

The Economic and Fiscal Effects of the Massachusetts Research Credit

Prepared for the AIM Foundation

August 13, 2003

AIM FOUNDATION

ASSOCIATED INDUSTRIES OF MASSACHUSETTS FOUNDATION, INC.

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In 1991, the Massachusetts Legislature enacted the research credit, intended to increase expenditures related to research and development, which play a significant role in the creation of new technologies and increases in productivity. Research tax credits increase expenditures on research activities by reducing their effective cost. In addition to the direct benefits to firms engaging in research activities, other private firms and society-at-large also benefit from the new technologies, increased productivity, and reduced prices that result from research. Because these additional spillover benefits do not accrue directly to the companies doing the research, the optimal level of research will be funded by a combination of public and private funds. By reducing the cost of research through tax credits, Massachusetts is providing indirect research funding that helps to increase the level of research expenditures to the economically optimal level. Twenty other states also provide research credits, suggesting the credit's effectiveness at generating research expenditures.

A comprehensive evaluation of the research credit's benefit to Massachusetts should consider the credit's positive impacts on the Commonwealth's private and public sectors as well as the cost of the credit to the Commonwealth. Evaluating the value of the credit to Massachusetts' economic development in this context includes static estimates of the increased excise tax revenue (from firms currently claiming credits) that would result if the credit were eliminated and dynamic estimates of the revenue reductions associated with decreased economic activity caused by the elimination of the credit.

This study attempts to quantify the credit program's costs and benefits by estimating Massachusetts' short-term employment, personal income, and output impacts that can be attributed to the credit and the significant number of jobs, income, and taxes that are generated by the credit and that could be lost if the research credit were eliminated.

COMPARISON STATES INCENTIVES FOR RESEARCH

The impact of Massachusetts' research credit on the attraction and retention of research activities will depend on the attractiveness of other states when investment decisions are made. To put the credit in the context of economic development and interstate competition, the Massachusetts credit should be compared to the state tax treatment of research costs described for other states in Table 1.

- Forty-five states impose a corporate income tax and allow research costs to be deducted as expenses.
- Many provide exemptions or credits against sales or property tax for expenditures related to investments in depreciable property used in research.
- Twenty-one states provide R&D tax credits with eighteen of them based on R&D spending, most of which use an incremental credit base (the difference between current year expenditures and expenditures during a base year).

Table 1

SELECTED STATES RESEARCH CREDIT PROVISIONS

State	Credit Rate on Expenses	Incremental or Total Expense
Massachusetts	10.0%	Incremental
Competitor states		
California	15.0%	Incremental
Connecticut	20.0%	Incremental
Illinois	6.5%	Incremental
Maine	5.0%	Incremental
Maryland	10.0%	Incremental
Minnesota	5.0%	Incremental
New Jersey	10.0%	Incremental
New York	4.0% to 9%	Cap. Expenditures
North Carolina	5.0%	Incremental
Ohio	7.0%	Incremental
Pennsylvania	10.0%	Incremental
Rhode Island	16.9% to 22.5%	Total Expense
Texas	5.0%	Incremental
Vermont	10.0%	Total Expense

OVERVIEW OF THE CREDIT MECHANISM

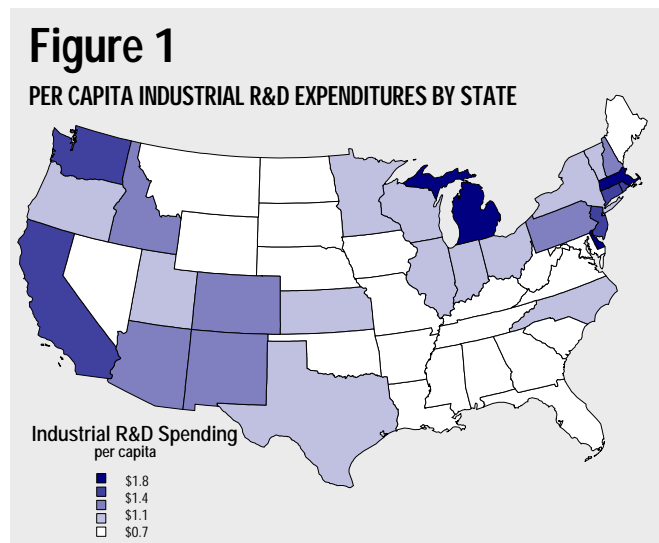
The Massachusetts research credit provides a credit against corporate excise tax liabilities for a portion of expenses related to research expenditures in Massachusetts. The credit is based on the federal research credit, as such credit was in effect in 1991. (See Appendix A). The credit is available to all corporations that are subject to the general corporate excise (i.e., business and manufacturing corporations) but not to corporations subject to specialized excises such as the financial institutions excise, the utility corporation excise and the various insurance excises.

