

The Economic and Fiscal Impacts of TEDCO's Six Primary Funding Vehicles

PREPARED BY



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Executive Summary

The Maryland Technology Development Corporation (TEDCO) retained the University of Baltimore’s Jacob France Institute to update the prior 2013, 2015 and 2018 analyses of the Corporation’s economic and fiscal impacts. The key findings of this analysis are as follows:

Maryland has a more than twenty-year history of investing in technology-based economic development. Across the nation, states are increasingly taking the lead in promoting entrepreneurship, innovation and technology commercialization as a core focus of their economic development strategy. According to the Information Technology and Innovation Foundation (ITIF)’s *How Technology-Based Start-Ups Support U.S. Economic Growth* report, “Technology-based start-ups have long been an important driver of America’s economic growth and competitiveness.” States invest in programs such as TEDCO to support the formation and growth of these firms because according to ITIF, “start-ups in technology-based industries benefit the economy in a number of ways: they create many high-paying jobs; they invest heavily in R&D; and they are more likely to export their goods and services.” Maryland has been at the forefront of supporting technology-based development, through programs such as TEDCO. Created in 1998 by Maryland General Assembly to facilitate the transfer and commercialization of technology from Maryland’s research universities and federal labs into the marketplace and to assist in the creation and growth of technology-based businesses in all regions of the State, TEDCO has supported the development and expansion of Maryland’s entrepreneurial and innovation driven economy through targeted research, commercialization, and financing programs as well as business support and outreach programs.

TEDCO’s programs have supported the development of a large, diverse and growing portfolio of companies that supports the growth and diversification of the Maryland economy. TEDCO’s current portfolio of companies assisted by its six primary research and business funding programs has grown from 212 Maryland companies¹ with 1,147 jobs in the 2013 study to 366 companies with 4,845 jobs in 2021.²

Maryland has received significant and growing economic benefits from its investment in TEDCO. When multiplier effects are included, the companies created or supported by the six core TEDCO programs generated a total of \$2.3 billion in Maryland economic activity in 2021, supporting a total of 10,433 jobs earning \$884.7 million in labor income and generating estimated state and local government revenues of \$100.1 million. As a result of the growth of TEDCO’s portfolio of assisted companies; the development of new programs; and the assumption of management of the Maryland Venture Fund (MVF), TEDCO’s impacts have increased significantly since the first economic impact study was prepared in 2013, with current total impacts of \$2.3 billion and 10,433 jobs about four times the \$566 million and 2,835 jobs in the 2013 report.

Figure 1: TEDCO Job Impacts by Year

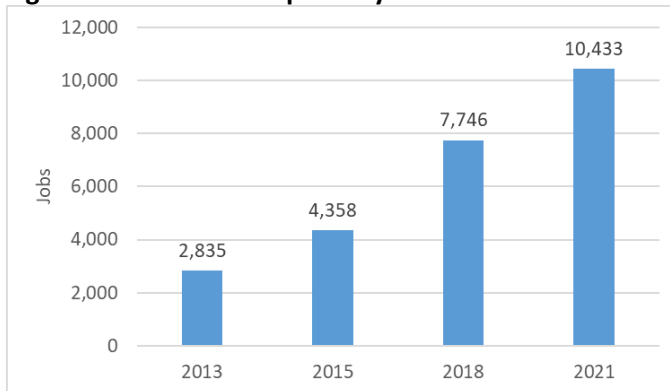
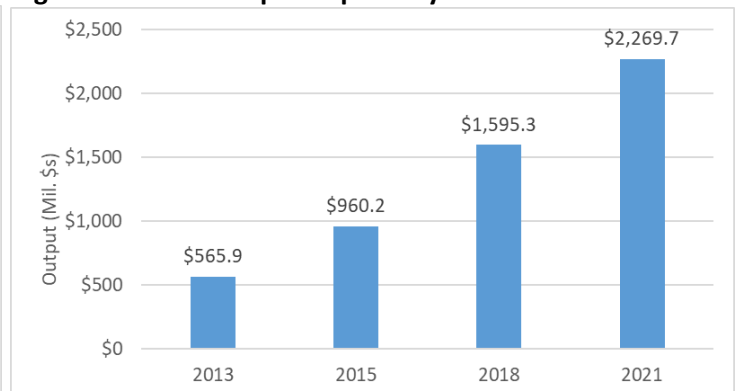


Figure 2: TEDCO Output Impacts by Year



¹ Some TEDCO supported companies were formed or have moved out of state and are excluded from this analysis.

² TEDCO assumed management of the Maryland Venture Fund (MVF) in 2016; and therefore, MVF’s companies and impacts were excluded from the earlier 2013 and 2015 analyses. MVF accounted for 37 Maryland companies with 1,182 jobs in 2018 and 52 Maryland companies with 1,601 jobs in 2021.

Maryland has received a strong return on its investment in TEDCO. IMPLAN, the widely-employed input-output model for economic analysis, estimates that the total portfolio of TEDCO funded companies, plus the Maryland Stem Cell Research Fund (MSCRF), generates a total of \$100.1 million in combined state and local government revenues, consisting of \$56.6 million in State of Maryland revenues and \$43.5 in county and local government revenues. Estimated State of Maryland government revenues of \$56.6 million are more than twice the FY2021 State appropriation of \$25.8 million reflecting \$20.4 million in general funds and \$5.4 million in special funds. The Jacob France Institute (JFI) also calculated an estimated 2021 return on investment of the State of Maryland’s investment in TEDCO’s Builder Fund, MII, RBII and Seed Investment Funds and found that focusing narrowly on the estimated state tax revenues and TEDCO expenditures associated with these four primary investment programs, the 2021 return on the State investment in TEDCO totals 29 percent.³ The overall rate of return of all of TEDCO’s programs and funding is 18 percent. It is important to note that the economic and ROI estimates in this report are only for TEDCO’s six primary funding programs and do not include the business, economic, fiscal, or innovation ecosystem enhancement impacts of TEDCO’s related business outreach and support programs.

