NOVEMBER 2024

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Catalyzing Investment to Achieve U.S. Government Aims

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A Report of the CSIS Defense-Industrial Initiatives Group

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Contents

Abstract

The Department of Defense (DOD) has become concerned that critical technologies are insufficiently capitalized to support national security. A review of global private capital investment shows that investors have been allocating resources toward software-heavy capabilities, such as e-commerce and software as a service (SaaS), leaving funding gaps for critical components and capabilities where investors perceive greater risk. DOD's new Office of Strategic Capital (OSC) was set up to address this challenge by catalyzing investments in cutting-edge technologies to support the development and maturation of critical components and capabilities. To do this, OSC aims to go beyond direct contract and grant funding to leverage various financing tools used by U.S. government agencies outside DOD. This report provides an overview of these alternative funding mechanisms. By examining these financing tools and their ongoing use, DOD may better prepare to effectively leverage alternative financing toward national security aims.

Introduction

The United States faces increasing technological competition from adversaries around the globe as its strategic rivals—particularly China—accelerate the development, production, and scaling of critical technologies. The Department of Defense (DOD) strives to achieve technological advantage through various tools that focus most frequently on new acquisition approaches, organizations dedicated to innovation, and direct funding of contracts. There is new urgency around technological research and development (R&D), particularly for emerging technologies, as strategic competitors have made clear through documents and public statements that they intend to accelerate their work in emerging technologies.[1] Given that most development of emerging technology is now funded through private capital, U.S. policymakers have the task of jump-starting progress in areas critical to U.S. national security. This presents a challenge to U.S. policymakers, who must galvanize private sector investment without the coercive tools or centralized economy that competitors such as China or Russia use when crafting and executing industrial strategy.

DOD founded the Office of Strategic Capital (OSC) in December 2022 to solve a persistent and increasingly important question: how can the government ensure "the future warfighter has the capabilities they need by attracting and scaling private capital to critical technologies for national security?"[2] To support this goal, OSC received $49 million in appropriations and $984 million in budget authority in the fiscal year (FY) 2024 National Defense Authorization Act (NDAA). As DOD and OSC navigate this terrain, they can look to other U.S. agencies and departments that have gone beyond direct funding to use alternative funding mechanisms, including a variety of debt and equity tools, and that have operated such programs for decades.

Government organizations making use of alternative funding mechanisms that can help crowd in private capital include the Department of Commerce and Department of Energy (DOE), the Small Business Administration (SBA), the Export-Import Bank of the United States (EXIM), and the U.S. International Development Finance Corporation (DFC) and its predecessor, the Overseas Private Investment Corporation (OPIC). While several reports discuss these agencies, their missions, and their funding tools, there is a lack of literature summarizing the various non-direct funding tools. To fill that gap, this report pulls together publicly available data on investments made by these government agencies and departments, with a specific focus on investments that align with the 14 critical technologies DOD has identified as vital to national security.[3]

Like the other agencies mentioned, DOD seeks to attract more capital to critical technologies through strong and consistent demand signals, financing, and innovative use of alternative funding mechanisms. In the past two decades, private capital markets have targeted software investments instead of hardware, as they typically generate a greater and more rapid return on investment. Capital has flowed to e-commerce and software as a service (SaaS) and away from deep technology relevant to national security. In 2006, venture capitalists invested 55 percent of funds in software and 45 percent in hardware, but by 2017 that balance had shifted significantly to 92 percent in software and only 8 percent in hardware. More recent data suggests that this trend continued through the Covid-19 pandemic. As of 2023, $66.6 billion in venture capital funding went to software, while only $6.3 billion went to hardware.[4] Companies made this choice because software has lower barriers to entry, less risk, and higher profit margins. This trend accentuates the need for DOD to look for new tools to mobilize private sector capital into investments it deems critical for national security priorities.

DOD must grapple with the same challenge as the rest of the U.S. government in this domain, which is how to influence investment in transformative technologies and sectors critical to national security in ways that are commercially viable and do not distort the market. The alternative finance mechanisms covered in this report also work toward that goal.

Overview and Definitions

In this paper, the authors look at how five federal credit agencies have used different kinds of funding mechanisms over the last 20 years in their quest to generate innovation: the SBA, DFC, EXIM, DOE, and Department of Commerce. The goal of this research is to create foundational knowledge on these programs and offer insights into how DOD, including the newly created OSC, could use these tools.

The team evaluated a range of investment mechanisms from cases of loans, loan guarantees, loan portfolio guarantees, equity financing, export financing, and investment funds to funding through acts of Congress, such as the Inflation Reduction Act (IRA) and the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act. Each agency has some flexibility in the use of its financial instruments—for example, setting interest rates on debt financing or establishing the length of tenors.

This analysis uses the following definitions for each financial tool and explains how agencies deploy it:

- **Loans:** A federal agency offers debt financing with set terms on tenors (length of repayment) and rates (set at the U.S. Treasury rate or a widely used benchmark). Loans are typically disbursed and repaid in dollar denominations and may be referred to as direct loans or debt financing.
- **Loan guarantees:** A federal agency assumes the debt obligation if the borrower defaults. A government agency can also purchase the debt from the lending financial institution and take responsibility for the loan.
- **Loan portfolio guarantees:** A federal credit agency guarantees a portfolio of loans, which enables the guaranteed party to scale up its lending activities to qualifying borrowers. Guarantees are typically provided to local banks to lend to micro, small, and medium-sized enterprises.
- **Equity financing:** Equity authority is the ability of the U.S. government to make investments in companies either directly by buying a percentage of the company or indirectly through funds that invest in those companies.[5]
- **Export financing:** Government agencies can provide financing to suppliers (exporters) trading with overseas buyers (importers). Export finance allows suppliers to access working capital while they wait for buyers to pay invoices.
- **Investment funds:** U.S. government agencies can invest debt and equity into emerging market private equity funds to help address the shortfall of private equity capital or into investment funds in critical technologies where there are financing gaps.

This analysis focuses on investments that align most closely with DOD's 14 critical technology areas, which include biotechnology, quantum science, future-generation wireless technology, advanced materials, trusted artificial intelligence (AI) and autonomy, integrated network systems of systems, microelectronics, space technology, renewable energy generation and storage, advanced computing and software, human-machine interfaces, directed energy, hypersonics, and integrated sensing and cyber. Several sources use the North American Industrial Classification System (NAICS) to identify critical technology areas, with the downside that such categories are construed broadly, often combining cutting-edge technologies with commonplace consumer goods.[6] Each agency invests in a cross section of sectors beyond the 14 critical technology areas; however, this analysis focuses exclusively on areas of overlap with DOD.

This analysis pulls open-source data on each of the federal credit agencies from annual financial reports and databases from each of the agencies covered, as well as from the federal government-wide website USAspending.gov. The site is "the official open data source of federal spending information, including information about federal awards such as contracts, grants, and loans."[7] This report is not intended to be a review of non-DOD agencies or their use of funding mechanisms to achieve their goals, but it may offer useful insights for those agencies as well as DOD.

U.S. International Development Finance Corporation

Overview

DFC is the U.S. government's development finance institution. DFC assumed the functions of OPIC and the U.S. Agency for International Development (USAID)'s Development Credit Authority (DCA) through Congress's Better Utilization of Investments Leading to Development (BUILD) Act.[8] The BUILD Act increased DFC's exposure cap to $60 billion, doubling OPIC's former $29 billion exposure cap. DFC officially launched operations in December 2019.[9]

In addition to its mandate to prioritize less-developed countries, DFC gives preference to projects involving U.S. persons as project sponsors or participants, as well as projects in countries complying with international trade obligations and embracing private enterprise. In its selection of projects, DFC considers factors such as environmental and social impact, workers' rights, human rights, and compliance with U.S. sanctions. DFC also seeks to complement—not compete with—the private sector by mobilizing private sector capital. DFC currently prioritizes the energy, healthcare, financial inclusion, food security and agriculture, technology and infrastructure, and water and sanitation sectors.

