

EVALUATION OF THE RESEARCH AND DEVELOPMENT TAX CREDIT



DEPARTMENT OF LEGISLATIVE SERVICES 2018

Evaluation of the Research and Development Tax Credit

**Department of Legislative Services
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October 2018

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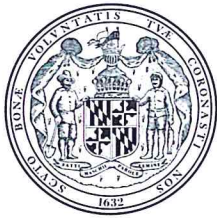
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DEPARTMENT OF LEGISLATIVE SERVICES
OFFICE OF POLICY ANALYSIS
MARYLAND GENERAL ASSEMBLY

Victoria L. Gruber
Executive Director

Ryan Bishop
Director

October 2018

The Honorable Richard S. Madaleno, Jr., Co-chair, Tax Credit Evaluation Committee
The Honorable Jay Walker, Co-chair, Tax Credit Evaluation Committee
Members of the General Assembly

Ladies and Gentlemen:

As you know, the Tax Credit Evaluation Act of 2012 (Chapters 568 and 569) establishes a legislative process for evaluating certain tax credits. To assist the committee in its work, the Department of Legislative Services (DLS) is required to evaluate the research and development (R&D) tax credit on a number of factors, including (1) the purpose for which the tax credit was established; (2) whether the original intent of the tax credit is still appropriate; (3) whether the tax credit is meeting its objectives; (4) whether the goals of the tax credit could be more effectively carried out by other means; and (5) the cost of the tax credit to the State and local governments.

During the 2017 interim and 2018 session, the committee reviewed a draft of this report and also held a public hearing on the report. The report makes several recommendations related to the credit. The document is divided into 9 chapters.

- **Chapter 1** provides an overview of the Tax Credit Evaluation Act and the R&D tax credit.
- **Chapter 2** provides an overview of the intent and objectives of the tax credit.
- **Chapter 3** provides an overview of the federal tax credit and R&D credits in other states.
- **Chapter 4** discusses the State and local costs of the tax credit.
- **Chapter 5** discusses the tax credit program activity.
- **Chapter 6** provides information on R&D activities and innovation in Maryland.
- **Chapter 7** examines factors that influence research and innovation across states.
- **Chapter 8** analyzes the impacts of the tax credit.

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- **Chapter 9** summarizes the findings of the report and discusses recommended changes to the tax credit program.

We wish to acknowledge the cooperation and assistance provided by the Department of Commerce and the Comptroller of Maryland in the development of this report. DLS trusts that this report will be useful to members of the General Assembly in future deliberations about the R&D tax credit.



Victoria L. Gruber
Executive Director

Sincerely,



Ryan Bishop
Director

VLG:RB/kmc

cc: Thomas V. Mike Miller, Jr., President of the Senate
Michael E. Busch, Speaker of the House of Delegates

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Executive Summary

Since the mid-1990s, the number of State business tax credits has grown exponentially as have related concerns about the actual benefits and costs of many of these credits. Although tax credits comprise a small percentage of total income tax revenues, the number and amount of credits claimed have significantly increased over time.

In response to concerns about the fiscal impact of tax credits on State finances, Chapters 568 and 569 of 2012, the Tax Credit Evaluation Act, established a legislative process for evaluating certain tax credits. The evaluation process is conducted by a legislative evaluation committee that is appointed jointly by the President of the Senate and the Speaker of the House of Delegates. The Act requires that the research and development (R&D) tax credit be evaluated by the committee by July 1, 2018. To assist the committee in its work, the Department of Legislative Services (DLS) is required to evaluate the credit on a number of factors, including (1) the purpose for which the tax credit was established; (2) whether the original intent of the tax credit is still appropriate; (3) whether the tax credit is meeting its objectives; (4) whether the goals of the tax credit could be more effectively carried out by other means; and (5) the cost of the tax credit to the State and local governments.

Created by Chapters 515 and 516 of 2000, the R&D tax credit provides two types of credits: (1) a basic credit equal to 3% of the Maryland qualified R&D expenses paid during the tax year, up to the Maryland base amount; and (2) a growth credit equal to 10% of the Maryland qualified R&D expenses paid during the year that

exceed the Maryland base amount. The R&D tax credit is subject to an annual overall budgetary limit. The program's fiscal impact has recently doubled over time due to an increase in the maximum amounts provided to the program. In tax year 2000, the first year of the program, \$6.0 million was provided. Program funding increased in several steps and beginning with tax year 2016, the Department of Commerce (Commerce) may now award a maximum of \$6.5 million in growth credits and \$5.5 million in basic credits.

Maryland is an R&D intensive state, with Maryland heavily dependent on the federal government as a source of R&D expenditures. While Maryland is a R&D intensive state overall, own-source business R&D is relatively low. The ultimate goal of a R&D tax credit is to improve society, for example by boosting long-term economic growth through increased innovation. However, tax policies do not appear to be the most important factor in explaining the difference in R&D and innovation across states. High education and skill levels of the workforce and presence of elite research universities appear to be more important factors in stimulating innovation.

This report provides an overview of the R&D tax credit program, a comparison to other government incentive programs, credit implementation and process issues, and the impact of the credit on innovation. An overview of R&D and factors that influence innovation is also provided.

DLS makes several findings and recommendations related to the R&D tax credit as follows:

There Is No Evidence That the R&D Tax Credit Is Effective

The design and implementation of Maryland's R&D tax credit decreases its effectiveness. The basic tax credit provides tax credits for a business's total recent R&D expenditures rather than incremental increases, so it is much more likely to provide windfall credits for R&D activities that would have otherwise occurred in the absence of the tax credit. Additionally, the credit is concentrated within a few, large, multi-state corporations that receive other State tax incentives. In every year, the total amount of credits that businesses are eligible for has substantially exceeded the aggregate annual limit; the amount approved for each credit is reduced by a proportional amount of the excess. As a result of this oversubscription and the resulting reduction in the value of the credit, the credit provides a limited direct incentive for companies to increase R&D expenditures. The credit is also likely underutilized.

Whereas many studies have found the federal research tax credit to be effective, there is less consensus about whether state R&D credits are effective. DLS failed to find a correlation between the R&D tax credit program or state tax policy and increased innovation and long-term economic growth based on the *State Technology and Science Index* and the *State New Economy Index*. Based on Pennsylvania's experience, increasing the R&D tax credit will not likely achieve significant increases in innovation. Thus, DLS questions the overall effectiveness of the R&D tax credit program.

Recommendation: The General Assembly should consider terminating the R&D tax credit and instead explore other options to increase innovation in the State,

such as providing a federal Small Business Innovative Research matching grant to encourage R&D in Maryland or providing grants aimed at increasing human capital in science and technology fields.

If the General Assembly chooses to continue the tax credit program, DLS has several recommendations to improve the credit that are discussed further.

Incremental Credits Are Preferred for Incentivizing Growth

An effective R&D tax credit program avoids providing windfalls – awarding tax credits for R&D activity that businesses would have done anyway – by focusing as much of the benefit on increasing marginal spending rather than total or recent spending. In contrast to the federal research tax credit and most state R&D tax credits, the design of the State R&D tax credit program is much more likely to provide windfall credits for R&D activities that would have occurred in the absence of the tax credit. This is primarily due to the basic tax credit that provides tax credits for a business's total recent R&D expenditures rather than for incremental increases.

Recommendation: The General Assembly should consider eliminating the basic R&D tax credit. The General Assembly should also consider options to redesign the credit to prioritize eligibility for new and emerging companies.

The Legislative Intent and Performance Metrics of the Credit Are Not Defined

Chapters 515 and 516 established the R&D tax credit but did not specify a specific goal or intent for the credit. Other states require that the intent of tax incentives be clearly expressed.

Recommendation: The General Assembly should clearly define the intent of the R&D tax credit program in statute.

Recommendation: Commerce should define performance metrics for the tax credit program and periodically evaluate the program based on those metrics.

Recommendation: Considering the General Assembly's interest in providing business opportunities for minority- and women-owned businesses, DLS recommends that the General Assembly require Commerce to report on the number of minority- and women-owned businesses that claim the credit.

Most Companies Do Not Claim the Full Value of the Tax Credit

The R&D credit is only refundable for qualified small businesses. Otherwise, the credit claimed cannot exceed the taxpayer's total tax liability imposed in the year but can be carried forward for seven years. The Comptroller's Office has previously advised DLS that it is not able to routinely identify and report the types of credits being carried forward by companies claiming tax credits, including the R&D tax credit. This prevents an accurate assessment by the Comptroller's Office of the total amount of R&D tax credits

claimed in each year as well as for other tax credits that have carry-forward provisions.

Recommendation: The General Assembly should require the Comptroller's Office to specify the treatment of credit carry forwards if the company has multiple credits and to track credit carry forwards.

Large Businesses Earn Most Credits

The concentration of R&D tax credit claims within a few, large companies is greater than in the other tax credit programs that have been evaluated by DLS. To encourage R&D expenditures by small businesses, Chapter 109 of 2013 made the R&D credit refundable if the business meets the qualifications of a small business, as defined by the Act, beginning in tax year 2012. About one-third of all companies qualified for the small business refund but only received approximately 2% of the credits in tax years 2012 through 2015.

Recommendation: The General Assembly should consider setting aside a portion of the tax credits to be allocated for R&D expenditures by small businesses.

Definition of a Small Business Is Not Consistent with Other State Programs

Chapter 109 defined a small business as a for-profit corporation, limited liability company, partnership, or sole proprietorship that, at the beginning or end of the taxable year in which the eligible R&D expenses are incurred, has net book value assets totaling less than \$5 million. DLS is not aware of a similar definition that is used in any State

programs; the definition is unique as most government programs define a small business based on sales, income, or number of employees. Commerce advises that none of the other department's programs use net book assets as a small business requirement.

Recommendation: The General Assembly should consider changing the definition of a small business to be consistent with other State programs or to be consistent with the definition used for the federal research credit.

The Credit Appears to Be Underutilized

Overall, the qualified R&D expenditures reported by companies comprised less than 40% of total R&D business expenditures in the State. In addition, based on data provided by the Comptroller's Office, less than one-half of the businesses that have been awarded R&D tax credits under the program file an amended return and claim the tax credit.

Recommendation: Commerce should comment on why only a fraction of companies performing R&D are awarded credits.

Recommendation: Commerce and the Comptroller's Office should comment on why only a fraction of companies that are awarded credits are claiming the credit.

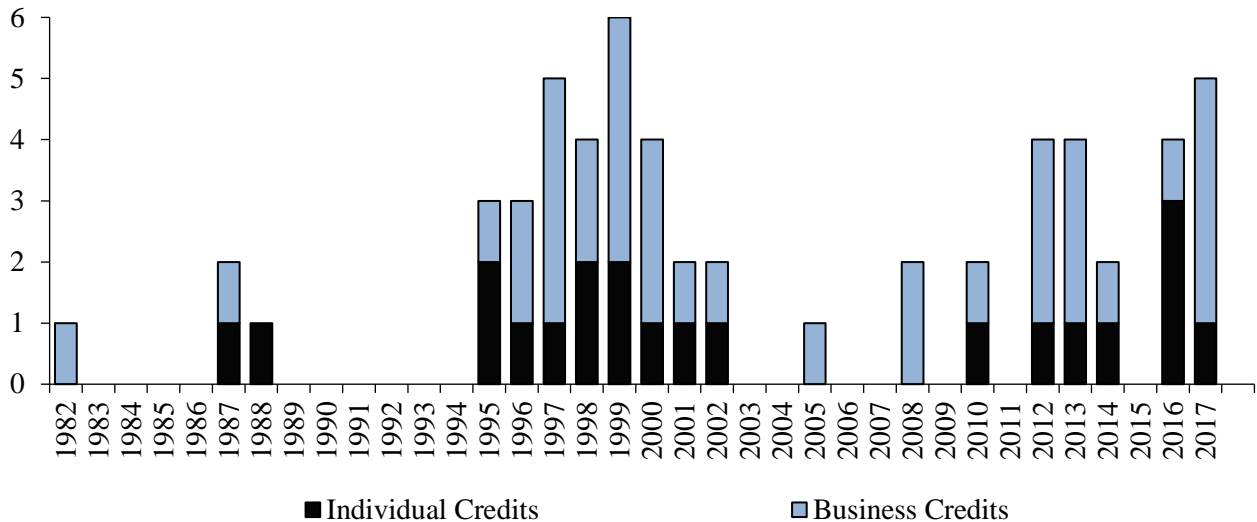
Chapter 1. Overview and Background of the Research and Development Tax Credit

Overview

Since the mid-1990s, the number of State business tax credits has grown significantly as have related concerns about the actual benefits and costs of many of these credits. Although the reduction in State revenues from tax credits is generally incorporated in the State budget, most tax credits are not subject to an annual appropriation as required for other State programs. However, several of the larger credits that have been more recently established are subject to a budget appropriation, including the heritage structure rehabilitation tax credit and State reimbursement for one-half of the local property tax credit costs under the enterprise zone tax credit program. Reporting information for State tax credits varies. Under certain tax credit programs, agencies are required to publish specified information about the credit on an annual basis. Every other year, the Department of Budget and Management (DBM) is required to prepare a statement of the estimated amount by which exemptions from all types of State taxation reduces revenues.

Although tax credits comprise a small percentage of total income tax revenues, **Exhibit 1.1** shows that the number and amount of credits claimed has increased over time. Prior to 1995, there was 1 credit for individuals (earned income credit) and 2 primarily business tax credits (enterprise zone and Maryland-mined coal credits). Since 1995, 34 tax credits primarily for businesses and 19 tax credits primarily for individuals have been established. This includes temporary and expired tax credits. Twenty-nine of the credits were established between 1995 and 2002. More recently, 19 credits have been established since 2012, including 9 primarily for businesses. The total amount of credits has increased from a little less than \$50 million in tax year 1994 to about \$250 million in tax year 2008. Most of this increase has been due to an increase in tax credits for individuals and in particular earned income credits, which have increased almost five-fold since 1994.

Exhibit 1.1
Tax Credits Created Each Year
1982-2017



Source: Department of Legislative Services

Tax Credit Evaluation Act

Overview

In response to concerns about the impacts of certain tax credits, Chapters 568 and 569 of 2012 established the Tax Credit Evaluation Act, a legislative process for evaluating certain tax credits. The evaluation process is conducted by a legislative evaluation committee and must be done in consultation with the Comptroller of Maryland, DBM, the Department of Legislative Services (DLS), and the agency that administers each tax credit. The committee is appointed jointly by the President of the Senate and the Speaker of the House of Delegates and must include at least one member of the Senate Budget and Taxation Committee and one member of the House Ways and Means Committee.

Prior to July 1, 2016, the committee reviewed the following credits: enterprise zone, One Maryland, earned income, film production activity, and sustainable communities (now named heritage structure rehabilitation). Chapter 582 of 2016 altered the Tax Credit Evaluation Act so that the following credits are required to be reviewed by the date indicated:

- **July 1, 2017:** businesses that create new jobs and job creation;

- **July 1, 2018:** research and development (R&D) and biotechnology investment incentive; and
- **July 1, 2019:** Regional Institution Strategic Enterprise Zones and cybersecurity investment incentive.

Chapter 582 made additional changes to the tax credit evaluation process. It required the agency that administers a tax credit subject to evaluation to provide information to and otherwise cooperate with DLS and the evaluation committee. The Act also altered the date by which DLS must publish an evaluation of the credit from October 31 to November 15, and the date by which the evaluation committee must hold a public hearing on the evaluation report from December 14 to December 31. Additionally, the Act eliminated the requirement that, in lieu of a specified evaluation date, a credit must be evaluated in the year preceding the termination date of the credit. Lastly, Chapter 582 increased the time period from five to seven years that a tax credit designated for evaluation under the Tax Credit Evaluation Act is subject to reevaluation.

Chapter 149 of 2017 altered the Tax Credit Evaluation Act to require the review of the More Jobs for Marylanders tax credit by July 1, 2021. Chapter 578 of 2018 requires the evaluation committee to evaluate the cybersecurity investment incentive and the purchase of cybersecurity technology or service tax credits by July 1, 2023.

R&D Tax Credit Program

Credit Value and Funding

Chapters 515 and 516 of 2000 established the State R&D tax credit program. There are two types of credits available: (1) a basic credit equal to 3% of the Maryland qualified R&D expenses paid during the tax year, up to the Maryland base amount; and (2) a growth credit equal to 10% of the Maryland qualified R&D expenses paid during the year that exceed the Maryland base amount.

The Maryland base amount is the product of the average annual gross receipts of the business for the four preceding tax years and the Maryland base percentage. Generally, the Maryland base percentage is equal to the percentage that the Maryland R&D expenses is of the total gross receipts for those years.

