2015 | volume 17 issue 2

Mass Benchmarks

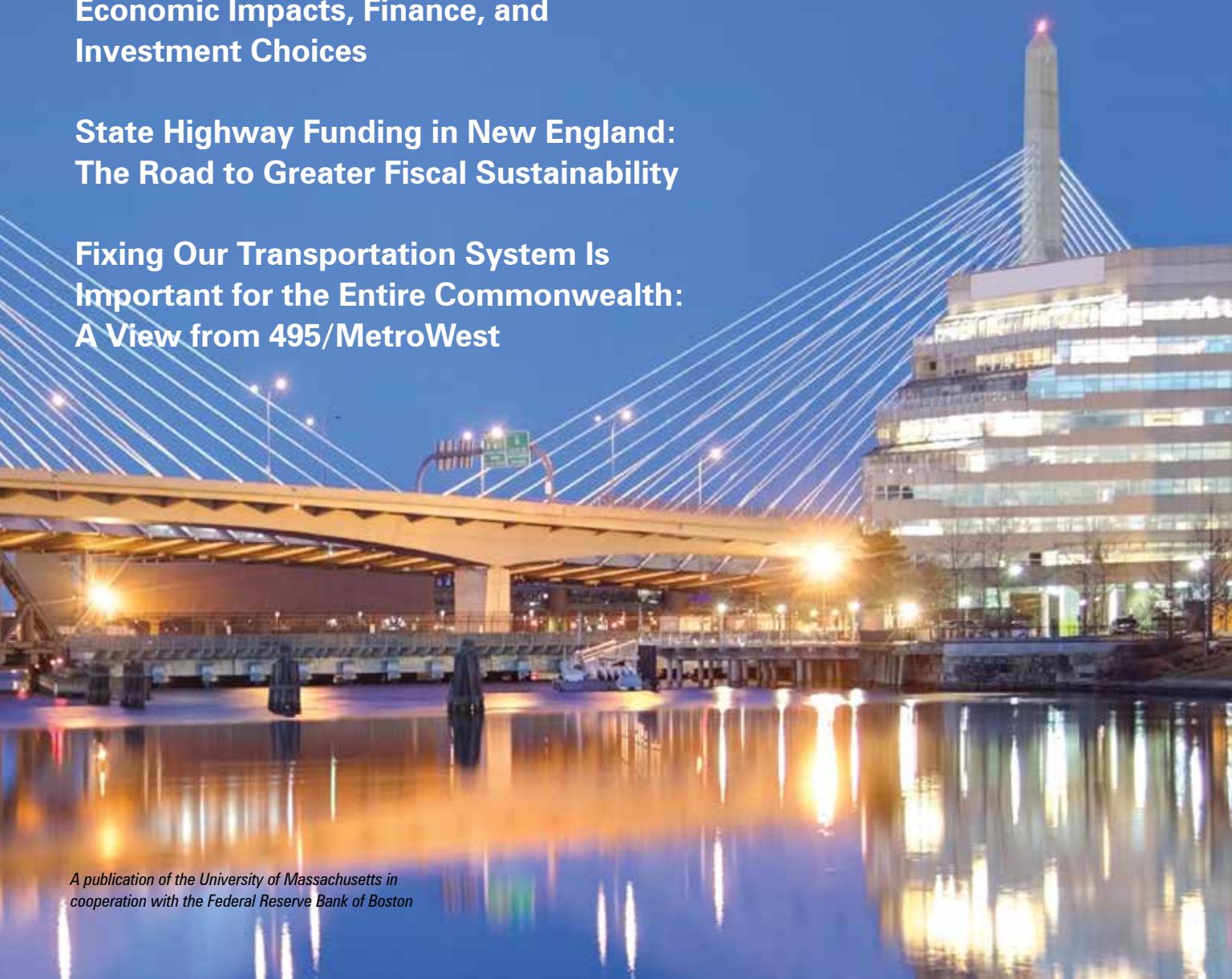
A JOURNAL OF THE MASSACHUSETTS ECONOMY

Strong State Growth Continues

Transportation in Massachusetts: Economic Impacts, Finance, and Investment Choices

State Highway Funding in New England: The Road to Greater Fiscal Sustainability

Fixing Our Transportation System Is Important for the Entire Commonwealth: A View from 495/MetroWest



A publication of the University of Massachusetts in cooperation with the Federal Reserve Bank of Boston

Mass Benchmarks

2015 | volume 17 issue 2

*Mass*Benchmarks, published by the University of Massachusetts in cooperation with the Federal Reserve Bank of Boston, provides timely information about the Massachusetts economy, including reports, commentary, and key data about the state's regions and industry sectors that comprise them.

The editors invite queries and articles on current topics involving the Massachusetts economy, regional economic development, and key growth industries from researchers, academic or professional economists, and others. A topical outline and brief biography of the author should be sent to info@donahue.umassp.edu.

A complete list of past issues, latest news, updates, and additional research on the Massachusetts economy can be found at www.massbenchmarks.org.

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FROM THE PRESIDENT

This issue of *Mass*Benchmarks focuses our attention on a number of critical issues facing the Commonwealth's transportation system. And it highlights a number of important fiscal and regional challenges to ensuring that the state remains a competitive place to live, do business, and raise a family.

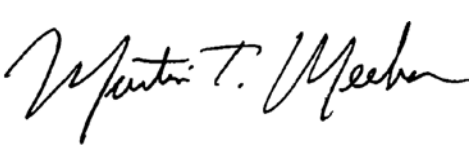
The issue opens with an assessment of the state's economy authored by Northeastern University Professor Alan Clayton-Matthews and UMass Amherst Professor Robert Nakosteen. In their thought-provoking article, they describe a state economy that, as they put it, "is experiencing an economic expansion reminiscent of the late 1990s." While sluggish international economic conditions and geopolitical challenges are clearly weighing heavily on both the state and national economic outlook, their analysis reminds us of how much the Commonwealth benefits from its investments in innovation and education, and of the continuing challenges facing those communities and regions of the state which have not yet had the opportunity to fully benefit from these strengths.

The remainder of the issue focuses on transportation policy challenges. In the first of three articles on this topic, former Cambridge Systematics senior vice president Marc Cutler and the UMass Donahue Institute's Branner Stewart examine historical efforts to improve and reform state transportation agencies in an attempt to inform state policy discussions on what they identify as the three most serious problems facing the state transportation system — revenue, cost control, and management.

The second article focuses on transportation finance, specifically the steady erosion in the effectiveness of the state gas tax as a result of inflation and improving fuel efficiency. Authored by New England Public Policy Center (NEPPC) at the Federal Reserve Bank of Boston's Deputy Director Darcy Sass and former NEPPC senior research analyst Jennifer Weiner, this article makes it clear that the debate over how to generate the revenue that will be required to maintain and sustain our state transportation network can be expected to remain a subject of intense debate for the Commonwealth's leaders for some time to come.

Our issue concludes with a thoughtful assessment of the significant transportation challenges facing regions outside of the immediate Boston area by Paul Matthews, the Executive Director of the 495/MetroWest Partnership. Matthews reminds us that, in our rush to solve the very serious problems facing the MBTA and the communities it serves, we should not lose sight of the very real needs of communities and regions that in many cases have been waiting for decades for critical transportation investments and improvements.

Taken together, the lessons in this issue of *Mass*Benchmarks provide our state's political, business and labor leaders with the kind of timely information and insight that has characterized this journal since its founding nearly two decades ago. They also reflect the University of Massachusetts' continuing commitment to its mission of public service, outreach, and economic development.



Martin T. Meehan, President
University of Massachusetts

EXCERPTS FROM THE BOARD

By all indications, the Massachusetts economy is continuing its robust expansion. Employment is growing at rates not seen since the late 1990s. Gross state product growth has consistently exceeded national growth this year. While residential construction remains below prerecession levels, building activity is increasing and office rents are rising, both strong signals of a growing regional economy. But while these developments are most welcome, a number of risk factors continue to weigh heavily on the state's economic outlook.

Recent job growth in the state has been impressive, with year over year payroll employment increasing by over 90,000 (through August). The technology and knowledge-intensive sectors of the economy continue to lead the way. In particular, jobs in the professional, scientific, and technical services industry have grown by more than 5 percent in the past year. This sector includes legal, accounting, architectural, engineering, and specialized design services; computer services; consulting services; and research services, among others. The health services and products sector has been another employment growth driver. This sector includes pharmaceutical and medical device firms, as well as the state's world-renowned hospitals and other health care providers. The Commonwealth's knowledge-intensive industry mix continues to drive the state's economic growth and, to an extent, helps to immunize the state against some of the issues that are weighing heavily on the national and global economic outlook.

But several dark clouds have been forming globally. Of particular concern is the apparent decline in the rate of growth of the Chinese economy. Slowing Chinese growth is already affecting nations that rely on China as a destination for their commodity exports, including Canada, Australia, and Brazil, and oil exporters. While the Massachusetts economy is somewhat buffered from these developments, thanks to its relatively smaller reliance on manufacturing exports, they can be expected to exert downward pressure on state export activity. And the Bay State's professional business services sector, an important source of recent job growth, is exposed to this weakness to the extent it affects their international clients. While the state is relatively well positioned to manage these risks, it is by no means immune from the effects of continued global economic weakness.

The overall strong performance of the state economy continues to mask troubling imbalances across the Commonwealth. To date, the growth and prosperity associated with the state's dynamic technology and innovation sectors has been concentrated in the Greater Boston region, though there appear to have been some positive spillover effects in some other areas of the state. While labor markets in many of the Gateway Cities have been improving — in some cases rapidly — their economic performance continues to lag and it is difficult to see this changing anytime soon. Even in the Greater Boston area, income growth has been concentrated at the top of the distribution, and this troubling pattern appears to be continuing. Housing prices and residential rents are rising fast, putting increasing pressure on the state's working families, many of whom have had to cope with both stagnant incomes and increasingly unaffordable housing options.

These issues aside, Massachusetts appears poised to continue its robust economic expansion, at least into next year.

Prepared by Executive Editor Robert Nakosteen
September 29, 2015

THE STATE OF THE STATE ECONOMY

Economic Currents

Strong State Growth Continues

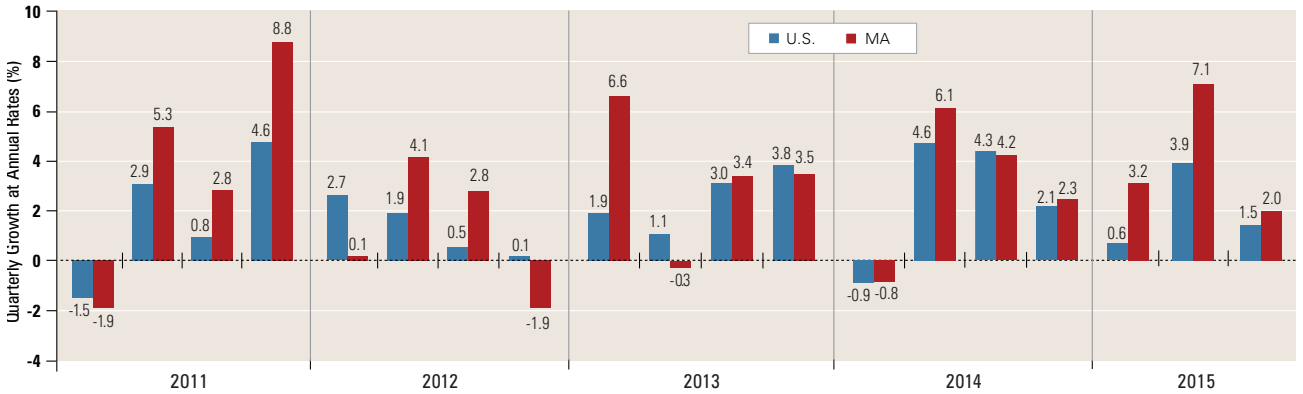
CONTINUED GROWTH IN THE STATE'S ECONOMY, INCLUDING GROSS STATE PRODUCT, EMPLOYMENT, AND OTHER INDICATORS, REFLECTS ITS STRONG PERFORMANCE, DRIVEN BY A VIBRANT TECHNOLOGY SECTOR AND DEPENDABLE EDUCATION AND HEALTH SECTORS. THE BAY STATE'S ECONOMY SHOULD CONTINUE TO EXPAND, EVEN WITH INCREASES IN ELECTRICITY PRICES, STAGNANCY IN EUROPE, AND A STRONGER, EXPORT-DAMPENING DOLLAR.

Alan Clayton-Matthews and Robert Nakosteen

INTRODUCTION

The Massachusetts economy is experiencing an economic expansion reminiscent of the late 1990s, though without the impetus of the tech bubble that drove the earlier cycle. State gross product is growing robustly, even taking into consideration the weather-related slow growth early in the year. The Commonwealth has more or less tracked the national economy in the most comprehensive measure of economic performance. Employment growth remains strong, and the number of jobs has grown without significant interruption since late in 2009. Job growth during this expansion has exceeded growth during the previous one. The unemployment rate remains low by historical standards, and was below the national rate even before the recession became acute in mid 2008. The current expansion appears to be on firm footing, given the recent performance of the national economy. Sustainable state economic growth is not possible without reasonable growth in the nation. The Massachusetts tech sector depends heavily on national demand for its products and services.

Figure 1. Growth in Real Product, Massachusetts and United States
Q1 2011 – Q3 2015



Source: U.S. data from the U.S. Bureau of Economic Analysis (BEA); Massachusetts data from *Mass*Benchmarks. Calculations by Alan Clayton-Matthews

The outlook is not without reservations. Nationally, growth in GDP has been weak relative to historical expansions. Productivity growth has been declining, as has labor force participation. The decline in labor participation virtually across the age spectrum is especially troubling (the trend is strikingly different in the state; see below). The drop of the price of oil since May of 2014 has benefitted consumers, but is taking its toll in the United States oil patch running from the Dakotas to Texas. In the state, lower petroleum prices have been at least somewhat neutralized by sharp increases in electricity prices. Globally, Europe remains in a slow- or no-growth period, and the Euro crisis does not seem to have been resolved. Growth in China is slowing, and bubbles in property and equities are deflating. These global developments have strengthened the U.S. dollar in international currency markets, making exports from Massachusetts less price competitive. The stronger dollar has already led to a slowdown in international exports from the state.

Despite these cautions, the Massachusetts economy seems poised to continue its strong economic performance. A vibrant high technology sector continues to energize the state economy, and the education and health sectors continue their dependability.

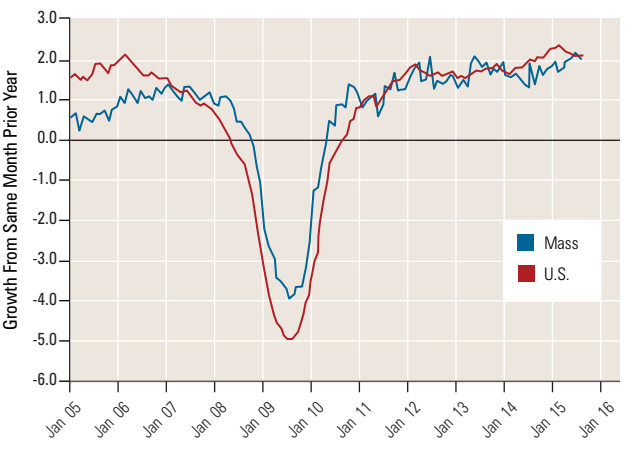
STATE OF THE STATE ECONOMY

Output, Employment, and Unemployment

Gross state product (GSP) is the most comprehensive measure of overall economic performance. For this report, we use data from the Bureau of Economic Analysis for the period up to the beginning of 2015, after which we use the *Mass*Benchmarks Current Economic Index as a proxy. In the most recent GSP report, for the third quarter of the year, the state is reported to have grown by 2 percent, compared with national GDP growth of 1.5 percent. The trend since the start of 2014 has been state growth exceeding national growth as measured by gross product. Third quarter gross state product was disappointing for both the state and the nation. This bears watching as we move forward.

Employment and the unemployment rate have trended very positively for the state. Employment growth has been strong, especially recently. In the last twelve months ending in July, 69,300 jobs were added, an average of 5,800 per month and an annual rate of growth of 2 percent. Between the (employment) trough of the recession in October 2009 through July 2014, 240,000 jobs were added, an average of 4,200 per month and an annual growth rate of 1.5 percent. Clearly, job creation in the state has accelerated in the past year, and is tracking national growth closely.

Figure 2. Massachusetts and U.S. Payroll Employment Growth, 2005–2015



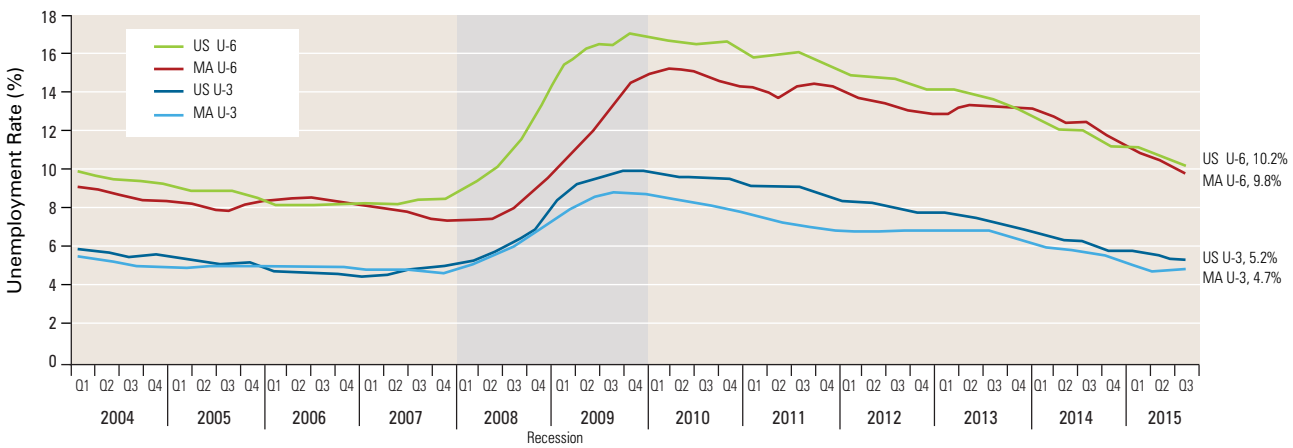
Source: U.S. Bureau of Labor Statistics

The quarterly unemployment rate has continued its steady downward trend. The unemployment rate in the state has been falling consistently since the beginning of 2010. Since that time, it has been consistently below that of the nation. Perhaps most encouraging about the pattern of unemployment is the drop in the U-6 rate. The U-6 unemployment rate adds to measured unemployed workers who have dropped out of the labor force but would re-enter if there were jobs available, as well as part-time workers who would prefer to work full-time, and would if the hours were available. The U-6 unemployment rate peaked at 15.3 percent in the second quarter of 2010, and has fallen more or less steadily to its most recently reported level of 10.2 percent in the third quarter of 2015. The state and national U-6 rate have tracked closely in recent months, with the Massachusetts rate slightly below the U.S. rate of 9.8 percent.

