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Tax Incentive Evaluation

Georgia Research & Development Tax Credit

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Tax Incentive Evaluation: Georgia Research & Development Tax Credit

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1. Executive Summary

This study is a review of the Georgia Research and Development Tax Credit (O.C.G.A. § 48-7-40.12) conducted in accordance with the Tax Credit Return on Investment Act of 2021, also known as Senate Bill 6 (SB6). SB6, passed during the 2022 legislative session, requires periodic evaluation of Georgia tax credits and exemptions on a rolling five-year basis. SB6 tax exemption studies are required to include a brief history of the exemption, a review of existing literature or academic research related to the subject of the exemption, and an estimate of forgone tax revenue exempted, along with any additional costs or revenues incurred by the state in administering the exemption. Studies are required to include an estimate of the economic impact of the exemption on the state economy and an estimate of the overall return on investment (ROI) of the credit or exemption. Studies are also expected to address the question of whether the taxpayers' spending and the accompanying economic impact would have occurred in the absence of the exemption, a topic commonly referred to as the "but for" question. This study is one of three produced under contract with the Georgia Department of Audits and Accounts by the Carl Vinson Institute of Government at the University of Georgia.

Georgia's R&D tax credit, (O.C.G.A. § 48-7-40.12), provides a credit against taxable income equal to 10% of a business enterprise's year-over-year increase in qualified research expenses. The increase refers to the excess of qualified research expenses over a base amount where the base is the product of the business' gross receipts in the current taxable year and the average of the ratios of its aggregate research expenses to gross receipts for the preceding three taxable years or 0.30, whichever is less.

NET CHANGE IN STATE REVENUE

Table A shows that annual forgone tax revenue for 2015–2020 ranges from a high of $302.5 million in 2015 to a low of $190.5 million in 2016. These figures are based on data provided by the Georgia Department of Revenue and represent the total amount of credits approved by the department in a given year. The amount of the credit approved, as opposed to the amount utilized, is reported to avoid ambiguities that may arise over time from the way credits are treated. Credits may be claimed in the year approved if sufficient tax liability exists, or they may be transferred to a partner or parent company with taxable income, carried forward for up to 10 years or, in some circumstances, used to offset payroll withholding. Since the exact timing of credit carry-forwards cannot be known or projected with any reasonable degree of certainty, the research team chose to report the amount approved to represent the amount of present and future expenditures incurred in a given year. Figures for 2021 through 2025 were projected

based on historical trends. Note that tax data for years going back as far as 2020 are subject to change because taxpayers can still file amended returns for those years.

The R&D credit is projected to induce 5% of additional spending on R&D activities in the state, which will, in turn, increase state sales tax collections on the purchase of equipment and supplies related to R&D activities and increase state income tax collections on incremental employment by workers in the industry. Based on conversations with Georgia Department of Revenue officials, no new positions have been created to administer or audit the Research and Development Tax Credit program and personnel resources currently allocated to administering the credit are minimal. Therefore, no additional state expenditures are anticipated. There are also no known reductions in state spending that result from the credit; hence, this is also assumed to be zero. The net change in state revenues is shown in Table A in non-inflation-adjusted dollars.

Table A. Fiscal Impact of the Research and Development Tax Credit, 2015–2025

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	–$302,563,367	–$190,548,634	–$224,681,048	–$234,294,332	–$235,713,952	–$241,844,708
Increased State Tax Collections	$4,904,424	$3,230,968	$3,768,139	$3,907,058	$4,047,647	$3,467,684
Fiscal Impact	–$297,658,943	–$187,317,666	–$220,912,909	–$230,387,274	–$231,666,305	–$238,377,024

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	–$259,504,050	–$270,866,556	–$282,229,061	–$293,591,566	–$304,954,071
Increased State Tax Collections	$3,868,228	$4,059,145	$4,251,990	$4,446,777	$4,643,521
Fiscal Impact	–$255,635,822	–$266,807,411	–$277,977,071	–$235,144,789	–$300,310,550

Source: Georgia Department of Revenue 2022 & IMPLAN 2015–2021 data

NET CHANGE IN ECONOMIC ACTIVITY

Economic activity associated with the Georgia R&D tax credit is estimated using IMPLAN, a software program designed for estimating economic impacts. IMPLAN produces a standard impact analysis comprised of direct, indirect, and induced effects and measures economic activity as the value added to the economy from incremental economic activity, in this case, increased R&D activities. One question looms large when estimating the economic impact of tax incentives: How much of the activity in question would have occurred without the tax incentive? This is commonly referred to as the "but for" question: But for the tax incentive, how much of the impact would have happened anyway?

A review of existing research on "but for" analyses regarding R&D tax credits puts the figure at about 95%. In other words, only 5% of incremental R&D activity is attributable to the credit, and the other 95% would have likely happened anyway. Estimates produced by the Institute of Government based on historical R&D spending data from the National Science Foundation arrive at a similar conclusion. Results of the most likely "but for" scenario (95%) are shown below in Table B, along with forgone tax revenue. If Georgia's 10% R&D tax credit results in a 5% increase in R&D spending, each dollar of tax credit yields approximately 56 cents in additional economic activity, translating to an ROI of -44% (Table C).

To introduce a measure of sensitivity analysis, economic activity was calculated using a range of 90% to 95% for the "but for" analysis. The institute assumes that increases in R&D spending in excess of 10% must be based on factors besides the presence of the tax credit. The ideal 90% "but for" scenario implies that companies utilizing Georgia's 10% tax credit on R&D spending reinvest $1 in R&D for every $1 saved due to the credit. The 91% "but for" scenario implies that companies utilizing Georgia's 10% tax credit on R&D spending reinvest $0.90 in R&D for every $1 saved due to the credit. Finally, the most likely 95% "but for" scenario implies that companies utilizing Georgia's 10% tax credit on R&D spending reinvest $0.50 for every $1 saved due to the credit.

An alternate use scenario was also calculated based on the assumption that the tax credit did not exist and the state simply collected the forgone tax revenue and spent it in the same manner as all other tax collections. Details of this analysis are discussed in more detail in Section 6 under Alternate Use of Forgone Revenue. The return on investment of the three "but for" scenarios and the alternate use are shown in Table C. The ROI of the most likely 95% but for scenario is -44%, meaning that for each $1 in tax revenue forgone due to the credit, the state accrues $0.56 in economic impact. Only in the case where the 10% tax credit yields a 10% increase in spending on R&D does the economic impact of the credit exceed the forgone tax revenue for a positive ROI of 12%. Further, the 10% credit must induce a 9% increase in R&D spending to achieve a "break-even" return on the credit for a 0% ROI.

Table B. Forgone Tax Revenue, 5% Increased Spending on R&D Due to Credit, and Value-Added Economic Impact of Georgia's R&D Tax Credit; Projected by CVIOG based on R&D data supplied by DOR

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	$302,563,367	$190,548,634	$224,681,048	$234,294,332	$235,713,952	$241,844,708
Increased Spending due to Credit (5%)	$151,281,684	$95,274,317	$112,340,524	$117,147,166	$117,856,976	$120,922,354
Value-Added	$166,767,854	$106,660,464	$124,187,480	$131,014,043	$132,533,647	$134,692,741

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	$259,504,050	$270,866,556	$282,229,061	$293,591,566	$304,954,071
Increased Spending due to Credit (5%)	$129,752,025	$135,433,278	$141,114,531	$146,795,783	$152,477,036
Value-Added	$144,276,250	$150,336,634	$156,381,535	$162,411,637	$168,427,617

Table C. Return on Investment of "But For" Scenarios and Alternate Use

	5% "But For"	9% "But For"	10% "But For"	Alternate Use
ROI	-44%	0%	12%	33%

NET CHANGE IN PUBLIC BENEFIT

In most cases, tax credits have intangible public benefits that cannot be captured by traditional economic impact estimates. Such benefits may be stated or implied as the intent—or part of the intent—of a credit, or they may simply accrue as an externality, or side effect, of the credit.

The R&D tax credit is intended to lower the cost of private research with spillover benefits to the public. For instance, the internet has redefined commerce, information, and even social relationships. This is a striking example of the massive spillovers from an innovation that are not necessarily captured by one firm's profits. Other examples abound. Research has shown that the publicly-ideal level of R&D is not achieved by private industry without subsidies. Through tax credits, federal and state governments seek to increase research activities that have positive external benefits to society at large.

Research and development may elevate the profile of the state and local business environment. Businesses engaging in R&D may cluster together and draw suppliers to the region as well. One major beneficiary of the Georgia R&D credit interviewed for this study cited two significant suppliers of R&D-derived intermediate inputs that have relocated to facilitate closer collaboration. These suppliers, who in turn conduct their own research and development, create additional jobs and economic impact that may not be captured by a static economic impact model due to the simple fact that such relocations typically occur over a fairly long time horizon.

A second public benefit not captured in a traditional impact analysis is investment in local and state education systems by R&D companies with the intent of growing a pipeline of future employees. This public benefit came to light in an interview with a major beneficiary of the credit who cited savings from the credit as one factor enabling this type of public-private partnership. An investment in schools by a private R&D firm highlights a benefit that accrues to students whether or not they ultimately end up working for that particular employer.

2. Background

This study is a review of the Georgia Research and Development Tax Credit (O.C.G.A. § 48-7-40.12) conducted in accordance with the Tax Credit Return on Investment Act of 2021, also known as Senate Bill 6 (SB6). SB6, passed during the 2022 legislative session, requires periodic evaluation of Georgia tax credits and exemptions on a rolling five-year basis. SB6 tax exemption studies are required to include a brief history of the exemption, a review of existing literature or academic research on similar exemptions, an estimate of forgone tax revenue, and any additional costs or revenues incurred by the state in administering the exemption. Studies are required to include an estimate of the economic impact of the exemption on the state economy and an estimate of the overall return on investment (ROI) of the credit or exemption. Most importantly, evaluations must address the question of whether the taxpayer's spending and the accompanying economic impact would have occurred in the absence of the exemption, a topic commonly referred to as the "but for" question. This study is one of three produced under contract with the Georgia Department of Audits and Accounts by the Carl Vinson Institute of Government at the University of Georgia.

