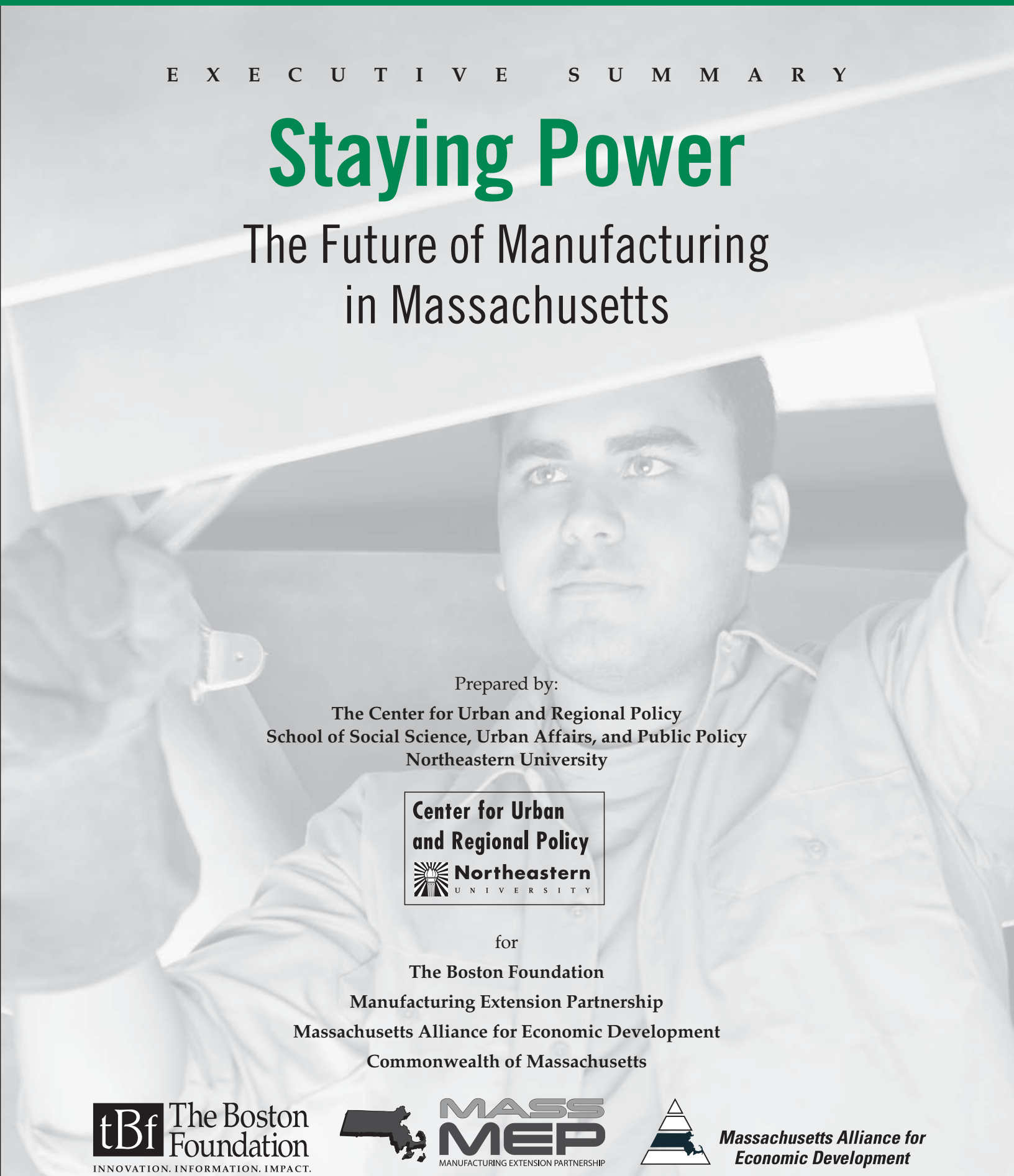
EXECUTIVE SUMMARY

Staying Power

The Future of Manufacturing in Massachusetts



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for

The Boston Foundation

Manufacturing Extension Partnership

Massachusetts Alliance for Economic Development

Commonwealth of Massachusetts

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Massachusetts Alliance for Economic Development

About the Boston Foundation

The Boston Foundation, Greater Boston's community foundation, is one of the oldest and largest community foundations in the nation, with assets of almost $900 million. In 2007, the Foundation and its donors made some $92 million in grants to nonprofit organizations and received gifts of more than $90 million. The Foundation is made up of some 850 separate charitable funds established by donors either for the general benefit of the community or for special purposes. The Boston Foundation also serves as a major civic leader, provider of information, convener, and sponsor of special initiatives designed to address the community's and region's most pressing challenges. For more information about the Boston Foundation, visit www.tbf.org or call 617-338-1700.

About the Center for Urban and Regional Policy

The Center for Urban and Regional Policy (CURP) within the School of Social Science, Urban Affairs, and Public Policy at Northeastern University, was founded in 1999, as a "think and do tank"—a place where faculty, staff, and students pool their expertise, resources, and commitment to address a wide range of issues facing cities, towns, and suburbs with particular emphasis on the Greater Boston region. CURP staff are involved in a wide array of projects, all aimed at helping policymakers and citizens better understand the dimensions of urban issues. Projects currently under way address housing, workforce development, economic development, education, information access, and more. For more information, visit www.curp.neu.edu.

About the Massachusetts Alliance for Economic Development (MAED)

MAED is a private nonprofit partnership of business, industry leaders, and government dedicated to fostering economic growth in the Commonwealth. The Alliance markets Massachusetts by providing information services to companies seeking to expand within or relocate to Massachusetts. The Alliance's products and services include www.massachusettssitefinder.com, developed in conjunction with the Commonwealth, a statewide Site Finder Service; the Research & Information Service; and the Massachusetts Ambassadors program. For more information, visit www. massecon.com.

About the Massachusetts Manufacturing Extension Partnership (MassMEP)

MassMEP assists organizations make the transition from traditional to world-class manufacturers that are equipped to compete in a global economy. MassMEP is able to leverage a vast array of public and private resources and services that are available to every manufacturing enterprise in the Commonwealth. The nationwide system of MEP centers is linked through the U.S. Department of Commerce. For more information, visit www.massmep.org.

UNDERSTANDING BOSTON is a series of forums, educational events and research sponsored by the Boston Foundation to provide information and insight into issues affecting Boston, its neighborhoods, and the region. By working in collaboration with a wide range of partners, the Boston Foundation provides opportunities for people to come together to explore challenges facing our constantly changing community and to develop an informed civic agenda. Visit www.tbf.org to learn more about Understanding Boston and the Boston Foundation.

E X E C U T I V E S U M M A R Y

Staying Power

The Future of Manufacturing in Massachusetts

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Dear Friends,

The Boston Foundation is proud to publish this detailed and illuminating report on the state of manufacturing in Massachusetts. We have titled it "Staying Power" because of the continued vitality of the manufacturing sector in the Commonwealth and across the country. Nationally, manufacturing generates $1.6 trillion in revenue—and manufactured goods make up more than 60 percent of U.S. exports.

In Massachusetts, this highly productive sector employs almost 300,000 people in thousands of companies across the state. And while that represents a significant decline from job levels in the 1940s, the Commonwealth's manufacturing output has increased over the last decade to stand at close to $40 billion.