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³ This return on investment analysis excludes the MSCRF because it is focused on research and cannot be expected to generate near term returns and MVF because the core operating costs are generated internally to the fund.

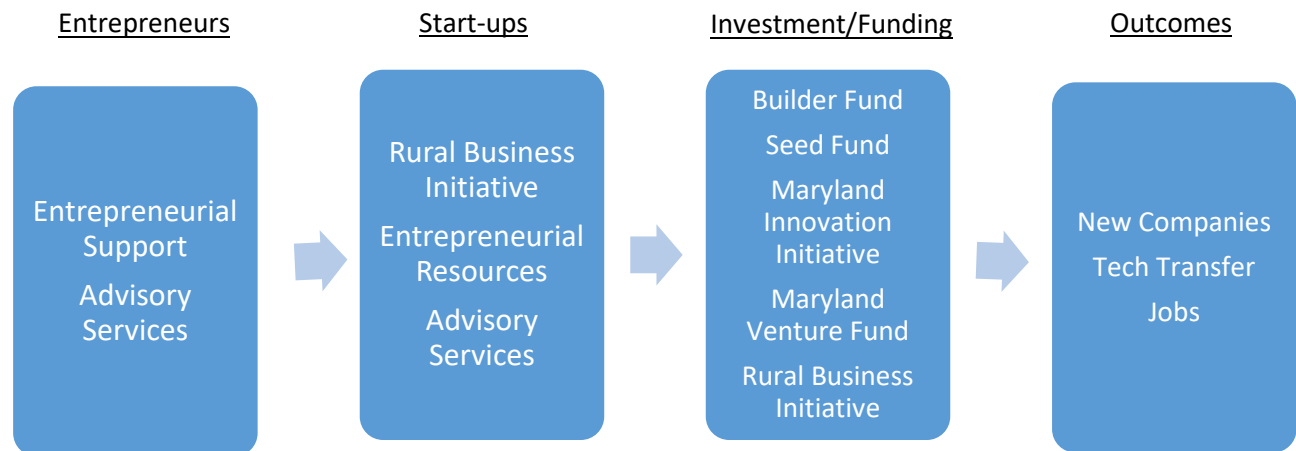
Introduction

TEDCO retained the Jacob France Institute to update the economic and fiscal impact portions of its 2013, 2015, and 2018 economic impact reports.⁴ This report assesses only the economic and fiscal contributions of the portfolio of companies and research spending supported by TEDCO’s six primary funding vehicles, not the full functional and strategic impacts covered in the first two (2013 and 2015) reports or the additional impacts generated by TEDCO’s other business support and innovation system enhancement programs such as Network Advisors, Prelude Pitch, Market Search Databases, Roundtables, and MARCOMM support. See the Appendix for a description of the methodology used in this report.

TEDCO’s Mission

TEDCO was created by the Maryland General Assembly in 1998 to facilitate the transfer and commercialization of technology from Maryland’s research universities and federal labs into the marketplace and to assist in the creation and growth of technology-based businesses in all regions of the state. TEDCO’s mission is to, *Enhance economic empowerment by fostering an inclusive and entrepreneurial innovation ecosystem. Identify, invest in, and help grow technology companies in Maryland.* TEDCO’s vision statement is that, TEDCO will be the recognized national leader for supporting translational research, and technology-based, economic and entrepreneurial development while being the hub of Maryland’s innovation ecosystem. TEDCO fulfills its mission by investing in **research** through MII and MSCRF and providing **technical assistance and funding** to entrepreneurs, start-up and early-stage companies in Maryland through its core entrepreneurial/business programs (Figure 1).

Figure 1: TEDCO's Core Entrepreneurial/Business Funding Vehicles



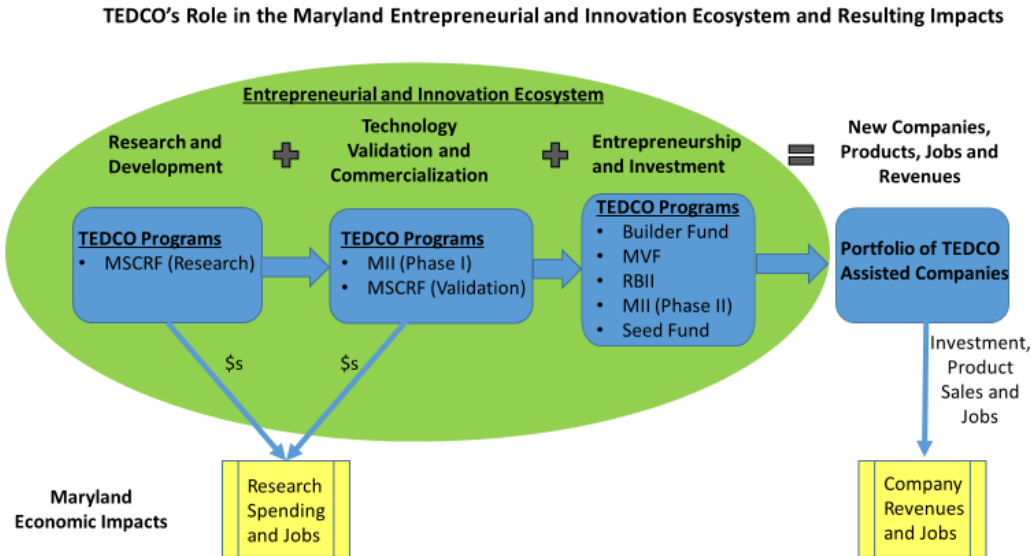
Jacob France Institute Approach to Measuring the Economic Impact of TEDCO