HISTORY

Georgia's research and development (R&D) tax credit was signed into law in 1997, allowing the credit to be claimed in taxable years beginning on or after January 1, 1998. The credit remained unchanged until 2009, when the incentive calculation formula was altered and Georgia Department of Revenue (DOR) form IT-RD was updated. Amendments to the credit occurred in 2010, 2012, and 2018. In 2017, the tax credit was reviewed by Georgia State University's Fiscal Research Center for the Senate Study Committee on Special Tax Exemption (FRC 2017). The FRC study found that the credit stimulates additional research activities in the state, though the data were insufficient to determine the extent of its impact.

PURPOSE

Tax credits and tax exemptions are typically designed to encourage certain types of taxpayer behavior by reducing the cost of a specifically targeted activity by the amount of the credit or exemption. Although the intent of the Georgia R&D tax credit is not stated specifically in the enabling legislation, the analysis that follows assumes that it is intended to encourage spending, and ultimately incremental activity, in the area of research and development of new products and services. Thus, the underlying assumption is that lowering the cost of an economic activity, such as spending on R&D, encourages greater participation in the activity (FRC 2017). State governments generally enact targeted tax credits and exemptions to either attract new businesses to the state or to encourage the expansion of existing businesses, with the goal of growing employment and subsequent tax revenues.

Tax incentives are evaluated based on their effectiveness in accomplishing their stated or implied objectives. Consequently, numerous methods exist by which they may be evaluated. Objectives may range from simply raising tax revenues to growing jobs, to encouraging expansion of specifically targeted industries. Objectives may also be of a broader nature, such as encouraging research that benefits society as a whole (Wheeler 2005). Medical studies that seek to better understand a particular disease, as opposed to trying to develop a specific, marketable drug to treat it, are an example of such research.

While the R&D tax credit may certainly achieve some objectives of fostering increased basic research, it is assumed for the purposes of this study that its primary intent is to encourage growth and expansion of industries engaged in R&D in Georgia and to stimulate growth of high-paying jobs in these industries. To that end, the tax credit may be deemed successful if it generates a positive return on investment (ROI). ROI is a performance measure used to evaluate the profitability of an investment. ROI measures the amount of return on a particular investment, relative to the investment's cost. ROI can be used to evaluate the efficiency of a tax incentive where a positive ROI occurs when the cost of the tax incentive, as measured by forgone tax revenue plus any costs incurred in administering the incentive, is less than the economic benefits that accrue to the state as a result of the incentive.

IMPLEMENTATION

The State of Georgia provides a tax credit equal to 10% of a business enterprise's increase in qualified research expenses conducted in Georgia (O.C.G.A. § 48-7-40.12). The increase refers to the excess of qualified research expenses over a base amount. This base amount is the product of the business enterprise's Georgia gross receipts in the current taxable year and the average of the ratios of its aggregate research expenses to Georgia gross receipts for the preceding three taxable years or 0.30, whichever is less. This credit is only granted to Georgia businesses claiming and receiving the federal R&D credit (IRS Section 41). In any one taxable year, claimed credit is limited to 50% of the business's remaining Georgia net income tax liability after all other tax credits have been applied. If the amount of the state R&D credit exceeds this limit, the excess credit may be used against payroll withholding for the first five years after a business is formed. Unused credits can be carried forward up to 10 years.

As defined by O.C.G.A. § 48-7-40.12, qualified research expenses (QREs) include both in-house and contract research expenses. Filers must submit DOR Form IT-RD and Federal Form 6765 with their Georgia income tax return for each year in which QREs were incurred. QREs include employee wages, supplies, and computer leasing expenses. Indirect costs related to the research such as the research department's overhead expenses, depreciation on property used in the research process, and general corporate overhead are not QREs. Only 65% of payments for qualified research by a contractor are included, but for a qualified research consortium, 75% of payments are included. The qualified research must be conducted for the purpose of

discovering information that is technological in nature and which is intended to be useful in the development of a new or improved business component. Substantially, all of the activity must relate to the process of experimentation with respect to a new or improved function, performance, reliability, or quality.

The following example demonstrates how the Georgia R&D tax credit works in practice. The first step is to calculate the base QREs. If a taxpaying entity, whether it be an individual or a corporation, has $100,000 in QREs in 2017, $200,000 in 2018, $225,000 in 2019, and $300,000 in 2020, the base amount used to calculate the credit's value in 2021 would be $206,250. In this example, this same taxpayer incurred $375,000 in QREs for tax year 2021, indicating that excess QREs over the base amount total $168,750. To calculate the value of the credit, the taxpayer takes 10% of these excess QREs, or $16,875. This is the value of the R&D tax credit before any other credits are accounted for. Assume that this taxpayer also has a tax liability of $30,000 in 2021 after all other credits are applied. In this case, only $15,000 of the original credit value is claimed for the current tax year, as state law limits the use of R&D credits to 50% of current-year tax liabilities. The remaining $1,875 in credit value is then eligible to be carried forward for a period of, at most, 10 years.

3. Utilization

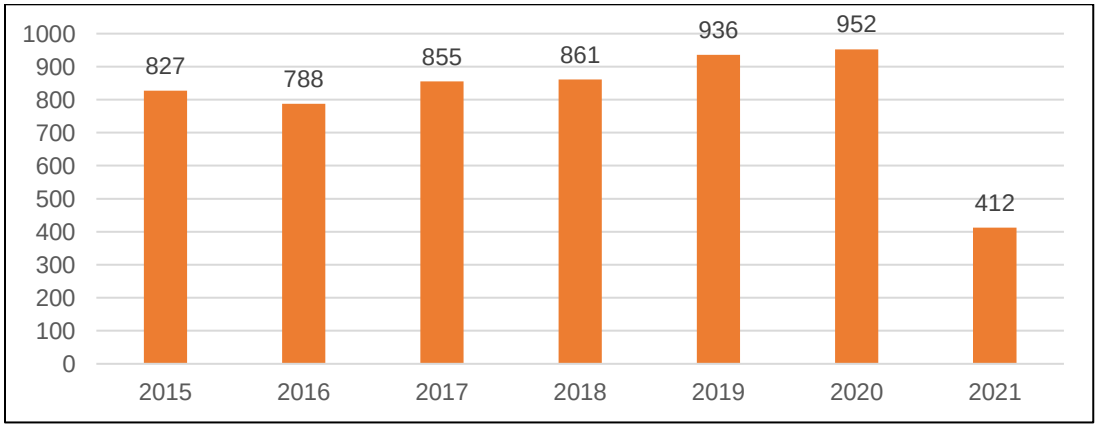
In general, the number of taxpayers utilizing the credit and the amount approved under the credit has been on an upward trajectory in recent years. Each year, the amount claimed makes up a small proportion of the amount approved. Most taxpayers utilizing the exemption transfer the credit to another entity with the tax liability to absorb it. On average, Georgia's R&D tax credit captures 46% of total private R&D spending in a given year. Taxpayers in the manufacturing sector are the main users of the credit. The proportion of the credit being awarded to Georgia-based companies increased from 58% to 77% from 2015 to 2020.

NUMBER OF TAXPAYERS IMPACTED

Figure 1 shows that the number of taxpayers claiming Georgia's R&D tax credit increased by 15% from 2015 to 2020. Only from 2015 to 2016 did the number of taxpayers claiming the credit decrease. Note that some data for 2021 are not yet available, so the low number for that year may not be meaningful. Although the amount of credit approved decreased by 37% from 2015 to 2016, the number of taxpayers claiming the exemption only decreased by 4.7%.

While the number of taxpayers approved for the exemption is on an upward trajectory, most taxpayers do not receive the credit consistently year after year. Between 2015 and 2021, a total of 2,178 unique taxpayers had an amount approved in one or more years. Only 42 companies (1.8%) received the credit all seven tax years, from 2015 to 2021. Five-hundred-and-twenty-eight companies (24.2%) received approval in 2015–2020 but were missing in 2021. A total of 791 taxpayers (36.3%) were approved for the tax credit only once between 2015 and 2021. Another 507 taxpayers (23.3%) were approved for the credit only twice. These results highlight the fact that many companies utilizing the credit do not consistently increase R&D spending from year to year.

Figure 1. Number of Taxpayers Approved Under Georgia's R&D Tax Credit by Year, 2015–2021

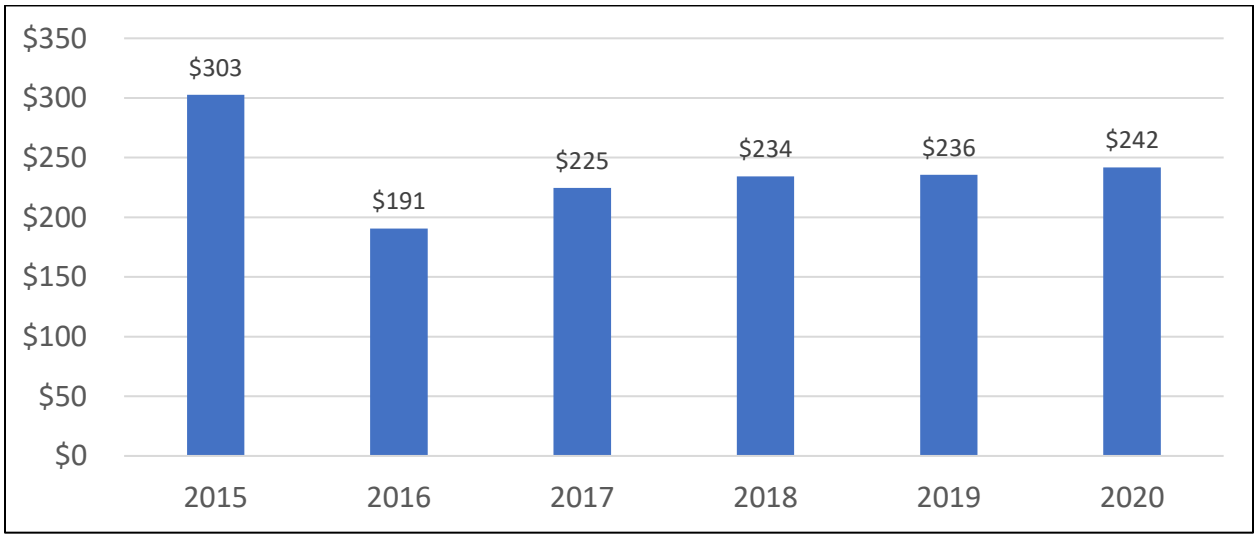


Source: Georgia Department of Revenue 2022

AMOUNT OF TAX EXPENDITURE

Figure 2 shows that the total amount approved for the Georgia R&D tax credit over the 2015–2020 period was $1.43 billion, with an average of $238.3 million approved per year. The year 2015 stands out, with $302 million approved. The total amount approved dropped by 37% from 2015 to 2016. After the large decrease in R&D activity between 2015 and 2016, the amount approved increased each year through 2020. The largest percentage increase was from 2016 to 2017 at 18%. Year-over-year increases from 2017 to 2020 were less significant at 1–4%. Determining whether a given firm ended R&D operations in Georgia or failed to apply for the state R&D credit is beyond the scope of this evaluation. It is possible that many firms continued R&D operations in Georgia without a year-over-year increase in QREs, rendering them ineligible for the credit.