Yet here, as elsewhere in this country, manufacturing often is perceived as emblematic of an 'old' economy. Not true. As this report makes clear, manufacturing continues to be a dynamic and healthy part of our economy, offering solid, well-paying jobs. According to the *Boston Indicators Report*, the average weekly wage for jobs in manufacturing is $1,273, much higher than many jobs in other sectors. Nationally, manufacturing jobs pay on average 25 percent more than other jobs.

Massachusetts always has been a source of innovation in science and technology. From the first steam-powered looms in the 1800s to the first telephone, sewing machine, modern typewriter, jet engine, microwave—and, of course, computer-related advances too numerous to list here.

It makes obvious sense for us to manufacture products invented in our state so that we can reap the full benefits of the jobs those inventions generate. But it also makes sense to encourage manufacturing here because it can inspire and spark invention and innovation.

One of the most exciting and promising sources of manufacturing jobs is in the area of clean energy. Already, there are 10,000 jobs involving clean energy in Massachusetts and that sector is growing fast—with many more potential jobs in manufacturing.

There are numerous ways that we can encourage manufacturing in Massachusetts. For instance, our approach to education can be geared toward jobs in manufacturing by emphasizing STEM (Science, Technology, Engineering and Math) on all levels along with improvements in vocational education in high schools, in community colleges and in workforce training programs.

Maybe the most important thing we can do is give credit where credit is due. Manufacturing always has been—and will continue to be—an important part of the Commonwealth's economy because, as this important report informs us, it is a sector that has real staying power.

Paul S. Grogan
President and CEO
The Boston Foundation

Manufacturing in Massachusetts: Background

It is difficult today to imagine how manufacturing once so profoundly dominated the economy of Massachusetts, but in the period during and just after World War II, 40 out of every 100 workers in the Commonwealth were employed by firms that produced a range of goods from textile fabrics to aircraft engine parts. Even as late as 1970, more than a quarter of the Massachusetts workforce was employed in one manufacturing industry or another. Today, this sector still employs nearly 10 percent of the state's workforce, but when policymakers, scholars, or even business leaders consider the economic strengths of the state, they more readily turn their attention to such cutting-edge "post-industrial" sectors as biotechnology, nanotechnology, health care, and financial services.

We should be rightly proud of Massachusetts leadership in such emerging industries and recognize how important these are to the Commonwealth's future. Yet it is imperative that we also understand just how critical the manufacturing sector remains, despite decades of deindustrialization, off-shoring, outsourcing, and downsizing. It is true that the majority of the manufacturing jobs that the Commonwealth enjoyed in the 1940s has disappeared, yet even so, nearly 300,000 manufacturing workers are still employed in thousands of firms across the state, a number exceeded only by those working in the state's health care, retail, and education sectors. Given the higher wages in manufacturing, only the Commonwealth's health care sector has a larger dollar payroll.

That manufacturing actually remains in Massachusetts, despite the growing globalization of the world's economy and the Commonwealth's oft-expressed reputation as an unwelcoming place for business, suggests a need to answer a number of fundamental questions. Why have so many manufacturers remained here? What kinds of jobs do these companies still provide, and what do they look for in their employees? Most importantly, can we expect this sector to remain viable, or are its days numbered? How many manufacturing jobs can we expect to keep in Massachusetts over the next decade or more?

With these questions in mind, the Commonwealth of Massachusetts—through 2006 legislation designed to stimulate and promote job creation—commissioned Northeastern University's Center for Urban and Regional Policy (CURP) to undertake a study of the current state of the manufacturing sector in Massachusetts, forecast the likely future of this sector, and consider what actions the state might take to help sustain and expand it. The state was particularly interested in discerning what products are still produced in Massachusetts, where they are produced, how much employment opportunity still exists in this sector, what challenges confront local manufacturers, and what assistance the state might provide to manufacturing firms to help keep them viable and vital.

The study comes at a time when much of the conventional wisdom dismisses Massachusetts manufacturing as a dying industrial sector overtaken by competition from other regions of the country and increasingly by competitors in China and India that offer a competent workforce at bargain rates. With employment losses of more than 112,000 between 1996 and 2006 alone, a straight line projection would suggest that the remaining 300,000 manufacturing jobs in Massachusetts will completely disappear by 2025.

What we found in our analysis is almost diametrically opposite to this conventional wisdom. The results of our analysis of existing statistical data combined with more than 700 completed surveys of manufacturing firms in the Commonwealth and more than 100 personal interviews with CEOs, owner/managers, and company executives reveal that, *after experiencing a sharp decline in employment, the remaining manufacturing sector has more than 8,600 firms, the large majority of which are now technologically sophisticated, plugged into strong supply chains with good customer relations, and looking forward to competing successfully for a large share of business in the region, the nation, and the world.* Indeed, over the past decade, even as employment has declined, manufacturing has increased its share of total state product. Contrary to the conventional wisdom, manufacturing is actually a *larger* part of the Massachusetts

economy today than it was a decade ago and it has the wherewithal to grow still larger. Our analysis suggests that future employment losses will likely be modest, and *even 10 years out we project this sector will still employ more than 250,000 workers* in Massachusetts.

Our analysis, however, also suggests that manufacturers in Massachusetts face a number of daunting challenges, chiefly dealing with the cost of doing business and the need to replace a rapidly aging workforce. The survey responses from manufacturers and the personal interviews we carried out identify actions state and local government can take to help overcome some of these challenges and thus help assure the viability of this important set of industries.

CURP partnered with many of the state's leading economic development organizations to ensure that broad regional considerations and varied industry concerns were represented in the planning, survey development and distribution, and interviewing that went into the data collection process. Particularly significant contributions came from the Associated Industries of Massachusetts, the Massachusetts Manufacturing Extension Program, the Massachusetts Alliance for Economic Development, state Senator Jack Hart, and the Offices of Housing and Economic Development and Labor and Workforce Development within Governor Deval Patrick's Administration. We also want to acknowledge the key role the Boston Foundation played in publishing and disseminating this report.

And these organizations provided support, direction, or personal contacts with manufacturers:

Berkshire Chamber of Commerce
Berkshire Economic Development Council
Boston Redevelopment Authority
Boston Tooling and Machining Association
495/MetroWest Corridor Partnership
Massachusetts Biotechnology Council
Massachusetts Business Roundtable
Mass Insight
Massachusetts High Technology Council
MassMEDIC
Massachusetts Taxpayers Foundation
Merrimack Valley Economic Development Council
MetroWest Chamber of Commerce
Neponset Valley Chamber of Commerce
New England Council
Quincy 2000
Regional Employment Board of Hampden County
SouthCoast Development Partnership
Taunton Development Corporation
University of Massachusetts
Western Massachusetts Economic
Development Council

CURP set the context of the study by analyzing data from the U.S. Bureau of Labor Statistics, the U.S. Census Bureau, and the state's own industry information systems in order to conduct a trend analysis of Massachusetts manufacturing employment going back to 1939. Additionally, these data provided detailed information on which products were being produced with how many employees and in what locations. Existing data also provided information on wages paid to employees, manufacturing productivity, and the share of gross state product (GSP) originating in the state's manufacturing sector.

