

Report to the Governor and the General Assembly of Virginia

# Science and Technology Incentives

## Economic Development Incentives Evaluation Series



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# Summary: Science and Technology Incentives

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Virginia provides 11 incentives to promote science and technology economic activity by businesses in the state. Spending on these incentives totaled \$39 million in FY20 and \$176 million between FY11 and FY20. More than half (56 percent) of this amount was for the state's three research and development (R&D) incentives. Spending on science and technology incentives has grown over time and reached 10 percent of spending on state economic development incentives in FY20, primarily because of adoption of the major R&D tax credit.

## WHAT WE FOUND

### **Research indicates R&D incentives are effective, but Virginia's are too small to meaningfully increase statewide business R&D activity overall**

Virginia offers three R&D tax incentives—the major R&D tax credit, the R&D expenses tax credit, and the R&D sales tax exemption—to encourage private R&D activity in the state. Research suggests R&D tax credits increase R&D activity, particularly for smaller companies that are more likely to face credit constraints. While Virginia's R&D tax credits likely have increased R&D expenditures and activity for many of the companies using them, they have had limited impact on increasing statewide R&D activity because the total value of the credits over the last 10 years has equaled only 0.15 percent of overall R&D spending in the state during that period. However, even significant increases in funding for the tax credits would likely not have a meaningful impact on the state's business R&D activity: analysis suggests doubling the credit would only increase the state's business R&D intensity slightly. Other factors likely have a greater influence on R&D activity overall in the state, such as the strength of the economy and industry mix.

The measurable economic benefits and returns in state revenue from R&D incentives are negligible based on economic impact modeling, but the actual benefits are likely greater. The analysis does not capture the spillover benefits to other companies and only captures short-term impacts of the R&D tax credits. Though understated, the economic benefits of the R&D expenses tax credit are slightly higher than the major R&D tax credit, and this is likely because the R&D expenses tax credit targets smaller companies and has more features of a well-designed tax credit.

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## WHY WE DID THIS STUDY

Through language in the Appropriation Act, the General Assembly directed the Joint Legislative Audit and Review Commission (JLARC) to review and evaluate economic development initiatives. Topics include spending on incentives and activity generated by businesses receiving incentives; the economic benefits of incentives; and the effectiveness of incentives.

JLARC releases two reports each year: a high-level summary report on overall spending and business activity and an in-depth report on the effectiveness of individual incentives. (See Appendix A: Study mandate.) JLARC contracted with the Weldon Cooper Center for Public Service to perform the analysis for both reports.

This report is the sixth in the series of in-depth reports on the effectiveness of individual incentives and focuses on Virginia's science and technology incentives.

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### **Tax credit to encourage private investment in high-tech startup businesses has little impact on startup growth**

Virginia offers the Qualified Equity and Subordinated Debt Investments Tax Credit (angel investment tax credit) to encourage private equity investment in high-tech startup companies. The credit has had little impact on business startup growth because it is not well designed to ensure investments are made in startups with growth potential. The incentive does not target professional, experienced investors. In addition, startups assisted by investors receiving angel investment tax credits have not leveraged much additional private investment, which they need to grow. Because of these factors and the credit's lack of job creation requirements in return for receiving the incentive, this credit is estimated to have a negligible economic benefit and returns in state revenue.

### **State's programs providing financial assistance directly to startups help businesses innovate and grow**

Virginia offers two programs that provide financial assistance directly to startups. The Growth Acceleration Program (GAP) Funds make early, seed-stage equity investments in small technology and life sciences startups, and the Commonwealth Research Commercialization Fund (CRCF) program provides grants to small, high-tech startups that are also in very early stages of development. Both programs report high investment leverage rates, meaning projects have received additional private investments. The CRCF program has also helped Virginia remain competitive in receiving federal grant funding for small business innovation and research. The programs are well designed with a rigorous application and review process for awarding program funds, and program staff support to the assisted startups.

The GAP Funds program has a high economic benefit and return in revenue, in part, because proceeds from the sale, move, or public offering of a company in the program can fund future equity investments. The CRCF program has a low measurable economic benefit because grant recipients experienced low levels of employment growth, which is typical for this type of program because it leverages universities for research-related activity. However, steps are being taken to broaden eligibility to more sectors, which may enable faster growing projects to be funded, increasing the impacts of the program.

### **Space tax incentives have minimal impact on space activity**

Virginia offers three tax incentives to support increased space flight activity in Virginia. The incentives do not have much influence on increasing space activity in the state. They also have negligible economic benefits and returns in state revenue because most of the components for space flight vehicles launched in Virginia come from out-of-state or international suppliers.

Factors other than the incentives are much more influential in attracting space flight activity to Virginia. Virginia's Mid-Atlantic Regional Spaceport (MARS) is one of four

facilities nationally that has vertical launch facilities, and it has locational advantages on the East Coast. Virginia has also provided significant funding directly to support MARS, including \$15 million in annual operating appropriations, more than \$50 million in additional appropriations for infrastructure, and \$28 million in grants to companies to support infrastructure development at MARS.

### Most science and technology incentives have a negligible economic benefit

Program	Spending FY20	Incentive type	Economic benefit per \$1M of spending
Growth Acceleration Program (GAP) Funds	\$3.3M	Equity investment	●●●●
Commonwealth Commercialization Research Fund	1.9	Grant	●●○○
Major R&D tax credit	17.2	Tax credit	●○○○
R&D expenses tax credit	5.2	Tax credit	●○○○
Angel investment tax credit	3.9	Tax credit	●○○○
R&D exemption	5.3	Exemption	●○○○
Capital gains subtraction	0.9	Subtraction	●○○○
Space tax incentives	1.1	Exemption/ subtraction	●○○○
<b>Total</b>	<b>\$39.0M</b>		
Negligible ●○○○ Low ●●○○ Moderate ●●●○ High ●●●●			

SOURCE: Weldon Cooper Center economic impact analysis of incentives.

NOTE: The economic benefits of each incentive are assessed relative to the economic benefits of other incentives evaluated in this series to date. Economic benefits can range from negligible to high. See Appendix C for methodology for categorizing the economic benefits of each incentive. The venture capital subtraction is not included because it has not been used yet. The spaceport exemption and Zero G resupply subtraction are reported together to prevent disclosure of taxpayer information, because the tax subtraction has very few users.

## WHAT WE RECOMMEND

### Legislative action

- Prioritize the R&D tax credits for smaller companies that will likely benefit more from them.
- Improve the effectiveness of the major R&D tax credit by adjusting the reimbursement structure and prioritizing research conducted with higher education institutions.
- Eliminate the angel investment tax credit.
- Eliminate the space flight income tax subtractions after the current contract to resupply the International Space Station expires.

The complete list of recommendations and options is available on page v.





# Recommendations: Science and Technology Incentives

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## RECOMMENDATION 1

The General Assembly may wish to consider prioritizing Virginia's research and development tax credits for smaller companies by amending §§ 58.1-439.12:08 and 58.1-439.12:11 of the Code of Virginia to either (i) reallocate a portion of the Major Research and Development Tax Credit to the Research and Development Expenses Tax Credit cap or (ii) combine the two credits and give smaller companies priority for awards.

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## RECOMMENDATION 2

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to adopt a step-rate reimbursement structure for the Major Research and Development Tax Credit.

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## RECOMMENDATION 3

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to adopt an annual company-level cap for the Major Research and Development Tax Credit.

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## RECOMMENDATION 4

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to prioritize research conducted with Virginia higher education institutions for the Major Research and Development Tax Credit by providing a higher company-level cap for awards for such research.

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## RECOMMENDATION 5

The General Assembly may wish to consider eliminating the Qualified Equity and Subordinated Debt Investments Tax Credit by repealing § 58.1-339.4 of the Code of Virginia.

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## RECOMMENDATION 6

The General Assembly may wish to consider not renewing the investment periods for the (i) long-term capital gains subtraction, which ended June 30, 2020, and (ii) venture capital subtraction, which will end December 31, 2023.

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## RECOMMENDATION 7

The General Assembly may wish to consider amending §§ 58.1-322 and 58.1-402 of the Code of Virginia to eliminate the Zero G Zero Tax income tax subtractions after the current contract to resupply the International Space Station expires.

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**RECOMMENDATION 8**

The General Assembly may wish to consider amending § 2.2-2213 of the Code of Virginia to require the Virginia Commercial Space Flight Authority to include in its annual report a summary of (i) its six-year strategic plan, (ii) how available state funds have been spent to achieve the strategic plan goals to date, and (iii) the extent to which the strategic plan goals have been achieved to date.

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# Science and Technology Incentives

## *Economic Development Incentives Evaluation Series*

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Virginia provides economic development incentives to encourage business growth as part of its economic development strategy. To better understand the effectiveness of these incentives in stimulating business activity, the General Assembly directed the Joint Legislative Audit and Review Commission (JLARC) to conduct, on a continuing basis, an evaluation of the effectiveness and economic benefits of economic development incentives such as grants, tax preferences, and other assistance. (See Appendix A for the study mandate.) This report is part of a series of annual reports that provide comprehensive information about the effectiveness and economic benefits of individual economic development incentives offered by the state. JLARC contracted with the University of Virginia's Weldon Cooper Center for Public Service to perform the evaluation.

This report examines 11 science and technology economic incentive programs (Table). The Commonwealth provides three economic development incentives to promote research and development (R&D) of new and improved products and processes. They include the Major Research and Development Tax Credit, targeted to larger companies with R&D budgets of \$5 million or more; the refundable Research and Development Expenses Tax Credit, targeted to smaller firms with annual research expenditures less than \$5 million; and the Research and Development Sales and Use Tax exemption.

Five incentives are designed to encourage the growth of innovative startup businesses. Three incentives provide tax relief for individual investors of these businesses, including the state's "angel investor" tax credit (formally known as the Qualified Equity and Subordinated Debt Investments Tax Credit), the Qualified Business Long-Term Capital Gains Subtraction, and the Venture Capital Account Subtraction. Two incentives, the Growth Acceleration Program (GAP) Funds and the Commonwealth Research Commercialization Fund, provide financial assistance directly to startups.

Three programs provide tax incentives to Mid-Atlantic Regional Spaceport (MARS) users to encourage space launch activity at that facility. Two Zero Gravity Zero Tax income tax subtractions encourage companies to use the spaceport for human flight training or supplying the International Space Station. The Virginia Spaceport Users Exemption provides a sales and use tax exemption for inputs, components, and supplies used for activities undertaken at MARS.

State spending on these 11 incentives totaled \$176 million over the past decade (FY11–FY20). Annual spending on these incentives grew substantially over the period (from \$6 million in FY11 to \$39 million in FY20) because several of the incentives were adopted in FY11 or after (Table). The Major Research and Development Tax Credit is new (adopted in 2016), is by far the largest incentive evaluated in this report, and makes up most of the spending growth for these incentives. Forgone revenue for the Major

Research and Development Tax Credit was \$6 million in FY18, and this amount grew to \$17.2 million in FY20, making it among the largest of the state's incentives in FY20 in terms of spending. (See Appendix D, *Economic Development Incentives 2021*, JLARC 2021.)

**TABLE: Virginia's 11 science and technology incentives are covered in this report**

Program	Spending FY20	Spending FY11–FY20	Purpose		
			R&D activity	Startup growth	Space launch activity
Major Research and Development Tax Credit	\$17.2M	\$28.0M	✓		
Research and Development Exemption	5.3	39.1	✓		
Research and Development Expenses Tax Credit	5.2	31.5	✓		
Qualified Equity and Subordinated Debt Investments ("angel investment") Tax Credit	3.9	24.5		✓	
Growth Acceleration Program (GAP) Funds	3.3	21.6		✓	
Commonwealth Research Commercialization Fund	1.9	13.3		✓	
Space tax incentives (3 incentives)	1.1	6.7			✓
Qualified Business Long-Term Capital Gains Subtraction	0.9	11.1		✓	
Venture Capital Account Subtraction	0.0	0.0		✓	
<b>All programs</b>	<b>\$38.6M</b>	<b>\$175.9M</b>			

SOURCE: Weldon Cooper Center review of Code of Virginia and agency documents.

NOTE: Spending on tax credits includes amounts claimed.

Virginia, like many states, has adopted incentives to target high technology, bioscience, and other innovative sectors, hoping to enhance the state's reputation as a technology hub. These sectors also typically offer high-paying jobs and employ well-educated staff, which help to strengthen the state economy. Despite adopting these incentives, Virginia's performance on some key high technology indicators lags the nation. Virginia performs well on basic measures of high technology performance, but it lags on some indicators that reflect the vitality of private innovation and entrepreneurship, such as patent activity and R&D intensity (Table).

These incentives, however, likely have little influence on these measures. Many of the incentives are less well targeted than research indicates they should be, or they have limited ability to influence the key measures of vitality of innovation and entrepreneurship. The size of the incentives is also small compared with the statewide business activity in these areas, so the incentives cannot be expected to have a significant impact on business activity overall in the state. For example, the R&D tax credits represented less than 0.5 percent of estimated business R&D spending in Virginia in 2019.

**TABLE: Virginia performs well on basic measures of high technology performance but lags on measures indicating vitality of innovation and entrepreneurship**

<b>Measure</b>	<b>Virginia's rank among U.S. states</b>
<b>Basic measures of high technology performance</b>	
Federal R&D obligations per employed worker (2019)	5th
Federal Small Business Innovation Research/Small Business Technology Transfer Research grant funding per \$1 million in GDP (2016–2018)	6th
High Tech Employment (2020)	7th
<b>Measures of vitality of private innovation and entrepreneurship</b>	
Fast growth companies per 1 million residents (2021)	2nd
Venture capital per \$1 million in GDP (2019)	19th
Total R&D intensity (percentage of GDP) (2018)	25th
Patents per capita (2020)	27th
Business R&D as percentage of output (2019)	29th
University business startups per 100,000 population (2016-2020)	33rd

SOURCE: Association for University Technology Managers, U.S. Census Bureau; EMSI; Inc. Magazine 5000; National Science Foundation; U.S. Patent and Trademark Office, U.S. Census Bureau.

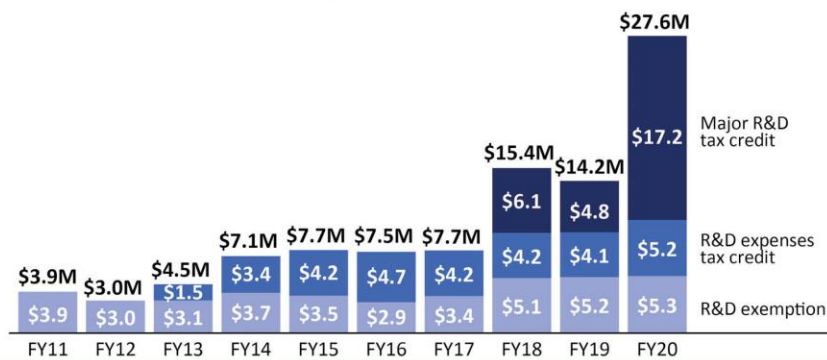
## RESEARCH AND DEVELOPMENT INCENTIVES

Encourage R&D activity in the state

### VALUE TO BENEFICIARIES

FY11–FY20

**Total tax savings: \$97.7M**



**Beneficiaries**



Companies that perform eligible R&D activities

### ACHIEVEMENT OF PURPOSE

**Research suggests R&D tax credits encourage additional R&D spending particularly for smaller companies**

**\$1 in credits** leads to additional

**\$1.75** in R&D spending for **smaller** companies



**\$1.25** in R&D spending for **larger** companies



**R&D tax credits are too small to have meaningful effect on state R&D business activity**

R&D tax credits equal

**0.15%**

of business R&D spending in Virginia

### IMPACT TO STATE ECONOMY FY11–FY20

**Economic benefit per \$1M in incentives**

Jobs, state GDP, and personal income



● ○ ○ ○ ○

● ○ ○ ○ ○

● ○ ○ ○ ○

**Return in revenue**

per \$1 spent



● ○ ○ ○ ○

● ○ ○ ○ ○

● ○ ○ ○ ○

● ● ● ● High  
● ● ● ○ Moderate  
● ● ○ ○ Low  
● ○ ○ ○ Negligible

Major R&D tax credit

R&D expenses tax credit

R&D sales tax exemption

NOTE: Impact to state economy is underestimated and does not include spillover effects and long-term effects of R&D spending.

# 1. Research and Development Incentives

Virginia offers three research and development (R&D) incentives to encourage private R&D activities in the state. The Major Research and Development Tax Credit (major R&D tax credit) and Research and Development Expenses Tax Credit (R&D expenses tax credit) both allow companies to earn tax credits for eligible R&D expenses (Table 1-1). The major R&D tax credit is targeted to companies with higher levels of R&D spending (more than \$5 million), and the R&D expenses tax credit is targeted to companies with smaller amounts of R&D spending. Companies may also claim the Research and Development Exemption, which allows them to purchase goods such as chemicals, lab equipment, and computer hardware and software used for eligible R&D activities tax free.

The U.S., along with Virginia and other states, has long recognized the importance of innovation through research and development to long-term economic growth. Countries with higher levels of R&D spending tend to have higher levels of GDP. However, private companies often *underinvest* in R&D from a societal standpoint because they do not capture the full returns from their investment. The benefits of R&D often “spill-over” to other companies (through improved products and processes) and the public at-large (reduced costs from improved products and processes). Thus, R&D is more beneficial to society than to the business performing R&D. For this reason, economists and policymakers often justify incentives to encourage R&D.

Virginia adopted its first R&D tax credit—the R&D expenses tax credit—in 2011 to be more competitive with 35 other states that already had R&D credits. Virginia’s R&D tax credit, like credits in many states, was modeled after the federal R&D tax credit, which was designed to incentivize companies to invest more in R&D than they otherwise would. This is accomplished by providing credits only for incremental R&D expenses over a base amount, though in some cases it may allow taxpayers to earn credits even if R&D expenses have decreased from prior years. Unlike many Virginia tax credits, the R&D expenses tax credit is refundable. It was also originally available to all companies with qualifying expenses. The General Assembly adopted the nonrefundable Major R&D tax credit in 2016 to incentivize larger amounts of R&D spending and restricted the original R&D expenses tax credit to smaller companies.

Even though Virginia adopted its tax credits later than most states, companies have been able to purchase goods for R&D activities tax free in Virginia for some time. Virginia adopted the R&D sales tax exemption when the retail sales and use tax was adopted in 1966 to “recognize the importance of research and development to the state’s industrial and economic progress.”

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**Spillovers** are used to justify government intervention in R&D. If one business creates something innovative, the knowledge often spills over to other businesses as they learn from the original R&D without having to pay the full R&D costs. Society also benefits because of the improved products and processes (safer vehicles, improved health care, etc.).