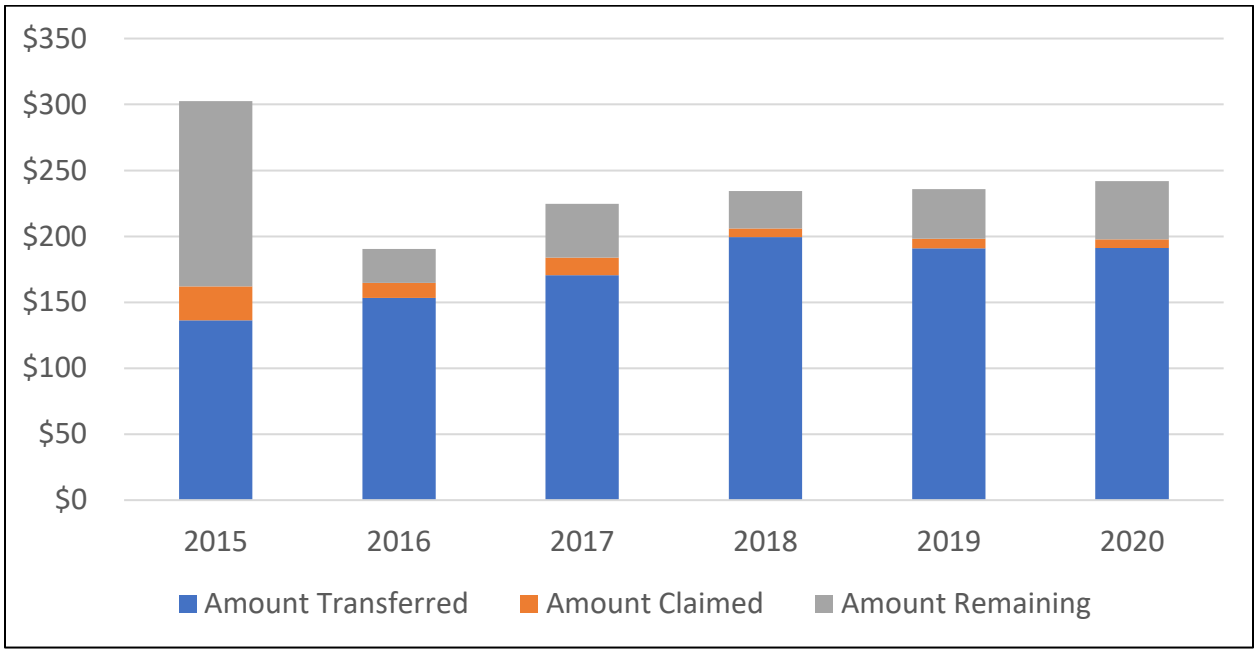
Figure 2. Amount Approved Under Georgia's R&D Tax Credit by Year, 2015–2020 in millions of dollars



Source: Georgia Department of Revenue, 2022

Tax credits for R&D can be claimed, transferred, used to offset payroll withholding, or carried forward up to 10 years (Figure 3). Most companies claiming Georgia's R&D tax credits do not have enough tax liability to claim anywhere near the amount approved, and these companies largely transfer the credit to a partner or parent company. For the purposes of this evaluation, the amount claimed and amount transferred can be thought of as a total "amount used" by either the company performing the R&D activity or a company with which the original company has a tax relationship. The amount remaining is the amount approved minus the amount used, signifying the amount that could be claimed or carried forward in future tax years. The total amount approved is the most relevant figure in this evaluation, as those approved dollars are already earmarked for the tax credit whether or not they are claimed, transferred, or remaining in a given year. The following analysis assumes that the entire amount approved for a given company will be utilized at some point during the carry-forward period; that is, firms will not leave money on the table.

Figure 3. Amount Claimed, Transferred, and Remaining Under Georgia's R&D Tax Credit by Year, 2015–2021 in millions of dollars



Source: Georgia Department of Revenue 2022

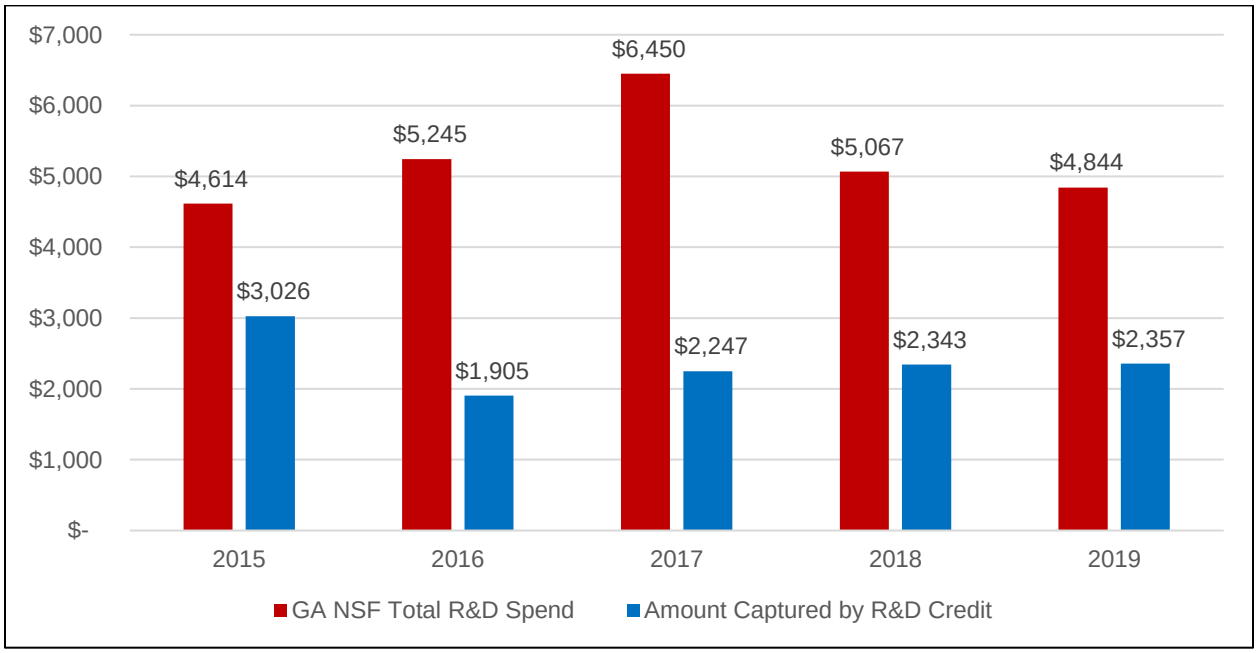
The tax credit does not capture the full amount of private R&D spending in Georgia. This is by design, since the tax credit can only be claimed on a business enterprise's increase in qualified research expenditures from one year to the next. The research team used data from the Georgia Department of Revenue and the National Science Foundation's National Center for Science and Engineering Statistics (NSF NCSES) to compare total private R&D spending in the state of Georgia to the amount captured by the tax credit (GA DOR 2022; NCSES 2022). Overlapping data from both sources was only available for years 2015–2019. Figure 4 shows that during this time frame, the average proportion of total R&D spending in Georgia captured by the tax credit was 46%. The year 2015 again stands out, with Georgia's R&D tax credit capturing 66% of the total R&D spending in the state. The year with the lowest proportion of total R&D spending captured by the tax credit was 2017 at 33%.

The difference in trends between the total amount spent on R&D in Georgia, as reported by the NCSES, and the amount captured by the tax credit serves as a measure of the extent to which firms utilize the credit. If the number of companies performing R&D in Georgia stayed consistent each year and each company increased its R&D expenditures year over year, the proportion of R&D spending captured by the tax credit would remain constant and the total would increase proportionally with total R&D spending. However, based on Figure 3, it is evident that the proportion of R&D spending captured by the tax credit changes over time. This is due to several factors including the entry and exit of new firms into the Georgia market and

the time that it typically takes for new R&D activities to produce marketable products and thus taxable income.

When total R&D spending increases but the proportion captured by the tax credit decreases, as in 2015 to 2016, we would expect that the number of companies claiming the R&D tax credit decreased. When the number of companies claiming the R&D tax credit in Georgia decreases, those companies either halted R&D operations in Georgia or did not increase their year-over-year R&D expenditures. When total R&D spending decreases but the proportion captured by the tax credit increases, as in 2017 to 2019, we would expect that the number of companies claiming the R&D tax credit increased, though each new company likely made up a very small proportion of total spending.