At the same time, CURP cooperated with its partners in the development of a survey that would ascertain specific information from local manufacturers regarding their ownership structure, range of products, employee characteristics, use of state incentives, expectations for the future, and their suggestions for state policies that could help them thrive. This new survey was designed to find answers to the "why" questions that existing large-scale data sets cannot often provide. Of the more than 8,600 surveys that were delivered to manufacturers in the state, 706 were completed and returned to CURP for analysis.

CURP and its partners recognized that even the surveys might not provide the full story about Massachusetts manufacturing. To probe even further, CURP staff conducted personal on-site interviews with 104 of the surveyed firms to allow them to both tell their companies' individual stories and to elaborate on their survey responses where necessary.

Together, these new and original sources of information, combined with the existing data from the Census Bureau, the Bureau of Labor Statistics, and other sources, shed light on a sector of the state's economy that has not received much attention of late. In this report we highlight the most critical findings that the combination of these data sources revealed.

A Brief Post-World War II History of Manufacturing in Massachusetts

To be sure, traditional durable and nondurable manufacturing has lost the preeminent position it held in the Massachusetts economy in the mid-20th century. From a peak of more than 800,000 jobs during World War II, the sector has declined to less than 300,000 today. Even so, the decline in employment did not occur uniformly (see **Figure 1**). Rather, it was punctuated by periods of growth, most notably during the era of the "Massachusetts Miracle" from the early 1970s through the mid-1980s when employment was spurred by the advent of the mini-computer produced by such firms as Digital Equipment Corporation, Data General, Wang, and Prime. The employment ups and downs have reflected the pattern experienced by the nation as a whole, although in Massachusetts the periods of growth have been more modest and the periods of decline more severe (at least until recently).

Comparing the Commonwealth to the entire United States, six distinct eras of manufacturing employment become evident:

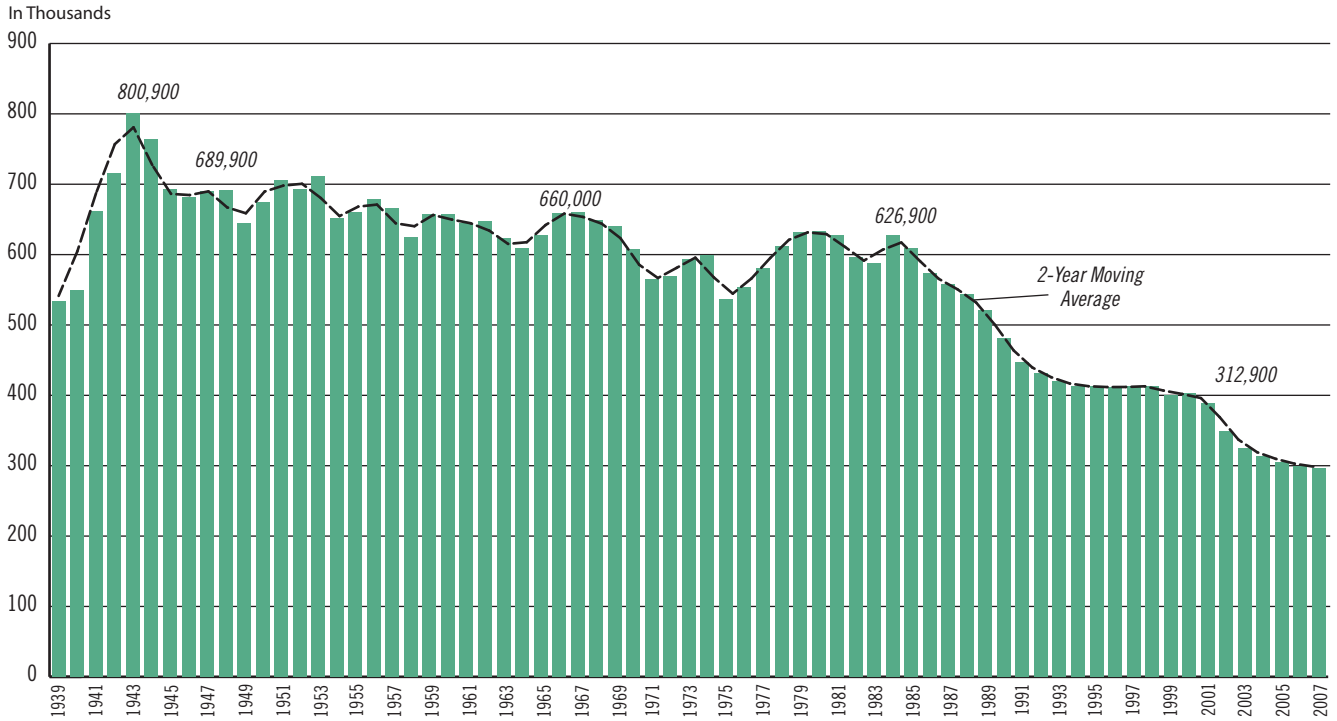
1. World War II Mobilization and Combat (1939-1943) Like the rest of the nation, Massachusetts readied for war, expanding its manufacturing capacity by nearly 50 percent, to more than 800,000 jobs.

2. World War II Completion and Demobilization (1943-1947) Returning to production for civilian life, Massachusetts shed many of the manufacturing jobs needed for wartime production. Still, employment levels remained about 30 percent above their 1939 level.

3. The Southern Shift (1947-1970) As many textile and leather goods companies that had called the Commonwealth home looked for cheaper labor, Massachusetts's manufacturing sector shrank, even as that of the whole nation grew steadily.

FIGURE 1

Massachusetts Manufacturing Employment (1939-2007) (with 2-Year Moving Average)



Source: U.S. Bureau of Labor Statistics, State and Local Employment Series

4. The Massachusetts Miracle (1970-1984) The exodus of manufacturing jobs ceased and even reversed as the rise of the personal computer reinvigorated manufacturing in Massachusetts.

5. Post-Miracle (1984-2000) The loss of several large computer companies and the continued erosion in traditional manufacturing industries led to a nearly 40 percent drop in manufacturing employment by the mid-1990s, followed by a brief period of stability.

6. The Globalization Era (2000-2006) Job losses accelerated in Massachusetts, but the Commonwealth was joined by the rest of the nation, as globalization led to the foreign relocation of many of the durable and nondurable manufacturing jobs that had already left Massachusetts decades earlier.