To qualify, an individual or corporation must have qualified R&D expenditures, as defined by § 41 of the Internal Revenue Code in Maryland. Generally, qualified expenses include qualified research in the course of the taxpayer's trade or business, qualified payments for basic research, and payments to energy consortia. Qualified research is the most common type of expense and can include both in-house and external contract research. Qualified research must meet three tests to qualify for the credit: (1) the research expenses must qualify as deductible research and experimentation costs; (2) the research must be intended to discover information that is

technological in nature and intended to be useful in developing a new or improved business component; and (3) substantially all of the research activities must constitute elements of a process of experimentation.

Except for certain businesses, the tax credit is nonrefundable – the value of the credit may not exceed the tax liability imposed in the tax year. Any unused amount of the credit may be carried forward for seven years after the taxable year in which the expense was incurred. The tax credit is refundable if the business claiming the credit is a for-profit corporation, limited liability company, partnership, or sole proprietorship that at the beginning or end of the taxable year in which the eligible R&D expenses are incurred has net book value assets totaling less than \$5 million.

Under certain circumstances, a company may deduct R&D expenses for federal income tax purposes. Businesses claiming the credit are required to add back, to federal adjusted gross income or federal taxable income, the amount of any State credits claimed.

The Department of Commerce (Commerce) administers the tax credit application, approval, and certification process and is required to submit an annual report to the Governor and the General Assembly detailing specified information about the tax credit. Commerce may not approve annual credits that in the aggregate exceed \$12 million. If the amount of credits earned during any year exceeds the aggregate limit, the amount approved for each credit is reduced by a proportional amount of the excess. For example, in tax year 2015, the basic credit was equal to 0.39% of eligible expenses compared with a statutory rate of 3.0%, while the growth credit rate was reduced from 10.0% to 0.95%.

The program terminates June 30, 2021.

Application Process and Claiming the Credit

In order to claim the credit, a business must submit an application to Commerce by September 15 of each year for expenses incurred in the previous calendar year. The application includes certain taxpayer information and information necessary to calculate the amount of the credit. Commerce reviews and processes applications and issues tax credit certificates with the approved credit amount by December 15 each year. If the total amount of basic credits applied for exceeds \$5.5 million and the total amount of growth credits applied for exceeds \$6.5 million, Commerce will prorate the amount of tax credits that each applicant receives. In order to claim the credit, a business must file an amended tax return because the tax credit certificate is issued in the year following the year the R&D expense was incurred.

Legislative Changes

As previously indicated, Chapters 515 and 516 established the R&D tax credit program by creating a tax credit against the State income tax for individuals and corporations that incur qualified R&D expenses in Maryland. As originally enacted, the basic credit and growth credit were each capped at \$3 million. Chapter 152 of 2001 authorized the unused portion of either the

basic credit or the growth credit to be issued for the other credit if that credit had reached its maximum.

Chapter 98 of 2005 extended the tax credit program through tax year 2010 and established annual reporting requirements for Commerce. Chapter 98 also reduced the length of time, from 15 years to 7 years, that unused credits may be carried forward.

Chapter 90 of 2007 clarified that the State R&D tax credit program is decoupled from any repeal of the federal research and experimentation tax credit.

Chapter 109 of 2013 increased the aggregate amount of credits that may be approved each year from \$6 million to \$8 million. In addition, Chapter 109 authorized certain small businesses to claim a refund of the credit.

Chapter 525 of 2014 increased the aggregate amount of credits that may be approved each year from \$8 million to \$9 million.

Finally, Chapter 743 of 2017 increased the aggregate amount of credits that may be approved each year from \$9 million to \$12 million.

Chapter 2. Intent and Objectives of the Research and Development Tax Credit

Intent of the Research and Development Tax Credit

Chapters 515 and 516 of 2000 established the research and development (R&D) tax credit but did not specify a specific goal or intent for the credit. In addition, there is no intent specified within program regulations.

Without clearly defined goals and objectives, it is difficult to identify the metrics and data needed to evaluate the effectiveness of the tax credits. The Tax Credit Evaluation Act requires the Department of Legislative Services (DLS) to evaluate whether the original intent of the tax credit is still appropriate; however, there is no statutory requirement for tax credits to include an intent. Other states require the intent of tax incentives to be clearly expressed. For example, in Minnesota, the legislature must include a statement of purpose and define measurable objectives in any bill that creates, renews, or continues a tax expenditure enacted after July 1, 2010. Washington requires any bill proposing a new tax incentive to include a performance statement indicating the incentive's legislative purpose.

While there is no intent stated in statute or regulations, the Department of Commerce states in annual program reports that the credit was enacted to encourage businesses to maintain and increase R&D expenditures in the State. Further, it is not a tax credit that specifically targets job creation although it likely supports an increase in State R&D jobs. The promotion of R&D expenditures is similar to the intent of the federal research tax credit, which is intended to increase this activity above a baseline level. When the federal credit was enacted in 1981, the U.S. Congress concluded that research activity was not at an adequate level, and a substantial incentive was needed to overcome the reluctance of companies to engage in those activities. Governments typically are interested in increasing R&D activities because technical innovation is linked to long-term economic growth. The Congressional Research Service states that "in general, economists agree that technological innovation has accounted for a major share of long-term growth in real per-capita income in the United States."

Rationale for Government Intervention

The United States is a modern market economy as most goods and services are produced by the private market. Markets provide optimal benefits to society when economic activity and resources are efficiently allocated. This allocation depends on several conditions, including free competition and a clear assignment of prices and benefits. Although most goods and services in the United States are supplied by the private market, governments intervene in many markets by either supplying the good or service or causing different outcomes than that produced by the private market alone.

Market failures occur when the private market does not produce the most efficient outcome for society. For example, the private market may not incorporate all of the activity's costs and benefits to society. If the activity has additional benefits to society, such as health care or education, markets may underproduce the good compared to the socially optimal quantity. A recent U.S. Federal Reserve analysis noted that in the midst of the recent financial crisis and resulting recession, few people are left unconvinced of the possibility of market failures.

Governments can intervene in a variety of ways – through regulation, taxation, and/or subsidies. Subsidies are a form of government assistance provided by the government to a subset of the public that lowers the cost of producing a good or the price that a consumer pays for a good. While tax credits are a form of subsidies provided through the tax code, subsidies can also be delivered via regulation and direct provision. Most analysts believe that although markets can fail, there should be an expectation that government intervention can improve outcomes before any action is taken. Poorly designed policies can result in society being worse off. For example, most economists believe that although there were market failures within the U.S. housing industry, poorly designed policies (including subsidies) contributed to the housing market implosion. Policy analysts typically identify two rationales for how subsidies can improve free-market outcomes:

- ***Efficiency:*** Subsidies can correct the failure of the market to produce the efficient amount of goods and services, thereby improving societal benefits.
- ***Outcomes:*** Markets can operate efficiently but produce outcomes that are deemed inequitable – for example, private market activities can result in unacceptable levels of poverty and joblessness.

R&D Tax Credit

DLS can identify a valid efficiency goal that is supported by economic theory for a government R&D incentive. Economists believe that firms may not produce the optimal amount of research, as the benefits to society through spillover effects are greater than the private gain to the firm. Even with patents, trademarks, and other forms of intellectual property protection, businesses may not be able to capture all of the returns for their R&D investments. As a result, businesses may reject some research projects whose benefits to society exceed its private gains, leading to an economywide underinvestment in research. Thus, in the absence of an incentive, firms will not produce the efficient amount of research. However, given the incentive provided by the federal credit, it is not clear whether the additional State incentive is necessary and results in additional societal benefits.

R&D Credit Studies

Studies Generally Support the Effectiveness and Intent of the Federal Credit

The U.S. Department of the Treasury noted that research studies generally conclude that the federal credit has a valid intent as the social returns to R&D (as measured by increases in productivity; technological knowledge; or increases in jobs, job quality, or standards of living) exceed the private returns to conducting R&D. Numerous studies have analyzed the federal research tax credit, and this research generally finds evidence that the tax credit increases private business research. The U.S. Congressional Budget Office noted that although results varied, studies clustered around the finding that each federal tax credit dollar leads to an additional dollar of business R&D. A recent study questioned this result by finding that firms appear to respond by increasing spending that qualifies for the credit much more than their overall R&D spending. Given that many studies have not controlled for this behavior, the reported impact of the federal tax credit may be overstated.

Studies Are Less Supportive of State Tax Credits

There is less consensus about whether state R&D credits are effective and have a valid intent or objective. A recent academic study concluded that establishing a state tax credit can significantly increase the number of high-technology companies. The Iowa Department of Revenue evaluated its research activities tax credit in 2016 and found that each dollar of foregone tax revenue resulted in an additional \$1.68 in qualified research conducted in Iowa.

However, several other studies have questioned the effectiveness of state tax credits and whether the programs have a valid intent. For example, recent research found that state tax credits do not seem to play an important role in stimulating R&D activity across all states. The Virginia Joint Legislative Audit and Review Commission concluded that the state's R&D sales tax exemption is partially effective at encouraging purchases of tangible personal property used in R&D, but other factors, such as the availability of highly qualified research personnel and university faculty expertise, tend to have a much greater impact on R&D spending decisions. The study also noted that the sales tax exemption comprises only a small component of a taxpayer's total tax liability and therefore provides only a small incentive.

Minnesota's Office of the Legislative Auditor reviewed the state's research tax credit and concluded that while the tax credit generated jobs and earnings growth in Minnesota, the increase has been relatively small. The study also found that the tax credit lacks a specified purpose and recommended that the legislature establish in statute explicit and measurable objectives.

The California Legislative Analyst's Office analyzed the state's credit in 2003. The report notes that "a strong case can be made that such a subsidy is appropriate at the *federal* level. In addition, under certain circumstances, *state* tax subsidies may also be justified. However, we are not aware of economic evidence which, on balance, justifies a state credit in addition to the federal

credit.” The report recommended that the legislature consider reducing the credit or phasing it out, as it is unknown how effective the state credit is relative to other policy options.

Chapter 3. Governmental Research and Development Tax Credit Programs

Federal Tax Credit

Federal Program Provides Incremental Benefit

Originally enacted in 1981, the federal research tax credit was temporarily extended 16 times before being made permanent by the Protecting Americans from Tax Hikes Act of 2015. In federal fiscal 2017, businesses will claim an estimated \$10.8 billion in tax credits, making the federal research tax credit one of the largest business tax expenditures.

The goal of the federal tax credit is to increase research and development (R&D) by reducing its after-tax cost to businesses. In order to accomplish this, the tax credit is generally equal to the current year R&D expenses that exceed a base amount, with the base amount designed to approximate the level of R&D that would have occurred in the absence of the tax credit.

A qualified research expenditure (QRE):

- qualifies under Internal Revenue Code research expensing rules;
- is undertaken to discover information that is technological in nature and the application of which is intended to be useful in the development of a new or improved business component of the taxpayer; and
- constitutes elements of a process of experimentation.

QRE includes both “in-house” R&D expenses and contract research expenses paid to individuals who are not employees of the business. In-house research expenses include wages, supplies, and computer leasing expenses. Generally, only 65% of contract research expenditures qualify for the tax credit, except for payments to a qualified research consortium (75% of the expenses). Wages and salaries paid to qualified R&D employees comprise about 70% of all QRE, expenses for supplies comprise about 16%, and contract research expenses account for the remaining 14%.

Taxpayers may choose one of two methods to calculate the credit:

- **Regular Credit:** The regular credit generally equals 20% of the current year QRE above the base amount. The federal base incorporates both gross receipts and R&D expenditures over a specified period that depends on if the business is established or newly formed. The base amount cannot be less than 50% of the taxpayer’s QRE in the current taxable year. The regular credit also allows a separate credit calculation equal to 20% of basic research

above a base amount and payments to an energy research consortium. According to the U.S. Department of Treasury, these two activities account for less than 1% of QRE.

- ***Alternative Simplified Credit (ASC):*** The tax credit equals 14% of QRE that exceeds 50% of the average QRE for the three preceding tax years. The rate is reduced to 6% if a taxpayer did not have any QRE in any of these three preceding taxable years. The election to use the ASC method is effective for succeeding tax years unless revoked with the consent of the Internal Revenue Service.

About 51% of taxpayers that account for about 70% of total reported R&D expenses elect to claim the ASC tax credit.

Taxpayers typically deduct, instead of capitalize, R&D expenditures. A taxpayer has the option of either reducing the R&D deduction amount by the tax credit claimed or elect to take a reduced credit (either standard or ASC). The percentage value of the reduced tax credit is currently reduced to 13% (standard) and 9.1% (ASC). The U.S. Department of the Treasury estimates that more than 90% of corporate taxpayers elect to take the reduced credit.

The federal research tax credit is nonrefundable, and unused tax credits can be carried back 1 tax year or forward up to 20 tax years. About one-half of the value of the tax credit is claimed in the first tax year with the remaining amount carried over to other tax years. A qualified small business may (1) claim up to \$250,000 as a credit against its employer payroll tax liabilities and (2) apply the tax credit against the Alternative Minimum Tax.

There Are Differences in the Federal and State R&D Programs

Although both the federal and State R&D tax credits feature a base amount, there are several significant differences. Most importantly, the federal tax program provides only an incremental credit that reduces the likelihood that credits are provided for research that would have occurred in the absence of the credit. The State R&D tax credit provides a tax credit for the portion of all eligible R&D expenses in the current year. Although both programs use a base amount, the State base amount is similar to the regular base amount in that it uses both gross receipts and R&D expenses, but the lookback period (preceding four years) is more similar to the ASC base amount.

The effective rate for both the federal and State credits are below the statutory credit rates. For example, the effective rate of the federal regular credit is about 4% of all eligible R&D expenses. In addition, businesses are typically unable to claim the full value of each tax credit in the first year. Both programs provide additional benefit for eligible small businesses, but the federal benefit is based on gross receipts whereas the State benefit is related to the net book assets of the company.

Twelve states provide a tax credit that is at least partially refundable. Maryland, along with Arizona, Connecticut, and West Virginia, limits the refundable credit to certain small businesses. Seven states, including Maryland, have a maximum limit on the total amount of credits that can be awarded in each year. In 2016, this limit ranged from \$2 million in New Hampshire to \$250 million in New York. Maryland, New Hampshire, Pennsylvania, and Virginia prorate the credit if the program is oversubscribed, while Florida and New York provide the credit on a first come, first served basis.

R&D Credits in Surrounding States

Of Maryland's nearby states, Delaware, Pennsylvania, and Virginia have an active R&D income tax credit. West Virginia previously had a program that terminated in 2013, and North Carolina repealed its program beginning in 2016.

Delaware

Delaware provides a R&D tax credit equal to (1) 10% of the excess of the taxpayer's qualified R&D expenses over the Delaware base amount or (2) 50% of the taxpayer's federal tax credit (under the ASC method) that is apportioned to activity in the state. Prior to 2017, a maximum of \$5 million in credits could be awarded in each year to all companies, and the value of the credit was limited to 50% of the tax liability imposed in the year. Recent legislation removed both of these limitations beginning January 1, 2017. In addition, the legislation made the credit fully refundable.

Virginia

The Virginia R&D tax credit is an income tax credit for qualified R&D expenses incurred beginning on January 1, 2011, but before January 1, 2022. Program funding is limited to \$7 million in each fiscal year. The tax credit is equal to:

- 15% of the first \$300,000 in qualified R&D expenses; or
- 20% of the first \$300,000 of qualified R&D expenses if the research is conducted in conjunction with a Virginia public or private college or university, to the extent the expenses exceed a base amount.

Virginia taxpayers with more than \$5 million in eligible R&D expenses may also qualify for the major R&D tax credit. The credit is equal to 10% of the difference between the qualified R&D expenses paid or incurred by the taxpayer during the taxable year and 50% of the average qualified R&D expenses paid or incurred by the taxpayer for the three preceding taxable years. If the taxpayer did not pay or incur Virginia qualified R&D expenses in any one of the three preceding taxable years, the tax credit equals 5% of the qualified R&D expenses paid or incurred by the taxpayer during the taxable year. No more than \$20 million in tax credits can be issued to all companies in each fiscal year.

Pennsylvania

Pennsylvania's R&D credit is equal to 10% of the excess of the taxpayer's qualified R&D expenses over the Pennsylvania base amount. The tax credit was established in 1997, and through 2003, an annual total of \$15 million in credits could be awarded to all companies. Subsequent legislation has expanded the credit, including an increase in the maximum annual credits to \$30 million in 2004 and to \$55 million beginning in 2011. A small business is allowed a credit equal to 20% of the excess of the taxpayer's total qualified R&D expenses for the taxable year over the base amount. A total of \$11 million in credits are reserved for small businesses in each year. Taxpayers may sell or otherwise transfer R&D credits if certain conditions are met.