Another sign of the improved labor market is the low rate of layoffs as measured by initial unemployment claims. In Massachusetts, these are as low as they were at the peak of the 1990s and 1980s expansions.

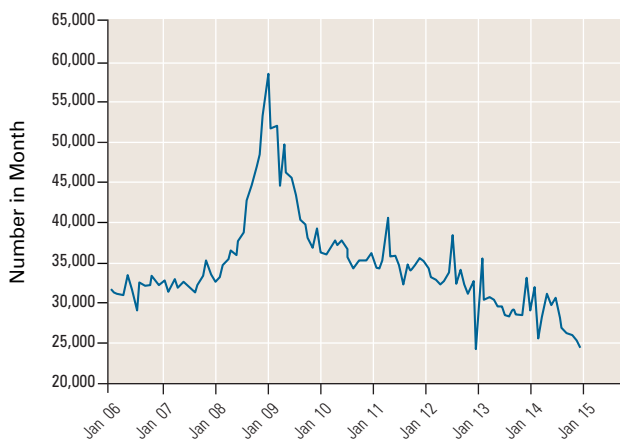
An even more striking image of the state labor market is evident in the pattern of initial unemployment claims data. After spiking in March of 2009, initial claims for unemployment compensation have dropped more or less monotonically and dramatically through this year.

Figure 3. Unemployment Rates, Massachusetts and the United States
Q1 2004–Q3 2015



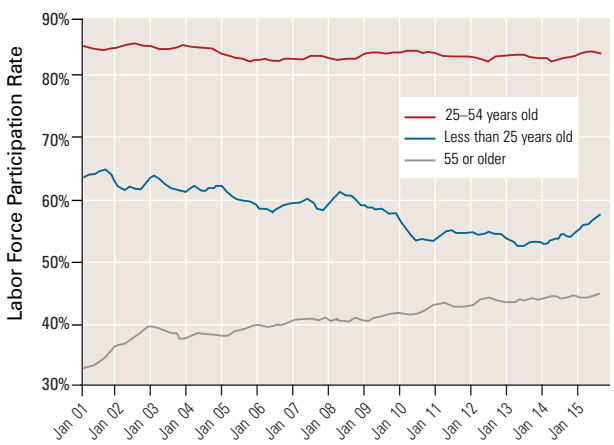
Source: Local Area Unemployment Statistics (LAUS) program, Bureau of Labor Statistics; authors' calculations; National Bureau of Economic Research (NBER)

Figure 4. Initial Unemployment Claims
Massachusetts



Source: Massachusetts Department of Unemployment Insurance (DUA)

Figure 5. Participation Rates by Age
Massachusetts
12-Month Moving Average

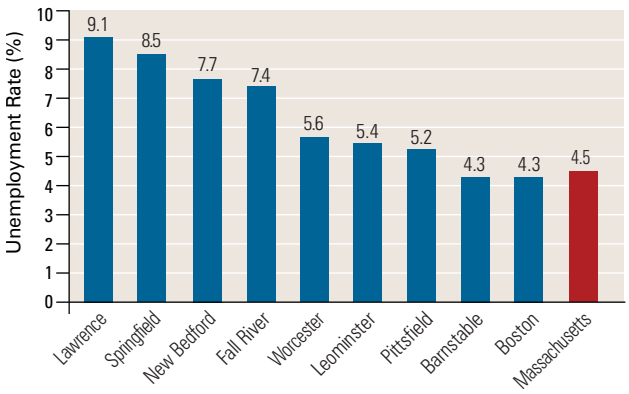


Source: U.S. Bureau of Labor Statistics , Current Population Survey (CPS)

An interesting and important corollary to the trends in employment and the unemployment rate is the pattern of labor force participation in the state. As referred to earlier, there is a troubling national trend of falling labor participation virtually across the age spectrum. The age pattern of labor participation over time in the state has been quite different than in the nation. For the youngest age group, less than 25 years of age, following a sharp decline coincident with the onset of the recession in 2008, participation has been on the rise, more or less steadily, since the start of 2013. For those in the middle age range, from 25 to 54 years of age, labor participation has held fairly steady, even through the recession. For those 55 years of age and older, participation has been rising steadily since well before the recession.

There continues to be considerable variation in unemployment rates within Massachusetts, though there has been modest convergence toward the falling state unemployment rate. Lawrence recorded the highest rate among the large cities in the state, registering 9.1 percent in September. The unemployment rates in Springfield (8.5 percent), New Bedford (7.7 percent) and Fall River (7.4 percent) exceeded the seven percent level. In our last issue of this report, Lawrence recorded an unemployment rate above 10 percent, while the rates in the other aforementioned cities were all above 9 percent. The economies of these four cities have consistently struggled over the years; this improvement in their performance does not mask the intractability of sharply diverging economic performance within the state.

Figure 6. Unemployment Rate by City
September 2015
Not seasonally adjusted



Source: Massachusetts Executive Office of Labor and Workforce Development (EOLWD), Local Area Unemployment (LAU) Statistics

ECONOMIC PERFORMANCE BY INDUSTRY SECTOR

Since the end of the state recession (from October 2009), the Professional and Business Services sector has added the largest number of jobs, over 90,000. This sector includes, among other industry groups, Architectural, Engineering, and Related Services; Computer Systems Design and Related Services; Management, Scientific, and Technical Consulting Services; and Scientific Research

Table 1. Employment in Massachusetts by Industry
Beginning of Economic Recovery and Most Recent Month
Seasonally adjusted

Industry Super-Sectors	Employment at Beginning of Recovery (October 2009)	Employment in Most Recent Month (September 2015)	Employment Change	Employment Percentage Change
Natural Resources and Mining	1,300	900	-400	-30.8%
Construction	106,700	131,300	24,600	23.1%
Manufacturing	253,300	248,200	-5,100	-2.0%
Trade, Transportation & Utilities	539,300	563,400	24,100	4.5%
Information	86,100	86,600	500	0.6%
Financial Activities	210,300	210,800	500	0.2%
Professional and Business Services	452,100	542,700	90,600	20.0%
Education and Health Services	678,400	757,900	79,500	11.7%
Leisure and Hospitality	299,400	351,800	52,400	17.5%
Other Services, Excluding Public Administration	118,500	136,800	18,300	15.4%
Public Administration	437,300	462,400	25,100	5.7%
Total, All Industries	**3,182,700**	**3,492,800**	**310,100**	**9.7%**

Source: Massachusetts Executive Office of Labor and Workforce Development (EOLWD), Current Employment Statistics (CES-790). Calculations by the authors

and Development Services. The stalwart Education and Health Services sector added over 79,000 jobs, and Leisure and Hospitality added over 52,000 jobs. The largest percentage change in employment occurred in the Construction sector, with 23.1 percent employment growth since the end of the state recession.

Manufacturing employment remained essentially flat, falling by two percent since the end of the recession. It is difficult to interpret the decline in manufacturing employment, given the diversity and complexity of the sector. Still, it is clear that manufacturing remains under pressure. Relatively high costs in the state (most prominently energy and health care costs), a strengthening dollar, and global competition all provide challenges to manufacturing firms within the state.

STATE MERCHANDISE EXPORTS

In the twelve-month period ending in August of this year, merchandise exports from the state fell by 9.3 percent compared with the prior twelve-month period. The strengthening value of the dollar, as well as continuing stagnation in Europe and declining growth in China have depressed merchandise exports.

The strength of the dollar has had a particularly severe impact on exports to the state's largest trading partner, Canada. Comparing exports to Canada during the most recent twelve-month period to the twelve months prior, the dollar volume of exports dropped by 10.4 percent. The U.S. dollar has appreciated relative to the Canadian dollar by more than 20 percent from September of 2014 through July of this year. While there is generally a lag between changes in currency exchange rates and their economic impact, the stronger dollar has had a more or less immediate impact.

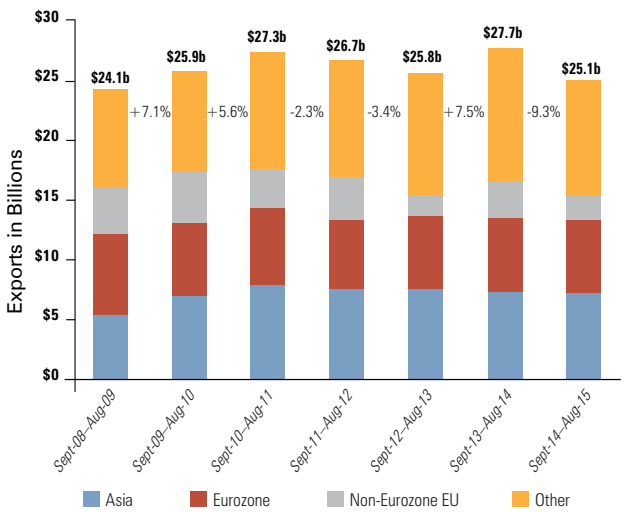
The pattern of merchandise exports from Massachusetts has often drawn attention out of proportion to its importance in the state economy. Trade within the United States is far more important to Massachusetts than international trade, though it is not possible to document this due to a lack of data. Even so, global merchandise exports do play a significant role in specific economic sectors in the state.

HOUSING

Three patterns emerge from an examination of house construction data. First, the state has not returned to the boom years of the early 2000s, when the market was characterized by bubble-driven expectations. This can be seen clearly in the accompanying graph. There has certainly been a recovery from the recession years, following the lows in house-construction permitting that continued through 2011, but the boom years in the early 2000s, especially 2005, have not been approached.

The second striking pattern in the housing construction data is the increasing concentration of activity in the greater Boston area construction boom early in this century. In 2004, the greater Boston area accounted for 23 percent of house construction permits issued. By 2014, the share of state permits issued in the greater Boston area was over 45 percent. The combined effect of these two patterns is that a growing portion of a shrinking housing sector is concentrating in the greater Boston area.

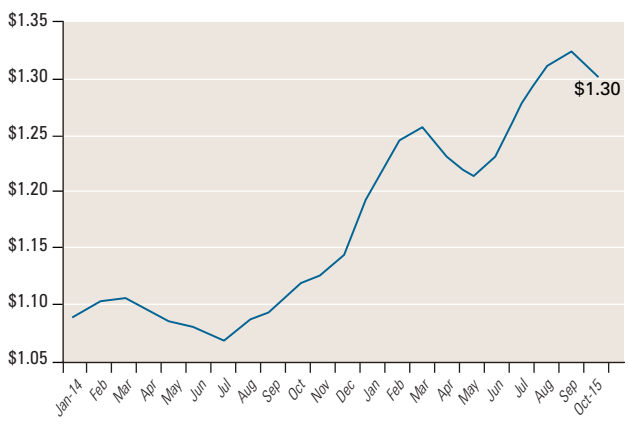
Figure 7. Massachusetts Exports by Trading Partner Region September 2008 – August 2015



Source: WISERTrade. Calculations by the authors

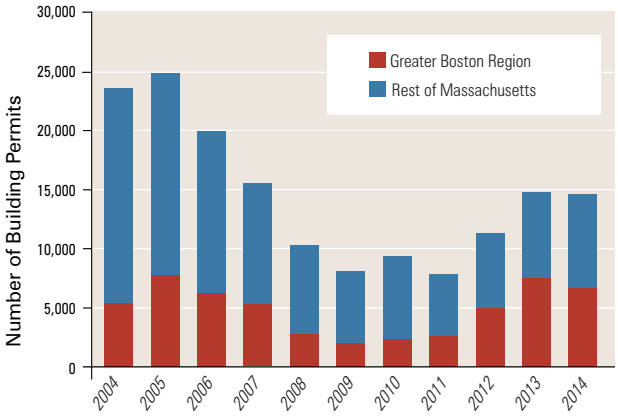
Figure 8. Canadian Dollars to One U.S. Dollar by Month, January 2014 – October 2015

Not seasonally adjusted



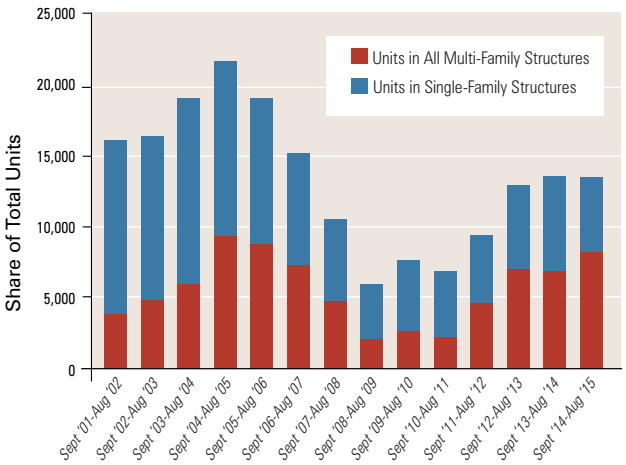
Source: Federal Reserve Bank of St. Louis

Figure 9. Housing Construction for the Greater Boston Region and Rest of the State 2004 – 2014



Source: U.S. Census Building Permits Survey. Data represent reported data plus the data imputed for non-reporters and partial reporters. Greater Boston consists of Suffolk and Middlesex counties and Rest of the State represents the remainder of the counties. Calculations by the authors

Figure 10. Housing Permits for Multi-Family and Single-Family Structures Massachusetts, September 2001 – August 2015



Source: U.S. Housing & Urban Development, State of the Cities Data System (SOCDS) Building Permits Database. Housing permit data represent permits for privately owned residential construction. Data are preliminary and subject to revision. Calculations by the authors

The final pattern that emerges from housing data is the increased importance of multi-family structures relative to single-family structures. In the early 2000s, single-family permits dominated: During the twelve-month period ending in August of 2002, single-family building permits represented almost 75 percent of all residential permits, the remainder being multi-family permits. By the twelve-month period ending in August of 2015, the percentage of permits granted for single-family structures had fallen to 38 percent, again the remainder of residential permits going to multi-family structures. The changing mix of single- versus multi-family structures is clearly related to the growing dominance of the greater Boston area in the state's house construction.

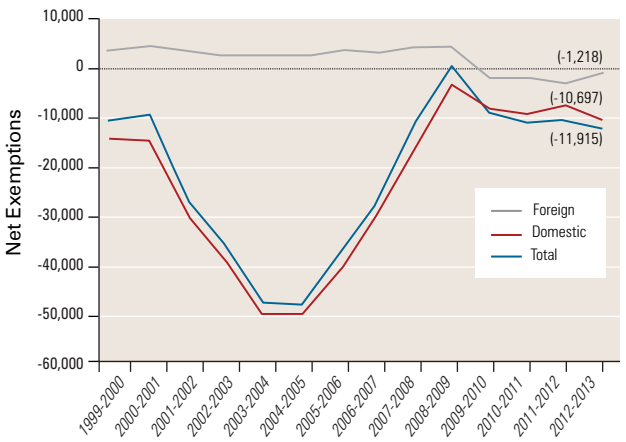
MOVING RESOURCES: MIGRATION IN MASSACHUSETTS

Massachusetts has long depended on people as its most important resource. The state has no significant natural resources and a cost structure that is less competitive than other regions. A highly educated and qualified labor force is the Commonwealth's comparative advantage. The challenge for the state is that human resources can be highly mobile, especially a highly educated work force. The in-migration of talented people is a vital engine of the state economy, but research has found that current in-migrants are the most likely out-migrants in the future.[1]

For the most part, in recent history, the state has lost more people leaving for other states than it has gained from migrants from other states. This may well be due to the many institutions of higher education in the state, and the fact that many individuals leave Massachusetts after graduating. Net migration, in-migration minus out-migration, has exhibited a cyclical pattern in recent years. Net migration grew after the recession in the early part of the century, reaching a nadir of nearly net 50,000 departures from the state between 2004 and 2005. Since then, net migration has diminished, reaching and stabilizing around 10,000 out-migrants in 2008-2009.

The net migration numbers mask the volume of migration, both in and out, that occurs year to year. From

Figure 11. Massachusetts Net Migrations Using IRS Exemption Data, 1999 – 2013



Source: U.S. Internal Revenue Service (IRS) Statistics of Income (SOI) Tax Stats. U.S. Population Migration data represent year-to-year address changes reported on individual income tax returns filed with the IRS. For technical details please visit https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data. Calculations by the authors

Table 2. Migration by State, 1999–2013

In-Migrants by Origin, 1999-2013		Out-Migrants by Destination, 1999-2013	
Origin	**Inflows**	**Destination**	**Outflows**
New York	173,857	Florida	240,033
Florida	133,024	New Hampshire	205,131
New Hampshire	123,595	New York	157,496
California	105,783	California	135,639
Connecticut	102,218	Rhode Island	97,180
Foreign	99,690	Connecticut	94,573
Rhode Island	95,290	Foreign	69,412
New Jersey	61,712	Texas	60,808
Pennsylvania	52,861	North Carolina	60,667
Texas	43,938	Maine	60,267
Virginia	41,422	Virginia	54,125
Rest of U.S.	463,425	Rest of U.S.	548,055
Total	**1,486,815**	**Total**	**1,783,386**

Source: U.S. Internal Revenue Service (IRS) Statistics of Income (SOI) Tax Stats. U.S. Population Migration data represent year-to-year address changes reported on individual income tax returns filed with the IRS. For technical details visit https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data. Calculations by the authors

1999 through 2012, well over one million people entered the state and left it. Those out-migrants landed either close to their Massachusetts starting point, or in Florida or California. Florida led in receiving Massachusetts out-migrants, perhaps largely due to post retirement migration. Other than California, states receiving the largest volume of movers either border the Commonwealth or are New England states. Largely the same pattern characterizes inward migration to Massachusetts.

