MASSACHUSETTS BENCHMARKS

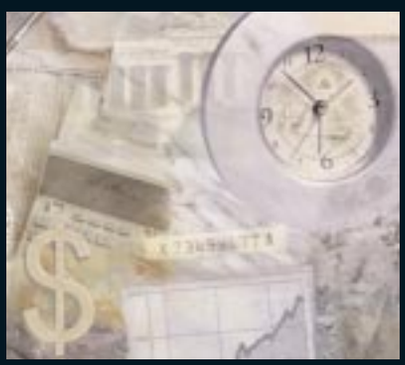
• The Quarterly Review of Economic News & Insight

• Spring '98 Volume One Issue 2

- Economic Currents
- Breaking the Mold in Massachusetts
- Worcester County: Working Toward The Millennium

A PUBLICATION OF THE UNIVERSITY OF MASSACHUSETTS

IN COOPERATION WITH THE FEDERAL RESERVE BANK OF BOSTON



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MASSACHUSETTS BENCHMARKS

spring 1998

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Letter FROM THE PRESIDENT

WELCOME TO THE SECOND ISSUE of *Massachusetts Benchmarks*. The issue opens with *Excerpts from the Board*, the editorial board's look ahead at how the state's economy might be affected for good or ill by the crises in the Asian nations, a tightening labor market, and a volatile stock market.

Alan Clayton-Matthews follows with an in-depth consideration of the recent performance of the state's economy. He pays particular attention to those conditions that might hold down its rate of growth in the short run.

In *From the Field*, John Mullin offers a status report on economic activity in Worcester County. Though the number of its manufacturing jobs has fallen since 1984, many of the jobs that remain are in industries that are doing well. At the same time, the county's strengths in such fields as higher education and health care and biotechnology provide a useful degree of diversification. These industries also mirror the strength of industries in Greater Boston. "Today, as the Worcester County economy grows," Mullin adds, "it is difficult to separate the metropolises of Boston and Worcester."

Robert Forrant describes the role of plastics in the state's economy, and then submits a potentially sobering view of its prospects.

Lou DiNatale and Ralph Whitehead, Jr., report the results of their latest survey of state voters. The topic: the public's sense of its economic security.

At the Center complements the issue's articles with displays of economic data. It begins with the University's index of the state's recent economic performance.

In this issue, we continue our task of measuring and describing the Massachusetts economy. We hope you find the information useful.

WILLIAM M. BULGER
President
University of Massachusetts

EXCERPTS FROM THE BOARD

oh, what difference a quarter makes.

When members of the editorial board met last fall, economic concerns were largely speculative. This time around, the group immediately began discussing existing risks and their real implications.

The Asian Crises

Last quarter, the emerging financial crises in the Asian "tiger" economies did not seem a threat. This time, it led the conversation.

For many of those involved with this discussion, it seemed most likely that only small reverberations from the Asian crisis will be felt in the state, through changes in exports and cheaper Asian products. Weaker Asian currencies will make US goods more expensive in Asian markets, which will lead to a decline in the demand for state exports in Asia.

The weakness of Asian currencies also makes Asian goods less expensive in US markets: potentially, these cheaper goods will displace US products. Asian products may also displace US goods in other markets, such as Europe. This situation may benefit US firms that use components produced in Asia, and allow consumers to enjoy lower prices.

Labor Market Tightness

Labor markets continue to tighten, threatening increased wage and salary inflation. Shortages in key occupations are even more acute and continue to cause concern.

In the last three years, previously sharp increases in the cost of employee benefits flattened out, primarily because of a shift to managed care health insurance plans; this held down total labor costs. This moderating force seems gone and evidence exists that non-wage labor costs are now rising.

Concern was expressed about lower labor force participation rates and higher unemployment rates for minorities. Seeing these issues exist in this buoyant economy raises long-term concerns about income distribution in the state and questions about the extent of the current prosperity.

Stock Market Volatility

Over the past few months most equity markets, both domestically and internationally, have exhibited more volatility. If a serious downturn in equity markets results in a smaller volume of investments transactions, this event would disproportionately affect the Massachusetts economy, because of the large representation in the financial services industry, particularly mutual funds.

A serious downturn in equity values will also reduce liquidity in the economy and short circuit the expansion. Consumption spending would likely decline because of a "wealth effect." Decreased confidence could adversely affect both consumption and investment spending.

What's Ahead

While the Asian crises led the discussion of new risks, the group noted that the situation may actually benefit both the nation and the state by cooling down an economy that was in danger of overheating, making an increase in interest rates by the Fed unnecessary.

The group also observed that over the next year, Massachusetts may experience lower growth rates and return to slightly higher but healthy unemployment rates. At the same time, the market for office space will continue tightening in Boston and throughout the state.

But then again, let's see what next quarter brings.