In 2016, a total of 948 companies claimed the maximum \$55.0 million in credits. Companies applied for \$85.5 million in credits; since the credit amount is reduced by the amount of the oversubscription, the credits awarded equaled 64.3% of the total credit applications. Manufacturing firms, particularly pharmaceutical manufacturers, are the primary beneficiaries. As of February 2017, a total of \$98.4 million in unused R&D tax credits have been sold or transferred. This is equal to 93.4% of the value of the unused credits.

Expired Programs

The West Virginia Strategic R&D tax credit was available for qualified expenses incurred between calendar 2003 and 2013. The tax credit was equal to the greater of (1) 3% of eligible R&D expenditures or (2) 10% of the excess over the base amount. The base amount was equal to the average annual combined state R&D expenditures during the three preceding years.

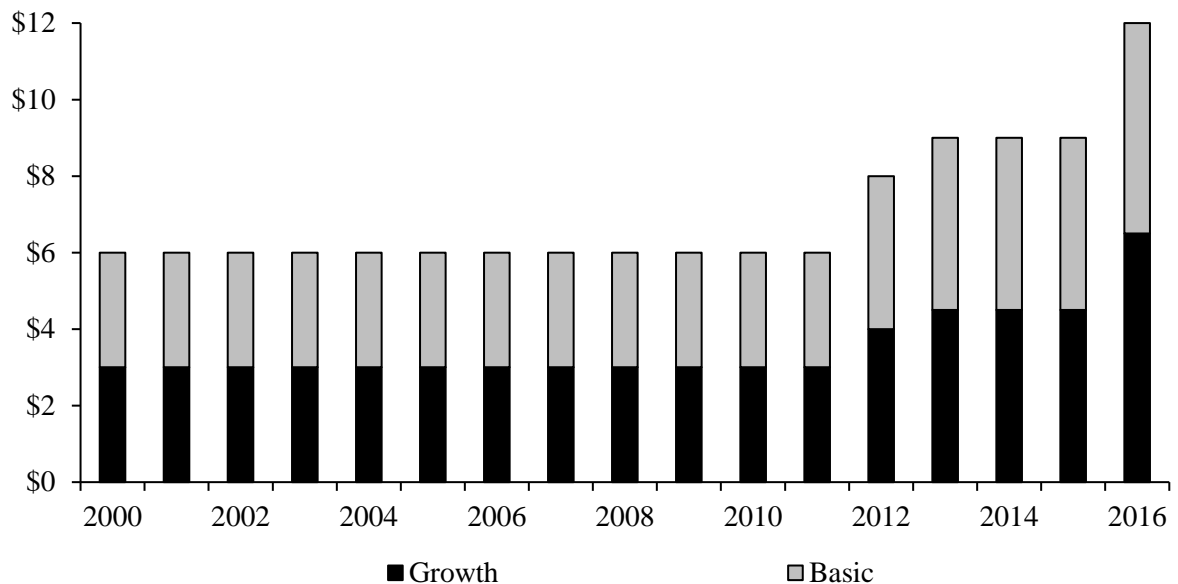
The North Carolina R&D credit provided a standard credit that was generally equal to between 1.25% and 3.25% of eligible expenses. Small businesses and research conducted within an area targeted for development qualified for an enhanced credit as well as research conducted at a North Carolina university (20.0% credit) or eco-industrial park (35.0% credit).

Chapter 4. State and Local Costs

State Costs

The total amount of research and development (R&D) tax credits that the Department of Commerce (Commerce) can award in each tax year is limited by statute. In each of the first 12 years, Commerce awarded the annual maximum of \$6.0 million in authorized tax credits. Legislation enacted in 2013, 2014, and 2017 eventually doubled to \$12.0 million the maximum annual tax credit limitation. Beginning with tax year 2016, Commerce may award a maximum of \$6.5 million in growth credits and \$5.5 million in basic credits. **Exhibit 4.1** shows the total amount of tax credits awarded in each tax year since the program's inception in tax year 2000 through 2016. During this time period, Commerce will have awarded a total of \$119.0 million in R&D tax credits.

Exhibit 4.1
Research and Development Credits Authorized
Tax Year 2000-2016
(\$ in Millions)



Source: Department of Legislative Services

Nonrefundable Tax Credit Reduces Fiscal Impact in Each Year

Except for qualifying small businesses, as defined by the program, the tax credit is nonrefundable. Businesses often do not have sufficient income tax liability to claim the full value of the tax credit in each tax year. If the value of the credit exceeds the tax liability imposed in the year, the amount of the excess can be carried forward for 7 tax years (15 years for tax years 2004 and prior). Accordingly, the actual annual fiscal impact may be less than the amount of credits awarded by Commerce in each year. The Comptroller's Office is unable to provide a precise estimate on the portion of tax credits that businesses claim in the first tax year and in each successive tax year. However, the Comptroller estimates that a little more than one-half of all companies claim the full amount of the credit in the first tax year. Overall, approximately 40% is claimed in the first tax year with the remaining amounts carried forward to future tax years.

Add-back Requirement Further Reduces Credit Costs

If certain conditions are met, R&D expenses may be deducted for federal income tax purposes, resulting in lower federal and State income tax liabilities. Businesses claiming the credit are required to add back the amount of any State tax credit claimed to determine Maryland income.

Program Administrative Costs

Currently, a program manager and an additional staff person at Commerce devote a portion of their time to administering the credit.

Local Fiscal Impact

Local governments receive a portion of corporate income tax revenues to support the construction and maintenance of local roads and other transportation facilities. R&D tax credits claimed against the corporate income tax will decrease local highway user revenues. Based on the recent percentage of total credits claimed against the corporate income tax and current funding of \$12 million, local highway user revenues decrease by about \$100,000 annually. Because businesses must add back the amount of the credit claimed in each year (thereby increasing adjusted gross income for personal income tax filers) and the credit is not claimed against the local income tax, local income tax revenues may increase in each year. However, given the low percentage of total claims against the personal income tax and number of taxable returns, the increase is minimal.

Additional Maryland R&D Incentives

Sales and Use Tax Exemption

In addition to the State and federal income tax credits for R&D activities, the State exempts from the sales and use tax purchases of tangible personal property for use or consumption in R&D. R&D is defined as basic and applied research in the sciences and engineering and the design, development, and governmentally mandated pre-market testing of prototypes and processes. Market research, research in the social sciences or psychology, and other nontechnical activities, routine product testing, sales services, or technical and nontechnical services do not qualify.

According to recent estimates, the sales and use tax exemption has a significantly larger fiscal impact than the R&D income tax credit. According to the Department of Budget and Management's *Fiscal Year 2018 Tax Expenditure Report*, the R&D sales and use tax exemption will reduce State revenues by \$24.6 million in fiscal 2018.

Cellulosic R&D Credit

Chapter 139 of 2008 established a State income tax credit for cellulosic ethanol technology research and development conducted in the State. The amount of the tax credit is equal to 10% of the eligible expenses incurred and cannot exceed the tax liability for that year. Any unused amount can be carried forward 15 tax years. The maximum amount available in each year is limited to \$250,000. The credit is available for eligible expenses incurred before January 1, 2017. According to the Comptroller's Office, no tax credits have been claimed to date.

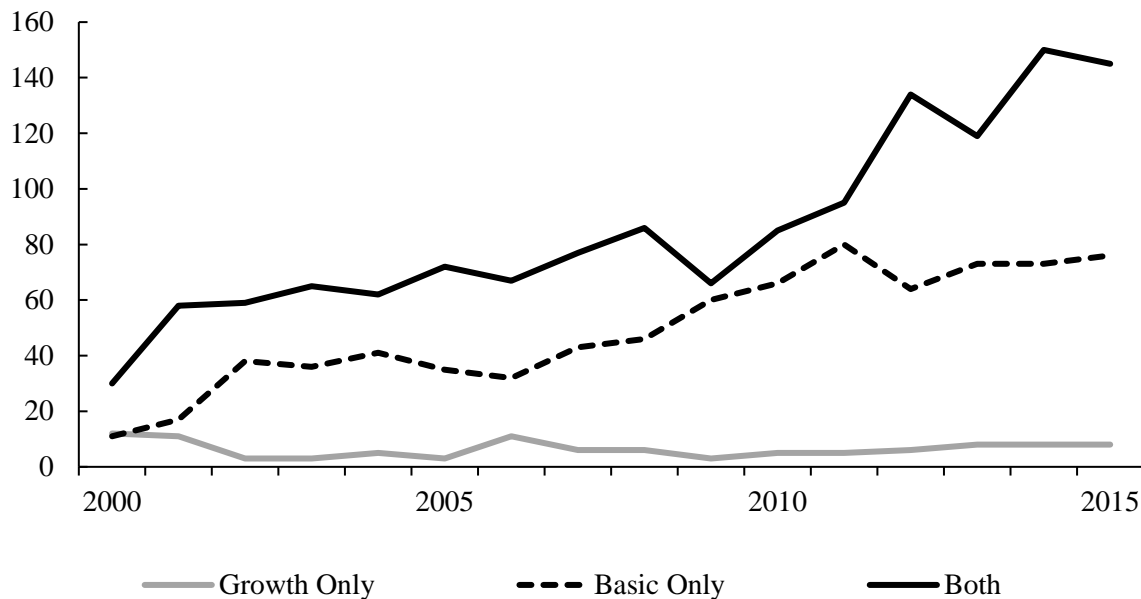
Chapter 5. Program Overview

Most Businesses Earn the Basic Credit

The number of businesses awarded research and development (R&D) tax credits has more than doubled, averaging more than 200 companies in each of the last five tax years. In each year, almost every business was awarded the basic credit (96% of all returns), compared to 65% for the growth credit. Overall, about 6 out of every 10 businesses earned both credits, about one-third earned only the basic credit, and a minor percentage earned only the growth credit.

Compared to previous years, businesses are now more likely to receive the basic credit. In contrast, the number of businesses receiving the growth credit in recent years has fallen from about 70% to 55%. **Exhibit 5.1** contrasts the growth in the number of businesses receiving the basic credit, the growth credit, and those businesses that received both credits.

Exhibit 5.1
Number of Businesses Earning Basic, Growth, or Both Credits
Tax Year 2000-2015



Source: Department of Commerce; Department of Legislative Services

There Is Significant Variation in R&D Expenses and Credit Values

In recent years, the Department of Commerce (Commerce) awarded a typical total tax credit of \$7,500. Businesses that earned this typical credit had approximately \$1.3 million in eligible R&D expenses and employed 235 workers in the State, of which 27 were R&D workers. Overall, the credit percentage was equal to 0.6% of the all eligible R&D expenses incurred in the year.

However, there was significant variation in the size of the companies that claimed the tax credit (and a corresponding range of R&D expenditures). The program provided a modest credit to most companies – almost 60% of all tax credits were under \$25,000. Although most businesses earned a modest credit, most credits were earned by a few businesses with significant R&D expenditures – about 50 tax returns reported R&D expenditures of at least \$50 million with a maximum of \$320 million. **Exhibit 5.2** shows the number of tax credits by the value of the total tax credit in each year and the average tax credit and R&D expenditures.

Exhibit 5.2
Tax Credit Awards and Qualified R&D Expenditures
Calendar 2000-2015

<u>Total Tax Credit Value</u>	<u>Claims</u>	<u>Average Amount</u>		<u>Credit %</u>
		<u>R&D</u>	<u>Tax Credit</u>	
\$2,500 or Less	586	\$213,300	\$1,110	0.5%
\$2,501-\$10,000	603	947,430	5,450	0.6%
\$10,001-\$25,000	403	2,798,740	15,910	0.6%
\$25,000-\$50,000	241	6,245,240	35,470	0.6%
\$50,000-\$100,000	176	11,363,000	71,180	0.6%
\$100,000-\$200,000	139	23,950,840	138,620	0.6%
Over \$200,000	118	69,267,510	477,240	0.7%
All Businesses	2,266	\$7,339,390	\$47,220	0.6%

R&D: research and development

Source: Department of Commerce; Department of Legislative Services

Under § 41 of the Internal Revenue Code, qualified research expenditures generally include 65% of contract research expenses – those amounts paid to conduct qualified research by any person other than the company's employees. About 30% of businesses that claimed the State tax

credit reported contract research expenses. Some of these businesses do not have a physical presence in the State, but the research is conducted within Maryland. Within the last five years, there has been a modest uptick in the utilization of contract research.

Value of the Credit Is Reduced by Oversubscription and Carry Forwards

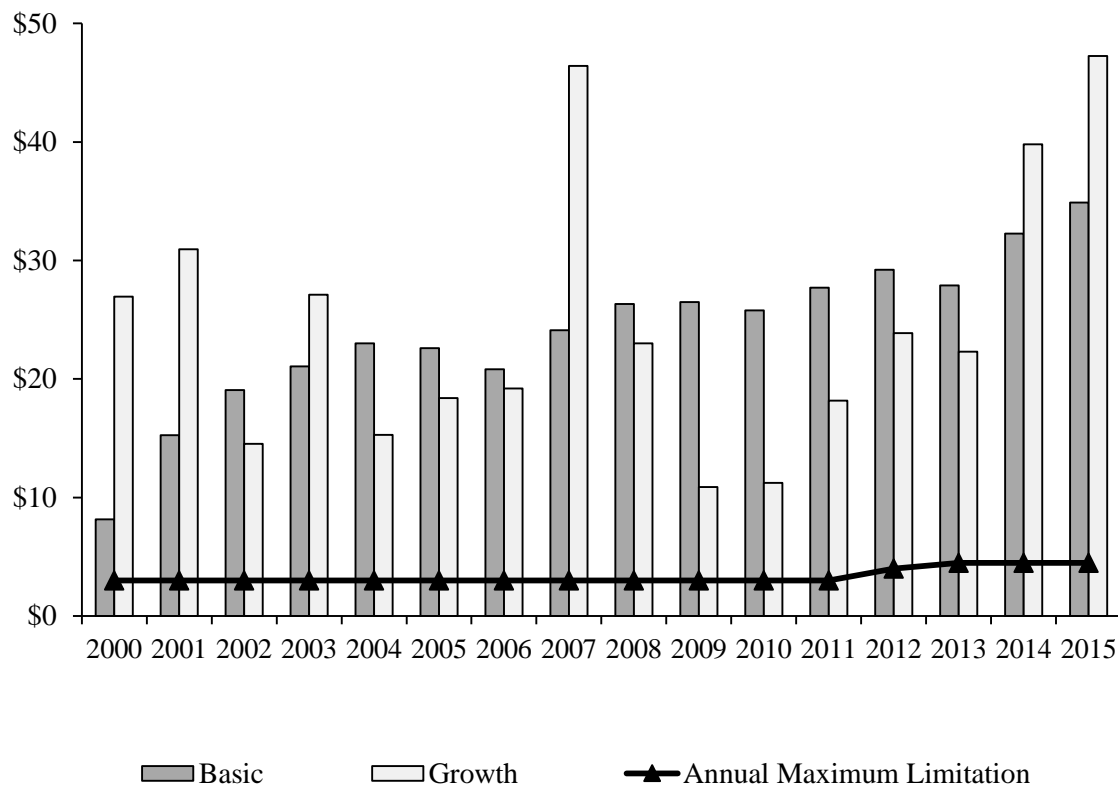
Oversubscription Reduces Tax Credit Value by About 90%

As shown in Exhibit 5.2, the percentage value of the tax (0.6%) is significantly less than the statutory rates of 3.0% for the basic credit and 10.0% for the growth credit. In every year, the total amount of credits that businesses are eligible for has substantially exceeded the aggregate limit; the amount approved for each credit is reduced by a proportional amount of the excess. In tax year 2015, Commerce reports that the basic credit was 7.8 times oversubscribed, and the growth credit was 10.5 times oversubscribed. As such, Commerce reduced the total tax credits awarded in tax year 2015 from \$82.1 million to \$9.0 million.

As a result of this oversubscription and the resulting reduction in the value of the credit, the credit provides a limited direct incentive for companies to increase R&D expenditures. In tax year 2015, the basic credit was equal to 0.39% of eligible expenses, while the growth tax credit rate was reduced to 0.95%. **Exhibit 5.3** shows the amount of qualifying R&D tax credits applied for under the program and the amount of credits allowed due to the aggregate limit for each credit.