The Jacob France Institute’s approach to analyzing the economic contribution of technology-based economic development programs is presented in Figure 2. Broadly speaking, the *Maryland Entrepreneurial and Innovation Ecosystem* consists of the generation of new products, processes and technologies through *research and development*; the transformation of these technologies into products through *technology commercialization*; and the development and sale of new products and technologies in the global marketplace through the start-up of new companies and investment by existing companies through

⁴ The 2013 and 2015 *Economic and Programmatic Impacts of the Maryland Technology Development Corporation on the Maryland Economy* reports were prepared by the Battelle Technology Partnership Practice – TEconomy Partners is the successor to this organization and the principal investigator on these projects is now the Director of the JFI.

entrepreneurship and investment. TEDCO is active in all of these three key phases, resulting in the development of a “portfolio” of supported companies and research activities.

Figure 2: Economic Impact Analysis Approach for TEDCO’s Six Primary Business Investment and Research Funding Vehicles



Total Direct Impacts: TEDCO’s Six Primary Funding Vehicles

The Jacob France Institute used the IMPLAN model for the State of Maryland to estimate the economic and fiscal impacts associated with TEDCO’s Six Primary Funding Vehicles. The IMPLAN input-output model can be used to estimate the economic and fiscal contributions of projects, companies or of entire industries on a state, regional, or county economy. An IMPLAN analysis can be based on the revenues and/or the jobs associated with an event, program or an industry. The inputs to this economic and fiscal impact analysis are the research activities funded by (for MII and MSCRF) and employment and business activities of the portfolio of companies (for the Builder Fund, MII, MVF, RBII and Seed Investment Fund) that have received support from TEDCO’s six core research, technology commercialization and investment programs. The direct impacts of the six core TEDCO primary funding vehicles are presented in Table 1, and consist of the following:

- The direct impacts of the Builder Fund, MII, MVF, RBII, and Seed Investment programs were the current employment levels of the portfolio of companies assisted currently active in Maryland.⁵ For

⁵ TEDCO provided data on 222 companies (16 Builder Fund firms; 52 MII firms; 24 MVF firms; 4 RBII firms and 126 SEED Investment Fund firms) with 1,380 jobs. The JFI merged this database with the company database used in the prior 2018 analysis to create an analytical database. Firms that went out of business or moved out of state were

MII, the research, development and commercialization support provided to each project’s university partners was also included. The employment and IMPLAN-estimated revenues of this portfolio of companies represent the direct impact of TEDCO’s core business investment programs; and

- The direct impacts of the MSCRF were the research expenditures associated with the program, which were analyzed as occurring in the R&D sector of the Maryland economy.

TEDCO has supported the development of an expanding portfolio of companies and research activities in Maryland. The direct Maryland economic activity generated by the Six Primary Funding Vehicles analyzed in this report totals almost \$1.3 billion in economic activity and 4,894 jobs in 2021; a nearly four-fold increase from the first report in 2013. As presented in Figure 3, the number of Maryland companies supported by TEDCO’s core business and research funding vehicles has increased from 212 in the first 2013 analysis to 366 companies in 2021, with TEDCO’s assisted company portfolio employment increasing from 1,147 in 2013 to 4,845 in 2021 (Figure 4). A large share of this growth can be attributed to the inclusion of the Maryland Venture Fund, which TEDCO assumed control over in 2016, as well as the expansion in TEDCO’s programmatic offerings.⁶

Table 1: Direct Maryland Impacts Associated with TEDCO's Six Primary Funding Vehicles - FY2021

	Revenues or Expenditures	Employment
Six Core TEDCO Programs	<u>\$1,267,701,663</u>	<u>4,894</u>
Builder Fund	\$18,630,189	66
Maryland Innovation Initiative	\$84,141,785	320
Maryland Stem Cell Research Fund	\$8,360,459	33
Maryland Venture Fund	\$407,088,000	1,601
Rural Business Innovation Initiative	\$3,597,629	15
Seed Investment Funds	\$745,883,601	2,858

Source: JFI analysis of TEDCO data.

Figure 3: TEDCO Six Primary Funding Vehicle Assisted Companies

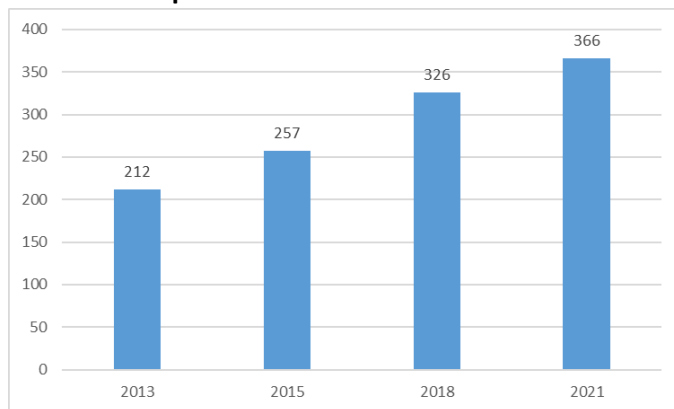
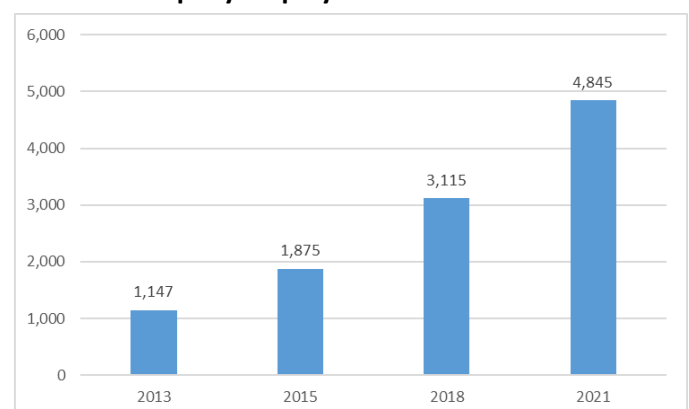