The CSIS study team examined four DFC financial products: direct loans, loan guarantees, equity financing, and investment funds. DFC guarantee and loan sizes range from $1 million to $1 billion. DFC typically can lend up to 50 percent of the project cost but may consider somewhat higher participation in the case of an expansion of an existing profitable foreign enterprise or for projects with significant offtake agreements. Loan or guarantee tenor is usually between 5 and 15 years but can go up to 25 years. DFC can provide direct loans to clients who lack a funding source of their

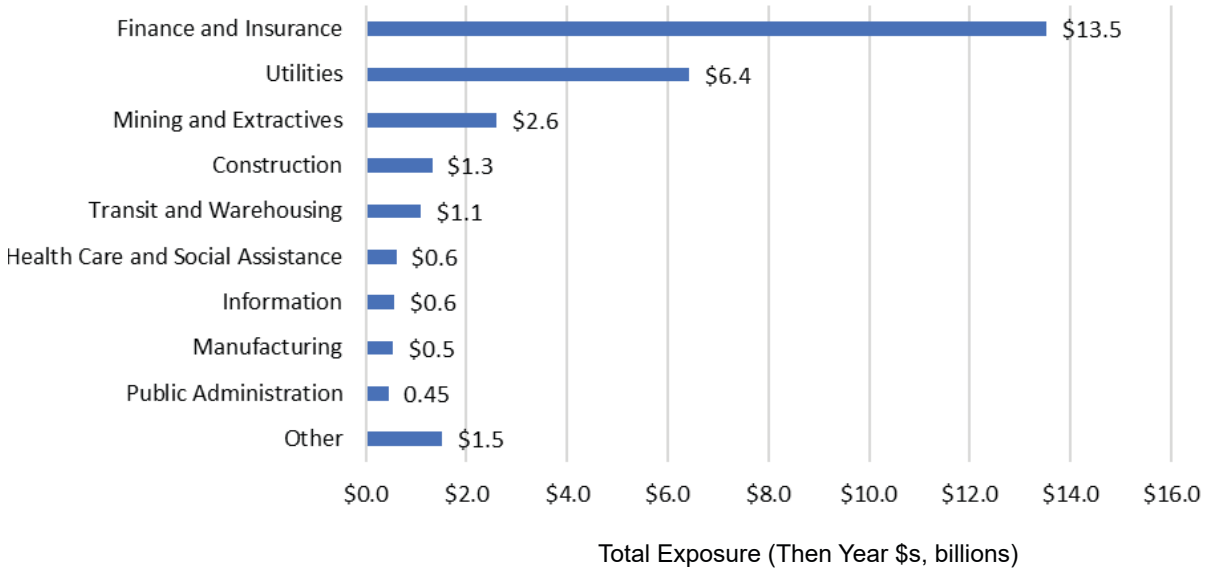
own or do not have access to commercial lending sources and require DFC to arrange physical disbursement of funds. DFC disburses funds directly from the Department of the Treasury and lends them to an eligible borrower. DFC also provides direct loans in the form of investment guarantees funded by certificates of participation in the U.S. fixed-income debt capital markets. DFC also can provide loan guarantees to clients that have an independent funding source or are independent funding sources (e.g., financial institutions) but are unable to provide funding without risk mitigation by DFC.

Examples of DFC debt financing, loan guarantees, and loan portfolio guarantees include the following:

- In 2021, DFC provided $300 million in debt financing (direct loan) to Africa Data Centres Holdings Limited to support the development of critical information and communications technology (ICT) infrastructure in Kenya, South Africa, and other DFC-eligible countries.[10]
- In 2021, DFC announced a $267 million guarantee to Smart RJ Concessionária de Iluminação Pública SPE S.A. to support the modernization of the public lighting system and installation and management of smart city infrastructure in the city of Rio de Janeiro.[11]

DFC also provides financial support to emerging market investment funds. DFC selects funds for investment by evaluating the fund's strategy, management team, track record, fundraising capabilities, and fund terms. In 2019, DFC provided $50 million in financing to the Meridiam Infrastructure Africa Fund. Meridiam was expected to make up to 10 infrastructure investments across Africa, primarily in the renewable energy, transportation, and environmental sectors.

Figure 1: Active DFC Projects by Sector, through FY 2021 Q3



Notes: Investment funds are not included, as no sector breakdown is available for those investments.
Source: Shayerah I. Akhtar and Nick M. Brown, *U.S. International Development Finance Corporation: Overview and Issues*, CRS Report No. R47006 (Washington, DC: Congressional Research Service, January 2022), https://crsreports.congress.gov/product/pdf/R/R47006, based on data from DFC at https://www.dfc.gov/what-we-do/active-projects.

Through the BUILD Act, the DFC also has a new financial tool in the form of equity financing. Investments in equity are limited to (1) 30 percent of the total project and (2) a total of 35 percent of the DFC's total investment exposure, up to $21 billion. In addition to adhering to the same requirements to obtain debt financing, equity financing applicants must demonstrate a strong business model, solid revenue, potential for scale, an experienced management team, and good corporate governance.

Funding

DFC is funded through a corporate capital account (CCA) consisting of appropriations and collections. DFC appropriations designate a portion of CCA collections that may be retained for operating expenses, and excess collections are credited to the Department of the Treasury. DFC's activities are demand driven (usage depends on commercial interest and the availability of bankable projects), but the agency seeks to attract applications with outreach, business development, calls for proposal, and action through administration initiatives, partnerships, and policies, such as the G7's Partnership for Global Infrastructure and Investment, the Quad (a partnership among the governments of Australia, India, Japan, and the United States), and the Indo-Pacific Economic Framework for Prosperity (an economic framework covering climate, technology, anticorruption, and trade among the United States and 13 partner countries in the Indo-Pacific).[12] In FY 2023, DFC committed $9.1 billion, up from $7.4 billion in FY 2022 and $6.7 billion in FY 2021.[13]

Governance

DFC is led by a nine-member board of directors comprising a chief executive officer, four other U.S. government officials (the secretary of state, who is the chairperson of the board; the USAID administrator, who is the vice chairperson; the secretary of the treasury; and the secretary of commerce) or their designees, and four nongovernment members (for three-year terms, renewable once). All board positions are presidentially appointed and subject to Senate confirmation.[14] All DFC powers are vested in the board, which provides direction and general oversight and approves major DFC decisions. The CEO acts on the board's direction. The board meets quarterly, and a quorum is five members. Other DFC officers include the deputy CEO (also a Senate-confirmed, presidentially appointed position), chief risk officer, chief development officer, and inspector general (IG).

Investments totaling more than $50 million go to the board for approval; transactions below that amount are approved by a credit committee internal to DFC. All investments of $10 million or in specified countries require congressional notification to oversight committees (the House Foreign Affairs Committee and the Senate Foreign Relations Committee).

Investments

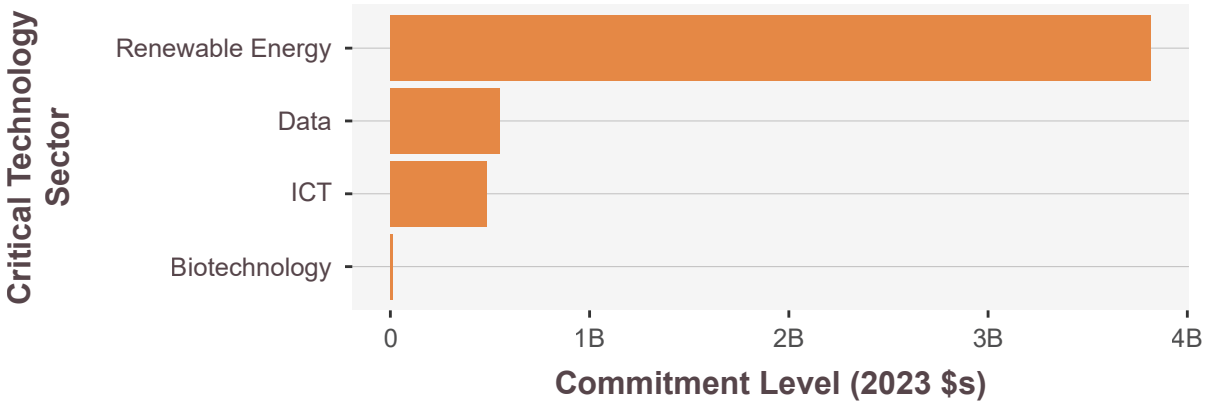
Given that DFC invests primarily in low- and lower-middle-income countries and does not invest in defense-related industries, many of DFC's and OPIC's (its predecessor) investments do not align with DOD's 14 critical technology areas or its supply chains. However, the team identified DOD-DFC

alignment in renewable energy, data, ICT, and biotechnology investments. DFC investments in these sectors began in 2010, and the total amount invested was $4,112,092,249.