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TABLE 1 -1

## Virginia provides three incentives to encourage research and development

<b>Major Research and Development Expenses Tax Credit</b> (adopted 2016)	
<b>Purpose</b>	Promote research and development activities
<b>Eligible beneficiaries</b>	Companies with qualifying R&D expenses in Virginia greater than \$5 million. Qualifying expenses include employee wages, contract research expenses, and supplies. Expenses for research on human cells or tissue derived from induced abortions or from stem cells obtained from human embryos are not eligible.
<b>Credit features</b>	<p>Tax credit amount is 10% of the difference between qualified R&amp;D expenses during the taxable year and 50% of the average R&amp;D expenses incurred during the previous 3 years. For example, the tax credit amount for a taxpayer with \$8M in qualifying R&amp;D expenses in 2020 and an average of \$6 million in qualifying expenses in the prior 3 years would be \$500,000 or 10% x (\$8M – (\$6M x 50%)). If the taxpayer did not have qualified R&amp;D expenses in any one of the three prior taxable years, the tax credit is 5% of the qualified R&amp;D expenses in that taxable year.</p> <p>Nonrefundable tax credit that can be claimed against the individual and corporate income and bank franchise tax <sup>a</sup>. Capped at \$24 million <sup>b</sup> annually, with no per company cap. Credits are prorated among eligible applicants if amount exceeds the cap. Credit amount taxpayers can claim on tax returns cannot exceed 75% of their tax liability that year, and excess credits can be carried over for 10 years. Expires January 1, 2025.</p>
<b>Research and Development Expenses Tax Credit</b> (adopted 2011)	
<b>Purpose</b>	Promote research and development activities.
<b>Eligible beneficiaries</b>	Companies with qualifying R&D expenses in Virginia of \$5 million or less. Qualifying expenses are the same as the major R&D tax credit.
<b>Credit features</b>	<p>Credit amount can be calculated using one of two methods: (i) the original method, which is 15% of the first \$300,000 of expenses in a tax year above a base amount, which accounts for R&amp;D expenses and firm sales for prior years (or 20% if conducted with Virginia higher education institution), or (ii) a simplified method, which is the method used to calculate credits for the major R&amp;D Tax Credit and does not factor in prior year sales.</p> <p>Refundable tax credit that can be claimed against the individual and corporate income and bank franchise tax <sup>a</sup>. Capped at \$45,000 per company (or \$60,000 if conducted with Virginia institution of higher learning) and \$7.77 million <sup>b</sup> overall, annually. Expires January 1, 2025.</p> <p>If the total annual approved tax credit amount is less than the credit cap, Virginia Tax allocates the remaining amount, on a pro rata basis, to taxpayers already approved for the credit. These supplemental credits are equal to 15% of the second \$300,000 in qualified research expenses or 20% of the second \$300,000 if the taxpayer's base credit was based on qualified research that was conducted in conjunction with a Virginia public or private college or university (if the original method for calculating the reimbursement was used), or an amount equal to the excess of the applicable limitation to the base credit amount (if the simplified method was used).</p>
<b>Research and Development Exemption</b> (adopted 1966)	
<b>Purpose</b>	Promote research and development activities and recognize the importance of R&D to the state's industrial and economic progress.
<b>Eligible beneficiaries</b>	Companies that purchase tangible goods used for qualifying R&D activities that advance existing knowledge or technology; the development of new uses for existing products, technology, or processes; or the improvement of existing products, technology, or processes.



Research and Development Exemption (cont'd)	
<b>Exemption features</b>	<p>Tax exemption for tangible personal property purchased for use or consumption <i>directly and exclusively</i> in basic research or research and development in the experimental or laboratory sense.</p> <p>Exempt items when used directly and exclusively in research include laboratory tools, parts, components, and equipment; drugs, chemicals and raw materials; computer hardware and software; technical books and journals; papers and supplies, protective clothing, furniture; items used for transport or storage; heating and cooling equipment.</p> <p>Purchases of goods used for both exempt and nonexempt purposes are not eligible for the exemption. Purchases for secondary activities such as administration, general maintenance, product marketing, and other supportive activities are also not eligible for the exemption.</p>

SOURCE: Weldon Cooper Center review of the Code of Virginia and agency documents.

NOTE: Authorized by §§ 58.1-609. 3(5), 58.1-439.12:08, and 58.1-439.12:11 of the Code of Virginia.

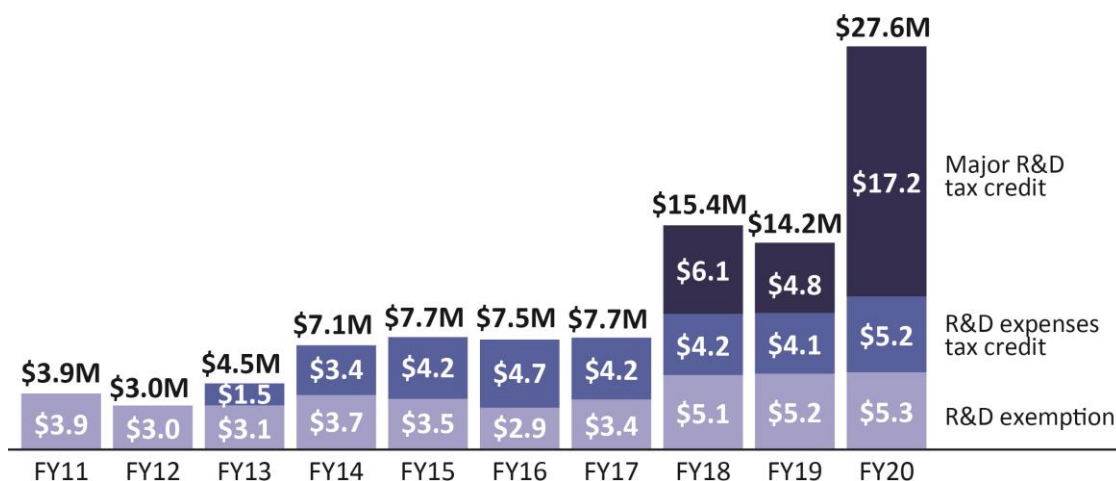
<sup>a</sup> Bank franchise tax is imposed on the net capital of banks and trust companies. <sup>b</sup> Annual caps increased effective taxable year 2021 and after for both the Major R&D (from \$20 million) and the R&D expenses tax (from \$7 million).

### Businesses saved \$28 million in taxes in FY20 with R&D incentives, primarily with the major R&D tax credit

Tax savings from Virginia's R&D tax incentives totaled nearly \$100 million during the 10-year period from FY11 to FY20. Prior to adoption of the major R&D tax credit, tax savings from R&D incentives averaged \$6 million per year. After adoption of the major R&D tax credit in 2016, average tax annual savings increased to \$20 million, with total savings reaching \$28 million in FY20. (Figure 1-1).

FIGURE 1-1

Tax savings from R&D expenses substantially increased after adoption of the major R&D tax credit (FY11–FY20)



SOURCE: Weldon Cooper Center analysis of economic development incentives.

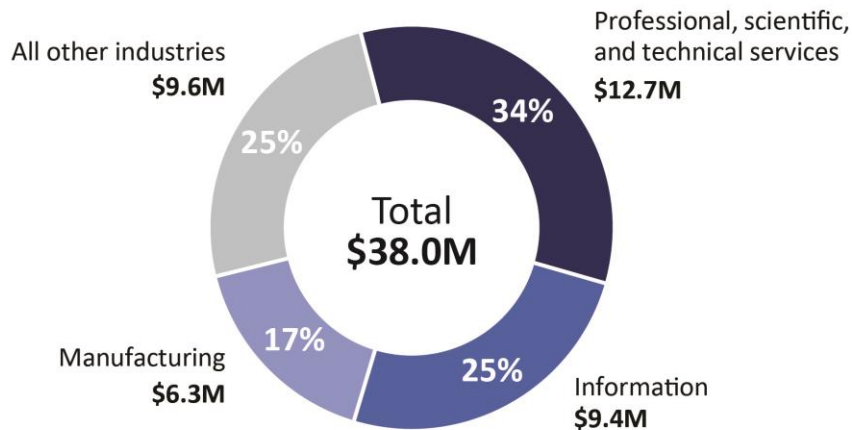
NOTE: Numbers may not sum because of rounding.

The average eligible taxpayer received larger savings from the major R&D tax credit than the R&D expenses tax credit, because the tax credit is targeted to companies with larger R&D expenses and does not have a per taxpayer cap. Average taxpayer savings were \$293,000 per return for the major R&D tax credit during the study period and \$23,000 per return for the R&D expenses tax credit, based on analysis of corporate returns. The R&D expenses tax credit, however, benefits more businesses. In FY20, more than 175 companies claimed the R&D expenses tax credit on tax returns compared with 39 companies that claimed the major R&D tax credit, based on corporate returns.

The majority (59 percent) of the R&D tax credit savings has been for companies in the professional, scientific, and technical services and the information industry sectors (Figure 1-2). Companies benefiting from the tax credits are concentrated in Northern Virginia, likely because of the proximity to Washington, D.C., and the high concentration of professional, scientific, and technical service industry employment in the region. (See online Appendix E for a map of R&D tax credits by locality.)

**FIGURE 1-2**

**Majority of tax savings from the R&D tax credits has gone to companies in the professional, scientific, and technical services and information sectors**



SOURCE: Weldon Cooper Center analysis of economic development incentives.

NOTE: Amounts are based on tax credits utilized for the R&D expenses tax credit (FY13–FY20) and major R&D tax credit (FY18–FY20) and are based on corporate returns only.

As intended, users of the R&D expenses tax credit are generally much smaller than major R&D tax credit users, based on employment size. Half of the companies receiving R&D expenses tax credits have fewer than 100 employees, while half of the companies receiving major R&D tax credits have 1,000 employees or more (Figure 1-3). Eligibility for the credits is contingent on R&D spending and not employment levels, but companies with higher employment levels likely have more resources to devote to R&D.

FIGURE 1-3

Companies receiving R&D expenses tax credits tend to be much smaller than companies receiving major R&D tax credits



SOURCE: Weldon Cooper Center analysis of economic development incentives.

Companies benefiting from the R&D exemption probably have a similar industry profile as companies that use the tax credits. Detailed information on R&D exemption users is not collected as with many other sales and use tax exemptions.

### Research indicates R&D tax credits increase R&D activity, particularly for smaller companies

The majority of empirical research studies address the impacts of R&D tax credits on R&D spending, and they find credits increase R&D spending. Early studies found that each \$1 spent on an R&D tax credit stimulates an additional \$1 of business R&D spending. More recent studies suggest that the multiplicative effect may be 2.0 or higher, suggesting \$1 in tax credits stimulates at least \$2 of additional business R&D spending. However, the effect of R&D tax credits on spending may be overstated, because some companies have mischaracterized expenditures as R&D-related to claim the federal credits. Some federal R&D credits were lowered by 20 percent after the companies were audited.

Less research has been conducted on R&D credits' impacts on other outcomes, but these studies also generally indicate tax credits increase R&D activity. Several studies have found that state R&D tax credits generated small increases in the number of R&D-related employees, establishments, and business startups. Studies have assessed the effect of R&D tax credits on patent activity and found that credits encourage firms to engage in more innovative projects, as measured by the estimated lifetime value of patents, and that a 10 percent reduction in R&D user costs are associated with nearly

a 30 percent increase in biotech patent filings. (See online Appendix N for more detail summarizing the research.)

Research has also examined effects of R&D tax credits by firm size and industry, with general consensus that smaller firms are more responsive to R&D tax credits than larger firms. Several studies have found that R&D tax credits, particularly refundable tax credits, have larger effects for smaller companies or for business startups because these businesses are more financially constrained and have less ability to obtain capital. Research on the effect of R&D tax credits in different industries has had conflicting findings on which industries benefit most.

Though the research on R&D tax credits is generally positive, several unresolved questions remain about how best to publicly subsidize R&D activity. These questions include whether public subsidies should be through financial assistance to private firms (like tax incentives) or funding for higher education research activities (also found to be effective in boosting business R&D expenditures).

### **Virginia's R&D tax credits are too small overall to meaningfully increase statewide business R&D activity**

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**R&D intensity**, a common measure of R&D activity, is R&D expenditures in a region divided by the gross domestic product of the region.

Business R&D intensity excludes government-funded R&D spending and represented 55% of total R&D spending in Virginia in 2019 (compared with 81% nationwide).

Virginia compares more favorably to the nation on overall R&D intensity than on business R&D intensity because of Virginia's high rate of federal R&D spending. Virginia's overall R&D intensity is 2.1 (versus 2.9 nationally), but Virginia's business R&D intensity is 1.33, which is half of the national rate of 2.6 percent.

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Evidence indicates that R&D tax credits can increase R&D activity, and Virginia's R&D tax credits likely have increased R&D expenditures and activity for many of the companies using them. The total tax credit amounts are too small, however, to have a meaningful effect on statewide business R&D activity. Between FY11 and FY20, the total value of the R&D tax credits is equal to only 0.15 percent of private R&D spending in the state. A 2019 report by a national consultant concluded that current funding levels for the R&D tax credits, and even significant increases in the credit caps, are likely to be insufficient to meaningfully improve the state's business R&D activity. This conclusion is consistent with the findings from analysis for this report and research that suggest other factors have a greater influence on business R&D activity.

Further analysis for this report also indicates that significant increases in the amount allocated for R&D tax credits would not improve the state's business R&D intensity, a common measure of R&D activity. This is the case even if it is assumed that the tax credits have a multiplicative effect of 2.0. For example, assuming that every \$1 in tax credits increases R&D spending by \$2, doubling the overall credit amount claimed in 2019 would have only boosted the state's R&D intensity from 1.33 percent to 1.35 percent in that year.

Significant increases in the amount allocated for the tax credits would also not improve Virginia's business R&D intensity relative to many other states, including Washington (6.94 percent), Michigan (4.42 percent), North Carolina (2.58) and Maryland (1.72). Of these four states, only Maryland offers an R&D tax credit, and it is smaller than Virginia's credits (capped at \$12 million annually). This suggests that factors other than tax credits influence R&D intensity. This also likely explains why the national consult-

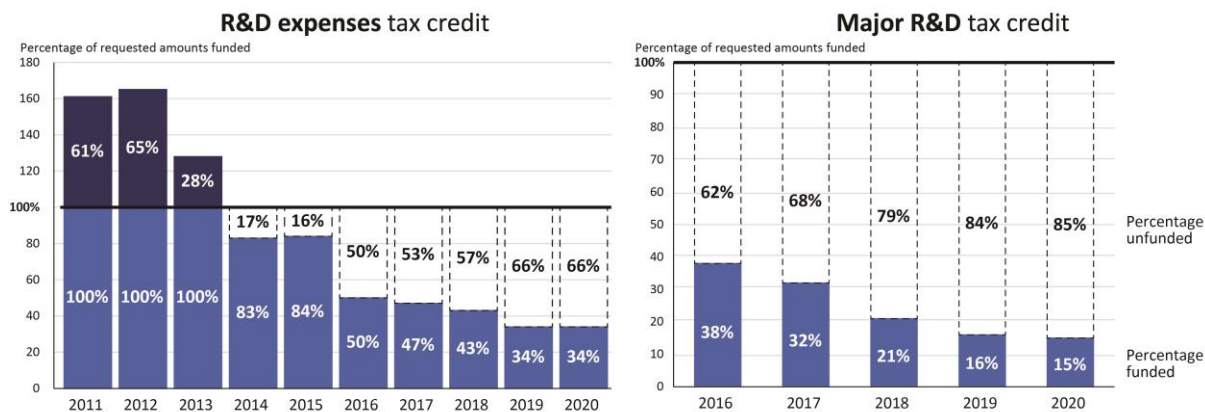
ant recommended that the state consider other strategies to strengthen the connections between businesses and the state's universities to improve private research funding, facilitate intellectual property transfer, and improve university commercialization.

Other factors have a greater influence on R&D intensity, such as the strength of the current economy. Research indicates business R&D spending is closely linked with corporate revenue, and consequently, is sensitive to economic conditions. This likely explains, in part, why the business R&D intensity for both the U.S. and Virginia declined during and immediately following the Great Recession. The U.S. economy recovered more quickly from the Great Recession than Virginia's economy, which may partially explain why U.S. business R&D intensity has exceeded its pre-recession level (2.62 percent in 2019 versus 2.28 in 2008), but Virginia's has not (1.33 percent in 2019 versus 1.88 in 2008).

R&D spending is also affected by a region's industry mix, with manufacturing firms accounting for approximately 62 percent of domestic R&D expenditures. Manufacturing receives 61 percent of federal R&D tax credit allocations but only 17 percent of Virginia's R&D tax credits.

While other factors may have a greater effect on business R&D activity statewide than the R&D tax credits, annual overall caps on both credits have likely limited their effect on individual business decisions to invest in R&D. Both tax credits have been oversubscribed and required proration; therefore, businesses have received far less than the full credit amount for which they are eligible (Figure 1-4).

**FIGURE 1-4**  
**Businesses have received far less than the full credit amount for which they are eligible because the credits are oversubscribed**



SOURCE: Virginia Tax.

NOTE: Taxpayers received supplemental credit amounts (more credits than they requested) for the R&D expenses tax credits between 2011 and 2013 because total requested amounts were less than the cap (see Table 1-1). Annual caps for both credits have changed over time. The R&D expenses tax credit was originally \$5 million, but it was increased to \$6 million (2014), \$7 million (2016), and \$7.7 million (January 1, 2021). The original cap for the major R&D tax credit was \$20 million; it was increased to \$24 million as of January 1, 2021.

## **R&D exemption also has limited effect on encouraging R&D activity but achieves some of its objectives**

The R&D sales tax exemption's effectiveness in encouraging R&D activity is also limited because, like the tax credits, it represents a very small portion of overall business R&D spending. Tangible goods used for R&D are eligible for the exemption. However, most R&D expenses are for wages and contractual expenses, which are not eligible. Only one-eighth of R&D expenses are for tangible goods, but not even all of those qualify for the exemption, according to a 2015 report by Virginia Tax. (For example, expenditures on tangible goods related to quality control and testing do not qualify.) Virginia Tax estimated that taxpayer savings from the exemption are less than two-tenths of 1 percent of total R&D spending.

Stakeholders from a 2011 JLARC review of the effectiveness of Virginia tax preferences indicated that the R&D exemption may still provide value to companies starting a new facility because it reduces, even if only marginally, high upfront costs such as stocking equipment and supplies. The R&D exemption is also interrelated with the manufacturing exemption (available for purchases of intermediate goods used in the industrial process to develop a final product) because R&D activities frequently result in the production of new products, likely enhancing the value of the exemption. Together, the R&D exemption and manufacturing exemption exempt virtually all purchases of tangible goods used directly in product development activities—from initial product research to the final production for market.

The R&D exemption achieves some of its objectives. The R&D exemption was created in the 1966 legislation that established the sales and use tax. Like the airline common carrier and ships and vessels exemptions that JLARC reviewed in 2021, the R&D exemption was adopted to recognize the importance of R&D and to support innovation to advance the state's industrial and economic progress, according to Virginia Tax reports.

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Economic impact analysis of incentive spending between FY11 and FY20 was conducted using economic modeling software developed by REMI, Inc.

(See Appendix L for the economic impact analysis used in this study.)

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## **Measurable economic benefits and returns in state revenue from R&D tax incentives are negligible, but actual benefits are likely greater**

Using economic impact modeling, the R&D expenses tax credit and sales tax exemption are estimated to have generated small amounts of measurable economic activity for the state between FY11 and FY20, and the major R&D tax credit is estimated to have resulted in economic losses. Economic losses occur because the increase in taxes to pay for the tax credit was greater than the small amount of jobs, Virginia GDP, and personal income generated by the credit (Table 1-2).

The overall (economic and social) impact of the incentives, though, is *underestimated* by this analysis because it does not reflect their spillover or long-term impacts. The spillover of a firm's R&D spending on other companies in the state or on Virginia residents could be *substantial* and increase the economic activity related to the incentives, depending on how much of these effects remain in Virginia. However, spillover effects

can be difficult to measure accurately, and it can be difficult to model their regional economic impacts. The estimates in this report also only reflect measurement of short-term economic impacts of the R&D tax incentives and do not account for enhancements in firm performance over time because of productivity improvements or increased sales from the introduction of new products. Research indicates R&D tax credits can have long-term impacts that do not materialize until five years after they are adopted.

**Net impact** is the increase in economic activity induced by the incentives after adjusting for the opportunity cost of increasing taxes to pay for the incentives.

(See Appendix M for more information.)