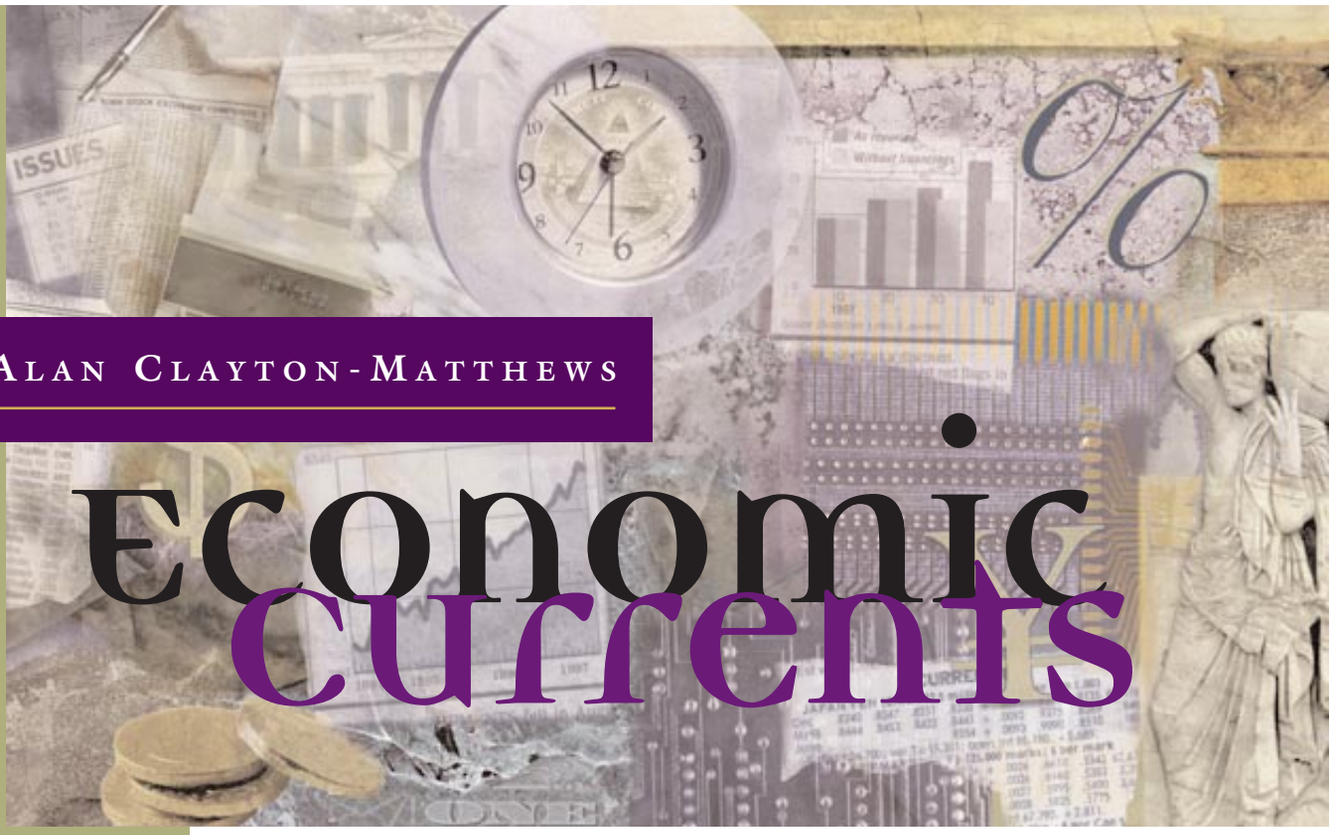


ILLUSTRATION: NAOMI SHEA

ALAN CLAYTON-MATTHEWS

Economic currents

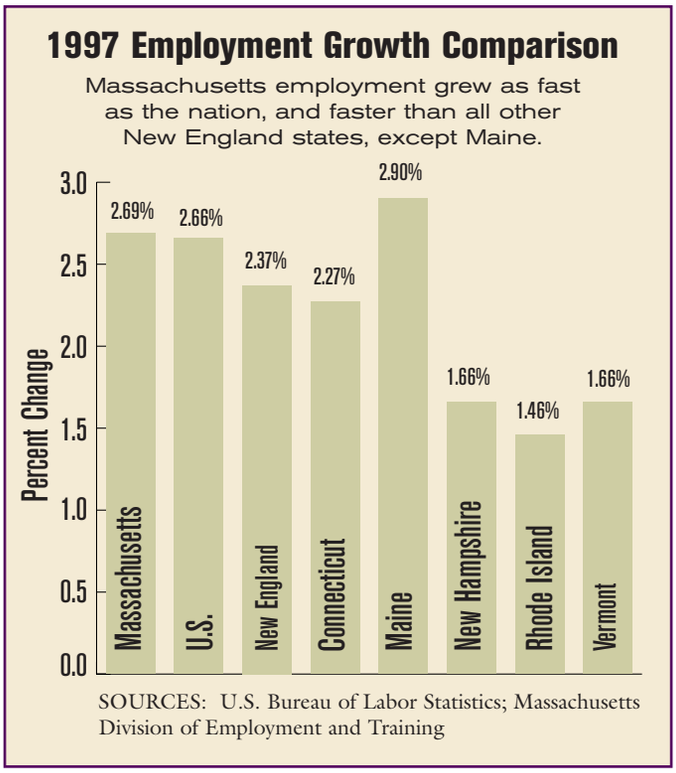
The Massachusetts economy continues to perform well, with high growth and low inflation. The question is, how long can this continue? In this issue we review the state's current economic performance. We also look at the financial crisis in Asia and the volatility in the stock market, which add some uncertainty to the outlook.

The Current Situation: Massachusetts Job Growth in High Gear

Over the last 12 months ending in December 1997, Massachusetts employers led the region in job creation. Nonagricultural establishment employment grew at an annual rate of 3.1%.[1] During the same period, the nation's employment grew at a 2.6% rate. Over the long term, employment in the state has historically grown less than in the nation as a whole. And, for several years, New Hampshire and Vermont were the employment growth leaders in New England, making the recent strength in Massachusetts notable.

The number of Massachusetts residents who are working, commonly called "household" employment, is another measure of employment. By this measure, employment grew at the more moderate – but still strong – rate of 1.7% over the last 12 months ending in December 1997.

Two differences in the definitions of these employment measures most likely account for the discrepancy between these two growth figures. First, establishment employment counts the number of employees on payrolls of Massachusetts establishments, wherever these employees may live. Household employment counts the number of Massachusetts residents who are working, wherever they work. Secondly, a person who works two jobs would be counted twice in establishment employment, but only once in household employment.[2]



Both differences appear to play a role. In three of our bordering states, growth in household employment from 1996 - 97 exceeded establishment growth over the same period: in New Hampshire by 3.6 percentage points; in Rhode Island by 0.7 percentage point; and in Vermont by 1.1 percentage points. This data suggest that workers from these states have been finding new jobs in Massachusetts. Evidence also indicates that increases in the number of second jobs, "moonlighting," accounts for part of the difference in the two employment measures for Massachusetts. For New England as a whole, establishment employment growth over the last 12 months exceeded household employment, suggesting growth in secondary jobs. Since Massachusetts accounts for roughly half of New England, it is reasonable to assume that many workers found second jobs in the state.

The length and strength of the recovery continues to keep unemployment low. The unemployment rate, at 3.8% in December 1997, has hovered at this level for over a year, and is nearly a percentage point below the national rate. Initial unemployment claims, another closely watched measure of employment conditions, have continued their downward trend. The seasonally adjusted level for December 1997 was 27,400. For the 12-month period ending in December 1997, initial claims fell at a rate of 8.1%. For the recovery period which began in late 1991, claims have fallen at an average annual rate of 7.6%.

Recent Employment Growth by Sector

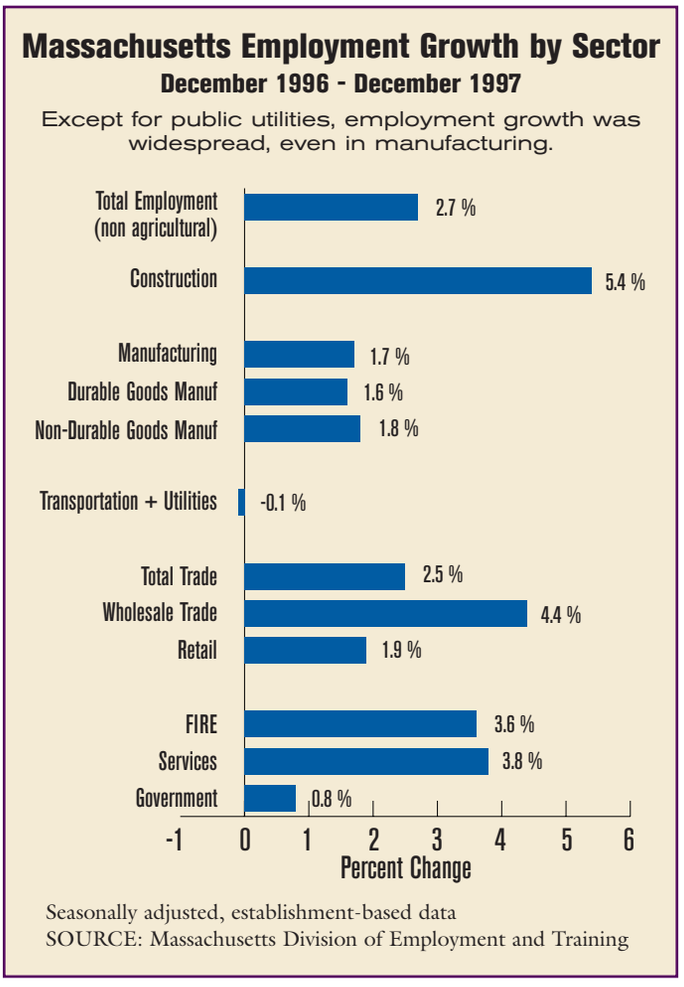
Over the twelve months ending in December 1997, the annual rate of employment growth has been particularly strong in the broad services (4.2%), finance, insurance and real estate (FIRE) (4.8%), wholesale trade (4.3%), and construction sectors (3.6%). Especially noteworthy is a turnaround in manufacturing employment. Since the recovery began, manufacturing employment declined at an average annual rate of nearly 1%, but during 1997, grew at a 1.5% annual rate. When increases in the work week are taken into account, labor input in manufacturing grew at a 2.4% rate during 1997.

Within services, the growth has been concentrated in business services (December 1997 employment is 9.4% higher than a year earlier), which include temporary employment agencies and engineering and management services. In the broad FIRE sector, growth has been strongest in the non-banking finance sector (December 1997 employment is 9.2% higher than a year earlier), essentially the state's mutual fund and money market industry.

The reversal in manufacturing is not solely or principally a high-tech phenomenon. Employment grew in high-tech sectors such as electronic components and chemicals. Growth also occurred in areas not considered high-tech: durables such as supply structures and equipment investment; and non-durables such as printing and publishing, plastics, and food.

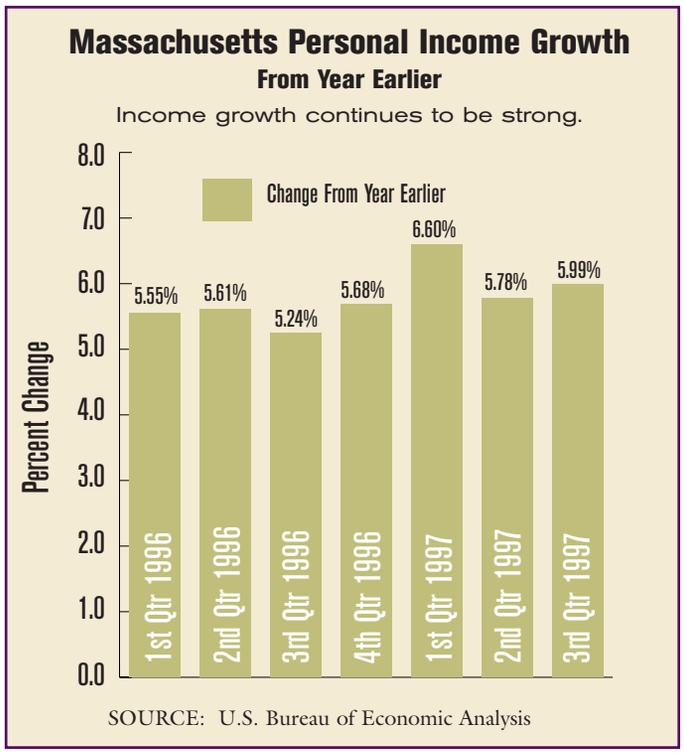
Employment has been lagging and even declining in a few sectors, reflecting the continual restructuring of the economy. Hospital employment continues to lag non-hospital health service employment. Employment in the state's

power-supplying utilities declined 4.7% between December 1996 and December 1997, reflecting deregulation. Retail trade employment has been sluggish, particularly in general merchandising and apparel stores, both of which had lower employment in December 1997 than a year earlier.



