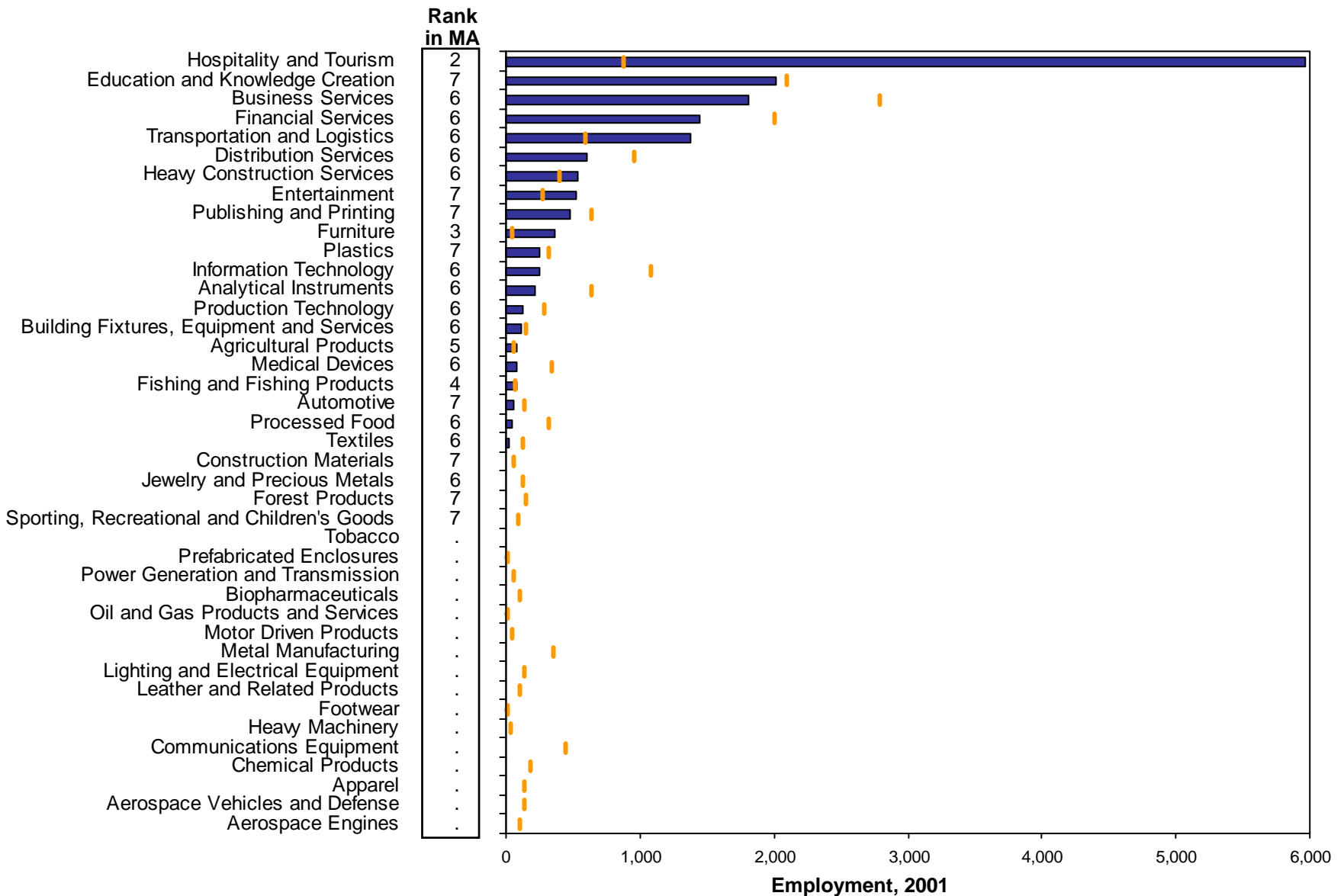
Southeast Region, 2001

Cluster	Subcluster	Location Quotient	Share of National Employment	Rank among Massachusetts Regions	Employment
Distribution Services	Apparel and Accessories Wholesaling	4.94	1.43%	1	3,150
	Catalog and Mail-order	3.86	1.12%	1	2,557
	Food Products Wholesaling	2.69	0.78%	2	1,244
Analytical Instruments	Process Instruments	5.84	1.69%	3	3,201
Hospitality and Tourism	Ground Transportation	2.78	0.81%	2	779
Textiles	Specialty Apparel Components	12.08	3.50%	1	976
	Finishing Plants	9.69	2.81%	1	528
	Fabric Mills	8.82	2.56%	1	2,500
	Specialty Fabric Processing	3.62	1.05%	1	129
Production Technology	Process Equipment Sub-systems and Components	3.61	1.05%	1	3,374
Jewelry and Precious Metals	Jewelry and Precious Metal Products	11.69	3.39%	1	3,398
	Costume jewelry	8.85	2.57%	1	235
Medical Devices	Surgical Instruments and Supplies	5.77	1.67%	2	3,291
	Ophthalmic Goods	2.60	0.76%	2	202
Apparel	Knitting and Finishing Mills	3.52	1.02%	1	888
	Men's Clothing	3.44	1.00%	1	1,145
	Women's and Children's Clothing	2.57	0.75%	1	1,354
Publishing and Printing	Photographic Equipment and Supplies	4.14	1.20%	2	591
Lighting and Electrical Equipment	Lighting Fixtures	10.06	2.92%	1	1,113
Sporting, Recreational and Children's Goods	Sporting and Athletic Goods	11.59	3.36%	1	2,224
	Games, Toys, and Children's Vehicles	2.55	0.74%	2	161
Communications Equipment	Electrical and Electronic Components	3.92	1.14%	2	1,830
Fishing and Fishing Products	Fishing and Hunting	37.02	10.74%	1	1,069
	Fish Products	8.80	2.55%	2	896
	Processed Seafoods	3.41	0.99%	2	42
Automotive	Automotive Components	3.59	1.04%	1	817
Furniture	Furnishings	5.08	1.47%	1	970
Leather Products	Coated Fabrics	10.11	2.93%	3	257
	Accessories	8.55	2.48%	1	312
Agricultural Products	Agricultural Products	2.53	0.73%	1	771
Construction Materials	Rubber Products	4.06	1.18%	1	580
Chemical Products	Special Packaging	3.50	1.01%	2	109
Footwear	Footwear Parts	22.82	6.62%	1	124