**Table 1-2**

**R&D tax incentives have negligible economic benefits and returns in state revenue (FY11–FY20), but they are understated**

	Annual average FY11–FY20		
	Major R&D tax credit	R&D expenses tax credit	R&D exemption
<b>Net impact to Virginia economy</b>			
Private employment	-4 jobs	1 job	9 jobs
Virginia GDP	(\$0.3 M)	\$0.6 M	(\$0.5 M)
Personal income	(\$0.3 M)	\$0.1 M	\$0.9 M
<b>Impact to Virginia economy per \$1 million of incentives</b>			
Private employment	5 jobs	8 jobs	10 jobs
Virginia GDP	\$0.8 M	\$1.3 M	\$0.9 M
Personal income	\$0.5 M	\$0.8 M	\$1.0 M
<b>Impact to state revenue</b>			
Total revenue	\$0.1 M	\$0.2 M	<\$0.1 M
Incentive awards	\$2.8 M	\$3.2 M	\$3.9 M
Revenue net of awards	(\$2.7 M)	(\$3.0 M)	(\$3.9 M)
Return in revenue	4¢ for every \$1 spent	5¢ for every \$1 spent	1¢ for every \$1 spent

SOURCE: Weldon Cooper Center economic impact analysis of amount of incentive spending between FY11 and FY20 for R&D exemption, FY13 and FY20 for R&D expenses tax credit, and FY18 and FY20 for major R&D tax credit.

NOTE: Includes direct, indirect, and induced impacts. Gross impact on Virginia's economy is used to calculate impact per \$1 million in incentive awards. This is consistent with how the economic development research literature typically calculates these impacts. (See Appendix M for detailed results on total impact of the incentives, impact of raising income taxes by the amount of the incentives [opportunity cost], and revenue generated by source.) For the R&D tax credits, these estimates assume that \$1 in credits resulted in additional R&D spending (\$1.75 in additional spending by R&D expenses tax credit users and \$1.25 in additional spending by major R&D tax credit users).

The economic benefits of the R&D tax credits and exemption, as well as the return in state revenue, are also negligible compared with other incentives evaluated for this series when assessed per \$1 million spent. (See Appendix C for more detail on the comparison of economic benefits and the return in revenue generated by Virginia incentives.) The economic benefits and return in revenue are slightly higher for the R&D expenses tax credit than they are for the major R&D tax credit. The R&D expenses tax credit has several design features that likely increase its effectiveness. The credit

- is targeted to smaller companies that are more responsive to R&D tax credits and for which economic benefits are more likely to remain within the region;

- is refundable, meaning taxpayers can receive a tax refund if the credit amount exceeds their tax liability, and they do not have to carry over the credit to another year;
- has a per taxpayer cap, allowing more taxpayers to use it; and
- provides a higher reimbursement (the taxpayer cap and credit rate are higher) for research that is conducted in conjunction with a higher education institution.

### **Several changes would improve the R&D tax credits**

Even though the R&D tax credits have not influenced statewide R&D activity, there are several reasons to maintain the R&D tax incentives. Research indicates that R&D tax credits lead to increased R&D spending and can have positive spillover effects that generate high social returns. Maintaining the R&D tax credits would allow Virginia to remain consistent with 35 other states that have them. Finally, the major R&D credit has only been in place since FY18, so adequate time has not passed to evaluate its full impacts.

The R&D exemption also achieves its objective of recognizing the importance of R&D activity to the state economy. The exemption helps Virginia remain consistent with other states, many of which also provide R&D exemptions. (See online Appendix F for information on states with R&D tax credits and exemptions.)

However, several changes should be made to the R&D tax credits to improve their effectiveness and economic benefits to the state. The R&D tax credits are set to expire January 1, 2025, but if they are extended, they could be improved and evaluated again to determine the effectiveness of the changes.

There is insufficient basis to conclude that increasing the amounts available for the R&D tax credits would substantially improve the state's business R&D activity overall. Analysis shows even significant increases in Virginia's R&D tax credits would not substantially improve the state's R&D business activity. Other policies and funding to strengthen the connections between businesses and the state's universities to improve private research funding, facilitate intellectual property transfer, and improve university commercialization, should be considered instead.

### ***Prioritize R&D tax credits for smaller companies by allocating a larger portion of total funding for the R&D expenses tax credit***

Prioritizing Virginia's R&D tax credit spending on smaller companies would improve the overall economic benefits of the combined R&D tax credits. Smaller companies are more likely to face credit constraints that inhibit their ability to perform productive R&D. Research indicates smaller companies are also more likely to increase R&D activity as a result of R&D tax incentives than large companies.



Prioritizing smaller companies would align Virginia with several other states that restrict their R&D tax credits to small businesses (Connecticut, New Mexico, and North Dakota). Several others prioritize smaller companies by providing them with more generous credit reimbursements, allowing only smaller companies to be eligible for refundable credits, or allocating to small companies a specific portion of credits.

- **Arizona:** credit is partly refundable (at 75 percent) for small businesses with 150 employees or less.
- **Delaware:** credit reimbursement (50 percent of federal credit amount) is doubled (to 100 percent of federal credit amount) for small companies with annual gross receipts under \$20 million.
- **Louisiana:** credit reimbursement rate varies by employment size and is 30 percent for businesses with fewer than 50 employees, 10 percent for 50–99 employees, and 5 percent for 100 or more employees.
- **Maryland:** credit is refundable for small businesses (assets less than \$5 million in a given year) and \$3.5 million (30 percent) of the overall cap is set aside for them.
- **Pennsylvania:** 20 percent of the credit (capped at \$15 million) is set aside for small businesses (assets totaling less than \$5 million for the taxable year the R&D expenses were incurred), which are reimbursed at a higher rate.
- **New York:** credit reimbursement rate is 20 percent for companies with fewer than 10 employees and 15 percent for companies with 10 or more employees (for the life sciences credit).

To prioritize Virginia’s R&D tax credits for smaller companies, Virginia should reallocate a portion of the funding from the major R&D tax credit to the R&D expenses tax credit by increasing the R&D expenses tax credit cap (currently \$7.77 million) and reducing the major R&D tax credit cap (currently \$24 million). The R&D expenses tax credit is more effective and is increasingly oversubscribed and award amounts prorated.

Determining how much to reallocate to the R&D expenses tax credit is a policy decision. For example, increasing the cap by 10 percent (to \$8.55 million) would improve the proration factor slightly (increasing it from 37 percent to 41 percent of 2020 requested amounts). The R&D expenses tax credit would represent 27 percent of the total allowed spending for both credits rather than the 20 percent currently. Doubling the R&D expenses tax credit cap to \$15.54 million would increase the proration factor to 74.6 percent (assuming 2020 requested amounts), and the R&D expenses tax credit would represent 37 percent of the total allowed spending for both credits.

Virginia could also combine the two credits and prioritize smaller companies for

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The **proration factor** is the share of tax credits each taxpayer can receive for the credit to remain under the overall credit cap. If the credit is capped at \$5 million and taxpayers collectively request \$6 million in credits, the proration factor is 83 percent (\$5 million / \$6 million).

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awards. This could be done by prioritizing funding requests for smaller companies or allocating a larger proportion of total credits to smaller companies. Currently, companies claiming the R&D expenses tax credit are those with eligible R&D expenses of \$5 million or less, but other criteria such as employment or assets could be used to determine eligibility as a small business. Receipt of federal grant funding through the highly competitive Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) matching fund programs could also be used to help identify small businesses. Using these criteria could be helpful for identifying particularly innovative projects to receive tax credit support if the credit continues to be oversubscribed. Refundability of the credit could be restricted to smaller companies, so that they can continue to use the credit even if they have no tax liability. Combining the R&D tax credits and prioritizing smaller companies would likely make it easier to reallocate funding to larger companies in years when requests for smaller companies are below the cap.

#### **RECOMMENDATION 1**

The General Assembly may wish to consider prioritizing Virginia's research and development tax credits for smaller companies by amending §§ 58.1-439.12:08 and 58.1-439.12:11 of the Code of Virginia to either (i) reallocate a portion of the Major Research and Development Tax Credit to the Research and Development Expenses Tax Credit cap or (ii) combine the two credits and give smaller companies priority for awards.

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#### ***Adopt changes to improve major R&D tax credit predictability, attractiveness, effectiveness, and economic benefits***

Virginia should adopt several changes to improve the major R&D tax credit. Even if the R&D tax credits are combined, these changes should apply for awards to larger companies. Several of these changes will bring the major R&D tax credit more in line with the R&D expenses tax credit, which already has more features of optimal design.

Virginia should adopt a step-rate reimbursement structure to increase the attractiveness of the major R&D tax credit. The attractiveness of the credit would improve because this change would increase the annual proration factor for the credit. Because the tax credit is heavily oversubscribed, taxpayers have received only a small fraction of the credit amounts requested (15 percent proration in FY20). Virginia could adopt a step-rate reimbursement structure similar to several states (Indiana, Minnesota, and North Dakota) that provides higher reimbursement for initial R&D outlays and lower rates for additional spending. For example, the first \$1 million of qualified expenditures could be reimbursed at a 10 percent rate, with a step down rate of 5 percent offered for any additional expenditures. This approach also prioritizes mid-size companies that spend less.

To illustrate the benefit of this change, in FY20 under the current reimbursement structure, a taxpayer with \$20 million in eligible R&D expenses would be approved for \$2 million in tax credits but only allowed to claim \$300,000 in credits because of the 15 percent proration. Assuming a step-rate reimbursement structure, the taxpayer would have been approved for a lower amount of credits (\$1.05 million), but able to claim a higher percentage of their credit request (28 percent proration factor), and allowed to claim nearly the same amount in credits (\$294,000). This change, in particular, would benefit mid-size companies with lower R&D expenses because a company with \$10 million in eligible R&D expenses in FY20 would have only been allowed to claim \$150,000 in credits under the current reimbursement structure but claim \$280,000 in credits under the step-rate structure.

## **RECOMMENDATION 2**

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to adopt a step-rate reimbursement structure for the Major Research and Development Tax Credit.

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Virginia could also adopt an annual taxpayer cap for the major R&D tax credit to improve the predictability of the credit. Predictability of the tax credit would improve because the taxpayer would know the maximum credit amount they would be allowed (the cap). This change would increase the tax credit's annual proration factor, meaning taxpayers would be able to claim a higher percentage of eligible credit amounts. Some taxpayers may be able to claim higher credit amounts than without the taxpayer cap. Other states impose caps on their R&D tax credits (Arkansas, Maryland, and New Hampshire), and Virginia imposes caps on several tax credits, including the R&D expenses tax credit.

An annual taxpayer cap at approximately \$300,000 between 2016 and 2020 would have brought the supply of and demand for the credit into balance, eliminating the need to prorate the tax credit for tax years 2016 and 2017 and greatly increasing the proration factor for tax years 2018 (93 percent proration) and 2020 (73 percent proration). This change would also reduce the impact of one or more substantial credit requests by taxpayers on the overall annual credit cap and likely ensure many mid-size firms receive their full credit amount.

## **RECOMMENDATION 3**

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to adopt an annual company-level cap for the Major Research and Development Tax Credit.

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The major R&D tax credit should prioritize research conducted with higher educa-

tion institutions by offering higher tax credit awards to companies performing eligible R&D activities with Virginia colleges and universities. Prioritizing research conducted with higher education institutions would improve the economic and social benefits of the tax credit because research conducted with universities is more likely to involve basic research (research for the advancement of scientific knowledge without a specific product as a goal) and is more likely to result in positive spillovers than purely commercial research conducted within firms.

This change could be accomplished by establishing a higher per company cap for companies that conduct eligible R&D activities with higher education institutions. The R&D expenses tax credit already encourages R&D partnerships with Virginia colleges and universities by providing a higher reimbursement rate and taxpayer cap to businesses partnering with Virginia's higher education institutions for eligible R&D activity.

#### **RECOMMENDATION 4**

The General Assembly may wish to consider amending § 58.1-439.12:11 of the Code of Virginia to prioritize research conducted with Virginia higher education institutions for the Major Research and Development Tax Credit by providing a higher company-level cap for awards for such research.

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## 2. Tax Incentives to Encourage Private Investment in Startups

Virginia offers three tax incentives to encourage private equity investment in startup, high-tech companies in Virginia (Table 2-1):

- **The Qualified Equity and Subordinated Debt Investments Tax Credit (angel investment tax credit)** - allows angel investors to receive a tax credit for their investment in small, high technology, Virginia-based businesses.
- **The Qualified Business Long-Term Capital Gains Income Tax Subtraction (capital gains subtraction)** - allows investors to deduct long-term capital gains income (from investments held for more than one year) earned from an investment in small, high technology, Virginia-based businesses.
- **The Venture Capital Income Tax Subtraction (venture capital subtraction)** - allows investors to deduct their investment in a qualifying venture capital account that makes eligible investments. Unlike the other two incentives, investments in small, high technology businesses are not required for investors to qualify for the subtraction, but venture capital accounts tend to target innovative businesses with high growth potential.

Unlike typical economic development incentives, these incentives provide the tax benefit to the investor, not the business. Investors can claim the tax benefits when they file their state income taxes. Investors are prohibited from using the angel investment tax credit and the capital gains subtraction for the same investment. The venture capital subtraction, which was adopted in 2017, has yet to be utilized.

The capital gains subtraction may have been intended to be a *temporary* solution to encourage private financing for business growth during the Great Recession without having an immediate impact on state finances, according to news reports. The original legislation creating the subtraction specified that qualifying investments must be made between July 1, 2010 and June 30, 2013. Forgone revenue because of the capital gains subtraction would affect the state budget at a future date because investments must be held for at least a year to qualify as capital gain income. Therefore, even though the subtraction was adopted in 2011, the first subtractions could not be claimed until 2012.

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**Angel investors** are typically wealthy individuals who provide personal capital to startup or early-stage companies in exchange for equity in the company. They are called 'angels' because they often invest in risky, unproven business ventures for which other sources of funds are not available.

**Long-term capital gains** are profits earned from the sale of real estate, a business, stocks, bonds, or other capital assets held by the seller for more than a year.

**Venture capital** account or fund is a form of private equity raised from private and institutional investors. Venture capital funds also provide technical, operational, and managerial expertise to startup businesses that are funded.

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Virginia also offers the **Small Business Investment Grant** to encourage investment in small businesses. This program is not targeted to high tech or fast-growing businesses and was evaluated for a prior report, *Workforce and Small Business Incentives* (JLARC 2018).

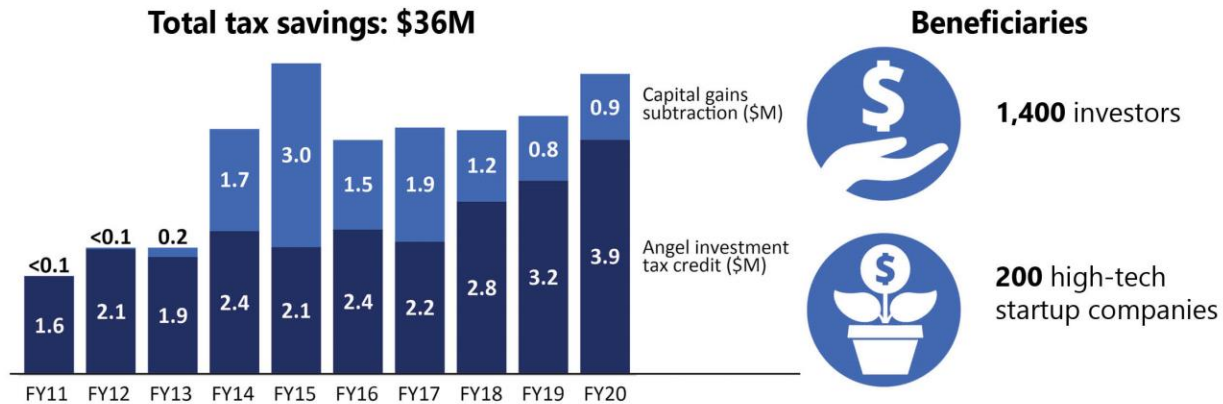
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## INCENTIVES TO ENCOURAGE PRIVATE INVESTMENT IN STARTUPS

Encourage private equity investment in high-tech, startup companies in the state

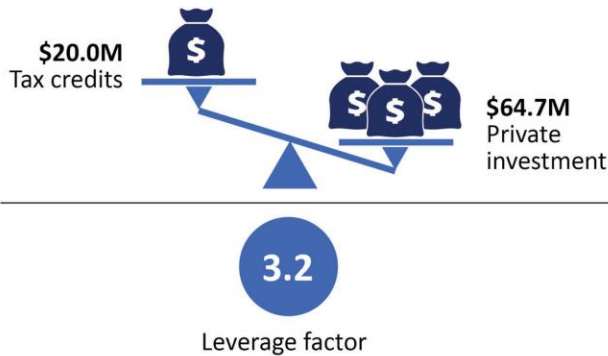
### VALUE TO BENEFICIARIES

FY11–FY20



### ACHIEVEMENT OF PURPOSE

**Angel investment tax credit has leveraged little additional private investment**



**Incentives not targeted to businesses with growth potential**

**X Not targeted to professional investors**

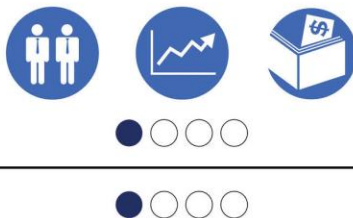
**X Not targeted to innovative businesses**

### IMPACT TO STATE ECONOMY

FY11–FY20

**Economic benefit per \$1M in incentives**

Jobs, state GDP, and personal income



**Return in revenue**

per \$1 spent



Angel investment tax credit



Capital gains subtraction

● ● ● ● High  
 ● ● ● ○ Moderate  
 ● ● ○ ○ Low  
 ● ○ ○ ○ Negligible

NOTE: Beneficiaries are estimates of unduplicated investors (FY11–FY20) and unduplicated companies (FY17–FY20) based on tax return information.

TABLE 2 -1

## Virginia provides three incentives to encourage private investment in Virginia startups

<b>Qualified Equity and Subordinated Debt Investments Tax Credit (angel investment tax credit)</b> (adopted 1998)	
<b>Purpose</b>	Promote private investment in small, startup Virginia high-technology companies.
<b>Eligible beneficiaries</b>	<p>Angel investors that purchase equity in (stock or ownership interest) or provide subordinated debt (an unsecured loan) to a small business in Virginia in certain high-technology sectors.</p> <p>"Inside investors," such as company officers and employees or their family members, are excluded. Investors must hold the investment for at least 3 years.</p>
<b>Credit features</b>	<p>Nonrefundable tax credit in the amount of 50% of the qualified investment made during the taxable year. Can be claimed against individual income tax. Capped at \$5 million annually overall and per taxpayer at \$50,000 or the taxpayer's tax liability, whichever is less.</p> <p>Credits are prorated if the amount requested in a tax year exceeds the cap. Half of the total \$5 million available for awards is reserved for investment in businesses that commercialize university intellectual property (IP), but unused amounts are usable by other eligible applicants.</p> <p>Businesses eligible for the investment (qualified business) must be (i) small, with less than \$3 million in gross revenues and have received less than \$3 million in equity or debt investment; (ii) Virginia-based, with its principal place of business and substantially all of its 'production' in Virginia; and (iii) in advanced computing, advanced materials, advanced manufacturing, agricultural technologies, biotechnology, electronic device technology, energy, environmental technology, information technology, medical device technology, or nanotechnology.</p> <p>Cannot claim this credit and several other incentives for the same activity (Capital Gains Subtraction, Venture Capital Subtraction, Virginia Real Estate Investment Trust Subtraction, Small Business Investment Grant).</p> <p>Can be carried over for 15 years. No expiration date.</p>
<b>Qualified Business Long-Term Capital Gains Subtraction</b> (adopted 2010)	
<b>Purpose</b>	Promote private investment in small Virginia high-technology companies.
<b>Eligible beneficiaries</b>	<p>Investors with long-term capital gains income or carried interest income from investments in a small, high technology business in Virginia.</p> <p>Investors must hold the investment for at least 1 year, but have few other restrictions. "Company insiders" and family members of the business owners are not expressly prohibited.</p>
<b>Incentive features</b>	<p>Income tax subtraction that allows corporate and individual taxpayers to subtract long-term capital gains income or carried interest income from a qualifying business from their taxable income. Carried interest income is income or fees paid to general partners that usually remain in the equity investment and are "carried" over from year to year until the investor cashes out. There is no annual or per taxpayer cap.</p> <p>Investment must be a "qualified business" that meets the same criteria for the Qualified Equity and Subordinated Debt Investments Tax Credit or a technology business certified by the secretary of administration <sup>a</sup> or secretary of commerce and trade.</p> <p>The investment must have been made between April 1, 2010 and June 30, 2020, but the subtraction can be claimed far into the future because there is no year specified by which the capital gains must be realized to claim the subtraction.</p> <p>Taxpayers cannot claim this and the Qualified Equity and Subordinated Debt Investments Tax Credit for the same investment.</p>

<b>Venture Capital Subtraction</b> (adopted 2017)	
<b>Purpose</b>	Promote investment in early stage companies in Virginia.
<b>Eligible beneficiaries</b>	Taxpayers with income attributable to an investment in a certified Virginia venture capital account.
<b>Incentive features</b>	<p>Income tax subtraction that allows corporate and individual taxpayers to subtract investments in a venture capital account from their taxable income. There is no annual or per taxpayer cap.</p> <p>Investment must be in a venture capital account certified by Virginia Tax, and the account must plan to invest at least 50% of its capital in qualified portfolio companies and employ at least one professional investor (at least 4 years of professional venture capital or similar investment experience).</p> <p>Qualified portfolio companies must have their primary business location in Virginia; must engage primarily in the production, sale, research, or development of a product or service other than management or investment capital; and provide equity in the company in exchange for capital. A qualified portfolio company cannot be an individual or sole proprietorship.</p> <p>The investment must be made between January 1, 2018 and December 31, 2023. There is no annual or per taxpayer cap.</p>

SOURCE: Weldon Cooper Center review of the Code of Virginia and agency documents.