Figure 4: TEDCO Six Primary Funding Vehicle Assisted Company Employment



removed from the database. The JFI identified the current levels of employment and industry of these companies through a combination of TEDCO provided data, commercial databases (Hoover’s and Pitchbook), and web searches. Where data were not available, company industry and/or employment were estimated by the JFI.

⁶ The remaining 49 jobs in the direct impacts (below) are created by the research activities supported by the MII and the MSCRF.

The Economic Impact of TEDCO’s Six Primary Funding Vehicles

This section presents the results of the economic impact analyses for the Six Primary Funding Vehicles in aggregate, with the discrete program by program results presented below. For each analysis, the Jacob France Institute provides the direct effect values driving the model (based upon the operational data provided by TEDCO and refined by the Jacob France Institute), the additional estimated, indirect, and induced multiplier impacts, and a summation of the total impacts (direct, indirect, and induced) from the IMPLAN model. An impact multiplier is also provided for the three model drivers (employment, labor income, and output)—for every one (job or dollar) of direct effect, the multiplier number will equal the total (including the direct effect) number of jobs or dollars created in the regional economy. The following impact data are provided for each analysis: output, labor income (including both wages and benefits), employment, state and local tax revenue, and federal tax revenue.⁷

TEDCO’s Overall Impact

As presented in Table 2, the economic contribution to the Maryland economy of the six core TEDCO programs totaled almost \$2.3 billion in 2021, with a total of 10,443 jobs earning \$884.7 million in labor income and supporting estimated state and local government revenues of \$100.1 million. Total direct research expenditures and portfolio company revenues of \$1.3 billion in economic activity and employment of 4,894 are augmented with an additional \$487.7 million in economic activity and 2,508 jobs in the form of *Indirect Impacts* through the local purchases made to support TEDCO’s portfolio of research and assisted companies and by \$514.4 million in economic activity and 3,032 jobs in the form of *Induced Impacts* resulting from the increase in local incomes attributable to TEDCO’s Six Primary Funding Vehicles. The \$2.3 billion in estimated TEDCO-supported impacts results in an output multiplier of 1.79, or \$1.79 in economic activity supported for each \$1 in research expenditures and portfolio company revenues.

Table 2: Economic Impact of TEDCO’s Six Primary Funding Vehicles on Maryland – In Aggregate- FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$1,267,701,663	\$529,733,169	4,894	\$44,287,830	\$105,782,311
Indirect Impacts	\$487,683,349	\$186,079,491	2,508	\$19,969,500	\$37,114,194
Induced Impacts	\$514,349,948	\$168,840,388	3,032	\$35,831,342	\$36,810,193
Total Impact	\$2,269,734,960	\$884,653,048	10,433	\$100,088,672	\$179,706,697
State Impact Multiplier	1.79	1.67	2.13		

Source: JFI calculations using IMPLAN I/O model for the State.

⁷ The estimation of tax revenue is subject to significant variability due to ever-changing rate structures, the use of available exemptions, and the accounting of potential income, if any, subject to taxation. These figures should be viewed with some measure of caution throughout this analysis.

The Maryland impacts associated with TEDCO’s core operations has grown with the State’s investment.

The State of Maryland has continued to invest expanding its innovation economy through targeted investments in TEDCO. TEDCO has expanded from three core programs in the 2013 report to Six Primary Funding Vehicles in 2021.⁸ While the addition of the MVF to TEDCO’s operations in 2016 and expansion of MII since its inception in 2013 account for a significant share of this growth, TEDCO has broadened and deepened its programmatic offerings to better support technology-based development in Maryland. TEDCO’s current impacts of nearly \$2.3 billion and 10,433 jobs represent a nearly four-fold increase in TEDCO supported jobs and a more than four-fold increase in TEDCO supported economic activity since the first report in 2013 (Figures 5 and 6). The Seed Investment program accounts for 58 percent of the total Maryland impacts associated with TEDCO, followed by MVF at 34 percent and MII at 6 percent (Table 3).

Figure 5: TEDCO Job Impacts by Year

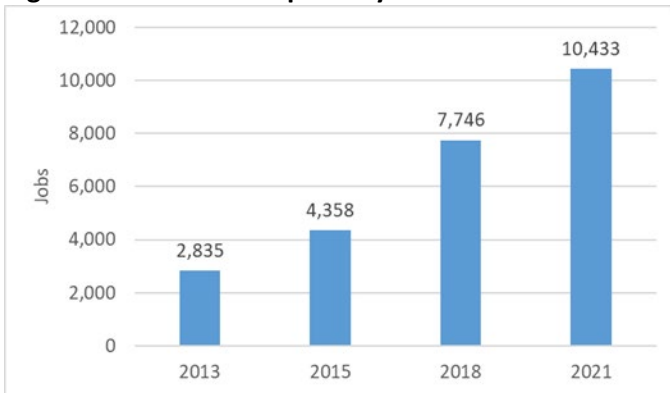


Figure 6: TEDCO Output Impacts by Year



Table 3: TEDCO’s Total Maryland Employment and Output Impact 2018 and 2021, by Program