Cape and Islands Region

Employment By Traded Cluster

Cape and Islands Region

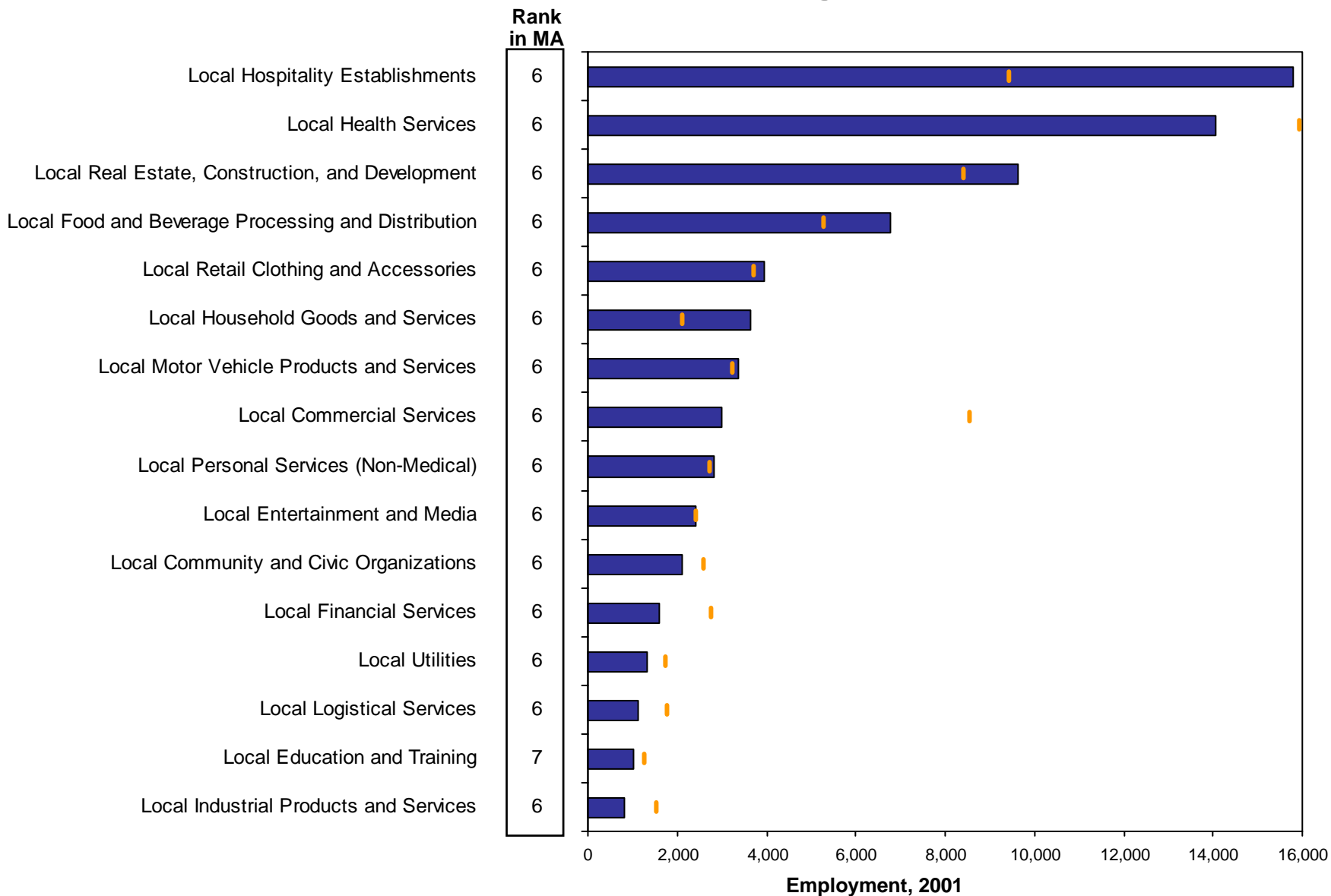


| - Indicates expected employment at rates in the **state benchmark** for traded clusters. Rank is across 7 state regions.

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

Employment By Local Cluster

Cape and Islands Region

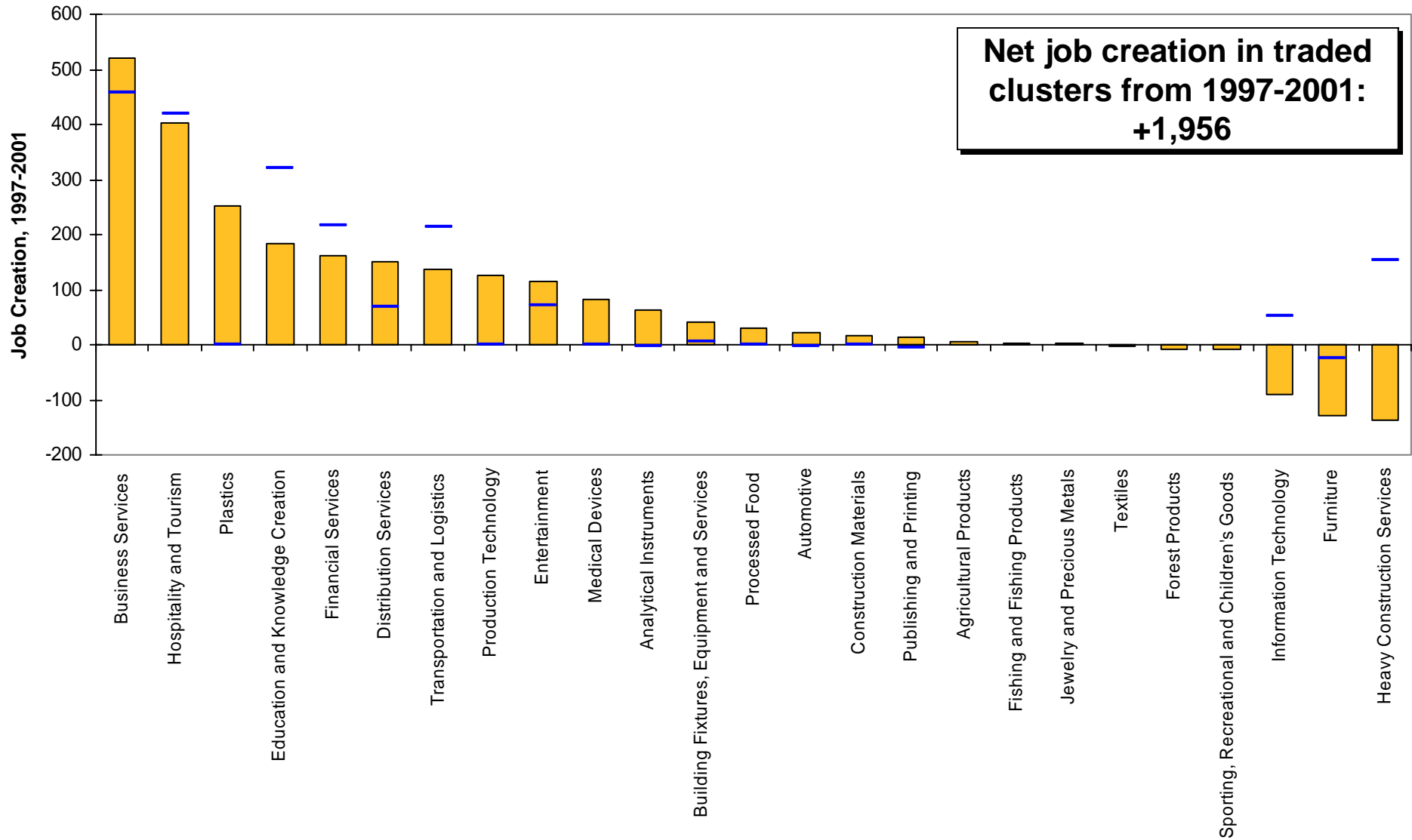


| - Indicates expected employment at rates in the **state benchmark** for local clusters. Rank is across 7 state regions.