NOTE: Authorized by §§ 58.1-339.4, 58.1-322.02, and 58.1-402 of the Code of Virginia.

<sup>a</sup> Originally the secretary of technology, which was reorganized under the secretary of administration.

## **Investors saved \$5 million in taxes in FY20 because of business startup investment incentives**

Tax savings from Virginia’s tax incentives to encourage private investment in startups totaled nearly \$36 million during the 10-year period from FY11 to FY20, and \$5.1 million in FY20. Two-thirds of the savings over the 10-year period are attributable to the angel investment tax credit. Tax savings for this credit have increased from \$1.6 million in FY11 to \$3.9 million in FY20. No taxpayers have realized savings from the venture capital subtraction.

The angel investment tax credit is one of Virginia’s most generous tax credits, particularly for individuals. Nearly \$25 million in angel investment tax credits were claimed on 2,476 tax returns during the study period, for an average of \$9,900 per return. This amount is greater than the average amount claimed for more than half of Virginia’s income tax credits in FY20 and is the most generous tax credit available to individuals, on average. Investors can claim the credit over multiple years, and an estimated 1,400 investors claimed the credit during the study period.

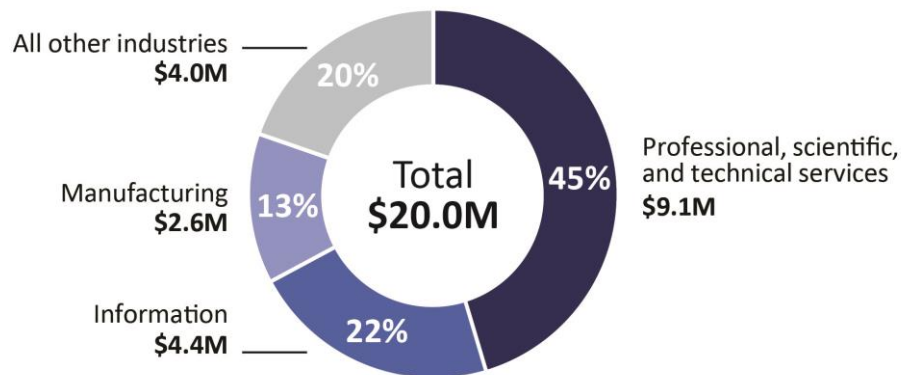
Since 2017, approximately 200 businesses received investments from individuals or businesses that claimed the angel investment tax credit. Most of the businesses are in the professional, scientific, and technical services (45 percent), information (22 percent), or manufacturing (13 percent) industries (Figure 2-1). They are also typically “micro businesses” averaging five employees, with the vast majority (83 percent) having fewer than 10 employees. These businesses are concentrated in Central Virginia, with half of the businesses in Richmond, Charlottesville, Henrico, and Albemarle.



Less than one-fifth of awards benefited businesses in Northern Virginia. (See Appendix G for a map of awards by Virginia locality.)

**FIGURE 2-1**

**Angel investment tax credit assisted-businesses are mostly in the professional, scientific, and technical services; information; or manufacturing sectors**



SOURCE: Weldon Cooper Center analysis of Virginia Tax data.

NOTE: Amounts are based on tax credits utilized between FY17 and FY20. Numbers may not sum because of rounding.

Businesses receiving investments from investors using the capital gains subtraction are probably similar in employment size and industry profile to businesses whose investors received angel investment tax credits. The definition of a “qualified business” is similar for both incentives. However, the capital gains subtraction’s eligibility is somewhat broader. Businesses that have been certified as high technology by the secretary of administration or commerce and trade can qualify for the subtraction. Company founders or other employees—investors unlikely to be influenced by incentives—can also qualify for the capital gains subtraction, whereas they cannot for the angel investment tax credit. More detailed information about the businesses benefiting from the long-term capital gains subtraction generally is unknown because tax forms collect very limited information about subtractions.

### **States adopted equity investment tax incentives to support startup growth, but research indicates incentives are not effective**

Many countries and states, including Virginia, have adopted investment incentive programs to help startup businesses grow, with angel investment tax credits being the most common incentive adopted by states. (See online Appendix H for more information on state tax incentives to encourage private investment.) States adopted angel investment tax incentives on the premise that fast-growing startup businesses are important to regional economic growth.

Startup businesses typically need multiple funding rounds to grow and be successful, but startups often lack access to capital because they have too few assets to offer as

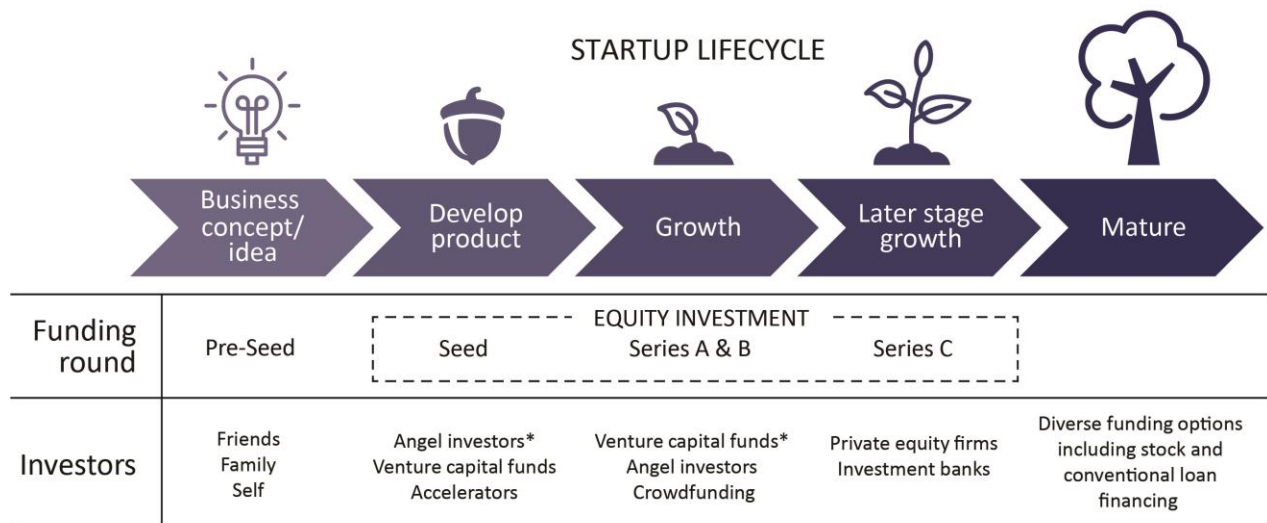
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**Funding rounds** are divided into stages that depend on the maturity of the business: pre-seed, seed, and seed series funding (Series A, B, C, and higher). Angel and venture capital investors recoup their investments when the business matures and sells shares to the public in an initial public offering (IPO) or to another company via merger or acquisition, but do not recoup their investment if the business fails.

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collateral for conventional loan financing. Early “pre-seed” funding is often provided by business partners, family, and friends (Figure 2-2). After these sources are exhausted, equity investment can provide critical funding. Angel investors often represent a source of early stage capital, whereas venture capital funds can be a significant funding source during later stages. Research supports the finding that equity investments, such as angel and venture capital investments, are effective in improving startup success.

**FIGURE 2-2**  
Multiple rounds of funding are needed for startup growth and success



SOURCE: Investopedia and Clear House Accountants.

NOTE: \*Most common funder.

While equity investment is a critical funding source for startups, research shows that *tax incentives* encouraging such investment have not been effective in supporting startup growth and success. Most of the research focuses on angel investment tax credits. Research finds that these tax credits help some startups receive additional early stage investment but do not lead to employment growth, increased startup entry into the market and patent activity, likelihood of later raising venture capital, or probability of a successful exit based on an IPO or merger/acquisition.

Research concludes that angel investment tax credits have not led to startup success because they appear to incentivize inexperienced investors who make investments in poor performing startups or new businesses that have limited growth intentions. The most comprehensive study on angel investment tax credits found that investments associated with the credits were made in slow-growing firms with less experienced owners. Just over 6 percent of angel tax credit investors had previous entrepreneurial experience compared with 55 percent of angel investors generally (based on past stud-

ies). This finding suggests that the angel investors receiving tax credits lacked the experience to identify businesses with fast-growing potential and to provide mentorship and guidance to business management.

Little evidence exists on the effectiveness of incentives like the capital gains and venture capital subtractions, but related studies suggest that Virginia's capital gains subtraction and venture capital subtraction (if it had been used) likely have small effects.

### **Virginia's angel investment tax credit and capital gains subtraction likely have had little impact on business startup growth**

Virginia's angel investment tax credit has had little impact on overall business startup growth in the state. Startups assisted by investors receiving angel investment tax credits have leveraged little additional private investment needed to help them grow. Data limitations prevented a similar analysis from being conducted for the capital gains subtraction investments.

Spending on both these incentives is too small to have much effect on startup growth overall. Spending on both tax incentives represents less than 0.7 percent of the \$1.2 billion in angel and venture capital funding secured by Virginia-based firms in 2019. In addition, demand for the angel investment tax credit has exceeded total available funding each year. Therefore, the credit has been prorated each year during the study period, and investors have received less than they are eligible for.

Even if funding increased, the tax incentives would likely still have little impact on business startup growth because they are not designed to target startups with growth potential. According to stakeholders, Virginia lacks an adequate number of startups with growth potential that are attractive to experienced investors, and they believe this is why Virginia lags many states in attracting angel and venture capital. Virginia ranked 20<sup>th</sup> among states in attracting pre-seed and seed capital investment (often provided by angel investors) in 2019 and 19<sup>th</sup> in venture capital activity as a percentage of GDP in 2020.

### ***Virginia's angel investment tax credit has leveraged little additional private investment to help businesses grow***

Startup businesses whose investors benefited from angel investment tax credit investments between 2017 and 2020 received limited follow-up investment, according to investment information. Angel investment tax credit-related businesses received \$64.7 million in private investment related to the credits between FY17 and FY20, according to tax form information. These startups were identified in a national investment database, which indicated these businesses received \$62 million in total investment (including tax credit-assisted investment and other investment). While this database may exclude some smaller investments, the information likely means these startups did not receive substantial additional investments beyond the amount reported on tax forms related to the credits. (See Appendix B for more detail about the analysis.)

The angel investment tax credit also has a lower leverage factor (total spending leveraged by the incentive) than other state investment programs. Investors received \$20 million in angel investment tax credits, which may have led to \$64.7 million in private investment for the tax credit-assisted startups between FY17 and FY20, resulting in a leverage factor of 3.2 (\$64.7 million/\$20 million). In comparison, the state's Growth Acceleration Program Funds and Commonwealth Research and Commercialization Fund investment programs (next chapter) had leverage factors of 16.1 and 7, respectively, between FY17 and FY20.

***Virginia's equity investment incentives are not well designed to encourage investment in startups with growth potential***

Virginia's equity investment tax incentives are not well designed to ensure investments are made in startups with growth potential. These incentives are not targeted at professional investors, with the exception of the venture capital subtraction, which has not been used (Table 2-2). Research indicates equity investment incentives should be targeted to professional, experienced investors who can select firms with greater innovative potential, tend to invest over longer time horizons (patient capital), and can provide mentorship to company founders. Investment from company insiders and family members can qualify for the capital gains subtraction, and research indicates these investors would invest without incentives.

**TABLE 2-2**

**Virginia's equity investment incentives are missing some features to encourage investment in startups with growth potential**

Feature	Angel investment tax credit	Long-term capital gains subtraction	Venture capital subtraction
<b>Investor requirements</b>			
Professional investor	○	○	●
Company insider exclusion	●	◐	●
Patient capital investment	●	◐	●
<b>Business requirements</b>			
Small size	●	●	○
High technology sector	●	●	○
Innovative/has growth potential	○	○	●
Bonus for university/public good	◐	○	○
Prior investment cap	●	○	○
<b>General incentive requirements</b>			
Program cap	●	○	○
Expiration date	○	◐	●

SOURCE: Weldon Cooper Center analysis of program statutes and Virginia Tax guidelines.

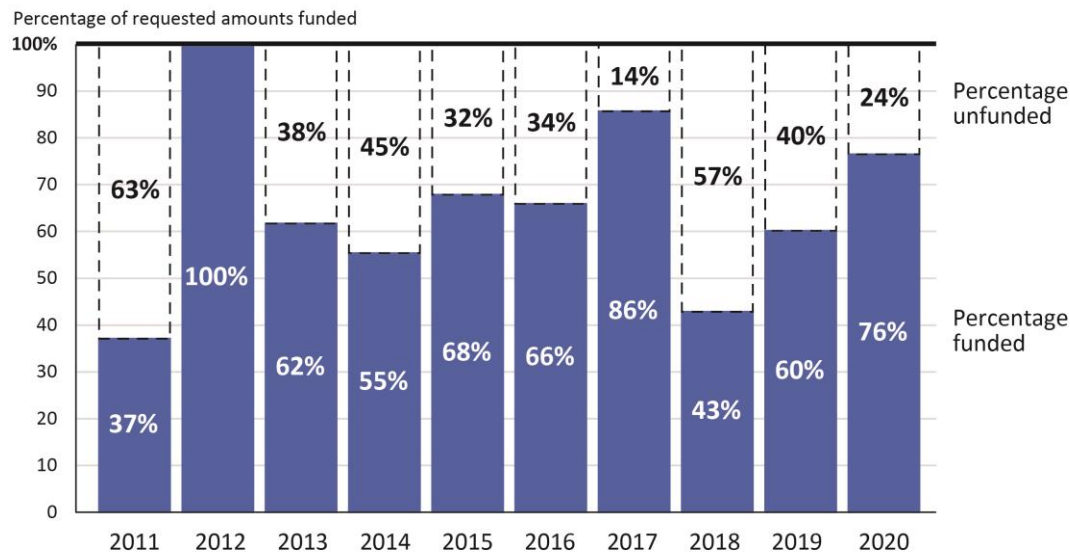
Legend: ● Meets criteria ◐ Partially meets criteria ○ Does not meet criteria

The incentives are also not effectively targeted to the appropriate businesses. Qualifying businesses for equity investment incentives should be young companies that face

funding constraints, are innovative and have growth potential, and generate potential spillover effects benefiting the public at large. The angel investment tax credit generally meets some of the criteria for effectively targeting businesses, but neither it nor the capital gains subtraction requires evidence that the business be innovative or have growth potential. This may explain why some businesses, such as brew pubs, have benefited from investments supported by the angel investment tax credit.

The angel investment tax credit also does not have an annual per taxpayer cap which, in conjunction with a high reimbursement rate (50 percent of the investment), has resulted in the credit being oversubscribed. This resulted in the credit having to be prorated. Investors have not received the full amount of credits for which they were approved, likely limiting the influence of the tax credit on investment decisions. Investors have received only 63 percent of their approved tax credit amount over the period, on average, despite increases in the credit cap over time (Figure 2-3).

**FIGURE 2-3**  
**Investors have received only 63 percent of approved angel investment tax credit amounts between FY11 and FY20**



SOURCE: Virginia Tax.

***Venture capital subtraction has not been used, in part, because of certain design features***

No taxpayer has yet claimed the venture capital subtraction, which was adopted in 2017, and no venture capital fund has yet to register to become a certified venture capital account, according to Virginia Tax. Industry stakeholders have offered several potential explanations for the lack of use. Even though this subtraction is well targeted to experienced investors and innovative or fast-growing businesses, it may be too cumbersome to use. A venture capital fund must file multiple forms to become

a certified venture capital account, and the associated administrative costs may be too costly compared with the tax benefit. Also, few investors are aware of the subtraction because it is not marketed.

Even without these limitations, the subtraction may be too narrowly targeted, because Virginia has few venture capital accounts that meet the eligibility requirements to become certified for the subtraction. There are 11 venture capital funds in Virginia, based on information from the National Venture Capital Association. Collectively, only 11 percent of companies listed in the portfolios of these venture capital funds are located in Virginia. Only four funds have portfolios where at least half of the companies are based in Virginia, which is a requirement for the subtraction.

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**Economic impact analysis** of incentive spending between FY11 and FY20 was conducted using economic modeling software developed by REMI, Inc.

(See Appendix L for the economic impact analysis used in this study.)

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### **Equity investment tax incentives have negligible economic benefits and returns in state revenue**

The angel investment tax credit and capital gains subtraction are estimated to have generated economic losses for the state between FY11 and FY20 (Table 2-3). Together the incentives only generated one additional job and generated small losses in Virginia GDP and personal income annually during the study period. This net impact to Virginia's economy occurred because the increase in taxes to pay for the tax incentives was greater than the small amount of jobs, Virginia GDP, and personal income generated by the incentives. Contributing to the small economic impact is the fact that the incentives reduce the cost of capital to the business but, unlike many incentive grants and some tax credits, do not require any job creation or increase in other forms of economic activity in return for receiving incentive funding. (Economic impact information is not available for the venture capital subtraction because it has not been used.)

When assessed per \$1 million spent on incentives, the economic benefits of the angel investment tax credit and long-term capital gains subtraction are negligible compared with the economic benefits across other incentives. (See Appendix C for more detail on the comparison of economic benefits and the returns in revenue generated by Virginia incentives.) Both incentives generate fewer than 10 jobs, less than \$1 million in Virginia GDP, and less than \$1 million in personal income for every \$1 million spent on the incentives. These estimates are far less than the economic benefits per \$1 million spent on the average incentive, which are estimated to be an additional 78 jobs, \$14 million in Virginia GDP, and \$7 million in personal income. However, these estimates are similar to the economic benefits per \$1 million spent on the average tax credit. (See *Economic Development Incentives 2020*, JLARC.)