Even with the additional funding provided beginning with tax year 2016, there would be little increase in the tax credit values (the basic credit would only increase to 0.47% and the growth credit to 1.38%). That companies qualify for additional tax credits in the absence of an overall limit does not in itself imply that funding should be increased. Although Commerce reports that the tax credit is oversubscribed, the department does not provide metrics or other evidence that additional tax credit funding is an effective policy for promoting R&D in the State. As discussed in more detail in Chapter 8, given the design and implementation of the tax credit, it is not clear that providing additional tax credit funding is the most effective option for promoting state R&D expenditures. In addition, the effective rate of the federal regular basic research tax credit is equal to about 4% of all eligible R&D expenses, much lower than the statutory rate of 20%.

Exhibit 5.3
R&D Credits Applied For and Allowed
Tax Year 2000-2015
(\$ in Millions)



R&D: research and development

Source: Department of Commerce; Department of Legislative Services

Most Companies Do Not Claim the Full Value of the Tax Credit

The R&D credit is only refundable for qualified small businesses. Otherwise, the credit claimed cannot exceed the taxpayer's total tax liability imposed in the year but can be carried forward for seven years. Slightly over one-half of all corporations claimed the full value of the tax credit in the first tax year. On average, corporations claimed about 40% of the total tax credit in the year in which the credit was awarded, with the remaining 60% carried forward to future tax years. Corporations account for 98% of the total tax credits claimed to date.

Most individual taxpayers were able to claim the full value of the tax credit in the first year, and overall, 91% of earned individual tax credits were claimed in the first tax year. One factor leading to the higher first-year claim rate is that businesses that qualify for the refundable small business tax credit are more likely to file personal income tax returns. In addition, corporations may not be able to claim as much of the tax credit in the first year as they are often claiming tax credits carried forward from previous tax years and may have limited or no corporate income tax liability.

Most Companies Only Earn the Credit for a Short Period of Time

Commerce has awarded tax credits to an estimated 575 companies since tax year 2000. However, most of these companies only received the tax credit in one or two years. Although these companies make up a majority of the total companies, **Exhibit 5.4** shows that these companies received less than 10% of all tax credits. The few companies that received the credit in most years have the largest R&D expenditures and therefore received the most credits – 20 companies received the credit in at least 15 years and earned \$46.8 million in tax credits.

Exhibit 5.4
Credit Awards and Companies by Years of Participation
Calendar 2000-2015
(\$ in Millions)

<u>Years Claimed</u>	<u>Companies</u>	<u>Credits</u>	<u>% of Total</u>	
			<u>Companies</u>	<u>Credits</u>
1 to 2 Years	297	\$7.7	51.7%	7.2%
3 to 6 Years	172	14.5	29.9%	13.5%
7 to 10 Years	56	16.8	9.7%	15.7%
11 to 14 Years	30	21.2	5.2%	19.9%
15 to 16 Years	20	46.8	3.5%	43.8%
Total	575	\$106.9		

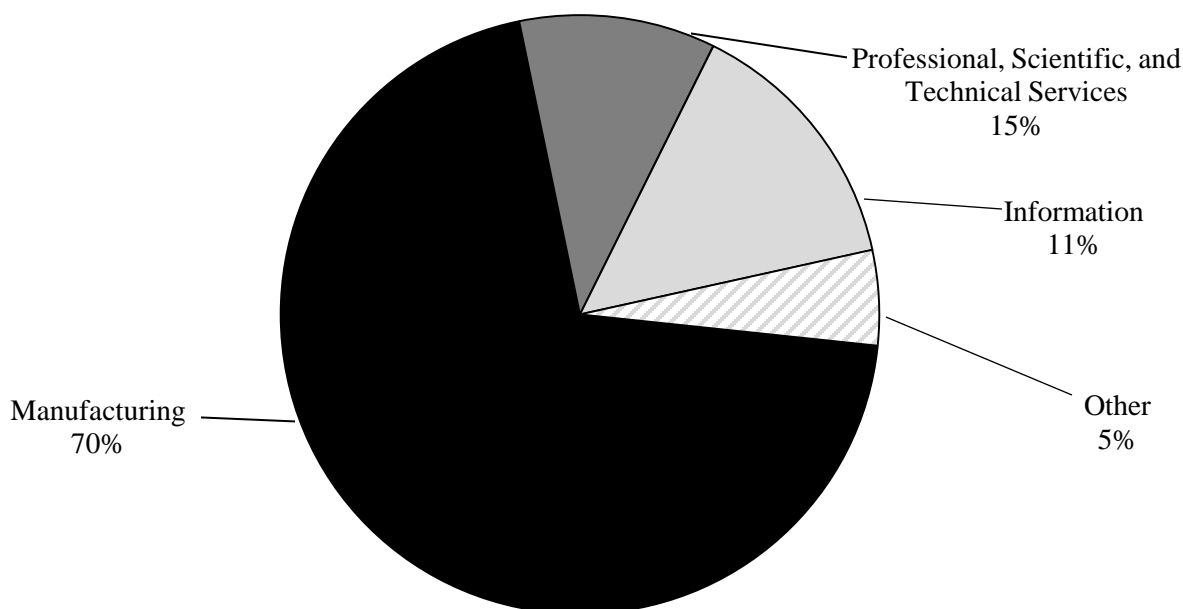
Source: Department of Commerce; Department of Legislative Services

Manufacturers Earn Most Tax Credits

Companies in a total of 13 industries claimed the R&D tax credit, including construction, wholesale and retail trade, transportation, educational services, real estate, and finance and

insurance. However, 95% of all tax credits were earned by businesses in the manufacturing industry; professional, scientific, and technical services industry; and information industry, as shown in **Exhibit 5.5**.

Exhibit 5.5
Total R&D Tax Credit Awards by Industry
Tax Year 2002-2015



Note: Numbers may not sum to total due to rounding.

Source: Department of Commerce; Department of Legislative Services

The share of tax credits earned by these three industries is proportionate to these industries' share of the total R&D conducted in the State over a similar time period. However, the manufacturing and information industries received a greater amount than their share of R&D (81% of tax credits compared to 68% of R&D expenditures), while the professional, scientific, and technical services industry received less (15% of all credits compared to 28% of all R&D).

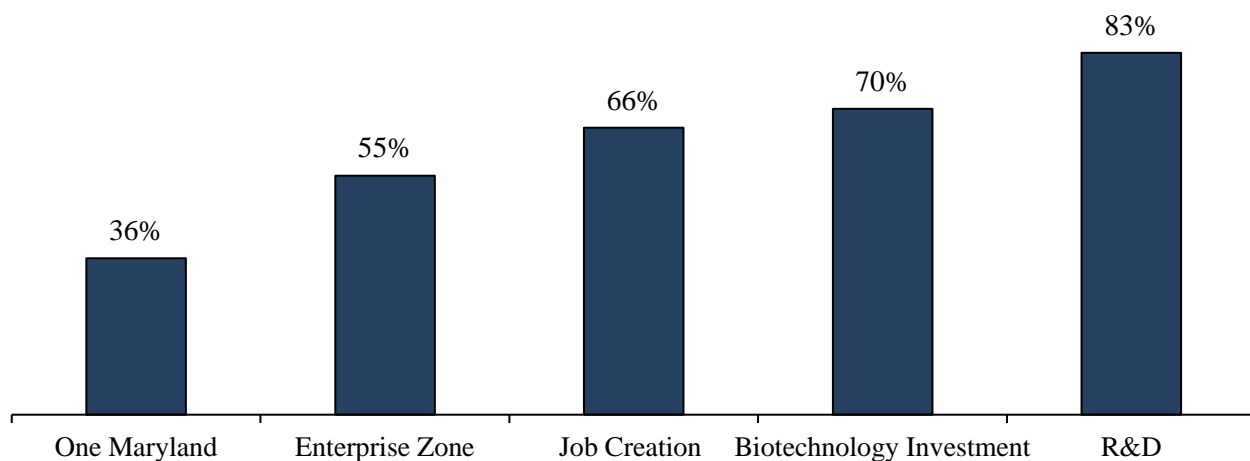
Businesses within the three industries that account for almost all of the tax credits are engaged in a variety of different activities. The Department of Legislative Services (DLS) classified the companies that claimed a tax credit of at least \$100,000 in tax year 2015. These companies received a total of \$6.5 million in tax credits. The largest share was earned by biopharmaceutical manufacturers followed by defense contractors. Traditional manufacturers had

the third largest share, which includes the manufacture of trucks, food products, tools, and specialized fabrics; other newer manufacturers claimed the next highest share of credits. Medical R&D, satellite communications, freight shipping, and video game development companies accounted for the other large tax credit claims.

Large Corporations Earn Most Credits

The concentration of R&D tax credit claims within a few companies is greater than in the other tax credit programs that have been evaluated by DLS. As shown in **Exhibit 5.6**, 83% of all R&D tax credits are earned by the largest 20% of companies. By comparison, this concentration ranges from 36% for the One Maryland tax credit to 70% for the biotechnology incentive investment tax credit.

Exhibit 5.6
Percent of Total Claims by Largest 20% of Companies



R&D: research and development

Source: Department of Commerce; State Department of Assessments and Taxation; Department of Legislative Services

R&D Activity Is Concentrated in Four Counties

As shown in **Exhibit 5.7**, county-level data is available beginning with tax year 2003; however, a precise distribution by county is not possible as some companies incurred R&D expenditures in multiple counties. Montgomery County businesses claimed a little bit more than

one-half of all credits and along with businesses in Anne Arundel, Baltimore, and Howard counties, accounted for a little more than 80% of all credits.

Exhibit 5.7
Tax Credit Claims and Total Credits by County
Tax Year 2003-2015

<u>County</u>	<u>Claims</u>	<u>Total Credits</u>
Allegany	8	\$9,460
Anne Arundel	117	4,903,160
Baltimore	240	13,848,800
Baltimore City	153	2,955,200
Calvert	2	53,680
Caroline	1	1,500
Carroll	44	652,230
Cecil	37	2,702,050
Charles	3	370
Dorchester	17	295,260
Frederick	119	1,429,810
Garrett	1	1,180
Harford	79	1,129,640
Howard	248	4,311,230
Kent	9	64,940
Montgomery	567	38,077,900
Prince George's	77	1,041,600
Queen Anne's	5	25,300
St. Mary's	11	106,640
Somerset	0	0
Talbot	2	2,300
Washington	46	1,981,900
Wicomico	13	83,110
Worcester	1	6,130
Multiple/Unknown	202	14,702,070
Total	2,002	\$88,385,450

Source: Department of Commerce; Department of Legislative Services

County-level data on R&D expenditures is not available; however, the number of patent filings is available. Using this data as a proxy for R&D expenditures shows that Montgomery County has the largest share of total patent filings over a similar time period (40%), and combined with Anne Arundel, Howard, and Baltimore counties, accounts for three-fourths of all patent filings in the State. The R&D credit appears to be generally supportive of patent innovation in a similar manner across counties – that is, the distribution of R&D tax credits across counties is similar to the distribution of patent activity. In several counties, however, these distributions diverged, but the lack of precise county-level data prevents a more accurate assessment.

Small Business Refundability

Benefits of a Refundable Tax Credit for Small Businesses

Because the standard R&D credit is nonrefundable, its maximum value is limited to the taxpayer's income tax liability imposed in that year. As described previously, about 40% of the credit is claimed in each tax year, and the remainder is carried forward to future tax years. A refundable credit is more valuable because a business receives the full value of a tax credit even if the credit exceeds the tax liability in the year, with the excess amount is paid as a refund to the taxpayer. Small and or emerging technology businesses typically have a low or no income tax liability.

Most tax credits are nonrefundable. Some exceptions include the federal and State earned income tax credits, the premium tax credit for health insurance, the refundable portion of the child tax credit, and the partially refundable American Opportunity Tax Credit for higher education. Chapter 109 of 2013 made the R&D credit refundable if the business meets the qualifications of a small business, as defined by the Act, beginning in tax year 2012.

Definition of a Small Business

Chapter 109 defined a small business as a for-profit corporation, limited liability company, partnership, or sole proprietorship that, at the beginning or end of the taxable year in which the eligible R&D expenses are incurred, has net book value assets totaling less than \$5 million. Generally, this means that net book value is the value at which a company carries an asset on its balance sheet. The net book value is calculated as the cost of the asset minus accumulated depreciation.

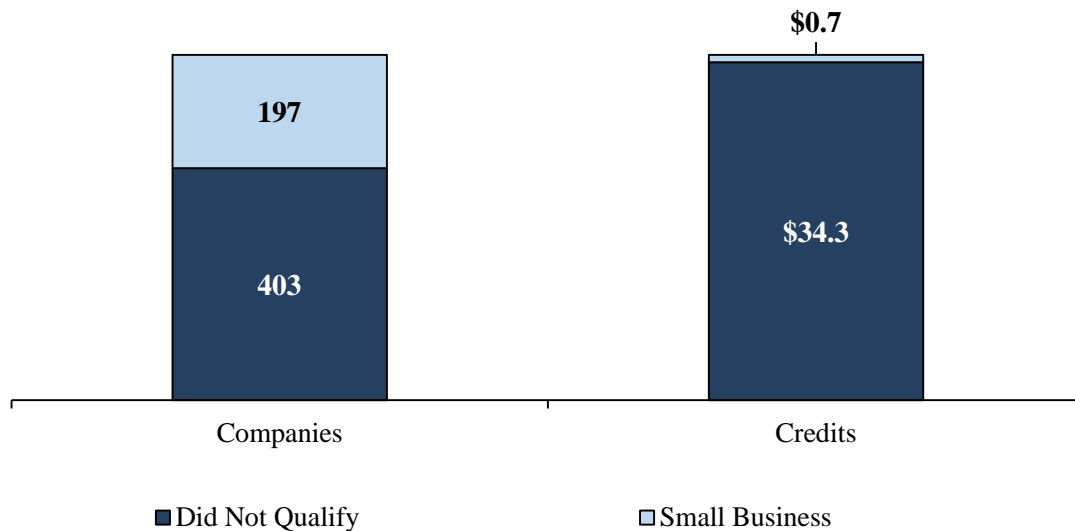
DLS is not aware of a similar definition that is used in any State programs; the definition is unique as most government programs define a small business based on sales, income, or number of employees. Chapter 121 of 1995 requires all fiscal and policy notes prepared by DLS to provide an assessment of the economic impact of the legislation on small businesses. The Act defines a small business as a corporation, partnership, sole proprietorship, or other business entity, including affiliates that (1) is independently owned and operated; (2) is not dominant in its field; and

(3) employs 50 or fewer full-time employees. Commerce advises that none of the other department's programs use net book assets as a small business requirement. The U.S. Small Business Administration uses varying income and employee thresholds based on the company's industry. These income thresholds range from \$0.75 million to \$38.5 million with the employee limits ranging from 250 to 1,500 employees.

Small Business Tax Credit Claims

In tax years 2012 through 2015, Commerce awarded 600 companies a total of \$35 million in R&D credits. As shown in **Exhibit 5.8**, about one-third of all companies qualified for the small business refund but only received a total of a little less than \$750,000 in credits.

Exhibit 5.8
Small Business Refund
Total Companies and Credits Claimed
Tax Year 2012-2015
(\$ in Millions)

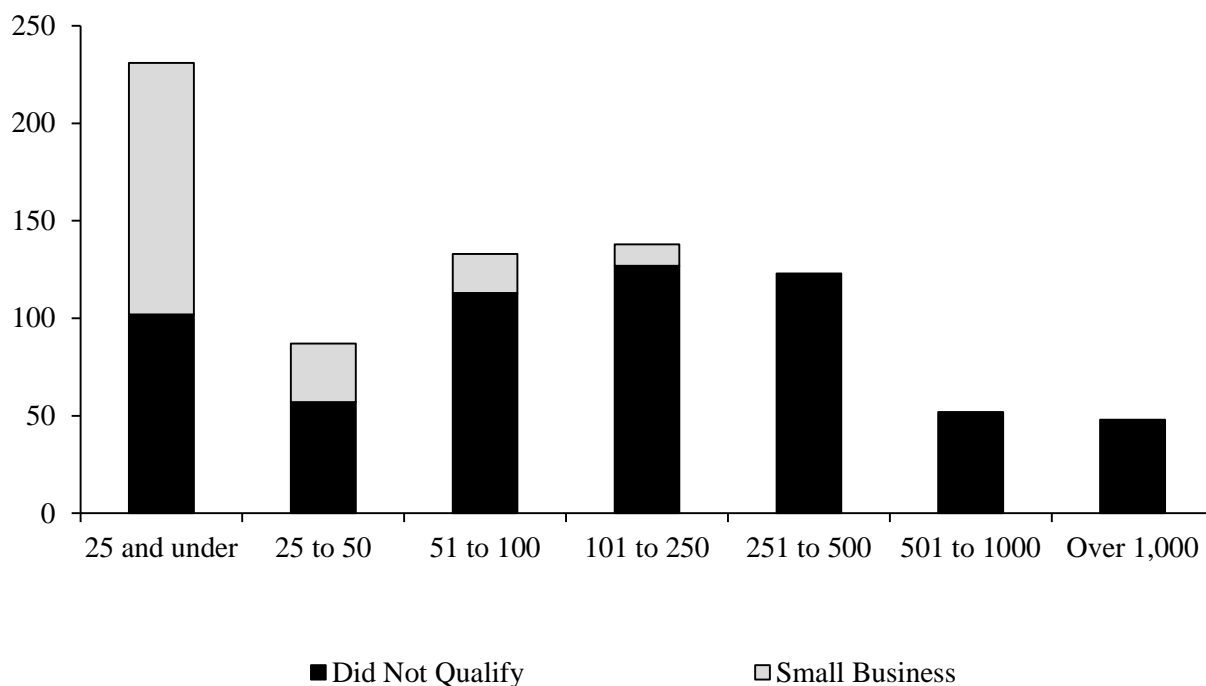


Source: Department of Commerce; Department of Legislative Services

The only available data related to company size that is reported by Commerce is the number of Maryland employees. By this measure, the program's use of net book assets corresponds reasonably well as companies with a larger number of employees are much less likely to claim the credit. However, there may be equity issues as similar companies are not treated equally. For example, only 56% of those companies with 25 or fewer employees qualified for the credit.