Figure 4. Total Private R&D Spending in Georgia Versus Amount Captured by Georgia's R&D Tax Credit by Year, 2015–2019 in millions of dollars



Source: Georgia Department of Revenue 2022; NSF NCSES 2022

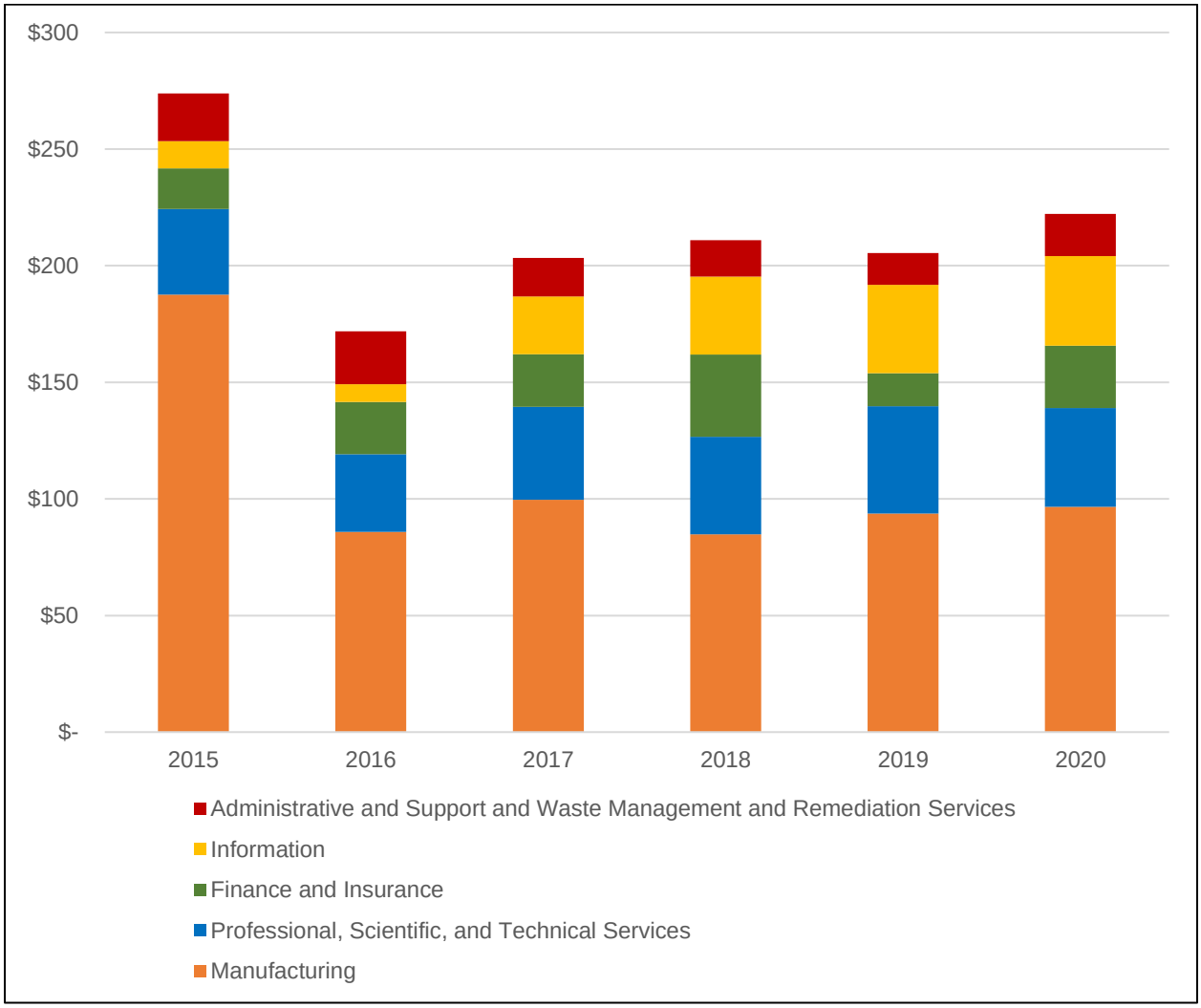
INDUSTRIES OF TAXPAYERS UTILIZING THE EXEMPTION

Figure 5 shows that the top five NAICS sectors utilizing Georgia's R&D tax credit over the 2015–2020 period in order of amount approved were manufacturing, professional/scientific/technical services, finance and insurance, information, and administrative/support/waste management/remediation services.[1] The proportion of the total amount approved by each of these top five sectors remained largely consistent aside from

[1] The North America Industry Classification System (NAICS) is the standard used by federal agencies to classify businesses based on type of economic activity.

manufacturing, which dropped by 54% from 2015 to 2016. Information saw the largest percentage increase in amount approved, jumping from 4% in 2015 to 16% in 2020. Information likely saw large gains due to increasing investments in internet and data storage improvements.

Figure 5. Top 5 Industries Utilizing Georgia's R&D Tax Credit by NAICS Sector and Year, 2015–2020 in millions of dollars

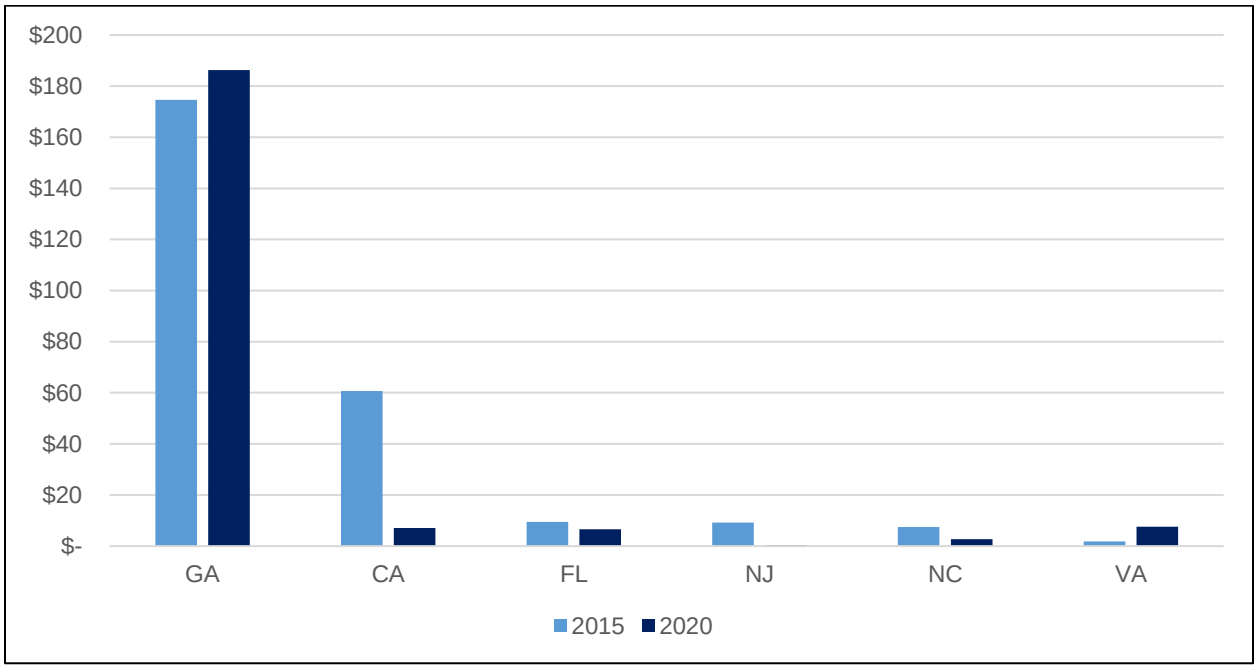


Source: Georgia Department of Revenue 2022

GEOGRAPHY OF TAXPAYERS UTILIZING THE EXEMPTION

Although the majority of Georgia's R&D tax credits go to Georgia-based companies, a significant amount is also claimed by firms located in other states that conduct R&D activities at Georgia-based facilities. Figure 6 indicates that California, Florida, and New Jersey together accounted for 26% of the amount approved in 2015. Georgia-based companies have a growing share of the amount approved under the R&D tax credit. From 2015 to 2020, the proportion of tax credits approved for Georgia-based companies grew significantly from 58% to 77%.

Figure 6. Amount Approved Under Georgia's R&D Tax Credit by State in 2015 Versus 2020 in millions of dollars



Source: Georgia Department of Revenue 2022

4. Research & Development Tax Credits in Other States

This section reviews R&D tax credit programs in three nearby states: South Carolina, Florida, and North Carolina. These southeastern states are Georgia's closest competitors geographically. South Carolina's R&D credit is 5% of expenditures, while Georgia and Florida credit 10% of expenditures. Florida allows for credits to be carried forward only 5 years, while Georgia and South Carolina allow a longer carry-forward period of 10 years. Despite eliminating its R&D tax credit in 2015, North Carolina continues to be the top southeastern state for R&D.

SOUTH CAROLINA

South Carolina first introduced a tax credit for R&D expenses in June 2001 (KBKG 2022). The Palmetto State offers a fairly competitive incentive for R&D activity, as it considers credits for all expenditures incurred in a taxable year within state boundaries. The credit is equal to 5% of these expenditures, which is unique as most R&D credit programs—including Georgia's and the federal R&D credit—calculate eligible expenses over a base amount to determine the value.

The value of the credit for any single taxpaying entity may not exceed 50% of that entity's tax liability within a single given year. The state allows for a 10-year carry-forward for any unused credit value. For example, if a company engaging in research in South Carolina incurred expenses related to R&D in 2021 that amount to $1 million, it would be eligible to claim a tax credit of 5% of that value, or $50,000, in that calendar year. If the company has a tax liability of $75,000 in that calendar year, then only $37,500 of the $50,000 credit may be used in that year. The remaining $12,500 may be carried forward for a period of up to 10 years, and the company must claim this unused credit amount by 2031 or risk losing up to 25% of the credit's initial value.

Tax credits are often amended by state legislatures to increase their effectiveness or to better tailor intended impacts to state economic needs or for various other reasons. Most recently, the South Carolina General Assembly passed S. 677, which authorizes taxpaying entities that receive R&D credits to transfer the value of the credit to members of partnerships and LLCs that originally received the credit. There are currently no limitations to this practice, beginning in May 2021.

FLORIDA

Florida first introduced a tax credit for R&D activities in 2012 and has made changes to its structure over time (KBKG 2022). As of March 2022, C corporations within the state are eligible to claim a tax credit of 10% of QREs over a base amount, calculated as the average of the previous four tax years' QREs. If a company has not been in existence for at least four tax years, the credit is reduced by 25% for each year in which the business enterprise, or a predecessor

corporation, did not exist. Additionally, a company may not receive an R&D credit for more than 50% of its annual tax liability once all other credits have been applied. If there is any credit value left unclaimed at the end of a tax year, the firm may carry forward this value for a period of five years. Finally, a company must claim the federal R&D credit in order to receive the Florida credit.