Renewable energy accounts for most investments, at more than 88 percent of total investments aligned with DOD criteria, for a total of 63 of 71 identified projects. Much of DFC support for the renewable energy sector is geared toward constructing solar photovoltaic (PV) plants to provide renewable energy solutions to households, agribusinesses, educational institutions, and solar manufacturing plants.

DFC and OPIC have also provided financing for four data-related projects for data centers and support for businesses and three ICT projects that financed cell phone tower constructions, telecom asset acquisitions, and the expansion of wireless businesses.

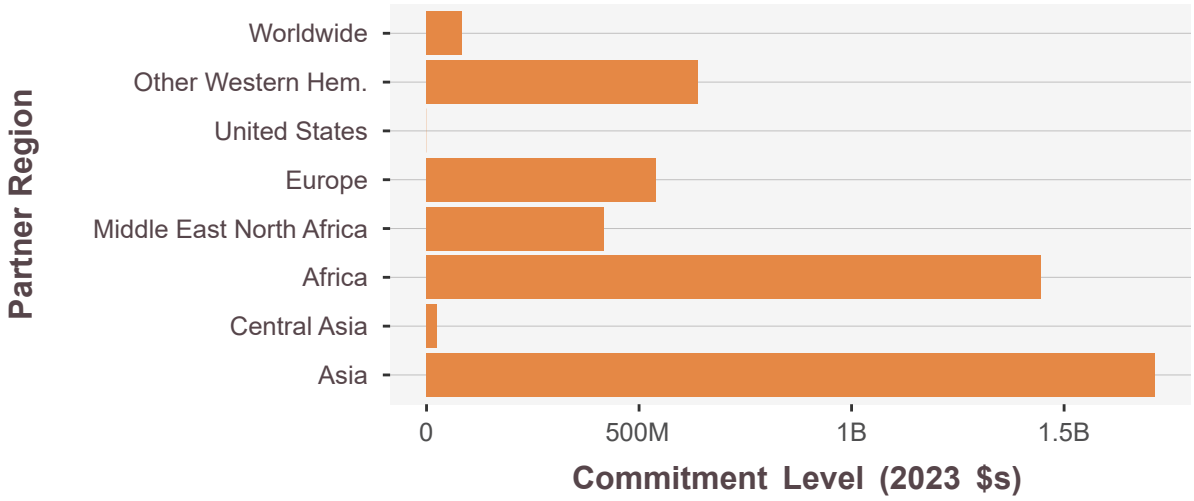
Figure 2: Active DFC Financing for Critical Technology Investment by Sector, FY 2012–FY 2023 Q3



Source: DFC.gov and CSIS analysis.

OPIC and DFC also focused their financial support in DOD sectors focused on critical technologies in Africa and Asia. Africa is the predominant recipients of OPIC and DFC financing, and India receives the most financial support overall.

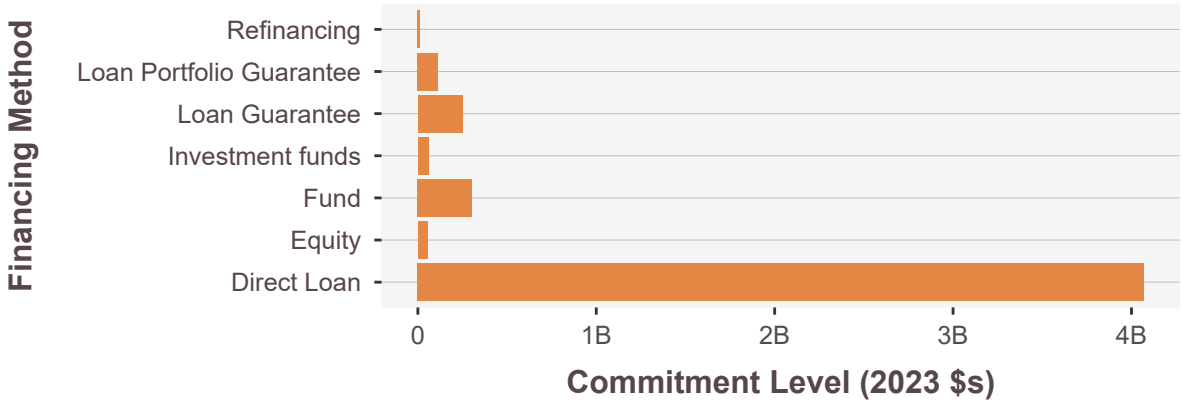
Figure 3: Active DFC Financing for Critical Technology Regional Financial Support, FY 2012–FY 2023 Q3



Source: DFC.gov and CSIS analysis.

When considered by commitment level, direct loans were the most prevalent tool used to support critical technology sectors. That said, commitment level is only one method for measuring the potential impact of assistance. Other measures, such as direct equity investment and ownership stake rather than repayment requirement, may have an outsized influence relative to their comparatively small commitment level.

Figure 4: Active DFC Financing for Critical Technology Areas by Mechanism, FY 2012–FY 2023



Source: DFC.gov and CSIS analysis based on data from DFC at https://www.dfc.gov/what-we-do/active-projects, accessed September 2023.

Export-Import Bank of the United States

Overview

EXIM has been the U.S. export credit agency since 1934, helping U.S. exporters that work in challenging and risky markets obtain financing by covering the credit and country risks the private sector is unable or unwilling to accept. EXIM offers the following financing tools: protecting exporters against nonpayment risk by foreign customers, offering support for U.S. companies selling services overseas, backing exporters' loans from private banks to finance materials and labor, and providing financing to foreign buyers for projects, transportation, and U.S. export sales financing.

The bank has several loan guarantee products. EXIM loan guarantees cover 100 percent of the loan principal and accrued interest and are available for medium-term (up to five years) and long-term (over seven years) repayment, which is usually determined by transaction size.[15] Loan guarantees are also available for short-term loans.

EXIM's medium- and long-term loan guarantees offer competitive term financing from lenders when it is otherwise unavailable from commercial banks, with terms generally up to 10 years.[16] These products provide financing for international buyers of U.S. capital goods and related services (not consumer goods), risk mitigation for a transaction with a particular buyer, more secure entry to emerging markets, longer repayment terms, flexible lender financing options backed by EXIM's guarantee, and coverage for 100 percent of commercial and political risks.

EXIM also offers working capital loan guarantees.[17] This product provides financing to exporters to help with cash flow to fulfill sales orders and take on new business abroad. EXIM provides a 90 percent loan-backing guarantee to the lender, decreasing repayment risk and thereby increasing the lender's willingness to extend a loan. With an expanded borrowing base, small business exporters can borrow more with the same collateral. Further, the guarantee can cover both multiple export sales and individual contracts. EXIM can guarantee both revolving and transaction-specific facilities, and there is no minimum or maximum transaction amount.

Before approving certain transactions, EXIM considers the economic impact of a particular transaction and the environmental effects. EXIM also has a statutory mandate to support small business. Small business authorizations in FY 2022 totaled $1.537 billion, representing 29.3 percent of total authorizations. In FY 2022, 1,589 transactions were authorized for the direct benefit of small business exporters, which amounted to 88.3 percent of total transactions.

EXIM has to comply with congressional mandates requiring minimum awards distribution for the following programs: the Small Business Mandate, Sub-Saharan Africa Mandate, Environmentally Beneficial Goods and Services Mandate, and Program on China and Transformational Exports Mandate.