TABLE 1

Manufacturing Jobs by Product Type and Sector (2004)

Massachusetts—Total Employment	3,199,900
Massachusetts—Manufacturing Employment	311,850

	Technology Intensity	Number of Jobs
Durable Goods Manufacturing		204,034
Computer and electronic product manufacturing	High Tech	71,640
Fabricated metal product manufacturing	Medium-Low Tech	36,292
Miscellaneous manufacturing	Medium-Low Tech	26,029
Machinery manufacturing	Medium-High Tech	20,810
Other transportation equipment manufacturing	Medium-High Tech	12,890
Electrical equipment and appliance manufacturing	High Tech	11,840
Nonmetallic mineral product manufacturing	Medium-Low Tech	7,126
Furniture and related product manufacturing	Low Tech	6,174
Primary metal manufacturing	Medium-Low Tech	5,136
Wood product manufacturing	Low Tech	,387
Motor vehicles, bodies and trailers, and parts manufacturing	Medium-High Tech	1,806
Nondurable Goods Manufacturing		107,816
Food manufacturing	Low Tech	23,805
Chemical manufacturing	Medium-High Tech	17,645
Printing and related support activities	Low Tech	17,234
Plastics and rubber products manufacturing	Medium-Low Tech	15,986
Paper manufacturing	Low Tech	12,354
Textile mills	Low Tech	6,471
Apparel manufacturing	Low Tech	4,419
Leather and allied product manufacturing	Low Tech	3,183
Textile product mills	Low Tech	2,775
Beverage and tobacco product manufacturing	Low Tech	2,709
Petroleum and coal products manufacturing	Medium-Low Tech	1,235

Source: U.S. Bureau of Labor Statistics, U.S. Census of Manufacturers

FIGURE 2

Massachusetts Manufacturing Employment by Technological Intensity, 1969-2000 (Indexed to 1969 Level)

Source: U.S. Bureau of Labor Statistics, State and Local Employment Series

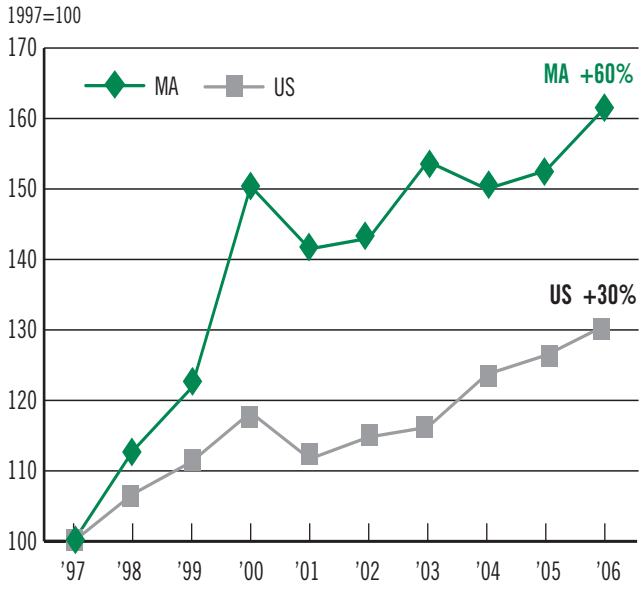
Diverging Trends by Technological Sophistication

In Massachusetts, job losses have not occurred uniformly across all types of industries. Using a classification scheme devised by the Organization for Economic Cooperation and Development (OECD), we divided the Massachusetts manufacturing sector into low-tech, medium-low-tech, medium-high-tech, and high-tech industries. **Table 1** provides a list of the key manufacturing industries in the Commonwealth according to this taxonomy for the year 2004.

As **Figure 2** illustrates, low-tech manufacturing employment has plummeted by 50 percent since 1969 while employment in high-tech manufacturing industries declined by only 12 percent.

FIGURE 3

Real GDP Originating in Manufacturing (Indexed to 1997 Value)



Source: BEA State Product and Gross Domestic Product data

TABLE 2

Massachusetts Manufacturing: Real Gross State Product and Productivity (1997 vs. 2006)

	1997	2006
Manufacturing Real Gross State Product (GSP)	$24.7 B	$40.0 B
Manufacturing GSP/Total State GSP	10.9%	13.3%
Annual Productivity Growth—All Sectors	3.6%	1.9%
Annual Productivity Growth—Manufacturing	12.7%	8.0%

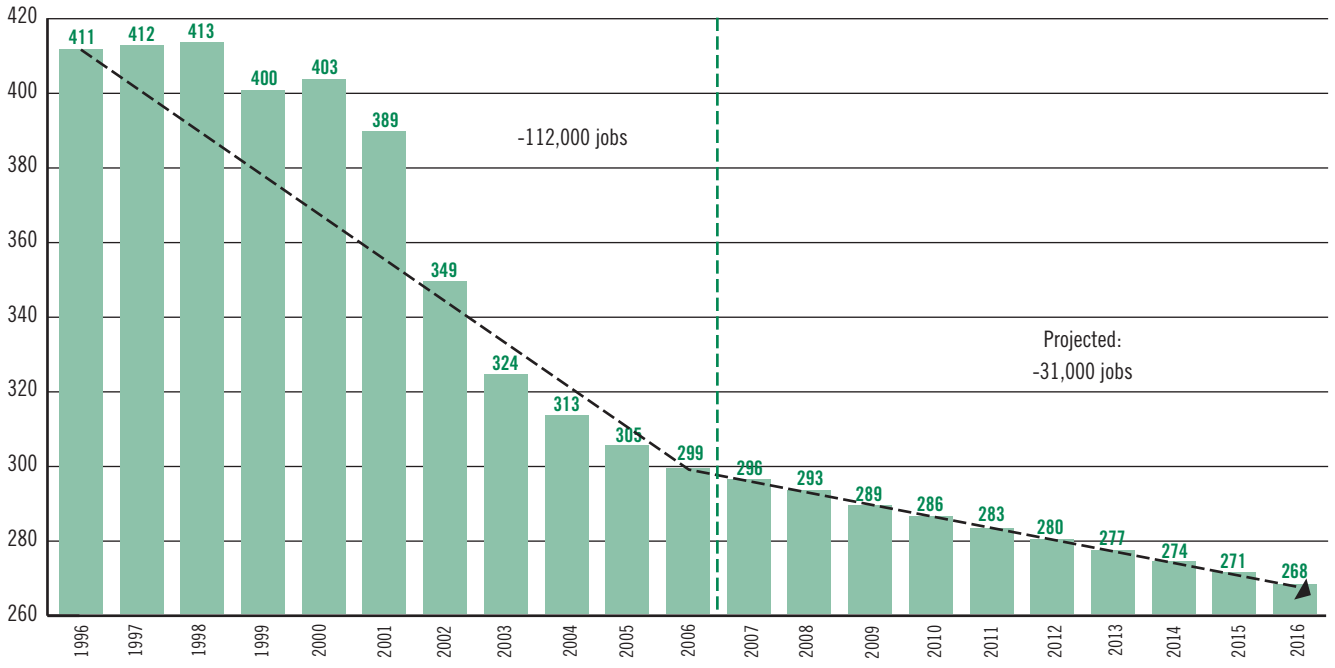
Source: U.S. Bureau of Economic Analysis, Gross State Product Series
U.S. Bureau of Labor Statistics, Current Employment Survey

Manufacturing Output Soaring

While manufacturing employment has declined in Massachusetts, manufacturing output certainly has not. As a result of tremendous increases in manufacturing productivity, output has grown rapidly even as the number of jobs in this sector has shrunk. Indeed, manufacturing productivity has grown twice as fast in Massachusetts as the nation as a whole (see **Figure 3)** as low productivity firms in the Commonwealth have been supplanted by higher productivity ones. In 1997, real manufacturing output or gross state product (GSP) originating in the manufacturing sector amounted to $24.7 billion (in 2000 dollars). By 2006, output had increased by an extraordinary 61 percent to nearly $40 billion. During the same 10-year period, Massachusetts's real gross state product produced by all of its industries increased to $300 billion, but this represented only a 32 percent increase. As a consequence, manufacturing output in Massachusetts represented 13.3 percent of total state output in 2006, up from 10.9 percent in 1997 (see **Table 2**).