CONCLUSION

While black clouds emerge from time to time on the horizon, the state economy seems to be immune to economic decline, at least at the moment. A host of economic variables all indicate sustained growth. Gross product and employment have been steadily increasing, while unemployment and initial claims for unemployment have been steadily falling. We must remain vigilant, however, especially given the recent financial market turmoil generated by slowing growth in China, as well as tepid and fragile growth in Europe. The strengthening U.S. dollar is of concern to exporters. The current national recovery is in its seventh year, nearing the half-life of an expansion.

The issue of Boston-centric growth, excluding much of the rest of the state, remains chronic. Unemployment has fallen throughout the state during the long economic recovery, but the gap between Boston and the remainder of the state is stark. Further evidence of this phenomenon is evident in the increasing share of the state's housing permitting and construction in metropolitan Boston.

Even with these qualifications and caveats, Massachusetts is undeniably experiencing healthy economic expansion. While there are issues within and beyond the state's borders, prospects for continuing growth seem strong.

Alan Clayton-Matthews is an associate professor of economics and public policy at Northeastern University and Senior Contributing Editor of this journal.

Robert Nakosteen is a professor of economics at the Isenberg School of Management at UMass Amherst and Executive Editor of this journal.

Endnote

1.) For a discussion of this issue, as well as the educational qualifications of migrants as compared with non-migrants in the state, see Nakosteen and Strate, "The Great Massachusetts People Migration Exchange," *Mass*Benchmarks, Volume 16, Issue 1, 2014.

Special Focus: State Transportation Policy in Massachusetts

This issue focuses on transportation issues, arguably one of the Commonwealth's most pressing public policy challenges. As millions of Massachusetts commuters learned during the record-setting winter of 2015, decades of deferred maintenance, inadequate levels of investment, and associated management challenges present the state's leaders with some very difficult fiscal and policy challenges.

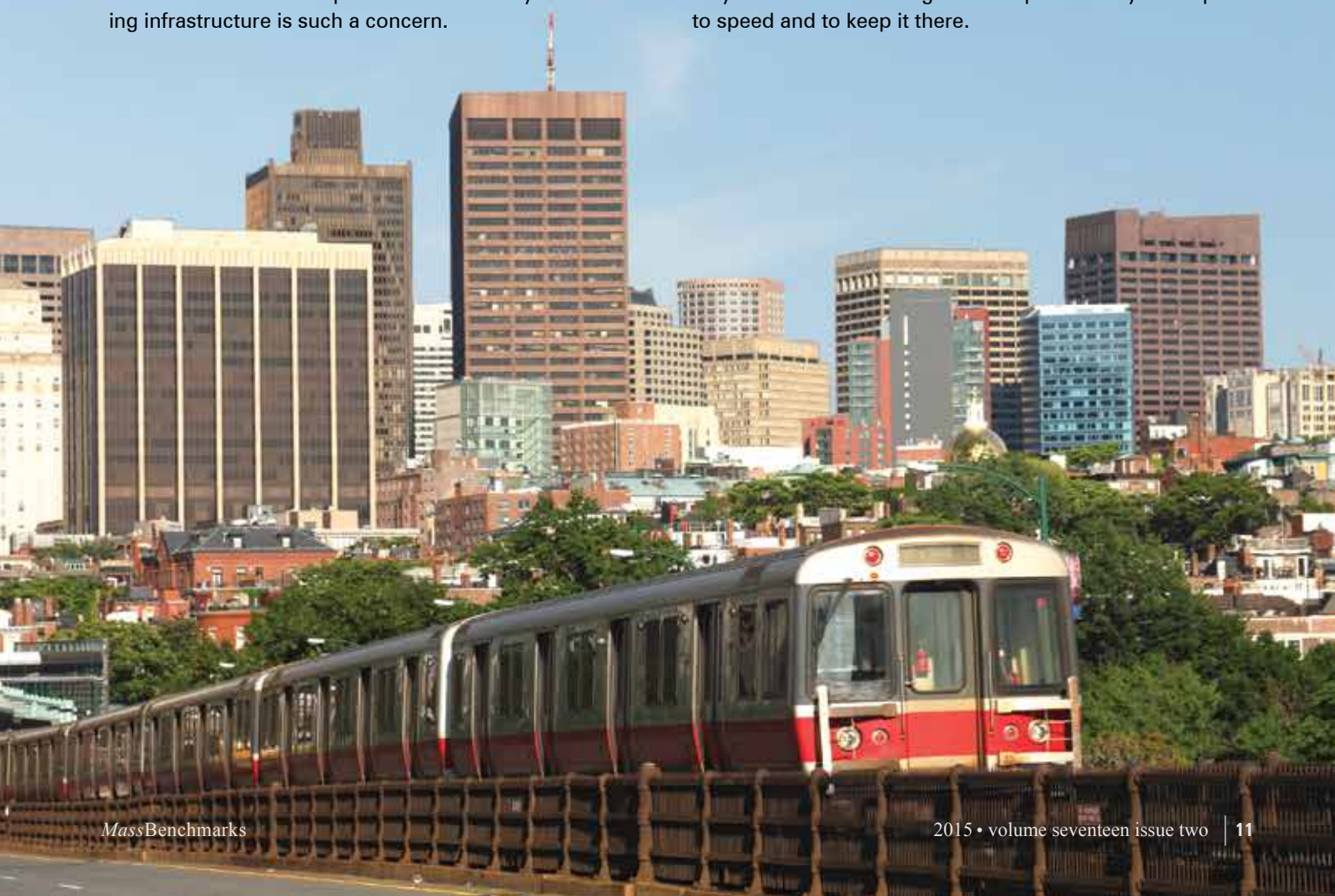
The three articles that follow help inform the ongoing discussions among Bay State leaders and citizens. They explore how we got here, how we will pay for what needs to be done, and how we might best meet regional transportation needs in every corner of the Commonwealth.

The first article, by former Cambridge Systematics senior vice president Marc Cutler and the UMass Donahue Institute's Branner Stewart, details historical efforts to improve and reform state transportation agencies. It summarizes some of the most pressing infrastructure challenges and offers recommendations to address what they identify as the three most serious problems facing the state transportation system — revenue, cost control, and management. The article begins by showing how transportation contributes to the Commonwealth's economic competitiveness and why deteriorating infrastructure is such a concern.

The second article is excerpted from a recent report from the New England Public Policy Center (NEPPC) at the Federal Reserve Bank of Boston. Authored by NEPPC Deputy Director Darcy Sass and former NEPPC senior research analyst Jennifer Weiner, it highlights challenges accompanying eroding effects of inflation and improved fuel efficiency on state gas tax revenues. Importantly, the authors highlight the critical role that fiscal policy choices play in the state's development of sustainable sources of funding for transportation infrastructure and services both now and in the future.

Finally, in Endnotes, Paul Matthews, the Executive Director of the 495/MetroWest Partnership, reminds us of the critical connection between transportation infrastructure and regional economic development. He underscores the importance of transportation investments and transit improvements to benefit communities outside of the MBTA's core service area. Given limited state capital funds, ensuring that state transportation policies and investments reflect the needs of the entire state will require a comprehensive, balanced approach.

These three articles, then, underscore the need for a forward-thinking state transportation policy and for a renewed discussion of how best to finance the necessary investments to bring our transportation system up to speed and to keep it there.



Transportation in Massachusetts: Economic Impacts, Finance and Investment Choices

THIS SURVEY EXPLORES THE MASSACHUSETTS TRANSPORTATION INFRASTRUCTURE'S FINANCING, RECENT HISTORY, AND ROLE IN IN THE STATE'S ECONOMY. IT DISCUSSES DEPRECIATION AND REINVESTMENT IN THE SYSTEM, EMPLOYING THE MEASUREMENT YARDSTICK OF THE STATE OF GOOD REPAIR.

MARC CUTLER AND BRANNER STEWART

This overview of the financial challenges associated with operating, maintaining, and building the Commonwealth's transportation network draws on a wealth of high-quality reports that have scrutinized how highway and transit dollars are being collected and spent. Without updating the data and analyses in the source documents, we explore the critical role of transportation in the state's economy and the recent complex history of financing the state's transit and highway systems. We devote special attention to the consequences of underinvestment and depreciation in the system, employing the yardstick of the State of Good Repair. Concluding recommendations present alternatives in fare policies, gas taxes, tolling, public-private cost-sharing partnerships, and performance-based planning and measurement tools.

WHY IS TRANSPORTATION FINANCE SO IMPORTANT AND TIMELY?

In August, 2009, Governor Deval Patrick engaged David D'Alessandro, the former CEO of the John Hancock Insurance Company and a long-time community leader, to lead an assessment of the Massachusetts Bay Transportation Authority (MBTA). The resulting "Independent Review of the MBTA," commonly referred to as

the D'Alessandro Report, was delivered in November of 2009. The report stated the following: "There is abundant evidence that the service and safety issues that plague the MBTA are considerably worse than is commonly understood — and are becoming critically worse."

In the winter of 2015, the citizens of Massachusetts learned the true meaning of the phrase "critically worse," as the MBTA essentially collapsed under the weight of over 100 inches of snow which fell during four unforgettable weeks. The people, businesses, and visitors to Massachusetts learned a painful lesson in what it means to have an inadequately funded and ineffectively managed transportation system. This epic failure weighed heavily on the subsequent debate throughout 2015 on the desirability and feasibility of Boston 2024's bid to host the Summer Olympics.

More importantly in the long-run than in short-term disasters and potentially huge special events, transportation plays a critical role in supporting businesses through the movement of goods and people (whether workers or customers), and in the day-to-day quality of life and economic opportunities of ordinary citizens. The quality of infrastructure, not only transportation but public schools, parks, public safety services, and health care facilities goes a long way in explaining the differences in individual opportunity and quality of life between developed and undeveloped nations.

This paper first examines the importance of transportation to the Massachusetts economy, and then analyzes, in more detail, the ongoing crisis surrounding transportation finance in the state — a crisis that has has provided a constant, intractable backdrop to public policy discussion in this young century.

TRANSPORTATION INFRASTRUCTURE INVESTMENT — CRITICAL TO THE MASSACHUSETTS ECONOMY

Transportation infrastructure is the connective tissue that makes the Massachusetts economy run. The Commonwealth is home to numerous world-leading industry clusters, including life sciences, healthcare, finance, higher education, tourism, and advanced manufacturing. These set the state apart from competing regions and provide Massachusetts with a dynamic economy that innovates, produces high-wage jobs, and generates new businesses.[1] Very few locations, both within the United States and globally, match Massachusetts' economic strengths and assets. While talent and the workforce distinguish the Massachusetts economy, transportation services and infrastructure provide the foundations — access to markets and to people — that the state's industries rely on to thrive. The state's roadways, transit, ports, and airports connect workers to employers, link businesses with suppliers and markets, and foster the face-to-face business and nonbusiness interactions that an economy based on innovation needs to succeed.

Making improvements to the transportation network is critical and will bring about clear economic benefits for the Commonwealth.

However, just as transportation makes it possible for people to work and allows businesses and institutions to function, problems in the transportation system manifested by lack of capacity, congestion, substandard condition, and poor connectivity threaten the long-term competitiveness of the Commonwealth. Today, aspects of the Massachusetts transportation network, notably transit but also readily apparent in poor pavement and bridge conditions and traffic gridlock are unraveling in the face of chronic underfinancing and growing obsolescence. Left unaddressed, deficient infrastructure and unreliable transportation services may prevent Massachusetts from fully capitalizing on economic opportunities.

Making improvements to the transportation network is critical and will bring about clear economic benefits for the Commonwealth. There are economic benefits both from the preservation of the existing transportation system and expansion of that system to both spur and accommodate future growth. Preservation is critical because it preserves the value of investments made over the last century. Expansion (through adding capacity, connectivity, or transportation services) is crucial for the long-term health of the economy.

Investment in transportation — whether increasing capacity (e.g., adding a lane, building a runway or new terminal, lengthening subway station platforms), improving service (e.g., expanding transit networks and frequencies; providing new non-stop air destinations), preserving and maintaining existing facilities (e.g., repaving roadways, modernizing track controls, overhauling subway trains), or adding connectivity (e.g., intermodal facilities that allow freight or passengers to use a combination of modes, a new interchange providing access to an Interstate or a new commuter rail stop serving a major economic activity center) — reduces travel time, lowers trip cost, decreases pollution, improves safety, and increases travel-time reliability. For businesses, this translates to greater productivity and better access to labor and

markets, thereby making industries more competitive and enabling economic growth.

Investments to preserve and expand the transportation system reverberate throughout the Massachusetts economy, creating jobs and income. Since the 1960s, Massachusetts has seen the extension of the Red Line to Braintree and Alewife; the relocation of the Orange Line and its extension to Oak Grove; the restoration of the three branches of the Old Colony Railroad; the construction of the Silver Line; commuter rail extensions to Providence, Worcester, and Newburyport; three new terminals and a new runway at Logan Airport; the completion of I-495; the original Massachusetts Turnpike extension to Boston; and the Big Dig. Today, the Massachusetts economy is 250 percent larger than the economy of 1970, in real terms.[2] Consider how much less growth the Commonwealth could have accommodated without those substantial transportation investments.

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The past 50 years of transportation improvements in Massachusetts are the result of an admirable record of investment and planning foresight, which any region would be proud of and which many envy. However, increases in economic activity and population are putting pressure on the Massachusetts transportation infrastructure, and may ultimately threaten the long-term health of the Commonwealth's flagship industries. Massachusetts' transportation infrastructure capacity has not kept pace with the growth in transportation demands. This shortcoming has created growing congestion problems throughout the state, notably in the Boston metropolitan area. Congestion, as it increases, becomes more onerous to businesses and labor, lowering efficiency, adding to costs, and ultimately reducing the Commonwealth's appeal and competitiveness.

Fed by a growing population and an expanding economy, traffic volumes in the Boston metropolitan area are continuing to increase, from 52.3 million vehicle miles traveled per day in 1990 to 77 million in 2014, according to the Texas Transportation Institute (TTI) in its Annual Urban Mobility Scorecard. During the same 24-year period, the average number of hours spent in gridlock by Boston's peak-period travelers rose from 44 to 64 hours per year.[3] Sitting idly in traffic comes with a price, which the TTI has also estimated for major U.S. metropolitan areas. The costs include the value of lost time for commuters and commercial vehicles.[4] With heavy trucks costing more than $1 per minute to operate, congestion levels do impact business costs, which must be absorbed in some form by shippers, trucking companies, and consumers.[5] According to TTI's estimates, the annual cost of congestion in metropolitan Boston reached $3.4 billion in 2014. In the smaller metros of Springfield and Worcester, the costs of congestion are also substantial, $408 million and $302 million, respectively. In a high-cost state like Massachusetts, the costs of congestion borne by commuters and truckers who depend on minimizing trip times can work against business attraction and livability. Without the investments of recent decades, congestion would be that much worse or much of our recent economic growth would have gone elsewhere.

In addition to the time wasted in traffic, the substandard condition of much of the Commonwealth's transportation infrastructure also casts a burden. For businesses and commuters alike, roadways pockmarked with potholes can damage vehicles' tires and suspensions, often resulting in expensive repairs. The cost of the Commonwealth's underinvestment in roadways is essentially being shifted to residents and businesses through added vehicle repairs. A single suspension repair can cost a lot more to fix than several years of a higher gas tax. The American Society of Civil Engineers estimates travel on poorly maintained roads cost Massachusetts drivers $2.3 billion in repairs in 2013.[6] The average annual costs for Massachusetts drivers due to rough roads ranges from $429 (South Coast) to $541 (Worcester) per driver.[7] These costs are likely to increase as the number of miles driven by Massachusetts drivers is rising, which will exacerbate pavement wear. Rough roads also raise costs for shippers by forcing truckers to take time-consuming detours to bypass unsatisfactory roads and by damaging freight. The combination of traffic congestion and poor road conditions can hurt perceptions of Massachusetts, already encumbered by high housing and energy costs and a challenging winter climate, as a place to do business.

The transit services available in Massachusetts are an asset to the Commonwealth's economy but also confront major deficiencies. Massachusetts' public transit agencies provided some 440 million passenger trips by bus, light rail, subway, and commuter rail in 2014.[8] Transit brings numerous economic benefits by providing options for people to reach jobs, medical appointments, schools, and shopping areas. By removing cars from roads, transit also reduces traffic congestion, fuel consumption, and

greenhouse gases while simultaneously improving safety by lowering injuries, fatalities, and property damage related to vehicle accidents.

By enabling more productive geographic concentrations of economic activity, transit does far more to make the Massachusetts economy a global standout than just bringing people to their jobs. The density of economic activity in the Boston area's urban core would be functionally impossible without transit services. This density is crucial to providing the Commonwealth's economic edge. Few regions in the United States can match the concentration of business, government, research, education, medical, cultural, and transportation activity within as an area as small as Boston-Cambridge. In less than 20 square miles (smaller than Manhattan),[9] one can find the fifth largest downtown office market in the United States,[10] a state capital, unmatched educational, research, and medical capabilities, world renowned attractions, a major seaport, and one of the country's busiest international airports. This remarkable concentration energizes the regional economy and offers tangible benefits to businesses.