Program/Impact	FY2018 Report		FY2021 Report	
	Employment (Jobs)	Output (Mil. \$s)	Employment (Jobs)	Output (Mil. \$s)
Total	<u>7,745</u>	<u>\$1,595.4</u>	<u>10,433</u>	<u>\$2,269.7</u>
Builder Fund	Not Analyzed		127	\$29.6
Maryland Innovation Initiative	616	\$133.5	673	\$147.1
Maryland Stem Cell Research Fund	83	\$16.7	75	\$15.8
Maryland Venture Fund	2,995	\$607.5	3,502	\$759.6
Rural Business Innovation Initiative	Not Analyzed		33	\$6.8
Seed Investment Funds	4,051	\$837.7	6,024	\$1,310.8

Source: JFI calculations using IMPLAN I/O model for the State.

⁸ Several programs analyzed separately in previous reports have been integrated into the Seed Investment Fund and some smaller programs have been discontinued and are no longer counted.

Total Program-Specific Estimated Economic Impacts for TEDCO’s Six Primary Funding Vehicles

The JFI analyzed the individual impacts of each of TEDCO’s Six Primary Funding Vehicles. When a company participated in more than one of TEDCO’s core programs, it was allocated to the first program in which it participated.

Economic Impacts of The Builder Fund

TEDCO’s Pre-Seed Builder Fund invests in and provides executive support to Maryland-based technology companies run by entrepreneurs who demonstrate economic disadvantage. The Builder Fund invests with the goal of helping companies reach meaningful milestones and becoming attractive investments to larger institutional investors. To be eligible, companies must meet three criteria:

1. Principal place of business is in Maryland
2. At least one full-time employee
3. More than 50% of founders demonstrate economic disadvantage

The Builder Fund typically invests in amounts up to \$200,000 via convertible notes. Funded companies are also provided Builder Fund resources which may include both hands-on and educational executive support, peer-to-peer mentorship/collaboration, and networking opportunities. As presented in Table 4, the portfolio of 14 active Maryland companies in which the Builder Fund has invested have direct employment of 66 workers and estimated revenues of \$18.6 million. The Builder Fund’s portfolio’s direct impacts are augmented with an additional \$5.1 million in economic activity and 26 jobs in the form of *Indirect Impacts* through the local purchases made to support the operations of these companies and by \$5.9 million in economic activity and 35 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to portfolio and supplier company operations. When multiplier effects are included, these companies generate \$29.6 million in economic activity in Maryland, support 127 jobs earning \$10.1 million in labor income, and have an associated \$2.0 million in estimated state and local government revenues. The \$29.6 million in estimated Builder Fund-supported economic activity results in an output multiplier of 1.59, or \$1.59 in economic activity supported for each \$1 in associated company revenues.

Table 4: The Builder Fund Impact - FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$18,630,189	\$6,310,069	66	\$1,274,936	\$1,351,662
Indirect Impacts	\$5,116,925	\$1,906,962	26	\$321,024	\$391,565
Induced Impacts	\$5,880,786	\$1,930,336	35	\$409,699	\$420,855
Total Impact	\$29,627,900	\$10,147,367	127	\$2,005,660	\$2,164,082
State Impact Multiplier	1.59	1.61	1.92		

Source: JFI calculations using IMPLAN I/O model for the State.

Economic Impacts of the Maryland Innovation Initiative

The Maryland Innovation Initiative (MII) was created as a collaboration between the State of Maryland and five Maryland academic research institutions (Johns Hopkins University, Morgan State University, University of Maryland College Park, University of Maryland Baltimore and University of Maryland Baltimore County.) The program is designed to promote commercialization of research conducted in these universities and leverage each institution’s strengths. The Maryland Innovation Initiative was created to foster the transition of promising technologies having significant commercial potential from the five participating

universities, where they were discovered, to the commercial sector, where they can be developed into products and services that meet identified market needs. The MII promotes commercialization through technology validation, market assessment, and the creation of start-up companies in Maryland based on university discovered technology. MII provides up to \$315,000 in project funding in a two-phase process:

- Technology Assessment - Technology Validation and Market Assessment, 9 months, up to \$115,000 (\$165,000 if a joint university effort); and
- Company Formation - Commercial Launch, 9 months, up to \$150,000.

The JFI analyzed the economic impacts associated with the portfolio of 58 currently active MII companies with direct employment of 305 workers. The JFI also analyzed the economic activity associated with the \$3.8 million in MII Phase 1 Technology Assessment research and development activity provided to the five partner universities in FY 2018. As presented in Table 5, the \$84.1 million in estimated MII portfolio company revenues and associated research expenditures supports a total of \$147.1 million in economic activity in Maryland, supports 673 jobs earning \$54.3 million in labor income, and have an associated \$5.7 million in estimated state and local government revenues. The MII portfolio of companies and research direct impacts of 320 jobs and \$84.1 million in research and estimated company revenues are augmented with an additional \$31.6 million in economic activity and 168 jobs in the form of *Indirect Impacts* through the local purchases made to support the operations of these companies and research projects and by \$31.3 million in economic activity and 185 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to portfolio and supplier company operations. The \$147.1 million in estimated MII-supported economic activity results in an output multiplier of 1.75, or \$1.75 in economic activity supported for each \$1 in associated company revenues/research expenditures.