FIGURE 4

Projected Massachusetts Manufacturing Employment (1996-2016) (in 000s)



Source: U.S. Bureau of Labor Statistics, State and Local Employment Series

An End to Large Employment Losses in Massachusetts Manufacturing (2007-2016)

As we noted above, if the near future looks like the recent past, Massachusetts will continue to lose manufacturing jobs at a rapid clip and the entire sector could disappear by 2025. According to our analysis, however, this sharp downward trend will not persist. We now have gone through a 20-year period in which most of the firms that could not survive in the new globalized economy have either moved their operations to lower-cost regions or shut down completely. What is left consists of highly sophisticated producers that contribute mightily to state output and employment, and that, for the most part, are able to survive in this new economic environment.

The first evidence in this report that the worst of manufacturing's employment decline is over was uncovered using a "shift-share" analysis based on national estimates of projected employment change by detailed manufacturing industry. These projections go through the year 2016 and are based on U.S. Bureau of Labor Statistics forecasts. Considering the particular distribution of Massachusetts manufacturing industries that now exists in the state, we anticipate that relative stability will prevail in the manufacturing employment for the next decade. *We can expect to see no more than a loss of 31,000 jobs over the next full decade—a significant amount, but very few relative to the 112,000 jobs lost over the previous decade* (see **Figure 4**). Depending on economic conditions, the loss could be even less.

100,000+ Future Job Openings

While the need for manufacturing workers will remain relatively strong, the aging of today's manufacturing workforce makes it almost certain that Massachusetts will witness a flood of retirements from this sector over the next decade. We anticipate that by 2016 about 50,000 of the 150,000 manufacturing employees currently age 45 or older will retire from their jobs. This number of retirements will greatly exceed the expected decline in overall employment. Combined with the natural turnover that takes place in manufacturing beyond those who retire, *Massachusetts stands to see more than 100,000 job openings in manufacturing by 2016*. These openings will need to be filled with new and presumably younger workers trained in vocational schools, community colleges, and on the job.

What Massachusetts Manufacturers Tell Us about Their Companies

Virtually all that we have described so far comes from existing data sources. We now turn to the survey and interview results to fill in the story and learn more detail about the manufacturing sector in Massachusetts from the firms that represent this sector.

Size and Ownership Structure

The Commonwealth's manufacturing sector is made up primarily of small, family-owned firms (see **Table 3)**. More than a third of all manufacturing establishments in the state employ fewer than four workers. This large number of companies, however, is responsible for only about two percent of all manufacturing jobs. At the other end of the spectrum, the comparatively small number of very large firms in the Commonwealth – just eight percent of all establishments employ more than 100 people – are responsible for well over half of the state's manufacturing jobs. The state's smaller firms are overwhelmingly family-run operations, whereas the larger companies are more likely to be owned by private investors or by stockholders (see **Table 4**). Still, only a little more than half of the firms with 100 or more employees are publicly-traded companies or private investor-owned and therefore subject to stockholder pressure.

TABLE 3
Estimated Share of Total Manufacturing Employment in Massachusetts by Size of Firm

Size of Firm (Employees)	Share of Manufacturing Firms	Share of Total Manufacturing Workforce
1-4	35%	1.9%
5-19	36%	8.7%
20-99	21%	21.1%
100-499	7%	32.9%
500 +	1%	35.4%

Source: Estimates based on 8,760 firms with valid addresses in the Info USA database

TABLE 4
Ownership Structure by Size of Firm

	All Firms	1-19 Employees	20-100 Employees	101+ Employees
Private family-owned	70%	79%	69%	38%
Private investor-owned	17%	13%	21%	20%
Publicly-owned stock corporation	7%	1%	5%	35%
Other	7%	8%	5%	7%

Source: CURP Survey

Location of Firms, Suppliers, and Customers

Manufacturers can be found all across Massachusetts. The 706 companies surveyed by CURP are distributed across 230 cities and towns in the state. Nearly 93 percent of these firms (655) have their headquarters in Massachusetts, and six out of seven operate exclusively within the state.

These manufacturers depend on each other and are closely linked locally in many ways. This is consistent with the general theory that since manufacturing components are often bulky or complex, it helps to have suppliers close by both for service and to reduce transportation costs. Overall, survey respondents indicated that their firms are supplied primarily from within the U.S. (92%), with a heavy concentration of in-state primary suppliers (43%). Only eight percent reported that their primary suppliers are located in foreign countries.

More than two out of five firms (43%) report that their primary customers are other manufacturers, reflecting the dense in-state supply chain. Nearly the same proportion (37%) consider other non-manufacturing businesses to be their main customers, while 20 percent sell directly to retail customers. Nearly half (45%) of the primary customers of Massachusetts manufacturers are located in the Commonwealth, and more than

60 percent are located in New England. Only about 10 percent of the current primary customers of in-state manufacturers are based in foreign countries.

Skills and Wages

The majority of jobs in manufacturing require no more than a high school diploma. Only one-eighth (12.3%) of the firms surveyed by CURP indicated that a majority of their jobs require a Bachelor's degree, and only 1.5 percent reported that a majority of their jobs require a graduate education. While higher education is not needed for most manufacturing jobs, job training and vocational skills are absolutely critical. One of the most consistent comments that we received from the manufacturers we personally interviewed was the importance of the skills possessed by their workers. Many of these are skills learned on the job or in vocational education programs rather than in a college or a university. Regardless of industry, size of firm, or location within the state, manufacturing executives were nearly unanimous in their claim that the quality of their workforce was vital to the success of their firms.

The mean hourly wage of unskilled production workers in our survey sample was $12.81, substantially more than double the federal statutory minimum wage of $5.85 an hour and more than 60 percent higher than the current Massachusetts minimum wage of $8.00. Twenty-seven percent of the firms we surveyed reported paying an average wage of more than $14.00 an hour to their unskilled workers and nearly half of these firms reported paying an average that exceeds $16.00. We found a slight variation by size of firm, with larger firms generally paying more than smaller ones for their unskilled workers. Skilled production workers averaged $20.48 per hour. Overall, including salaried workers and executives, the average annual wage is in excess of $65,000, nearly 25 percent higher than the average annual salary across all jobs in the state.

For unskilled workers with no more than a high school education, manufacturers provide well-paying jobs particularly when compared with jobs requiring similar skills in the allied health care field, retail trade, or the hospitality industry.

What Has Changed the Most for Massachusetts Manufacturers?

With the advent of new technologies and the growth in the global marketplace, the economy has radically transformed, no less for manufacturing than for any other sector. We asked our survey respondents to what extent they had experienced a number of changes in their operations over the past decade. The results are presented in **Table 5**. More than any other factor, manufacturers have felt enormous pressure to respond to customers' demands for *lower prices, improved service, and better product quality*. Since products and information can move across the world more rapidly today than ever before, customers have more freedom than ever to choose where to shop. Consequently, if firms are not providing outstanding products with excellent service at competitive prices, they know that their days in the industry are numbered. Manufacturers have implemented new technologies, and have seen their productivity grow as a result. Many have shifted from local to national or, for some of the largest, to global markets.