Non-employment Measures of the State's Performance

Non-employment indicators are consistent with the view that the state's economy has continued to expand without overheating. Incomes continued to grow robustly. Nominal state total personal income grew 6.0% in the year ending in the third quarter of 1997 over the prior year, while the aggregate state wage and salary total grew 7.4% over the same period. In real terms, these growth rates were 2.7% for personal income and 4.0% for the wage and salary component. Subtracting job growth from nominal wage and salary growth implies a per-job increase in wage and salaries of approximately 5% in the year ending in the third quarter of 1997. To the extent that such wage increases exceed the sum of productivity growth and the growth in hours worked, neither of which are measured at the state level, they contribute to inflationary pressures. Manufacturing wage rates, on average, were a moderate 3.3% higher in December than a year earlier. Inflation has been surprisingly low given the length of the economic expansion. Consumer prices in November 1997, as measured by the Boston consumer price index, were only 1.9% above those of a year earlier. Presumably, high growth in productivity, low growth in non-wage employment benefits, and the strong dollar have restrained price increases.

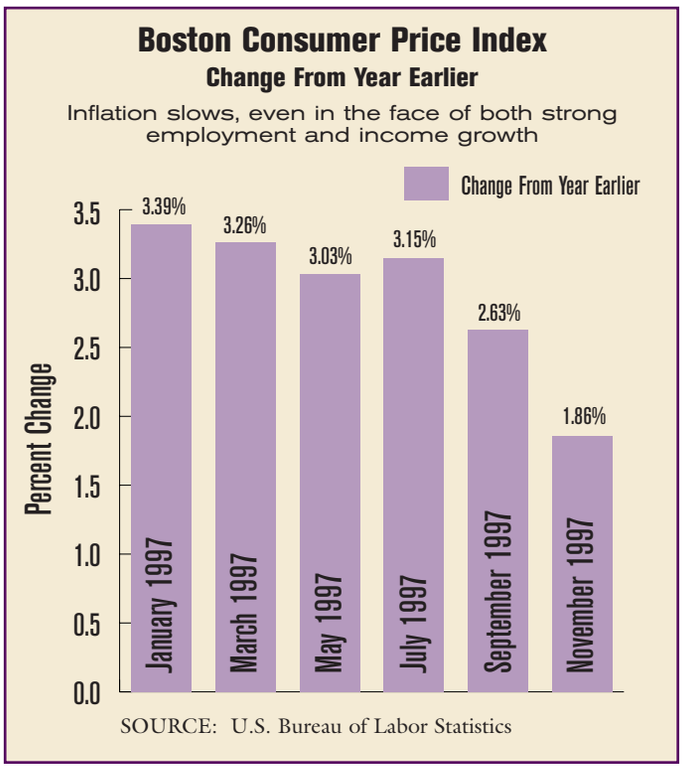


Housing markets remain in good shape, and without signs of speculative pressures. Sales have been brisk, with prices rising moderately. The Fannie Mae Freddie Mac housing price indexes show Massachusetts home prices rising by 4.4% from the second quarter 1996 to second quarter 1997. This increase is the largest among the New England states, and higher than the national rate of 3.6%. Permits for new housing averaged 1500 per month in the year ending in November 1997, versus 1400 per month in the prior year. Permits have been in the 1200-1600 range for several years, less than half the rate of the speculative boom at the end of the 1980s.

State tax revenues for calendar year 1997 were a healthy 5.8% higher than in 1996. The Massachusetts current performance index grew 3.1%[3] from December 1996 to December 1997. The slowdown in the growth of consumer spending in 1997 does not reflect any deterioration in consumer confidence. Mass Insight's consumer confidence index for Massachusetts, patterned after the Conference Board's index, was 126 for October 1997, the highest recorded value since the quarterly survey began in 1991. The Conference Board's monthly consumer confidence index for New England delivers the same message. The November 1997 value of 133.3 was the highest since the peak of the cycle in the late 1980s.

New Uncertainties: The Stock Market and the Asian Crises

Since the last issue went to press, new developments have increased uncertainty in the national economic outlook. These developments are likely to result in a slowdown of growth. First, the stock market has experienced high volatility of late and suffered what, in the best of circumstances, is a correction; in the worst of circumstances, it is an end to the long bull market. Second, a financial crisis of panic proportions has engulfed the fast-growing, Asian, "tiger" economies. National and state economies may experience small repercussions from the situation, perhaps reducing growth by a fraction of a percentage point, although we will only know the actual extent as the situation unfolds. The increasing uncertainty about the future state of the economy is mirrored in guesses about Fed policy. In September 1997, economists held a consensus guess that the Fed was on the verge of tightening policy. Now, these guesses are split between an easing of policy or a tightening of policy.



SOURCE: U.S. Bureau of Labor Statistics

The Stock Market

The rapid growth of equities markets in the 1990s had salubrious effects on the economy. According to anecdotal evidence, capital gains boosted both federal and state revenues, lowering the national deficit and overflowing the state's rainy day fund. Higher stock valuations mean increased wealth of national households, resulting, at least theoretically, in higher consumer confidence and spending. Since Massachusetts residents are wealthier than the national average, and also keep a higher proportion of their financial portfolio in stocks, this "wealth effect" of rising stock prices has probably contributed significantly to our robust rate of growth during this recovery. What happens to the stock market is important to Massachusetts: Boston is the second largest mutual fund center in the nation. The mutual fund industry has been one of the leading sources of growth in the state's employment and income. Employment in the securities brokers and dealers, and security and commodity services industries, which now comprise over 1% of state employment, grew at an average annual rate of 10% per year since 1980, with average per-worker earnings in 1996 of $90,000. That figure represents a total wage bill of $3.5 billion, or 3% of all wages and salaries in Massachusetts.

The fortunes of the stock market may be changing. A year ago, Fed Chairman Alan Greenspan warned of "irrational exuberance" in the stock market. Since then, many analysts have worried that the stock market is overvalued, or that the forces driving stock prices upward – growing profits and falling interest rates – are due for a turnaround. A fall in the stock market would adversely impact the state's economy in three ways. First, if history were to repeat itself, employment and wage growth in the securities industry would take a hit. In the fall of 1987, the stock market crashed: it then recovered lost ground in a year. Employment growth in the state's securities industry ground to a halt in 1988 before resuming its trend rate of growth in 1989. Second, the "wealth effect" would work in reverse, slowing aggregate consumer spending. Third, equity financing would be more expensive for firms, especially those seeking initial or secondary stock offerings. One recent analysis presented at the last New England Economic Project (NEEP) Outlook Conference by Regional Financial Associates (RFA) suggested that stocks were overvalued by 20%. According to RFA's analysis, if a sharp correction of 20% occurred, Massachusetts would be harder hit than any other state in the nation. Growth in the state's economy would slow to a standstill for a couple of quarters before resuming. This scenario is speculative, with wide disagreement among analysts whether stocks are actually overpriced and where they are headed. The exercise does, however, highlight the importance of the fortunes of the mutual fund industry to Massachusetts.

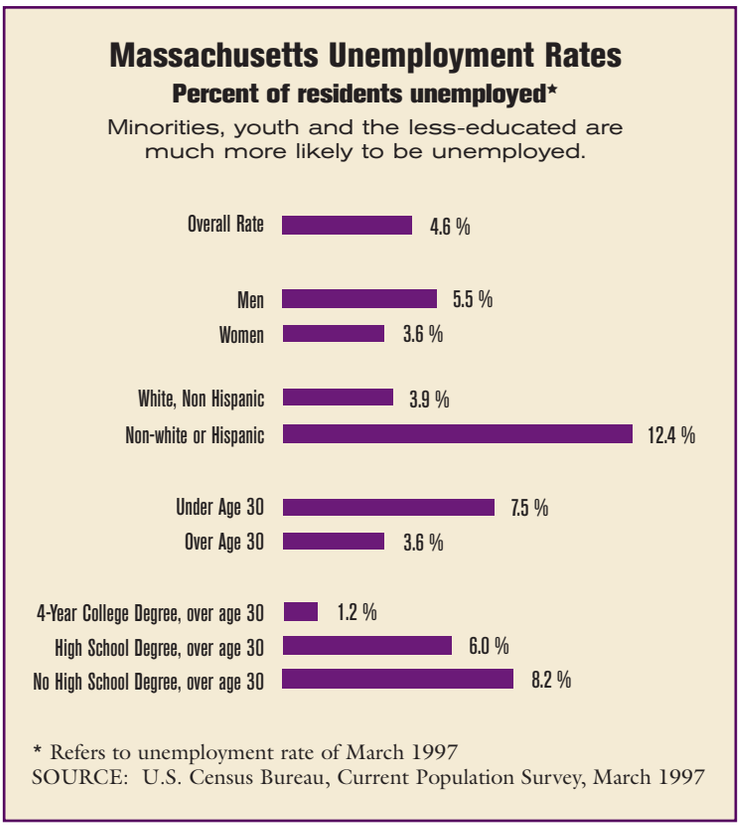
Since August, the bull stock market has stumbled, but not crashed as in 1987. At the end of the year, local stock prices, as measured by the Bloomberg stock index for Massachusetts, were still well below their peak in fall 1997. While the stock market has not yet adversely affected Massachusetts, this sector bears watching, especially in light of developments in Asia.