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

Job Creation By Traded Cluster

Cape and Islands Region

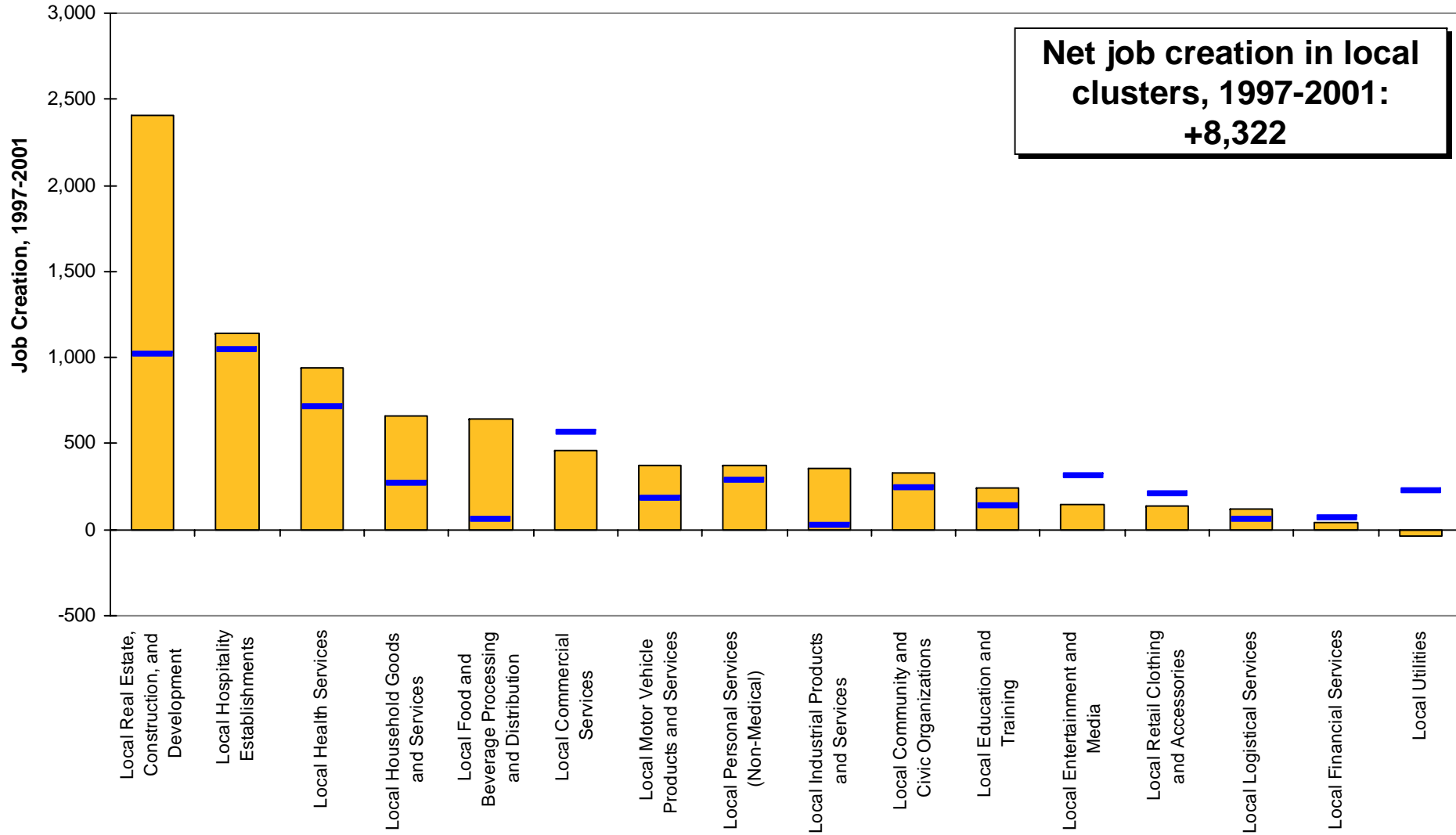


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment.

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

Job Creation By Local Cluster

Cape and Islands Region

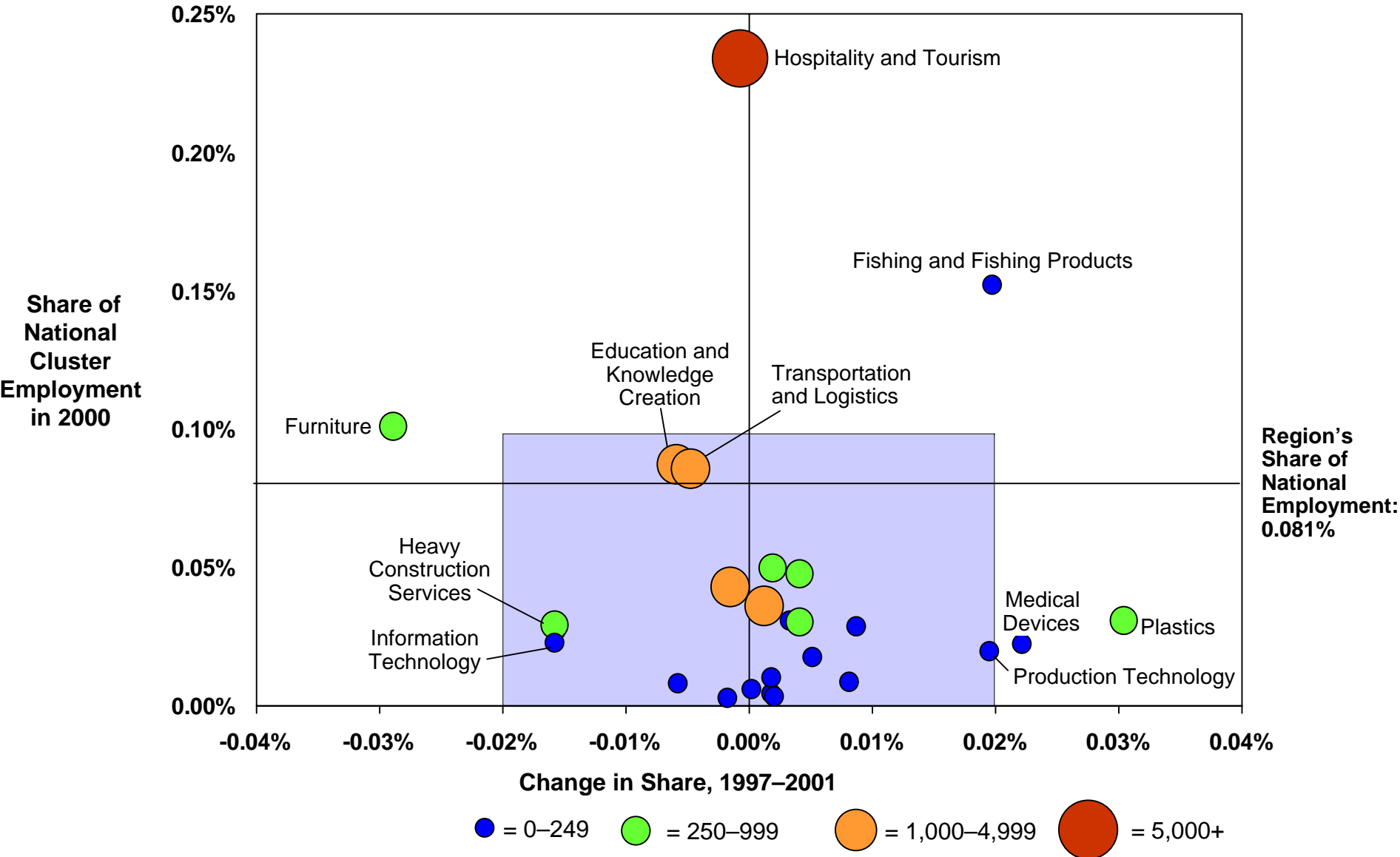


— Indicates expected job creation at rates achieved in **national benchmark** clusters, i.e. % change in national benchmark times initial employment