Exhibit 5.9 shows the number of companies that qualified for the small business refund based on the business's number of Maryland employees. DLS cautions that there is insufficient data to assess how much of the refundable benefit is claimed by small businesses.

Exhibit 5.9
Small Business Refunds by Number of Qualified Maryland Employees



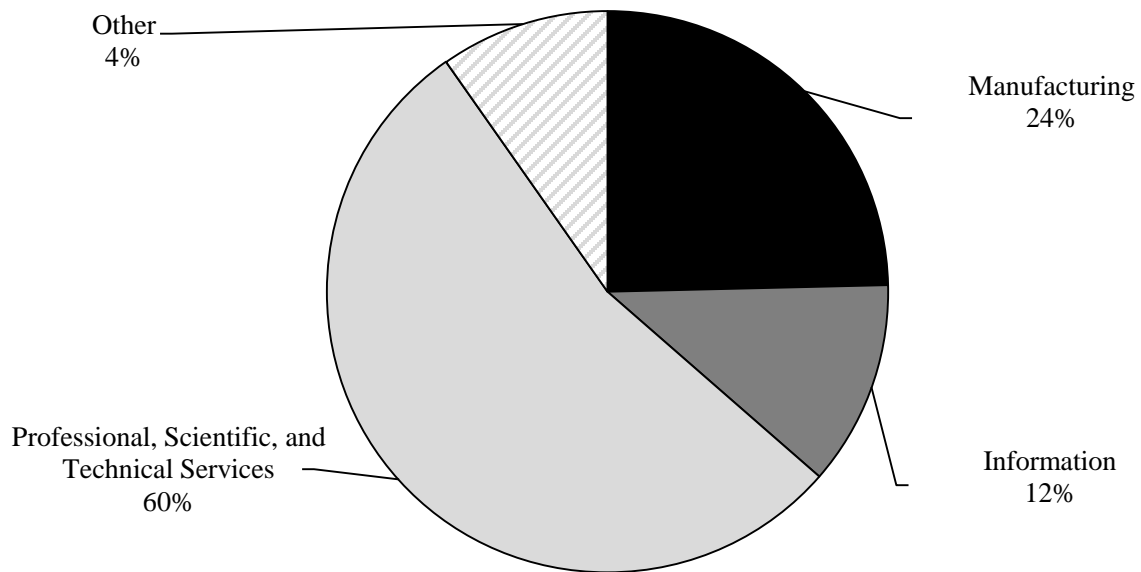
Source: Department of Commerce; Department of Legislative Services

Qualified small businesses in Montgomery County claimed \$322,500 in tax credits, accounting for approximately 43% of the total. Howard County and Baltimore City businesses claimed the next highest amount of credits, just under \$100,000 and \$73,100, respectively.

Professional, Science, and Technical Services Industry Claims Most Refundable Credits

In contrast to total R&D credit claims, which are mostly claimed by manufacturers, the professional, scientific, and technical services industry claimed 60% of all small business refundable credits. As shown in **Exhibit 5.10**, the manufacturing and information industries claimed most of the remaining credits.

Exhibit 5.10
Small Business Refunds by Industry
Tax Year 2012-2015



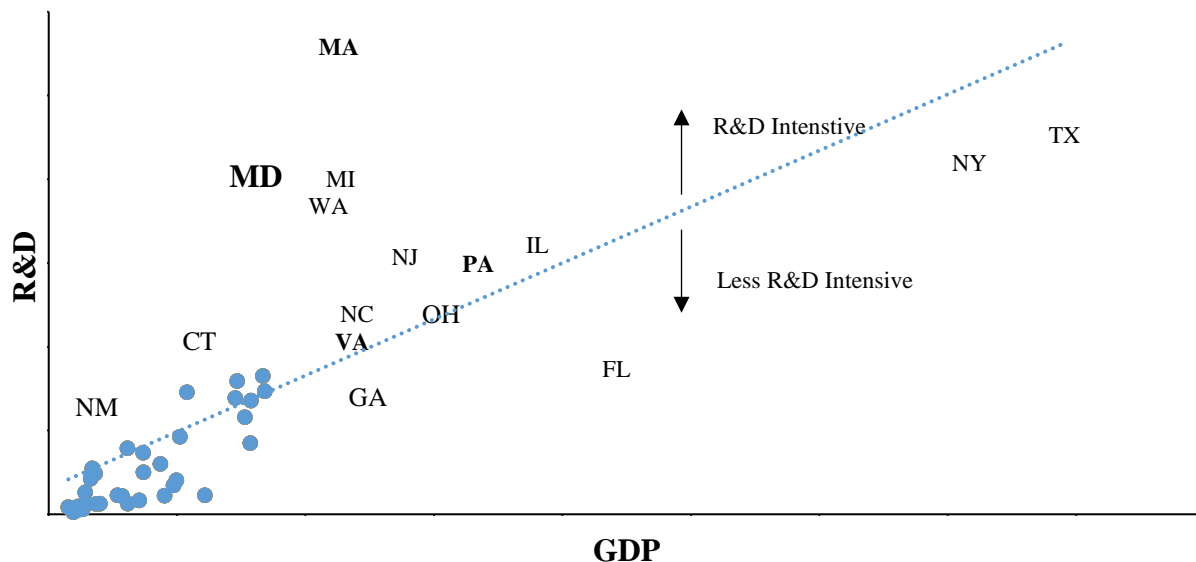
Source: Department of Commerce; Department of Legislative Services

Chapter 6. Maryland Research and Development and Innovation

Maryland Is One of the Most Research and Development Intensive States

According to the National Science Foundation (NSF), research and development (R&D) expenditures totaled \$20.2 billion in Maryland during calendar 2014. This amount was higher than every state except for California, Massachusetts, New York, and Texas. Further, Maryland R&D expenditures were almost double Virginia's total of \$10.4 billion. One measure used to compare R&D expenditures across states with different sizes of economies is to compare R&D intensities – the total R&D expenditures relative to the state economic output or Gross Domestic Product (GDP). The states with the largest R&D expenditures are not necessarily those with the greatest intensity of R&D, as shown in **Exhibit 6.1**. Nationally, R&D expenditures equal 2.75% of U.S. GDP. Maryland is an R&D intensive state as R&D expenditures are equal to 5.6% of GDP, ranking only behind New Mexico (6.3%) and Massachusetts (5.9%). As a result, Maryland R&D expenditures comprise 4.0% of national R&D expenditures, roughly double its share of U.S. GDP.

Exhibit 6.1
R&D Expenditures Relative to State GDP
Maryland and Selected States
Calendar 2014



CT: Connecticut

FL: Florida

GA: Georgia

GDP: Gross Domestic Product

IL: Illinois

MA: Massachusetts

MD: Maryland

MI: Michigan

NC: North Carolina

NJ: New Jersey

NM: New Mexico

NY: New York

OH: Ohio

PA: Pennsylvania

R&D: research and development

TX: Texas

VA: Virginia

WA: Washington

Note: Does not include California due to scale issues (significantly larger R&D and GDP).

Source: National Science Foundation; Department of Legislative Services

R&D Is Conducted by a Variety of Entities

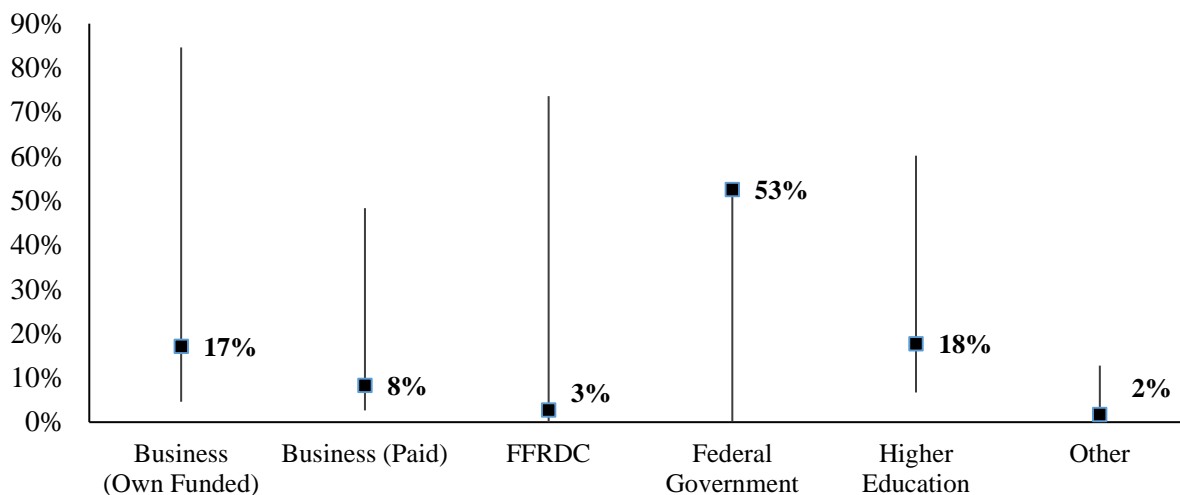
R&D is funded and conducted by a variety of entities including businesses, governmental entities, academic institutions, and other nonprofit organizations. NSF classifies R&D expenditures based on the entity conducting or funding R&D as follows:

- ***Business R&D (own funded):*** Most business R&D is conducted to develop or improve a product or process for commercial gain. About 16% is applied research, trying to identify the process or product that will solve a particular problem, and 5% is basic research that does not have a specific objective or application.
- ***Business R&D (paid):*** About one-fifth of business R&D was paid for by other entities. The federal government, and the U.S. Department of Defense (DOD) in particular, was the chief source of this external funding. Next, among external funders are foreign companies (including foreign parent companies of U.S. subsidiaries) and other U.S. companies.
- ***Higher Education:*** Although funding has recently plateaued, higher education R&D has increased five-fold since the 1970s. Most of the research is funded externally – by the federal government, nonprofits, businesses, and state and local governments.
- ***Federal Government:*** DOD and national security agencies account for about one-half of federal government R&D. These defense and national security agencies are an important source of R&D in the State, comprising about one-third overall, but the U.S. Department of Health and Human Services accounts for about one-half of all federal government R&D in the State.
- ***Federally Funded Research and Development Centers (FFRDC):*** First established in the 1940s, FFRDCs are privately operated R&D organizations that are exclusively or substantially financed by the federal government. Although a minor portion of overall R&D, each center is focused on a particular research area such as aerospace, energy, national security, and nuclear science. The Sandia and Los Alamos research centers located in New Mexico explain that state's high R&D intensity. There are 43 FFRDCs, of which 4 are located in Maryland. The research centers located in Maryland focus on modernizing health care, biodefense, cybersecurity, and cancer research.

Maryland R&D Is Heavily Dependent on the Federal Government

Nationally, businesses conduct about 70% of all R&D, followed by higher education (20%) and the federal government (10%). Owing to its proximity to Washington, DC and the concentration of federal agencies and R&D offices, Maryland is heavily dependent on the federal government as a source of R&D expenditures. **Exhibit 6.2** shows the share of Maryland's R&D expenditures by category, along with the range of values for other states. For example, business own-source R&D expenditures comprised 17% of Maryland R&D, while it ranged from a low of 5% to a high of 85% in other states. While higher education R&D expenditures only make up 18% of Maryland's total R&D, the State has the fourth highest level of higher education R&D expenditures after California, New York, and Texas.

Exhibit 6.2
Share of State Research and Development by Category
Maryland Compared to Highest and Lowest of All States
Calendar 2014



FFRDC: Federally Funded Research and Development Centers

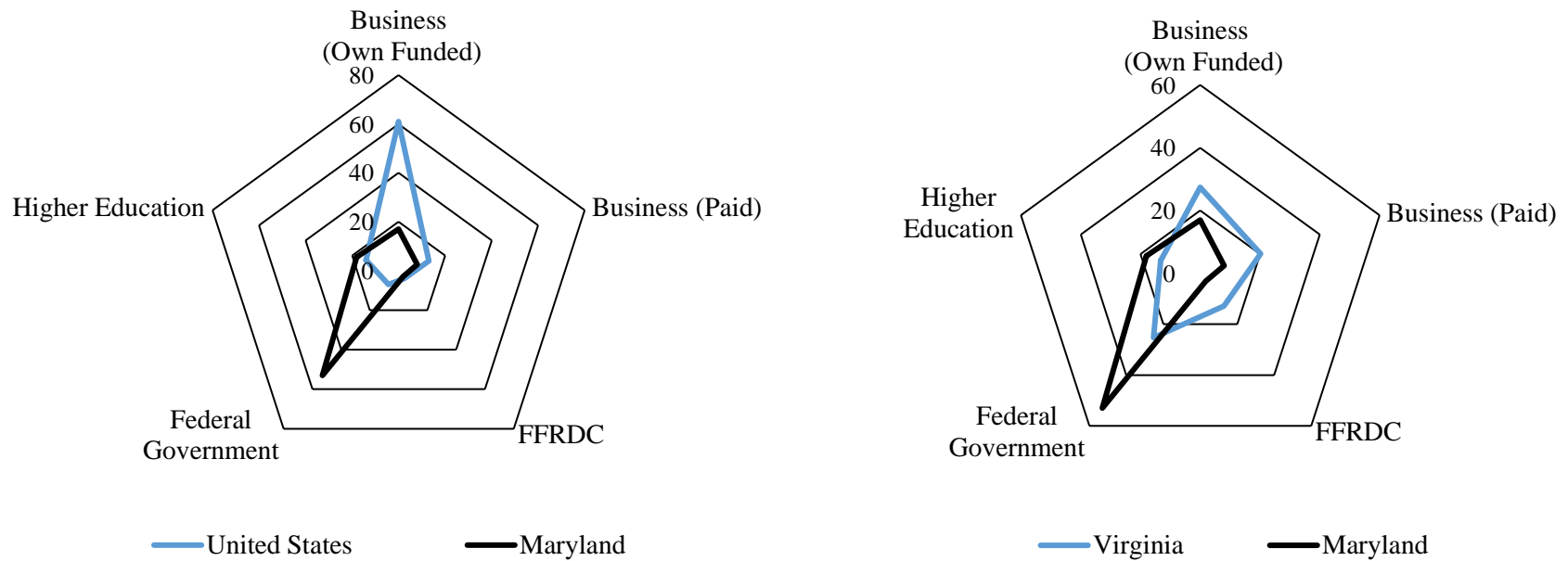
Note: Percentages do not total to 100% due to rounding.

Source: National Science Foundation; Department of Legislative Services

Federal R&D expenditures in Maryland totaled \$10.6 billion, which was 30% of the national total. Maryland's federal R&D expenditures are almost four times that of the District of Columbia, which has the second highest amount of federal R&D expenditures at \$2.7 billion.

Exhibit 6.3 shows the unique distribution of R&D expenditures and heavy reliance on the federal government in Maryland compared to the United States. Almost every state has a similar distribution of R&D as the national average. One exception is Virginia, which also has a large share of federal R&D expenditures. However, even in Virginia, R&D expenditures are more equally distributed as federal R&D expenditures only comprise a quarter of total R&D expenditures.