Funding

EXIM is considered a self-financing agency, which means that it collects funds from credit program customers and uses these funds to offset, or pay back, EXIM's appropriation to the Department of the Treasury. For FY 2022, EXIM authorized $5.242 billion in loan guarantees and insurance and no direct loan in support of an estimated $10.557 billion in U.S. export sales.[18]

Governance

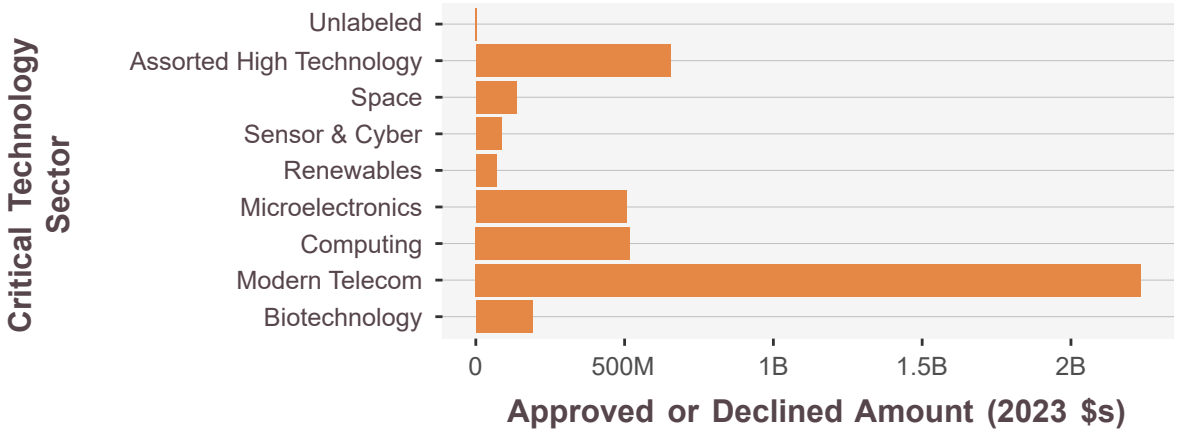
A five-member board of directors leads the bank. Members are presidentially appointed and Senate confirmed. The bank's president and first vice president serve, respectively, as the board's chair and vice chair. The board needs a quorum of at least three members to conduct business, such as to approve transactions above a certain threshold (now $25 million), make policies, and delegate authority. The 2019 reauthorization provided alternative procedures in the event of a quorum lapse. An Advisory Committee and a Sub-Saharan Africa Advisory Committee support the board.

Investments

The authors assessed EXIM transactions from 2007 to 2023 that aligned most closely with DOD's 14 critical technologies. An estimated 711 transactions used EXIM's working capital and medium- to long-term guarantee products. In that time, EXIM approved $3,458,276,775 and disbursed $2,771,404,019. ICT-related NAICS codes relevant to FutureG (transformative 5G and future-generation wireless networking technologies), as well as present- and previous-generation communications technologies, were associated with the highest volume of assistance (Figure 5).

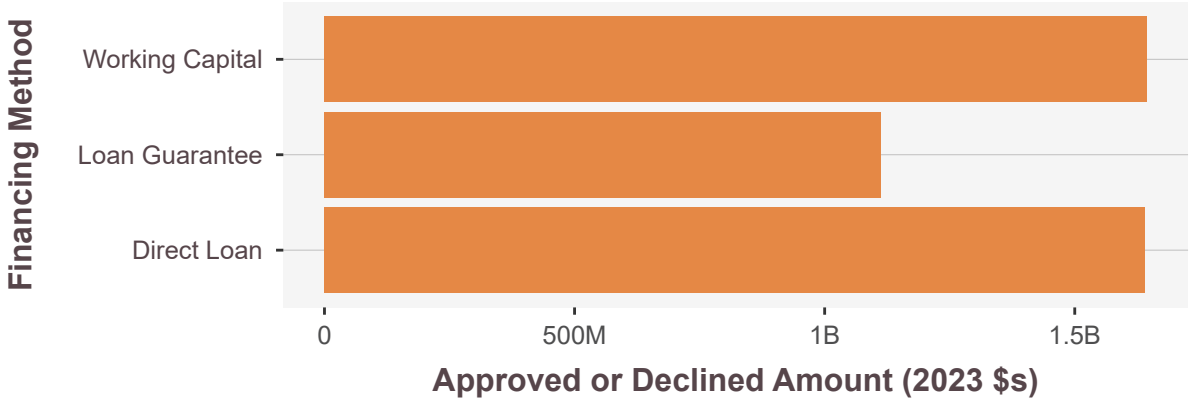
EXIM uses a mix of insurance, loan guarantees, and direct loans, which is not included in this analysis (Figure 6).

Figure 5: EXIM Financing to Critical Technology Sectors, FY 2007–FY 2022



Source: EXIM dataset and CSIS analysis.

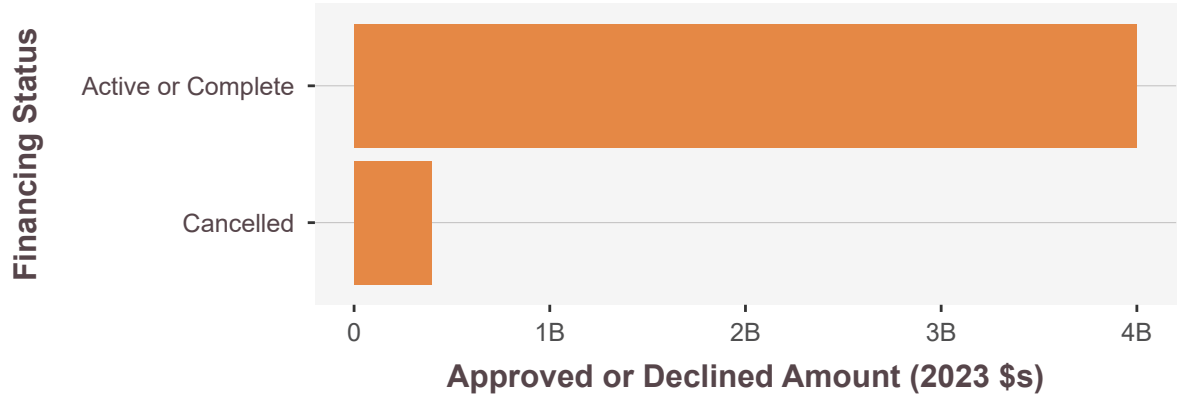
Figure 6: EXIM Financing to Critical Technology Sectors by Mechanism, FY 2007–FY 2022



Source: EXIM dataset and CSIS analysis.

Of the EXIM assistance spending for critical technology sectors, $307 million faced cancellation before or after disbursement (Figure 7). This research did not reveal the causes behind the cancellations. In addition, EXIM recently launched the China and Transformational Exports Program (CTEP) to maintain the United States' position as a leading exporter in several critical technology areas.

Figure 7: EXIM Financing to Critical Technology Areas by Status, FY 2007–FY 2022



Source: EXIM dataset and CSIS analysis.

Small Business Administration

Overview

The SBA, established in 1953, is an independent federal agency that supports small enterprises through counsel, aid, and investment. The SBA has a range of policy tools to invest in small businesses. This analysis focuses on the agency's 7(a) and 504 loan programs. These programs do not comprise the entirety of the SBA's loan authorities; however, they capture the SBA's long-term financial tools to support domestic business growth and innovation. Additional investment tools include the SBA's Small Business Investment Companies, which is a privately owned investment company licensed by the SBA and backed by the agency that lends low-cost government capital to invest in U.S. small businesses.

The SBA's 7(a) loan guarantee program encourages lenders to provide loans to enterprises otherwise unable to receive capital on "reasonable terms and conditions."[19] The 7(a) program is the SBA's primary loan program and houses several subprograms, which collectively guarantee loans that can be used toward acquiring short- and long-term working capital, refinancing debt, improving facilities, purchasing equipment, and covering paychecks in times of crisis.[20]

For a small business applicant to be eligible for SBA's 7(a) loan, it must be located in the United States, be a for-profit operating business, qualify within SBA's size requirements, demonstrate a need for the desired credit, and have lender certification that financing is unavailable without SBA assistance. The SBA will then require the lender to consider the applicant's ability to reasonably repay the loan based on the applicant's history and potential for profitability. If the lender approves, the SBA will cover up to 90 percent of the loan's value.

SBA's 7(a) loan terms depend on the lending institution and the recipient. SBA 7(a) loans have a $3.75 million cap, and the interest rate varies based on the lender selecting a base rate that gradually changes based on the loan value and maturity.