Table 2-3

Equity investment incentives have negligible economic benefits and returns in state revenue (FY11–FY20)

	Annual average FY11–FY20	
	Angel investment tax credit	Long-term capital gains subtraction
<b>Net impact to Virginia economy</b>		
Private employment	1 job	0 jobs
Virginia GDP	(\$1.3M)	(\$0.8M)
Personal income	(\$0.4M)	(\$0.1M)
<b>Impact to Virginia economy per \$1 million of incentives</b>		
Private employment	8 jobs	8 jobs
Virginia GDP	\$0.5M	\$0.3M
Personal income	\$0.6M	\$0.9M
<b>Impact to state revenue</b>		
Total revenue	\$0.04M	\$0.02M
Incentive awards	\$2.45M	\$1.11M
Revenue net of awards	(\$2.41M)	(\$1.08M)
Return in revenue	2¢ for every \$1 spent	2¢ for every \$1 spent

**Net impact** is the increase in economic activity induced by the incentives after adjusting for the opportunity cost of increasing taxes to pay for the incentives.

(See online Appendix M for information on the total economic impact and the opportunity cost of increasing taxes.)

SOURCE: Weldon Cooper Center economic impact analysis of amount of incentive spending between FY11 and FY20.  
NOTE: Includes direct, indirect, and induced impacts. Gross impact on Virginia's economy is used to calculate impact per \$1 million in incentive awards. This is consistent with how the economic development research literature typically calculates these impacts. (See Appendix M for detailed results on total impact of the incentives, impact of raising income taxes by the amount of the incentives [opportunity cost], and revenue generated by source.) The venture capital subtraction is not reported because no taxpayers used it during the study period.

The returns in state revenue for every \$1 spent on the equity investment incentives is also negligible compared with the return in revenue across other incentives. Each incentive generates only 2¢ per \$1 spent compared with 44¢ per \$1 spent for the average incentive. The return in revenue is also lower than the return in revenue generated by the average tax credit (5¢ per \$1 spent).

### Angel investment tax credit should be eliminated

Virginia's angel investment tax credit should be eliminated because of its lack of effectiveness. Nine other states with angel investment tax credits have allowed their tax credits to expire, and some reported letting them do so because they were ineffective. A literature review indicates that angel investment tax credits have not improved startup outcomes such as employment and innovation because investments are made in lower-performing firms. The economic benefits and returns in state revenue because of the tax credit are negligible and lower than many other tax credits evaluated in this series. Even if the tax credit were better targeted to experienced investors, they may not use it: other factors influence experienced investors' investment decisions more than tax credits. Some experienced investors report applying for angel tax credits is too much of an administrative burden.

If the General Assembly eliminated the angel investment tax credit, consideration could be given to allocating all or a portion of the \$5 million tax credit cap to other

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**New venture competitions** are certification, education, and financing forums hosted by universities, foundations, governments, corporations, and other organizations at which founders present or “pitch” their technologies and business models to a panel of judges.

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entrepreneurial programs, particularly programs that invest directly in startups. Research and development grant programs, accelerators, and new venture competitions have shown promise in multiple studies. Virginia currently has similar incentive programs, including programs administered by the Virginia Innovation Partnership Corporation (see next chapter) and the Small Business Investment Grant administered by the Virginia Small Business Financing Authority. However, if the tax credit funding is allocated to the Small Business Investment Grant, the General Assembly should consider making changes to the program that were recommended or suggested in *Workforce and Small Business Incentives* (JLARC 2018). These changes include to

- adopt a scoring system to better target awards to businesses more likely to have high economic impact and
- transfer the administration of the grant to a more appropriate agency, like the Virginia Innovation Partnership Corporation, which has other programs to encourage high-tech startup growth in the state.

## RECOMMENDATION 5

The General Assembly may wish to consider eliminating the Qualified Equity and Subordinated Debt Investments Tax Credit by repealing § 58.1-339.4 of the Code of Virginia.

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If the General Assembly chooses not to eliminate the angel investment tax credit, the tax credit should be changed to better target innovative, fast-growing businesses and incorporate other optimal incentive design features. These changes would better align the credit with best practices for effective incentives, although the credit may remain largely ineffective if it does not encourage investors to make investments they otherwise would not. Priority should be given to two changes:

- **Better target the tax credit to innovative, fast-growing businesses** – This could be accomplished in one or more ways: (i) restricting the tax credit to professional or experienced investors more likely to invest in these businesses by requiring them to be certified or accredited investors or requiring a minimum investment, such as \$25,000; (ii) requiring “qualified businesses” to hold intellectual property, like a patent, or have received prior funding from an angel investor group or startup accelerator; and (iii) moving eligibility determination for the tax credit from Virginia Tax to an organization that has an entrepreneurial innovation mission and could better market the incentives, such as the Virginia Innovation Partnership Corporation, which administers other angel and venture capital assistance funds. Better targeting may improve the economic benefits of the tax credit.
- **Include an expiration date in statute for the tax credit** – The expiration date for the angel investment tax credit could be set to July 1, 2025, which would be consistent with the expiration date of other Virginia tax incentives.

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**Certified or accredited investors** are individuals with annual income of at least \$200,000 and a net worth of at least \$1 million (U.S. Securities and Exchange Commission).

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Expiration dates are a recommended best practice for economic development incentives because they encourage legislatures to evaluate whether incentive programs should be extended, altered, or allowed to expire.

Consideration should also be given to additional changes:

- **Reducing the reimbursement rate to lessen proration of the tax credit** – The reimbursement rate for the tax credit could be reduced from 50 percent to between 25 and 33 percent of eligible investments. Given demand for the credit between FY11 and FY20, a 25 percent reimbursement rate would have eliminated oversubscription of the tax credit in all but one year. This change would provide more certainty to investors on the amount they will receive, thereby increasing the attractiveness of the credit. It would also bring the rates in line with other states.
- **Requiring businesses to attest that tax credits are needed and incentivizing them to remain in Virginia for a designated period** – Qualifying businesses could be required to attest that angel investment tax credits are needed to encourage investment in the business. Investors or businesses could be required to pay a penalty if the qualified business moves outside the state within a designated timeframe of receiving the benefit. Other Virginia incentives and other states' equity investment incentives have these requirements.

### **Investment periods for long-term capital gains subtraction and venture capital subtraction should not be renewed**

The time periods for which investments qualify for the capital gains subtraction ended in 2020, and the venture capital subtraction ends in 2023; these investment periods should not be renewed by the General Assembly. The capital gains subtraction appears to have been adopted as a temporary measure to encourage business investment during the Great Recession, and the economic benefits generated by the subtraction are negligible. The venture capital subtraction has not been used, and it is unlikely to be used in the future because there are few eligible venture capital fund companies located in Virginia. Minimal empirical evidence is available to show that incentives similar to the capital gains and venture capital subtractions are effective in stimulating new equity investment.

### **RECOMMENDATION 6**

The General Assembly may wish to consider not renewing the investment periods for the (i) long-term capital gains subtraction, which ended June 30, 2020, and (ii) venture capital subtraction, which will end December 31, 2023.

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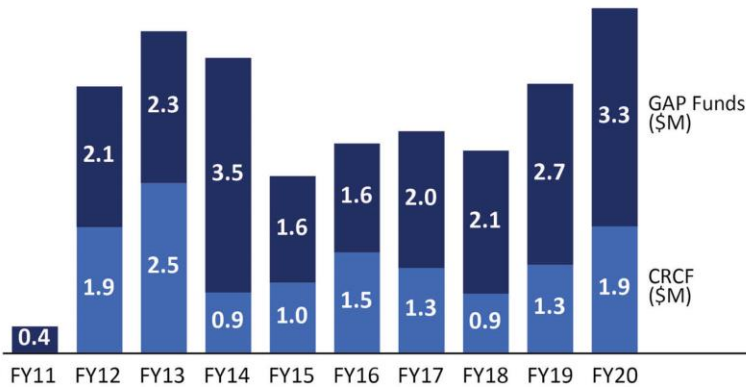
## DIRECT FINANCIAL ASSISTANCE TO STARTUPS

Encourage startup growth and innovation in the state

### VALUE TO BENEFICIARIES

FY11–FY20

Total tax savings: \$35M



Beneficiaries



Nearly **340** high-tech startup companies

### ACHIEVEMENT OF PURPOSE

GAP Funds and CRCF programs have high leverage factors

GAP Funds



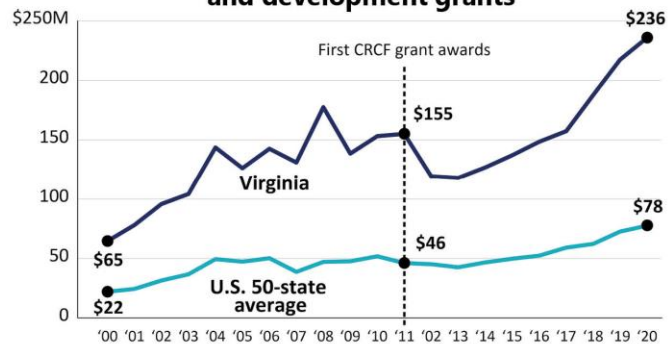
Leverage factor

CRCF program



Leverage factor

CRCF program helped state remain competitive in receiving federal research and development grants



### IMPACT TO STATE ECONOMY

FY11–FY20

Economic benefit per \$1M in incentives

Jobs, state GDP, and personal income



Return in revenue

per \$1 spent



- High
- Moderate
- Low
- Negligible

GAP Funds



CRCF program

NOTE: Beneficiaries are unduplicated estimates of businesses. Federal research and development grants are awards from the federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs.

### 3. Direct Financial Incentives for Startups

Virginia offers two programs that provide financial assistance directly to startups to encourage their growth and innovation. The Growth Acceleration Program Funds (GAP Funds) make early, seed-stage equity investments in small, Virginia-based technology and life sciences companies with high growth potential. The Commonwealth Research Commercialization Fund (CRCF) program provides grants to small, high technology companies to help bring the products and services they are developing to market (Table 3-1). Both programs are administered by the Virginia Innovation Partnership Corporation (VIPC). The programs were rebranded in 2021 and, because this change occurred after the study period for this report, this report refers to the programs by their previous names. (The GAP Funds program has been renamed Virginia Venture Partners, and CRCF has been combined with another program and renamed the Commonwealth Commercialization Fund.)

Like venture capital incentives, the GAP Funds and CRCF programs are designed to support startup growth, but the financial assistance goes directly to the business. A key goal of both the GAP Funds and CRCF programs is to help make startups more attractive for follow-up private investment that will help them grow.

For the GAP Funds program, VIPC serves as an “angel investor.” VIPC has an equity stake in the company and assists in company development through its status as a board member and advisor. VIPC recovers its funds when the company is sold, goes public, or moves from the state but loses its investment when the business fails. Thus, the program can potentially become self-sufficient over time by reinvesting the proceeds in new ventures, similar to a revolving loan fund. To date, some of the proceeds have been transferred to other related programs, such as the new Virginia Founders Fund, which is designed to provide startup funding for underrepresented demographics and regions.

A key feature of the CRCF program is it provides grant funding to Virginia-based recipients of federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants. The SBIR/STTR programs are highly competitive federal grant programs that encourage domestic small businesses to help meet federal research and development needs. The programs are similar, but SBIR grants are awarded to startups operating on their own, and STTR grants are awarded to startups that are collaborating with university-affiliated researchers. Both programs also provide Phase I awards for concept development and Phase II awards that further support prototype development. The STTR program fosters technology transfer through cooperative R&D between small businesses and research institutions and specifically requires formal collaboration between business awardees and a research institution.

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The **Virginia Innovation Partnership Corporation (VIPC)** was created in 2021 after legislation in 2020 merged the Innovation and Entrepreneurship Investment Authority and Virginia Research and Investment Committee into the Virginia Innovation Partnership Authority.

VIPC is the nonprofit operating arm for the Virginia Innovation Partnership Authority and was formerly known as the Center for Innovative Technology (CIT), which was the operating arm of the Innovation and Entrepreneurship Investment Authority. CIT was rebranded as VIPC in 2021 to reflect its expanded mission.

Programming changes also occurred in 2021. The GAP Funds program became Virginia Venture Partners, and the Commonwealth Research Commercialization Fund became the Commonwealth Commercialization Fund.

This evaluation does not capture the agency consolidation and programmatic changes that occurred in 2021, because the study period ends in FY20.

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TABLE 3-1

**Virginia offers two programs that provide financial assistance directly to startups to encourage their growth and innovation**

<b>Growth Acceleration Program Fund (GAP Funds; became Virginia Venture Partners in 2021)</b> (established 2004)	
<b>Purpose</b>	Promote expansion of early stage companies in targeted fields with rapid growth potential.
<b>Eligibility</b>	Virginia-based technology, green technology, and life science companies with a high-growth potential.
<b>Program features</b>	<p>Series of equity funds managed by Virginia Innovation Partnership Corporation (VIPC). VIPC makes seed-stage investments in eligible Virginia-based firms, or firms willing to relocate to Virginia.</p> <p>Investment averages \$125,000 and may be in combination with other private investors.</p> <p>Investment decisions are made on competitive basis, with screening and selection by VIPC staff, private sector experts, and VIPC's Investment Advisory Board, which includes regional venture capitalists, angel investors, and entrepreneurs.</p> <p>VIPC staff conduct due diligence and evaluate the quality and creativity of the company's management team, business plan, potential to leverage additional angel capital and venture investment, proprietary advantage of business model, technology development approach or intellectual property, and ability to grow rapidly.</p>
<b>Commonwealth Research Commercialization Fund (CRCF; became part of Commonwealth Commercialization Fund in 2021)</b> (adopted 2009 with first awards in FY12)	
<b>Purpose</b>	Promote high technology economic development through commercialization of promising research and development.
<b>Eligibility</b>	Companies developing technologies in target industry sectors identified by the Commonwealth Research and Technology Strategic Roadmap (now Innovation Index) at the time of application, such as life sciences, cybersecurity, advanced manufacturing, energy, and unmanned systems.
<b>Program features</b>	<p>Grants are made through several subprograms <sup>a</sup> to support early-stage technology development, including assistance with bringing the technology to market and making it attractive for further investment and licensing.</p> <p><u>Commercialization Program</u>: grants (average award \$65,000) are made to companies on the basis of scientific merit and economic development potential for technology at the proof-of-concept stage or earlier to support product validation and commercialization efforts. Funds must be matched by recipient.</p> <p><u>SBIR/STTR matching funds program</u>: grants (average award \$53,000 <sup>b</sup>) are made to Virginia-based businesses that have recently won a federal Phase I and/or Phase II Small Business Innovative Research (SBIR) or Small Business Technology Transfer (STTR) award to further accelerate high-potential technology development and commercialization efforts.</p> <p>Multi-stage application process by which applications are reviewed by VIPC staff to ensure compliance with program guidelines, scored by subject matter experts, evaluated and scored by an advisory committee, and ultimately selected by VIPC board of directors.</p>

SOURCE: Weldon Cooper Center review of the Code of Virginia and agency documents.

NOTE: Authorized by §§ 2.2-2355 and 2.2-2359 of the Code of Virginia.

<sup>a</sup>The Eminent Researcher and Matching Funds Program with Virginia colleges and universities do not provide funding for businesses and are not included in this review. <sup>b</sup> Minimum award amounts increased from \$50,000 to \$75,000 in FY20. Other states have similar programs, see Appendix J for more information.

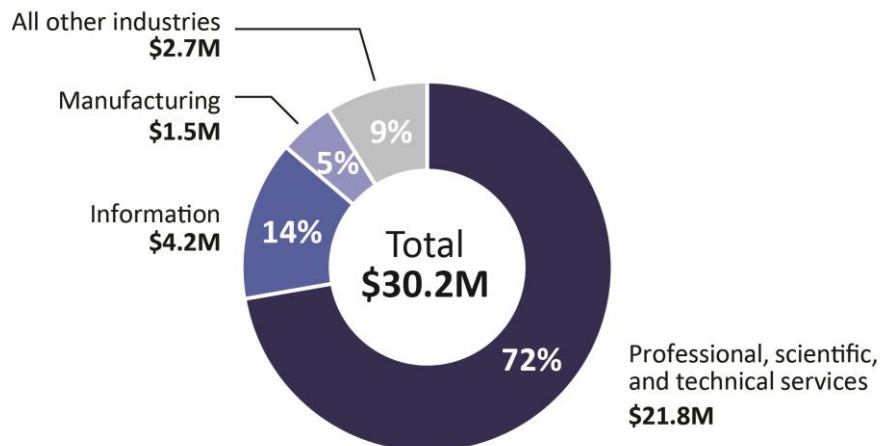
## Startups received \$5 million in GAP Funds investments and CRCF grants in FY20

Startup businesses received nearly \$35 million in GAP Funds investments and CRCF grants during the 10-year period from FY11 to FY20, including \$5 million in FY20. (This is similar to the amount of tax incentives private investors received from the angel investment tax credit and capital gains subtraction over this period.) GAP Funds investments make up nearly two-thirds of the funding (62 percent).

Nearly 340 companies benefited from the two programs over the 10-year period, with the GAP Funds program benefiting slightly more companies. Like other incentives in this report, the vast majority of awards from both programs has been to startups in the professional, technical, and scientific services industry sector (Figure 3-1), with another 19 percent of GAP Funds investments (only 4 percent for CRCF awards) to software design and cybersecurity firms in the information sector.

**FIGURE 3-1**

**Vast majority of GAP Funds and CRCF awards has been to startups in the professional, technical, and scientific services industry sectors (FY11–FY20)**



SOURCE: Weldon Cooper Center analysis of VIPC program data.

NOTE: Calculations based on 145 CRCF and 162 GAP Funds awards.

Both GAP Funds and CRCF awards are targeted to small startup firms, with CRCF awards going to the smallest companies of any Virginia grant program. Both programs target early-stage startup companies, with CRCF awards generally targeted at the earliest stages. The average size of companies receiving CRCF awards is 4.1 employees, and the average size of companies receiving GAP Funds investments is 6.5.

The GAP Funds and CRCF program are among the most geographically concentrated of Virginia's incentive programs, with startups in Arlington and Fairfax counties receiving 65 percent of GAP Funds investments. In addition to Northern Virginia, CRCF awards are clustered to companies near the University of Virginia and Virginia

Tech, two of Virginia's public research universities. (See online Appendix I for maps of awards by locality.)

### **GAP Funds and CRCF programs appear to help startups innovate and grow**

Evidence suggests Virginia's GAP Funds and CRCF programs help startup businesses innovate and grow. Several design features likely lead to the effectiveness of both programs, according to research (though the research mostly focuses on effective design features for direct investment funds). VIPC has historically collected and reported outcome measures for both programs and has made program improvement and data collection revisions over time. VIPC provides advice and support to businesses in both programs and helps oversee the management of businesses in GAP Funds companies through its status as a board member and adviser. Both programs also have additional features that research indicates can contribute to their success, including being operated through a third-party entity, having local entrepreneurs involved in award selection, and employing managers with extensive networks and contacts at entrepreneurial support organizations.

### ***Research on investment fund programs supports their effectiveness and finds commercialization programs improve firm performance in some areas***

Only a few peer-reviewed studies on the effects of government-supported investment funds exist, but they generally find that programs, like the GAP Funds program, which receive both government venture capital and private venture capital are successful. One study found that firms receiving both government venture capital and private venture capital received more venture investment than those funded by private venture capitalists alone. Another study found that private venture or mixed investment funds programs, like the GAP Funds program, were more successful than public direct investment funds in selecting the most promising startups or providing the additional services like managerial assistance that foster success.

Some research indicates commercialization programs can improve some performance measures but not all. Several recent empirical studies examining the effect of the federal SBIR/STTR programs, and their associated state match programs like the CRCF, found these programs generally resulted in increased likelihood of obtaining Phase II awards, higher employee wages, improved firm survival, and greater ability to attract capital. However, firm employment levels do not generally increase, and in some cases actually decrease, because program guidelines encourage collaborative outsourcing of R&D work. Available empirical evidence for other state commercialization programs is much more limited, perhaps because commercialization assistance is delivered more frequently by universities than statewide programs, and existing state programs are fairly diverse.