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

Specialization By Traded Cluster

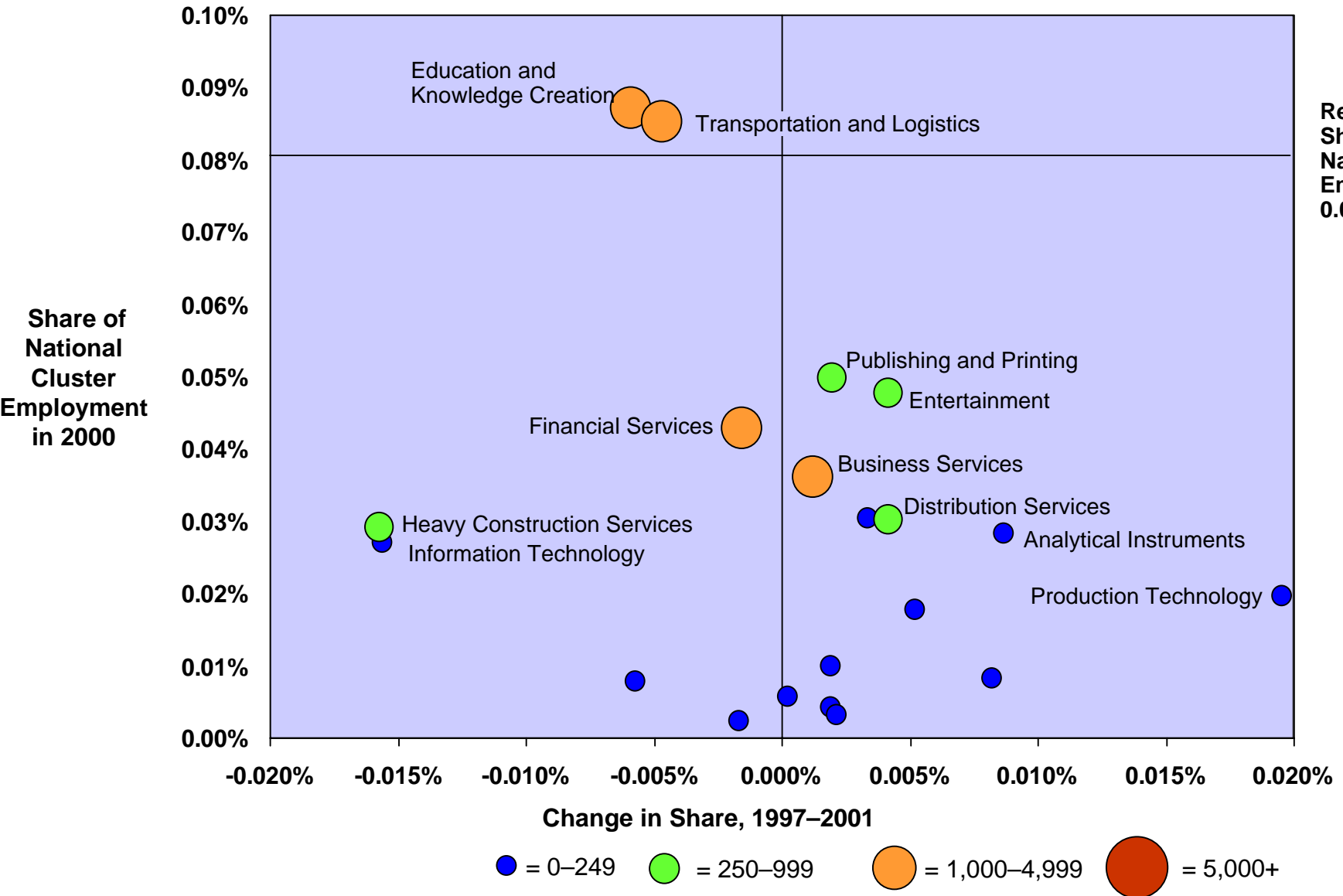
Cape and Islands Region



Specialization By Traded Cluster

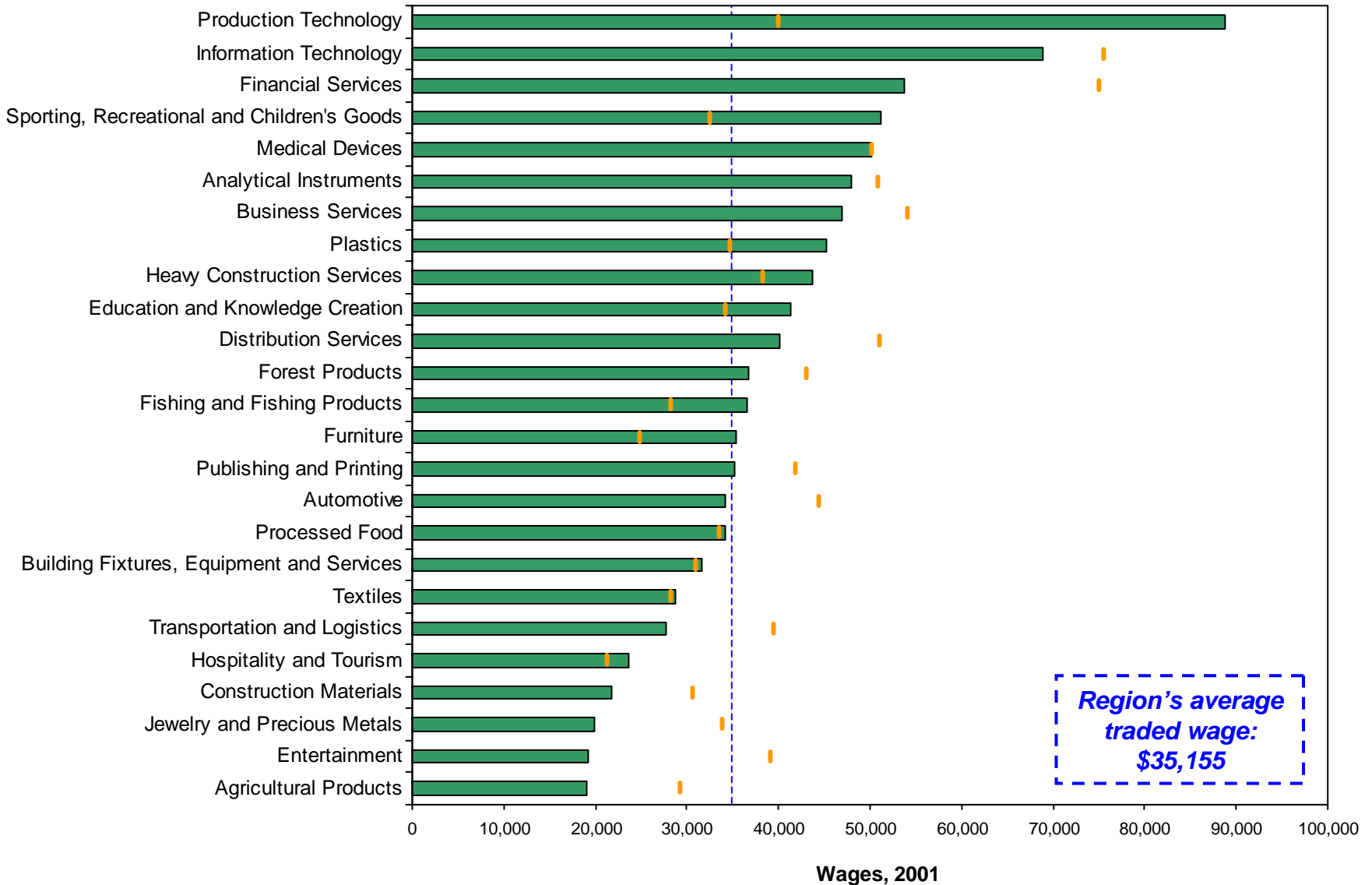
Cape and Islands Region

Region's
Share of
National
Employment:
0.081%



Wages By Traded Cluster

Cape and Islands Region with US Benchmarks



**Region's average
traded wage:
\$35,155**

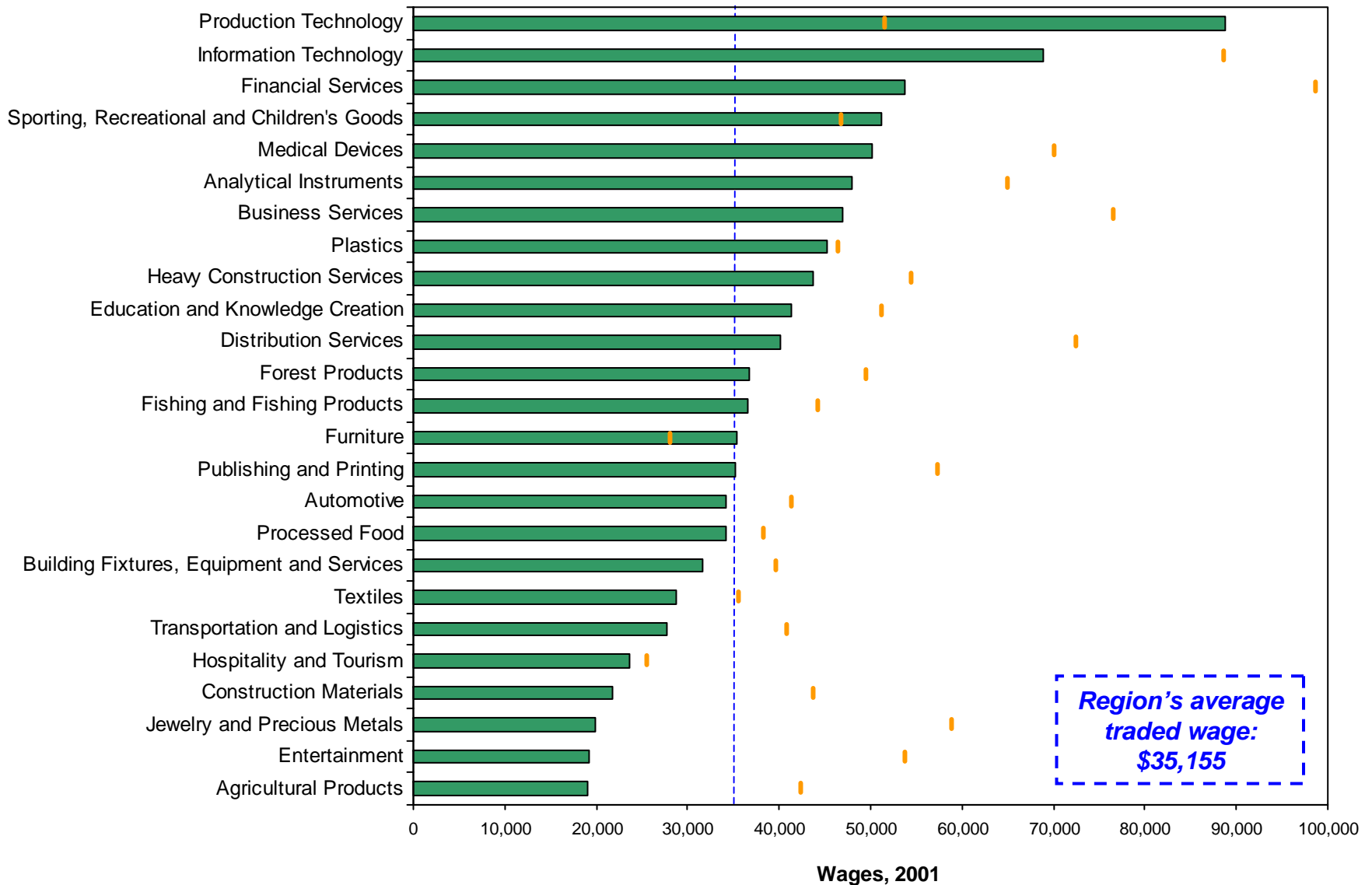
■ - Indicates US average wage in the cluster.

Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Wages By Traded Cluster

Cape and Islands Region with State Benchmarks



**Region's average
traded wage:
\$35,155**

! - Indicates Massachusetts average wage in the cluster.

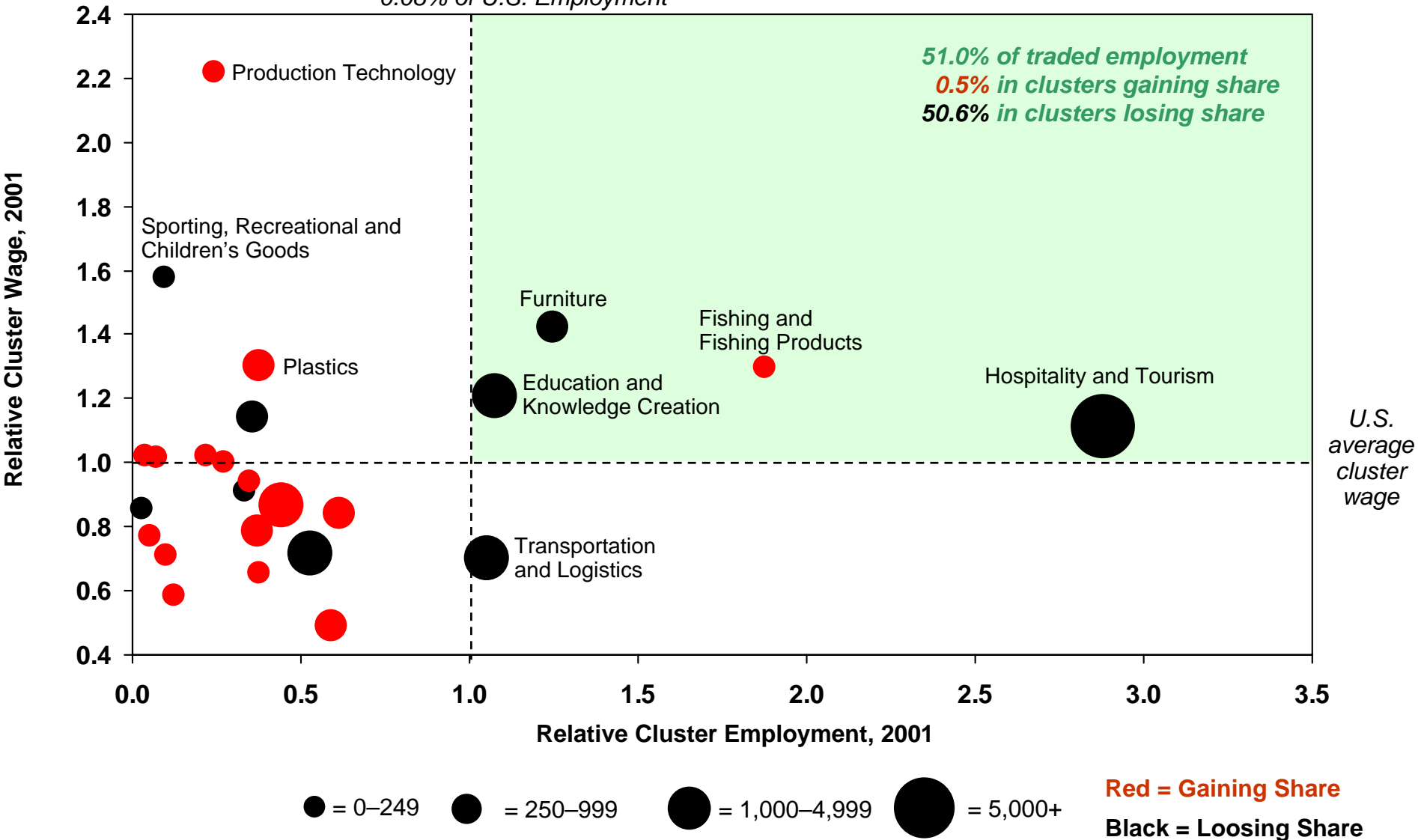
Note: Wages are not available in all clusters due to data suppression to protect confidentiality.

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