Reasons for Remaining in Massachusetts

Massachusetts is a relatively expensive place to live and to run a business. If entrepreneurs made location decisions based solely on cost, we would expect many more to have fled the Commonwealth for cheaper regions or nations long ago. Why, then, have so many stayed behind? We asked our respondents which factors matter the most in keeping them here. Their responses are reported in **Table 6**. Above all, satisfaction with the Massachusetts workforce and inertia (i.e., the sheer difficulty of relocating) are deciding factors. These two factors were cited as "extremely important" or "very important" by more than half of our survey respondents. Manufacturers praise the skills of their current workforce and report that if they moved away they are not sure they could replicate the skills of their present employees.

Many others noted that, despite the high cost of doing business in the state, the daunting prospect of picking up and relocating, even to a lower-cost region, is out of the question. This is particularly true for family-owned businesses that go back generations. These owners,

TABLE 5

Changes in the Business Environment Experienced by Manufacturing Firms in the Past Decade

Type of Change	Number of Firms	Percent of Firms
Increased Customer Demands for Lower Prices	440	62%
Increased Customer Demands for Improved Service Delivery	425	60%
Increased Customer Demands for Better Product Quality	386	55%
Substantial Increase in Use of New Technology	334	49%
Substantial Increase in Productivity Due to Improved Technology	293	42%
Shift from Local Markets to National Markets	207	29%
Shift from National Markets to Global Markets	189	27%
Reduction in Employment Due to Improved Technology	120	17%
Increased Outsourcing of Previous Internal Operations to Firms in Other States and Other Countries	80	11%
Increased Offshoring of Previous Internal Operations	73	11%
Increased Outsourcing of Previous Internal Operations to Other Massachusetts Firms	71	10%
Substitution of Skilled Labor for Less Skilled Labor	66	10%
Substitution of Less Skilled Labor for Skilled Labor	49	7%

Source: CURP Survey

TABLE 6

Reasons for Staying in Massachusetts: Percent of Firms Reporting Reason as "Extremely Important" or "Very Important"

Reason	Number of Firms	Percent of Firms
Strong Work Ethic in Workforce	347	52.0
Inertia (too hard to relocate)	345	51.7
Proximity to Customers	260	38.7
Availability of Appropriate Skilled Labor	258	38.5
Availability of Reasonably Priced Labor	258	38.5
Quality of Life (e.g. public schools, recreation, and cultural institutions)	249	37.3
Monetary or In-Kind Incentives from State, Local Governments or Quasi-Publics	221	33.7
Availability of Reasonably Priced Land for Expansion	219	33.3
Accessibility to Transportation for Shipping and Commuting (e.g. highways, airports, rail, seaport)	216	32.1
Proximity to Key Suppliers	148	22.1
Proximity to Professional or Research Support Services	74	11.1
Proximity to Universities and Colleges	71	10.6
Critical Mass of Similar Firms in Region	66	10.0
Proximity to European Markets	37	5.5%

Source: CURP Survey

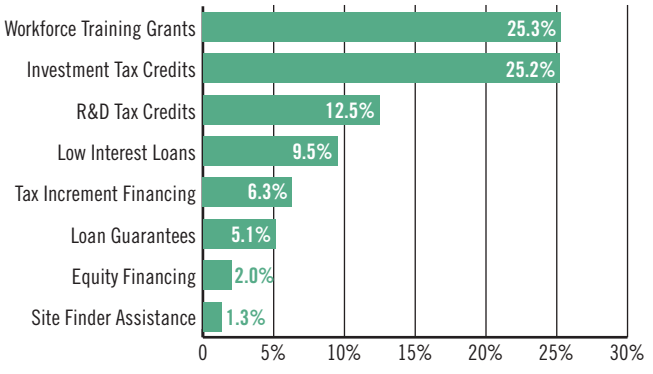
and their employees, tend to have deep roots in their communities and neighborhoods, and the idea of moving is difficult to contemplate.

Despite Boston's status as a center of learning and innovation and hub of the regional economy, proximity to universities, research centers, similar firms, suppliers, and transportation lines did not matter nearly as much for survey respondents. This, too, likely reflects the impact of the globalization of the marketplace, in which communicating and shipping are relatively easy to accomplish, while finding good employees continues to pose a challenge.

Incentives Used by Massachusetts Manufacturers

The Massachusetts state government offers a range of incentive programs to help local manufacturers, but for the most part manufacturers do not take advantage of these programs (see **Figure 5**). About a quarter of survey respondents said they had used state workforce training grants to help their workers develop needed skills, and another quarter said they had used investment tax credits, but no other incentive was utilized by more than one in eight respondents. While the reasons behind this are not totally clear, it is likely that many firms, especially the smallest ones without large numbers of support staff, simply do not know about the existence of these incentives or do not have the time and resources to apply for them. The fact that smaller and mid-sized manufacturing firms do not avail themselves of the range of state programs is startlingly clear in **Table 7**. Fewer than 10 percent of small firms use workforce training grants, compared to 35 percent of mid-sized companies (20-100 employees) and 65 percent of companies with more than 100 workers.

FIGURE 5
Percent of Firms Using State or Local Incentive Programs



Source: CURP Survey

TABLE 7
Use of State Incentives by Massachusetts Manufacturing Firms by Size of Firm

	1-19 Employees	20-100 Employees	101+ Employees
Workforce Training Grant	9.7%	35.0%	65.0%
Investment Tax Credit	17.1%	29.3%	47.0%
R&D Tax Credit	4.7%	15.5%	35.0%
Low Interest Loans	6.8%	12.2%	12.0%
Tax Increment Financing	2.4%	6.5%	24.1%
Loan Guarantees	2.7%	8.9%	4.8%
Equity Financing	1.5%	2.4%	3.6%
Site Finder Assistance	0.9%	1.2%	0.0%

Source: CURP Survey

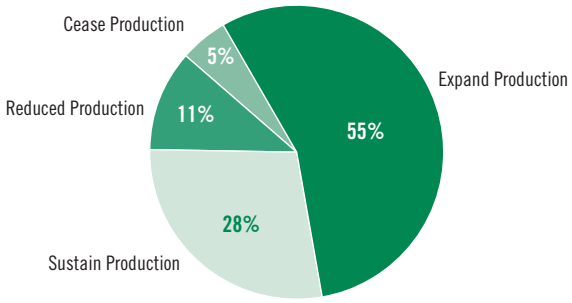
Expectations about Future Production and Employment

Even though they have witnessed the closing of many local competitors and the elimination of many jobs over the past few decades, manufacturers are surprisingly optimistic about what the future holds in store for them. *More than half (55.3%) of all respondents predict increasing production levels in the next five years, and another 28 percent foresee sustained production levels at current rates* (see **Figure 6**). By comparison, only one in nine firms predict reduced production levels, and fewer than five percent expect to cease production in Massachusetts altogether. Also, more than 70 percent of the survey respondents stated that they anticipate introducing new products over the next five years, including a full 90 percent of larger firms with more than 100 employees.