Funding

SBA's 7(a) program is funded through congressional appropriations and by fees and collections of its loan guarantees. In the rare event a loan recipient defaults or fails to repay on time, SBA will require additional allocations to support its programs. From 2014 to 2020, the SBA subsidized only $99 million of its loan guarantees—all of which occurred in 2020 amid the Covid-19 pandemic. In FY 2023, the SBA's 7(a) program received $35 billion to support its activities.[21]

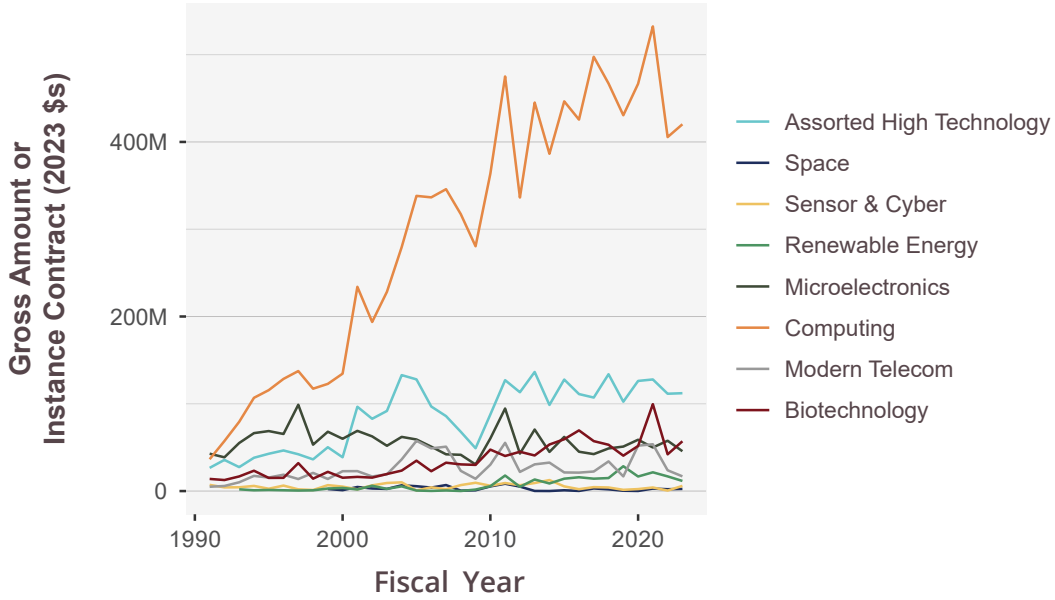
Governance

The agency's appointed administrator governs the SBA's 7(a) program on a statutory basis. However, the process is governed by the SBA's Loan Guaranty Processing Center, which screens applications submitted by lenders through the Electronic Loan Processing/Servicing website, which is available through the SBA One interface. The center processes applications sent by lending institutions that do not have delegated authority to make 7(a) loans without prior governmental approval.

Investments

SBA 7(a) applicants and awardees align with several of DOD's 14 critical technology areas. The following chart depicts the share capital guaranteed by the SBA 7(a) loans in critical technology areas categorized based on the NAICS.

Figure 8: SBA Financing to Critical Sectors by Year, FY 2010–FY 2023



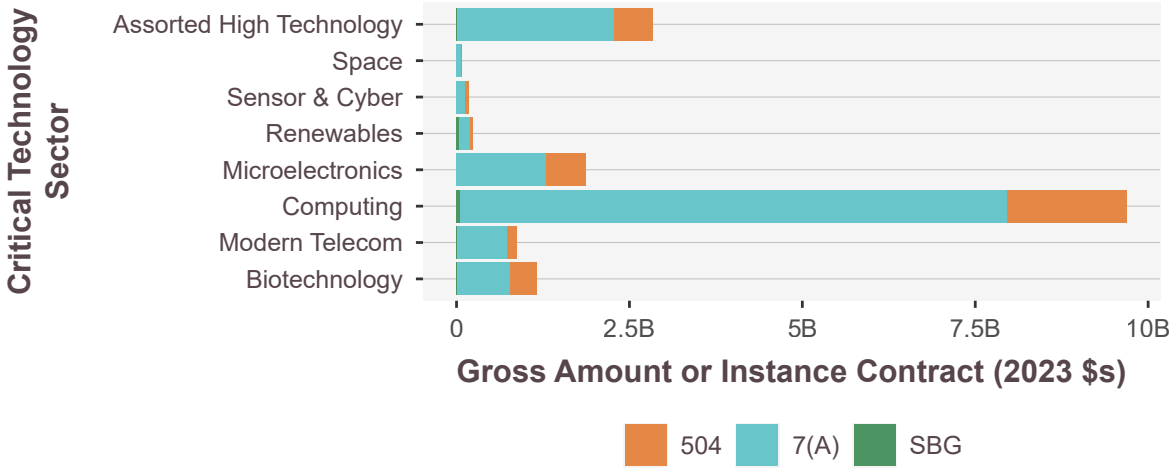
Source: SBA FOIA datasets and CSIS analysis.

From 2010 to 2023, SBA's computing allocations dominated the 7(a) program's coverage, with approximately $3 billion in computing-related loans. These figures should not be taken to mean that computing-related loans are going solely toward scaling up advanced computing software highlighted by DOD. However, they demonstrate the SBA's interest in these applicants and the organization's efforts to incentivize capital to flow into these businesses.

High technology and biotechnologies follow computing in terms of the SBA 7(a) program's investments, although the difference between those two and computing remains stark. High-technology coverage throughout 2010–23 was approximately $830 million, and biotechnology was about $330 million. High technology captures a range of R&D activities including nanotechnologies, scientific instrument manufacturing, and laboratory-related obligations. Biotechnology covers a myriad of medicinal and pharmaceutical applications.

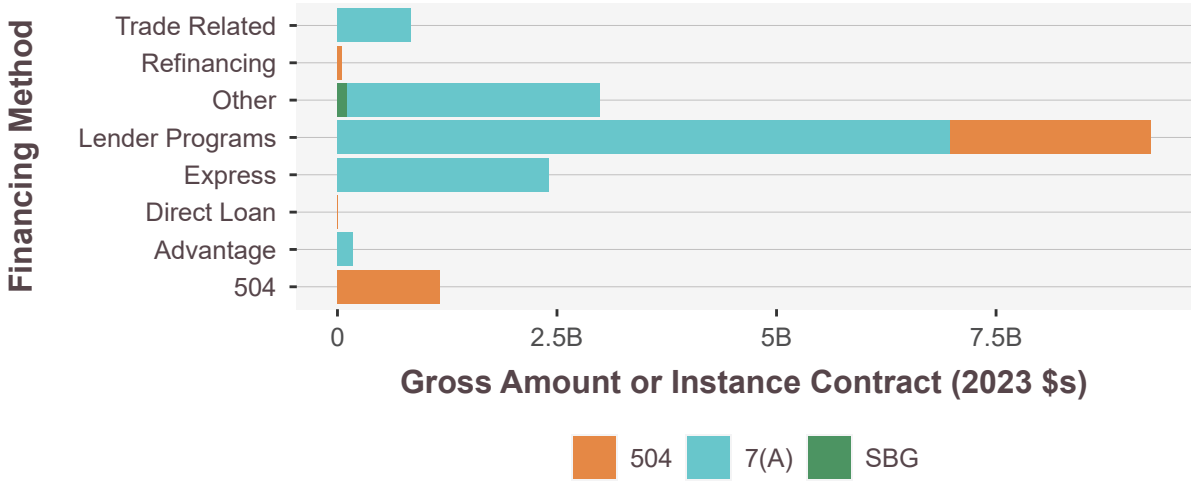
In contrast to EXIM, computing is the largest beneficiary of SBA assistance in critical technology sectors. The second-largest category, high technology, includes a wide range of R&D and cannot easily be assigned to a single critical technology area (Figure 9). Lender programs, including general 504 lenders programs, certified lenders programs, and preferred lenders programs for 7a loans, were the most prominent source of SBA assistance for investments in critical technology sectors (Figure 10).

Figure 9: SBA Financing to Critical Technology Sectors, FY 1991–FY 2023



Source: SBA FOIA datasets and CSIS analysis.