Relative Cluster Performance

Cape and Islands Region

0.08% of U.S. Employment



Patents by Organization

Cape and Islands Region

	Organization	Patents Issued from 1997 to 2001
1	SENTINEL PRODUCTS CORP.	14
2	JOHNSON & JOHNSON PROFESSIONAL INC.	8
3	EXCEL SWITCHING CORPORATION	8
4	RARE EARTH MEDICAL, INC.	7
5	ASSOCIATES OF CAPE COD, INC.	7
6	MARINE BIOLOGICAL LABORATORY	6
7	SENCORP SYSTEMS, INC.	6
8	CARDIOFOCUS, INC.	5
9	PACESETTER, INC.	4
10	WOODS HOLE OCEANOGRAPHIC INSTITUTION	4
11	EXCEL, INC.	4
12	EMERGING TECHNOLOGIES TRUST	4
13	CREATIVE PRODUCTS RESOURCE, INC.	4
14	CUSTOM CLEANER, INC.	4
15	BENTHOS, INC.	3
16	INFRA-TEMP, INC.	3
17	GENZYME CORPORATION	3
18	FLEX-REST, LLC	3
19	GOLDEN BRIDGE TECHNOLOGY, INC.	2
20	CREATIVE PRODUCTS RESOURCE, ASSOCIATES LTD.	2
21	ONSET COMPUTER CORP.	2
22	EARTH AND OCEAN SPORTS, INC.	2
23	GILLETTE COMPANY	2
24	STORMTREAT SYSTEMS, INC.	2
25	EXCEL SWITCHING CORPORATION	2
26	LINEX TECHNOLOGY, INC.	2