As described in Appendix A, the credit has two components: the qualified research component and the basic research component. The first component provides a credit for qualified research spending above a historical threshold. The second component provides a credit for grants to fund basic research at a university or research institution. The qualified research component accounts for the vast majority of the aggregate research credit claimed by corporations in the commonwealth. This study generally focuses on the qualified research component of the credit.

THE IMPACT OF CREDITS ON RESEARCH SPENDING

National studies of the impact of credits for research expenditures show an increase in research spending of one dollar for every dollar of credit.¹ At the state level, targeted credits have been shown to encourage growth within specific industries or research clusters.² Both types of analysis have found that investments in research generate gains in productivity, new products and services, and long-run economic growth. Due to the use of an incremental base, the credit provides an incentive to grow expenditures rather than a general tax relief measure.

As illustrated in Figure 1, Massachusetts per capita research expenditures are above the national average, in fact 2.2 times the nationwide level.³ Although this difference cannot be entirely attributed to the Massachusetts research credit, the level would likely decline toward the national average if the credit were eliminated. The incremental structure of research credits is an important reason for the credits' effectiveness.



¹ Office of Technology Assessment, *The Effectiveness of Research and Experimentation Tax Credits*, (Washington DC, Government Printing Office, 1995).

² Alan Clayton-Matthews, *The Medical Device Industry in Massachusetts* (Boston, University of Massachusetts, 2001).

³ Based on National Sciences Foundation research expenditure data and Bureau of Economic Analysis population data.

III. ECONOMIC AND REVENUE IMPACTS OF ELIMINATING THE RESEARCH CREDIT

The current research credit for qualified research expenses provides significant incentives for Massachusetts companies to grow research expenditures, making Massachusetts a more attractive investment location for companies engaged in research activities and for companies that benefit from the increased access to knowledge and new technologies. To evaluate the credit's economic impact, our analysis identifies the mechanisms by which the credit affects the Massachusetts economy and estimates the magnitude of the impacts in terms of jobs, personal income, and output.

Eliminating the research credit would lead to lower employment and income in Massachusetts. This study estimates both the private- and public-sector benefits attributable to the research credit by identifying the credit's cost and the offsetting dynamic economic and fiscal benefits of the current credit program.

To estimate the effects of the credit, we:

1. Estimate the decrease in the after-tax cost of research expenditures due to the R&D credit;
2. Simulate the positive impact of the lower cost of production on statewide jobs and income; and
3. Determine the net effect of the research credit on state and local government revenues: the difference between a) lower corporate excise taxes ("static" revenue impact) due to the credit, and b) higher state and local taxes due to a stronger state economy ("dynamic" revenue impact).

ESTIMATING THE CREDIT'S IMPACT ON THE COST OF PRODUCTION

The research credit lowers the cost of production for Massachusetts firms. To estimate this cost, we used data describing total research expenditures from the National Science Foundation and data on credits by industry from the Massachusetts Department of Revenue to estimate the research credits attributed to each of certain industries in Massachusetts. The reduction in the cost of production was then calculated to use as an input for the economic model.

ESTIMATING THE IMPACT OF THE RESEARCH CREDIT ON THE MASSACHUSETTS STATE ECONOMY

The research credit positively affects Massachusetts' overall economic activity, jobs, and income by reducing the cost of production related to research and making Massachusetts a more attractive investment location relative to other states. To model these economic impacts, we used a detailed structural economic model of the Massachusetts economy developed by REMI. The model is a dynamic economic forecasting and policy simulation tool that captures economic interactions among all the industries within the Commonwealth, as well as changes in Massachusetts' competitive position among the states. (More detailed information about the REMI model may be found in Appendix B.)

The decrease in the cost of production due to the research credit (as estimated for each industry in the first step) is entered into the REMI model to simulate the positive impact of the credit on the state economy. The model simulations indicate that the economic stimulus from the research credit grows over time as the impact is fully realized. The results presented below present estimates of the increased jobs and income created by the research credit in 2003.