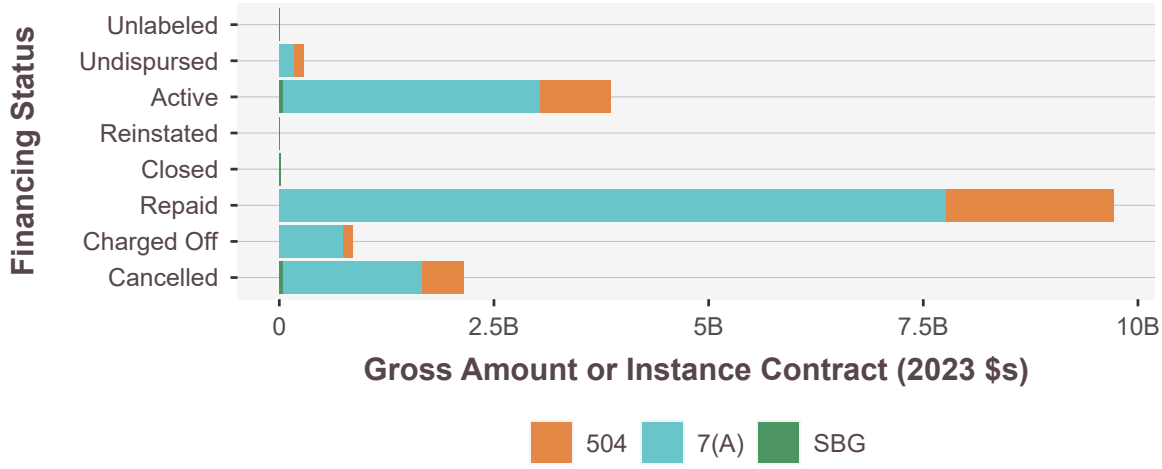
Figure 10: SBA Financing to Critical Technology Sectors by Mechanism, FY 1991–FY 2023



Source: SBA FOIA datasets and CSIS analysis.

In most cases, SBA was repaid in full. However, $1.6 billion of SBA assistance was cancelled, and $600 million was charged off during the covered period (Figure 11). Reasons for assistance cancellation were not identified in the course of research.

Figure 11: SBA Financing to Critical Technology Sectors by Status, FY 1991–FY 2023



Source: SBA FOIA datasets and CSIS analysis.

Department of Energy

Title 17 Program and ATVM Program

Overview

The DOE's Title 17 Energy Infrastructure Reinvestment (EIR) Program was established by the Energy Policy Act of 2005 and has financed projects under different loan authorities. The EIR Program is under Section 1706 of Title 17 and was incorporated in a 2023 update to implement provisions of the IRA. EIR projects support reinvestment in communities throughout the United States where existing energy infrastructure has been challenged by market forces, resource depletion, age, technology advancements, or the broader energy transition. This infrastructure might include power plants, fossil fuel extraction sites, transmission systems, fossil fuel pipelines, refineries, or other energy facilities that have ceased to operate or that continue to operate but could benefit from improvements to reduce greenhouse gas emissions or pollution.

The EIR guarantees loans to projects that retool, repower, repurpose, or replace energy infrastructure that has ceased operations, or projects that enable operating energy infrastructure to avoid, reduce, utilize, or sequester air pollutants or anthropogenic emissions of greenhouse gases.

The Advanced Technology Vehicles Manufacturing Loan Program (ATVM) provides loans to support the manufacture of eligible advanced technology vehicles and qualifying components, including newly authorized modes from the Bipartisan Infrastructure Deal.[22] This program covers light-duty vehicles; medium- and heavy-duty vehicles; trains or locomotives; maritime vessels, including offshore wind support vessels; aircraft; and hyperloop.

Funding

The IRA appropriated $5 billion through September 30, 2026, to carry out the EIR program with a limitation on commitments to guarantee loans with a total principal amount of less than $250 billion. The IRA removed the $25 billion cap on ATVM loan authority and appropriated $3 billion in credit subsidies to support these loans.

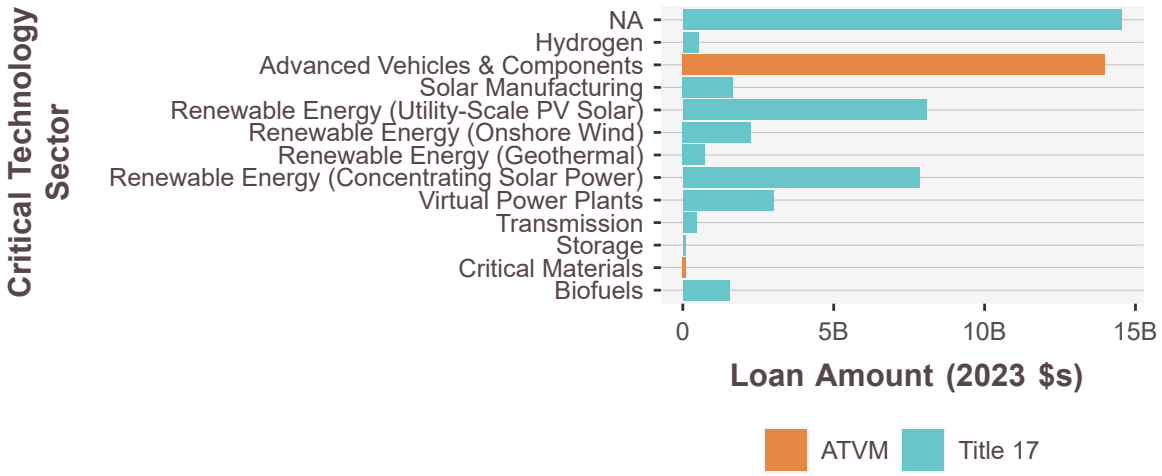
Governance

The administration of the DOE EIR program is under the statutory purview of the secretary of energy. The secretary delegates this authority to the leadership of the DOE's Loan Programs Office, which manages the ATVM program. The office has seven divisions: Loan Origination, Outreach and Business Development, Portfolio Management, Technical and Environmental, Risk Management, Management and Operations, and Legal.

Investments

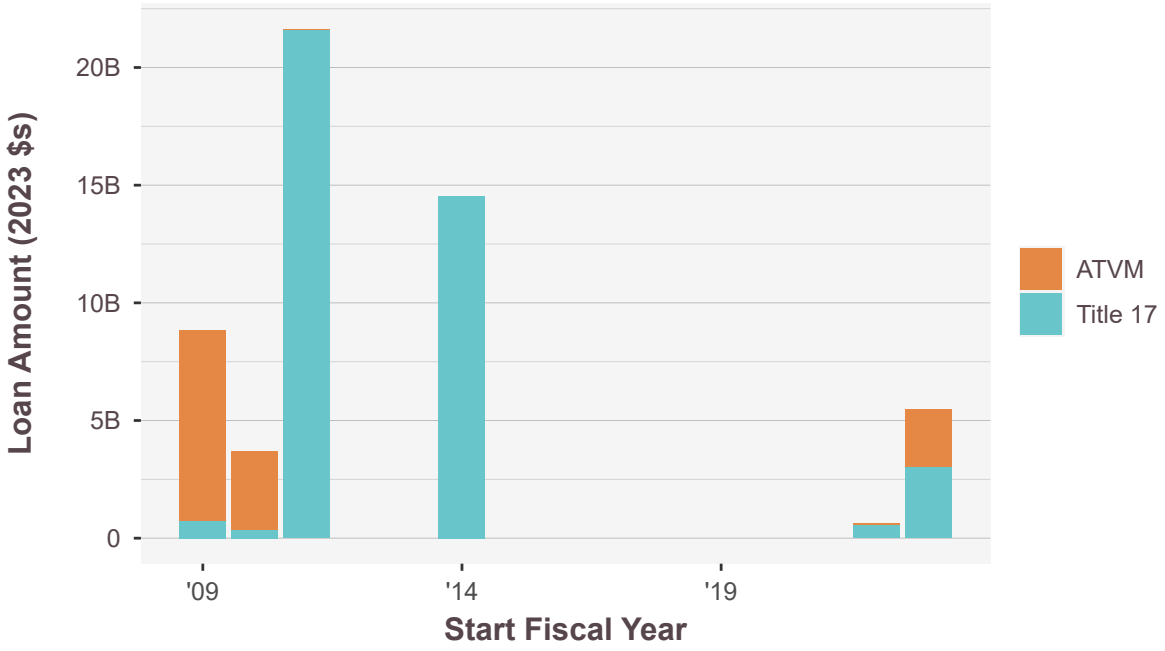
A major area of focus for DOE's Title 17 programs is developing PV solar power in the United States (Figure 12). Currently, there are four Midwestern projects that the DOE guarantees either entirely or partially. The total value of these projects is approximately $16.9 billion (Figure 13).