When it comes to employment levels, manufacturers seem no less optimistic. Corroborating our reasonably sanguine employment projections from U.S. Bureau of Labor Statistics data, *nearly nine out of 10 firms (87%)*

FIGURE 6

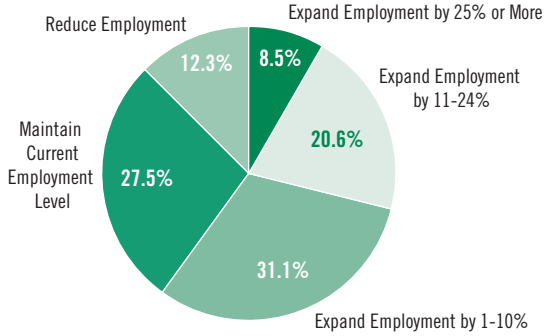
Expected Production Levels in Massachusetts over Next Five Years



Source: CURP Survey

FIGURE 7

5-Year Employment Projections of Massachusetts Manufacturing Firms



Source: CURP Survey

we surveyed expect their employment levels to grow or at least stay constant over the next five years (see **Figure 7**). One out of 12 firms (8.5%) expects to increase employment by at least 25 percent and another one in five (20.6%) are planning on increasing the number of their employees by 11 to 24 percent. Only one in eight of the survey respondents expect their firms to reduce employment over the next five years.

The Challenges Facing Massachusetts Manufacturers

Despite their optimism, the Commonwealth's manufacturers recognize that the road ahead will not always be an easy one. Business costs and the general cost of living are high in Massachusetts, and there is no sign of immediate relief any time soon. While firms in specific manufacturing industries and of different scale have varying needs and face a diverse set of challenges, survey respondents were in general agreement about the most difficult challenges they face today.

Key Challenges

As **Table 8** reveals, a concern over the cost of doing business – the cost of health insurance, workers' compensation, taxes, energy, labor, housing, and supplies and parts – is very much on the minds of the state's manufacturers. When asked to rank the importance of these challenges on a scale of 1 to 5, these costs all received mean scores well above three, and the top two challenges (health insurance and workers' compensation) had average scores over four. Meanwhile, other factors that might presumably pose difficulties for manufacturers, such as the often lamented weather and climate in Massachusetts, the inadequacy of transportation and infrastructure, the threat of labor union activity, and the threat posed by increased merger and acquisition activity, appears relatively mild to our respondents.

Each of these challenges poses a greater threat to small businesses than to large ones. While the rank order of challenges cited by respondents did not vary much by firm size, the magnitude of the challenge (on a scale of 1 to 5) did vary significantly. For example, 69 percent of small firms gave a score of 5 to the challenge of health care costs, while only 48 percent of large firms rated this challenge that highly. One half of small firms gave a score of 5 to the challenge of high taxes, but this was true for only about a quarter of the largest firms. In sum, economies of scale, a larger number of administrative personnel, and greater resources allow large companies to deal more easily with challenges that may pose a serious threat to small family-owned manufacturing businesses.

TABLE 8
Challenges Facing Massachusetts Manufacturers

Rank	Issue	Mean Response
1	High Cost of Health Insurance	**4.35**
2	High Cost of Workers' Compensation	**4.09**
3	High Taxes	**3.97**
4	High Energy Costs	**3.94**
6	High Labor Costs	**3.88**
7	High Cost of Housing	**3.38**
8	Cost of Supplies, Services, or Parts	**3.25**
9	Environmental Regulations	**3.18**
10	Zoning and Building Code Regulations	**3.16**
11	Inadequate Supply of Appropriately Skilled Labor	**3.15**
12	Cost of Construction	**2.96**
13	Customers are Moving to Other Locations	**2.46**
14	MA Weather and Climate	**2.23**
15	Suppliers are Moving to Other Locations	**2.22**
16	Aggressive Trade Unions	**2.04**
17	Inadequate Transportation/Infrastructure	**1.91**
18	Inferior Quality of MA Supplies, Services, or Parts	**1.90**
19	Increased Merger and Acquisition Activities	**1.88**
20	Ability to Import Skilled Foreign Labor (HB1)	**1.68**

Scale: **1** = no challenge; **5** = poses a great challenge

Source: CURP Survey

The Challenge of Recruitment

The most frequently cited challenges were those concerning direct and immediate costs to manufacturing firms, reflecting the urgency with which companies must deal with those problems. Although the challenge of recruiting skilled labor did not emerge as one of the most highly ranked in the survey, it was mentioned time and again during in-depth personal interviews with owners and executives. In one interview, the president of a Westfield manufacturer of aircraft engine components explained that he was actually turning down contract offers because of a lack of workers capable of operating sophisticated production machinery. He seeks high school graduates with intelligence and mechanical aptitude to be trained on his company's equipment. He is not finding them. We heard similar stories quite often.

Table 9 presents survey results that break down the difficulty of recruiting employees for various types of positions. For firms of all sizes, the most difficult positions to fill are those that require skilled craftsmen. It is not nearly as difficult for firms to find executives and middle managers as it is to find individuals who, though they may not have as much formal education, have the technical and mechanical skills to fabricate the products that these companies manufacture. According to the survey, more than a quarter of all firms find it "extremely difficult" or "difficult" to recruit appropriately skilled entry level workers.

TABLE 9
The Difficulty in Recruiting Labor for Massachusetts Manufacturers

Type of Employee	Percent reporting "Extremely Difficult"	Percent reporting "Difficult"	Percent reporting "Difficult" or "Extremely Difficult"
Executive Management	15%	24%	39%
Middle Management	8%	20%	28%
Scientific/R&D	25%	28%	53%
Skilled Craftsmen	35%	32%	67%
Entry Level	7%	20%	27%

Source: CURP Survey

What Manufacturers Want from Government

Near the end of the survey and in our interviews, we asked firms to tell us about what kinds of help they thought would make the biggest difference in sustaining or expanding their operations. Regardless of firm size, specific industry, or location in the state, there was a strong consensus on what government could do to help.

Respect and Acknowledgement

With all of the praise and attention that business, the media, and government leaders have heaped upon our technology-rich sectors linked to the state's premier universities and colleges, the state's traditional manufacturers feel strongly that they have been subject to "benign neglect." Other sectors that contribute much less to gross state product and employ only a fraction of what manufacturing does are repeatedly praised while manufacturing is ignored or worse yet, dismissed as old-fashioned and dying.

Beside the intangible impact of this "Rodney Dangerfield" slight to this entire sector, employers recognize that the lack of public acknowledgement and respect puts them at a disadvantage relative to other industries (e.g. film, life sciences) when it comes to state incentives and sends a message to young people to look elsewhere for jobs. This makes workforce recruiting that much tougher. Manufacturers want government officials to recognize their contributions to the state whenever the opportunity arises to use the "bully pulpit" in a constructive way.

Reducing the High Costs of Business in Massachusetts

This lack of respect, while not fully tangible, shows up very concretely, they believe, in the absence of more government assistance. In line with what manufacturers believe to be the greatest cost challenge they face, the government initiative that respondents would most like to see enacted is a reduction in the cost of employee health insurance (see **Figure 8**). More than nine out of 10 respondents claimed that such a reduction would be "extremely important" or "very important" for ensuring their continued viability. The implementation of Massachusetts's new Health Connector law makes this an even more urgent issue. Mandating that all residents obtain health insurance, the bill puts more pressure upon employers to pay for their employees' health care at a time when such costs are at all time highs.