The Asian Crisis

The Asian crisis is characterized by speculation and misallocation of investments by central governments and financial

institutions, leading to loss of confidence in financial institutions, collapse of currency values, and crashes of equity markets. The fallout, which began last summer, spread through Thailand, the Philippines, Indonesia, Malaysia, Hong Kong, Singapore, Taiwan, and came to a head recently as the Korean economy, the eleventh largest in the world, collapsed. To give the reader a feel for the magnitude of the crises, the Korean currency, the won, fell by 50% in value in the last three months of 1997, and the stock market in Korea fell 50% from July through December (valued in Korean won).

According to conventional economic analysis, the effects on the U.S. economy are expected to be small, though these expectations may change as events unfold. Immediately prior to the International Monetary Fund (IMF) aid package agreement with Korea, estimates were that the Asian crises would shave the U.S. economic growth rate by about one-half percentage point in 1998. Recently, some analysts have raised this to a full percentage point. In these analyses, Asian exports are reduced and imports increased because of the dramatic change in exchange rates. The impact is small because the magnitude of trade with these countries relative to U.S. output is also small. The exposure of New England and the nation to the export impact is similar: 14% of our exports go to the eight "tiger" countries, compared to 16% for the U.S.



Revisions increasing the effect of the Asian situation are based on three factors: the impact of the crises on Japan; the indirect impact due to trade with the rest of the world; and the effect of falling import prices on profits of U.S. firms. As a major creditor to the Asian hemisphere, the already unsteady Japanese banking sector has been dealt another major blow. The weakness of the yen relative to the strong dollar is now exacerbated, worsening the U.S. trade deficit with Japan. Our exports to other regions, including Europe and South America, may be adversely affected as they substitute Asian imports for U.S. imports. As import prices of consumer goods fall due to the stronger dollar, downward pressure is applied to prices of domestic firms, bringing lower profits. Lower profits lead to lower stock prices and less investment, with dampening effects on U.S. economic growth. Still, the consensus is that this crisis will pass. Market reforms are expected to "fix" the financial institutions in Asia. The short-term credit crises that firms in these countries face are alleviated by agreements from creditor banks worldwide to roll over short-term debt for a period of time and accept a conversion of some debt to longer term securities. According to the plan, investor confidence will be restored, resumption of international capital flows will resume, currencies rebound, and the pre-crises trading situation return. As events unfold, the story will be told in the quarterly earnings reports of Massachusetts firms, and in financial markets, as payment deadlines of Asian firms approach.

[1]Unless otherwise noted, we use a trend rate of growth for periods of 12 months or more for seasonally adjusted data like employment, calculated as the slope of a regression line fitting the logarithm of the data series to a linear time trend. Although this is not a straightforward measure to calculate, we find that most of the time it conforms better to a graph of the time series in question than other common single measures of growth, such as growth over the same period in the previous year, or the growth in a 12-month moving average over the prior year. Employment data do not reflect the 1997 *Massachusetts Benchmarks* revision.

[2]A third difference, that the self-employed are counted in household employment but not in establishment employment, is not likely to account for the difference in growth rates due the relative small proportion of workers who are self-employed.

[3]The Massachusetts performance economic index is a composite index composed of withholding taxes, sales taxes, establishment employment, the unemployment rate, and weekly hours in manufacturing. See the previous issue of *Massachusetts Benchmarks,* p. 19. (Previously referred to as the current economic index.)

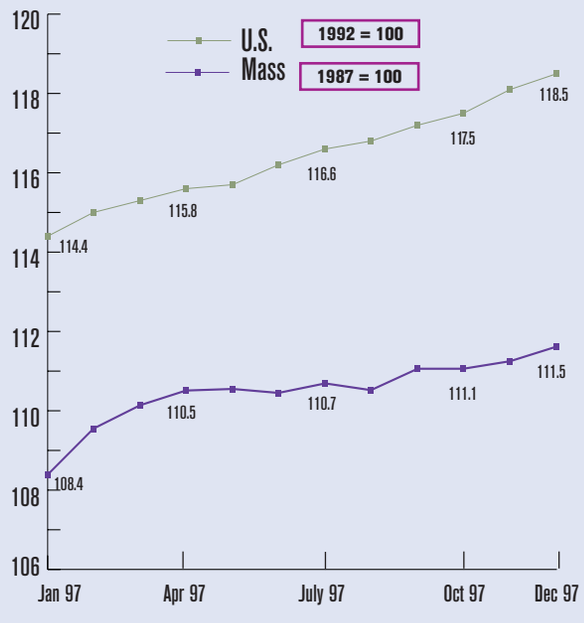
THE UNIVERSITY OF MASSACHUSETTS ECONOMIC BENCHMARKS

	December 1997		December 1996	
Coincident Performance Index	111.6		108.1	
Unemployment Rate	3.8%		3.9%	
Employment (thousands)*	3,158.6	% of total	3,075.9	% of total
Manufacturing	450.9	14.2%	443.4	14.4%
Services	1,121.4	35.5%	1,079.9	35.1%

Establishment-based data
Sources: Federal Reserve Bank of Boston; Massachusetts Division of Employment and Training; University of Massachusetts

Coincident Performance Indexes
U.S. and Massachusetts

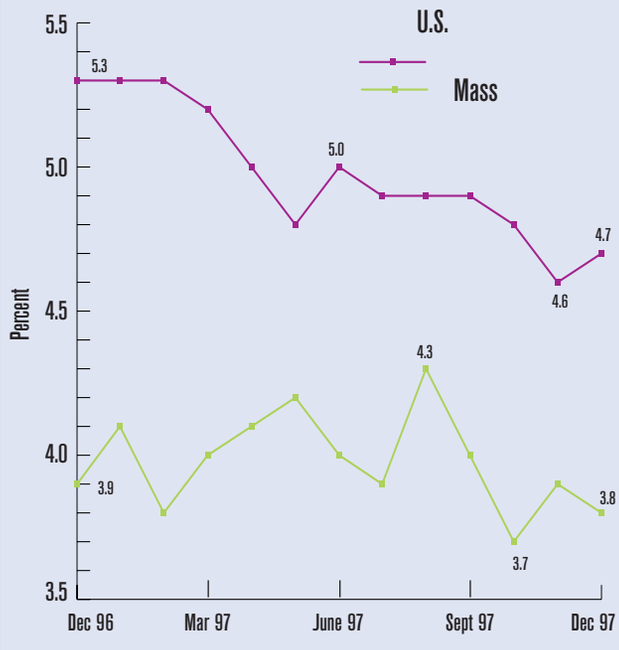
The trends, rather than the levels, of these indexes should be compared due to different formulations and base points.



Sources: The Conference Board; University of Massachusetts Boston; Federal Reserve Bank of Boston

Unemployment Rates
U.S. and Massachusetts

Greater volatility of the Massachusetts unemployment rate is at least partially due to the smaller sample size in its measurement.



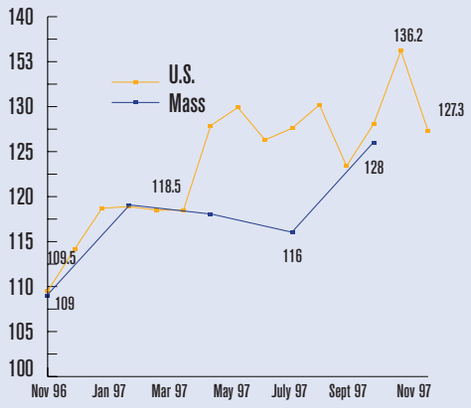
Sources: U.S. Bureau of Labor Statistics, Massachusetts Division of Employment and Training

Massachusetts Indicators

			Change from Year Earlier
Monthly:			
Initial Unemployment Claims	December 97	27,366	-6.0%
Help Wanted Index, Boston *(1987 = 100)*	October 97	60	-1.7%
New Housing Permits *average per month*	Dec. 96 – Dec. 97	1,471	4.1%
Quarterly:			
Personal Income (millions)	3rd Quarter 97	193,262	6.0%

Release dates differ for each series
Sources: The Conference Board; Massachusetts Division of Employment and Training; United States Bureau of Economic Analysis; United States Department of Commerce; University of Massachusetts

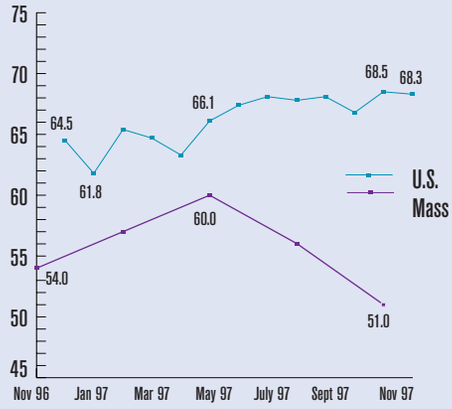
Consumer Confidence Indexes
U.S. and Massachusetts