***GAP Funds and CRCF projects leverage additional private investment to help businesses grow***

Virginia's GAP Fund and CRCF programs appear to help startup businesses innovate and grow. Both programs report fairly high investment leverage rates for assisted projects, meaning projects have received additional private investments. VIPC reports leverage rates of 45.8 for the GAP Funds and 43.0 for the CRCF programs between FY11 and FY20, meaning that for every \$1 in investment, GAP Funds projects received an additional \$46 in private investment, and CRCF projects received \$43 in additional investment.

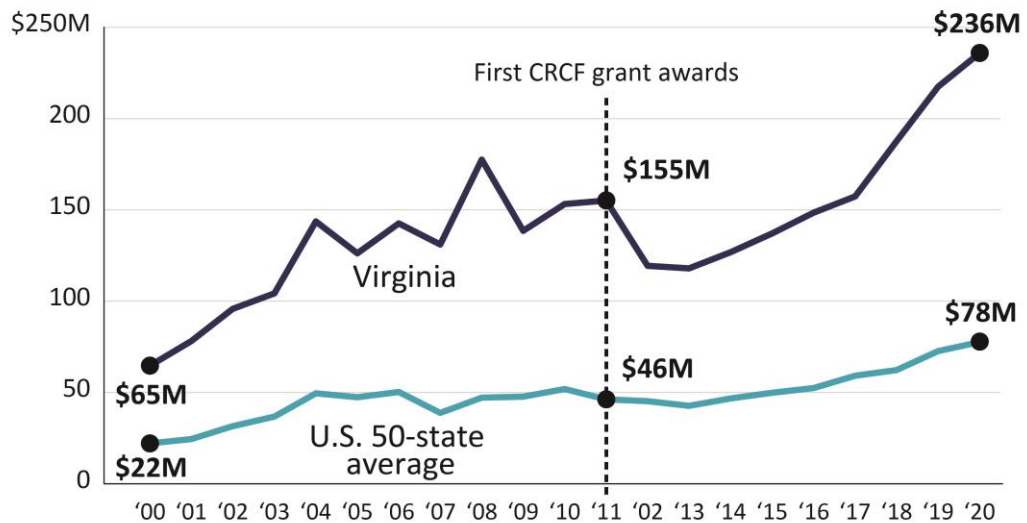
GAP Funds projects also perform well on other outcome measures. VIPC estimates that invested GAP Funds to date have a projected capital return factor of 1.6, meaning that returns are expected to exceed invested amounts by 60 percent. Businesses that received GAP Funds investments between FY11 and FY20 also have a lower failure rate than national estimates for startup companies. Sixteen percent of GAP Fund projects failed over the 10-year period compared with national estimates that 21.5 percent of startups fail in the first year, 30 percent in the second year, 50 percent in the fifth year, and 70 percent in their 10th year.

***CRCF program has likely helped the state remain competitive for federal SBIR/STTR awards, but creation of university-based startups lags other states***

The CRCF program may have helped Virginia remain competitive in receiving federal SBIR/STTR awards to promote research and development (Figure 3-2). (Approximately half of CRCF awards are used as a state match for the SBIR/STTR programs.) Virginia has historically drawn a high share of SBIR/STTR funds relative to state GDP, ranking fifth between 1996 and 1998. Since 2011, when the CRCF program began making awards, Virginia's growth rate (52 percent) for SBIR/STTR has been lower than the nation's (68 percent), but this is likely because several states introduced new SBIR/STTR match programs to increase their state businesses' competitiveness in receiving these awards. However, the CRCF awards likely helped Virginia keep pace during this time. Virginia still ranked sixth in SBIR/STTR awards per state GDP as of the 2016–2017 period.

**FIGURE 3-2**

**CRCF program may have contributed to Virginia's increase in federal SBIR/STTR awards after 2011**



SOURCE: Small Business Administration, SBIR/STTR Awards (<https://www.sbir.gov>).

The CRCF program has not enhanced or expanded the commercialization of university-based research as indicated by low creation of new university-based business startups. Startup projects receiving STTR grants are required to partner with research institutions. State performance in university-generated startups has lagged the national average since CRCF was established. Virginia currently ranks 36th among states with a rate of 0.56 startups per 100,000 residents, which is half of the national rate of 1.14. A national consultant and stakeholders cite several reasons for Virginia's relatively low prevalence of university-based startups, including inconsistent university policies for intellectual property, restrictions on university infrastructure sharing with business partners, inadequate pipeline of commercialization prospects, and deficiencies in entrepreneurship support. The CRCF program, however, has a limited ability to address these problems alone.

### **GAP Funds program generates high economic benefits, but economic benefits of CRCF program are low**

**Economic impact analysis** of incentive spending between FY11 and FY20 was conducted using economic modeling software developed by REMI, Inc.

(See Appendix L for the economic impact analysis used in this study.)

The GAP Funds and CRCF programs are estimated to have generated additional economic activity for the state between FY11 and FY20. The GAP Funds program accounted for the majority of the activity. Estimates show that each year private sector employment increased by 43 jobs, state GDP increased by \$8 million, and statewide personal income increased by \$5 million because of the program. The CRCF program also generated additional economic activity, but less than the GAP Funds program (Table 3-2). Estimates are based on employment growth for startup companies that had completed all funding requirements. (See Appendix B.)



Table 3-2

**GAP Funds program generates high economic benefits, but economic benefits of CRCF program are low (FY11–FY20)**

	Annual average FY11–FY20	
	GAP Funds	CRCF
<b>Net impact to Virginia economy</b>		
Private employment	43 jobs	20 jobs
Virginia GDP	\$8.4M	\$4.1M
Personal income	\$4.8M	\$2.2M
<b>Impact to Virginia economy per \$1 million of incentives</b>		
Private employment	274 jobs	36 jobs
Virginia GDP	\$52.8M	\$7.0M
Personal income	\$30.5M	\$4.0M
<b>Impact to state revenue</b>		
Total revenue	\$0.3M	\$0.2M
Incentive awards	\$0.2M	\$0.7M
Revenue net of awards	\$0.1M	(\$0.5M)
Return in revenue	\$1.66 for every \$1 spent	23¢ for every \$1 spent

SOURCE: Weldon Cooper Center economic impact analysis of amount of incentive spending between FY11 and FY20.  
 NOTE: Includes direct, indirect, and induced impacts. Gross impact on Virginia's economy is used to calculate impact per \$1 million in incentive awards. This is consistent with how the economic development research literature typically calculates these impacts. (See Appendix M for detailed results on total impact of the incentives, impact of raising income taxes by the amount of the incentives [opportunity cost], and revenue generated by source.) Annual average program spending for the GAP Funds program reflects recouped investments which are reinvested in the program.

**Net impact** is the increase in economic activity induced by the incentives after adjusting for the opportunity cost of increasing taxes to pay for the incentives.

(See Appendix M for information on the total economic impact and the opportunity cost of increasing taxes.)

The economic benefits and returns in state revenue of the GAP Funds program are high compared with Virginia's other incentives. The GAP Funds program has similar economic benefits and returns in revenue as the VALET Program and Trade Show Assistance Program, which have the highest economic benefits and returns in state revenue of the incentives evaluated in this report series to date (excluding four revolving loan programs, which have almost no cost to the state). When assessed per \$1 million spent on incentives, the GAP Funds program generated 274 additional jobs, \$53 million in additional state GDP, and \$31 million in additional statewide personal income each year between FY11 and FY20. Its return in revenue each year is \$1.66 per \$1 spent, meaning that the program more than pays for itself.

The GAP Funds program has high economic benefits and returns in revenue for two reasons. The program provides relatively small amounts of equity investment (an average of \$125,000) in typically fast-growing firms. The program is also partially self-funding (like loan programs), because proceeds from the sale, move (invoking a "claw-back"), or public offering of a company in the program can be used to fund future equity investments. (See online Appendix L for the methodological assumptions used in this analysis.)

The CRCF program has low economic benefits and returns in state revenue compared with other incentives. When assessed per \$1 million spent, the CRCF program generates 36 additional jobs, \$7 million in additional state GDP, and \$4 million in additional

statewide personal income each year between FY11 and FY20. These results are lower than the average incentive, which is estimated to have generated an additional 78 jobs, \$14 million in Virginia GDP, and \$7 million in personal income for every \$1 million spent. The return in revenue each year for the CRCF program is only estimated to be 23¢ for every \$1 spent compared with 44¢ for every \$1 spent for the average incentive.

The CRCF program's low economic benefits and return in revenue are primarily because CRCF grant recipients are slowing growing firms that experienced low levels of employment growth compared with GAP Funds projects. (This analysis is based on matching completed projects with employment records.) Some firms that received CRCF assistance did not grow at all. This finding is consistent with the research literature that found that state SBIR/STTR match programs (for which half of CRCF funds are used) do not stimulate firm employment growth. This may be because these businesses are more likely to contract out research-related activity, or because these businesses are more focused on developing viable technology that can be sold to other firms rather than building a long-term business.

### **Substantive changes do not appear necessary for the GAP Funds and CRCF programs at this time**

Substantive changes do not appear necessary to the GAP Funds and CRCF programs (now the Virginia Venture Partners and Commonwealth Commercialization Fund [CCF] programs, respectively). Both programs are well designed, and assisted projects have leveraged additional private investment to help them grow. The GAP Funds program is estimated to have generated high economic benefits. While the CRCF program is estimated to have generated low economic benefits, this result is likely because projects had lower job growth. VIPC staff indicated they are taking steps to address this by broadening the targeted industries eligible for the CCF program beyond the targeted industry sectors identified by the Commonwealth Research and Technology Strategic Roadmap (now the Innovation Index), which has narrowed over time, and by allowing exceptions to the targeted industry criteria for innovative, fast-growing projects.

## 4. Space Tax Incentives

Virginia offers three tax incentives that support increased space flight activities in the state. Spaceflight activity in Virginia occurs at Virginia’s Mid-Atlantic Regional Spaceport (MARS) operated by the Virginia Commercial Space Flight Authority (Virginia Space). The Virginia Spaceport Users Exemption (spaceport exemption), which was established in 1997, allows companies to purchase, lease, or use tangible goods used for spaceport activity at MARS tax free. The other two tax incentives were created as part of Virginia’s “Zero Gravity, Zero Tax Act,” which were passed by the 2008 General Assembly and allow space flight companies to subtract income earned from eligible space launch activities at Virginia airports or spaceports from their taxable income (Table 4-1). Companies can subtract income earned from

- launching people to space or launch services that either provide people with space flight training or simulate the space flight experience (Zero G human flight subtraction) and
- service contracts with NASA to resupply the International Space Station (Zero G resupply subtraction).

The Zero G human flight subtraction has not yet been used and is unlikely to be used in the near future, according to stakeholders.

Stakeholders indicate the incentives were established to enhance the competitiveness of the MARS spaceport and “level the playing field” with other states, such as Florida, which were also introducing space launch incentives. U.S. space launches were conducted almost exclusively by NASA, the military, and other federal agencies until the adoption of the federal Commercial Space Launch Act (1984) and the discontinuation of the space shuttle program in 2011. Since 2011, NASA and other federal agencies have relied on private commercial contractors to provide space launch services, and states have increasingly created space flight authorities and incentives to attract space launch companies.

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The **Virginia Commercial Space Flight Authority (Virginia Space)** was created by the General Assembly in 1995 to promote commercial space activity, economic development, and aerospace research within the Commonwealth.

Virginia Space began leasing the Wallops Island Flight Facility on the Eastern Shore in 1997 to form the **Mid-Atlantic Regional Spaceport (MARS)**.

In 1995, NASA was considering closing the Wallops Island Flight Facility in response to a decrease in NASA flight activity and government policy favoring commercialization of space launches. Virginia reportedly created Virginia Space to avoid closure of the Wallops Island facility.

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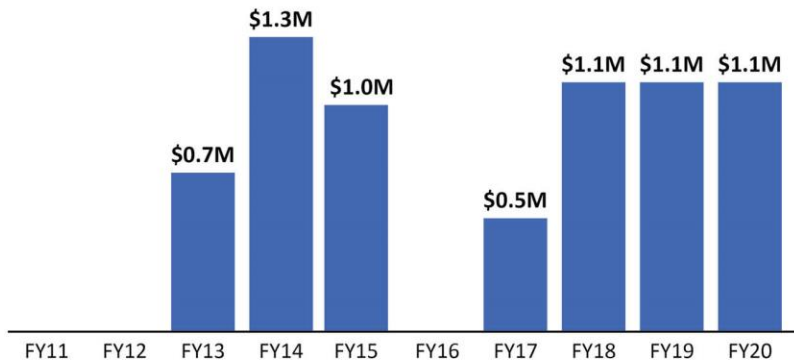
## SPACEPORT TAX EXEMPTION & ZERO G RESUPPLY SUBTRACTION

Encourage space launch activity in the state

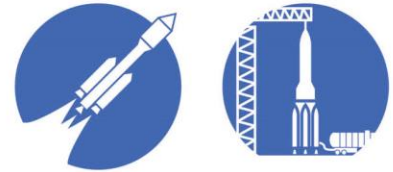
### VALUE TO BENEFICIARIES

FY11–FY20

**Total tax savings: \$6.7 million**



**Beneficiaries**



Space launch companies  
and their suppliers/  
sub-contractors

### ACHIEVEMENT OF PURPOSE

**Virginia's coastal launch site  
has more influence than the  
space tax incentives**



**Virginia's additional support for the  
space flight industry is more influential  
than the space tax incentives**

**6.7**

Space tax incentives (\$M)

**78.0**

Other state support (\$M)

### IMPACT TO STATE ECONOMY

FY11–FY20

**Economic benefit per \$1M in incentives**

Jobs, state GDP, and personal income



● ○ ○ ○ ○

**Return in revenue**

per \$1 spent



● ○ ○ ○ ○

●●●● High  
●●●○ Moderate  
●●○○ Low  
●○○○ Negligible

Spaceport exemption  
& Zero G resupply  
subtraction

**TABLE 4 -1**  
**Virginia offers three tax incentives to promote spaceport operations in Virginia**

<b>Virginia Spaceport Users Exemption (spaceport exemption) (established 1997)</b>	
<b>Purpose</b>	Promote spaceport operations in Virginia.
<b>Eligibility</b>	Companies that perform spaceport activities at the Mid-Atlantic Regional Spaceport (MARS).
<b>Program features</b>	<p>Items exempt from sales and use tax include space vehicles, equipment on space vehicles, fuel for space vehicles, and machinery used for maintaining and developing space vehicles. Items have to be purchased in Virginia or subject to the use tax and used or consumed at MARS.</p> <p>Spaceport activities broadly mean activities directed or sponsored at a facility owned, leased, or operated by or on behalf of the Virginia Commercial Space Flight Authority. The exemption does not apply to launch activities at the federal National Aeronautics and Space Administration (NASA) Wallops Flight Facility that are not leased or operated by Virginia Space.</p> <p>The exemption is still available if the launch fails, is postponed, or is canceled.</p>
<b>Zero G Zero Tax Act Income Tax Subtractions (Zero G human flight subtraction and Zero G resupply subtraction) (adopted 2008)</b>	
<b>Purpose</b>	Encourage the location and expansion of companies at a Virginia airport or spaceport involved in (i) flying or training humans in suborbital flight or (ii) involved in resupplying the International Space Station (ISS).
<b>Eligibility</b>	<p>Launch or space flight services must be provided at a Virginia airport or spaceport.</p> <p>Companies must have a contract with NASA to resupply the ISS to use the resupply subtraction.</p>
<b>Program features</b>	<p>Income tax subtraction that allows space flight companies to subtract income earned from eligible space flight activities from their taxable income.</p> <p>Companies can use the Zero G human flight subtraction if they provide individuals the training or experience of space flight, without performing an actual launch.</p>

SOURCE: Weldon Cooper Center review of the Code of Virginia and agency documents.

NOTE: Authorized by §§ 58.1- 322(C)(33,34), 58.1-402(C)(22,23), and 58.1-609. 3(13) of the Code of Virginia.

## **Companies saved \$1.1 million in income and sales taxes in FY20 because of space tax incentives**

Virginia's commercial space-related companies are estimated to have saved \$6.7 million in state income and sales taxes during the 10-year period from FY11 to FY20, and \$1.1 million in FY20. Nearly all of the savings went to space-related companies that used the spaceport exemption. The beneficiaries of these tax incentives are space flight companies, such as Northrop Grumman (previously Orbital Sciences), and their suppliers and subcontractors that support spaceport activities at MARS.

Savings from the tax incentives are relatively small because there were only 14 launches during the 10-year period, or about one launch per year. The bulk of spaceport spending attributable to the spaceport exemption likely occurs during launch preparation, which is one to two months prior to the launch, according to stakeholders. Use of the Zero G resupply subtraction is dependent on income from this small number of launches and the profitability of the launch providers.

Use of the spaceport tax exemption should increase in the future because Rocket Lab, a space launch provider, recently selected MARS as the launch site for its Electron rocket and the location to manufacture, operate, and launch its Neutron rocket. Rocket Lab launched its Electron rocket in February 2022 and expects to launch its Neutron rocket beginning in 2024. Therefore, Rocket Lab and the suppliers and subcontractors it uses for activities at MARS may begin using the spaceport exemption in FY22. The FAA estimates that commercial space launch activity will grow and other space flight companies may choose to launch from MARS, which may increase use of the exemption.

Use of the Zero G subtractions is not expected to increase. Rocket Lab does not have a contract with NASA to supply the ISS and cannot use the Zero G resupply subtraction. It could potentially use the Zero G human flight subtraction because the Neutron rocket is capable of human space flight, but the company has no plans for providing human spaceflight at this time.

### **Multiple factors, including other Virginia incentives, have greater influence on space activity than the space tax incentives**

Space launch location decisions are influenced by several factors, according to research and stakeholders. These factors, specifically spaceport infrastructure and location and other forms of state support, are much more important factors in making launch location decisions than the availability of the three space-related tax incentives.

#### ***MARS has infrastructure and location advantages that are attractive for space flight activity***

MARS offers several notable advantages as a launch site. MARS is operated by a state spaceport authority, Virginia Space, which can issue bonds to help fund the capital expense of infrastructure development. The estimated cost of building a commercial spaceport is more than \$200 million. The FAA reports the ability to issue bonds is the most important economic development tool for commercial launch sites because of the high capital costs.

MARS also has multiple infrastructure advantages. It has vertical launch facilities for launching payloads into orbit, which places it in competition with only three other spaceports nationally (Cape Canaveral in Florida, Pacific Spaceport Complex in Alaska, and Vandenberg Spaceport in California). As one of the first U.S. commercial spaceports, MARS has already developed considerable infrastructure. It currently has three launch pads, a vehicle and payload processing integration facility, and support instrumentation and emergency facilities.

MARS has numerous locational advantages, including

- a coastal location, which minimizes safety hazards because launch paths are over the open ocean rather than populated areas, resulting in lower insurance costs;

- a good launch trajectory to serve the International Space Station and low earth orbit;
- being within a zone that is less prone to natural disasters, such as seismic and hurricane activity like competing facilities in Florida and California;
- access to services and personnel available at the NASA Wallops Flight Facility through Virginia Space's partnership with NASA; and
- proximity to the Washington, D.C., metropolitan area and its skilled workforce, and close connections to major aerospace and defense customers.

MARS also has fewer launches each year than Cape Canaveral in Florida, its principal competitor, which allows it to offer scheduling flexibility to space launch companies.