Figure 12: DOE Financing to Critical Technology Sectors, FY 2009–FY 2023



Source: LPO Portfolio Projects, FAADS, and CSIS analysis.

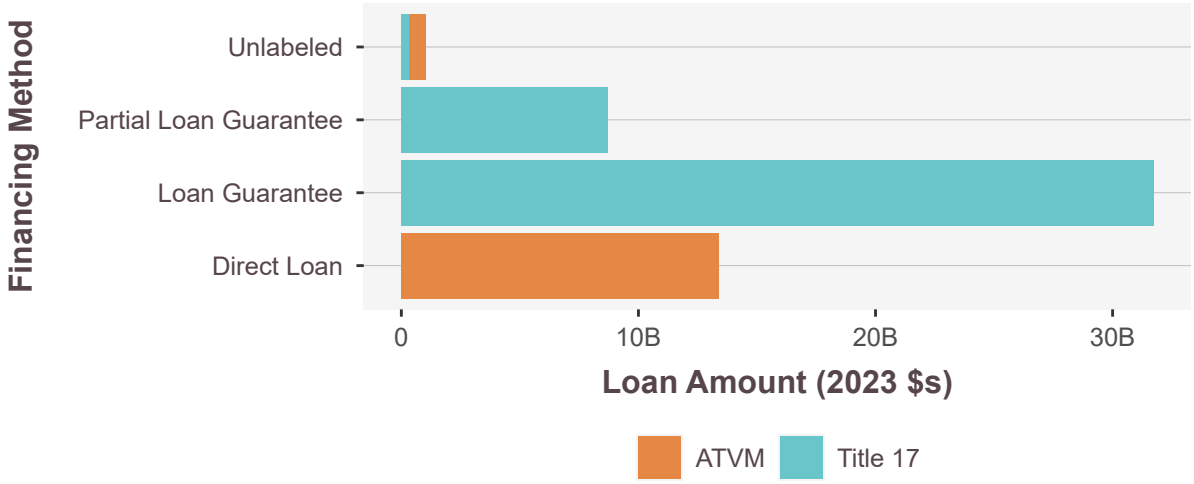
Figure 13: DOE Loan Value by Start Year, FY 2008–FY 2023



Source: LPO Portfolio Projects, FAADS, and CSIS analysis.

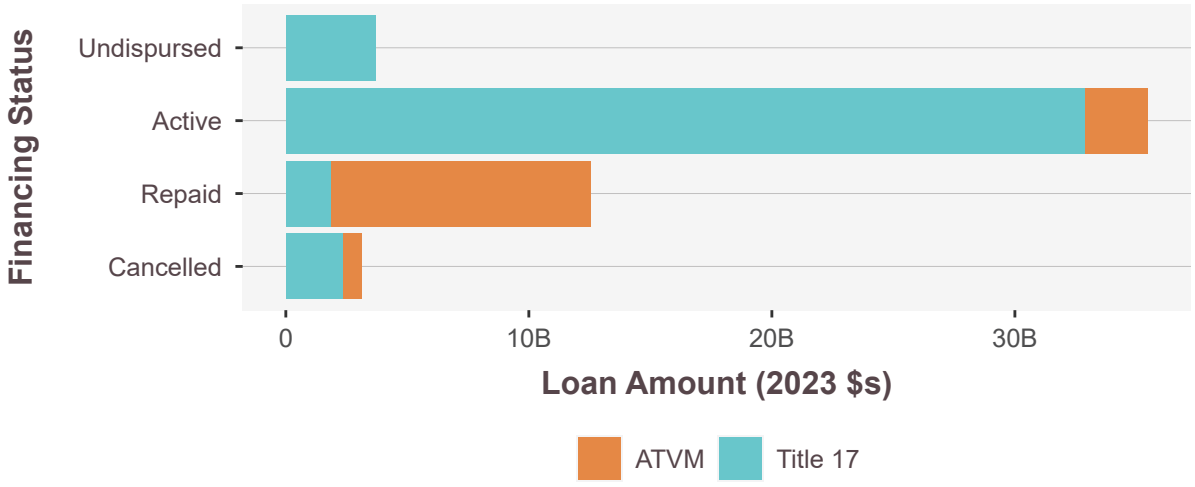
Full or partial loan guarantees are the most frequent tool of DOE Title 17 assistance, although direct loans are the preferred mechanism for ATVM assistance (Figure 14). Active projects make up the bulk of DOE's portfolio, which is unsurprising given the recently enabled lending as part of the IRA (Figure 15).

Figure 14: DOE Financing to Critical Technology Sectors by Mechanism, FY 2008–FY 2023



Source: LPO Portfolio Projects, FAADS, and CSIS analysis.

Figure 15: DOE Financing to Critical Technology Areas by Status, FY 2008–FY 2023



Source: LPO Portfolio Projects, FAADS, and CSIS analysis.

Department of Commerce

IRA and CHIPS Act

President Joe Biden signed the IRA into law in August 2022, providing funding opportunities through various departments, including the Department of Commerce, to accelerate the U.S. energy transition. Most of the Department of Commerce's funding will be allocated through grants, direct spending, contracts, cooperative agreements, and technical assistance to support coastal communities and resilience efforts as well as weather and climate forecasting. At the time of writing, it was unclear how the IRA, through the Department of Commerce, would support the climate-related areas in DOD's 14 critical technologies.

The CHIPS Act of 2022 provides financial incentives, including loans and funds, for the domestic manufacture of semiconductors and the conduct of related research and development.[23] The CHIPS Act will allocate $280 billion over the next 10 years. The Department of Commerce is looking to crowd in capital to finance rebuilding the domestic semiconductor industry and will provide loans and loan guarantees. Their effort is not to fully fund the production of chips or the construction of an entire fabrication facility. The Department of Commerce designed a new process to call for and assess proposals and to award the loans and loan guarantees, basing this on lessons and observations from the private equity industry.

CHIPS Act money comes with guardrails, particularly as the financial support will go toward industries critical to national security. Each funding recipient must enter into a "required agreement" with the Department of Commerce that governs the use of the CHIPS funding, putting in place certain restrictions.[24] For instance, recipients or their affiliates will be prohibited from transactions in the semiconductor industry in countries of concern, including but not limited

to China, Iran, North Korea, and Russia, for 10 years. Joint research or technology licensing is also prohibited with these countries. The guardrails are outlined in the Final Rule, Transaction Prohibition, and Technology Prohibition.

Domestic and international companies have undergone a process outlined by the Department of Commerce to apply for funds, which includes a letter of interest, requests for proposals, and a proposal review. The department has received more than 500 statements of interest and more than 100 preapplications and full applications since it began accepting them in March 2023. The department has made this an interactive process and essentially has no single criterion or project it is looking for; rather it is looking for proposals that are economically viable and that have a national security angle. The application process also includes an evaluation, preliminary term sheets, due diligence, and funding awards.

Funding

Through the IRA, the Department of Commerce manages a $2.6 billion framework to invest in coastal resilience, $400 million specifically for tribal priorities and benefiting coastal and Great Lakes communities, and additional investments to improve weather and climate data and services. Through the CHIPS Act, it is expected to oversee $50 billion to revitalize the domestic semiconductor industry and reshore supply chains back to the United States, including $39 billion for manufacturing incentives and $11 billion for R&D programs.

Governance

The National Oceanic and Atmospheric Administration will manage all of the climate-related work. The Department of Commerce's newly created CHIPS Program Office oversees CHIPS Act funding.