The Massachusetts Index is measured quarterly, the U.S. Index is measured monthly.
Sources: The Conference Board; Mass Insight/ New England Economic Project

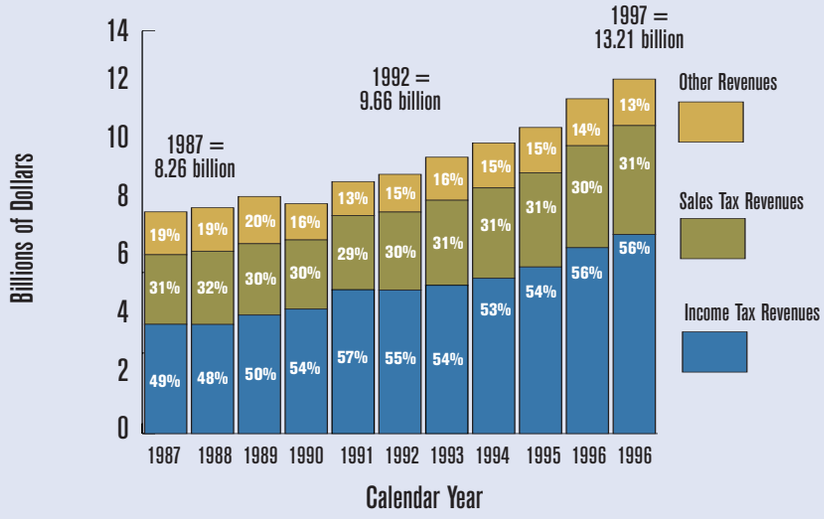
Business Confidence Indexes
U.S. and Massachusetts

Employers have generally positive views on current and prospective business conditions when the index is above 50.



Sources: The Conference Board; Associated Industries of Massachusetts

Massachusetts Tax Revenues, 1987-1997



Source: Massachusetts Department of Revenue

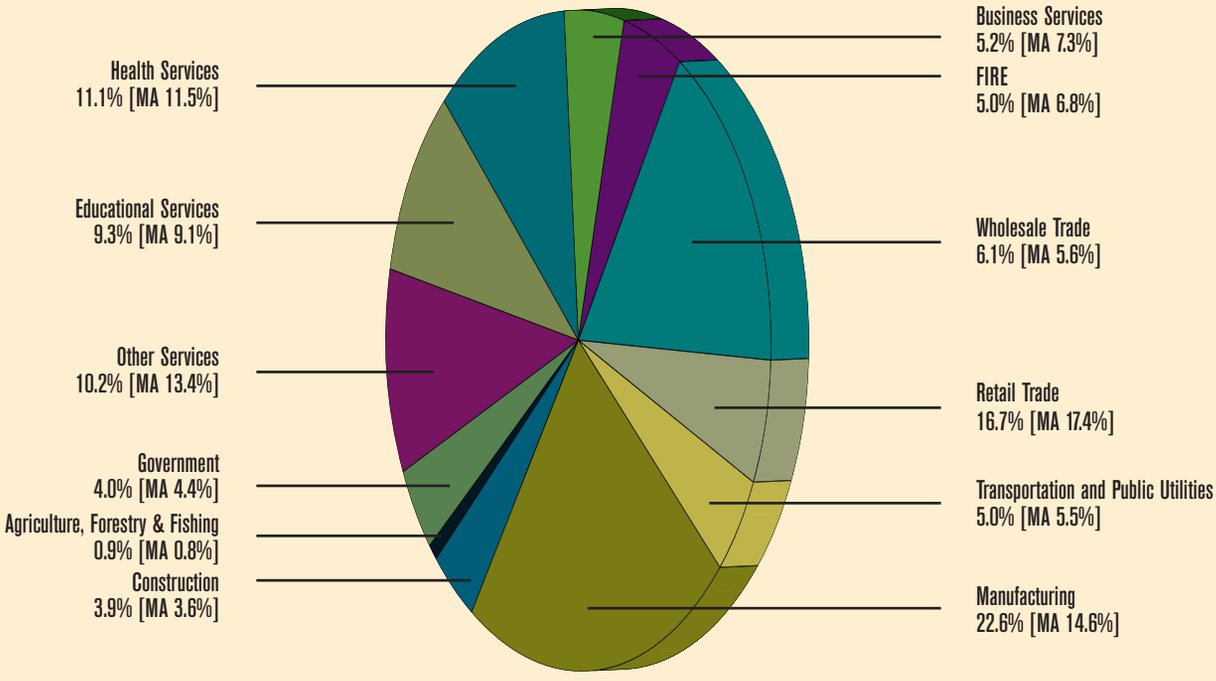
Regional Economic Performance

	Employment		Unemployment Rate	
	Dec 97	Dec 96	Dec 97	Dec 96
CENTRAL				
Fitchburg-Leominster PMSA	66,425	65,657	4.0	4.2
Worcester PMSA (MA only)	240,722	236,128	3.0	3.0
BOSTON METRO				
Boston PMSA (MA only)	1,762,045	1,724,205	2.7	2.9
NORTHEAST				
Lowell PMSA (MA only)	150,213	144,783	3.2	3.3
Lawrence PMSA (MA only)	119,057	116,581	4.4	4.7
SOUTHEAST				
Brockton PMSA	123,413	122,185	3.7	4.0
Providence-Fall River-Warwick MSA (MA only)	110,868	109,634	5.4	5.6
New Bedford PMSA	75,985	74,836	6.6	7.1
Barnstable/Yarmouth MSA	65,654	64,050	5.8	5.7
CONNECTICUT VALLEY				
Greenfield LMA	31,329	31,586	3.3	2.9
Springfield MSA	269,754	269,290	3.9	3.6
BERKSHIRE				
North Adams LMA	12,736	12,596	3.8	4.3
Pittsfield MSA	38,550	37,891	4.6	4.8

Household-based seasonally adjusted data
Source: Massachusetts Division of Employment and Training

central region

Average Monthly Employment: 371,237
2nd Quarter 1997

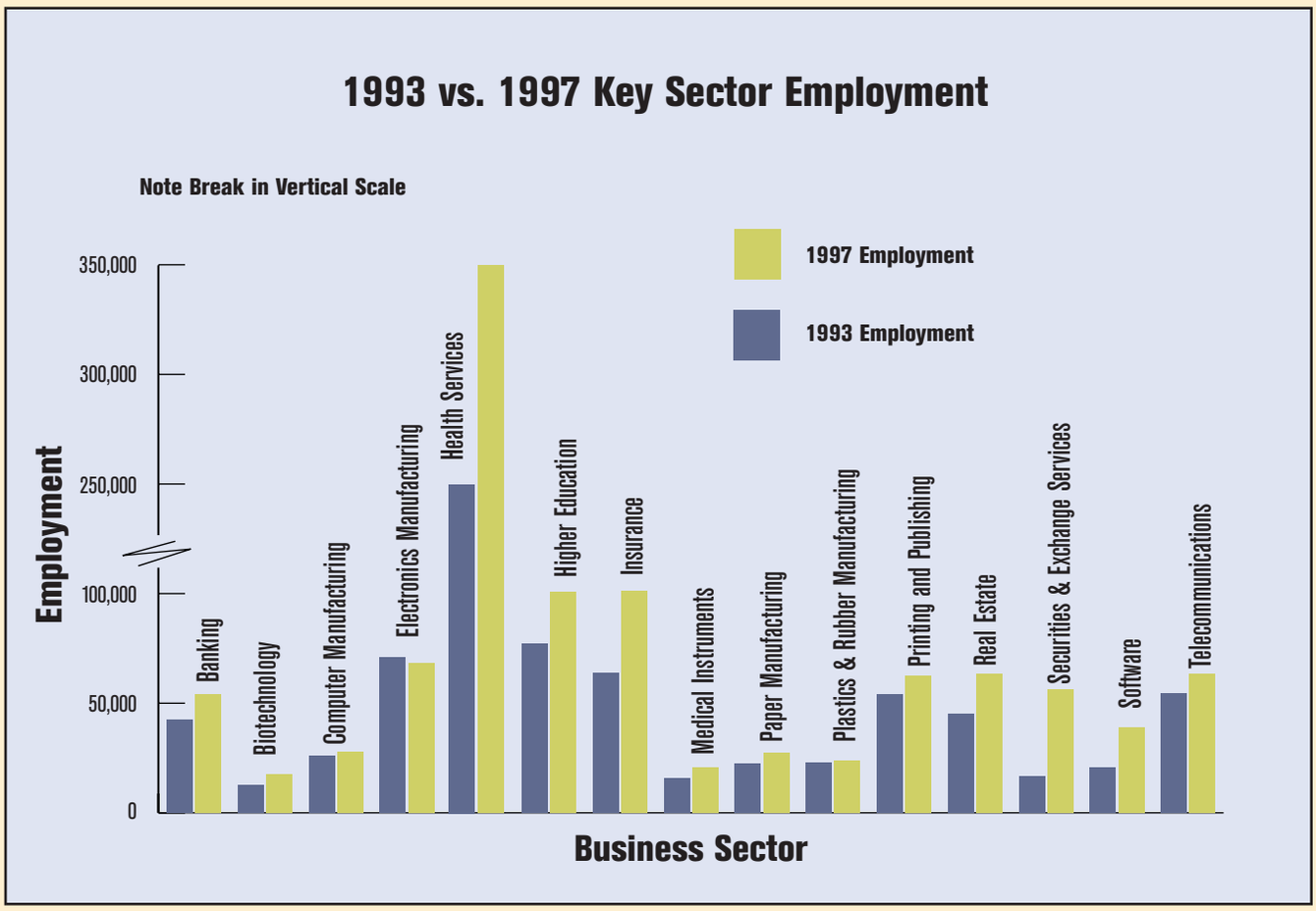


Establishment-based data used, not seasonally adjusted
Source: Massachusetts Division of Employment and Training