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

Leading Sub-Clusters by Location Quotient

Cape and Islands Region, 2001

Cluster	Subcluster	Location Quotient	Share of National Employment	Rank among Massachusetts Regions	Employment
Hospitality and Tourism	Boat Related Services	9.58	0.777%	1	649
	Water Passenger Transportation	3.81	0.309%	2	80
	Accommodations and Related Services	3.08	0.250%	2	4,530
	Tourism Related Services	1.53	0.124%	4	317
	Tourism Attractions	1.50	0.121%	6	337
	Ground Transportation	0.61	0.050%	6	48
Education and Knowledge Creation	Research Organizations	3.63	0.295%	3	1,473
	Educational Facilities	2.64	0.214%	7	315
Business Services	Laundry Services	1.83	0.149%	6	21
	Management Consulting	0.67	0.055%	6	691
	Photocopying	0.57	0.046%	6	38
Financial Services	Depository Institutions	1.32	0.107%	6	998
Transportation and Logistics	Bus Transportation	5.45	0.442%	4	109
	Marine Transportation	2.86	0.232%	2	229
	Air Transportation	1.20	0.097%	5	838
	Airports	0.75	0.061%	4	83
Distribution Services	Food Products Wholesaling	1.67	0.135%	4	216
	Transportation Vehicle and Equipment Distribution	1.14	0.092%	5	55
Heavy Construction Services	Subcontractors	0.80	0.065%	6	284
Entertainment	Entertainment Related Services	0.94	0.077%	6	208
	Entertainment Venues	0.82	0.066%	7	290
Publishing and Printing	Printing Services	1.39	0.112%	7	290
	Publishing	0.71	0.057%	7	181
Furniture	Furniture	2.13	0.172%	1	359
Information Technology	Software	0.86	0.069%	5	245
Analytical Instruments	Search and Navigation Equipment	0.82	0.066%	3	117
	Process Instruments	0.62	0.050%	5	95
Production Technology	Fabricated Plate Work	1.92	0.156%	5	126
Building Fixtures, Equipment and Services	Stone and Tile Work	0.82	0.066%	3	33
Agricultural Products	Farm Management and Related Services	1.06	0.086%	5	83
Fishing and Fishing Products	Fishing and Hunting	9.29	0.753%	4	75
Processed Food	Malt Beverages	0.52	0.043%	2	14
Textiles	Carpets and Rugs	0.57	0.046%	1	21

Appendix

Components of Regional Economies

A region's economy can be divided into traded clusters, local clusters, and natural endowment industries:

Traded clusters include those industries that compete across regions, and which tend to concentrate in particular locations. Traded clusters are the engines of regional economic competitiveness. While they account for only about a third of employment, they achieve the highest wages and productivity levels and drive demand for localized businesses.

Local clusters involve activities serving almost exclusively the local market. Local clusters are present in every region in roughly the same proportions. They employ the majority of people in any regional economy, so their efficiency is critical for competitiveness in traded clusters. However, they cannot prosper over the long run without success in the traded clusters.

Natural Endowment-dependent industries concentrate at natural resource sites. They account for a small and declining share of national employment but can be relatively high wage.

The Cluster Mapping Project data presented here has focused primarily on traded clusters, though it contains some information about other categories of industries. The performance of traded clusters holds the key to present and future competitiveness.

Employment by Traded Cluster

Within the broad category of traded clusters, a region's economy can be divided into individual clusters. Clusters are geographically proximate groups of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. Examples include automotive producers in Michigan and Ohio, information technology in Silicon Valley, and money management in Boston.

The 41 traded clusters (and their 264 component subclusters) utilized in the Cluster Mapping Project were developed using statistical analysis of the actual patterns of business location in the U.S. economy. Clusters and subclusters are listed at the end of this appendix.

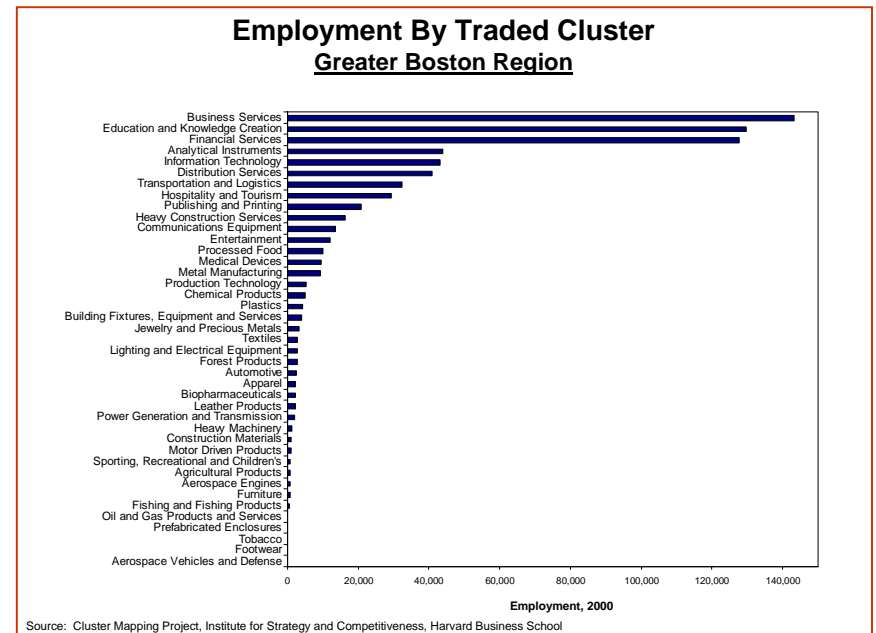
Interpretation:

This chart gives total employment in the regional economy by each traded cluster.

Employment by cluster gives a more detailed profile of the activities in the regional economy that make up the job base. It can be used to understand the importance of the health of various groups or industries on the overall prosperity of the region.

The small, yellow benchmark lines provide a comparison to the average employment in the cluster in the state. If the region's employment in the cluster as a percent of total traded employment matched that of the state, the employment bars would meet the benchmark lines.

Comparison to the state benchmark provides and indication of the regions participation in broader cluster activity in the state.



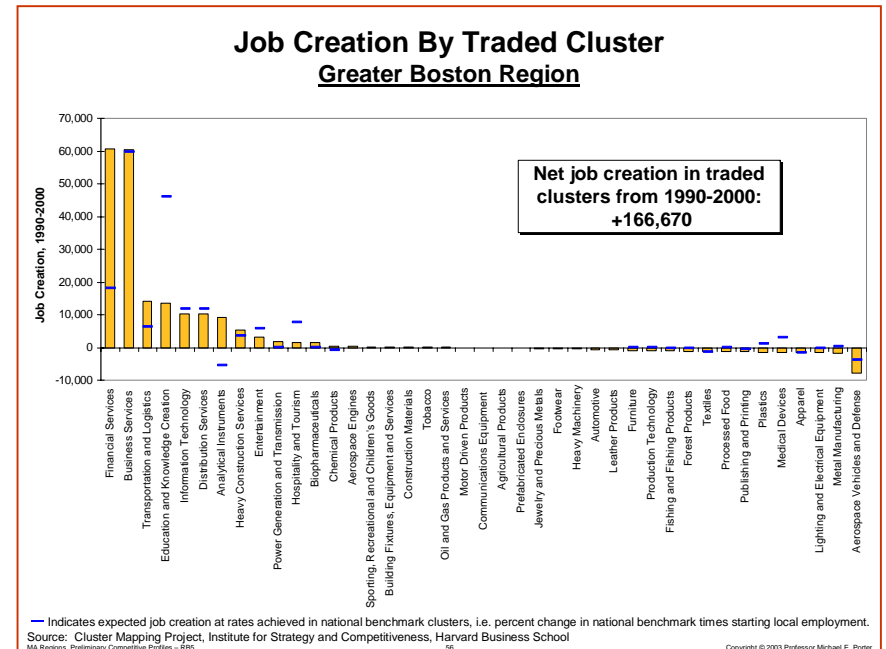
Job Creation by Traded Cluster

This chart shows the overall net change in traded jobs in the region over the period from 1990 to 2000 and the net gain or loss by traded cluster. The clusters are arranged in order of net jobs created. The blue bars provide benchmarks for job creation based upon rates of growth in the cluster throughout the U.S.

