Venture investing—funding and expertise—is considered crucial for accelerated defense innovation. However traditional venture investment will remain difficult to attract due to the unique challenges of U.S. Department of Defense (DoD) supply chains. The DoD is currently seeking to "implement capital investment strategies proven in the commercial sector to shape and scale investment in critical technologies and assets." The primary challenge lies in replicating private sector venture returns, which involves extending funds to high-risk technology developers due to their emerging status and drawing in investment partners with limited or no leverage options. This paper proposes a pilot program to prove the effectiveness of a high leverage fund model, scaled to satisfy longer term hard-tech investments, designed to significantly reduce the investment barriers faced by the DoD to strengthen the defense supply chain's resilience.

The Role of Equity Leverage in Securing Critical Defense Supply Chains

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What Problem is the Department of Defense Trying to Solve?

The United States Department of Defense must ensure the resilience and mission success of its supply chains for vital defense technologies aiding the warfighter. Securing access to the most innovative and valuable materials and capabilities underpins the nation's military readiness and national security. However, the DoD's current approaches to financing such investments fall short, leaving the defense industrial base vulnerable to disruption and technological stagnation.[1] Further, for years the DoD has wanted to entice private capital, both funding and experienced venture management, to participate. To do so, a new investment model must consider the challenge of capital market inefficiencies existing today.

This white paper examines the crucial role of equity leverage in the mix of potential solutions. Equity leverage can entice expert venture investors to consider critical defense supply chains. U.S. Federal Loan Guarantee (FLG) programs provide a tool to secure the future of our defense supply chains. As a matter of policy, federal credit enhancement is available to the private sector if capital markets alone cannot solve investment obstacles that are in the national interest to resolve.

> *"The ability of the Defense Department to build enduring technological advantage is predicated on collaboration with the private sector and open markets."*[2]
>
> -**Heidi Shyu**, Under Secretary of Defense, Research & Engineering

The Investment Landscape: Unique Hurdles

DoD supply chains have unique challenges making this industrial sector less attractive to traditional markets such as "Soft-Tech" where the bulk of venture capital (VC) has concentrated in recent decades. According to the *Defense Investor Network*, newly coined sectors such as deep tech, defense tech, hard tech and space tech provide opportunity

[1] https://www.afcea.org/signal-media/defense-operations/transcending-valley-death

[2] https://insidedefense.com/daily-news/shyu-establishes-strategic-investment-capital-task-force-defense-innovation-board

at increased risk. The increased risk arises from the following factors:

CAPEX-Intensive—Unlike software, AI, and other commercial or consumer-facing technologies, defense supply chains often require sizeable upfront investments in manufacturing facilities, specialized machinery, and sustained R&D[3]. This differentiates defense critical technology companies from typical VC targets, which allow the VC to deploy smaller investments for quicker returns. The sheer size of required capital for defense hard-tech necessitates much larger funds to invest larger checks, with longer investment horizons, and potentially reduced returns, which lowers the attractiveness expert VCs who are deploying standard investment horizons and approaches.

2024 NDAA

- Advanced bulk materials
- Advanced manufacturing
- Autonomous mobile robots
- Battery storage
- Biochemicals
- Bioenergetics
- Biomass
- Cybersecurity
- Data fabric
- Decision science
- Edge computing
- External communication
- Hydrogen generation and storage
- Mesh networks
- Microelectronics assembly, testing, or packaging
- Microelectronics design and development
- Microelectronics fabrication
- Microelectronics manufacturing equipment
- Microelectronics materials
- Nanomaterials and metamaterials
- Open RAN
- Optical communications
- Sensor hardware
- Solar
- Space launch
- Spacecraft
- Space-enabled services and equipment
- Synthetic biology
- Quantum computing
- Quantum security
- Quantum sensing

Other Critical

- BioTechnology
- Quantum Science
- Future generation Wireless
- Critical minerals and rare earth metals
- Hypersonic materials
- Embedded AI and autonomy
- Integrated networks
- Directed energy
- Human and machine interfaces
- Integrated systems
- Energy generation
- Advanced computing and software
- Space logistics
- Space technology

Figure 1 - Critical Technologies at the Top of Congressional and DoD Priority.

Defense Products and Services—The DoD has a need for investment in technology areas that may not always have a dual-use (commercial and defense). This adds to market risk should DoD decide not to procure something if the battlefield shifts to a new paradigm. Close examination of the technologies in Figure 1 highlights the need to support critical technologies on a larger scale and for a longer term.[4]

"The investment in time and capital required to support the R&D and CAPEX for hard-tech critical technologies, along with bureaucratic uncertainties, are significant impediment to attracting experienced venture managers to invest in this space. We would like to be both patriots and capitalists, and we see a path to overcome the impediments via the DoD Federal Loan Guarantee program. Frankly, a loan guarantee leverage ratio of 2 to 1, or even 3 to 1, is not likely sufficient to attract the right managers and the right equity investors—there is too much cost and uncertainty in hard-tech defense investments, and venture managers are able to find better investment opportunities elsewhere."