Table 5: Maryland Innovation Initiative Impact- FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$84,141,785	\$31,808,094	320	\$2,159,189	\$6,410,162
Indirect Impacts	\$31,598,279	\$12,188,709	168	\$1,394,062	\$2,439,025
Induced Impacts	\$31,330,693	\$10,283,195	185	\$2,182,982	\$2,242,039
Total Impact	\$147,070,757	\$54,279,998	673	\$5,736,233	\$11,091,225
State Impact Multiplier	1.75	1.71	2.10		

Source: JFI calculations using IMPLAN I/O model for the State.

Economic Impacts of the Maryland Stem Cell Research Fund

TEDCO’s Maryland Stem Cell Research Fund (MSCRF) was established by the governor and the Maryland General Assembly under the Maryland Stem Cell Research Act of 2006. The purpose of the fund is to promote state-funded human stem cell research and medical treatments through grants to public and private entities in the state. MSCRF offers six programs to accelerate research and commercialization of human stem cell-based technologies:

- **Clinical** – Funds companies or Universities/Research Institutes that wish to conduct human stem cell-based clinical trials in the State of Maryland;
- **Commercialization** – Funds Maryland-based start-up companies or established companies developing new human stem cell-based products;
- **Validation** – Funds faculty at Maryland-based Universities/Research institutes with IP for human stem cell-based technologies that require additional validation before creation of start-up companies;

- **Launch** – Funds new faculty or researchers, of any rank, who are new to the field of human stem cell research at Maryland-based Universities/Research Institutes;
- **Discovery** – Funds faculty at Maryland-based Universities/Research Institutes (not federal labs) with innovative ideas to develop novel human stem cell-based technologies and cures; and
- **Post-Doctoral Fellowship** – Funds exceptional post-doctoral fellows who wish to conduct human stem cell research in academia or in industry in the State of Maryland.

The MSCRF was not created to be a job-creation program but rather as a pathway to medical breakthroughs using this novel science to treat and cure diseases. Nevertheless, as presented in Table 6, the \$8.4 million R&D activities associated with the MSCRF support a total of \$15.8 million in Maryland economic activity, support 75 jobs earning \$6.4 million in labor income, and have an associated \$0.6 million in estimated state and local government revenues. Total direct research expenditures of \$8.4 million and direct employment of 33 research jobs are augmented with an additional \$3.8 million in economic activity and 20 jobs in the form of *Indirect Impacts* through the local purchases made to support this research activity and by \$3.7 million in economic activity and 22 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to these research expenditures. The \$15.8 million in estimated MSCRF-supported economic activity results in an output multiplier of 1.90, or \$1.90 in economic activity for each \$1 in State of Maryland supported research expenditures.

Table 6: Maryland Stem Cell Research Fund Impact- FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$8,360,459	\$3,730,659	33	\$200,479	\$718,465
Indirect Impacts	\$3,817,472	\$1,434,314	20	\$155,361	\$286,854
Induced Impacts	\$3,666,906	\$1,203,555	22	\$255,487	\$262,408
Total Impact	\$15,844,837	\$6,368,528	75	\$611,327	\$1,267,728
State Impact Multiplier	1.90	1.71	2.23		

Source: JFI calculations using IMPLAN I/O model for the State.

Economic Impacts of the Maryland Venture Fund

The Maryland Venture Fund (MVF) is an early-stage, evergreen venture capital fund dedicated to funding and growing the next generation of outstanding businesses in Maryland. MVF is managed by an experienced team with significant operating and venture experience whose focus is on making the entrepreneurs successful. With more than \$135 million in assets under management, MVF supports exceptional entrepreneurs and helps them build valuable companies that last. As presented in Table 7, the portfolio of 52 currently active Maryland companies in which MVF has invested have direct employment of 1,601 workers and estimated revenues of \$407.1 million. The MVF portfolio of companies' direct impacts are augmented with an additional \$182.5 million in economic activity and 899 jobs in the form of *Indirect Impacts* through the local purchases made to support the operations of these companies and by \$170.1 million in economic activity and 1,002 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to portfolio and supplier company operations. Including multiplier effects, these companies generate \$759.6 million in economic activity in Maryland, support 3,502 jobs earning \$293.2 million in labor income, and have an associated \$28.9 million in estimated state and local government revenues. The \$759.6 million in estimated MVF-supported economic activity results in an output multiplier of 1.87, or \$1.87 in economic activity supported for each \$1 in associated company revenues.

Table 7: Maryland Venture Fund Impact- FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$407,088,000	\$170,821,162	1,601	\$10,411,836	\$33,747,286
Indirect Impacts	\$182,455,283	\$66,594,736	899	\$6,603,350	\$13,355,815
Induced Impacts	\$170,073,326	\$55,819,274	1,002	\$11,850,295	\$12,170,351
Total Impact	\$759,616,609	\$293,235,171	3,502	\$28,865,481	\$59,273,453
State Impact Multiplier	1.87	1.72	2.19		

Source: JFI calculations using IMPLAN I/O model for the State.

Economic Impacts of the Rural Business Innovation Initiative Impact

TEDCO's Rural Business Innovation Initiative (RBII) assists start-up and small technology-based businesses in the rural areas of Maryland to advance the company to a higher level of success. The program offers both assistance and pre-seed funding to qualified companies. Companies are eligible if they meet the following criteria:

- Must be involved in developing new technologies/products or utilizing technology to create new or expand their business;
- Must have fewer than 16 employees; and
- Have annual revenues \$1 million or less.