Interpretation:

This chart allows a region to identify its biggest job generators and job losers among traded clusters over the last decade. A few clusters often account for a large majority of the overall employment gain. Clusters with job losses are a cause for concern. It is helpful to compare job performance with the policy priorities a region has set.

Comparison of job growth relative to the U.S. benchmarks provides insights into the strengths and weaknesses in the region's economy and shifts in the region's competitive position. A region might not be participating in a cluster which is surging nation-wide; or a region might be gaining market position in an important cluster.



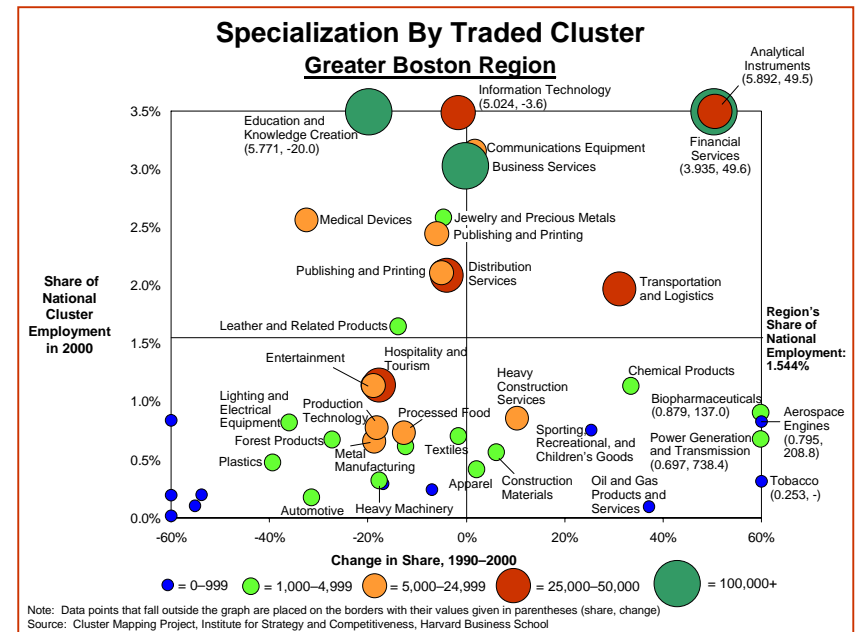
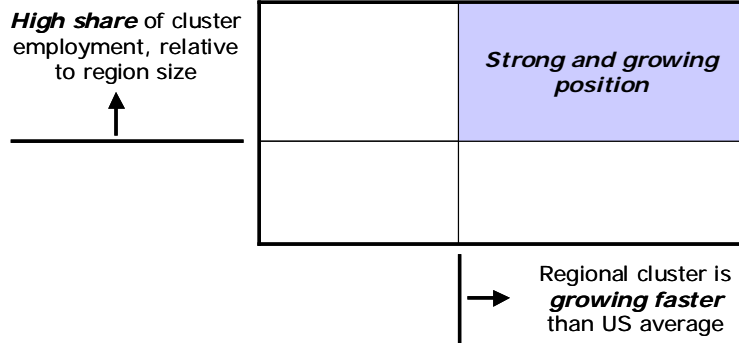
Specialization by Traded Cluster

While the previous charts have focused on absolute employment and changes in employment, the Specialization chart shows the region's competitive position by traded cluster.

The size of each cluster "bubble" is proportional to the number of jobs in the region.

The location of each cluster bubble on the chart identifies a cluster's relative performance in the US economy:

- Clusters on the **top** half of the chart have local employment levels that are more than proportionate to the region's overall employment. These are clusters in which the region is relatively specialized.
- Clusters on the **right** half of the chart are growing employment at a faster rate than the national average for those clusters. These are clusters in which the region is gaining position in terms of relative employment.



Wages by Traded Cluster

The region's clusters are listed in order by average wage. The yellow bars show the benchmark average wage for the cluster nationally. The average wage across all traded clusters in the region is indicated by the blue dashed line.

Wages are a direct measure of a cluster's productivity and competitiveness. Clusters that are exceptionally productive (the value of output produced per unit of labor) can sustain higher wages.

Note: The wages for some clusters may not be reported due to data suppression in the underlying government reports. When two or fewer employers in an industry are present in a given region, wage and precise employment figures are omitted to protect the confidentiality of the data.

Benchmark lines provide a comparison to wages in the cluster across the state or across the U.S.



Patents by Organization

This table lists by organization the top patent recipients in the region for the most recent five-year period. Patents are assigned to regions according to the inventor's address of residence. In the case of multiple inventors from different locations, the patent is assigned fractionally to each region. Universities, research institutes and government agencies are highlighted in blue.

Interpretation:

Patenting is the best single measure of innovation output. Regions with a healthy level of innovation tend to have patents originating from a variety of corporations across a number of fields as well as significant patenting from universities and research institutes. Concerns about innovative capacity arise when the patenting rate is low, patents originate principally from a government agency, or patenting is dominated by only a few large firms.

Patents by Organization Greater Boston Region

	Organization	Patents Issued from 1997 to 2001
1	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	506
2	MASSACHUSETTS GENERAL HOSPITAL	265
3	EMC CORPORATION	203
4	DIGITAL EQUIPMENT CORPORATION	184
5	POLAROID CORPORATION	163
6	HARVARD COLLEGE, PRESIDENT AND FELLOWS	149
7	MILLENNIUM PHARMACEUTICALS, INC.	144
8	SUN MICROSYSTEMS, INC.	128
9	ANALOG DEVICES, INC.	113
10	GENETICS INSTITUTE, INC.	111
11	BRIGHAM AND WOMEN'S HOSPITAL	108
12	BOSTON SCIENTIFIC CORPORATION	106
13	CHILDREN'S MEDICAL CENTER CORPORATION	89
14	COMPAQ COMPUTER CORPORATION, INC.	86
15	COGNEX CORPORATION	85
16	DANA-FARBER CANCER INSTITUTE, INC.	85
17	BOSTON UNIVERSITY	77
18	RAYTHEON COMPANY	76
19	GILLETTE COMPANY	69
20	VERTEX PHARMACEUTICALS, INC.	67
21	BETH ISRAEL DEACONESS MEDICAL CENTER, INC.	66
22	HEWLETT-PACKARD COMPANY	57
23	CABOT CORPORATION	57
24	CHARLES STARK DRAPER LABORATORY, INC.	54
25	MOTOROLA, INC.	52

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

Leading Sub-Clusters by Location Quotient

The Location Quotient is a ratio measure of the concentration of a cluster in a particular location relative to that locations average share of employment in the traded economy. So, LQ is a measure of an industry's level of concentration within a location, with an LQ > 1 indicating higher than average concentration in that location.

This chart selects the sub-clusters in the region with the highest LQs. The subclusters are grouped by cluster based on overall cluster employment in the region, and then ordered by subcluster LQ.

Sub-clusters with a high share of national employment and a high LQ may form the basis for developing a competitive position in a cluster. Strengths in a breadth of related sub-clusters are an indication of an established position in a cluster.