Florida's R&D tax credit is notable for two main reasons: a statewide cap on credit values and the need to be qualified as a "target business industry" by the Florida Department of Economic Opportunity. Since the inception of the credit, Florida has capped the annual gross amount of R&D tax credits available. For example, in 2018 the cap was $16.5 million. After 2018, Florida has capped the value of its R&D credits at $9 million per year. If this number is reached at any point, the state will allocate credits on a prorated basis. Additionally, Florida has attempted to tailor its R&D credit to the following narrow set of industries managed by the Department of Economic Opportunity:

- Life Sciences
- Information Technology
- Aviation/Aerospace
- Homeland Security/Defense
- Emerging Technologies
- Cloud Information Technology
- Marine Sciences
- Materials Science
- Nanotechnology Industries
- Manufacturing

The following example shows how Florida calculates R&D tax credits for corporations within its borders. A C corporation engaging in R&D activities in the nanotechnology industry in 2021 would be eligible for the Florida R&D credit. Imagine that this corporation had R&D expenses of $200,000 in 2017, $250,000 in 2018, $300,000 in 2019, and $350,000 in 2020. The base amount of QREs would be the average of spending during this period, or $275,000. If the corporation then spent $400,000 on R&D expenses in 2021, it would be eligible for a credit value of $12,500. If the same company has a tax liability of $20,000 in 2021 after all other credits have been accounted for, it would only be allowed to claim $10,000 of the credit for that tax year; the other $2,500 may be carried forward for up to five years. However, this value could decrease if the state reaches $9 million in credit awards within a given year as credits are prorated accordingly.

NORTH CAROLINA

Unlike Florida and South Carolina, North Carolina ceased implementation of its tax credit for R&D expenditures in 2015 (PMBA 2022; Loughead 2022). The original tax credit was introduced in 1996. Prior to repeal, North Carolina offered a 3.25% tax credit for small businesses and research activities in "development Tier 1" areas, 20% for university-related R&D expenses, and

a 35% rate for "eco-industrial parks." For a period of time, the state also offered a variable credit rate on all other R&D activities within the state. For taxpaying entities that engaged in $50 million or less worth of R&D spending, North Carolina offered a credit of 1.25%. Entities engaging in R&D spending $50 million–$200 million received a rate of 2.25%. Finally, if an entity had expenses of over $200 million, it received a credit rate of 3.25%. Additionally, any unused credit amounts could be carried forward for up to 15 years. As of January 1, 2016, North Carolina no longer offers a state tax credit for R&D expenditures incurred within its borders.

North Carolina, a state with intensive R&D activities, eliminated its tax credit for R&D expenses but has not seen a drop in research activity or expenditures. In fact, the state has seen a notable jump in its innovation ranking since the repeal of its R&D credit (Rhoades 2022). In addition to continued success in the field of research, North Carolina has introduced other business-friendly reforms that have increased its economic competitiveness while bringing in enough revenue to lower its already-flat individual income tax.

5. Literature Review

GENERAL RESEARCH ON STATE R&D TAX CREDITS

This section explores the extant literature on the direct, indirect, and induced economic impacts of R&D tax credits and incentives. It is well-known that private R&D activities have significant benefits for both the individual firm/institution and society as a whole. However, the private rate of return is often below the social rate of return (Lucking et al. 2019). As such, less private R&D activity takes place than what is theorized to be socially optimal. Therefore, governments have devised three broad types of policies to stimulate private R&D: tax credits and direct subsidies, support for university research systems to stimulate human capital, and support for formal R&D cooperation across a wide variety of institutions (Becker 2015).

Several studies have concluded that spending on R&D in the private sector is elastic, meaning firms are sensitive to the cost of research (OTA 1995; Hall & Van Reenen 2000; Bloom et al. 2002). Even among studies that find weak elasticity, those at the country level suggest that R&D tax credits increase research expenditures by reducing firms' cost of research. States that offer R&D tax credits tend to have higher spending on R&D activity (Wu 2005). The literature also shows that state credits have a positive impact on the size of the high-tech business sector within that state (Wu 2008).

A 2006 study using a quasi-experimental design found that R&D credits increase spending and employment. Spending effects were widespread across all industries and firm sizes, but the positive employment effects were limited to large firms in high-tech industries (Ho 2006). However, the magnitude of this increased spending, particularly for state-level credits, appears to be low. In fact, evidence at the state level has shown mixed results, and any estimated increases are typically due to states recruiting research activities that already existed in other states. A 2009 study found that while generous state-level tax credits do increase long-term R&D spending in that state, this effect is "offset" by a corresponding drop in research expenditures in other states. This phenomenon suggests the aggregate effect of state credits on national R&D is likely close to zero, but that states that offer such a credit may recruit research activities and spending away from noncredit states (Wilson 2009). North Carolina appears to be an exception to this rule, as its Research Triangle Park provides an example of a public-private partnership that encourages innovation without the need for a state R&D tax credit.

MEASURING R&D ACTIVITY

Measuring R&D activity can be challenging. Most recent studies analyze R&D expenditures, R&D intensity, or patent counts to measure how state tax credits affect R&D activity. However,

accurately measuring expenditures can be complex as different data sets use different definitions of spending. Attempting to measure patent counts has several drawbacks: a high count of patents may not mean a high level of innovation as many patents are never implemented (Becker 2015). Comparing R&D tax credits is equally complex, as each state has different tax rates, calculation of QREs, carry-forward periods, and other rules.

To simplify this complex spectrum of state credits, many researchers use an indicator variable (0 = no credit, 1 = credit) for whether the state offers a tax credit (e.g., Berger 1993; Guenther 2007; Becker 2015). Others use a price variable that captures the marginal cost of R&D (e.g., Wilson 2009; Miller & Richard 2010; Schmidt 2021). Recent studies have inferred a tax credit effect by comparing sets of "treated" firms (those that receive a subsidy) to a control group of similar firms that do not receive the subsidy. Methodologically, most studies rely on ordinary least squares (OLS) regressions that use credits to predict expenditures. However, OLS regressions can be biased by unobserved differences between and among states. Consequently, many researchers incorporate fixed effects variables into their models to control for differences across industries, states, and/or countries.

In short, the process of evaluating and comparing state R&D credits is complex and constantly evolving. While unable to offer perfectly accurate results that account for every existing variable, evaluations of the effectiveness and ROI of R&D credits help lawmakers and researchers better understand a credit's impact on the sector it is targeting and on new economic activity in general.

NOTABLE EVALUATIONS

A significant body of academic research has sought to determine whether state R&D incentives have significant effects on R&D spending and employment (Gullickson & Harris 2008; Gullickson et al. 2011; Becker 2015; Girardi 2016; Lucking et al. 2019). This section first details previous evaluations of Georgia's R&D credit and then discusses two recent stand-out examples of R&D incentive evaluations from other states.

2017 Study of Georgia's R&D Tax Credit

In 2017, the Georgia Senate Subcommittee on Special Tax Exemption requested a review of six tax incentives by Georgia State University's Fiscal Research Center (FRC 2017). The purpose of this review was to determine the justification, effectiveness, efficiency, equity, and ROI of the incentives, along with other relevant criteria, such as budgetary risk and local government impact. After grading each incentive using these criteria, the FRC was asked to provide recommendations for the General Assembly moving forward. One of the six incentives evaluated was the Georgia Tax Credit for Qualified Research Expenses, or the Georgia R&D tax credit.

The FRC thoroughly examined the structure and administration of the credit. Administration of Georgia's credit is rather complex due to the need to calculate QREs and establish base amounts. The FRC proposed that the alternative simplified credit would be a better option for calculating the state credit.[2] The authors also speculated that Georgia's R&D tax credit may inadvertently provide an incentive for businesses to structure their R&D spending in an incremental fashion, though the FRC did not have the data needed to test this possibility. These factors resulted in the FRC scoring the credit as negative in the efficiency category. The FRC also indicated tradeoffs in terms of equity, as the credit is technically available to firms of all sizes, but the value of the credit decreases with the magnitude of the firm's gross receipts. The structure of the credit could place firms with higher expenses and lower profits at a disadvantage, though carry-forward provisions are included in an attempt to mitigate this situation.

The FRC found no local government impact from Georgia's R&D credit. Additionally, the state is subject to a budgetary risk because there is no annual limit on credits awarded. If R&D activity increased by an unexpectedly large degree and other tax receipts were low in a given year, the state could face budgetary imbalances. While the lack of a limit of R&D tax credits awarded increases the attractiveness of the credit to private firms, it also increases the budgetary risk to the state.

Overall, the FRC found the state R&D tax credit to be justified as "it has long been accepted that R&D activities are an example of a classic public good for which the benefits accrue not only to those engaged in the activity but to others in society" (FRC 2017, p. 9). The FRC also indicated that the subsidy could be responsible for attracting more activity to Georgia compared to other states. The FRC also pointed out that an increase in R&D spending would result in an increase in jobs with higher-than-average wages. The FRC lacked the data to measure the return on investment for Georgia's R&D tax credit in its 2017 study and emphasized the need for the Georgia DOR to enhance data collection so that ROI could be measured accurately.

The FRC offered two recommendations based on its evaluation and the criteria used to grade the state R&D tax credit. First, Georgia should consider requiring more in-depth reporting from the claimant firms. This would provide future evaluators a chance to better analyze the ROI of the credit. Second, the FRC suggested that the state should adopt the alternative simplified credit to simplify calculation for firms and reduce the administrative burden on the Georgia DOR.

[2] The Federal R&D Alternative Simplified Credit (ASC) is 14% of QREs that exceed 50% of the average QREs for the three preceding years, while the rate is reduced to 6% if a taxpayer lacks QREs in any one of the preceding three tax years. This form of calculation may be especially beneficial to taxpayers who do not have the resources to fully account for their R&D expenditures.

2017 Evaluation of Maryland's R&D Tax Credit

A 2017 evaluation of Maryland's R&D tax credit offers a thorough examination from which future efforts in Georgia may draw inspiration (Rehrmann et al. 2018). The Maryland Department of Legislative Services was tasked by the Maryland General Assembly's Tax Credit Evaluation Committee to examine five aspects of the tax credit: (1) the purpose for establishing the credit, (2) whether the credit's original intent was still appropriate, (3) whether the credit was meeting objectives, (4) whether goals could be more effectively carried out by other means, and (5) the cost of the credit to state and local governments.

The review examined R&D expenditures in various states relative to GDP. The review also explored which industries or institutions drove R&D spending within Maryland, the distribution of this spending, and the number of patents filed. The evaluation determined that Maryland is one of the most R&D-intensive states relative to its GDP. However, the study noted that the federal government is the driver of over half (53%) of R&D activity in Maryland, or $10.6 billion; this figure represents 30% of all federal R&D activities in the nation and is almost four times as high as the second-highest jurisdiction, the District of Columbia. This analysis revealed that private R&D in Maryland was significantly lower than the national average. Only 17% of R&D expenditures in Maryland were driven by private businesses; Alaska (13%) and New Mexico (5%) were the only states lower shares of private R&D.