In the Boston region's urban core, major industries such as life sciences, healthcare, tourism, finance, information technology, and higher education are strengthened by being nearby businesses and institutions that carry out complementary services and activities. Proximity yields agglomeration benefits, or an "agglomeration economy," where productivity and wage levels are higher than in less dense areas not offering similar attributes.[11] This proximity allows frequent face-to-face meetings, the interchange of ideas, and shortens the amount of time needed for business-to-business (or institution-to-business) deliveries of goods and services. By improving labor market accessibility, increasing information exchange, and facilitating industrial specialization, the MBTA is a critical element contributing to the growth of extremely productive areas like Kendall Square in Cambridge and its life sciences cluster. The dense economic activity in the urban core is further supported by the Boston region's multimodal transportation system, including Logan International Airport, the Port of Boston, and numerous Interstates and roadways, but without the MBTA and the land use densities it allows, the region simply would not function at the high level that it does.

The growth of Kendall Square, the Longwood Medical Area, and the Seaport District coincides with a lifestyle choice among a growing number of people to minimize their driving to get to the best paying jobs. Increasingly, the workforce is choosing to use transit, walk, or cycle rather than drive to get to their jobs. The days of the 45- to 90-minute trip to a suburban office park are not the future for a knowledge-based economy — people in life sciences and technology, and education and medicine.[12] This is corroborated by a 2015 MassBio survey of biotech workers in Eastern Massachusetts that found that 55 percent of respondents used rail, subway, or bus as their *primary* means of commuting versus 38 percent who drove exclusively to work.[13] In an interconnected world where highly skilled individuals can choose where they want to live, Massachusetts needs to stand out from the competition on transportation and other quality of life issues. Transit services are increasingly seen as an asset to attract top talent to the region.

The density of economic activity in the Boston area's urban core would be functionally impossible without transit services. This density is crucial to providing the Commonwealth's economic edge.

Even as the MBTA has enabled the growth of the Boston region, the surge of workers and residents into areas like Kendall Square and the Seaport District is now exposing the limits of the transportation network — both transit and roadway — to get people to their jobs. Gridlock, transit capacity, and transit reliability are becoming increasingly worrisome to major employers in the region and may put the brakes on the burgeoning growth of the Commonwealth's life sciences, engineering, and information technology sectors that see a central, urban location as pivotal to their continued success. In 2014, the MBTA's ridership reached 401 million trips, a number that has grown significantly since the recession and is a recent record.[14] Imagine what it would be like to add those trips to the state's roadways. The growth in ridership is emblematic of the Commonwealth's expanding economy as well as the growing preference to use transit. On the other side, however, unreliable transit service also prevents the Massachusetts economy from operating at full capacity by skimming labor productivity through tardiness, absenteeism, and missed connections (e.g., meetings), and can keep some workers, many with needed skills, from pursuing jobs in the region.

Rising congestion on Massachusetts roadways and the stretched capacity of its public transit services can choke off the movement of goods and the inflow of people, undermining the Commonwealth's substantial competitive advantages. The Massachusetts transportation

system underpins the state's $460 billion economy and its 3.5 million jobs.[15] Already the third densest state in the nation, Massachusetts is expected to add 500,000 people over the next 20 years.[16] Without sufficient investment in transportation infrastructure and services, the state's roadway and transit systems are likely to be too hard pressed to handle this growth.

THE COMPLEX STORY OF TRANSPORTATION FINANCE IN MASSACHUSETTS

Massachusetts has had noted success in building a transportation network that can sustain and contribute to the growth of a dynamic economy. Looking into the future, however, can transportation continue to be a driver of the Commonwealth's growth? The combination of increasing demand, deteriorating infrastructure, and constrained funding threatens to erode competitiveness and stop the Commonwealth short of fully meeting its economic potential. The Commonwealth's ability to secure adequate financing to substantially meet future transportation needs, both in infrastructure and services, will have a bearing on its competitiveness and overall prosperity in coming decades.

The remainder of this paper focuses on the two big drivers of transportation finance in Massachusetts — the Highway Division of the Massachusetts Department of Transportation (MassDOT) and the MBTA. In the 2009 Transportation Reform Act, the major transportation-related functions of Massachusetts government were at long last consolidated into a single state Department of Transportation.[17] These elements included the previously stand-alone Highway Department, the Registry of Motor Vehicles (RMV), and the Aeronautics Commission. Each previously independent entity was converted into a division of the new MassDOT. In addition, the previously independent Turnpike Authority was rolled into a newly combined Highway Division. A Rail and Transit Division was created to oversee administration of the MBTA and the state's 15 Regional Transit Authorities (RTAs). The previously independent MBTA Board of Directors was folded into a reconstituted MassDOT Board of Directors. While all of the administrative-related functions of MassDOT are important and directly impact the lives of the citizens of Massachusetts, the transportation finance crisis is driven overwhelmingly by the massive expenditures of the Highway Division and the MBTA. Everything else is practically a rounding error. Therefore, to provide clarity and simplicity to what can often prove a convoluted analysis, this paper will focus on the sources of funding and expenditures of these two entities. If the financial problems afflicting the Highway Division and the MBTA can be fixed, everything else would more readily fall into place.

Concern about transportation funding and expenditures is not new, and the operation and finance of transportation in Massachusetts have been studied repeatedly in the 21st Century. Prominent examples include the following reports, on which this paper draws heavily. No independent research was conducted for this paper.[18]

2007: "Transportation Finance in Massachusetts: An Unsustainable System," Transportation Finance Commission Report[19]

2009: "Independent Review of the MBTA" ("D'Alessandro Report")[20]

2009: "Building Massachusetts' Economy through Transportation Investment," A Better City[21]

2011: "Maxed Out: Massachusetts Transportation at a Financing Crossroad" Transportation for Massachusetts[22]

2013: "The Way Forward: A 21st Century Transportation Plan," Patrick Administration[23]

2014: "We Move Massachusetts," MassDOT[24]

2015: "Back on Track: An Action Plan to Transform the MBTA,"[25] Governor's Special Panel to Review the MBTA. The first report responding to this action plan, "Report #1: Baseline Analysis and Progress to Date," was released in September 2015.[26]

The 21st Century has also seen, in response to these studies, a plethora of legislation attempting to resolve the identified problems. These include:

2000: Forward Funding of the MBTA[27]

2009: Transportation Reform Legislation[28]

2013: Transportation Finance Legislation[29]

2015: An Act for a Reliable, Sustainable MBTA[30]

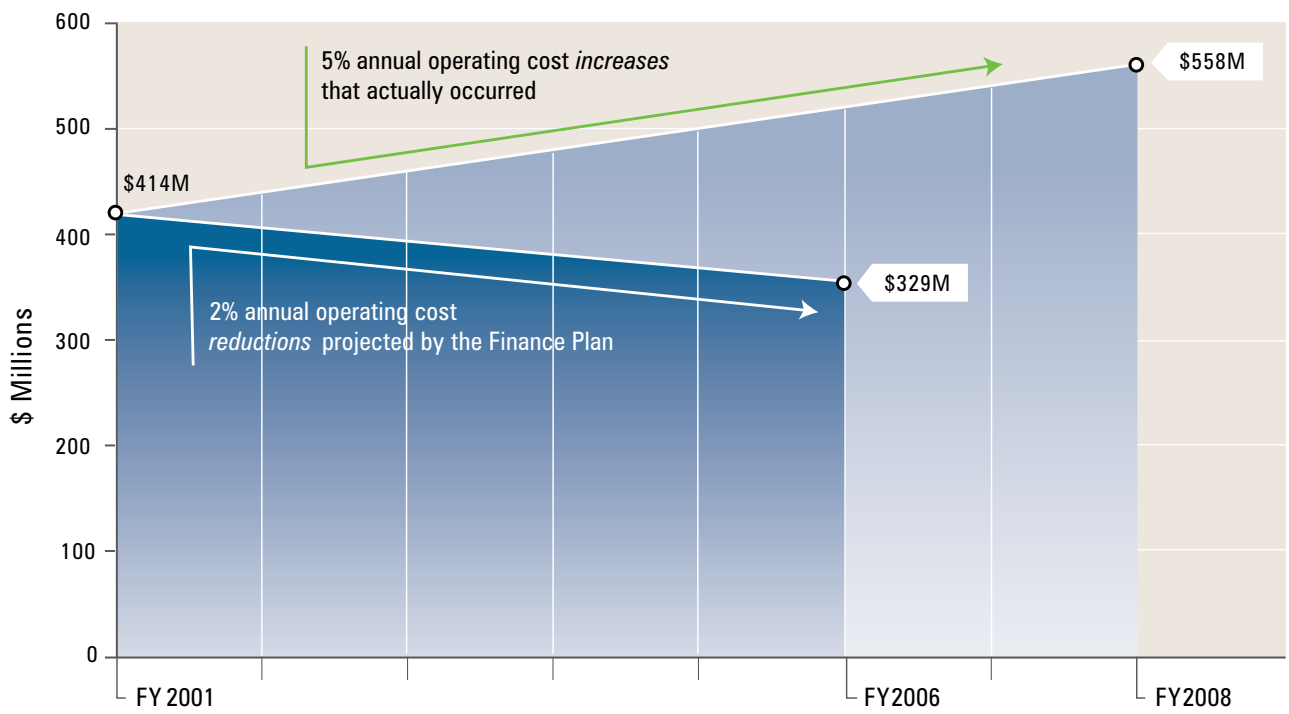
A key starting point in understanding transportation finance in Massachusetts is the 2000 MBTA Forward Funding legislation. This is in fact where the D'Alessandro Report started its analysis in 2009. Prior to 2000, the MBTA was backward funded. The agency conducted its operations for the year, collected revenue from its various sources, calculated its deficit, and presented a bill to the legislature. The legislature had no choice but to pay the bill, no matter how imperfectly managed it thought the agency might have been, because the services had already been delivered. In 2000, this system was changed to have the MBTA operate within a predetermined budget like most normal government agencies. To sweeten the pot, the MBTA was for the first time given a dedicated revenue stream — 20 percent of the state's 5 percent sales tax

revenue. The Highway Department had long had its own dedicated revenue stream — the state's 21 cent per gallon motor fuel tax, the vast majority of which went to funding roads and bridges. Both the MBRA and the Highway Division also receive dedicated federal transportation dollars.

As documented in the D'Alessandro Report, nothing about Forward Funding worked out as expected. Conservative forecasts of sales tax revenue growth were not met due to the rapid rise of untaxed Internet sales, and to sluggish economic growth. Cost control measures expected to be implemented by the MBTA failed as well. Instead of declining by 2 percent per year as projected in the first five-year Forward Funding budget, operating costs surged ahead by $558 million or 35 percent. The major drivers of the cost escalation were fuel and utilities, payroll and fringe benefits, The Ride — the MBTA's special needs transportation service — and Commuter Rail. The MBTA even adopted the most egregious of the Highway Department's historic financing schemes, covering annual personnel costs through the capital budget, meaning that future taxpayers would pay, through interest costs on bonded indebtedness, the salaries of current day employees, many of whom would have long since retired. These disturbing trend lines, as identified by the D'Alessandro Report, are shown in Figure 1. The annual operating costs of the MBTA have continued to surge, and are now an estimated $1.6 billion for FY2016 (up from just over $1 billion in FY2008). Note that Figure 1 shows the *increase* over the initially planned Forward Funding operating budget and is not representative of the total operating budget for FY2008 according to the MBTA Fiscal and Management Control Board's September 2015 "Baseline Analysis and Progress to Date" report. Annual growth rates approaching 6 percent between FY13 and FY16 further underscore the futility of the planned reductions included 15 years ago in the Forward Funding budget.

In 2009, the state took another crack at transportation finance and governance with the enactment of the Transportation Reform Legislation. This Act created the unified MassDOT that we have today, and implemented management reforms, some of which were intended to address the findings of the D'Alessandro Report. In particular, MBTA employees and retirees were moved from the MBTA's own health care insurance to the state's less generous and more efficiently managed General Insurance Commission (GIC), and the notorious "23 and out" rule was eliminated, where MBTA employees could retire at any age with a maximum pension after 23 years of service. Thus, a young person who joined the MBTA at say 20 years old, could retire at 43 and undoubtedly go on to a meaningful second career with a full pension in hand. Eligibility now requires 25 years of service and the employee

Figure 1. 2009 MBTA Review Report Findings: MBTA Costs, Actual vs. Finance Plan FY 2001–FY 2008



Source: D'Alessandro, D., Romary, P., Scannell, L.J. & Woliner, B. *MBTA Review,* 2009

must be at least 55 years old. This law also required MassDOT to create an Office of Performance Management to use data-driven approaches to analyze system performance.

Around the same time as the reform legislation, the state sales tax was increased from 5 percent to 6.25 percent in response to the budget emergency created by the Great Recession of 2008/9. The MBTA maintained its 20 percent share of the revenue, and received an additional $160 million in annual operating revenue going forward. The sales tax now accounts for 57 percent of MBTA revenue, followed by fares and local assessments on the cities and towns in the MBTA District (which is funded from local property tax revenues).

In assessing the MBTA's financial situation, the role played by the Central Artery/Tunnel Project (the Big Dig) must also be mentioned. It is often stated that some of the costs of the Big Dig were put onto the MBTA by the state. This is not exactly true. Instead, as part of internal state government negotiations over the environmental approval for the Big Dig, the state entered into a series of commitments to fund future MBTA capital improvement projects so that public transit would not be shortchanged during the coming decade of highway construction. These commitments were codified in the state's Implementation Plan (SIP) for Air Quality, a legally binding document at the state and federal levels. While specific commitments have changed over the years, and some projects experienced long delays, many projects were completed, such as the Greenbush branch of the Old Colony Commuter Railroad, and thousands of park and ride spaces at MBTA commuter rail parking lots. The key point is that the debt burden for financing these projects was put entirely on the back of the MBTA financial structure, at precisely the moment that the Forward Funding assumptions were coming undone. So, while the MBTA did not directly fund the Big Dig, it did have to absorb the costs of transit projects that were required for the Big Dig's environmental approvals. This policy goes a long way toward explaining the massive debt under which the MBTA operates today, which is discussed below.

In 2013, the state took yet another shot at transportation finance. The motivation for this action was the Patrick Administration's proposal, "The Way Forward," to increase transportation capital spending by $13 billion over 10 years, starting with an additional $650 million in FY14 and increasing to $1.3 billion in FY23. Of this amount, $9 billion ($5.2B highway, $3.8B transit) would go for state of good repair (SGR) improvements to existing infrastructure, and $4 billion to expansion projects. The legislature ultimately enacted a slightly scaled-down version of about $800 million per year, financed by an increase in the state's motor fuel tax from 21 cents per gallon to 24 cents per gallon. The tax had last been increased in 1991 and its purchasing power had fallen to a "real" 12 cents per gallon due to inflation in the intervening two decades (essentially, the taxes generated by the sale of a gallon of gasoline in Massachusetts declined by over 40 percent in real terms between 1991 and 2013). For comparison, Massachusetts still has a lower motor fuel tax than all of the other New England states except New Hampshire. In addition, the tax was to be indexed to inflation in the coming years. However, in the election of 2014, Massachusetts voters enacted a citizens' referendum repealing the gas tax indexing. Thus, the future of the Way Forward funding strategy was in jeopardy from the beginning.

The 2013 legislation also banned the state's grievous practice of funding operating expenses such as payroll under the capital budget, required the state to adjust MBTA fares by no more than five percent every two years, and created the Project Selection Advisory Council to develop performance-based criteria for project prioritization. MassDOT and the Council have established the following draft criteria[31]:

- System preservation
- Mobility
- Cost-effectiveness
- Economic impact
- Environmental and health factors
- Safety
- Social equity and fairness
- Policy support

The 2011 report "Maxed Out" is a good place to gain an overall understanding of transportation finance in Massachusetts. While it is a few years out of date, the basic conclusions still stand. This report also has the advantage of having as one of its contributing authors Ms. Stephanie Pollack, then of Northeastern University's Dukakis Center for Urban and Regional Policy, and today the state's Secretary of Transportation.