Exhibit 6.3
Distribution of Research and Development Expenditures for
Maryland, United States, and Virginia
Calendar 2014



FFRDC: Federally Funded Research and Development Centers

Source: National Science Foundation; Department of Legislative Services

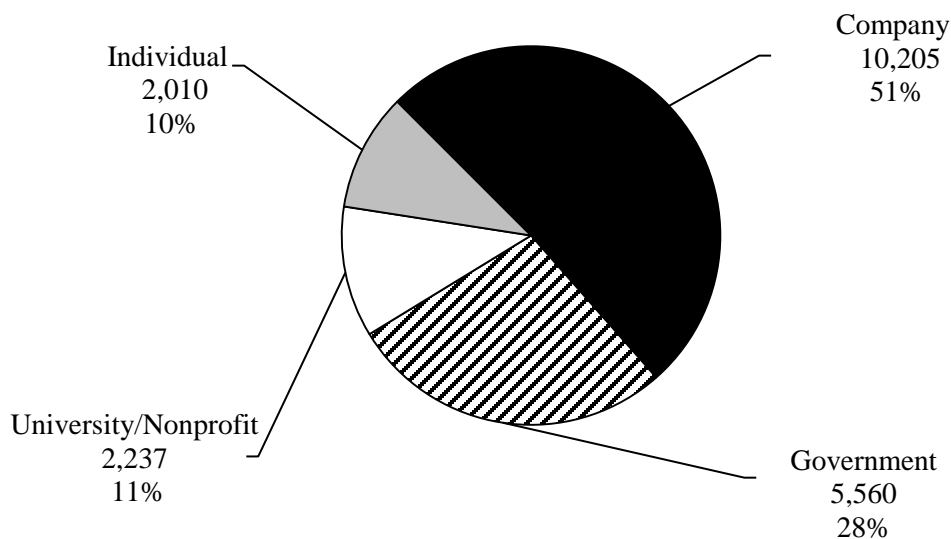
Business R&D Intensity in Maryland Is Lower

California has the largest own-source business R&D followed by Massachusetts. These large business R&D expenditures reflect a concentration of high-technology industries in the Boston/Cambridge area and Silicon Valley. While Maryland is a R&D intensive state overall, own-source business R&D is only 17% of the total, as noted previously. Only Alaska (13%) and New Mexico (5%) have a lower share. Maryland own-source business R&D expenditures equaled \$3.4 billion in 2014; this was the twenty-second largest of any state. In Maryland, own-source business R&D expenditures are equal to 0.9% of Maryland's private sector GDP, which is below the national average of 1.5%.

Patent Filings Also Show Varied Sources of Innovation

Data on recent patent filings also shows that innovation in Maryland results from R&D conducted at a variety of organizations. As shown in **Exhibit 6.4**, entities other than businesses accounted for slightly less than one-half of all patents granted in the State in the last 15 years. Four defense and national security agencies accounted for about one-half of all government patent filings. The Johns Hopkins University (1,210 patents) and the University of Maryland (560) account for most of the university/nonprofit patent filings. Overall, the State has a high number of patents in ordinance/ammunition, chemistry, molecular biology, drugs, and tools.

Exhibit 6.4
Distribution of Patents Filed in Maryland
Calendar 2000-2015



Source: U.S. Patent and Trademark Office; Department of Legislative Services

Chapter 7. Factors That Influence Innovation Across States

State Rankings on Innovation

The ultimate goal of a research and development (R&D) tax credit is not to increase R&D in and of itself but rather to improve society, for example, by boosting long-term economic growth through increased innovation. To examine the importance of R&D tax credits in meeting this objective, the Department of Legislative Services (DLS) reviewed the conclusions of two reports that measure each state's capacity for innovation and long-term growth. These reports also explain the various factors that are needed to spur innovation and long-term economic growth.

State Technology and Science Index

The *State Technology and Science Index*, published by the Milken Institute, benchmarks states based on the science and technology capabilities that influence company growth, high-value-added job creation, and economic growth. States are ranked based on 107 indicators that are classified into five categories: (1) R&D inputs; (2) risk capital and entrepreneurial infrastructure; (3) human capital investment; (4) technology and science workforce; and (5) technology concentration and dynamism.

While the index examines R&D spending, it does not identify the presence of a state R&D tax credit as a contributing factor to innovation. Rather, the index focuses on a state's capability to conduct R&D, which is a factor of the education and skill level of a state's workforce and is cited as the most important intangible asset of a state's economy. Another important factor is the extent to which states successfully commercialize R&D into new products and services.

State New Economy Index

The *State New Economy Index*, published by the Information Technology and Innovation Foundation (ITIF), measures if state economies are knowledge-based, globalized, entrepreneurial, and innovation-oriented as well as the extent to which information technology is utilized. The index uses 25 indicators that are also classified into five categories: (1) knowledge jobs; (2) globalization; (3) economic dynamism; (4) the digital economy; and (5) innovation capacity.

The index placed the most importance on the knowledge jobs and innovation capacity category, thus signifying that this was the most influential factor in a state's ability to adapt to economic and technological changes. Similar to the *State Technology and Science Index*, the index also examines R&D spending, but it does not use R&D tax credits as an indicator for long-term success.

Maryland Ranks High in Each Report

Each index has ranked Maryland as a top five state for innovation and science and technology capabilities. In 2016, the Milken Institute gave Maryland the third highest score, one spot lower than in 2014. The Milken Institute noted that Maryland, with its outstanding research universities and federal research centers, has the requisite endowments for success. However, it also notes that Maryland's drop in the human capital investment rank could undermine the State's ability to maintain a highly skilled workforce. Thus, the State cannot merely focus on increasing R&D spending, but it should retain a highly skilled workforce and encourage entrepreneurship.

According to ITIF, the high concentration of knowledge workers in Maryland, many of whom are employed by the federal government, is the primary factor that explains the State's high ranking in its report. Data from the National Science Foundation shows that many Maryland workers are employed in high technology industries that require significant education and skills.

In 2012, there were 347,286 workers employed in high science, engineering, and technology (SET) employment industries in Maryland. Employment in high SET employment industries has recently increased in Maryland at a faster pace, growing on average by 1.1% annually, compared to the national growth rate of 0.4%. Nationally, employment in high SET employment industries makes up 12.1% of total employment. Maryland has a higher percentage (16.1%) of workers in high SET employment industries. Only Virginia (17.9%) and Washington (16.7%) have a higher percentage. **Exhibit 7.1** shows the percent of workers in high SET employment industries in neighboring states and their respective ranking.

Exhibit 7.1
Percent of Workers in High SET Employment Industries in Nearby States
Calendar 2012

	<u>Employment</u>	<u>State Rank</u>
Virginia	17.9%	1
District of Columbia	14.8%	7
Pennsylvania	11.6%	21
North Carolina	11.3%	23
Delaware	11.2%	24
West Virginia	8.1%	44
Maryland	16.1%	3

SET: science, engineering, and technology

Source: National Science Foundation; Department of Legislative Services

Characteristics of High-ranking States

Both reports highlight the factors that explained the success of high ranking states. The most common attribute was the high education and skill levels of the workforce and presence of elite research universities. Massachusetts ranks first in both reports, and the Milken Institute cites that state's extensive university and private-sector research assets. Similarly, ITIF explains that Massachusetts's success is due to a concentration of software, hardware, and biotechnology firms that are supported by world-class universities such as the Massachusetts Institute of Technology and Harvard.

Another factor that explains a state's high ranking was the ability to attract investment and commercialize R&D. California's workforce is ranked high; however, the Milken Institute noted that its ability to commercialize R&D was unrivaled. In 2016, Colorado was ranked just above Maryland, which the Milken Institute attributes to Colorado reaping dividends not only from increased funding for its public and private universities but also its commitment to clean technologies that have attracted substantial venture capital investments.

Characteristics of Low-ranking States

The Milken Institute analyzed the factors shared by low-ranking states, which included Arkansas, Kentucky, Louisiana, Mississippi, and West Virginia. According to the report, these states are the least knowledge-intensive, and their residents exhibit weak entrepreneurial skills. The report also stated that commitments to investments in research, entrepreneurship, and human capital are necessary for these states to improve their economic outlook as they face a bleak future in the absence of change.

ITIF attributes the poor performance of low-ranking states on a dependence on natural resources, tourism, or mass-production manufacturing, as well as the reliance on low costs rather than innovative capacity to gain a competitive advantage. According to ITIF, innovative capacity (derived through universities, R&D investments, scientists and engineers, highly skilled workers, and entrepreneurial capabilities) is increasingly the driver of competitive success, while states only offering low costs are being undercut by cheaper producers abroad.

There Appears to Be No Correlation Between State Tax Policy and Innovation

Both of the reports previously discussed stressed the importance of human capital and innovative capacity in promoting long-term economic growth as well as enabling states to adapt to a changing global economy. It is difficult to isolate the impact of each of the factors cited in the reports, such as the skill of the workforce or the impact of a state's overall tax burden imposed on businesses. However, tax policies do not appear to be the most important factor in explaining the difference in R&D and innovation across states. For example, the Milken Institute cites California,

“where, despite a reputation for high taxes and regulatory hurdles, technology and innovation have fueled stellar economic performance since 2010.”

DLS also examined the impact of state business tax burdens and found no correlation between the difference in tax burdens and innovation. Using various tax burden rankings explains less than 5% of the difference in a state’s average ranking in each report. In addition, some of these tax rankings question the efficacy of tax credits. One example is a report issued by the Tax Foundation, which ranks state business tax climates by examining their corporate, individual income, sales, property, and unemployment insurance taxes. States that scored well typically had low rates or did not impose one of the major taxes (sales, corporate, or personal income). In its report, states that have an R&D tax credit are scored poorly as the Tax Foundation believes the weaknesses of such a tax credit far outweigh the potential benefits.

Maryland ranks low in the Tax Foundation’s business tax climate study; only California, Connecticut, Minnesota, New Jersey, New York, Ohio, Rhode Island, and Vermont fared worse. However, California, Connecticut, Maryland, and Minnesota had some of the highest rankings for innovation. Meanwhile, South Dakota and Wyoming typically are ranked as having the best tax climates, but these states ranked poorly for innovation. States often compete for businesses and jobs. While a lower tax burden and an efficient tax system can attract businesses and increase R&D, these do not appear to be the most important factors driving R&D and innovation across states.

There Appears to Be No Correlation Between R&D Incentives and Innovation

In *Location Matters*, the Tax Foundation and KPMG estimated the tax burden in each state for both a mature and new pharmaceutical R&D facility conducting product development, taking account states’ effective tax rates and the impact of R&D incentives. For a mature R&D facility, Maryland ranked tenth for the lowest tax burden with an overall effective tax rate of 7.9%. Maryland ranked nineteenth for a new R&D facility with an estimated tax burden of 10.4%. Property taxes were the largest component of the total tax liability, comprising almost 60.0% of a mature R&D facility’s overall tax liability and 70.0% for a new R&D facility. For mature and new R&D facilities, the effective income tax rates in Maryland are less than 2.0% and 1.0%, respectively. New York had the highest total tax burden with an effective tax rate of 24.8% for a mature R&D facility, while Rhode Island, with an effective tax rate of 22.4%, had the highest total tax rate for a new R&D facility, despite both states providing an R&D tax credit.

As with the overall tax burden, DLS failed to find a correlation between a low tax liability for mature or new R&D facilities and increased R&D and innovation. Using either ranking, or an average of both, also explains less than 5% of the difference in a state’s average ranking in each report. Some of the most innovative states also had some of the highest tax burdens for mature or new R&D facilities. Conversely, some states with low tax burdens had some of the worst rankings for innovation, despite offering an R&D tax credit.

Impact of Taxes and Tax Credits on Business Location and R&D

Taxes can play a role in a business's decision-making process, especially at the margins. However, based on the state rankings of both the *State Technology and Science Index* and the *State New Economy Index*, there is no clear evidence that a state R&D tax credit will stimulate innovation and create long-term economic growth. In the report, *Here or There? A Survey of Factors in Multinational R&D Location*, researchers surveyed over 200 multinational companies in various industries to determine which factors influence decisions on where to conduct R&D. The study found that costs were not as important as other factors. According to the report, "when companies located R&D facilities either at home or in another developed economy, the most important factors were the quality of R&D personnel and the quality of intellectual property protection. Next in importance were the expertise of university faculty and the ease of collaborating with universities. Also important were market factors such as growth potential and the need to support sales of the company." The report implies that although a location may have high costs, it can still have a comparative advantage in conducting R&D due to the quality of its workforce.

Chapter 8. Effectiveness of Maryland's Research and Development Tax Credit Program

Design and Implementation Factors Limit Maryland's Research and Development Tax Credit

Most state research and development (R&D) tax credits provide a limited incentive to increase R&D expenditures. The design and implementation of Maryland's R&D tax credit decreases its effectiveness in the following ways:

- ***Basic Tax Credit Provides Windfalls:*** In contrast to the federal research tax credit and most state R&D tax credits, the design of the Maryland R&D tax credit program is much more likely to provide credits for R&D activities that would have occurred in the absence of the tax credit. This is primarily due to the basic tax credit that provides tax credits for a business's total recent R&D expenditures rather than for incremental increases.
- ***Tax Credit Is Concentrated within a Few Companies:*** Since 2000, 11 businesses, out of a total of 475, have been awarded approximately one-half of all R&D tax credits. These businesses have a large share of the total qualified R&D expenditures reported by businesses, which explains the large share of all tax credits. However, the concentration of R&D tax credits is not proportionate to other measures of R&D activity and innovation. In addition, companies with the largest R&D expenditures are more likely to claim the basic tax credit.
- ***Tax Credit Overlaps with Other State Tax Credits:*** The 11 businesses that claim the most tax credits are established, large, multi-state corporations. The R&D tax credit was one of the first significant business income tax credits established. Since its establishment, the State has enacted a number of additional business tax credit programs. A common outcome of these State tax credit programs is a concentration of benefits to a few large corporations.
- ***Tax Credit Does Not Influence R&D Decisions for Most Firms:*** The tax credit provides a modest incentive, and most companies claim the tax credit for only one or two years. In recent years, the Department of Commerce (Commerce) has awarded R&D tax credits to about 200 businesses in each year. By comparison, the National Science Foundation estimates that about 1,200 companies had R&D expenditures in calendar 2007, the last year of data. Overall, the qualified R&D reported by companies comprised less than 40% of total R&D business expenditures in the State. Further, based on data provided by the Comptroller's Office, less than one-half of the businesses that have been awarded R&D tax credits under the program file an amended return and claim the tax credit.

Basic Tax Credit Provides Windfalls

Most tax incentives are designed to maximize their effectiveness by promoting economic activity that would not have otherwise occurred in the absence of the incentive. An effective R&D tax credit program avoids providing windfalls – awarding tax credits for R&D activity that businesses would have conducted anyway by focusing as much of the benefit on increasing marginal spending rather than total or recent spending.

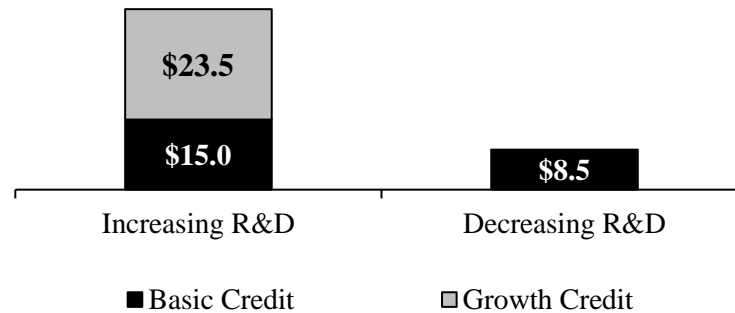
The federal research tax credit and most other state tax credits attempt to promote R&D spending by providing a tax credit for R&D spending above the base amount of R&D, which approximates the spending that would have occurred in the absence of the tax credit.

A business's total qualified R&D spending consists of the amount that it would have spent even if there were no subsidy, plus the additional or marginal amount that it spends only because the credit is available. Business R&D from year to year can be volatile, but for the typical company that was awarded an R&D tax credit, it changed by about 2% annually. The tax credit provided for the marginal spending is the only portion of the credit that affects the taxpayer's research spending behavior. The remainder of the credit is a windfall to the taxpayer for doing something that it was going to do anyway, instead of being used to support potentially beneficial new research.

From calendar 2000 to 2015, 767 companies that received the State R&D tax credit increased their R&D spending, as measured by current year R&D expenditures that exceeded the company's base amount. As shown in **Exhibit 8.1**, Commerce awarded all of the \$23.5 million in growth tax credits because these companies increased their R&D spending. By comparison, these companies also received \$15.0 million in basic tax credits based on the amount of R&D expenditures incurred in the previous four tax years. In addition, the 433 businesses that decreased R&D expenditures received a total of \$8.5 million in basic credits but no growth credits.