ESTIMATING THE NET IMPACT OF THE R&D CREDIT ON MASSACHUSETTS STATE AND LOCAL TAXES

The research credit's cost to the Commonwealth is less than the amount of the actual excise tax credits claimed because of the higher state and local taxes generated by more jobs and investment. This offset is referred to as the "dynamic" fiscal impact of the credit. The net impact is calculated as the combined impacts of credit costs and higher state and local revenues resulting from increased Massachusetts economic activity. Competition with other states for investment drives the economic impact of the research credit; locations offering a favorable tax environment for research activities will capture a greater share of total research activities and the resulting economic benefits.

ESTIMATES OF THE ECONOMIC AND LONG-TERM REVENUE IMPACTS OF THE R&D CREDIT

Table 2 briefly summarizes estimated benefits of the research credit on Massachusetts personal income and employment.

As presented in Table 2, our analysis shows that 2,050 Massachusetts jobs can be attributed to the credit in 2003. These jobs generate nearly \$100 million in personal income. As discussed below, this personal income impact is relatively large when compared to the cost of the credit.

Table 3 provides estimates of the net state and local tax impacts of the research credit. The corporate excise tax reduction due to the research credit, the static credit cost, is estimated to be \$72.1 million in 2003. However, the increased statewide economic activity and personal income attributable to the research credit increases Commonwealth tax revenues by \$7.6 million, offsetting a portion of the static credit cost. Combining both the static loss and the dynamic tax gain, the net cost of the research credit to the state and local governments is only \$61.3 million in 2003.

However, as shown clearly in the comparison of Tables 2 and 3, the state's return on the cost of the research credit is substantial. This is a significant long-run return on the state's investment in terms of additional private-sector jobs and income.

As shown in Table 3, local governments gain property tax revenue without incurring tax expenditures. Local taxes, primarily property taxes, are \$3.1 million higher in 2003 due to the research credit.

Table 2

INCREASE IN MASSACHUSETTS ECONOMIC ACTIVITY FROM THE RESEARCH CREDIT, 2003

(dollars in thousands)

Economic Impact	2003
Employment	2,050
Personal Income	\$96,700

Table 3

STATE AND LOCAL TAX IMPACTS OF THE MASSACHUSETTS R&D CREDIT, 2003

(dollars in millions)

Tax Impact	2003
A. Credit Cost	(\$72.1)
B. State Dynamic Tax Impacts	
General Sales and Gross Receipts	\$1.8
Selective Sales	0.7
Individual Income Tax	4.4
Corporate Net Income	0.4
License and Other Taxes	0.3
Total State Dynamic Tax Impact	\$7.6
Net State Tax Impact (A+B)	(\$64.5)
C. Local Dynamic Tax Impacts	
Property	\$3.1
Selective Sales and Other Taxes	0.1
Total Local Dynamic Tax Impact	\$3.2
Net State and Local Impact (A+B+C)	(\$61.3)

Appendix A

Description of the Massachusetts Research Credit

OVERVIEW OF THE CREDIT

The Massachusetts research credit was enacted in 1991, is based on the federal research credit in place in 1991, and applies only to research activities in Massachusetts. The credit is available to all corporations that are subject to the general corporate excise (i.e., business and manufacturing corporations) but is not available to corporations subject to specialized excises such as the financial institutions excise, the utility corporation excise and the various insurance excises.

The credit has two components: the qualified research component and the basic research component. The first component applies where a corporation increases its annual qualified research spending above a historical threshold. The second component applies where a corporation makes a grant to fund basic research at a university or research institution. The qualified research component accounts for the vast majority of the aggregate research credit claimed by corporations in the Commonwealth. The basic research component is rarely claimed. This study generally focuses on the qualified research component of the credit.

Computation. The Massachusetts research credit is equal to the sum of (i) 10% of the excess, if any, of Massachusetts qualified research expenses for the taxable year, over the Massachusetts qualified research base amount (i.e., the qualified research component) and (ii) 15% of the Massachusetts basic research payments to Massachusetts educational or research institutions (i.e., the basic research component). Affiliated businesses (whether or not incorporated) are required to determine a single credit amount for the entire group of affiliates on an aggregated basis.

The computation of the Massachusetts qualified research base amount is somewhat complicated. The base amount is determined by multiplying the following two items together:

- The Massachusetts fixed-base percentage, which equals aggregated Massachusetts qualified research expenses for the 1984 through 1988 period divided by aggregate gross receipts for the 1984 through 1988 period;⁴ and
- Average annual gross receipts for the four prior tax years preceding the tax year for which the credit is being computed.