The industries examined in this section include the largest employers and represent a mix of newer industries that have led the state out of the most recent recession and older industries that have been a base for our economy.

us and massachusetts comparison

	Massachusetts Percent of 1997 State Total Employment	United States Percent of 1997 U.S. Total Employment
Banking	1.64%	1.32%
Biotechnology	0.53%	0.49%
Computer Manufacturing	0.84%	0.32%
Electronics Manufacturing	2.06%	1.61%
Health Services	10.37%	8.56%
Higher Education	3.04%	2.49%
Insurance	3.05%	1.91%
Medical Instruments	0.62%	0.31%
Paper Manufacturing	0.82%	0.59%
Plastics & Rubber Manufacturing	0.71%	0.83%
Printing & Publishing	1.89%	1.40%
Real Estate	1.91%	1.97%
Securities & Exchange Services	1.70%	0.51%
Software	1.18%	0.58%
Telecommunications	1.91%	1.76%



Source: Dun and Bradstreet MarketPlace database

Dun and Bradstreet MarketPlace data are not produced for research purposes.
Due to definitional and other differences, they will not necessarily agree with other data sources.

From the **Field**

ILLUSTRATION: NAOMI SHEA

Central Region

Worcester County: Working Toward the Millennium

JOHN MULLIN

Throughout the county, "smart manufacturing" is alive and well – and succeeding.

Manufacturing In Transition

Worcester County has long been famed for its manufacturing prowess. Its Blackstone Valley was the crucible of our industrial revolution. Its main city, Worcester, was the Silicon Valley of the nineteenth century: the rise of the modern wire industry and thousands of textile machines put the city at the forefront of America's first industrial revolution. Leominster, with its "Man Behind the Foster Grants," has long promoted itself as the pioneer plastics city. Indeed, the one link among the cities and towns of this region is that they made things. Perhaps of greater interest, the region is still linked by this tradition.

Throughout the county, "smart manufacturing" is alive, well and succeeding. Smart manufacturing companies are the lean, customer-driven, technology-accepting, export market competitive makers of things. They depend on flexible, well paid, continually trained workers and rely on local institutions for technical, financial and support services. With minimal fanfare, Worcester County is building on its manufacturing base and, using the principles of smart man-

ufacturing, showing some success. In fact, over the past year, manufacturing employment and sales in the county have actually increased. The greater Worcester area now employs approximately 42,000 manufacturing workers in a wide range of occupations.

What is happening in Worcester County? Six key factors appear important.

Tradition. Almost all of these companies have evolved from established firms in the region. Their roots are here; they rely on local financial institutions that know them, and interact with support firms in the area. A large amount of anecdotal evidence suggests that "locally founded companies stay local."

Support network. Greater Worcester has these firms in place. With the acceptance of "just in time" processes and the attraction of "mother ship" companies, the need for these support firms is extensive. It was once suggested that Worcester establish as its slogan, "Come to Worcester - ninety percent of your operations are already here and are world class."

Clustering. The county has several existing and emerging clusters that match Michael Porter's famed definition. Among these are fabricated metals, industrial machinery and equipment, fiber optic technologies and the plastics industry. Significant strengths also exist in the publishing, semi-conductor, pharmaceutical and medical instruments industries.

Regional respect for manufacturing. State and local governments and institutions are reacting to provide needed technical assistance, infrastructure improvements and financial help. This response is not an easy task: the image of manufacturing as a form of industrial servitude still remains. Further, the popular perception is that Massachusetts manufacturers can no longer compete with those found in other areas. Today, thanks in part to more than ten public, private and quasi-public organizations in the county, the competitive position of these companies has improved.

Location. Worcester County cities and towns are well placed. Today, as the Worcester County economy grows, the job center of Massachusetts moves west and the region's centers of competitive advantage expand, it is difficult to separate the metropolises of Boston and Worcester. Moreover, one can see similar connections emerging between Worcester and Providence. The city, with its interstates and major highway axes, is accessible from virtually all cities in the Northeast, not to mention four major airports: Worcester products can be quickly shipped anywhere in the globe through these ports.

A balanced regional economy. With a healthy number of jobs in manufacturing, service, construction, institutions and governments, prospects for steady growth are positive. The region has quietly undertaken diversification quite nicely and supports a good mix: traditional industries such as Norton and Wyman-Gordon; high tech companies such as BASF; ten colleges; and Fidelity (at its fringes in Marlboro and North Smithfield, Rhode Island). Indications are that the area may also become a power in energy production: at least six energy producers are currently examining the Blackstone Valley for potential sites.

The principles of smart manufacturing firms:

Lean with a compressed hierarchy of management.

Value workers. Employees are paid a "living wage" and offered incentives (education, financial rewards) for improvement. They share in the company's success.

Seek constant improvement; these companies celebrate when they gain an ISO designation.

Export oriented. ***The world is their market place, where they must prove their worth.***

Push their suppliers to develop components that are of the highest possible quality. ***Endeavor to rely on a local or regional supply base.***

Medical Services and Higher Education

In addition to manufacturing, medical services and higher education play a strong role in this regional economy. Recent data shows, for example, that every dollar spent at the University of Massachusetts Medical Center translates into an increase of $2.23 of expenditures in the economy, bringing an additional $1.23 of spending for goods and services throughout the region. Similarly, one new job at the Medical Center stimulates another job some-

place in Worcester County. This data suggests that a regional commitment to expanding medical services makes economic sense. Another recent report, written by the Colleges of Worcester Consortium, Inc. and funded by Bank Boston, entitled *The Colleges of Worcester: A Foundation of Economic Success,* reports that the ten colleges in the area, totaling 6,700 employees and 27,000 students, have a 1.5 billion dollar affect on the Commonwealth and have stimulated the creation of 16,700 jobs across the state. Clearly, higher education and medical activities are crucial to the county's future.

Notes of Caution

We should not get carried away with the signs of improved performance and the relative stability of the region's manufacturing base. It is considerably smaller, on the whole, than it was a decade ago. The Central Massachusetts Regional Planning Commission noted that its cities and towns lost 13,400 manufacturing jobs between 1984 and 1996. The region's textile, leather and apparel industries are mere shadows of their former selves. Many of the remaining companies are in highly competitive markets and are owned by multinationals that have limited loyalty to place. Many will continue to leave, downsize or close. Perhaps of greater importance, many others will be formed and begin to grow again. While Worcester and its surrounding towns, the Blackstone Valley, the Devens area and Leominster, are organized and well on their way to insuring that they are competitive, other areas have not been so prepared or fortunate. Fitchburg continues to struggle to define its economic future. The prospects for recovery are also problematic for the greater Gardner area: while Simplex is expanding and the few remaining furniture firms are achieving some marketing success, the northwest area of the county is steadily becoming an area of disinvestment, poverty and despair. The towns of Athol, Winchendon and Templeton will need extensive state and regional assistance in the coming years.

Encourage formal and informal networking among their employees and those of competitors.
Active participants in their trade groups.

Try to bank locally or regionally.
If local banks grow so will their communities.

Technology driven.
They have no choice.

Strong ties to the region's universities, colleges and laboratories, at the managerial level and the shop floor.
Reciprocity exists: manufacturers are also involved in the classroom.

Belief in lifelong training.
Active participants in public and private training programs. Active participants in the community.

Looking Ahead

In the long term, the prospects for success in Central Massachusetts are quite bullish, with few "outliers" that will require more work. The city of Worcester has a well-defined sense of direction. The Blackstone region is quickly and courageously facing the complex issues of handling the construction of the new I-90 - Route 146 Interchange without creating an eighteen mile strip mall. Given home rule, this will be no easy task!

Over the long haul, we expect this valley to be well positioned for growth, provided that it works as a region. It must also address the lack of modern water and sewer systems in most of its towns. The fiber optics firms in the southwest part of the county are also showing promise, as are diverse industries between Leominster and Ayer (on the county's edge) and Leominster and Worcester. Unfortunately, the northwest tier of communities from Fitchburg through Gardner to Athol need additional assets to create a climate for a strong positive economy. More work is needed.