Through its analysis of federal versus private R&D trends, Maryland's Department of Legislative Services determined that there is no evidence that its state R&D tax credit is effective, largely due to the design and implementation of the incentive (Rehrmann et al. 2018). Maryland's tax credit is based on a business's total recent R&D expenditures rather than incremental increases; this leads to a higher likelihood of tax incentives being provided for activities that would have occurred even in absence of the credit. The study also found that the credit is heavily concentrated within a few large, multistate corporations. Between 2000 and publication of the report in 2017, 11 out of 475 businesses had been awarded almost half of all R&D credits. The annual limit on aggregate credits awarded also reduced the value of Maryland's R&D credit in the more recent years. Overall, the credit was found to have provided only a limited direct incentive for companies to increase R&D expenditures.

Notably, the Maryland Department of Legislative Service's key recommendation was to terminate the state's R&D credit. The authors emphasized other options to incentivize innovation, such as targeted grants to small businesses. The authors suggested that if the credit were to be redesigned, offering incremental credits would be more effective. The report also identified the lack of performance metrics provided by the legislature as another issue and suggested that requiring such reporting would help future analyses determine whether the credit is accomplishing its goals. Finally, the review advised that credits carried forward should be monitored more closely.

2021 Evaluation of Iowa's Research Activities Tax Credit

The most recent and comprehensive evaluation of a state R&D credit to date is Iowa's 2021 review of its Research Activities Credit (RAC) (Schmidt 2021). This study is notable for its use of three different methodologies to evaluate the effectiveness of state R&D tax credits as tools to stimulate research inputs and outputs.

The first methodology tested the difference of means in research inputs and outputs across different states with and without R&D tax credits. If R&D credits are associated with increases in research inputs/outputs, the mean for credit states should be higher than noncredit states. The evaluation found that, on average, research inputs and outputs are higher in R&D credit states than in states without R&D incentives. However, there are two major problems with limiting the analysis to a difference of means. First, certain factors such as industry makeup, demographics, and general tax policy in each state could explain R&D spending more than a tax credit. Second, evaluating means alone does not control for temporal dependence, or "stickiness," in the data. For example, a state that currently engages in high levels of research spending will likely have higher research spending in the future, regardless of the presence of an R&D tax credit.

The second methodology involved multiple regressions to control for other differences among states and causal relationships, or "stickiness," in research expenditures. Finally, the third methodology incorporated the multiple regression results to predict economic outcomes across different scenarios, including termination of the state's RAC program. The researchers controlled for the other factors listed above and temporal dependence. The model predicted higher R&D spending and even marginally increased private employment per capita in the absence of the RAC.

After controlling for industrial composition, population demographics, and other state fiscal policies, the Iowa evaluation results suggested that R&D credits do not have a robust, positive effect on research inputs/outputs. Instead, the findings indicated that certain states tend to have a more favorable environment for research activities, unrelated to the presence of any R&D-specific incentive.

6. Economic Impact

This section presents estimates of the total amount of increased economic activity attributable to the R&D tax credit in Georgia. This includes additional tax revenues associated with new jobs or expanded work hours for existing jobs in R&D-related industries as well as the spillover effects to supporting industries (Demski 2020). Economic impact also includes tax dollars generated from construction of new facilities or other capital expenditures by firms engaged in R&D activities, as well as the indirect and induced impacts or "ripple effects" as employees in supporting industries spend their earnings on goods and services.

The analysis begins with estimates of total gross activity generated by the tax credit, followed by projections for R&D spending through 2025. Next, this section presents calculations of net economic activity generated by the tax credit divided by the amount of forgone tax revenue under several scenarios. Three scenarios assume different levels of R&D activity would have occurred "but for" the credit. These calculations allow for estimates of Georgia's return on investment from offering the tax credit.

HOW ECONOMIC ACTIVITY IS MEASURED

Economic impact modeling is a technique used to estimate how a new firm, facility, or policy change will affect a specific economy, such as a county, region, or state. Such estimates are often produced using an input-output model that first calculates a baseline forecast of economic activity for a geographic region and then estimates how shocks (inputs) to the economy alter economic activity (output). For this report, Institute of Government researchers estimated the economic impacts of the Georgia R&D tax credit.

Institute researchers use IMPLAN, a widely used and accepted economic model of the United States to estimate the economic impacts of changes to public policy (IMPLAN 2022). This model produces a baseline economic forecast using data from the US Census Bureau, the North American Industry Classification System (NAICS), the Bureau of Economic Analysis, and the Bureau of Labor Statistics as well as other data from the US Department of Commerce.

An input, or change to the economy, is added to the model. Inputs can be new jobs, labor income, increased demand for goods and services, or a variety of policy changes, such as a tax credit. IMPLAN estimates the overall change in economic activity resulting from the input. The economic measures reported by the model include the number of jobs supported, the labor income associated with those jobs, the value added (or lost) to the economy in the particular geographic region being studied, and the total economic output added (or lost) as a result of the change.

It is widely acknowledged that the R&D industry creates quality jobs. The benefits of quality jobs do not only accrue to those employed in research and development; there is a positive spillover effect attributed to indirect and induced activity in the surrounding area. It is important for an estimate of economic impact to capture all jobs created by the tax credit, including the jobs from direct employment, indirect jobs (associated with the supply chain), and induced employment. Employees performing R&D activities within a company constitute the direct workforce and are paid directly by the company. Indirect jobs are primarily at vendors who supply R&D firms with all the goods and services required for the firms' operations. Finally, induced employment includes all of the satellite businesses that spring up due to the increased spending in the region. The R&D direct workforce spends its wages on housing, utilities, groceries, restaurants, cars, and other goods.

IMPLAN utilizes economic multipliers to quantify direct, indirect, and induced effects for employment, labor income, value-added impact, and total output impact. Total output impacts are the most inclusive, largest measures of economic impact. Because of their high dollar value, total output impacts are often the most quoted figures in economic impact studies and receive the most media attention. One problem with total output as a measure of economic impact, however, is that it includes the value of inputs produced by other industries, which means that there is inevitably some double-counting of economic activity. The other measures of economic impact—employment, labor income, and value-added—are free from double-counting and provide a much more realistic measure of the true economic impact.

IMPLAN's value-added figure equates to an increase in state GDP, which consists of employee compensation, proprietor income, property income, and indirect business taxes. Value-added is equivalent to gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported). Because value-added impacts exclude expenditures from foreign and domestic trade, they are a more accurate measure of the actual economic benefits flowing to businesses and households in a region—in the case of this evaluation, Georgia—than the more inclusive output impacts.

GROSS ACTIVITY

The research team used 2018 data to calculate the economic impact of Georgia's R&D tax credit, as this was the most recent year for which the deadline for retroactive filing had passed. Gross Spending on R&D was calculated as the amount approved for the R&D credit multiplied by 10 since Georgia's R&D tax credit is equal to 10% of a business enterprise's increase in qualified research expenses. This economic impact was run as an industry output of $2.34 billion designated as scientific R&D services (IMPLAN code 464).

Table 1 presents the IMPLAN-estimated economic impact of Georgia's R&D tax credit for 2018. The first row shows that an industry output of $2.34 billion in scientific R&D services would

create an estimated 9,328 direct jobs. That means that each additional $1 million in R&D output increases the number of jobs in the R&D industry by 4. The total employment impact of 26,048 jobs includes direct, indirect, and induced employment. For each new R&D job, 1.8 additional indirect and induced jobs are created due to spending by the companies and employees performing R&D. Each $1 million in R&D output creates 11 total jobs across Georgia's economy.

Table 1 also shows that an industry output of $2.34 billion in scientific R&D services would create an estimated value-added impact of $2.62 billion. Value-added is defined as the total market value of all final goods and services produced within a region (Georgia) in a given period of time (2018). In other words, the value-added is the wealth created in Georgia by the increase in R&D activity. Thus, each additional $1 million in R&D output increases Georgia's GDP by $1.11 million. Total economic output was calculated at $4.95 billion in 2018 dollars. Again, the total output figure inevitably includes some double-counting as well as the economic impact to the US and the world, making it a poor measure of Georgia's payoff from a state tax credit.

Table 1. Economic Impact of Georgia's R&D Tax Credit in 2018
figures may not sum due to rounding

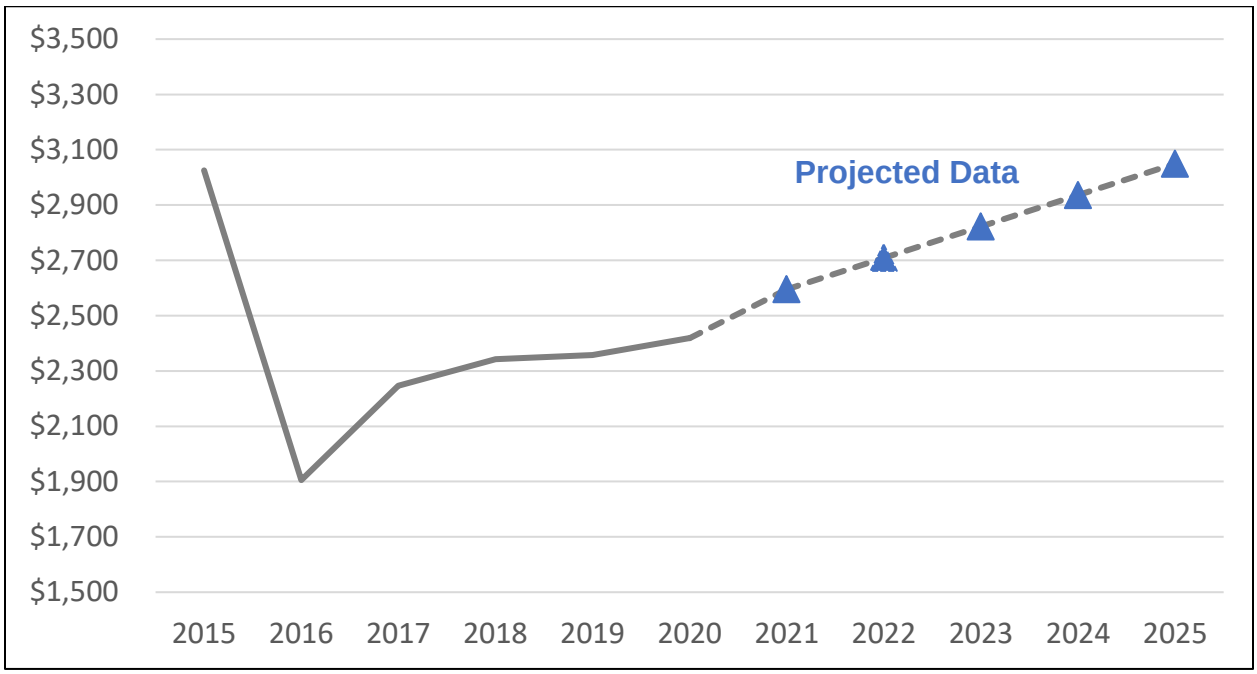
Impact	Employment	Labor Income	Value-Added	Output
Direct Effect	9,328	$817,368,353	$1,160,708,353	$2,342,943,320
Indirect Effect	8,773	$509,586,707	$779,118,507	$1,438,120,968
Induced Effect	7,946	$364,836,786	$680,453,994	$1,169,619,486
Total Effect	**26,048**	**$1,691,791,845**	**$2,620,280,855**	**$4,950,683,774**