Companies with increasing R&D expenditures had average qualified R&D expenditures of \$6.9 million and an average total tax credit of \$50,169. These companies received an average basic tax credit of \$19,532 based on their average base amount of \$4.8 million. As shown in **Exhibit 8.2**, the growth credit provided a stronger incentive, as companies received an average growth tax credit of \$30,637 for the additional \$2.1 million in R&D spending in the year that was above the base amount. The companies that decreased R&D spending had a base amount of \$6.7 million. However, their current year R&D expenditures were \$5.1 million. Since the basic tax credit is based on the lower of the current year expenditures and base amount, these companies received an average basic tax credit of \$19,674.

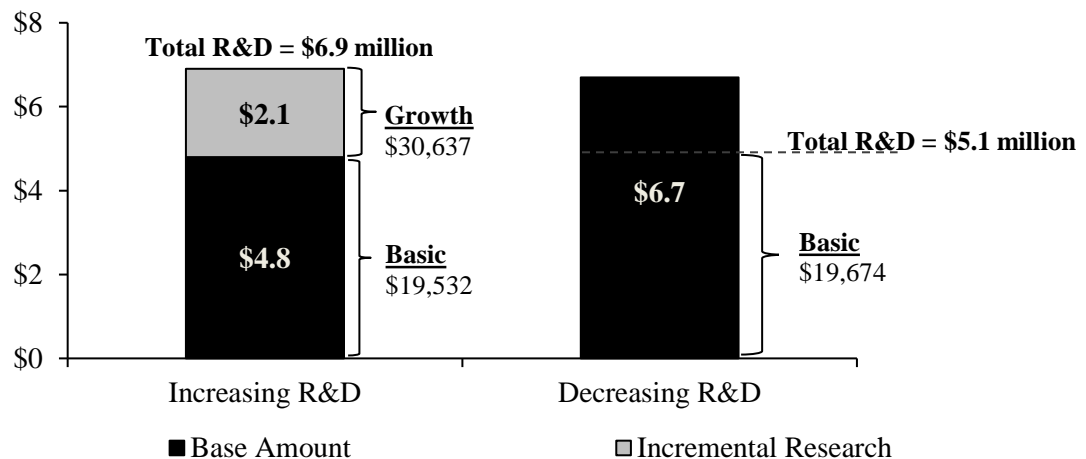
Exhibit 8.1
Total Basic and Growth Tax Credits Awarded
Businesses with Increasing or Decreasing R&D Expenditures
Tax Year 2000-2015
(\$ in Millions)



R&D: research and development

Source: Department of Commerce; Department of Legislative Services

Exhibit 8.2
Average Qualified R&D and R&D Tax Credits
Businesses with Increasing and Decreasing R&D Expenditures
Tax Year 2000-2015



R&D: research and development

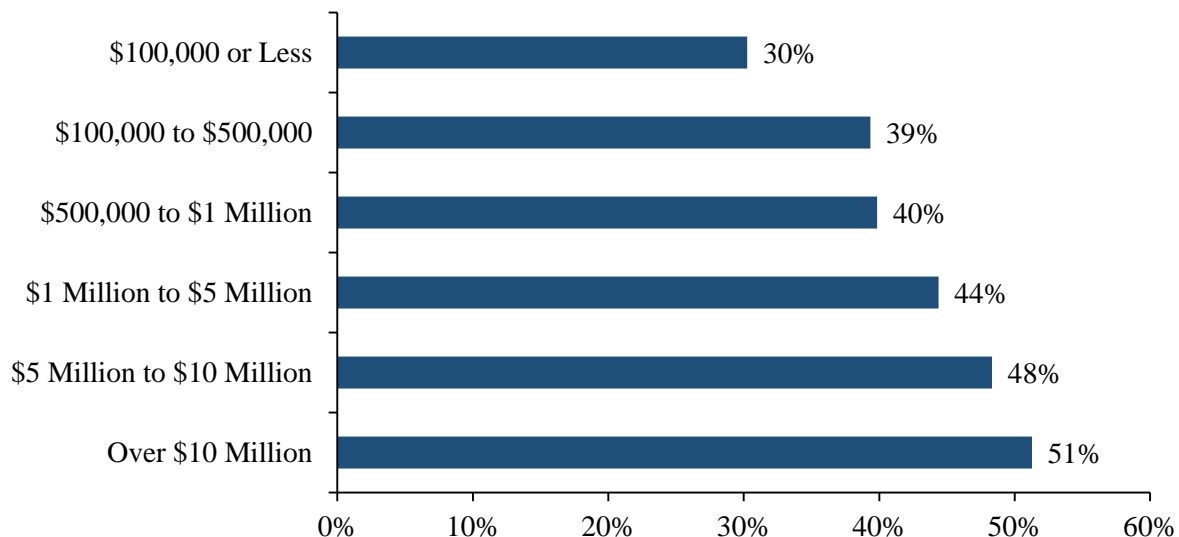
Source: Department of Commerce; Department of Legislative Services

Even though the basic tax credit awards credits to companies that decrease their R&D, it may lessen the reduction in R&D expenditures that would have otherwise occurred in the absence of the tax credit. Accordingly, Commerce has stated that the purposes of the R&D tax credit is to both increase and maintain R&D expenditures and employment. However, additional factors outlined in the rest of this chapter further reduce the program's impact on maintaining R&D expenditures and employment.

Companies with Large R&D Expenditures Receive More Basic Tax Credits

The basic tax credit comprises a greater share of a company's total R&D tax credit as the company's total R&D increases. As shown in **Exhibit 8.3**, the basic tax credit comprised a little more than one-half of the total tax credit received by a company with annual R&D expenditures of \$10 million or more, compared with 30% for those companies with R&D expenditures of less than \$100,000.

Exhibit 8.3
Basic Credit as a Percentage of Total Credit Awarded
By Total R&D Expenditures
Tax Year 2000-2015



R&D: research and development

Source: Department of Commerce; Department of Legislative Services

Additional Funding Has Increased Company Windfalls

Legislation enacted in 2013, 2014, and 2017 increased the total annual amount of tax credits that Commerce could award in each calendar year. However, in each of these years, the funding increase was effective beginning with the prior calendar year. For example, the increased funding enacted in the 2017 session was effective beginning with calendar 2016; therefore, these additional tax credits did not impact R&D expenditures incurred in the year. The impact of these additional tax credits was a tax decrease, which increased cash flows for companies. Although these increased cash flows may have been used to fund future R&D expenditures, any impact on R&D expenditures was indirect and an even less effective incentive. A total of \$6 million in tax credits have been awarded for prior calendar years, or about 7% of the total tax credits awarded under the program.

Most Claimants Are Large Established Corporations

The R&D tax credit was one of the first State business income tax credits. However, since its inception, the State has established numerous tax incentives. Many of these subsequent tax incentives provide larger tax benefits and therefore have a greater influence on business behavior. Several of the largest recipients of R&D tax credits have also received One Maryland, enterprise zone, and job creation tax credits for expanding operations and as an incentive to maintain their presence in Maryland. Other incentives provided to these companies, including the aerospace, electronics, or defense contract tax credit and conditional loans under the Maryland Economic Development Assistance Authority and Fund, explicitly require the company to maintain a certain number of employees as a condition of receiving the benefit.

The 11 companies that claimed a majority of tax credits also account for a majority of the total qualified R&D under the program (\$8.4 billion out of a total of a \$16.2 billion). Since 2000, these companies received \$29.7 million in basic credits to maintain a portion of this R&D and \$21.4 million in growth credits for increasing their R&D over this time period. All of these companies are large, established, multi-state corporations; most are manufacturers. Given the overlap of the R&D tax credit with other State incentives, a significant portion of the R&D activity under the program was supported by other State incentives. Therefore, some portion of this activity would have occurred in the absence of the program.

The goal of the program is to promote and maintain R&D spending and employment in the State. The top 11 recipients of the R&D tax credit are major factors in both, employing a total of 18,900 Maryland employees in each year of the program. Since 2000, these companies have also been awarded a total of 2,300 patents. However, these companies receive a disproportionate amount of R&D tax credits (51%) compared to their share of patents (20%) and employment (25%).

There Is Insufficient Data Available to Analyze the Impact of Recent Funding Increases

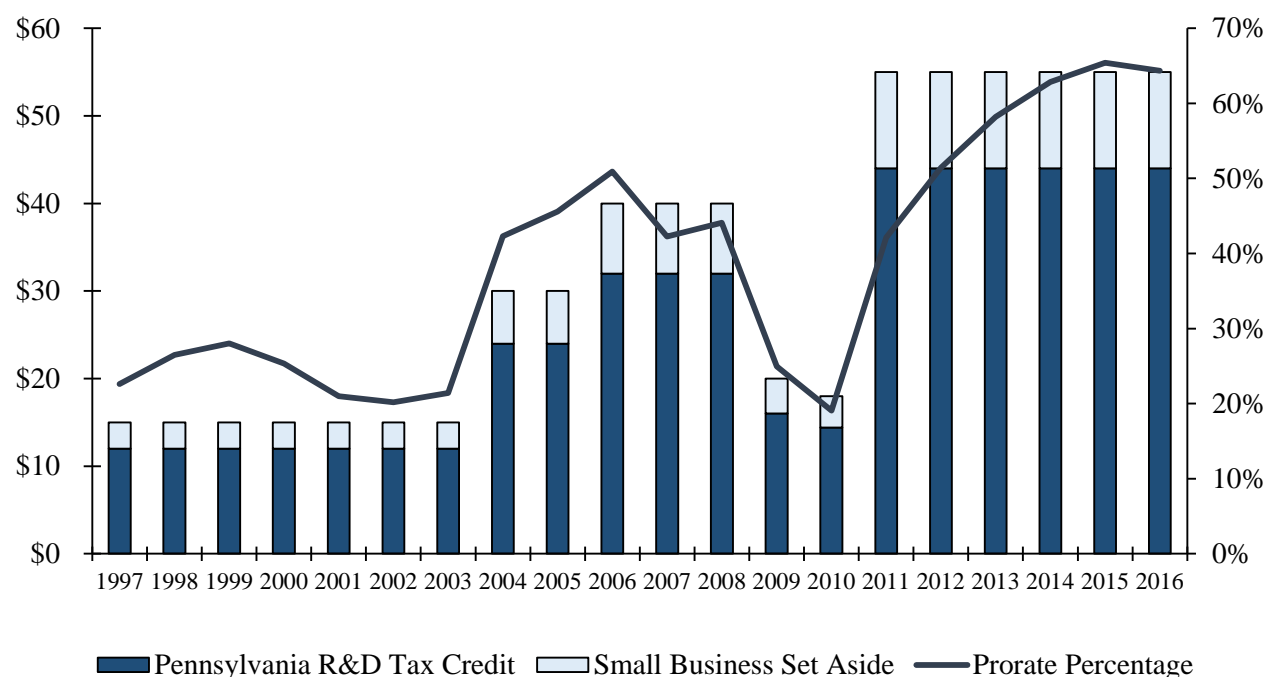
As mentioned earlier, legislation in recent years has increased the maximum amount of R&D tax credits that Commerce can award in each calendar year. The first increase was effective beginning with calendar 2012, and the last increase was enacted in the 2017 legislative session. Given the relatively recent nature of these increases, there is insufficient data available to measure its impact on outcomes (business R&D expenditures and patent filings). In addition, isolating the impact of the income tax credit from other influences such as the R&D sales and use tax exemption and other economic impacts is difficult. The uniqueness of the distribution of R&D activities within the State also makes it difficult to find a similar state to Maryland for comparison purposes.

Pennsylvania Has Significantly Increased R&D Tax Credit Funding

Although it is too soon to analyze the impact of increasing funding for the state R&D tax credit, Pennsylvania altered the annual funding provided for its R&D tax credit beginning in calendar 2004. Even though the total funding has increased, legislation did temporarily decrease the total funding in two years (2009 and 2010). These changes in annual funding allow for an examination of whether R&D investment and patent filings respond to changes in the availability, total funding, and value of a state R&D tax credit. Thus, the effects of increasing R&D tax credits in Maryland can be gleaned by examining Pennsylvania's program.

Between 1997 and 2003, the Pennsylvania Department of Revenue could approve up to \$15 million in tax credits in each fiscal year, of which \$3 million was set aside for small businesses, as shown in **Exhibit 8.4**. The aggregate annual tax credit limit has increased to \$55 million, with \$11 million set aside for small businesses. Exhibit 8.4 also shows the percent of R&D tax credits that have been approved versus requested since the requested credits exceed the annual credit caps and thus must be prorated. When the credit cap was set at \$15 million, taxpayers tended to receive less than a quarter of their requested credits, but increasing the credit cap to \$55 million now typically enables taxpayers to claim over half of their requested credits. Due to the set aside for small businesses, small businesses have received 85.1% of the total amount of tax credits for which they have applied since 1997. Thus, most of the increased funding for the Pennsylvania R&D tax credit has benefited larger businesses since they are now able to claim more of their requested credits.

Exhibit 8.4
Pennsylvania R&D Tax Credit Funding
Fiscal 1997-2016
(\$ in Millions)



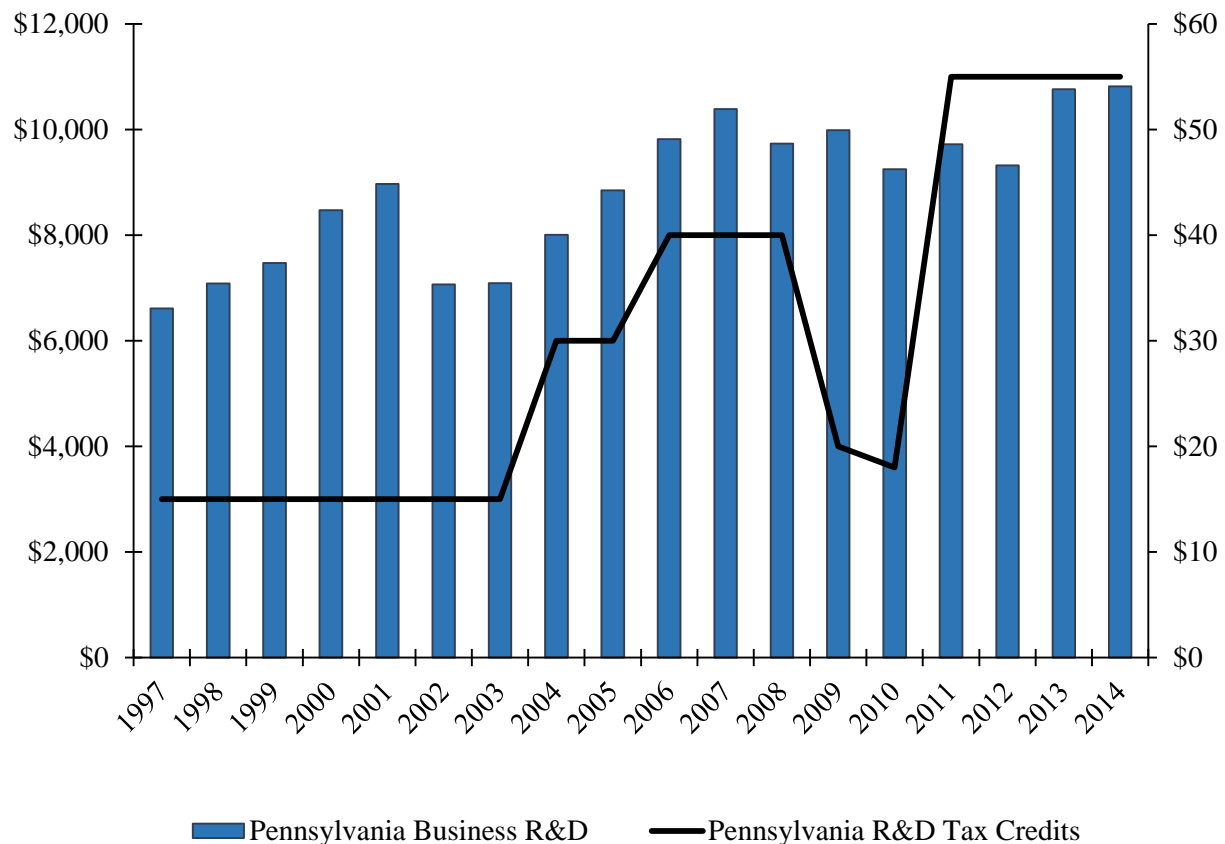
R&D: research and development

Source: Pennsylvania Department of Revenue; Department of Legislative Services

No Strong Correlation Between Pennsylvania's R&D Tax Credit and R&D Spending

According to Pennsylvania Department of Revenue reports, the tax credit had a potential impact on increasing research expenses from 1997 through 2015. However, the Department of Legislative Services (DLS) found no apparent relationship between the amount of R&D funding and business R&D expenditures. Pennsylvania doubled its funding in 2004, but private-sector R&D spending only increased by 13.0%, as shown in **Exhibit 8.5**. Further, R&D expenditures did not appear to respond to other significant changes in funding. R&D expenditures increased by 2.6% in 2009, when funding was reduced by one-half, and by 5.0% in 2011, when the credit cap increased from \$18 million to \$55 million in 2011. From 2008 to 2010, Pennsylvania was ranked twelfth relative to its private-sector R&D intensity but subsequently dropped to sixteenth place in 2011, despite the significant increase in annual credit funding.