Figure 2 shows how transportation operations are financed in Massachusetts since the 2009 Reform Legislation. Operational costs reflect the day-to-day business of the agencies — running the MBTA's trains and buses, routine maintenance of the state's roads and bridges, etc. There are two primary pools of state-generated money — the Commonwealth Transportation Trust Fund (CTTF) of $1.47 billion in FY12, and the Massachusetts Transportation Trust Fund (MTTF) of $680 million. The primary sources of funds for the CTTF are gas and sales taxes, and Registry fees. The main source of revenue for the MTTF are highway tolls and transfers from the CTTF. Almost half of this money, over $1 billion, goes not to operate

any transportation service or to build new facilities, but to service existing debt from past borrowings:

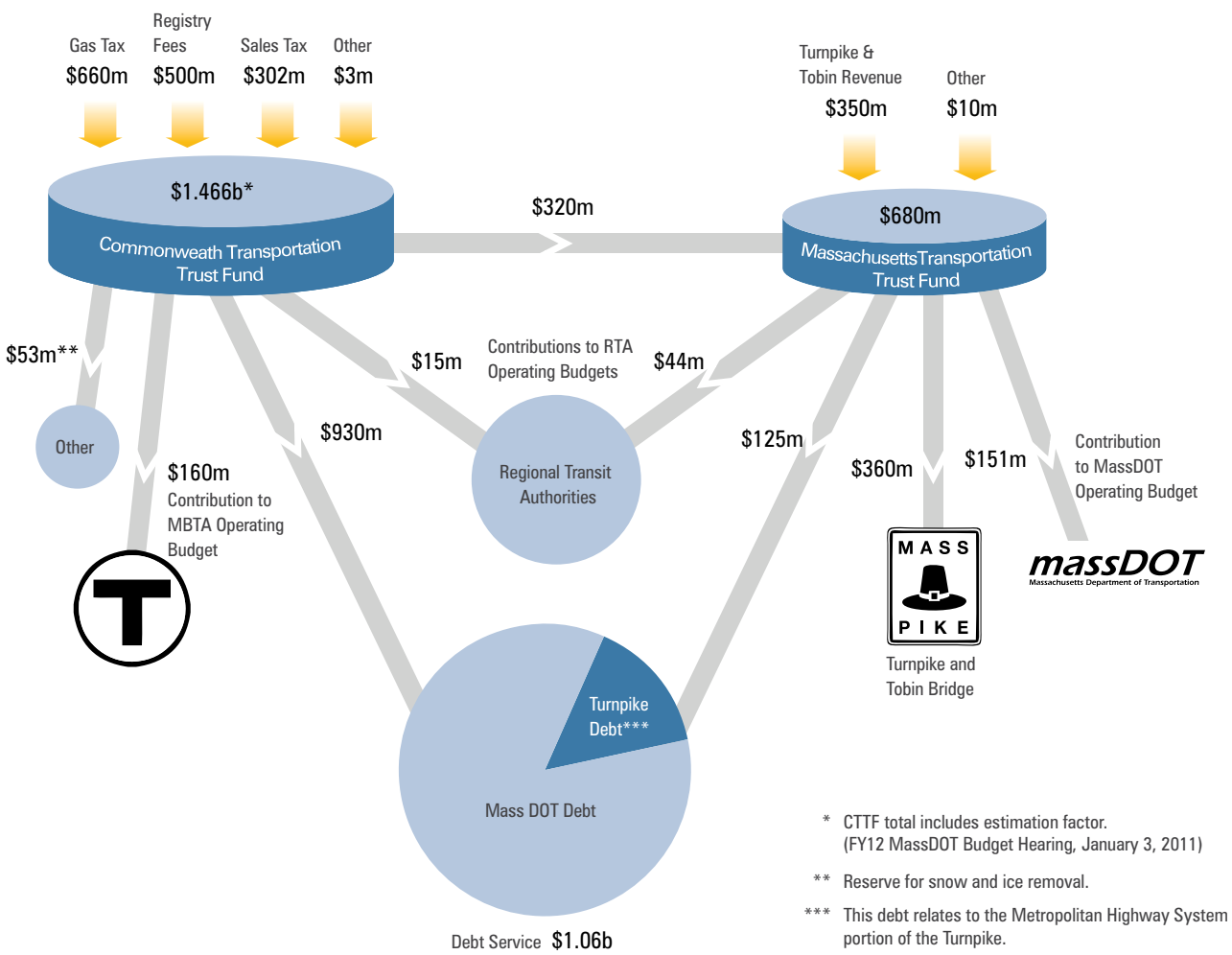
> The MBTA carries the highest debt burden of any transit authority in the nation. In FY11, 25 percent of its annual operating budget went to debt service, which is the MBTA's second largest cost after wages and benefits; the system's annual debt payments are now nearly as large as its total revenue from fares.[32]

Highway debt service has also been historically very high. According to the 2013 Highway Statistics,[33] Massachusetts interest payments on highways constitute 13 percent of all state expenditures on highways, compared with a national average of 5 percent. As shown in Figure 3, Massachusetts has the sixth highest highway debt of any state, far in excess of the other New England states, which have among the lowest debt levels.

Capital spending reflects the short- and long-term investments and improvements to the state's infrastructure. Typically, the state creates a capital budget through a rolling five-year plan (updated annually) called the Capital Investment Plan (CIP). Historically, the Highway and MBTA plans were handled separately, but now under the leadership of a unified MassDOT, they are becoming increasingly (although not yet totally) integrated. On June 29, 2015, the state's Transportation Board adopted a one-year capital plan for FY16 to reflect the priorities of the Baker Administration, with the intent of subsequently developing a new 5-year plan to replace the last Patrick Administration's plan for FY14–FY19. This one-year CIP

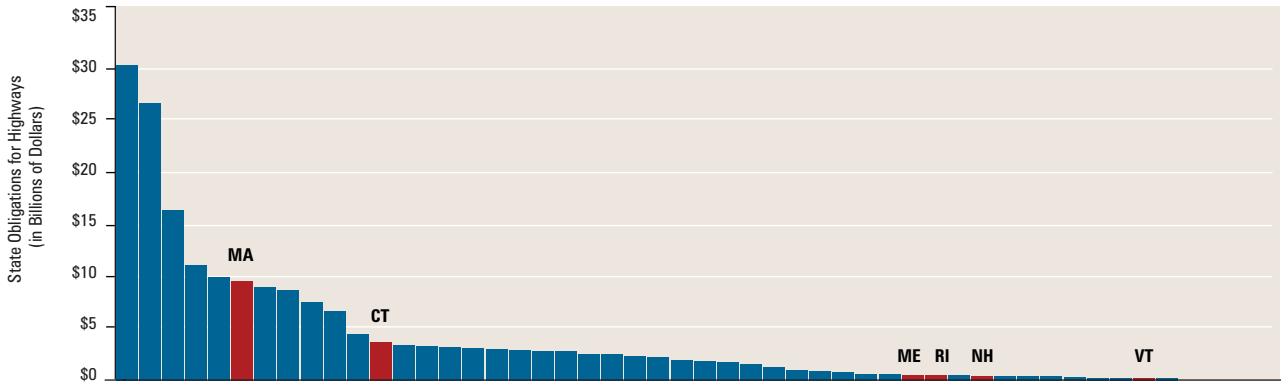
Figure 2. Revenue Sources and Funding Streams for Massachusetts Transportation Operations

Well over half of state transportation revenues go to pay off borrowing.



Source: Transportation for Massachusetts (T4MA). *Maxed Out — Massachusetts Transportation at a Financing Crossroads,* October 2011

Figure 3. State Transportation Bond Debt, Obligations Outstanding, as of 2013



Source: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics Series, Table SB-2
Note: Massachusetts amounts shown here report data for 2010, the most recent data available. Data for almost all other states are from 2013.

offers the most up-to-date snapshot of transportation capital finance.

The FY16 CIP assumes $2.5 billion in capital funding, primarily for roadways and the MBTA. The sources of these funds are shown in Figure 4. The largest source of money is state bond cap funding. These are borrowed dollars which must be repaid by future revenue streams such as the motor fuel and sales taxes, tolls or fares, or if necessary, the general funds of the state as appropriated by the legislature. Bonds are not a revenue stream but in effect a mortgage on future earnings. They are backed by the "full faith and credit" of the state. Bond funds are used for all capital investments by the state except for those by independent authorities. So, transportation projects are competing not just against each other for limited bond cap funding, but against other worthy projects in education, health care, public safety, the judiciary, and other areas. Each fiscal year (FY), the Executive Office for Administration and Finance (A&F) calculates the total available bond cap given the state's fiscal health and projected revenue streams. The intent is to avoid excessive indebtedness which could jeopardize the state's bond rating and likely result in higher interest rates on debt. Specifically, the percentage of the Commonwealth's budgeted revenue needed to pay debt service must remain below 8 percent. Transportation is the largest single recipient of state bond cap funding, receiving 34 percent of total bond cap dollars in the state's overall FY12-FY16 Capital Investment Plan, and 52 percent of all capital sources of funding.[34]

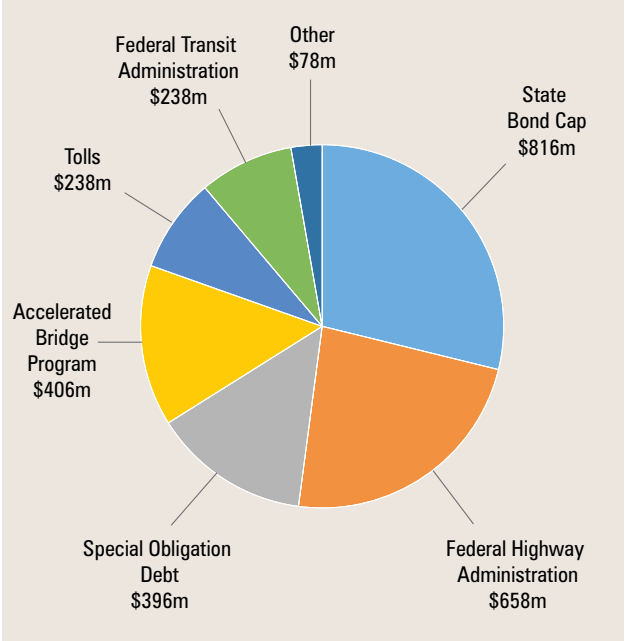
The second largest source of funding is federal grants from the Federal Highway and Transit Administrations (FHWA and FTA) to highway and transit projects, respectively. The state must typically match these grants with a minimum of 20 percent of the cost. Unlike most states, Massachusetts has often used bond funds to meet the match through borrowing rather than paying for it out of current revenue.

The special obligation debt reflects borrowing pursuant to the new revenue streams created by the 2013 Transportation Finance legislation. Whereas the legislation envisioned spending around $800 million per year, the state is only obligating about half that much, probably reflecting the repeal of motor fuel tax indexing and the resulting lower projected revenue streams.

The Accelerated Bridge Program (ABP) was created in 2008 by the Patrick Administration to fund a more

Figure 4. Sources of Massachusetts Capital Funding for Transportation

FY16 Capital Investment Plan



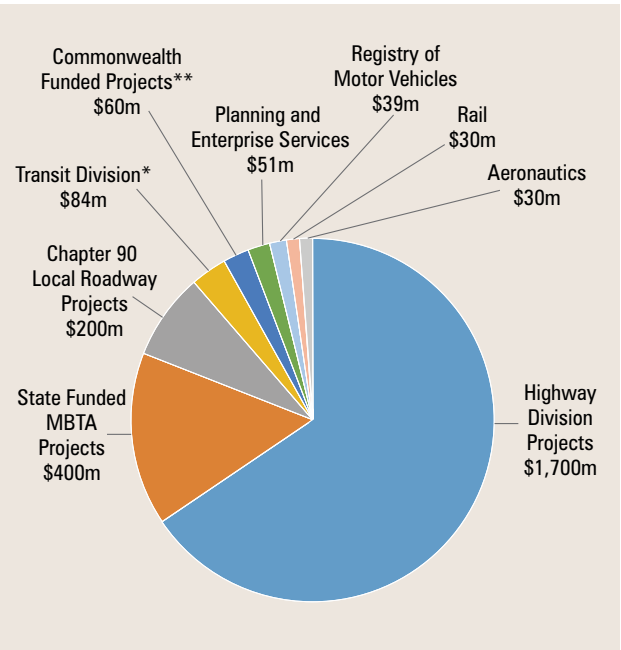
Source: Massachusetts Department of Transportation

robust bridge rehabilitation and replacement program, given the deteriorating condition of the state's bridges. The ABP is also funded by a special borrowing program, and was set to expire in FY16. The ABP has reduced the number of structurally deficient bridges in the state from 543 to 416, and has completed some 167 projects at a cost of $2.5 billion.

Highway tolls account for a relatively small share of bond cap funding. The only toll roads in the state are the Massachusetts Turnpike (I-90) and the Boston harbor crossings (Tobin Bridge; and Sumner, Callahan and Ted Williams tunnels). An earlier plan to remove tolls from the Western Turnpike (west of I-95/Route 128) was abandoned by the Patrick Administration. The MassDOT capital budget is allocated as shown in Figure 5.

Figure 5. The Allocation of the MassDOT Capital Budget

FY16 Capital Investment Plan



* Funding to 15 regional transit authorities (RTAs)

** Boston Harbor dredging and roadway improvements to the UMass Boston campus

Source: Massachusetts Department of Transportation

In addition, the MBTA has a separate capital budget of another $698 million for all of its other capital needs, funded by borrowing against the MBTA's own revenue streams (sales tax, fares, local assessments, FTA grants, etc.). In the aftermath of winter 2015, the MBTA's capital spending was increased to $740 million for FY2015 and is now budgeted at $1.05 billion for FY2016 according to the MBTA Fiscal and Management Control Board's September 2015 "Baseline Analysis and Progress to Date" report.

Among the priority highway projects of regional or state significance included in the FY12-FY16 CIP are the reconfiguration of the I-90 Allston/Brighton Interchange,[35] improvement of the I-90/I-495 interchange, and the continuation of the I-91 viaduct replacement project in Springfield from prior capital budgets.[36] MassDOT states that in subsequent plans it no longer intends to take FHWA dollars off the top for state-designated "Regional Major Infrastructure Projects," but rather to allocate the money to the regional Metropolitan Planning Organizations (MPOs) for locally determined priorities. Major bridge projects under the Accelerated Bridge Program include the massive reconstruction of the Longfellow and Fore River Bridges, and the replacement of the I-95 Whittier Bridge over the Merrimack River. Major state-funded transit projects include three expansion projects: the Green Line Extension to Somerville and Medford,[37] South Coast Rail to New Bedford and Fall River, and the use of federal grant money to advance the expansion of South Station. The major state-of-good-repair projects are the replacement of the MBTA's existing Red and Orange line cars.

One final point involves the findings of the Governor's Special Panel to Review the MBTA, issued on April 8, 2015. This report takes a very different approach to the issues surrounding the MBTA than most of the previous studies. Instead of focusing on revenue, it focuses almost exclusively on management. The specific findings of the study are as follows:

- The MBTA has an unsustainable operating budget.
- There is chronic capital underinvestment, with the MBTA not even able to spend all of the capital funds available to it.[38]
- Project delivery is bottlenecked.
- There are ineffective workplace management practices.
- The expansion program is short-sighted.
- The MBTA suffers from organizational instability.
- There is a lack of customer focus.
- The contracting and procurement processes are flawed.
- There is a lack of accountability to the state.

In response, the panel made the following recommendations:

- A new fiscal and management oversight board should be created.
- The MBTA should seek to capture revenue opportunities through fares, advertising, real estate, grants, and federal programs.

- A firewall should be created between the capital and operating budgets, with one, five and twenty year plans developed for each.
- Capital planning should focus on modernizing vehicles and infrastructure, with a pause before any new expansion projects are considered.
- The MBTA should become more customer-focused.
- The system's route structure should be updated to reflect shifts in demand and travel patterns.

The subsequent 2015 MBTA reform legislation, enacted in July 2015, created the new Fiscal and Management Control Board (FMCB) and gave the MBTA a three-year waiver on the state's Pacheco Law, which restricts how state agencies may go about privatizing services. The FMCB was created to oversee and improve the finances, management, and operations of the MBTA. A report, "Baseline Analysis and Progress to Date," released in September 2015, sets the stage for the work that the FMCB will need to do over the next three or more years to more fully address the significant operational, fiscal, and management challenges facing the MBTA.[39] The findings of the FMCB's Baseline Analysis further underscore the issues highlighted in this *Mass*Benchmarks report, including expense growth far exceeding revenue growth and the growing backlog on maintenance and needed capital investments due to persistent underspending.

STATE OF GOOD REPAIR (SGR) PERFORMANCE MEASUREMENT

Underinvestment in maintenance has clear long-term consequences. Over time, without proper care, transportation assets (roadways, bridges, tracks, buses and trains) will deteriorate to the point where they have diminished capacity or are no longer viable. Further, deferring maintenance ultimately leads to far higher costs. Potentially more damaging is the effect of lost confidence in our transportation network by residents, businesses, and visitors. Maintaining state of good repair as a system standard reinforces Massachusetts' image as an attractive place to live, do business, and visit.

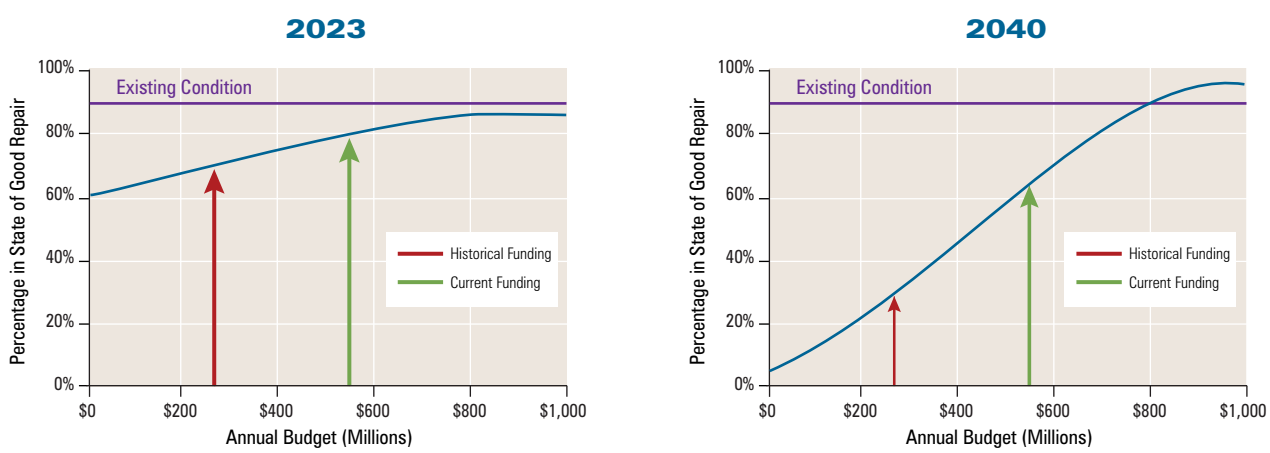
A state of good repair (SGR) means that bridges, pavement, buses, trains, and tracks are functioning at their ideal capacity within their specified design life. Adhering to a state of good repair requires timely maintenance and replacement, so there is not an excessive number of breakdowns in the case of buses and trains; or in the case of roadways, bridges, and tracks, there are no speed or operating restrictions.

Recent plans and reports have detailed how far the Massachusetts transportation network is from having a state of good repair and that reaching this level is gradually becoming further and further out of reach given current funding. Through scenario planning tools developed to compare future transportation system performance based on levels of investment, it is evident that the continued underfunding of infrastructure will yield deteriorated performance, particularly in transit, in coming years. In response, Massachusetts has taken initial strategic steps to pull out of this seemingly unshakable downward trend.