Source: Georgia Department of Revenue 2022 & IMPLAN 2018 data

R&D SPENDING PROJECTED THROUGH 2025

To project future spending, the Institute research team calculated the trend in Georgia R&D spending using DOR data from tax years 2016–2020. Tax years 2015 and 2021 were not included in the trend calculation due to abnormally high and low values. Based on trends in R&D spending from 2016-2020, the Institute projects that spending on R&D will increase by approximately 4% per year. Figure 8 plots the estimates. R&D spending is projected to be $2.56 billion in 2021, increasing to $3.05 billion in 2025. These projections do not account for recessions or other major changes to R&D spending trends.

Figure 8. Amount of Increased R&D Spending Under Georgia's R&D Tax Credit, 2015–2025 in millions of dollars



Source: Georgia Department of Revenue 2022 & Carl Vinson Institute of Government 2022

"BUT-FOR" ANALYSIS

The purpose of state R&D tax credits is to increase R&D spending and employment within the state. Thus, states with R&D tax credits would be expected to have faster growth than states without R&D tax credits. To determine the extent to which state R&D tax credits stimulated R&D spending, the research team analyzed National Science Foundation (NSF) data. States were divided into two groups based on the presence or absence of an R&D tax credit. The researchers then calculated the average year-over-year percentage change in R&D spending from 2008 to 2019.

The average year-over-year percentage change in R&D spending among states without R&D credits was 5.26% compared to 10.43% among states with R&D credits. Thus, states with R&D tax credits saw year-over-year R&D spending grow 5% faster on average than states without R&D tax credits over the 12-year period from 2008 to 2019. The research team then used this figure as a proxy for the amount of additional spending on R&D that could be attributed to the presence of a tax credit. Stated differently, the Institute assumed that 95% of R&D spending (100% of R&D spending less the 5% that is attributed to the presence of the credit) in a given state (including Georgia) would have happened without—or "but for"—the tax credit.

This finding is consistent with other state R&D tax evaluations. Maryland's Department of Legislative Services "failed to find a correlation between a low tax liability for… R&D facilities and increased R&D and innovation. [Tax liability] also explains less than 5% of the difference in

a state's average ranking in each report" (Rehrmann et al. 2018, p. 42). The Iowa Department of Revenue evaluation reached a similar conclusion, stating that the presence of an R&D tax credit in a given state "has a weak—if any—effect on research inputs and outputs… Both the top corporate income tax rate and support for higher education have stronger impacts on research inputs and outputs" (Schmidt 2021, p. 35).

Based on this very simple measure, Georgia's 10% tax credit for R&D only increases R&D spending by about 5%. Even after extrapolating indirect and induced economic impacts, the value proposition of Georgia's R&D tax credit is low. These findings are consistent with the literature showing that—unlike the federal R&D credit, which has been proven to stimulate net activity in research, development, and innovation—reducing state tax liability on R&D expenditures does not significantly increase spending activity.

NET ECONOMIC ACTIVITY

For the purposes of this evaluation, net economic activity is calculated as gross economic activity in a given year minus a "but-for" reduction. The Institute research team created three scenarios representing different degrees of spending that would have occurred "but for" the state's R&D tax credit. The increased spending percentage figure for each actual DOR data year and each Institute-projected data year was evaluated using IMPLAN as an industry output event (under IMPLAN code 464, scientific R&D services), as in the gross activity analysis above. IMPLAN value-added figures were used to calculate the ROI, as value-added is the most accurate measure of the economic benefits accruing to Georgia (as it excludes double-counting, domestic trade, and foreign trade).

Table 2 displays the net economic impact of Georgia's R&D tax credit assuming that 95% of R&D spending in Georgia would have occurred but for the credit (Table 2). The 95% but for model is the most conservative model and fits most closely with findings from the literature. The amount of increased spending attributed to the credit is calculated as 5% of the total increased spending on R&D in a given year. The ROI of forgone tax revenue in any given year is 0.56, meaning that for every $1 of forgone tax revenue, Georgia's economy receives 56 cents in return, which is a negative ROI.

Table 2. Forgone Tax Revenue, 5% Increased Spending on R&D Due to Credit, and Value-Added Economic Impact; Projected by CVIOG based on R&D data supplied by DOR

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	$302,563,367	$190,548,634	$224,681,048	$234,294,332	$235,713,952	$241,844,708
Total Increased Spending on R&D	$3.025 B	$1.905 B	$2.246 B	$2.342 B	$2.357 B	$2.418 B
Increased Spending due to Credit (5%)	$151,281,684	$95,274,317	$112,340,524	$117,147,166	$117,856,976	$120,922,354
Value-Added	$166,767,854	$106,660,464	$124,187,480	$131,014,043	$132,533,647	$134,692,741

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	$259,504,050	$270,866,556	$282,229,061	$293,591,566	$304,954,071
Total Increased Spending on R&D	$2.595 B	$2.708 B	$2.822 B	$2.935 B	$3.049 B
Increased Spending due to Credit (5%)	$129,752,025	$135,433,278	$141,114,531	$146,795,783	$152,477,036
Value-Added	$144,276,250	$150,336,634	$156,381,535	$162,411,637	$168,427,617

Source: Georgia Department of Revenue 2022 & IMPLAN 2015–2021 data

ALTERNATE USE OF FORGONE REVENUE

The preceding section assumes that the state gives up tax revenue in order to stimulate economic activity in R&D industries, or, in the context of ROI, it "invests" foregone tax revenue seeking a "return" of increased economic impact. In a hypothetical "alternate use", scenario, the state could choose to eliminate the credit, collect the tax, and spend it in the same manner as all other tax collections. The three primary functions of Georgia tax dollars are education, healthcare, and public safety. In Georgia, 56.6% of state expenditures go to education: 42 cents of a given tax dollar collected goes to pre-k through 12th-grade education, and 15 cents goes to postsecondary education (Georgia General Assembly 2021). Health care accounts for the second-largest piece of Georgia's budget at 23 cents of every tax dollar collected. The remaining 20 cents of each tax dollar is spent on public safety, transportation, and other government services.

To compare the alternate use scenario to the 95% but for R&D spending scenario, the $234 million in foregone tax revenues attributable to the R&D credit is modeled as tax collected and spent on a typical set of state services. The outcome of this model is compared with the scenario where 5% of qualified R&D spending is assumed to be a direct result of the credit. This scenario was chosen for comparison because it represents the most realistic case of "but for" based on both CVIOG's calculations and a review of existing literature. Results of the alternate use scenario for 2018 as an example year are shown in Table 3. Table 4 shows comparable results for the 5% "but for" scenario. Clearly, the alternate use scenario comes out ahead in terms of creating jobs and value-added output.

It is useful to compare the incremental number of jobs created – including direct, indirect, and induced jobs – by each scenario (95% but for R&D spending scenario and alternate use scenario). For each $1 million of tax revenue collected and spent by the state of Georgia, 20 direct, state government jobs are created (Table 3). The number of direct jobs created by $1 million in R&D spending is significantly lower. For each $1 million in R&D spending generated by Georgia's tax credit, only 4 direct jobs are created (Table 4). Total jobs created by the two scenarios also differ significantly. For each $1 million of tax revenue collected and spent by the state of Georgia, 27 total jobs are created across the economy. For each $1 million in R&D spending generated by Georgia's tax credit, only 11 total jobs are created.

Though collecting and spending state revenue creates a larger number of jobs and gross labor income, jobs created by the R&D tax credit have a much higher average salary. Average salary can be calculated by dividing the direct labor income figure in each scenario by the direct employment. The average salary of a direct job in R&D is $87,700 while the average salary of a state government job is $38,184. R&D jobs typically require a higher level of education and skills than the average state government job, thus they are typically considered to be "high quality" jobs.

The alternate use scenario has a higher total value-added figure than the 95% but for R&D spending scenario. By collecting and spending $234 million in state tax dollars, the state of Georgia accrues $312.7 million in value-added impact (Table 3). This translates to an ROI of 33%, meaning that, for every $1 of tax revenue collected and spent by the state of Georgia, $1.33 accrues to the state in the form of value-added or GDP (Table 5). The ROI of the alternate use is significantly higher than the ROI of the 95% but for R&D spending scenario. To stimulate $117 million in R&D spending, the state of Georgia gives up $234 million in revenue. This foregone revenue only creates $131 million in value-added impact (Table 4). Dividing $131 million in value-added impact by $234 million in foregone tax revenue yields and ROI of -44%, meaning that, for every $1 of tax revenue foregone under the state R&D tax credit, only 56 cents in value-added impact, or GDP, accrues to the state of Georgia (Table 5).

A 91% "but for" scenario is the break-even point for ROI (Table 5). If 91% of R&D spending in Georgia would have occurred "but for" the tax credit, then for each $1 of forgone tax revenue, Georgia's economy receives $1 in return. The best-case scenario of increased R&D spending assumed by the research team was 10%, which assumes that for every $1 of reduced tax liability, firms increase R&D spending by $1. The ROI of this 90% "but for" scenario is positive but not high – for each $1 of forgone tax revenue, Georgia's economy receives $1.12 in return[3].