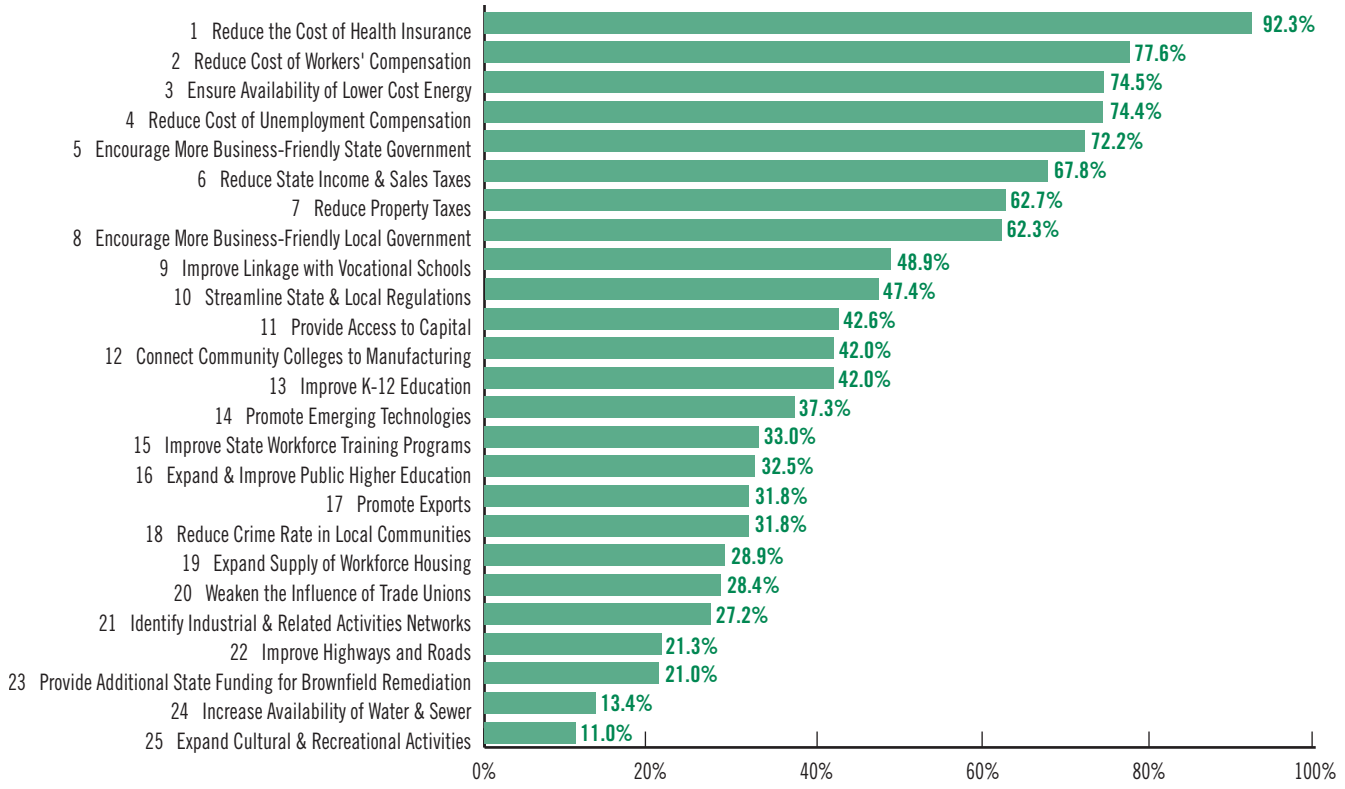
The survey respondents' other preferred government initiatives reflect the critical need to reduce other burdensome costs, as well. After a plea for reducing the cost of health care, the most highly ranked items on the list were, in order, reducing the costs of workers' compensation, energy, and unemployment compensation. In their discussion of key challenges and in their suggestions for pro-manufacturing state policies, respondents have very clearly demonstrated that the high costs associated with running a business in this state pose a real threat to the survival of local manufacturing enterprises and must be addressed and remedied.

Developing the Workforce of the Future

The training and education of the next generation of manufacturing workers also came up frequently. Many respondents considered the following factors to be very important: the improvement of communication between manufacturers and vocational schools (49% of respondents); better connections between manufacturers and community colleges (42%); the improvement of public K-12 education (42%); and the improvement of state workforce training programs (33%). As the manufacturing workforce ages, owners and managers worry (and rightly so, as our retirement projections suggest) that the next generation will not be willing or ready to fill all of the jobs that become vacant in the near future. The development of the workforce through improved education and training is on the minds of manufacturing leaders across the state.

FIGURE 8

Actions State and Local Government Can Take to Help Manufacturers Sustain or Expand Their Operations in Massachusetts: Percent Reporting Action Would Be Important to Sustaining or Expanding Their Massachusetts Operations



Source: U.S. Bureau of Labor Statistics, State and Local Employment Series

Conclusion

This report, therefore, suggests a perspective on the Massachusetts manufacturing sector that is very much at odds with the conventional wisdom. Over the past two decades, manufacturing employment has declined precipitously, leading many to conclude that manufacturing is disappearing in the Commonwealth and that there is little that can be done or should be done to reverse this outcome. With luck, pluck, and enlightened public policy, other industries will take its place as contributors to the state's gross product and as a source of employment and household income.

What we have found is quite a different story. After losing much of its low productivity, cost-sensitive industry, what is left in Massachusetts is highly sophisticated, highly productive, and likely to remain a strong contributor to both state product and employment. The sector has strong ties to its customer base and is linked integrally into powerful supply chains. As such, manufacturing today is responsible for a higher share of state output than a decade ago. While the manufacturing sector shed more than 112,000 jobs during the last decade, we project the losses will be modest over the next decade, leaving the state with well over 250,000 manufacturing jobs still here in 2016.

These jobs are generally good jobs at good pay, a large majority of which go to workers who have not attended college. Moreover, manufacturing is spread throughout the state so that it not only contributes to the well-being of the most affluent cities and towns in Massachusetts, but provides an economic base for many of the older industrial areas in the Commonwealth.

Nonetheless, manufacturing continues to face challenges that could compromise its future. The cost of doing business in Massachusetts is considered exorbitant by many firms and more than 90 percent of those we surveyed feel they are threatened by the escalating costs of health insurance for their employees. Other costs that worry them are those connected to workers' compensation, unemployment compensation, and property taxes.

But perhaps the greatest challenge facing manufacturing here in Massachusetts will be finding appropriately skilled workers to fill the more than 100,000 job openings we forecast will be created over the next decade as the result of workforce retirements plus normal employee turnover. Manufacturers worry that young workers are not interested in pursuing jobs in their industries and believe that our workforce training system in Massachusetts is not yet up to the task of training sufficient numbers to fill their need.

Manufacturers are not asking for much from the state, but they do want more respect and they want the state to find ways of reducing some of the cost burdens they face to meet employee obligations related to insuring for medical costs, workplace disability, and unemployment. Most of all, they want the state to consider ways of improving vocational schools, community colleges, and workplace training programs that will help fill workforce needs as they continue to produce the wide array of sophisticated products they now are well positioned to manufacture.

For More Information

A pdf of the full report **Staying Power: The Future of Manufacturing in Massachusetts** is available on the Boston Foundation's website at www.tbf.org.

For a printed version of the full report or additional printed copies of the Executive Summary, please call 617-338-1700.