In May 2014 MassDOT published its first multimodal Long-Range Transportation Plan (LRTP), called "*we*MOVE Massachusetts." This report received very little public attention and was never promoted by MassDOT under either the Patrick or Baker Administrations (so far). Yet, on MassDOT's home page, it has a prominent position in the lower right-hand corner under the heading "MassDOT Initiatives," along with Financial Studies, and GreenDOT — MassDOT's environmental sustainability initiative.

As part of this study, MassDOT developed a simple spreadsheet tool called Planning for Performance, which enables analysts to test future scenarios of funding by

Figure 6. Pavement Condition



Source: Massachusetts Department of Transportation, *we*MOVE Massachusetts: Planning for Performance, May 2014

mode and program category against future asset performance. This tool was used to help inform MassDOT's internal deliberations about the allocation of funding in Governor Patrick's Way Forward funding proposal. The tool is available for MassDOT to use to test the impact of what-if funding scenarios.

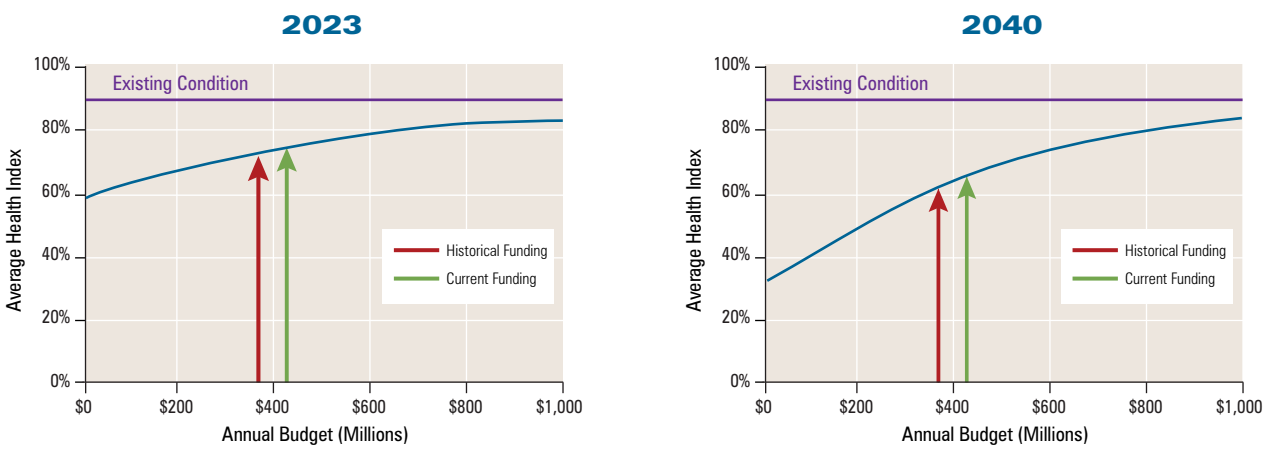
In the report, the future performance of fifteen critical highway and transit assets was tested for the years 2023 (the end of the 10-year Way Forward program) and 2040 (MassDOT's then standard planning horizon year). In each case, the asset's performance was forecast with historic funding levels extended into the future, versus performance including the new Way Forward funding. Funding in Way Forward, which had been set aside for expansion projects, was essentially sidelined and not included in the asset performance analysis.

Figures 6, 7 and 8 show the findings for three key assets: roadway pavement, bridge, and MBTA rolling stock (including all buses and train types combined). Results for 2023 and 2040 are shown. The disparities in performance apparent in 2023 depending on funding levels grow larger when the analysis is extended out to 2040, due to the cumulative effect of several decades of underfunding. The Planning for Performance tool used readily available federal and state data and methodologies, but findings may differ across studies due to the underlying assumptions and methods used.

As shown in Figure 6, about 88 percent of state-owned roadway pavement was in a state of good repair (SGR) at the time of the study, following a major infusion of federal stimulus[40] funding, from during and after the Great Recession. This condition was forecast to decline to 71 percent SGR by 2023 under historic funding levels, but only to 79 percent under Way Forward funding levels. Eighty percent SGR is the industry standard.

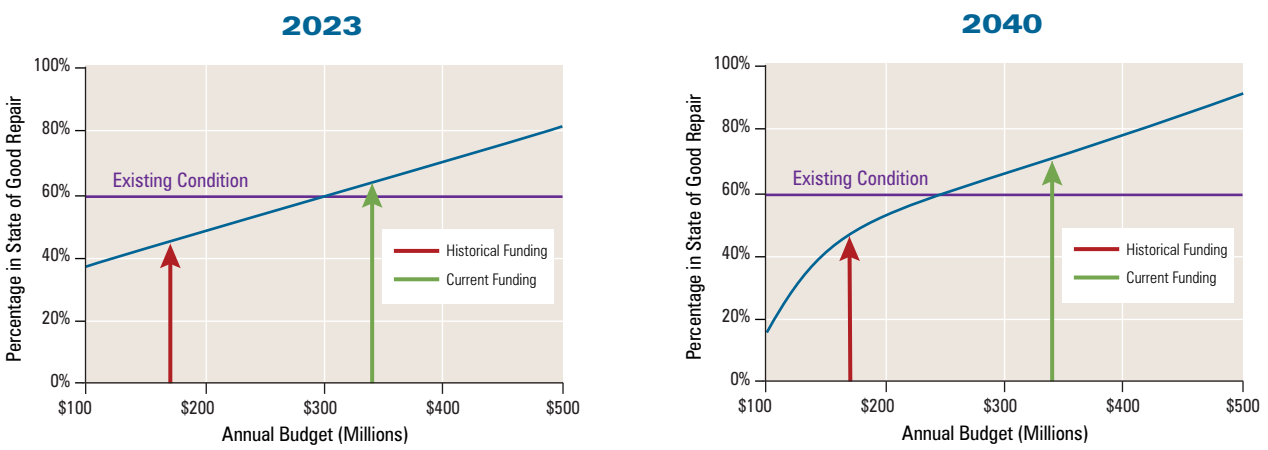
As shown in Figure 7, the state's bridges were found to have an average health index[41] of 89 at the time of the study, following several years of ABP funding by the state. This would decline to 72 under historic funding and to 76 under Way Forward funding.

Figure 7. Bridge Condition



Source: Massachusetts Department of Transportation, *we*MOVE Massachusetts: Planning for Performance, May 2014

Figure 8. MBTA Rolling Stock Condition



Source: Massachusetts Department of Transportation, *we*MOVE Massachusetts: Planning for Performance, May 2014
Note: This curve shows a weighted average of bus, subway, and commuter rail conditions based on the number of vehicles in each fleet.

The findings for MBTA vehicles are particularly striking, as shown in Figure 8. As vividly seen in the aftermath of record snowfalls in the winter of 2015, the MBTA's fleet of buses, subway cars, commuter rail locomotives and cars, and light rail vehicles are far from a state of good repair standards. At the time of the study, only 58 percent were found to be in SGR (far worse than the key highway assets). Under historic funding levels, this performance would decline to 46 percent (significantly worse than today!) versus increasing to 61 percent (still inadequate) under Way Forward funding. These findings played a role in the state's decision to give priority to the replacement of Red, Orange, and Green line cars in subsequent CIPs.[42]

Numerous estimates have been incorporated into the various studies of recent years of MassDOT's total capital funding deficit (including the MBTA), i.e., the amount of money needed in excess of currently projected revenue to bring the entire system into a State of Good Repair (SGR). The 2007 Transportation Finance Commission report pegged the number at $15-19 billion. MassDOT estimated $8.2 billion. The MBTA Fiscal and Management Control Board, in its September 2015 "Baseline Analysis and Progress to Date" report, found the MBTA's state of good repair backlog to be an estimated $7.3 billion.

FINDINGS AND RECOMMENDATIONS

Many studies have found that the state has revenue, cost control, and management problems in its transportation system. Different studies have emphasized different aspects of the problem, but in reality, all of these findings are correct. The state suffers from all three deficiencies, and all three must be addressed in any comprehensive plan moving forward. Some specific suggestions include the following:

- The finances of the MBTA have to at long last be placed on a sound footing. A few places to start would be:
  - Develop a modernized fare policy which provides for time-of-day and length of trip pricing, and seeks to better target discounted fares to those most in need. For example, the elderly as a group have long since ceased to be poorer than other societal cohorts. Yet, everyone receives a 50 percent fare discount when they turn sixty-five, including the co-author of this paper. King County (Seattle) has taken a lead in trying to better target discount fares to people in-need. This is clearly politically challenging.
  - Secondly, the state should at long last rectify the mistake it made at the time of the Big Dig and take the remaining Big Dig-related indebtedness off the MBTA's books. This step would provide a badly needed fresh start for the MBTA to rationally plan ahead without the overhang of a mountain of debt. Like Greece, the MBTA needs debt relief.
  - Thirdly, the MBTA should stop expanding beyond projects currently in the CIP until it is put on a sound financial and governance footing.
- On the highway side, the state's gas tax is still relatively low compared with peer states, despite the 3-cent increase in 2013. The loss of gas tax indexing was a huge blow to future transportation financing. This issue needs to be revisited, particularly during periods of relatively low fuel prices. Fuel prices are around $2.30 per gallon versus over $3.50 a couple of years ago. How onerous would the average driver find, say, a 10-cent increase in the gas tax? More experimentally, the state might look at the experience of Oregon in implementing Vehicle Miles Traveled (VMT) charges in lieu of direct motor fuel taxes.[43] As vehicle fuel economy continues to improve, the growth of motor fuel tax revenues will decline.
- In addition to gas tax financing for roadways, the state makes relatively little use of tolling. Why is it that only Metro West commuters on I-90 and those using the three harbor crossings have to pay a toll to enter Boston? The answer is "history," and it makes no sense. There has long been internal discussion at the state-level of tolling I-93 and I-95 to the New Hampshire and Rhode Island borders. Federal policy has become more accommodating to toll experimentation on the interstate system. After all, New Hampshire and Maine toll our residents! With the advent of open road All Electronic Tolling (AET), those aggravating toll booths which back up traffic for miles are rapidly becoming an anachronism. The Patrick Administration initiated the conversion of all existing tolls to AET beginning in 2014 with the Tobin Bridge. The Baker Administration is continuing this initiative to complete the entire system by including the I-90 Allston/Brighton Interchange project as a high priority in the CIP.
- Since MassDOT is responsible for both highway and transit assets, highway tolls and MBTA fares should be adjusted and coordinated with consistency.
- Public/Private Partnerships (P3s) are an increasingly popular way to finance highway and transit projects around the world. While there are several models, the most common is for a private developer to build new infrastructure and recoup the costs by

capturing the future toll or farebox revenue streams. The Patrick Administration and legislature created a P3 Commission, which has been advancing two projects — the construction of a new tolled bridge across the Cape Cod Canal (Project Span), and the construction of a tolled managed lane along Route 3 south of the Braintree Split (Project Mobility). Managed lanes (highway lanes that employ tools such as lane use restrictions or variable tolling to optimize traffic flows) in general, no matter how constructed, offer an untapped opportunity in Massachusetts to employ congestion pricing and to allow drivers to decide how much they are willing to pay to avoid congestion and save travel time. On the transit side, the state has recently partnered with private interests to build a new commuter rail station at the New Balance headquarters in Brighton, and the Assembly Square station in Somerville on the Orange Line. The Wynn casino project in Everett has agreed to underwrite the cost of additional off-peak Orange Line service.

- The state needs to borrow less and pay more as we go through dedicated revenue streams which can reasonably be expected to cover future bonding costs. The state should adopt the management recommendations of Governor Baker's MBTA panel and seek to implement similar efficiencies on the highway side. To spend limited dollars wisely, the state should use performance-based planning tools as in the *we*MOVE Massachusetts study, and as are being developed through MassDOT's Office of Performance Management. It should also consider the project-selection criteria developed by the Project Selection Advisory Council.

No matter what financing mechanisms are chosen, the state will need to continue to make three fundamental trade-offs in allocating transportation funding:

- Preservation versus expansion
- Investment in highways versus transit
- Investment in the Boston region versus the rest of the state

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The views expressed are those of the authors and do not necessarily represent those of the University of Massachusetts, the Federal Reserve Bank of Boston, the editorial board or their current and past clients and employers.

Endnotes

1.) The importance of transportation to Massachusetts industry is covered in detail in A Better City's "Building Massachusetts' Economy Through Transportation Investment," prepared by Cambridge Systematics, Inc. in 2009 as well as the Economic Development Research Group's "Moving Forward: Transportation and the Massachusetts Economy," July 2010. http://www.edrgroup.com/pdf/OTF-White-Paper-July-2010.pdf

2.) In real 2009 dollars, the Massachusetts GDP has grown from $169 billion in 1970 to $425 billion in 2014, according to the U.S. Department of Commerce's Bureau of Economic Analysis and the Census Bureau's Statistical Abstract of the United States. 1970 inflation adjustment calculated by author.

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7.) TRIP, "Massachusetts Transportation by the Numbers: Meeting the State's Needs for Safe and Efficient Mobility," October 2014.

8.) American Public Transit Association, 2014.

9.) The 20 square mile reference to Boston-Cambridge's land area represents a quadrangle drawn over the two cities (and parts of Everett and Chelsea) that encapsulates the cited economic activities. The actual land area of the Boston and Cambridge municipal boundaries is larger.

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17.) With the exception of the Massachusetts Port Authority.

18.) In the interest of full disclosure, the co-author of this paper, Marc Cutler, participated in several of these studies while working for the consulting firm, Cambridge Systematics, Inc. Mr. Cutler is now an independent consultant and the views expressed herein are his own. Specifically, he participated in the following studies: "Transportation Finance in Massachusetts: An Unsustainable System," "Building Massachusetts' Economy through Transportation Investment," and "We Move Massachusetts." The other co-author, Branner Stewart, also participated in "Building Massachusetts' Economy through Transportation Investment" while at Cambridge Systematics, Inc.

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36.) The I-91 project has been in the news lately as the construction work is expected to cause a one-year delay in the opening of the MGM Grand Casino in Springfield.

37.) The Green Line Extension has recently been called into question due to much higher than anticipated construction bid costs.

38.) This point has been disputed by some of the commentary on this report.

39.) MBTA Fiscal and Management Control Board, "Report #1: Baseline Analysis and Progress to Date," September 22, 2015. http://www.mbta.com/uploadedfiles/About_the_T/Board_Meetings/FMCB60dayReportReport1BaselineAnalysisandProgresstoDate.pdf

40.) The American Reinvestment and Recovery Act (ARRA).

41.) Average health index is one of two measures typically used by FHWA to measure bridge quality. The scale is 0-100.

42.) Procurement of new commuter rail locomotives and cars was already underway at the time of the study.

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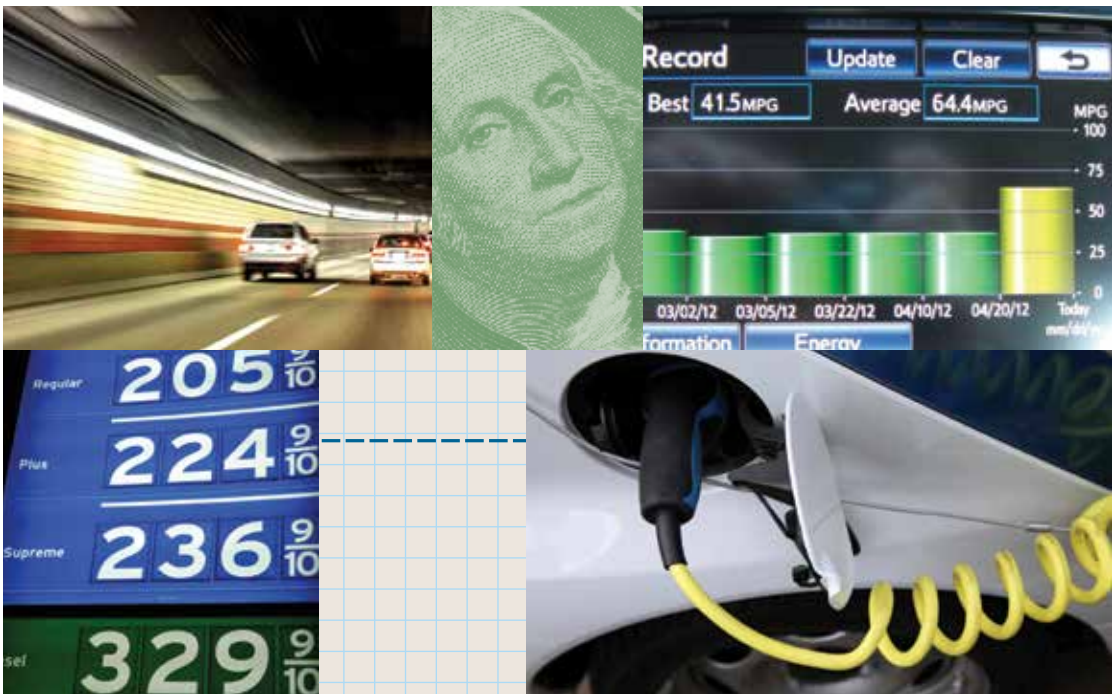


State Highway Funding in New England: The Road to Greater Fiscal Sustainability

Jennifer Weiner and Darcy Saas

STATES IN NEW ENGLAND AND ACROSS THE NATION ARE PROJECTING TRANSPORTATION FUNDING SHORTFALLS. THE STRUCTURE OF THE MOTOR FUEL EXCISE TAX — A KEY SOURCE OF HIGHWAY REVENUES FOR MOST STATES — IS WIDELY CITED AS A FACTOR CONTRIBUTING TO THESE GAPS. AS A FLAT, PER-GALLON LEVY, THE TRADITIONAL "GAS TAX" IS NOT FISCALLY SUSTAINABLE AS IT FACES EROSION FROM INFLATION AND INCREASED VEHICLE FUEL EFFICIENCY. WHAT OPTIONS DO STATES HAVE IN THE NEAR TERM TO SUPPORT MORE SUSTAINABLE FUNDING FOR HIGHWAYS OR OTHER MODES OF TRANSPORTATION?