Table 3. Alternate Use of Forgone Revenue (assuming that tax revenue was collected and spent on a basket of state goods and services)
figures may not sum due to rounding

Impact	Employment	Labor Income	Value-Added	Output
Direct Effect	4,684	$178,854,754	$166,964,739	$234,294,330
Indirect Effect	437	$22,543,140	$38,368,445	$74,189,314
Induced Effect	1,174	$56,484,662	$107,376,947	$183,837,616
Total Effect	**6,295**	**$257,882,556**	**$312,710,131**	**$492,321,260**

Source: Georgia Department of Revenue 2022; IMPLAN 2018 data; FRC 2022

Table 4. 95% But-For Scenario (assuming that half of the amount of forgone revenue was reinvested in R&D spending)
figures may not sum due to rounding

Impact	Employment	Labor Income	Value-Added	Output
Direct Effect	466	$40,868,418	$58,035,418	$117,147,166
Indirect Effect	439	$25,479,335	$38,955,925	$71,906,048
Induced Effect	397	$18,241,839	$34,022,700	$58,480,974
Total Effect	**1,302**	**$84,589,592**	**$131,014,043**	**$247,534,189**

Source: Georgia Department of Revenue 2022 & IMPLAN 2018 data

Table 5. Return on Investment of "But For" Scenarios and Alternate Use (detailed 9% and 10% but for tables located in the appendix)

	5% "But For"	9% "But For"	10% "But For"	Alternate Use
ROI	**-44%**	0%	12%	**33%**

Source: Georgia Department of Revenue 2022; IMPLAN 2018 data; FRC 2022

[3] See appendix for detailed tables displaying 90% and 91% "but for" scenarios.

SUMMARY OF FINDINGS

In the example year 2018, the economic impact of R&D spending in Georgia ($2.34 billion) generated a value-added impact of $2.62 billion (Table 1). The industry output of $2.34 billion creates 9,328 direct jobs, meaning that each additional $1 million in R&D output increases the number of jobs in the R&D industry by 4. For each new R&D job, 1.8 indirect and induced jobs are created due to spending by the companies and employees performing R&D.

Using trends in NSF data, the Institute determined that the amount of increased R&D spending attributable to a given state's R&D tax credit is approximately 5%, meaning that 95% of R&D spending in Georgia would have occurred "but for" the tax credit. Under the 95% "but for" scenario, the ROI of the tax credit is negative: for every $1 of forgone tax revenue, Georgia's economy receives 56 cents in return. According to the Institute's analysis, collecting that same amount of revenue and spending it on a typical basket of state goods and services outperforms the R&D tax credit in terms of ROI. The ROI of the alternative use scenario in which state tax dollars are collected and spent is 33%, significantly higher than the best-case scenario of R&D spending (which had an ROI of 12%).

7. Fiscal Impact

This section presents estimates of the fiscal impact of the R&D tax credit on the state budget. This analysis provides a measure of the total change in state revenues attributable to the credit. The largest component of the total fiscal impact is forgone tax revenue resulting from the direct cost of the 10% credit on annual increases in R&D spending. This amount, projected to 2025, is shown in the top row of Table 6. Note that forgone tax revenue is the same for all "but for" scenarios. Because firms are assumed to spend additional dollars on R&D activities as a result of the credit (5% of spending attributed to credit), the state can expect to collect tax revenues on this additional spending. IMPLAN's estimates of these additional state tax revenues are shown in the second row of Table 6.

Other aspects of the fiscal impact calculation include additional state revenue, administrative costs to the Georgia Department of Revenue, and reduced state spending. Because there are no application fees or other costs associated with utilizing the credit, additional revenues to the state (typically fee revenue) are assumed to be zero. Based on conversations with Georgia Department of Revenue officials, no new positions have been created to administer or audit the R&D tax credit program, and personnel resources currently allocated to administering the credit are minimal; therefore, this cost is also assumed to be zero and is thus not included in Table 8. There are also no known reductions in state spending that result from the credit; hence, this is also assumed to be zero and is similarly not included in Table 6.

Overall, this analysis shows that the fiscal impact to the state is comprised primarily of foregone tax revenue, which is minimally offset by increases tax collections resulting from additional spending on R&D activities. Increased annual state tax collections range from a low of $3.2 million in 2016 to a high of $4.9 million in 2015. Increased state tax collections generally have an inverse relationship with forgone tax revenue, but the ratio of increased state tax collections with forgone revenue is not linear. The annual fiscal impact to the state of Georgia ranges from -$187 million in 2016 to a projected -$300 million in 2025.

Table 6. Fiscal Impact of the Research and Development Tax Credit, 2015–2025

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	–$302,563,367	–$190,548,634	–$224,681,048	–$234,294,332	–$235,713,952	–$241,844,708
Increased State Tax Collections	$4,904,424	$3,230,968	$3,768,139	$3,907,058	$4,047,647	$3,467,684
Fiscal Impact	–$297,658,943	–$187,317,666	–$220,912,909	–$230,387,274	–$231,666,305	–$238,377,024

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	–$259,504,050	–$270,866,556	–$282,229,061	–$293,591,566	–$304,954,071
Increased State Tax Collections	$3,868,228	$4,059,145	$4,251,990	$4,446,777	$4,643,521
Fiscal Impact	–$255,635,822	–$266,807,411	–$277,977,071	–$235,144,789	–$300,310,550

Source: Georgia Department of Revenue 2022 & IMPLAN 2015–2021 data

8. Public Benefit

In most cases, tax credits have intangible public benefits that cannot be captured by traditional economic impact estimates. These intangible benefits may be stated or implied as the intent—or part of the intent—of a credit, or they may simply accrue as an externality, or side effect, of the credit. Many economists believe that private markets do not provide the socially optimal amount of research (Jones & Williams 1998). Firms engage in research to maintain their place in the market by innovating better or faster than their competitors. They choose to invest in research when they think they can recoup their investment plus some profit. Economists generally think that this profit motive leaves some socially beneficial research undone because it may be difficult to internalize the benefit of the new innovation.

The R&D tax credit is intended to lower the cost of research with large spillover benefits that are hard for the innovating company to internalize through profits. Through tax credits, federal and state governments seek to increase research that has positive external benefits to society at large. In theory, this increases total social welfare because individuals and businesses alike benefit from the new ideas that otherwise would have never seen investment. The internet—which has redefined commerce, information, and even social relationships—is a striking example of the massive spillovers from an innovation that are not necessarily captured in one firm's profits (Fichtner & Michel 2015). Other examples abound. One need only to consider the impact that basic research aimed at sequencing the human genome has had on the development of advanced medical treatments, or the massive number of patents resulting from aerospace research that have been incorporated into common consumer products.

At a state level, research and development may elevate the profile of the state and local business environment. While traditional economic impact modeling is designed to capture the effect of increased employment, spending, and taxation within a region, it may fail to fully account for the clustering effect of businesses, suppliers, and customers. For example, one major user of the Georgia R&D credit was interviewed by the Institute for this evaluation. This user cited two significant suppliers of R&D-derived intermediate inputs that have relocated to facilitate closer collaboration. These suppliers, who in turn conduct their own research and development, create additional jobs and economic impact that may not be captured by a static economic impact model due to the simple fact that such relocations typically occur over a fairly long time horizon. These relocations may also add to the state's reputation as a good place to conduct business, another intangible that cannot be captured by a traditional quantitative impact analysis.

A second public benefit not captured in a traditional impact analysis is money invested in local and state educational systems by firms to help grow a pipeline of future employees for their business. This public benefit also came to light in an interview with a major user of the credit who cited savings from the credit as one factor enabling this investment. This investment highlights a benefit that accrues to students whether or not they ultimately end up working for that particular employer.

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Appendix

91% But For Scenario: Forgone Tax Revenue, 9% Increased Spending on R&D Due to Credit, and Value-Added Economic Impact; Data Projected by CVIOG based on DOR data

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	$302,563,367	$190,548,634	$224,681,048	$234,294,332	$235,713,952	$241,844,708
Total Increased Spending on R&D	$3.025 B	$1.905 B	$2.246 B	$2.342 B	$2.357 B	$2.418 B
Increased Spending due to Credit (9%)	$272,307,030	$171,493,771	$202,212,943	$210,864,899	$212,142,557	$217,660,237
Value-Added	$300,182,136	$191,988,836	$223,537,464	$235,825,277	$238,560,564	$242,446,933

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	$259,504,050	$270,866,556	$282,229,061	$293,591,566	$304,954,071
Total Increased Spending on R&D	$2.595 B	$2.708 B	$2.822 B	$2.935 B	$3.049 B
Increased Spending due to Credit (9%)	$233,553,645	$243,779,900	$254,006,155	$264,232,409	$274,458,664
Value-Added	$259,697,249	$270,605,940	$281,486,763	$292,340,946	$303,169,710

Source: Georgia Department of Revenue 2022 & IMPLAN 2015–2021 data

90% But For Scenario: Forgone Tax Revenue, 10% Increased Spending on R&D Due to Credit, and Value-Added Economic Impact; Data Projected by CVIOG based on DOR data

Year	2015	2016	2017	2018	2019	2020
Forgone Tax Revenue	$302,563,367	$190,548,634	$224,681,048	$234,294,332	$235,713,952	$241,844,708
Total Increased Spending on R&D	$3.025 B	$1.905 B	$2.246 B	$2.342 B	$2.357 B	$2.418 B
Increased Spending due to Credit (10%)	$302,563,367	$190,548,634	$224,681,048	$234,294,332	$235,713,952	$241,844,708
Value-Added	$333,535,707	$213,320,928	$248,374,960	$262,028,085	$265,067,293	$269,385,481

Year	2021	2022	2023	2024	2025
Forgone Tax Revenue	$259,504,050	$270,866,556	$282,229,061	$293,591,566	$304,954,071
Total Increased Spending on R&D	$2.595 B	$2.708 B	$2.822 B	$2.935 B	$3.049 B
Increased Spending due to Credit (10%)	$259,504,050	$270,866,556	$282,229,061	$293,591,566	$304,954,071
Value-Added	$288,552,499	$300,673,267	$312,763,069	$324,823,274	$336,855,233

Source: Georgia Department of Revenue 2022 & IMPLAN 2015–2021 data