Exhibit 8.5
Pennsylvania Business R&D Spending and Tax Credits
Calendar 1997-2014
(\$ in Millions)



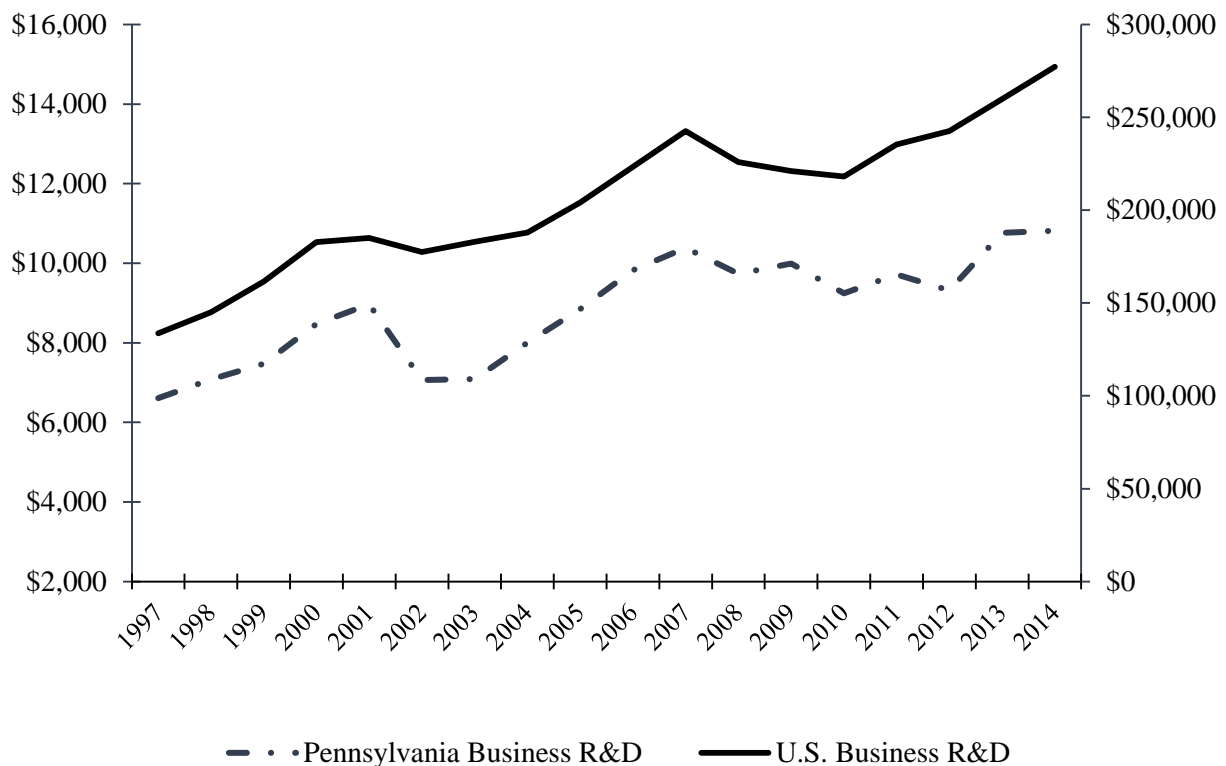
R&D: research and development

Source: National Science Foundation; Pennsylvania Department of Revenue; Department of Legislative Services

Pennsylvania R&D Expenditures Reflect National Trend

In addition to the limited correlation between changes in Pennsylvania's annual R&D tax credit funding and business R&D, spending has not increased significantly when compared to the United States, as shown in **Exhibit 8.6**. Since Pennsylvania R&D business expenditures follow a similar pattern, it is unlikely that the R&D tax credit is significantly altering taxpayers' behavior and leading to an increase in business R&D.

Exhibit 8.6
Business R&D Spending in Pennsylvania and the United States
Calendar 1997-2014
(\$ in Millions)



R&D: research and development

Source: National Science Foundation; Department of Legislative Services

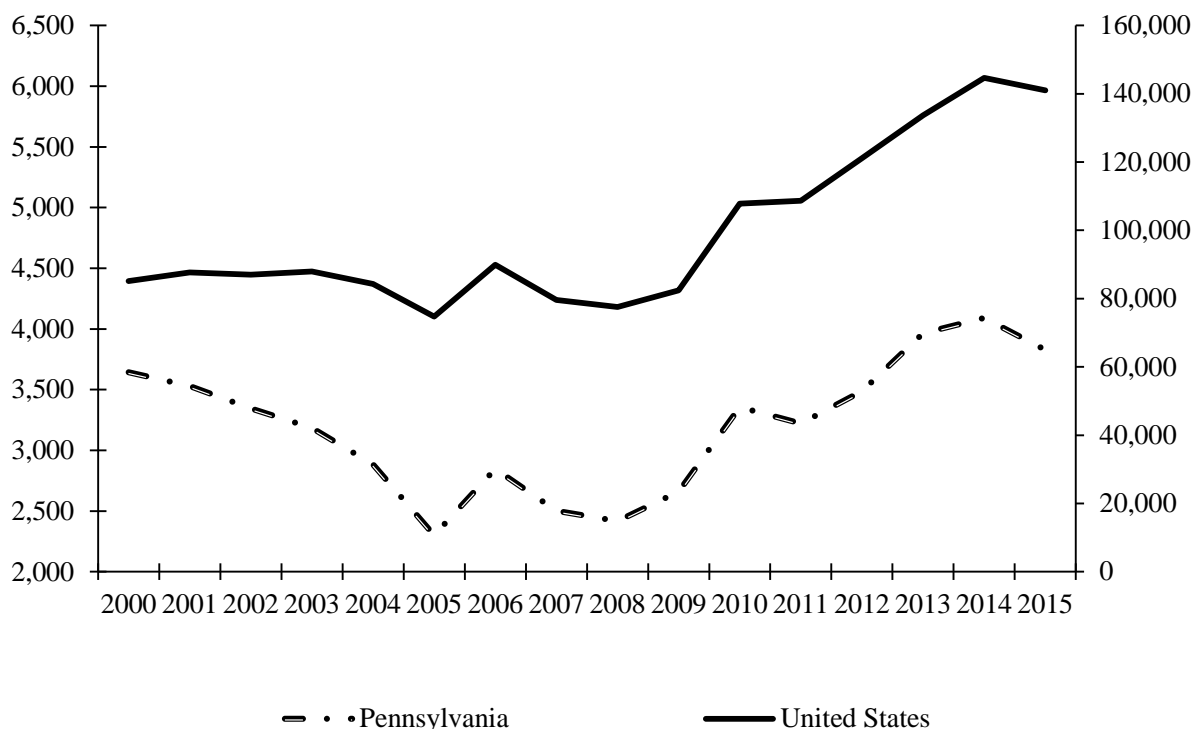
Pennsylvania R&D Tax Credit Likely Did Not Increase Patents

There also does not appear to be a correlation between R&D tax credits and the number of patents issued in Pennsylvania. From 2000 through 2010, Pennsylvania, on average, ranked twenty-third in terms of number of patents per capita compared to other states. Since 2011, Pennsylvania's ranking decreased two places to twenty-fifth overall.

Between 2000 and 2003, when Pennsylvania's credit cap was at \$15 million, patents filed in Pennsylvania comprised 3.9% of all patents filed in the United States. Between 2004 and 2008, when funding increased, its share of patents dropped to 3.2%. Between 2011 and 2015, when

Pennsylvania's credit cap was at \$55 million, the share of patents decreased further to 2.9%. **Exhibit 8.7** compares the total number of patents issued in Pennsylvania and in the United States. From 2000 to 2015 the number of patents increased by 8.0% in Pennsylvania, significantly lower than the national increase of 61.0%.

Exhibit 8.7
Patents Issued in Pennsylvania and the United States
Calendar 2000-2015



Source: National Science Foundation; Department of Legislative Services

Why Are There No Meaningful Effects from Increasing Pennsylvania's R&D Credit Funding?

Pennsylvania's R&D credit is somewhat different than Maryland's program as it only provides an incremental credit equal to 10% (20% for a small business) of the taxpayer's total qualified R&D over the taxpayer's Pennsylvania base amount. Additionally, tax credits may be sold or otherwise transferred if not used by the business. These differences likely provide stronger incentives for Pennsylvania taxpayers to increase their R&D expenditures, since there are fewer tax credits provided to R&D that likely would have occurred in the absence of the credit, and

taxpayers realize more of the tax benefits sooner. Thus, DLS would expect to see a stronger effect in Pennsylvania than Maryland.

Even with these enhancements, the Pennsylvania tax credit provides a limited direct incentive for companies to increase R&D. There is also uncertainty over its value when the company is planning R&D expenditures. In addition, as discussed in Chapter 7, other factors are a greater influence on R&D and innovation. Changes in these factors in Pennsylvania and other economywide influences likely explain why the significant increase in R&D annual funding did not appear to meaningfully change the trajectory of R&D spending or number of patents.

Chapter 9. Findings and Recommendations

Based on the information and analysis provided in this report, the Department of Legislative Services (DLS) makes a number of findings and recommendations about the research and development (R&D) tax credit, as discussed below.

There Is No Evidence That the R&D Tax Credit Is Effective

The design and implementation of Maryland's R&D tax credit decreases its effectiveness. The basic tax credit provides tax credits for a business's total recent R&D expenditures rather than incremental increases, so it is much more likely to provide credits for R&D activities that would have otherwise occurred in the absence of the tax credit. Additionally, the credit is concentrated within a few, large, multi-state corporations that receive other State tax incentives. Since 2000, 11 businesses, out of a total of 475, have been awarded approximately one-half of all R&D tax credits. The tax credit does not influence R&D decisions for most firms, since it provides a modest incentive, and most companies claim the tax credit for only one or two years. In every year, the total amount of credits that businesses are eligible for has substantially exceeded the aggregate annual limit; the amount approved for each credit is reduced by a proportional amount of the excess. As a result of this oversubscription and the resulting reduction in the value of the credit, the credit provides a limited direct incentive for companies to increase R&D expenditures. The credit is likely underutilized; only a small fraction of companies that had R&D expenditures as reported by the National Science Foundation (NSF) were awarded the credit and less than one-half of the businesses that have been awarded R&D tax credits actually claim the tax credit.

Whereas many studies have found the federal research tax credit to be effective, there is less consensus about whether state R&D credits are effective. DLS failed to find a correlation between the R&D tax credit program and increased innovation and long-term economic growth based on the *State Technology and Science Index* and the *State New Economy Index*. Both reports highlight the factors that explained the success of highly ranked states, which included the high education and skill level of the workforce and presence of elite research universities. There was no apparent correlation between state tax policy or R&D incentives and innovation. Based on Pennsylvania's experience, increasing the R&D tax credit will not likely achieve better results. DLS found no evidence that expanding or decreasing the R&D tax credit program in Pennsylvania changed the trajectory of R&D spending or the number of patents being issued. Thus, DLS questions the overall effectiveness of the R&D tax credit program.

Recommendation: The General Assembly should consider terminating the R&D tax credit and instead explore other options to increase innovation in the State, such as providing a federal Small Business Innovative Research matching grant to encourage R&D in Maryland or providing grants aimed at increasing human capital in science and technology fields.

If the General Assembly chooses to continue the tax credit program, DLS has several recommendations to improve the credit that are discussed further.

Incremental Credits Are Preferred for Incentivizing Growth

Most tax incentives are designed to maximize its effectiveness by promoting economic activity that would not have otherwise occurred in the absence of the incentive. An effective R&D tax credit program avoids providing windfalls – awarding tax credits for R&D activity that businesses would have done anyway – by focusing as much of the benefit on increasing marginal spending rather than total or recent spending. In contrast to the federal research tax credit and most state R&D tax credits, the design of the State R&D tax credit program is much more likely to provide windfall credits for R&D activities that would have occurred in the absence of the tax credit. This is primarily due to the basic tax credit that provides tax credits for a business's total recent R&D expenditures rather than for incremental increases.

Recommendation: The General Assembly should consider eliminating the basic R&D tax credit. The General Assembly should also consider options to redesign the credit to prioritize eligibility for new and emerging companies.

The Legislative Intent and Performance Metrics of the Credit Are Not Defined

Chapters 515 and 516 of 2000 established the R&D tax credit but did not specify a specific goal or intent for the credit. Without clearly defined goals and objectives, it is difficult to identify metrics and data requirements to evaluate the effectiveness of the tax credit. The Tax Credit Evaluation Act requires DLS to evaluate whether the original intent of the tax credit is still appropriate; however, there is no statutory requirement for tax credits to include an intent. Other states require that the intent of tax incentives to be clearly expressed. For example, in Minnesota, the legislature must include a statement of purpose and define measurable objectives in any bill that creates, renews, or continues a tax expenditure enacted after July 1, 2010. Washington requires any bill proposing a new tax incentive to include a performance statement indicating the incentive's legislative purpose.

Recommendation: The General Assembly should clearly define the intent of the R&D tax credit program in statute.

Recommendation: The Department of Commerce (Commerce) should define performance metrics for the tax credit program and periodically evaluate the program based on those metrics.

Recommendation: Considering the General Assembly's interest in providing business opportunities for minority- and women-owned businesses, DLS recommends that

the General Assembly require Commerce to report on the number of minority- and women-owned businesses that claim the credit.

Most Companies Do Not Claim the Full Value of the Tax Credit

The R&D credit is only refundable for qualified small businesses. Otherwise, the credit claimed cannot exceed the taxpayer's total tax liability imposed in the year but can be carried forward for seven years. The Comptroller's Office has previously advised DLS that it is not able to routinely identify and report the types of credits being carried forward by companies claiming tax credits, including the R&D tax credit. This prevents an accurate assessment by the Comptroller's Office of the total amount of R&D tax credits claimed in each year as well as for other tax credits that have carry-forward provisions.

Recommendation: The General Assembly should require the Comptroller's Office to specify the treatment of credit carry forwards if a company has multiple credits and also to track credit carry forwards.

Large Businesses Earn Most Credits

The concentration of R&D tax credit claims within a few companies is greater than in the other tax credit programs that have been evaluated by DLS, with 83% of all R&D tax credits earned by the largest 20% of companies. To encourage R&D expenditures by small businesses, Chapter 109 of 2013 made the R&D tax credit refundable if the business meets the qualifications of a small business, as defined by the Act, beginning in tax year 2012. About one-third of all companies qualified for the small business refund but only received approximately 2% of the credits in tax years 2012 through 2015. Meanwhile, Pennsylvania encourages small businesses to claim their R&D tax credit by setting aside 20% of its aggregate tax credits for small businesses.

Recommendation: The General Assembly should consider setting aside a portion of the R&D tax credits to be allocated for R&D expenditures by small businesses.

Definition of a Small Business Is Not Consistent with Other State Programs

Chapter 109 defined a small business as a for-profit corporation, limited liability company, partnership, or sole proprietorship that, at the beginning or end of the taxable year in which the eligible R&D expenses are incurred, has net book value assets totaling less than \$5 million. DLS is not aware of a similar definition that is used in any State programs; the definition is unique as most government programs define a small business based on sales, income, or number of employees. Commerce advises that none of the other department's programs use net book assets as a small business requirement.

Recommendation: The General Assembly should consider changing the definition of a small business to be consistent with other State programs or to be consistent with the definition used for the federal research credit.

The Credit Appears to Be Underutilized

In recent years, Commerce has awarded R&D tax credits to about 200 businesses in each year. By comparison, NSF estimates that about 1,200 companies had R&D expenditures in calendar 2007, the last year of data. Overall, the qualified R&D expenditures reported by companies comprised less than 40% of total R&D business expenditures in the State. In addition, based on data provided by the Comptroller's Office, less than one-half of the businesses that have been awarded R&D tax credits under the program file an amended return and claim the tax credit.

Recommendation: Commerce should comment on why only a fraction of businesses with R&D expenditures are awarded credits.

Recommendation: Commerce and the Comptroller's Office should comment on why only a fraction of businesses that are awarded credits are claiming the credit.