TEDCO provides **assistance** to companies through local RBII representatives. Each rural region has a dedicated, highly experienced mentor who evaluates potential clients and provides resources, consulting services, technical management assistance and professional ongoing mentoring through targeted projects to help companies succeed, all at no cost to the company. Companies that have received mentoring services from the RBII program for at least 90 days are eligible to apply for \$25,000 in **pre-seed funding**. As presented in Table 8, the portfolio of 4 currently active Maryland companies in which TEDCO has invested have direct employment of 15 workers and estimated revenues of \$3.6 million.⁹ The RBII portfolio's direct impacts are augmented with an additional \$1.6 million in economic activity and 8 jobs in the form of *Indirect Impacts* through the local purchases made to support the operations of these companies and by \$1.6 million in economic activity and 9 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to portfolio and supplier company operations. When multiplier effects are included, these companies generate \$6.8 million in economic activity in Maryland, support 33 jobs earning \$2.7 million in labor income, and have an associated \$0.3 million in estimated state and local government revenues. The \$6.8 million in estimated RBII-supported impacts results in an output multiplier of 1.9, or \$1.90 in economic activity supported for each \$1 in associated company revenues.

Table 8: Rural Business Innovation Initiative Impact - FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$3,597,629	\$1,610,198	15	\$88,522	\$310,117
Indirect Impacts	\$1,640,741	\$614,376	8	\$66,746	\$122,918
Induced Impacts	\$1,579,184	\$518,318	9	\$110,029	\$113,008
Total Impact	\$6,817,554	\$2,742,891	33	\$265,297	\$546,043
State Impact Multiplier	1.90	1.70	2.18		

Source: JFI calculations using IMPLAN I/O model for the State.

⁹ These impact calculations are only for the companies participating in the pre-seed funding program.

Economic Impacts of the Seed Investment Funds

TEDCO’s Seed Investment Funds support businesses that have the potential to scale, to create jobs, and to provide a return on investment to the State through targeted investments in companies that represent good opportunities to grow strong, sustainable businesses in Maryland. The Seed investment funds include:

- **Technology Commercialization Fund (TCF)** is TEDCO’s primary and legacy seed investment initiative and supports technology and product development by start-up companies to advance their development to attract the interest of traditional venture capital investors;
- **Cybersecurity Investment Fund (CIF)** invests in cybersecurity technologies and builds on TEDCO’s Technology Commercialization Fund;
- **Life Science Investment Fund (LSIF)** provides funding to companies developing products for human health that require FDA approval. This fund was transferred to TEDCO from the Department of Commerce’s BioMaryland program; and
- **Gap Investment Fund** invests in technology-based start-up companies that need capital to grow their businesses in Maryland. Investments are matched by other investments the company has received from private sources. The purpose of this fund is to help bridge the gap between seed funding and venture capital investments. Companies must use Gap Investment Funds to employ new staff in Maryland to grow and accelerate commercialization efforts to become better positioned to attract institutional venture capital.

As presented in Table 9, the portfolio of 238 active Maryland companies that have received Seed Fund investments have direct employment of 2,858 workers and estimated revenues of \$745.9 million – the largest direct impact of TEDCO’s Six Primary Funding Vehicles. The SEED fund portfolio’s direct impacts are augmented with an additional \$263.1 million in economic activity and 1,387 jobs in the form of *Indirect Impacts* through the local purchases made to support the operations of these companies and by \$301.8 million in economic activity and 1,779 jobs in the form of *Induced Impacts* from the increase in local incomes attributable to portfolio and supplier company operations. When multiplier effects are included, these companies generate \$1.3 billion in economic activity in Maryland, support 6,024 jobs earning \$517.9 million in labor income, and have an associated \$62.6 million in estimated state and local government revenues. The \$1.3 billion in estimated Seed Investment Funds-supported economic activity results in an output multiplier of 1.76, or \$1.76 in economic activity supported for each \$1 in associated company revenues.

Table 9: Seed Investment Funds Impact- FY2021

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$745,883,601	\$315,452,987	2,858	\$30,152,867	\$63,244,619
Indirect Impacts	\$263,054,649	\$103,340,395	1,387	\$11,428,957	\$20,518,016
Induced Impacts	\$301,819,054	\$99,085,710	1,779	\$21,022,850	\$21,601,531
Total Impact	\$1,310,757,304	\$517,879,092	6,024	\$62,604,674	\$105,364,166
State Impact Multiplier	1.76	1.64	2.11		

Source: JFI calculations using IMPLAN I/O model for the State.

Projected 2023 Impacts of TEDCO’s Six Primary Funding Vehicles

TEDCO’s operations generate an expanding portfolio of research and companies assisted. The economic impacts associated with TEDCO’s operations increase as the portfolio of TEDCO-assisted companies grows, through two mechanisms: 1) employment growth of the existing portfolio companies; and 2) the addition of new companies assisted by TEDCO’s core programs. The Jacob France Institute projected the five-year growth in the economic impacts associated with TEDCO’s Six Primary Funding Vehicles and their resultant research, commercialization activities, and company operational activities based on the following assumptions:

- Based on the assumptions used in the past three reports, the existing portfolio of companies will experience four percent annual growth in employment¹⁰;
- With increases on programmatic funding the Builder Fund will invest in 45 companies per year with a starting employment of three jobs per company;
- MII and MSCRF research funding will be continued at current levels;
- The MII will invest in 10 companies per year, each with a starting employment of four jobs per company with current Technology Assessment Phase spending held stable;
- The MVF will invest in companies that create 50 new jobs per year;
- The Rural Business Innovation Initiative will invest in 2 companies per year with a starting employment of three jobs per company; and
- The Seed Investing program will invest in 18 companies per year with a starting employment of three jobs per company.

As presented in Table 10, the economic contribution to the Maryland economy of TEDCO’s Six Primary Funding Vehicles is projected to grow to \$3.5 billion in 2026, supporting a total of 15,808 jobs earning \$1.3 billion in Labor Income, and generate state and local government revenues of \$158.1 million, including an estimated \$89 million in State of Maryland government revenues.¹¹ Based on these assumptions and projections, with continued State of Maryland investment in TEDCO, the economic and job impacts of the program can be expected to increase by more than half over the next five years.