But there is reason for optimism: plastics thrive in the north, Devens is attracting manufacturing firms in the east, the Blackstone Valley is poised to take advantage of its new transportation assets, Worcester's traditional metal working and modern biotech industries are creating new products, medical and educational institutions are expanding, and old industries are reinventing themselves. This region, a premier center of smart manufacturing, is moving in the right direction.

John R. Mullin *is professor of urban planning and director of the Center for Economic Development at the University of Massachusetts Amherst. His research focuses on industrial planning with a specific emphasis on revitalization. Over the past ten years, his research and planning work has involved more than twenty projects in Worcester County.*

BREAKING THE MOLD IN MASSACHUSETTS

ILLUSTRATION: NAOMI SHEA

ROBERT FORRANT

The plastics industry in Massachusetts has contributed to two recent and important state trends: the stabilization of manufacturing employment and a growth in the dollar value of manufacturing exports. Examining the plastics industry in Massachusetts, this contribution is not surprising. The question is, can it continue?

The current numbers

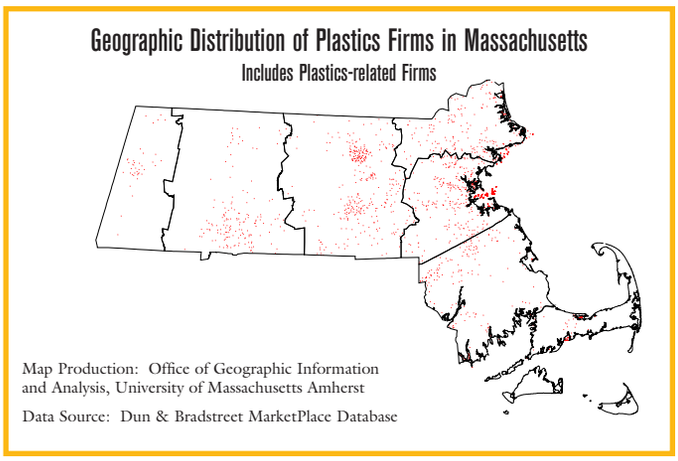
Close to 660 plastics firms, and close to 300 companies providing molds, machinery and materials to the industry, are scattered throughout the state. An additional 216 firms in the state engage in plastics manufacturing as a component of their broader operations. Together these companies employed approximately 46,000 people in 1997. With this number of firms, Massachusetts has the eleventh largest concentration of plastics companies in the nation. California and Ohio rank first and second, with approximately 2,300 and 1,370 firms, respectively. Massachusetts ranks third in the nation after Rhode Island and New Jersey in plastics firm density per square mile.[1]

The value of foreign exports of plastics products from Massachusetts increased 96 percent between 1988 and 1994, to $417.1 million up from $212.4 million. After a decrease of 5.2% between 1994 and 1996, exports by second quarter 1997 are up 23.8% from last year.[2]

What Does the Industry Look Like?

Companies in the plastics industries are in three distinct market segments: packaging, including plastic bags, especially for food processors and in the manufacture of

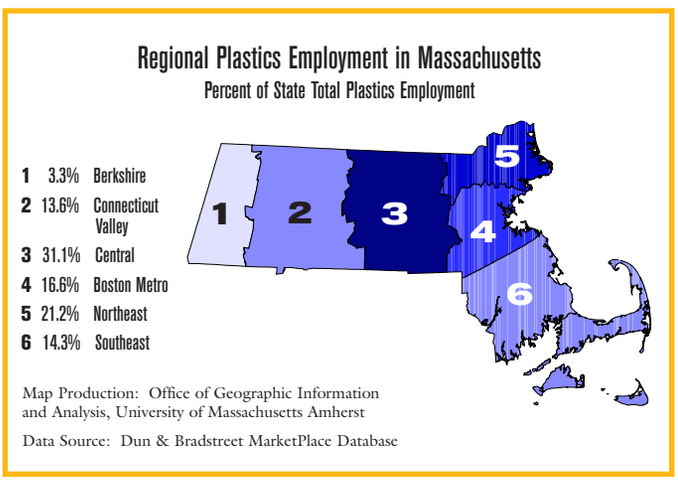
things like foam packing materials; specialty products, mainly for the aircraft, computer, medical, and telecommunications industries; and high volume commodity products, things like cosmetics tubes, dinnerware and disposable bowls, cutlery, and cups. Significant numbers of firms in these segments are found in cities across the state, with particularly large groupings of firms in greater Pittsfield, Leominster–Fitchburg, greater Lawrence-Lowell and greater Springfield. Rounding out the industry, an important group of large firms like Gillette and Millipore, although not classified directly as plastics companies, do in fact make things out of plastic and therefore rely on the expertise of molders, mold makers, and plastics engineers for their success.



The Industry Support Structure

In addition, there are approximately 300 companies that build machines and produce needed components like molds, tools, dies, instruments, and controls for plastics firms. The state is also home to several research centers that engage in such things as new materials development, mold and materials analysis, and new product design.

Throughout the state, these producers, supportive firms and technical service providers have formed formal and informal networking groups, such as those described by John Mullin as Worcester County's "smart manufacturers."



Plastics research and development and process engineering capabilities also come from the University of Massachusetts Center for Research on Polymers, located in Amherst. It is one of the strongest polymer research centers in the world, while the Lowell campus has the largest accredited plastics engineering department in the country and is home to the Biodegradable Polymers Research Center. Faculty from both campuses receive substantial National Science Foundation funding and the two research centers receive financial support from several industry partners.

Challenges Before the Industry

According to a recent study of the plastics industry by University of Massachusetts Lowell Professor Michael Best, the ability to access research and development and engineering expertise is crucial to plastics firms as materials and processes continuously evolve, and environmental concerns pressure the industry to develop biodegradable materials. Therefore, the long-run success of the state's plastics firms is predicated upon three factors: their ability to develop new products quickly; their capacity to make the transitions required to work with new materials and meet more stringent environmental standards; and their ability to train a next generation of employees capable of utilizing state-of-the-art equipment and participating in a continuous shop-floor innovation process. The research and technical support available to the state's plastics firms is crucial to their long-term success, for each market segment is faced with numerous environmental and competitive pressures.

In packaging, for example, the debate over waste disposal has market implications for firms. More stringent recycling requirements throughout Europe make it imperative that Massachusetts firms gain access to new materials in a timely manner. For commodities producers, those that turn out disposable plastic dinnerware for example, the threat from low-cost imports is severe. For specialty producers, the ability to work to ever higher quality standards, provide design and engineering services to customers, and ship in a just-in-time environment are just a few of the challenges. In all cases, the resolution of problems grows from an ability to design and maintain molds, make quick changeovers on the shop floor from one product to another, and continuously improve manufacturing processes to be a cost effective provider of products on the global market.

The Role of Shop-Floor Skill

Just as the research and development demands placed upon plastics firms have been ratcheted upward, so too have the skills requirements of front-line workers. In many plants, employee teams are now charged with responsibilities that have long been the purview of supervisors and managers. It is no longer sufficient for a worker simply to tend an injection molding machine. In-process quality checks are made to ensure that scrap rates are kept to an absolute minimum. The change-over times on equipment, for the machines to effi-

ciently produce a range of products, must be continuously shortened to meet shipment deadlines and keep customers happy. Equipment is outfitted with state-of-the-art heat sensors and other high tech devices which are designed to help maintain a high level of material quality; these devices need to be monitored. Long gone are the days when workers stood with sharp knife at the ready to cut the excess plastic away from parts spewing forth from injection molding machines: today, operators must help determine why the excess material exists in the first place.

Looking to the Future

While Massachusetts has set world class standards in its support for more advanced research and development and the engineering needs of the plastics industry, we have not done as well in preparing twenty-first century front-line employees. For example, mold making requires perhaps the most critical hands-on and conceptual skills in the industry. And mold makers are vital to the development of new products. Yet as a group in the workforce, mold makers should have an endangered species status. If anything can chill the growth of smart plastics manufacturing in Massachusetts, it just may be this dearth of highly skilled mold makers.

What can be done? Reviewing the work done in western Massachusetts to educate and train new machinists and tool and die makers, another endangered species, is useful. Numerous vocational-technical high school programs have totally redesigned their methods of instruction to include the latest in computer design technologies and computer-controlled machinery, while still maintaining an emphasis on basic hands-on instruction. The industry advisory boards to schools like Westfield Vocational High School and Chicopee Comprehensive High School assisted in the procurement of new equipment and offered after school and summer employment opportunities for students. A group of metalworking firms have stepped up to offer an elaborate four-year machinist apprenticeship program that includes a rotation among participating shops so that students can learn all aspects of the industry while earning a two-year degree in manufacturing technologies from Springfield Technical Community College.