INTRODUCTION

There is general agreement that many of the region's roads and bridges are in need of significant repair and improvement. According to the American Society of Civil Engineers, over half of public road miles in the New England states are in poor or mediocre condition. Furthermore, over ten percent of the region's bridges are structurally deficient, while nearly one third are functionally obsolete.[1] There is concern that revenue sources will be inadequate relative to the projected expense of maintaining and keeping New England's roads, bridges, and other transportation assets in good condition. How to address this challenge is largely a policy choice; a new report by the Federal Reserve Bank of Boston's New England Public Policy

Centers seeks to inform discussions about transportation funding options. The report, *State Highway Funding in New England: The Road to Greater Fiscal Sustainability*, compares gas-tax structures in the New England states and examines alternative tax structures that could improve fiscal sustainability. This article is based on that report and explores challenges associated with relying on the motor fuel excise tax as a primary revenue source for transportation expenditures.[2]

A KEY, BUT CHALLENGED, REVENUE SOURCE FOR TRANSPORTATION

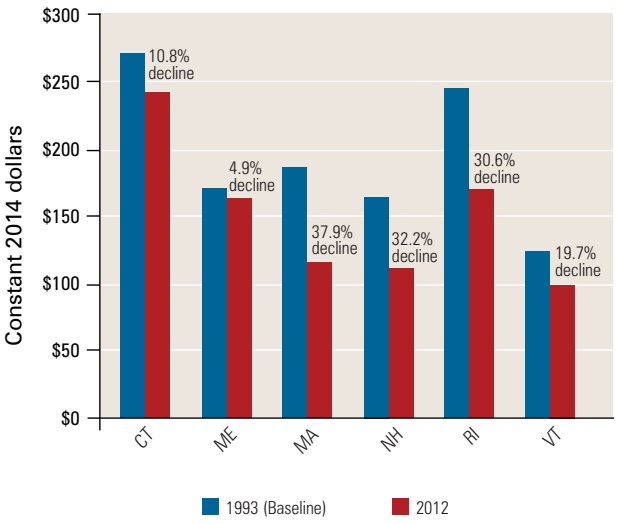
The motor fuel excise tax or gas tax has long been a key source of highway revenues for the federal government and most states. Motor fuel taxes — including taxes on gasoline and diesel fuel — are a large source of state highway revenues in New England. In fiscal year (FY) 2013, these levies represented nearly one-third to over one-half of own-source revenues for highways in the six New England states, with the majority of motor fuel tax collections associated with sales of gasoline. All six New England states levy an excise tax per gallon of gasoline sold. As of July 1, 2014, excise tax rates in the region ranged from 12.1 cents per gallon in Vermont to 32.5 cents in Rhode Island. Massachusetts' excise tax per gallon was 24.0 cents per gallon, slightly more than the U.S. average, which was 20.9 cents per gallon (as of January 1, 2014).

Two of the most frequently cited criticisms of the gas tax in its common form relate directly to fiscal sustainability. First, revenues from a conventional flat-rate excise tax do not automatically grow with inflation, whereas the costs associated with maintaining, constructing, and reconstructing roads tend to increase as prices and wages rise. Second, as vehicle fuel efficiency increases, flat-rate gas taxes will generate less revenue for a given amount of road use than in the past. We consider each challenge in turn.

The motor fuel excise tax differs from other major taxes, such as general sales or income taxes, whose revenues tend to grow automatically with inflation due to the nature of their bases.[3] The gas tax is typically levied as a flat tax per gallon sold. To prevent the value of traditional gas taxes from declining due to inflation, legislatures must actively and periodically vote to adjust the rates. That seldom occurs widely in practice. A 2011 report by the Institute on Taxation and Economic Policy (ITEP) noted that 14 states had gone at least 20 years without increasing their gas tax rate, and 26 states had gone at least 10 years. The federal gas tax, which is the largest source of funding for federal aid for highways, has not been raised since 1993, and many observers believe that it will not be raised in the near future, despite solvency issues facing the Federal Highway Trust Fund.

Figure 1. Fiscal Sustainability of Actual Gas Taxes in New England

Inflation-adjusted gasoline tax revenue per 10,000 vehicle miles traveled



Source: Author's calculations using data from FHWA, BLS, and state sources. Methodological appendix available at www.bostonfed.org/neppc.

Note: Data reflect both excise and price-based taxes for states that have both (Connecticut, Vermont).

New England states have varied in their willingness to increase their gas tax rates over the years. At one extreme, nominal excise tax rates in Massachusetts and New Hampshire remained unchanged from the early 1990s until increases were adopted in 2013 (Massachusetts) and 2014 (New Hampshire). At the other end of the spectrum, Maine automatically adjusted its excise tax each year to the changes in the consumer price index (CPI), a common measure of general inflation, between 2003 and 2011, leading to small but steady rate increases during that period.

Like Maine, some other states have mitigated the challenges of inflation and effected regular adjustments to the tax through legislative processes by adopting such automatic adjustments to their gas tax rates, a process known as indexing. [4] Massachusetts and Rhode Island recently (in 2013 and 2014, respectively) passed legislation to automatically index their excise taxes to the CPI in future years, joining Florida and Maryland, but Massachusetts voters repealed the indexing provision in a November 2014 referendum.[5]

Other states have adopted taxes whose rates are based on a percentage of the price of gasoline — a similar structure to a typical sales tax — to complement or even replace their gasoline excise tax. Among the New England states, Vermont levies two assessments tied to the retail price of

gasoline and Connecticut is the only state to levy a tax on the wholesale price of gasoline. As gas prices tend to rise over time, a price-based gas tax is likely to yield a more sustainable revenue stream than a traditional flat excise tax without requiring changes to the tax rate. Two potential drawbacks are that gasoline prices tend to be volatile and their long-term trends may not match up with trends in highway maintenance or construction costs.

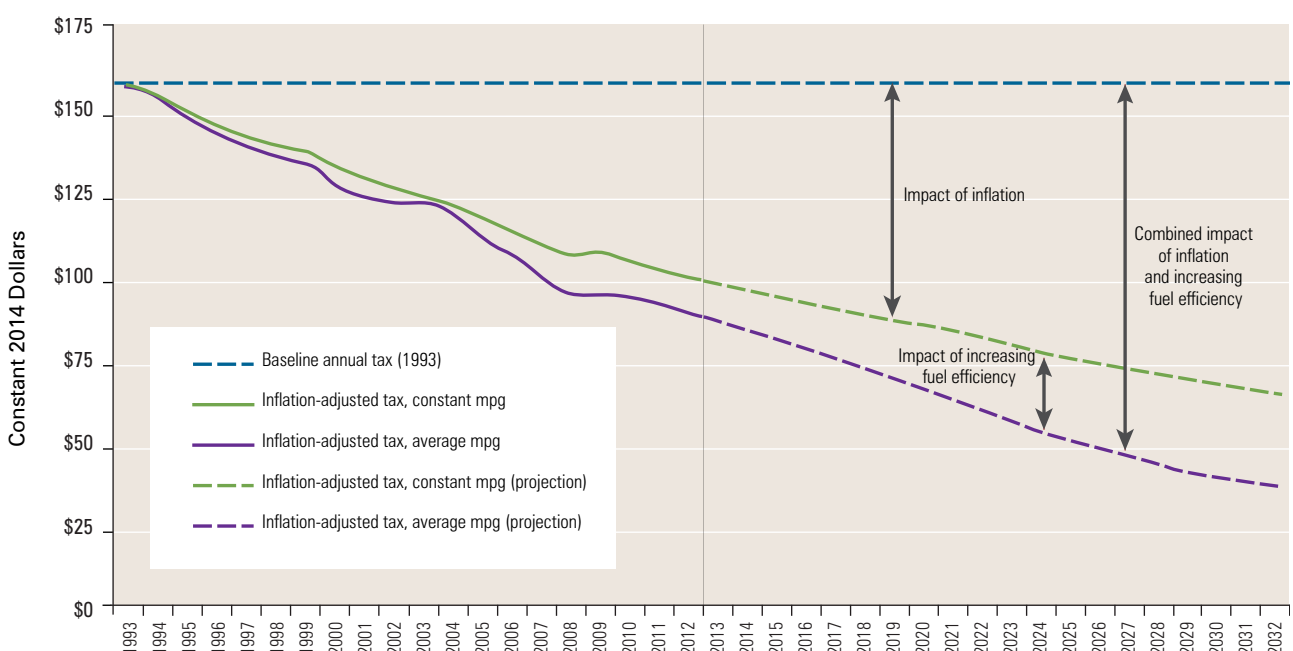
The Center's research illustrates that New England states that periodically increased their gas tax rate experienced less erosion in their gas tax revenues, as did the states that levy an additional tax on the price of gasoline. Figure 1 presents a cross-state comparison of inflation-adjusted gasoline tax revenue per 10,000 vehicle miles traveled in each New England state in 1993 versus 2012. Gas taxes in Maine, which employed automatic indexing for close to a decade, experienced small reductions (4.9 percent) in inflation-adjusted revenue per 10,000 vehicle miles traveled between the two years. Massachusetts and New Hampshire, the two states that did not adjust their tax rates over this period, saw the largest declines (37.9 and 32.2 percent, respectively).[6] Connecticut and Vermont experienced less erosion primarily because of growth in revenues earned from their price-based taxes.

As noted previously, the second challenge to the fiscal sustainability of the gas tax is vehicle fuel efficiency increases. Rising fuel efficiency means that revenues derived from traditional gas taxes would decline even in the absence of inflation. Since 1993, the average fuel economy of all light-duty vehicles in the United States has grown from 19.3 miles per gallon to 21.6 miles per gallon in 2012.[7]

To address this threat to fiscal sustainability, some analysts have proposed indexing gasoline excise rates to changes in average vehicle fuel economy.[8] The idea behind this concept is that tax rates are periodically adjusted upward as vehicles become more fuel efficient, allowing states to retain some of the revenue they would otherwise lose due to decreased gasoline consumption. To our knowledge, no state currently employs this approach.[9]

Over the past 20 years, inflation has played a more important role with respect to gas tax erosion than rising fuel efficiency and will likely continue to do so in the next few decades (see Figure 2). However, increasing federal fuel economy standards through 2025 and the growing availability of hybrid and electric vehicles suggest that rising fuel efficiency will represent a greater threat to gas tax revenue streams in the years ahead than it has in the recent period. Average on-road fuel efficiency among all light-duty vehicles is expected to reach 28.7 miles per gallon by 2025 and 37.2 miles per gallon by 2040 (gains of 33 percent and 73 percent over 2012, respectively).[10]

Figure 2. Annual Inflation-adjusted Tax for Vehicle Traveling 10,000 Miles per Year at 18.4 Cents per Gallon Assuming National Average Fuel Efficiency



Source: Authors' calculations using data from FHWA, BLS, CBO, and EIA. Methodological appendix available at www.bostonfed.org/neppc.

Note: Combined impact includes increased fuel efficiency of conventionally powered vehicles and increased presence of hybrid, electric, and other alternative fuel vehicles.

CONCLUSION

Shortfalls between projected transportation expenditures and projected transportation revenues are, at least in some sense, a policy choice. Policymakers have always had the option to raise more revenues or to shift spending away from other areas, including the general fund, to fund highways at the level necessary to maintain a state of good repair.

If states wish to promote more sustainable revenue streams for highways while continuing to rely on gasoline taxes as a major component of highway funding, it is important for policymakers to consider the dual revenue impacts of rising costs and improving gas mileage when evaluating policies to modify existing structures.

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Learn more about the New England Public Policy Center through its website: www.bostonfed.org/neppc

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1.) American Society of Civil Engineers. "2013 Report Card for America's Infrastructure."

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3.) The dollar value of retail sales will tend to increase as prices rise, increasing general sales tax revenues even if the sales tax rate remains unchanged. Likewise, income tax revenues tend to increase as wage rates rise.

4.) Critics of automatic gas tax indexing have argued that lawmakers should be required to vote on any tax increase, whereas proponents contend that the automatic feature is necessary to maintain the value of the tax, given the political difficulty of raising the tax rate through the legislative process. Maine's experience with automatic indexing presents an example of a potential middle ground. While indexing was in effect in Maine, the tax rate was automatically adjusted on an annual basis, but the legislature was required by law to vote every two years on whether to repeal the indexing measure (which it ultimately did). See Paul Carrier. "Boost in gas tax gets green light." *The Portland Press Herald*. April 10, 2002.

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6.) Because fuel efficiency growth in these states did not match the national average over this period, these states experienced less revenue erosion than suggested by Figure 2.

7.) U.S. Department of Transportation. FHWA. *Highway Statistics*, Table VM-1. Various Years. These estimates represent the ratio of actual vehicle miles traveled by light-duty vehicles (including hybrid, electric, and other alternative-fuel vehicles) divided by actual gallons of gasoline consumed. Increases in average fuel efficiency have not always been even, as they also depend on the mix of vehicle types. In some years during this period, average fuel efficiency decreased, reflecting a shift from more fuel-efficient passenger cars to less fuel-efficient light-duty vehicles, such as SUVs, mini-vans, and pick-up trucks.

8.) See O'Connell and Yusef (2013), and ITEP (2013).

9.) Another alternative, also previously used by Ohio and Michigan, would be to inversely link gas tax rates to actual gasoline consumption. See Bowman and Mikesell (1983).

10.) Estimates represent miles-per-gallon equivalents, which capture both conventionally powered and hybrid, electric, and other alternative-fuel vehicles. Sales of hybrid and electric vehicles in New England are expected to grow from 3.4 percent of total light-duty vehicle sales in 2012, to 4.7 percent in 2025, and 6.8 percent by 2040. See Energy Information Association. 2014 Annual Energy Outlook, Tables 48 and 59. This assumes that auto manufacturers are able to comply with Corporate Average Fuel Economy (CAFE) standards set by the Department of Transportation.

Fixing Our Transportation System Is Important for the Entire Commonwealth: A View from 495/MetroWest

Paul Matthews

CREATION OF THE MBTA FISCAL MANAGEMENT AND CONTROL BOARD AND DEVELOPMENT OF TRANSPARENT, DATA-DRIVEN, RANKING OF CAPITAL TRANSPORTATION PROJECTS FOR FUNDING ARE AMONG THE KEY REFORMS IN RENEWAL OF THE STATE'S TRANSPORTATION INFRASTRUCTURE. THE VIBRANCY OF THE SYSTEM — BOTH INSIDE AND BEYOND GREATER BOSTON — IS CRUCIAL TO THE STATE'S ECONOMIC DEVELOPMENT.

While the shutdown of the MBTA last year wreaked havoc for our residents, employers, and visitors with huge repercussions for our economy, there has been one positive outcome — an unprecedented focus on addressing our transportation needs. In the words of Albert Einstein, "In the midst of every crisis, lies great opportunity," and so our widespread recognition of this crisis presents an opportunity for us all to work together in fixing our transportation system.

The shutdown illuminated a central truth — transportation matters, not only environmentally and socially, but as an essential service with direct impacts on our economy and competitiveness. The MBTA shutdown is the latest and most visible warning sign of our transportation crisis, but it has been building for decades and affects the entire Commonwealth, not just Boston residents and commuters. There have been other warning signs over the years, such as the Central Artery overruns and the deficiency of

our bridges,[1] as well as countless analyses of our transportation needs, including the Transportation Finance Commission's volume 1[2] and 2[3] reports, the D'Alessandro Review of the MBTA,[4] and Governor Baker's MBTA Special Panel.[5] While these have resulted in progress over the last few years such as management reforms, the establishment of MassDOT as a consolidated transportation department, the Accelerated Bridge Program, an ongoing shift away from using capital funds for operating expenses, and some new resources for transportation, the scale of our transportation crisis and its interrelationship with our economy demands more expansive and comprehensive solutions.

After all, the shutdown occurred at the beginning of 2015, against a backdrop of increased worldwide visibility for Massachusetts during the Olympics discussion, and far more importantly, an increased level of emphasis on transportation infrastructure by employers making location decisions.

This prioritization of transportation infrastructure in corporate site selection was made clear by two leading trade publications at the beginning of last winter. In November, *Site Selection* magazine published Site Selectors' Top Location Criteria, showing Transportation Infrastructure[6] as the number-one criterion.

Table 1
Site Selectors' Top Location Criteria For 2014

1.	Transportation infrastructure
2.	Ease of permitting and regulatory procedures
3.	Existing work-force skills
4.	Land/building prices and supply
5.	Utility infrastructure
6.	State and local tax scheme
7.	Flexibility of incentive programs
8.	Availability of incentives
9.	Access to higher education resources
10.	Legal climate (tort reform)

Source: *Site Selection* survey of corporate site selectors, October 2014 http://siteselection.com/press/releases/141103_Business-Climate.html

Likewise, *Area Development*'s issue in the first quarter of 2015 was entitled "Infrastructure Investment: the Bridge to Economic Growth."[7] The importance of transportation infrastructure was clear in the publication's 29th Annual Corporate Survey,[8] which found that the top site selection factor is highway accessibility, with 88.3% of the respondents rating that priority as either very important or important. Particularly noteworthy is that this factor moved up from second choice the year before, exceeding occupancy and construction costs in importance.