***Virginia has provided additional support to the space flight industry that is more influential than the space tax incentives***

Virginia has provided other financial support to Virginia Space and space-launch providers that is far greater and, according to one stakeholder, has far more impact on attracting space flight companies to MARS than the spaceport exemption and Zero G resupply subtraction. Between FY11 and FY20

- Virginia Space received \$8.5 million in bond financing in addition to its annual operating appropriation (\$15.8 million per year since FY15) and more than \$50 million in appropriations for infrastructure improvements at MARS.
- Orbital Sciences, a space launch provider, received more than \$28 million in grant funding from Virginia's Transportation Partnership Opportunity Fund that supported infrastructure development at MARS during the 10-year period.
- Though outside the study period, Rocket Lab was awarded a \$15 million custom incentive package to establish a space vehicle production facility to assemble and launch Rocket Lab's Neutron rocket, and Virginia Space received an appropriation of \$30 million for an additional launch pad in FY22.

These other state resources are far greater than the estimated \$1.1 million spent per year during the 10-year period on the spaceport exemption and the Zero G resupply subtraction. (State subsidization is common for most spaceports, because otherwise spaceports would have substantial operating deficits.)

In addition to financial support, Virginia has passed laws to help make MARS more attractive to space flight companies. Virginia has adopted space-flight liability and immunity laws that protect space flight entities from liability for participant injury. The liability laws are credited, in part, with the decision by Orbital Sciences (now Northrop Grumman) to locate the launch operations for its Taurus II launch vehicle at MARS in 2008. Virginia has also passed laws granting FOIA protection for companies when they do business with Virginia Space.

## Space tax incentives have negligible economic benefits and negligible returns in state revenue

The spaceport exemption and Zero G resupply subtraction are estimated to have generated economic losses for the state between FY11 and FY20. Estimates show that each year private sector employment decreased by one job, state GDP decreased by \$0.5 million, and statewide personal income decreased by \$0.1 million because of the tax incentives (Table 4-2). Economic losses occur because the increase in taxes to pay for the incentives was greater than the small amount of jobs, Virginia GDP, and personal income generated by the incentives. Estimates for the spaceport exemption and the Zero G resupply subtraction are reported together to prevent disclosure of taxpayer information, since the subtraction has very few users. Estimates are not provided for the Zero G human flight subtraction because it was not used during the 10-year study period.

**Economic impact analysis** of incentive spending between FY11 and FY20 was conducted using economic modeling software developed by REMI, Inc.

(See Appendix L for the economic impact analysis used in this study.)

**TABLE 4-2**

**Spaceport exemption and Zero G resupply subtraction are estimated to have negligible economic benefits and returns in state revenue (FY11–FY20)**

	Annual average FY11–FY20
<b>Net impact to Virginia economy</b>	
Private employment	(1 job)
Virginia GDP	(\$0.5M)
Personal income	(\$0.1M)
<b>Impact to Virginia economy per \$1 million of spending</b>	
Private employment	6 jobs
Virginia GDP	\$0.3M
Personal income	\$0.6M
<b>Impact to state revenue</b>	
Total revenue	<\$0.1M
Cost of incentive	\$0.6M
Net revenue	(\$0.6M)
Return in revenue per \$1 spent	4¢ per \$1 spent

SOURCE: Weldon Cooper Center economic impact analysis of business activity induced by Virginia's economic development incentive programs between FY10 and FY19.

NOTE: Includes direct, indirect, and induced impacts. Gross impact on Virginia's economy is used to calculate impact per \$1 million in incentive awards. This is consistent with how the economic development research literature typically calculates these impacts. Estimates assume firm capital costs are reduced for the air transportation sector, which includes space flight. (See Appendix M for detailed results on total impact of the incentives, impact of raising income taxes by the amount of the incentives [opportunity cost], and revenue generated by source.)

**Net impact** is the increase in economic activity induced by the incentives after adjusting for the opportunity cost of increasing taxes to pay for the incentives.

(See Appendix M for information on the total economic impact and the opportunity cost of increasing taxes.)

The economic benefits and return in state revenue of the space tax incentives are negligible compared with the economic benefits and return in state revenue of other incentives. When assessed per \$1 million spent on incentives, the space tax incentives generate six additional jobs, \$0.3 million in additional state GDP, and \$0.6 million in additional statewide personal income each year between FY11 and FY20. The return in revenue each year for the space tax incentives is 4¢ per \$1 spent. These estimates,



while negligible, are similar to other tax incentives evaluated in prior reports in this series, including the sales tax exemptions for the airline and shipping industries and the airline repair parts exemption. The economic benefits and returns in state revenue generated by the space tax incentives are negligible because most of the components for space flight vehicles launched in Virginia are sourced from out-of-state or international suppliers; therefore, the industry's multiplier effect is relatively low.

### **Spaceport exemption could be maintained, but the Zero G subtractions should be eliminated**

While space tax incentives have very limited impact on space activity and negligible economic benefits, the spaceport exemption could be maintained for several reasons. Although space launch providers can use the exemption, they report that their suppliers and sub-contractors are the primary beneficiaries of the exemption. Discontinuing the spaceport exemption would put Virginia at a disadvantage to other states with space launch facilities—all of which have similar exemptions—at a time when Virginia Space is trying to increase space launches. This exemption also provides similar tax treatment to the space industry as other capital intensive industries, such as data centers, railroads, airlines, and shipbuilding.

The Zero G tax incentives should be eliminated because they are narrowly targeted at specific types of space launch and training activities. The Zero G resupply subtraction benefits only Virginia companies with a resupply contract for the ISS. While it likely provides meaningful tax relief to its users, it is likely immaterial to other space launch company decisions to locate in Virginia because very few companies have a resupply contract. The current resupply contract for the ISS will expire in 2026, and NASA will end operation of the ISS in 2030, further reducing the relevance of the resupply subtraction. The subtraction for human space-flight training has never been used, and stakeholders expressed doubt that it would be used in the near future.

If the General Assembly wishes to continue to provide an incentive to encourage space flight companies to locate or launch from Virginia Space, it should consider replacing the Zero G income tax subtractions with a new, broader grant to incentivize infrastructure development at Virginia Space. Direct assistance with infrastructure costs seems to be the most important factor influencing MARS's value and prominence, so a capital investment grant may be more effective at influencing location decisions. The new incentive could provide grant awards to space launch companies based on a percentage of new capital investment (such as 2 percent of capital investment like Virginia's International Trade Facility Tax Credit) or provide grants to space launch companies that create a minimum number of jobs and a minimum capital investment in Virginia (similar to Florida's Space Business Incentives Act.) Additional funding beyond the cost of the resupply subtraction (well under \$1 million per year) would likely be needed to encourage additional space launch companies to locate operations in Virginia (and launch from MARS). For example, several Virginia infrastructure-related grant programs for port users and companies in need of rail/road access

improvements provide maximum awards of around \$500,000 per project, though total annual funding for the program varies.

#### **RECOMMENDATION 7**

The General Assembly may wish to consider amending §§ 58.1-322 and 58.1-402 of the Code of Virginia to eliminate the Zero G Zero Tax income tax subtractions after the current contract to resupply the International Space Station expires.

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Virginia Space could be required to provide policymakers with more comprehensive information on state funds spent on MARS and whether funding objectives have been met. This would allow policymakers to understand whether the state is effectively incentivizing commercial space activity. The state has provided significant financial support directly to Virginia Space for MARS infrastructure, which benefits the space launch companies that use the spaceport. However, limited information is reported about total spending and related outcomes.

Virginia Space could be required to include in its annual report to the General Assembly a summary of its six-year strategic plan that it presents to its board, how available state funds have been spent to achieve the strategic plan goals to date, and the extent to which the strategic plan goals have been achieved to date. According to Virginia Space and MARS staff, its key performance measures are currently the size of its customer base (i.e., the number and diversity of its launch customers) and the number of launches it performs.

#### **RECOMMENDATION 8**

The General Assembly may wish to consider amending § 2.2-2213 of the Code of Virginia to require the Virginia Commercial Space Flight Authority to include in its annual report a summary of (i) its six-year strategic plan, (ii) how available state funds have been spent to achieve the strategic plan goals to date, and (iii) the extent to which the strategic plan goals have been achieved to date.

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## Appendix A: Study mandate

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### 2020–2022 Appropriation Act

### Passed as Chapter 552 of the Acts Assembly, April 7, 2021

#### § 1-12 Item 32 F

F.1. The General Assembly hereby designates the Joint Legislative Audit and Review Commission (JLARC) to conduct, on a continuing basis, a review and evaluation of economic development initiatives and policies and to make such special studies and reports as may be requested by the General Assembly, the House Appropriations Committee, or the Senate Finance Committee.

2. The areas of review and evaluation to be conducted by the Commission shall include, but are not limited to, the following: (i) spending on and performance of individual economic development incentives, including grants, tax preferences, and other assistance; (ii) economic benefits to Virginia of total spending on economic development initiatives at least biennially; (iii) effectiveness, value to taxpayers, and economic benefits to Virginia of individual economic development initiatives on a cycle approved by the Commission; and (iv) design, oversight, and accountability of economic development entities, initiatives, and policies as needed.

3. For the purpose of carrying out its duties under this authority and notwithstanding any contrary provision of law, JLARC shall have the legal authority to access the facilities, employees, information, and records, including confidential information, and the public and executive session meetings and records of the board of VEDP, involved in economic development initiatives and policies for the purpose of carrying out such duties in accordance with the established standards, processes, and practices exercised by JLARC pursuant to its statutory authority. Access shall include the right to attend such meetings for the purpose of carrying out such duties. Any non-disclosure agreement that VEDP enters into on or after July 1, 2016, for the provision of confidential and proprietary information to VEDP by a third party shall require that JLARC also be allowed access to such information for the purposes of carrying out its duties.

4. Notwithstanding the provisions of subsection A or B of § 58.1-3 or any other provision of law, unless prohibited by federal law, an agreement with a federal entity, or a court decree, the Tax Commissioner is authorized to provide to JLARC such tax information as may be necessary to conduct oversight of economic development initiatives and policies.

5. The following records shall be excluded from the provisions of the Virginia Freedom of Information Act (§ 2.2-3700 et seq.), and shall not be disclosed by JLARC:

(a) records provided by a public body as defined in § 2.2-3701, Code of Virginia, to JLARC in connection with its oversight of economic development initiatives and policies, where the records would not be subject to disclosure by the public body providing the records. The public body providing the records to JLARC shall identify the specific portion of the records to be protected and the applicable provision of the Freedom of Information Act or other provision of law that excludes the record or portions thereof from mandatory disclosure.

(b) confidential proprietary records provided by private entities pursuant to a promise of confidentiality from JLARC, used by JLARC in connection with its oversight of economic

development initiatives and policies where, if such records are made public, the financial interest of the private entity would be adversely affected.

6. By August 15 of each year, the Secretary of Commerce and Trade shall provide to JLARC all information collected pursuant to § 2.2-206.2, Code of Virginia, in a format and manner specified by JLARC to ensure that the final report to be submitted by the Secretary fulfills the intent of the General Assembly and provides the data and evaluation in a meaningful manner for decision-makers.

7. JLARC shall assist the agencies submitting information to the Secretary of Commerce and Trade pursuant to the provisions of § 2.2-206.2, Code of Virginia, to ensure that the agencies work together to effectively develop standard definitions and measures for the data required to be reported and facilitate the development of appropriate unique project identifiers to be used by the impacted agencies.

8. The Chairman of JLARC may appoint a permanent subcommittee to provide guidance and direction for ongoing review and evaluation activities, subject to the full Commission's supervision and such guidelines as the Commission itself may provide.

9. JLARC may employ on a consulting basis such professional or technical experts as may be reasonably necessary for the Commission to fulfill its responsibilities under this authority.

10. All agencies of the Commonwealth shall cooperate as requested by JLARC in the performance of its duties under this authority.

## Appendix B: Research methods and activities

JLARC contracted with the University of Virginia's Weldon Cooper Center for Public Service (Weldon Cooper Center) for this review. Key research activities performed by Weldon Cooper Center staff for this study included

- collection and analysis of national- and state-level financial and economic data and state agency incentive program data;
- program employment performance tracking and employment size assessment;
- estimation of business savings and state tax revenue impacts from incentives;
- quantitative analysis of the economic and fiscal impacts of incentives using a dynamic economic model (See Appendix L, available online, for more detail on the analyses);
- interviews with agencies and stakeholders;
- review of other states' science and technology incentive programs; and
- review of documents and literature.

### Collection and analysis of national- and state-level financial and economic data and state agency incentive program data

This report drew on over a dozen federal, state, and private industry sources of economic data (Table B-1). Some of these data were used primarily for descriptive purposes, including to highlight trends in state economic activity such as high technology and space industry employment. Information from state agencies, including the Virginia Tax, Virginia Economic Development Partnership, Center for Innovative Technology/Virginia Innovation Partnership Corporation, Virginia Commercial Space Flight Authority, and Virginia Employment Commission, was used for both descriptive and analytical purposes.

**TABLE B-1**  
**Multiple data sources were collected and used for a variety of analyses**

<b>Data source</b>	<b>Description of data</b>	<b>Analysis</b>
<b>State financial and economic data</b>		
Association of University Technology Managers (AUTM)	Statistics Access for Technology Transfer (STATT)	Quantify state and national university startup rates over time.
Crunchbase	Seed and pre-seed investment and deals	Quantify state and national angel equity investment levels over time.

<b>Data source</b>	<b>Description of data</b>	<b>Analysis</b>
EMSI	Employment by 6-digit NAICS industry	Compute state and national high tech employment percentage trends. Determine relative sizes of national and state space industry.
Inc Magazine	Fast 5000	Quantify state and national fast-growing firms.
National Science Foundation	Business R&D and Innovation Survey	Compute state business R&D trends; estimate value of Virginia R&D sales and use tax exemption value.
National Venture Capital Association/Pitchbook	Seed and early stage venture capital funds	Quantify state and national venture capital investment over time. Identify Virginia-based venture capital funds.
U.S. Census Bureau	Business Dynamics Statistics (BDS)	Compute state and national small business startup rate trends.
U.S. Patent and Trademark Office (USPTO)	Patent counts by origin and type	Compute state patent rates.
U.S. Small Business Administration	SBIR/STTR awards	Compute state SBIR/STTR award trends.
<b>Virginia incentive programs</b>		
Center for Innovative Technology/Virginia Innovation Partnership Corporation	GAP Funds and CRCF award and completion information	Determine firm location and industry. Compute economic impacts.
Department of Taxation	Tax credit utilization; Tax subtraction fiscal impacts	Computation of tax credit usage and tax subtraction fiscal impact by fiscal year.
Department of Taxation	Information from tax credit applications	Tabulate tax credit applications and approvals to compute proration factors.

Data source	Description of data	Analysis
Virginia Commercial Space Flight Authority	Number of MARS launches, state support for operations budget	Estimate state tax revenue impact of Spaceport Users Exemption. Ascertain economic contribution of tax incentives relative to other financial support.
<b>Other</b>		
Annual State Tax Revenue, Census of Government	State tax revenue by tax category and fiscal year	Tax revenue impact analysis
Crunchbase	Equity investment by angel and venture capital funds	Determine equity investment leverage for GAP Funds, CRCF, and Qualified Equity and Subordinated Debt Investments Tax Credit.
Federal Aviation Administration	Estimated price per launch by space launch vehicle (Antares and Minotaur)	Estimation of state tax revenue impact of spaceport exemption.
IMPLAN	Regional SAM Balances, institution industry demand, regional employment multipliers, study area industry data	Estimation of state tax revenue impact of spaceport exemption.
REMI PI+	Demand by industry, GDP, personal income, and transfer receipts by year	Tax revenue impact analysis.
Virginia Employment Commission	Quarterly Census of Employment and Wages (QCEW) payroll employment records	Track employment performance and determine incentive program average firm size, location, and industry.

SOURCE: Weldon Cooper Center.

Project-level information for each incentive program was aggregated to show characteristics of program users and features of the programs, including industry and geographical location. Agency data was used in combination with other data such as confidential Virginia Employment Commission (VEC) Quarterly Census of Wages (QCEW) payroll employment records to track employment outcomes, measure firm employment size, and conduct economic impact analyses.

### Program employment performance and employment size assessment

Virginia Employment Commission (VEC) Quarterly Census of Employment and Wages (QCEW) data was joined with program firm beneficiary data to assess firm employment characteristics. These characteristics included the employment size distribution and average size of firms benefitting from incentives. It was also used to assess program participant employment growth over the FY11–FY20 period for the GAP Funds and Commonwealth Research Commercialization Fund (CRCF) programs.

Employment size characteristics are based on the size of the firm when it received an award or when it used a tax credit. For example, if a company received a GAP Funds investment in FY18, it was matched with a firm-level 2017 annual employment record. In addition, employment growth for the GAP Funds and CRCF program companies was computed based on the employment change before

and after a program award was received. For example, for a CRCF grant recipient in FY15, employment change in each of the years 2014–2020 would be compared to base year 2013. This was done for every firm in the project file by year. The firm employment changes were then aggregated by year.

To conduct these analyses, program project records for FY11–FY20 were matched with 2007–2020 VEC payroll employment data using the Federal Employer Identification Number (FEIN), company name, company location, and NAICS industry information provided for research and development (R&D) tax credits, CRCF, and GAP Funds and a list of firm beneficiaries for the Qualified Equity and Subordinated Debt Investments Tax Credit (angel investment tax credit) provided by Virginia Tax. The FEIN is a unique nine-digit number that identifies a firm for federal tax purposes.

The total firm match rate was approximately 69%, which is lower than other recent studies that linked establishment employment data with economic incentive project data. For example, earlier reports achieved a 90% match rate (*Workforce and Small Business Incentives*, JLARC, 2018) and an 86.4% match rate (*Infrastructure and Regional Incentives*, JLARC, 2020). The lowest match rates were obtained for business startups (CRCF, GAP Funds, and the angel investment tax credit), with match rates between 53% and 64%. These rates are similar to other small business incentive programs examined in a previous report; the Small Business Investment Grant Fund obtained a 68.4% match rate and the SWaM Loan Fund had a 63.7% match rate. Some business startups that received awards late in the study period (e.g., FY20) might not yet be reflected in 2007–2020 payroll reporting data. Moreover, some small firms will not report payroll data to the VEC if they have no employees.

**TABLE B-2**

**Project-establishment employment record matching success rate by program**

<b>Program</b>	<b>Project records</b>	<b>Employment record matches</b>	<b>Success rate</b>
CRCF	145	228	63.6%
GAP Funds	162	304	53.3
R&D expenses tax credit	730	966	75.6
Major R&D tax credit	73	90	81.1
Angel investment tax credit	126	211	59.7
<b>Total</b>	<b>1,236</b>	<b>1,799</b>	<b>68.7%</b>

SOURCE: Weldon Cooper Center analysis.

NOTE: TY2017–2020 firm beneficiaries only.

## **Estimation of business savings and state tax revenue impacts from tax incentives**

Business savings and spending and/or tax revenue impact estimates for individual incentive programs came from several sources, including agency records, Virginia Tax data and reports, and imputation using secondary source information. Information on amounts awarded and disbursed to GAP Funds and CRCF award recipients was obtained from Virginia Innovation Partnership Corporation project records. Firm tax credit utilization data for each of the tax credits examined (i.e., R&D expenses tax



credit, major R&D tax credit, angel investment tax credit) were obtained from Virginia Tax credit utilization files. One limitation of the two R&D related tax credit tax revenue impact estimates is that they do not take into consideration that, in the absence of the credits, some users could instead utilize the state's research and development tax subtraction. Thus, the actual revenue impact of these programs may be less than credit utilization by some unknown factor. Data for the Qualified Business Long-term Capital Gains Subtraction (capital gains subtraction) was obtained from Virginia Tax, using information that is reported annually to the General Assembly (Report on Long-Term Tax Subtraction). It should be noted that the revenue impact figures are estimates. Because of a high rate of individual income reporting errors by taxpayers, compliance audit data on a rolling basis is used to adjust downward the initial tax revenue impacts.