The answer is an aggressive state-industry-school partnership which contains the following: recognition that money must be spent to equip schools with the latest in manufacturing technologies; realization from industry leaders that they can not stand on the side-lines bemoaning the existing lack of skills; and, the understanding of our critical need for a strong core of highly skilled mold makers and machinists to translate the ideas and designs of manufacturers into tangible things. We never want to say that this has become a lost art.

Plastics-related Employment

Key Communities by Region, Third Quarter 1997

Plastics-related employment includes plastics firms and companies providing molds, machinery and materials to the industry.

		Plastics Employment	City Rank in State
Central	Worcester	3,841	**1**
	Leominster	2,719	**2**
	Clinton	1,230	**9**
	Holden	697	**17**
	Fitchburg	476	**24**
Northeast	Lawrence	2,656	**3**
	Billerica	1,508	**4**
	Haverhill	579	**19**
	Gloucester	510	**21**
	Wilmington	499	**22**
Western	Pittsfield	1,301	**7**
	Springfield	1,384	**5**
	Easthampton	869	**13**
	Chicopee	600	**18**
	Deerfield	493	**23**
Boston Metro	Boston	1,099	**10**
	Woburn	981	**11**
	Peabody	945	**12**
	Mansfield	793	**15**
	Somerville	778	**16**
Southeast	New Bedford	1,334	**6**
	Fairhaven	1,300	**8**
	Fall River	858	**14**
	Brockton	471	**25**
	Attleboro	376	**32**

Source: Dun and Bradstreet MarketPlace
Totals of companies with primary SICs in the plastics industry as defined by the Society of Plastics Industry, Inc. (SICs 2821; 2822; 2823; 2824; 305; 306; 308; 3544;3559)

Robert Forrant *is an assistant professor in the department of regional economic and social development at the University of Massachusetts Lowell. He has completed industry sector studies throughout Massachusetts and consulted for numerous education and training organizations. From 1974 -1986, he worked as a machinist in several industries, including plastics processing, cutlery, and a 1,500 person metalworking facility producing diesel fuel injection systems for automobiles and trucks.*

[1]Dun and Bradstreet MarketPlace data. Dun and Bradstreet and MarketPlace data are not produced for research purposes. Due to differences of definition, they will not necessarily agree with other data sources.

[2]Massachusetts Institute for Social and Economic Research (MISER) at the University of Massachusetts. Adjustments to data from U.S. Census Bureau, Foreign Trade Division.

Note: A good deal of the information for this report is taken from a detailed analysis of the state's plastics industry prepared in 1994 by Professor Michael Best and others at the University of Massachusetts Lowell Center for Industrial Competitiveness.

Street Signs

LOU DINATALE
and
RALPH WHITEHEAD, JR.

On issues of increased satisfaction with economic security, "As goes the nation, so goes Massachusetts."

So Goes Massachusetts

Massachusetts might have taken a bit longer than the rest of the nation to join the current expansion but, according to a recent *Benchmarks* poll, our sense of economic security is in step with the country's.

The *Wall Street Journal* regularly surveys the nation on a number of economic security questions. The most recent survey was conducted in December of 1997. We put the same questions to roughly 500 Massachusetts adults in January of 1998. The overall results of both polls appear in the following tables, with the state responses broken down by several demographic groups.

Majorities of both the nation and the state express satisfaction with job opportunities, though the margin of satisfaction in the state exceeds that of the nation. Majorities of both are also satisfied with their job security, but the satisfied percentage in the state is slightly lower.

The highest percentage of dissatisfaction is in the area of savings. As in the nation, the state's percentage of those who are dissatisfied with how much they are saving exceeds the percentage of those who are satisfied.

In the state responses, one notable pattern involves household income: on several questions, the higher the income bracket, the higher the percentage of those in the bracket who are satisfied.

A state that revels in its independence might not expect to hear, "As goes the nation, so goes Massachusetts," but, at least in this round of polling, we do seem to be in step.

LOU DINATALE is a senior fellow at the John W. McCormack Institute of Public Affairs at the University of Massachusetts Boston and one of the most widely quoted political analysts in New England.

RALPH WHITEHEAD, JR. is the Public Service Professor of the University of Massachusetts and the features editor of this journal.

With your income keeping up with the cost of living

		Satisfied	Dissatisfied	Margin	Don't Know
Nation		51	48	+3	1
State		61	37	+24	2
Gender	male	63	34	+29	3
	female	58	41	+17	2
Age	< 40	56	40	+16	4
	40-59	66	33	+33	1
	60+	55	44	+11	1
Income	< $30K	44	56	-12	0
	$30-50K	50	45	+5	5
	> $50K	75	25	+50	0
Education					
high school or less		49	49	0	1
some college		56	44	+12	0
college + postgrad		70	26	+44	4

With the job opportunities in your area

		Satisfied	Dissatisfied	Margin	Don't Know
Nation		54	42	+12	4
State		59	26	+33	14
Gender	male	62	24	+38	15
	female	57	29	+28	14
Age	< 40	63	22	+41	15
	40-59	61	30	+31	9
	60+	51	24	+27	25
Income	< $30K	45	36	+9	18
	$30-50K	63	21	+42	15
	> $50K	71	20	+51	9
Education					
high school or less		54	32	+22	14
some college		5l	27	+24	21
college + postgrad		69	19	+50	11

With the amount of money you are saving

		Satisfied	Dissatisfied	Margin	Don't Know
Nation		44	55	-11	1
State		43	49	-6	8
Gender	male	45	45	0	9
	female	41	51	-10	7
Age	< 40	41	51	-10	7
	40-59	41	53	-12	6
	60+	46	42	+4	12
Income	< $30K	29	57	-28	13
	$30-50K	35	55	-20	9
	> $50K	59	38	+21	2
Education					
high school or less		38	53	-15	10
some college		39	56	-17	5
college + postgrad		50	41	+9	9

With your current job security

		Satisfied	Dissatisfied	Margin	Don't Know
Nation		78	21	+57	1
State		62	17	+45	21
Gender	male	67	15	+52	19
	female	58	20	+38	23
Age	< 40	62	21	+41	17
	40-59	75	18	+57	7
	60+	43	9	+34	47
Income	< $30K	34	22	+12	34
	$30-50K	60	19	+41	21
	> $50K	74	15	+59	11
Education					
high school or less		58	17	+41	25
some college		53	25	+28	22
college + postgrad		70	12	+58	17

With your retirement security

		Satisfied	Dissatisfied	Margin	Don't Know
Nation		56	41	+15	3
State		56	31	+25	12
Gender	male	63	29	+34	8
	female	49	34	+15	16
Age	< 40	41	39	+2	20
	40-59	60	31	+29	9
	60+	68	25	+43	8
Income	< $30K	46	29	+17	25
	$30-50K	50	42	+8	7
	> $50K	64	30	+34	6
Education					
high school or less		54	31	+23	15
some college		48	35	+13	17
college + postgrad		61	30	+31	8

ENDNOTES

Lines on the Map

Massachusetts Benchmarks divided the state into five broad regions to analyze regional economic dynamics: Boston Metro; Northeast; Southeast; Central; and Western. But even before going to press with the first issue, we heard suggestions from the outside about redefining these regions. And, with an in-house staff whose professional viewpoints span economics, business, regional planning, statistics and geography, internally, the debate goes on.

In drawing the lines on our map, we struggle for each region to simultaneously 1) make economic sense 2) be easily recognizable 3) have a rich and current set of economic and social data available. Our five regions meet these requirements, although at the request of our regional analysts, we will further distinguish the Berkshires and the Cape and Islands.

Our regions are a compromise between economic function and data availability. We have adopted the regions used by the Massachusetts Office of Business Development (MOBD) with slight modifications. Each region is constructed using cities and towns as building blocks, and each is centered around one or more federally designated metropolitan statistical areas (MSA) and surrounding, non-metropolitan labor market areas (LMA).

Massachusetts has seven primary metropolitan statistical areas (PMSAs), four MSAs, and ten LMAs representing non-metropolitan areas. These divisions encompass key cities and adjacent communities with a high degree of economic and social integration. Data, including employment and labor force information, is collected regularly for these statistical areas.

But labor market area statistics offer only part of the picture. A host of equally important data must be used to fill in the gaps, which requires sorting through the complex web of statistical, political and planning jurisdictions in the state and piecing together the accompanying data.

Political regions in the state include 351 cities and towns. Until recently, 14 counties existed, built by combining these cities and towns. Much economic and government fiscal data are gathered and reported on the basis of these political units. Cities and towns comprise the basic geographic unit for collecting employment and labor force data. Information on local government expenditures and revenues is also collected and recorded by cities and towns.

The thirteen Regional Planning Agencies (RPAs) provide additional sources of information. Legally defined as "special state districts," they conform to various regional dynamics including economic networks, employment and commuting patterns, transportation systems, newspaper circulation and natural boundaries. Many of the RPAs collect and maintain unique sets of data for their specific regions.

The *Benchmarks* staff is continually discovering new sources of valuable information and searching for ways to make data useful. The lines we've drawn allow us to report this information on a regular basis.

THE *MASSACHUSETTS BENCHMARKS* PROJECT STAFF

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