Table 10: TEDCO 6 Core Program Projected 2026 Impacts

	Output (\$s)	Labor Income (\$s)	Employment	State/Local Tax Revenue (\$s)	Federal Tax Revenue (\$s)
Direct Effect	\$1,955,567,254	\$799,281,056	7,486	\$72,994,649	\$165,465,964
Indirect Impacts	\$731,282,543	\$278,421,256	3,760	\$31,172,266	\$55,662,726
Induced Impacts	\$773,929,431	\$254,047,818	4,561	\$53,915,077	\$55,387,096
Total Impact	\$3,460,779,228	\$1,331,750,130	15,808	\$158,081,993	\$276,515,786
State Impact Multiplier	1.77	1.67	2.11		

Source: JFI calculations using IMPLAN I/O model for the State

¹⁰ This 4% rate is much lower than the 7% annual growth of the portfolio of TEDCO assisted companies included in the 2018 and 2021 reports and thus, represents a conservative estimate.

¹¹ All impact values are expressed in current 2021 \$s.

Summary and Conclusion

TEDCO makes a significant and growing contribution to the Maryland economy. TEDCO's economic impact was not analyzed as a simple source of expenditures because it serves as a mechanism for the state to ***invest*** in research, technology commercialization, the start-up of new companies, and the expansion of existing companies in new and leading technology areas. As a source of investment, TEDCO's operations create a "portfolio" of activities that continues to provide returns to the State of Maryland in the form of new jobs, new and expanded companies, and new product revenues. Across the nation, competitor states are similarly investing in both their innovation economies and entrepreneurial ecosystems in order to grow their economies. Maryland, with leading federal, university and private research assets, a skilled and educated workforce, and a strong position in technology development and innovation, is well positioned to compete nationally and globally across multiple technology and innovation areas. TEDCO plays a central role in supporting the local generation, commercialization, development, production and sale of the technologies and products of tomorrow.

By supporting entrepreneurship and innovation in Maryland, TEDCO generates significant economic and fiscal returns to the state. These include:

- TEDCO has supported the development of a portfolio of 366 Maryland technology-based with 4,845 jobs. Since the first TEDCO impacts study in 2013, the number of companies in TEDCO's portfolio of impacted companies has increased by 73% and the number of portfolio company jobs has increased more than four-fold;
- TEDCO's Six Primary Funding Vehicles generated \$2.3 billion in economic activity in 2021, supporting 10,443 jobs earning \$884.5 million in labor income, and generating estimated state and local government revenues of \$100.1 million, including an estimated \$56.6 million in estimated State revenues;
- TEDCO's impacts have grown with the State of Maryland's investment in the program, with current total impacts of \$2.3 billion and 10,433 jobs representing a nearly fourfold increase in impacts since the first, 2013 study;
- The \$56.6 million on estimated State government revenues attributable to TEDCO's Six Primary Funding Vehicles exceed the State's FY2021 TEDCO appropriation of \$35.9 million, which includes \$10 million in appropriations to support the Maryland Technology Infrastructure Funds, whose impacts are not included in this analysis; and
- The JFI estimates that the Maryland Return on Investment (ROI) for TEDCO's core commercialization programs is 29%.

Appendix – Economic Impact Methodology

The economic activity generated in a city, county, region or state is greater than the simple total of spending associated with the event or activity being studied. This is because as this money is earned, it is, in turn, spent, earned and re-spent by other businesses and workers in the local economy through successive cycles of spending, earning and spending. However, the spending in each successive cycle is less than in the preceding cycle because a certain portion of spending “leaks” out of the economy in each round of spending. Leakages occur through purchases of goods or services from outside of the region and federal taxation. The IMPLAN multipliers used in this analysis capture the effects of these multiple rounds of spending. This analysis focuses on five measures of economic impact:

- **Output.** The total value of production or sales in all industries;
- **Employment.** The total number of full and part time jobs in all industries;
- **Labor Income.** The wages and salaries, including benefits, and other labor income earned by the workers holding the jobs created;
- **State and Local Government Revenues.** The fiscal benefits accruing to both state and local governments in Maryland as a result of the direct and multiplier impacts associated with TEDCO’s Six Primary Funding Vehicles; and
- **Federal Government Revenues.** The fiscal benefits accruing to the federal government as a result of the direct and multiplier impacts associated with TEDCO’s Six Primary Funding Vehicles.

Four measures of the economic impacts and fiscal impacts of TEDCO’s Six Primary Funding Vehicles are presented in this report:

- **Direct effects.** The change in economic activity being analyzed—in this case portfolio of assisted companies supported by TEDCO’s five core business investment programs and the MII, and stem cell research expenditures associated with the MSCRF. For this analysis, the JFI used the employment data for TEDCO’s portfolio companies, MII and MSCRF research funding, and the IMPLAN model to estimate business activity based on these activities;
- **Indirect effects.** The changes in inter-industry purchases, for example the purchase of research supplies by a university or start-up company;
- **Induced effects.** The changes in spending from households as income and population increase due to changes in production; and
- **Total effects.** The combined total of direct, indirect and induced effects.

The input to the IMPLAN modeling for TEDCO’s five core business investment programs was the employment of the portfolio of currently active companies that have been supported by these programs. IMPLAN was used to estimate revenues and economic activity based on company employment. Company employment figures and industry were based on data provided by TEDCO, business databases, and internet searches; with missing values estimated by the JFI. The input for MII (research) and MSCRF were the actual FY2021 programmatic research expenditures.