Information on business savings and associated state revenue impacts for the spaceport users exemption, Zero G resupply subtraction, and R&D sales tax exemption were estimated using both primary and secondary data as explained below.

### ***Virginia Spaceport Users Exemption***

Virginia Tax has issued two estimates of the spaceport users exemption tax expenditures since the exemption was established by the General Assembly in 1997. The first estimate was produced for the Fiscal Impact Statement that accompanied the legislation creating the exemption. The estimate was based on tax audit information and estimated the value of the exemption to users at \$248,000 in FY98. The second estimate was produced in 2004 for a Fiscal Impact Statement for legislation that advocated repeal of several commercial and industrial exemptions and was based on information obtained from the Virginia Commercial Space Flight Authority, including launch activity from FY97 to FY04. Total eligible sales were determined from this information. A state tax revenue impact estimate of \$70,000 was computed for FY10 based on this information.

A different methodology was used to estimate the spaceport exemption state revenue impact for this report, since MARS space launch activity did not begin in earnest until 2013. Estimates are based on IMPLAN data for the state of Virginia and estimates of space launch service costs for various types of space launch vehicles. IMPLAN is an industry-standard, commercial economic impact model and regional economic database. It is based on input-output analysis, which requires estimates of the value of intermediate input purchases for each industry. The relevant purchasing industry in the case of space launches is NAICS sector 481212 (Nonscheduled Chartered Freight Air Transportation), which includes businesses that provide space freight transportation. Using the 2018–2020 sector scheme (which differs from the 2014–2017 sector scheme and the 2009–2013 sector scheme), the corresponding IMPLAN sector is sector 414 (Air Transportation).

The estimate relies on information on launch service cost information from the Federal Aviation Administration (FAA), which reports that the launch costs of the two space launch vehicles used at MARS are \$80 million for the Antares launch expenses and \$40 million for the Minotaur launch expense in 2018 dollars (FAA 2018). These costs (i.e., space launch company revenues or sales) were multiplied by the number of launches each fiscal year for each particular type of space launch vehicle and summed for the fiscal year. Next, exemption eligible input purchases were obtained by identifying the intermediate input purchases that were eligible for the exemption. This consisted of spending on

inputs that fall within manufactured commodity sectors 3109-3395 and leased goods commodity sectors 3450-3454. The taxable purchase amount is estimated by multiplying fiscal year launch sales by gross absorption coefficients for IMPLAN for these input sectors. These coefficients represent the input purchases for various inputs per dollar of output. For example, the air transportation industry spent \$0.0011283 per dollar of output on commodity 3278 (Machine shops). This absorption coefficient was multiplied by the cost of two Antares space vehicle flights in FY18 (\$160 million) to obtain the estimated expenditure on this input of \$180,521 for the fiscal year. Estimates for Virginia then formed the basis of the relevant sales tax base for sales and use tax revenue impact calculations.

The estimates for the space exemption are significantly higher than previous Virginia Tax estimates. The actual figure varies with the ebb and flow of launch activity, with an average annual revenue impact for the FY11–FY20 period of approximately \$618,000. This is higher than the \$70,000 Virginia Tax estimate for FY10 and \$248,000 estimate for FY98 produced for legislative fiscal impact statements. These differences likely stem from differences in imputation methodology, increased launch activity at MARS, and inflation escalation factors.

### ***Zero G resupply subtraction***

Estimates of the tax revenue impact of the Zero G resupply subtraction relied on information on state fiscal year firm launch revenue estimates described for the spaceport users exemption. This figure was multiplied by a gross profit margin average estimate of 22% for Northrop Grumman for 2010–2021 (obtained from the Macrotrends financial research metric website for Northrop Grumman) to obtain corporate profit for the space launch activities. Since this income is reported as enterprise-wide income, it is subject to apportionment. Information on launch company apportionment was obtained from Virginia Tax electronic records for 2013–2016 from Form 500A (Corporation Allocation and Apportionment of Income). This apportionment factor was multiplied by profit estimates for each year and the corporate tax rate of 6%.

### ***Research and Development Exemption***

The estimate for this exemption relied on the methodology used by Virginia Tax to generate a FY15 projection for use in a report on the exemption by the Joint Subcommittee to Evaluate Tax Preferences (2015). The previous estimates were also based on a baseline estimate for FY11 using the Virginia Tax methodology. However, values after FY11 were escalated by a CPI inflation factor, whereas each fiscal year (except for FY19 and FY20, which were escalated) produced are based on annual estimates obtained from annual National Science Foundation (NSF) reports. The estimates for this report are slightly lower than those reported previously for FY11–FY20 in an annual JLARC incentives report, coming in at \$39.0 million versus \$43.3 million.

The methodology utilized national and Virginia R&D data from the annual NSF Business R&D and Innovation Survey (data published for 2011–2019). Four tables are used:

- costs for industrial R&D performed in the United States, by industry and company size last published in 2007 that shows expenditures on wages of personnel, materials and supplies, and other costs;

- domestic R&D paid for by the company and others and performed by the company, by source of funds and state for 2011–2019 that shows R&D paid for by the company and the federal government in Virginia;
- domestic R&D paid for and performed by the company, by character of work, industry, and company size for 2011–2019 that shows the portion of R&D accounted for by basic and applied research that are eligible for the exemption nationwide’ and
- domestic R&D paid for by the U.S. federal government and performed by the company, by character of work, industry, and company size for 2011–2019 that shows, which is used to estimate federally funded R&D as a service.

Since the exemption includes federal contractors that perform R&D as a service as well as private business R&D, private business R&D is estimated by determining the portion of federally funded R&D that is performed by the service sector (i.e., non-manufacturing sector). This represents approximately 19–23% of that activity for 2011–2018. This proportion is then applied to federally funded R&D in Virginia for each year to estimate R&D as a service. This total is then added to private business R&D to obtain total covered R&D for the state. Next, the proportion of these expenditures for basic and applied research was calculated using a three-year rolling average. Virginia Tax compared NSF’s definition of basic and applied research with Virginia’s exemption criteria and estimated that 90% of applied research would be covered under the exemption and 100% of basic research. These were used to determine the relative weighted average of total basic and applied research based on national data that eligible expenses fell between approximately 92–93% ( $W_1$ ). Lastly, expenditures on materials and supplies are assumed to be eligible for the exemption and represent 11.7% ( $W_2$ ) of all R&D costs. Finally, based on Virginia Tax audit data, just 25% ( $W_3$ ) qualify for the exemption under the “exclusive and direct use” criteria. Thus, the following calculation was performed to estimate the sales tax base.

Sales Tax Base =  $W_1 * W_2 * W_3 * (\text{Virginia private business R\&D} + \text{Estimated Virginia R\&D as a service})$

The sales tax base was then multiplied by the effective state sales and use tax rate for the corresponding fiscal year (3.98% in 2011–2012 and 4.28% in 2013–2018). Estimates for FY19 and FY20 were obtained by escalating the estimated tax revenue in FY18 by the Consumer Price Index.

## Interviews with agencies and stakeholders

Interviews were held with agency staff to discuss programs on the evaluation list, including staff from Virginia Tax, Virginia Economic Development Partnership, Virginia Innovation Partnership Corporation, and Virginia Commercial Space Flight Authority (Virginia Space). Industry stakeholders were also interviewed, including representative of

- Virginia Technology Councils: Northern Virginia Technology Council (NVTC), VERGE (an alliance that includes the Roanoke-Blacksburg Technology Council and Valleys Innovation Council), and Hampton Roads Innovation Collaborative, and
- two private companies representing industries that also benefit from incentives in this evaluation.

## Review of other states' science and technology incentives

Weldon Cooper Center staff reviewed several sources of information to obtain information on comparable science and technology incentives offered by other states. Sources often varied by the type of incentive since there is no authoritative, comprehensive source on all state incentives. They include the following:

- Space launch incentives. Information from the Federal Aviation Administration (2009); Council for Community and Economic Research (C2ER) incentives database; Florida Office of Economic and Demographic Research (2018); and PFM Group Consulting LLC (2019) supplemented by a review of spaceport and state departments of taxation and revenue websites.
- R&D sales and use exemptions. Review of Wolters Kluwer VitalLaw; Healy Schadeewald, and Nelson (2021); Joint Subcommittee to Evaluate Tax Preferences (2015); and state departments of taxation and revenue websites.
- R&D tax credits. Information from Wolters Kluwer VitalLaw; Healy Schadeewald, and Nelson (2021); Commonwealth of Pennsylvania Independent Fiscal Office (2020); and Schmidt (2021).
- Angel investment tax credits. Review of Denes et al. (2020); Howell and Mezzanotti (2019); the C2ER incentives database; and state departments of taxation and revenue websites.
- Venture capital fund tax incentives. Information from Wolters Kluwer VitalLaw and the C2ER Incentives Database.
- Long-term capital gains incentives. Information from Wolters Kluwer VitalLaw, McNichol (2021), and Guzman (2020).
- Direct investment funds. Programs comparable to GAP Funds were identified using information from the C2ER Incentives Database; Center for Regional Economic Competitiveness and Cromwell Schmisser (2016); PFM Group Consulting LLC (2019b); and Google keyword searches.
- Commercialization grants. Information on state SBIR/STTR matching programs was obtained from the U.S. Small Business Administration (2021), while information on the university commercialization component was obtained from the C2ER incentives database and keyword searches using the Google search engine.

## Review of documents and literature

During this study, several sources of information, including documents, reports, and published or unpublished research were examined. The purpose of this literature review was to understand the purpose and goals of Virginia incentive programs, industry locational factors, the role and importance of economic incentives, market imperfection rationales for programs, empirical research on the economic effects of various science and technology incentive programs at the national and state level, and methodological approaches for quantifying the economic and tax revenue impacts of economic incentives. Sources consulted included:

- program materials describing the programs, Virginia agency reports describing program usage, and legislative statutes authorizing the programs;
- program evaluations and economic impact studies published by state agencies or their consultants in other states; and

- scholarly books and articles that examine the economic effects of economic incentives for spaceports, research and development, and equity investment.

## Appendix C: Economic benefits and return in revenue for all Virginia incentives reviewed to date

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Economic development incentives vary in their economic benefit and return in revenue to the state. To provide context to the economic benefits and return in revenue generated by each incentive, incentives have been categorized as having a negligible, low, moderate, or high economic benefit and return in revenue. To determine the category, each incentive is scored from 0 to 3 on four measures: the amount of jobs, Virginia GDP, and personal income generated per \$1 million spent on the incentive and the return in revenue generated per \$1 spent on the incentive. The scoring is based on the distribution of all 52 incentives reviewed to date for each of the four measures, with a score of '0' meaning the incentive fell below the 25th percentile (or first quartile) of the distribution for the measure and a score of 'three' meaning the incentive was in the highest quartile (above the 75th percentile) for the measure.

The scores for the three measures of economic benefits (jobs, Virginia GDP, and personal income) were averaged to arrive at an overall average score for economic benefits for each incentive. Incentives with average scores for the three measures near '0' were categorized as having negligible economic benefits relative to other incentives. Incentives with average scores near '1', '2', or '3' were categorized as having low, moderate, or high economic benefits, respectively, relative to other incentives. For return in revenue, an incentive with a '0' score on that measure was categorized as having a negligible return in revenue relative to other incentives. An incentive with a score of '1', '2', or '3' was categorized as having a low, moderate, or high return in revenue, respectively, relative to other incentives.

An incentive's category may change over time. Only 52 of more than 70 Virginia economic development incentives have been evaluated so far, and because incentives are categorized relative to other incentives evaluated, incentives may change categories as additional incentives are evaluated each year. Once all incentives are evaluated, re-evaluation of incentives will begin. The category may change for re-evaluated incentives because of new or improved outcomes data, program changes, and changes to the state economy and industry mix.

Of the incentives evaluated through June 2022, grants tend to generate moderate or relatively high economic benefits and returns in revenue. Tax incentives tend to generate low or negligible economic benefits and returns in revenue (Table C-1). Grant programs have higher economic benefits than other types of incentives because a higher percentage of grant funding is directed to businesses in manufacturing industries, which generally have high economic multipliers and pay higher wages. In addition, businesses that receive grants must agree to create jobs and make capital investments, and usually make above minimum job creation and capital investment levels, but other incentives may not have similar requirements for businesses to receive an award.

**TABLE C-1**  
**Grants tend to generate higher economic benefits and returns in revenue than tax incentives**

<b>Incentive</b>	<b>Incentive type</b>	<b>Economic benefits</b>	<b>Return in state revenue</b>
Aircraft parts, engines, and supplies exemption	Exemption	●○○○	●○○○
Airline common carrier exemption	Exemption	●○○○	●○○○
Biodiesel and Green Diesel Tax Credit	Tax credit	●○○○	●●○○
Coal Employment and Production Incentive Tax Credit	Tax credit	●○○○	●○○○
Coalfield Employment Enhancement Tax Credit	Tax credit	●○○○	●○○○
Film exemption	Exemption	●○○○	●○○○
Green Job Tax Credit	Tax credit	●○○○	●○○○
Major Research and Development Tax Credit	Tax Credit	●○○○	●○○○
Railroad rolling stock exemption	Exemption	●○○○	●○○○
Recyclable Materials Tax Credit	Tax credit	●○○○	●○○○
R&D exemption	Exemption	●○○○	●○○○
R&D expenses tax credit	Tax Credit	●○○○	●○○○
Ships and vessels exemption	Exemption	●○○○	●○○○
Spaceport users exemption	Exemption	●○○○	●○○○
Telework Tax Credit	Tax credit	●○○○	●○○○
Transportation Partnership Opportunity Fund	Grant	●○○○	●○○○
Qualified Business Long-Term Capital Gains Subtraction	Subtraction	●○○○	●○○○
Qualified Equity and Subordinated Debt Investment Tax Credit (angel investment tax credit)	Tax credit	●○○○	●○○○
Zero G Zero Tax resupply subtraction	Subtraction	●○○○	●○○○
Barge and Rail Usage Tax Credit	Tax credit	●●○○	●●●○
Commonwealth Research Commercialization Program	Grant	●●○○	●●○○
Economic Development Access Program	Grant	●●○○	●●●○
International Trade Facility Tax Credit	Tax credit	●●○○	●●●○
Motion Picture Production Tax Credit	Tax credit	●●○○	●●○○
Pollution control equipment exemption	Exemption	●●○○	●○○○
Railroad common carrier exemption	Exemption	●●○○	●●○○
Real Property Investment Grant	Grant	●●○○	●●●○
Semiconductor manufacturing exemption	Exemption	●●○○	●○○○
Semiconductor wafer exemption	Exemption	●●○○	●●○○

Incentive	Incentive type	Economic benefits	Return in state revenue
Tobacco Commission Megasite Grant	Grant	●●○○○	●●○○○
Virginia Business Ready Sites Program	Grant	n.a.	n.a.
Worker Retraining Tax Credit	Tax credit	●●○○○	●●○○○
Governor's Motion Picture Opportunity Fund	Grant	●●●○○	●●●○○
Job Creation Grant	Grant	●●●○○	●●●○○
Manufacturers SSF apportionment	Other	●●●○○	●●●○○
Port of Virginia Economic and Infrastructure Grant	Grant	●●●○○	●●●○○
Port Volume Increase Tax Credit	Tax credit	●●●○○	●●●○○
Qimonda (semiconductor) grant	Grant	●●●○○	●●●○○
Rail Industrial Access Program	Grant	●●●○○	●●●○○
Tobacco Region Opportunity Fund	Grant	●●●○○	●●●○○
Cash Collateral Program	Loan	●●●●●	●●●●●
Data center exemption	Exemption	●●●●●	●●●●●
Economic Development Loan Fund	Loan	●●●●●	●●●●●
GAP Funds Program	Other	●●●●●	●●●●●
Loan Guaranty Program	Loan	●●●●●	●●●●●
Micron (semiconductor) grant	Grant	●●●●●	●●●●●
Small Business Investment Grant	Grant	●●●●●	●●●●●
Small Business Jobs Grant	Grant	●●●●●	●●●●●
SWaM Loan Fund	Loan	●●●●●	●●●●●
Trade Show Assistance Program	Grant <sup>a</sup>	●●●●●	●●●●●
Virginia Jobs Investment Program	Grant	●●●●●	●●●●●
Virginia Leaders in Export Trade (VALET)	Grant <sup>a</sup>	●●●●●	●●●●●
		Negligible ●○○○○	Low ●●○○○
		Moderate ●●●○○	High ●●●●●

SOURCE: JLARC staff analysis of economic impact and return in revenue estimates generated by the Weldon Cooper Center.

NOTE: Includes incentives evaluated as of June 2022. Time period for which incentives are evaluated varies. Estimates are sensitive to the assumptions used to determine the percentage of economic activity that can be attributed to the incentive.

<sup>a</sup> Not technically grants but provide financial assistance similar to grants.



## Appendix D: Agency responses

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As part of an extensive validation process, the state agencies and other entities that are subject to a JLARC assessment are given the opportunity to comment on an exposure draft of the report. JLARC staff sent an exposure draft of this report to the Virginia Commercial Space Flight Authority (Virginia Space), Virginia Department of Taxation, Virginia Innovation Partnership Corporation, secretary of finance, secretary of commerce and trade, and secretary of transportation.

Appropriate corrections resulting from technical and substantive comments are incorporated in this version of the report. This appendix includes response letters from the

- Virginia Commercial Space Flight Authority and the
- Department of Taxation.



## VIRGINIA COMMERCIAL SPACE FLIGHT AUTHORITY

June 02, 2022

Mr. Hal E. Greer  
Director  
Joint Legislative Audit and Review Commission  
919 East Main Street, Suite 2101  
Richmond, VA 23219

Dear Mr. Greer,

Thank you, the members of your team, and the University of Virginia's Weldon Cooper Center for Public Service for all your efforts in completing this report. I have reviewed the report and I appreciate how thoroughly it outlines the capabilities and opportunities Virginia provides in comparison to other states.

I do have a few concerns:

- Virginia Space would not support eliminating a tax credit to incentivize new business or existing growth. A reduction or elimination of any tax credits affecting the aerospace industry would decrease our competitiveness with other locations, both domestically and internationally.
- Page iii lists three rather than four national vertical launch facilities: Wallops, VA; Cape Canaveral, FL; Vandenberg, CA and Kodiak, AK.
- Page 45 describes a \$30 million appropriation for the Rocket Lab project. The \$30 million fund appropriation to Virginia Space is dedicated to construction of an additional launch pad to support multi-vehicle operations. The \$15 million custom incentive package is dedicated to Rocket Lab's production facility.

Please let me know if further changes are made that require my review.

Sincerely,

A handwritten signature in black ink, appearing to read "Roosevelt Mercer", written over a large, empty oval space.

Major General Roosevelt "Ted" Mercer, Jr., USAF (ret.)  
CEO & Executive Director  
Virginia Space Commercial Space Flight Authority



# *COMMONWEALTH of VIRGINIA*

*Department of Taxation*

June 3, 2022

Mr. Hal E. Greer, Director  
Joint Legislative Audit and Review Commission  
919 East Main Street, Suite 2101  
Richmond, Virginia 23219

*HAI*  
Dear Mr. Greer:

Thank you for the opportunity to review and comment on the exposure draft report: *Science and Technology Incentives*. We believe the report is very well done and will be useful to the members of the General Assembly going forward. We also appreciate you incorporating our comments and suggestions into the final report.

Thank you again for the opportunity to review the draft report. Should you have any additional questions, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Craig M. Burns".

Craig M. Burns  
Tax Commissioner

c: The Honorable Stephen E. Cummings, Secretary of Finance





[JLARC.VIRGINIA.GOV](http://JLARC.VIRGINIA.GOV)

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