**Leading Sub-Clusters by Location Quotient
Greater Boston Region, 2000**

Cluster	Subcluster	Location Quotient	Share of National Employment	Employment
Business Services	Online Information Services	4.60	7.107%	12,600
	Marketing Related Services	2.18	3.366%	7,343
	Management Consulting	1.74	2.681%	30,398
	Computer Services	2.06	3.184%	14,069
	Computer Programming	2.40	3.708%	41,231
Education and Knowledge Creation	Research Organizations	3.25	5.025%	23,992
	Patent Owners and Lessors	2.90	4.478%	1,158
	Educational Institutions	4.14	6.399%	102,186
Financial Services	Securities Brokers, Dealers and Exchanges	4.70	7.260%	57,850
	Risk Capital Providers	3.21	4.957%	1,691
	Real Estate Investment Trusts	1.97	3.044%	783
	Investment Funds	4.22	6.516%	238
	Depository Institutions	2.44	3.774%	33,340
Analytical Instruments	Search and Navigation Equipment	6.50	10.044%	17,643
	Process Instruments	3.03	4.675%	9,289
	Optical Instruments	4.90	7.565%	1,546
	Laboratory Instruments	4.30	6.644%	7,512
Information Technology	Electronic Components	2.16	3.331%	7,893
	Software	5.13	7.916%	26,242
	Peripherals	3.19	4.919%	5,621
	Communications Services	5.46	8.433%	4,715
Publishing and Printing	Publishing	1.98	3.064%	9,752
	Photographic Equipment and Supplies	3.34	5.153%	2,690
	News Syndicates	1.84	2.845%	321
Communications Equipment	Communications Equipment	2.93	4.530%	11,476
Medical Devices	Medical Equipment	2.23	3.445%	2,177
	Diagnostic Substances	2.06	3.178%	1,346
Chemical Products	Biological Products	2.25	3.478%	817
	Ammunition	11.34	17.506%	1,345
Building Fixtures, Equipment and Services	Steam and Air-conditioning	2.39	3.686%	60
Jewelry and Precious Metals	Cutlery	10.72	16.550%	1,744
Leather Products	Coated Fabrics	4.20	6.493%	612
Oil and Gas Products and Services	Oil and Gas Trading	3.19	4.933%	97

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

Traded Clusters and Subclusters in the US Economy

Aerospace Engines Aircraft Engines Precision Metal Products	Chemical Products Intermediate Chemicals and Gases Packaged Chemical Products Other Processed Chemicals Refractories Leather Tanning and Finishing Ammunition Special Packaging Treated Garments	Furniture Furniture Wood Materials and Products Furnishings Tableware and Kitchenware	Metal Manufacturing Fabricated Metal Products Metal Alloys Primary Metal Products Precision Metal Products Fasteners Wire and Springs Metal Processing Iron and Steel Mills and Foundries Nonferrous Mills and Foundries Metal Furniture Environmental Controls Pumps Saw Blades and Hand Saws General Industrial Machinery Laundry and Cleaning Equipment Metal Armaments	Processed Food Milk and Frozen Desserts Baked Packaged Foods Coffee Processed Dairy and Related Products Meat and Related Products and Services Flour Specialty Foods and Ingredients Milling Candy and Chocolate Malt Beverages Paper Containers and Boxes Metal and Glass Containers Food Products Machinery
Aerospace Vehicles and Defense Aircraft Missiles and Space Vehicles Defense Equipment	Communications Equipment Communications Equipment Electrical and Electronic Components Specialty Office Machines	Heavy Construction Services Final Construction Subcontractors Primary Construction Materials Ceramic Tile Equipment Distribution and Wholesaling Fabricated Metal Structures and Piping Explosives	Motor Driven Products Motors and Generators Batteries Motorized Equipment Refrigeration and Heating Equipment Appliances Specialized Pumps Specialized Machinery Tires and Inner Tubes	Production Technology Machine Tools and Accessories Process Equipment Sub-systems and Components Hoists and Cranes Process Machinery Industrial Patterns Fabricated Plate Work Industrial Trucks and Tractors Ball and Roller Bearings
Agricultural Products Farm Management and Related Services Soil Preparation Services Irrigation Systems Packaging Fertilizers Agricultural Products Wine and Brandy Cigars Milling and Refining	Construction Materials Tile, Brick and Glass Plumbing Fixtures Wood Products Cut and Crushed Stone Gum and Wood Chemicals Rubber Products	Heavy Machinery Construction Machinery Farm Machinery Railroad Equipment and Rental Mining Machinery Machinery Components Valves and Pipe Fittings	Oil and Gas Products and Services Oil and Gas Machinery Hydrocarbons Oil and Gas Exploration and Drilling Oil Pipelines Petroleum Processing Oil and Gas Trading Water Freight Transportation Services	Publishing and Printing Publishing News Syndicates Signs and Advertising Specialties Photographic Services Photographic Equipment and Supplies Radio, TV, Publisher Representatives Printing Services Printing Inputs Paper Products Specialty Paper Products Inked Paper and Ribbons Office Equipment and Supplies
Analytical Instruments Laboratory Instruments Optical Instruments Process Instruments Search and Navigation Equipment Electronic Components	Distribution Services Merchandise Wholesaling Apparel and Accessories Wholesaling Catalog and Mail-order Food Products Wholesaling Farm Material and Supplies Wholesaling Transportation Vehicle and Equipment Distribution	Hospitality and Tourism Tourism Attractions Tourism Related Services Water Passenger Transportation Accommodations and Related Services Boat Related Services Ground Transportation	Plastics Plastic Materials and Resins Plastic Products Paints and Allied Products Synthetic Rubber	Sporting, Recreational and Children's Goods Sporting and Athletic Goods Games, Toys, and Children's Vehicles Motorcycles and Bicycles
Apparel Men's Clothing Women's and Children's Clothing Hosiery and Other Garments Accessories Knitting and Finishing Mills	Education and Knowledge Creation Educational Institutions Research Organizations Educational Facilities Patent Owners and Lessors Supplies	Information Technology Computers Electronic Components and Assemblies Peripherals Software Communications Services	Power Generation and Transmission Electric Services Turbines and Turbine Generators Transformers Porcelain, Carbon and Graphite Components Electronic Capacitors	Textiles Fabric Mills Specialty Fabric Mills Specialty Fabric Processing Textile Machinery Yarn and Thread Mills Carpets and Rugs Wool Mills Fibers Finishing Plants Specialty Apparel Components Women's and Children's Underwear Tire Cord and Fabrics
Automotive Motor Vehicles Automotive Parts Automotive Components Forgings and Stampings Flat Glass Production Equipment Small Vehicles and Trailers	Entertainment Video Production and Distribution Recorded Products Entertainment Equipment Entertainment Related Services Entertainment Venues	Jewelry and Precious Metals Jewelry and Precious Metal Products Costume Jewelry Cutlery Collectibles	Prefabricated Enclosures Recreational Vehicles and Parts Mobile Homes Trucks and Trailers Caskets Elevators and Moving Stairways Office Furniture Household Refrigerators and Freezers Aluminum Processing	Tobacco Cigarettes Other Tobacco Products Tobacco Processing Specialty Packaging
Biopharmaceuticals Biopharmaceutical Products Health and Beauty Products Containers	Financial Services Depository Institutions Securities Brokers, Dealers and Exchanges Insurance Products Health Plans Risk Capital Providers Investment Funds Real Estate Investment Trusts Passenger Car Leasing	Leather and Related Products Leather products Fur Goods Coated Fabrics Related Products Accessories		
Building Fixtures, Equipment and Services Plumbing Products Drapery Hardware Fabricated Materials Heating and Lighting Furniture and Fittings Clay and Vitreous Products Floor Coverings Steam and Air-conditioning Stone and Tile Work Wood Cabinets, Fixtures and Other Products Concrete, Gypsum and Other Building Products	Fishing and Fishing Products Fish Products Fishing and Hunting Processed Seafoods	Lighting and Electrical Equipment Lighting Fixtures Electric Lamps Batteries Switchgear Electrical Parts Metal Parts		
Business Services Management Consulting Online Information Services Computer Services Computer Programming Photocopying Marketing Related Services Professional Organizations and Services Engineering Services Laundry Services Facilities Support Services	Footwear Footwear Specialty Footwear Footwear Parts	Medical Devices Surgical Instruments and Supplies Dental Instruments and Supplies Ophthalmic Goods Medical Equipment Diagnostic Substances Biological Products		Transportation and Logistics Air Transportation Bus Transportation Marine Transportation Ship Building Transportation Arrangement and Warehousing Trucking Terminal Airports Bus Terminals

Note: Tier 1 subclusters only.

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