That issue, which moved beyond the survey results, focused on states such as Michigan, Nevada, and Texas, which had invested in their transportation infrastructure. It also provided context from corporate location decision makers. One such leader, Larry Gigerich, managing director of Ginovus, an Indianapolis-based consulting firm,

Table 2. Site Selection Factors by Rank — Area Development Corporate Survey 2014*

Ranking	2014	2013
1. Highway accessibility	88.3	93.5 (2)**
2. Occupancy or construction costs	87.9	87.4 (4)
3. Available land	85.7	80.3 (13)
4. Available buildings	82.2	83.3 (6)
5. Availability of skilled labor	82.1	95.1 (1)
6. Labor costs	82.6	90.8 (3)
7. Right-to-work state	77.9	80.6 (11T)
8. Proximity to major markets	77.1	75.6 (15)
9. Energy availability and costs	76.8	80.8 (10)
10. Corporate tax rate	75.6	82.4 (7)
11. Tax exemptions	73.2	80.6 (11T)
11. State and local incentives	73.2	81.9 (8)
13. Expedited or "fast-track" permitting	71.0	76.3 (14)
14. Low union profile	70.9	81.4 (9)
15. Inbound/outbound shipping costs	69.5	70.9 (18)
16. Environmental regulations	68.6	71.7 (17)
17. Availability of long-term financing	63.1	74.8 (16)
18. Training programs	62.8	51.5 (23)
19. Accessibility to major airport	62.4	59.4 (21)
20. Proximity to college/technical training	61.5	54.1 (22)
21. Proximity to suppliers	60.3	67.7 (19)
22. Raw materials availability	53.7	60.5 (20)
23. Availability of unskilled labor	52.5	48.9 (24)
24. Availability of advanced ICT services	45.1	84.6 (5)
25. Water availability	44.0	N/A
26. Railroad services	30.9	29.4 (25)
27. Waterway or oceanport accessibility	27.8	29.2 (26)

*All figures are percentages and are the total of the "very important" and "important" ratings of the Area Development Corporate Survey and are rounded to the nearest tenth of a percent.

**2013 ranking

Source: *Area Development*. 29th Annual Corporate Survey. Q1 2015.

The shutdown illuminated a central truth — transportation matters, not only environmentally and socially, but as an essential service with direct impacts on our economy and competitiveness.

pointed out that "States and communities that make the investments in increasing road infrastructure, and in existing infrastructure, will be in better shape for economic development."

Recognizing this interrelationship between transportation and the economy was one of the principal reasons that the nonprofit that I work for, the 495/MetroWest Partnership, was founded in 2003. In fact, it was frustration with inadequate attention to our transportation needs that provided the impetus that united our municipal officials, business executives, and policymakers in establishing the public-private Partnership. In many ways, regions are defined by infrastructure; in our organization's case, we are literally named after our interstate. At the time, our region was facing outmoded infrastructure, jurisdictional boundaries, limited availability of state and federal funding, a lack of regional transit options, a limited commuter rail schedule, and unlike many areas around Boston, rising user fees through tolls on travelling into and out of the city.

By bringing together our public and private sector leaders and forging collaborative responses, we have been able to accomplish a great deal in addressing these challenges, such as founding the state's newest Regional Transit Authority, the MetroWest RTA; securing federal funding through Congressman McGovern to develop design solutions to interchange problems at 495/90[9] and 495/9[10]; and collaborating with our regional planning agencies on corridor studies and the identification of transportation need. We've also worked with MassDOT to advance road and bridge projects such as 495/90 and the Burns Bridge project[11]; pointed out our region's disproportionate financial contributions to our transportation system through tolls; and joined forces with our communities, employers, and legislators to advocate for our region's needs in transportation planning and budgeting. To build consensus on our transportation needs and priorities, in 2004 and again in 2014, we worked with the *MetroWest Daily News* to solicit public nominations on these issues, and utilized regional experts to identify our *Top Ten Transportation Nightmares.*

As demonstrated by the range of issues identified in this list, the top concerns reflect the transportation needs of not only our residents and municipal governments, but also of our employers. These include unsafe and congested highway interchanges, reliable commuter rail, and 'last mile' transit service. Since our regional economy generates $21 billion in annual payroll[12] and includes some of the top companies in the Commonwealth, such as BJ's Wholesale Club, Boston Scientific, Cisco Systems, EMC, Genzyme Sanofi, IBM, Staples, and TJX, these issues have profound impacts on the entire state economy.

Our economy's interrelationship with transportation was made clear in our recent 495/MetroWest Business Climate Survey with Framingham State University and the business publication, *MetroWest495BIZ.*[13] In the survey, our regional employers ranked public transportation and traffic as their top concerns, specifically access to highway infrastructure, expanded investment in highway infrastructure, access to commuter rail, last mile service from commuter rail, and improved commuter rail scheduling (ranked in descending order). One of the respondents went beyond the survey to offer a personal statement that "the to-and-from work commutes are prohibitive to all fields of business in our state."

Beyond our current employers and in keeping with *Site Selection* and *Area Development's* identification of transportation infrastructure as the highest priority in corporate real estate decisions, transportation and access to transit are regularly raised by companies considering locating in our region including Massachusetts. The Partnership works closely with our municipal governments, developers, chambers of commerce, and others on employer retention, expansion, and attraction initiatives. It is also working with the Executive Office of Housing and Economic Development, the Office of Business Development, MassDevelopment, other public agencies and economic development nonprofits across the state while participating in the state's Regional Economic Development Organization program. Throughout all of these conversations on economic development and site selection, transportation infrastructure and transit services are always of paramount concern to any potential locating company, regardless of their size, industry, client base, or supply chain.

That's why it was so important when the Baker Administration and the leaders in the House and Senate moved swiftly, decisively, and collaboratively in responding to the MBTA shutdown and our transportation needs. Convening the MBTA Special Panel and following through on its recommendations[14] by proposing and enacting legislation to create the MBTA Fiscal and Management Control Board[15] created a platform that will bring oversight and discipline to the MBTA's finances and

Table 3. 495/MetroWest Region's Top Ten Transportation Nightmares

1. Route 9 Corridor: Main Street MetroWest or Thruway to Boston?	• MassDOT Highway District 3 is planning work on an acceleration ramp from Route 20 Westbound to Route 9 Westbound in Northborough, with construction expected to begin in early 2017. • Route 9 & Lyman St. Intersection & Signal Improvements in Westborough scheduled, with construction expected to begin in early 2017. • Resurfacing and related work on Route 9 in Shrewsbury and Westborough, with construction expected to begin in early 2017. • Resurfacing and related work on Route 9 from Framingham town line to White Bagley Road in Southborough, with construction expected to begin in late 2016. • Route 9 & I-495 Interchange Improvements scheduled for FY 2021-2025 portion of the Central Massachusetts Metropolitan Planning Organization (CMMPO) Long Range Transportation Plan (LRTP) Mobility 2040, included safety and capacity improvements from Rte 9/I-495 interchange in Westborough to Rte 9/Crystal Pond Rd. Interchange in Southborough. • MassDOT is constructing safety and capacity improvements to the Route 9/Oak Street intersection in Natick. Construction will be completed in Spring 2016. • Route 9 & Route 27 Interchange Improvements capacity and safety improvements scheduled for FY 2021-2025 portion of the Boston Region MPO LRTP, Charting Progress to 2040.
2. The Turnpike: A Daunting Challenge	• MassDOT is implementing All Electronic Tolling (AET) on the Turnpike for completion by the end of calendar year 2016.
3. Suburban Mobility Challenges: First Mile, Last Mile & a Few in Between	• Worcester Regional Transit Authority (WRTA) shuttle in Westborough. • MetroWest Regional Transit Authority (MWRTA) shuttle with Boston Scientific in Marlborough. • CrossTown Connect Transportation Management Association (TMA) and Acton Shuttle Service. • Private sector shuttles to/from Commuter Rail stations in 495/MetroWest region. • MetroWest/495 TMA services.
4. Commuter Rail	• Fitchburg Line Improvement Project to reduce commuter train travel time and increase reliability — includes double tracking, station, bridge and other improvements, currently under construction to be completed by January 2016. • Improvements to reverse commute schedule on Fitchburg Line to be implemented in 2016. • Increased frequency of trains as well as rail work to reduce heat restrictions on Framingham/Worcester Line. • Updates to all Commuter Rail schedules expected late Fall 2015.
5. I-495/I-290 Interchange	• A project to reconstruct the interchange is currently in the preliminary stages of design and permitting. Likely improvements include modifications to the EB to NB ramp and SB to WB ramp. Improvements are also being considered for the NB to WB and EB to SB ramps.
6. I-495/I-90 Interchange	• Inclusion in MassDOT's FY 2016 Capital Investment Plan: Five projects of particular note in this category include South Coast Rail, the expansion of Boston South Station, the reconfiguration of the I-90 interchange in the Allston area of Boston, the I-90/I-495 interchange project and the Green Line Extension (GLX) to Route 16. All of these efforts are key to growing our economy, improving our mobility, and strengthening our quality of life. For all, we have committed funds for planning, public involvement, permitting, and design — in the case of South Station, we were fortunate to receive a competitive federal grant to support that work. None of these three projects was slated to be in construction in FY2016 and MassDOT does not yet have finance plans in place to support the start of construction. But as we develop a full FY2017-FY2021 five year capital plan we look forward to working with our partners and stakeholders in the public and private sectors to determine how best to advance these and other crucial investments in a manner that is fiscally prudent and sustainable. • Massachusetts Secretary of Energy & Environmental Affairs, Matthew Beaton, issued a MEPA Certificate for the Project in April, 2015. • MassDOT will go out for RFP in Fall 2015 to procure consultant services for the preparation of the DEIR/EA and 25% design plans.
7. I-495/Route 9 Interchange	• Route 9 & I-495 Interchange Improvements scheduled for FY 2021-2025 portion of the Central Massachusetts Metropolitan Planning Organization (CMMPO) Long Range Transportation Plan (LRTP), Mobility 2040, included safety and capacity improvements from Rte 9/I-495 interchange in Westborough to Rte 9/Crystal Pond Rd. Interchange in Southborough.
8. I-495 and Routes 1/1A in Foxborough, Plainville and Wrentham	• I-495 maintenance pavement preservation resurfacing, safety improvements and related work in Foxborough, Plainville and Wrentham scheduled for FY 2016 Boston Region MPO TIP.
9. Route 16 in Milford and Wellesley	• Resurfacing and intersections improvements on Route 16 in Milford from Water St. West to approximately 120 feet west of Milford/Hopedale town line and the intersection of Route 140 scheduled for FY 2019 Boston Region MPO TIP.
10. Routes 126 and 135 in Framingham	• Intersection Improvements at Route 126 and Route 135 / MBTA and CSX Railroad in Framingham scheduled for FY 2026-2030 portion of the Boston Region MPO LRTP, Charting Progress to 2040. • MassDOT is constructing improvements to the Route 126 corridor in Framingham. The project includes improvements to the 135/126/CSX railroad intersection. Construction will be completed in Spring 2017.

Source: Visit www.495partnership.org for more details and links to the interactive 'Nightmares' website, created by VHB.
Prepared by Jessica Strunkin, Deputy Director, 495/MetroWest Partnership.

management. This foundation and our collaborative leaders demonstrated that the Commonwealth has the political will to make demanding solutions-based decisions in addressing our transportation challenges.

While much of the public debate on reforms has focused on the suspension of the Pacheco law, the Control Board has lived up to its promise by providing ongoing leadership on the complex and difficult financial and management challenges facing the MBTA. The board's members provide a range of outside expertise and perspectives on transportation, and have provided transparent oversight through meeting eight times over six months and issuing a series of reports, most recently a comprehensive baseline analysis. Through their deliberations and the work of Secretary Pollack and the MBTA's new management since the shutdown, the public has learned about the ballooning costs of the Green Line Extension, the costs of achieving a state of good repair for the MBTA, and the structural operating deficit.

Beyond the Fiscal Management and Control Board and the MBTA's governance, the Commonwealth is moving forward in making significant reforms and investments in modernizing our transportation management and infrastructure. One of the most significant but overlooked improvements has been with the proceedings of the state's Project Selection Advisory Council,[16] created in the 2013 transportation finance statute. The Council (or PSAC) was charged with developing a uniform, data-driven, and transparent approach to scoring and ranking capital transportation projects for funding. Its membership included state, regional, municipal, construction, and outside transportation experts. Emphasizing transparency, it held twelve public meetings and six public hearings around the Commonwealth. As a result, we and other transportation advocates were able to review its draft findings and provide our own perspective, in our case thanking them for their attention to regional equity in transportation spending and recognizing that modernization and capacity projects should be evaluated separately with objective criteria, rather than pitting riders against drivers. The final report, released in July, proposes a new evaluative mechanism for transportation projects to ensure that our limited funds are invested strategically, fairly, across modes, and in a regionally balanced way across the Commonwealth. As Secretary Pollack said, "With these project selection criteria, MassDOT will have an important tool for evaluating and prioritizing our investments to ensure that the Commonwealth achieves the best possible return on its transportation investments."[17]

As a direct consequence of the PSAC's deliberations and its work developing an objective evaluation mechanism, this spring Secretary Pollack took the unprecedented step of issuing a one-year Capital Investment Plan[18] for MassDOT and the MBTA. By adopting an interim one-year plan rather than the usual five years, the PSAC was able to complete deliberations and issue findings for use in evaluating projects and preparing the next five-year CIP.

The Commonwealth is benefiting from an honest and transparent dialogue on transportation reforms and improvements. We need a correspondingly honest dialogue on resources.

Despite the limited nature of this year's CIP and its fiscal constraints, it includes some major successes, including funding the MBTA's $84 Million Winter Resiliency program,[19] $200 Million in Chapter 90 funding for cities and towns, and expanded funding for the state's Transportation Management Associations[20] (or TMA's), which are public-private initiatives providing transportation services. In addition, the CIP highlights projects focusing on long-term needs, such as the South Station expansion, South Coast rail, the I-90 / I-495 interchange, and the I-90 interchange in Allston.

One project that would address congestion, improve services, modernize infrastructure, and increase efficiencies across the Commonwealth is the ongoing installation of All Electronic Tolling[21] on the Massachusetts Turnpike. This $250 million project[22] is scheduled to go live in July 2016, fifteen years after New Jersey installed electronic tolling and five years after New Hampshire, and following years of requests by Massachusetts commuters and advocates such as the Partnership. By incorporating modern technology to ease congestion and toll collections, this long overdue investment will pay dividends for years to come.

There are many other examples of innovative public-private collaborations to improve transportation services. In our region alone, Secretary Pollack and Astrid Glynn, MassDOT's Rail and Transit Administrator, have provided personal leadership and attention to commuter rail scheduling issues, particularly the needs of high tech employers with workers who would benefit from reverse commute. Crosstown Connect,[23] one of the state's newest TMA's, was established by the municipal governments of Acton, Boxborough, Concord, Littleton, Maynard, Stow, and Westford to provide key transportation linkages. The Worcester Regional Transit Authority has established a new shuttle[24] linking employers, residents, and commuter rail in Westborough, and despite being the newest RTA, the MetroWest Regional Transit Authority

has an entrepreneurial reputation and established services to address commuters' needs at large employers while exploring new collaborations with the state to support commuter rail operations.

External groups with differing ideologies have also contributed to the discussion of our transportation crisis, such as A Better City, Conservation Law Foundation, Kitty and Michael Dukakis Center for Urban and Regional Policy at Northeastern University, Massachusetts Business Roundtable; MassINC, Pioneer Institute, The Boston Foundation, and Center. Many of the state's business organizations are committed to supporting a world class transit system through FixOurT[25] led by AIM, The Massachusetts Taxpayers Foundation, and NAIOP Massachusetts, along with a number of mayors and municipalities from across the state. Over the last few years of transportation deliberations, T4Mass, a broad coalition of more than fifty business, civic, municipal, environmental, consumer, and planning organizations, has been advocating for transportation funds to be spent fairly and responsibly, and for transportation decisions that are transparent and accountable.

There are reasons for optimism, since strong collaborative leadership from the Baker/Polito Administration, the Legislature, and MassDOT, with support from outside state government has led to crucial innovations and reforms while laying a strong foundation for an improved transportation system. Additionally, the seeming divide between drivers and riders is diminishing. A statewide poll in March 2012 by MassINC Polling Group asked voters for their higher priority for investment — roads, transit, or both: 57% of the respondents answered both, 20% answered roads and 17% chose transit.[26]

Our successes to date prove that comprehensive solutions involve commitment to honest dialogue, collaborative leadership, and proactivity. With this foundation, the Commonwealth must continue to address the current needs of our transportation system while tackling additional demands, including the following:

- A $170 million structural operating deficit for the MBTA in FY16, which would grow to $427 million annually by FY20 if unaddressed[27]
- A $7.3 billion backlog for the MBTA to reach a state of good repair[28]
- Potentially up to a $1 billion overrun for the MBTA's Green Line Extension, based on preliminary contractor estimates for the first phase of the project[29]
- Estimates of $2.3 billion for the South Coast Rail Project[30]
- Estimates of $2 – $4 billion[31] for the long-gestating North-South Rail Link to connect Boston's North and South Stations
- Estimates of $850 million for the expansion of South Station[32] to allow expanded southside commuter rail services
- Estimates of $285 million to address the needs of the I-90 / I-495 interchange
- The I-90 Allston Interchange Improvement Project's potential realignment of I-90 with the a West Station and commuter rail layover facility for rail and transit access
- Beyond the MBTA, $14.4 billion in repairs to 446 structurally deficient bridges across the Commonwealth[33]
- $562 million annually for the Chapter 90 program for the cities and towns road program,[34] as determined by a Massachusetts Municipal Association survey of communities
- A $150 Million backlog for Regional Transit Authorities to reach a state of good repair[35]

While the costs of our transportation needs are mounting, there is a cost to inaction as well — recall the shutdown of the MBTA that we all lived through. The Commonwealth is benefiting from an honest and transparent dialogue on transportation reforms and improvements. We need a correspondingly honest dialogue on resources. Reform alone simply cannot address the enormity of our transportation needs, due to years of postponed investment in maintaining some of the oldest infrastructure in the country.

Fortunately, our leaders inside and outside state government are dealing with this crisis. A multipronged, collaborative response is crucial, involving not only the Baker/Polito Administration and the Legislature, but all transportation agencies, municipal governments, employers, and the public. All of us — regardless of where we live in the Commonwealth or how we get to work each day — depend on our transportation system. Now our transportation system is depending on us to ensure its future.

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The author wishes to thank Jessica Strunkin, Deputy Director of the 495/MetroWest Partnership, for her assistance.

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