Investments

For the CHIPS Act, the Department of Commerce announced for the first time the signing of a nonbinding preliminary memorandum of terms (PMT) to a funding applicant on December 11, 2023. BAE Systems Electronic Systems is expected to receive $35 million in federal incentives to support the modernization of the company's Microelectronics Center, a mature-node production facility in Nashua, New Hampshire.[25] The project will replace aging tools and quadruple the production of chips necessary for critical defense programs, including the F-35 fighter jet program. The Department of Commerce announced the second PMT on February 19, 2024, to GlobalFoundries to provide $1.5 billion in direct funding to improve domestic supply chain resilience, strengthen competitiveness in current-generation and mature-node semiconductor production, and support economic and national security priorities, at time of drafting.[26]

Cross-Cutting Insights

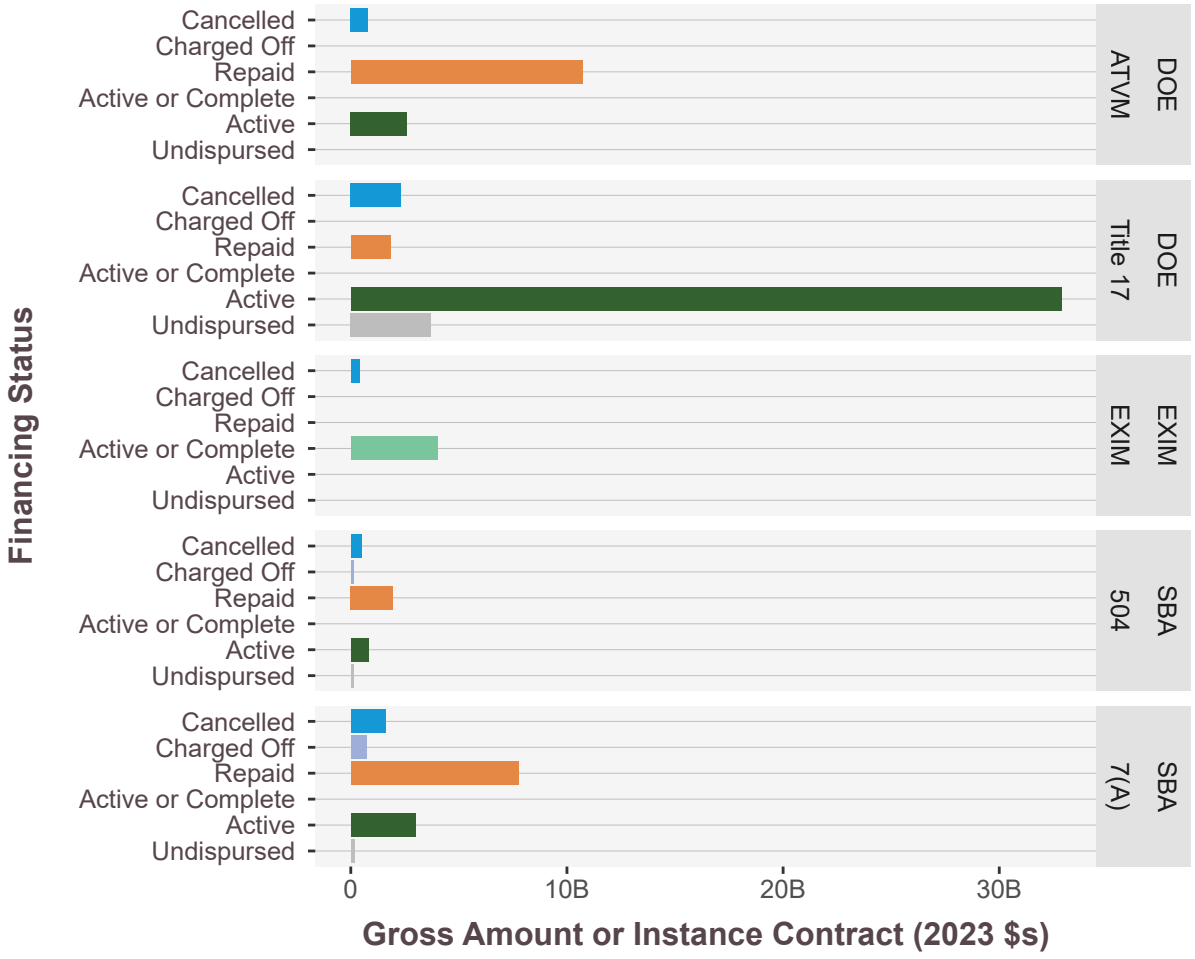
DOD's efforts to develop and maintain technological advantage over its strategic rivals requires investments in technology, which have most frequently focused on direct funding of contracts. OSC's mission is to expand the range of financing mechanisms that can be used to invest in cutting-edge technologies, with a particular focus on encouraging investment in DOD's 14 critical technology areas. To do this, OSC aims to go beyond direct contract and grant funding to use a variety of financing tools employed by U.S. government agencies outside of DOD.

Through a systematic look across the whole of U.S. government, the authors examined these funding mechanisms and how they have been used. An analysis of this research reveals the following insights, which may be of use to OSC as it seeks to crowd in capital for strategic impact:

- **Prepare to manage the challenge of perceived "failure" when investments do not yield returns.** The portfolio investment approach typical of venture capital, where some investments do not pay off, represents a cultural challenge. The pervasive culture of compliance, while crucial for ensuring that the government meets requirements and follows existing protocols, presents a challenge for the inherently risky nature of portfolio investments. In undertaking the portfolio investment approach typical of venture capital, DOD must accept healthy risk from the outset and prepare to champion the successes of certain investments while accepting that not all will yield desired returns. Given the urgency of fueling critical technologies investment, DOD should prepare to communicate the advantages of alternative funding approaches both externally and to its workforce.

As shown in Figure 16, loan cancellations or reductions through charge-offs will happen, but "failure" seems to be the exception. The exact portion of loans that will be repaid is difficult to calculate. For the DOE Title 17 program, 81 percent of its loans by value are still active, and the EXIM bank does not differentiate between ongoing or repaid loans for the 91 percent of loans that have not been cancelled. With those caveats in mind, across programs 6 to 14 percent of loans (when summed together totaling $5.7 billion of $76.1 billion) were cancelled when weighted by face value. Even when considering other negative outcomes, such as a loan not being disbursed or the government only partially recovering the loan via a charge-off, only 6 to 21 percent of loans experienced negative outcomes. Although this analysis captures only a fraction of alternative financing—specifically, programs directly relevant to DOD's 14 critical technologies—these ranges give a sense of the level of failure tolerance necessary when employing financial assistance and that the portfolio outcomes for all of the studied programs are positive.

Figure 16: Financing to Critical Technology Sectors by Status



Note: Unlabeled not shown

Source: Agency datasets and CSIS analysis. DOE datasets FY 2008–FY 2023, EXIM dataset FY 2007–FY 2022, SBA datasets FY 1991–FY 2023, DFC dataset FY 2012–FY 2023 Q3.

- **Understand the role of market signaling**. It is not merely the magnitude of financing that will determine the success of DOD to crowd in private capital investments in DOD-relevant technologies. Rather, clear communication of DOD priorities and identification of private sector projects that meet DOD's needs can attract attention from private capital investors, regardless of the size of investment. If DOD signals its interest in particular critical technologies projects and sources, this holds great potential to generate private capital investment. Therefore, DOD should consider concentrating its efforts on efficient investments in key private sector innovations and openly communicate these decisions rather than concern itself with the amount of capital required. In showing a clear indication of interest, regardless of magnitude, DOD can guide private capital investors in their understanding of DOD priorities and increase investor confidence in their potential return on investment.
- **Develop appropriate reporting systems to establish effective monitoring and evaluation of investments.** Current tracking tools are limited. The government-wide Federal Assistance Award Data System (FAADS) database includes useful information but does not capture key inputs or outcome variables—namely, the economic sector or loan outcome. DOD should carefully consider useful metrics it will employ to assess and manage its portfolio. By establishing these metrics early, DOD can prepare to collect the necessary data to evaluate program performance. DOE, DFC, and EXIM have developed and published key metrics that could serve as examples for DOD's development of open-source tracking systems. Publishing key metrics on programmatic developments would both enhance transparency and ensure the department's investments are systematically assessed.

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