Definitions and Limitations. The definitions are the key to the computation of the credit. The definitions are based on the definitions employed by the federal credit except that, in general, only Massachusetts activities are considered.

“Qualified research expenses” are expenses incurred to discover information that is (i) technological in nature and (ii) intended to be useful in the development of a new or improved product or business process. Qualified research expenses include (i) wages paid to employees conducting, supporting or supervising qualified research (ii) supplies used in qualified research and (iii) certain costs incurred for computer time-sharing. Only qualified research conducted in Massachusetts is eligible for the credit. The credit is limited to 100% of a corporation's first \$25,000 of excise, as determined before the allowance of any credits, plus 75% of the corporation's remaining excise in excess of \$25,000.

⁴ The Massachusetts fixed base percentage cannot be greater than 16%, start-up corporations must use a default fixed base percentage of 3%; corporations may elect to use federal or Massachusetts gross receipts in the computation. Notwithstanding the foregoing, the qualified research base amount cannot be less than 50% of Massachusetts qualified research expense as computed for the taxable year.

The 75% limitation is applied before the application of any other credits. The credit cannot reduce a corporation's excise below the \$456 minimum excise.

Combined Tax Return Filers. Massachusetts allows for the sharing of the research credit by corporations filing Massachusetts combined returns. A credit generated by an individual member corporation must be first applied against excise attributable to that member (subject to the limitations outlined above). A member corporation with excess research credit may apply the credit against the excise of another member of the combined group, to the extent that such other member can use additional credit given the limitations outlined above.

S Corporations and Unincorporated Flow-Through Entities. S corporations may apply the credit against their excise under either the non-income or income measures. The credit does not flow through to individual shareholders of an S corporation. Unincorporated flow-through entities (i.e., partnerships, joint ventures, certain LLCs), are treated as flow-through entities for purposes of determining the credit. All amounts relevant to the calculation of the credit that are paid or received by flow-through entities are attributed to the corporate owners and are taken into account in determining the corporate owner's credit in accordance with federal rules for the taxable year during which the flow-through entities taxable year ends.

Aggregation Rules. Corporations that are members of a controlled group or are considered under common control for federal purposes are subject to the aggregation rules. Under the rules, such entities must aggregate their activities for purposes of determining the credit. The aggregated credit is allocated to each member by formula. However, for purposes of applying the limitations on the credit the \$25,000 rule applies on an aggregated basis. That is, a single \$25,000 limitation applies to all of the members of the group. Once \$25,000 of aggregated group tax is offset, the 75% limitation applies to the remainder of the tax.

Carryover of Credit. A corporation that generates research credit can carry unused, unexpired credit forward to subsequent taxable years. The carryforward period is unlimited for credit that was unused because of the 75% limitation (see above). The carryforward period for other unused credit is 15 years.

Special Rules for Defense Contractors. Starting with the 1995 tax year, defense contractors have been permitted to compute the credit separately for defense and non-defense activities. This rule was intended to provide relief for defense contractors that had high base period amounts (due to high levels of federal defense spending in the 1984 through 1988 period) and relatively low current research spending (due to defense cutbacks in the 90s). It was perceived that companies in this position had no incentive to fund non-defense research, as they could not hope to exceed the base amount in any event. The bifurcated computation enabled these companies to claim the credit for increasing current non-defense research spending above historical levels of non-defense research spending, thereby increasing the availability of the credit and restoring the incentive to conduct research in Massachusetts.

Appendix B

Description of the REMI Massachusetts Economic Model

The REMI model incorporates information from the U.S. Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, and other public sources to develop a detailed model of the Massachusetts economy. The model includes an input-output structure that describes commodity flows from producers to intermediate and final consumers. The total industry purchases of commodities, services, employment compensation, value added, and imports is equal to the value of the commodities produced. Purchases for final use (final demand) drive the model. Industries producing goods and services for final demand purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakage from the region (imports and value added) stop the cycle.

The model summarizes these complex interactions and uses the data to estimate the total economic impact of the employment, investment and export sales related to the eligible industries in Massachusetts. The REMI model has detailed information for each of 53 sectors of the state economy. The model is used to establish a baseline economic forecast for the state under current law. Policy variables are then used to model the expected impacts of the credit's elimination, as described in the text.