-**Blake Modersitzki**, Pelion Venture Partners

Federal Procurement—DoD is the world's largest customer for defense products and services. Examination of the impact of innovative technologies in the Ukraine today points to the need for agility and rapid innovation. The DoD procurement process itself, notorious for its complexity and lengthy timelines, is an impediment to new market entrants, and the process tends to stifle rather than encourage innovation. The stated dream is to become a DoD "program of record." There is no guarantee in being awarded program-of-record status and the effort to do so typically requires three or more years and expertise in navigating a complex DoD system, along with significant financial resources to cross the "valley of death." Simply put, the time, money, and complexity are too much for most small innovative companies.

[3] Capital expenditures (CAPEX) are funds used by a company to acquire, upgrade, and maintain physical assets such as property, plants, buildings, inventories, technology including capitalizable R&D, or equipment used in manufacturing.

[4] National Defense Authorization Act of 2024: https://www.congress.gov/bill/118th-congress/senate-bill/2226

While the DoD supports promising technologies through programs such as the Small Business Innovation Research (SBIR) program, these efforts often leave crucial funding gaps. The boom-and-bust nature of defense procurement creates uncertainty, discouraging private investment and forcing young companies to enter the valley of death, where many companies die, before they have a chance to reach scale.

Limited Exit Opportunities—Exits for successful defense supply chain companies pose unique challenges. Traditional acquisition targets in other sectors may not hold interest in niche defense technologies—even dual-use—limiting potential buyers and hindering investment attractiveness. This liquidity hurdle further discourages venture investors and their limited partners from entering the arena.

Why VC Hesitates: "Venture capital is typically focused on shorter time horizons and quicker exits. Hard tech defense investments often require a longer view and carry inherent regulatory complexities, making them less aligned with traditional VC models."

*-**Jeff Sagarin**, Managing Director*
Kestrel Venture Fund[5]

The aforementioned factors—CAPEX intensity, DoD procurement challenges, limited exit liquidity—contribute to a general narrowing of investor interest in these critical defense supply chains. Traditional VC models, geared towards shorter investment horizons and quicker returns, simply do not align with the unique needs of the DoD when attempting to attract private capital.

As a result of the challenges outlined, over the last few decades, traditional venture investment has shifted away from the critical defense supply chain sector. Federal credit programs are available to correct the private capital market inefficiencies that have led to the underinvestment in new innovative small businesses focused on the defense supply chain.

Purpose of Federal Credit Programs

Federal loan guarantees are a powerful tool used by federal agencies such as the Department of Transportation, Department of Energy, the Small Business Administration, and others to correct financial market inefficiencies and promote economic development. Experience with government-applied credit enhancement has been a success story for the American taxpayer.[6]

A FLG utilizes the full faith and backing of the Federal Government to access borrowed funds that are then used to invest in critical technologies. A FLG also provides significant "leverage" for DoD funds, in that for very few appropriated dollars, hundreds of millions of dollars become investable. In other words, through the FLG program, the DoD can turn as little as $15-20 million appropriated funds into $1 billion of investable capital. In the context of defense supply chain investments, FLGs can:

- **Reduce Risk for Private Investors:** While their subordinated capital remains at risk, the leveraged debt makes it far easier for investments needing more time and mentorship to thrive.
- **Attract Larger Capital Allocations:** FLGs with generous leverage can incentivize larger financial bets, providing the substantial capital needed for defense projects needing a longer runway.
- **Stimulate Innovation:** By lowering the cost of capital, FLGs can spur investment in R&D and advanced manufacturing, pushing the boundaries of defense technology.
- **Lower Cost of Capital:** A FLG will ensure that debt—bonds or debentures—can be issued with a coupon closer to the prevailing treasury yield.
- **Attract Business Expertise:** A FLG will attract expert venture managers and will increase the success of the critical technology as managers

[5] https://www.defense.gov/News/News-Stories/Article/Article/2900731/dod-technology-chief-emphasizes-people-teamwork/

[6] https://www.whitehouse.gov/wp-content/uploads/2023/03/cr_supp_fy2024.pdf

will have the expertise to guide, support, and mentor founders within the portfolio.

- **Attract Entrepreneurs:** By attracting capital and venture manager expertise, a FLG will also attract entrepreneurs to focus on defense critical technologies. The uncertainty and complexities of navigating the valley of death have pushed many entrepreneurs to focus on commercial technologies and outlets only.

By strategically utilizing equity leverage within FLG programs, we can bridge the funding gap, incentivize private sector participation, and ensure the long-term health of our nation's critical defense supply chains.

"We will prioritize cooperation with our defense industrial base and with all others who have a stake in our national and economic security to collaboratively safeguard global market integrity and strengthen defense-critical supply chains."[7]

-Dr. Kathleen Hicks,
Deputy Secretary of Defense

Role of Leverage in Defense Equity Investing

Leverage, through a FLG, magnifies the potential return on equity investments, which will attract expert managers and equity investors. Simply put, leverage allows critical technology investors to have access to significantly larger funds to invest.

Thus, the challenges hindering today's investment into critical technologies can be addressed in intelligent ways using the tool of leverage. The leverage is obtained in a cost-effective manner by the DoD and has enormous potential to unlock much-needed capital and investment expertise. A simple exercise below illustrates the effect that FLG leverage can have to enhance investor returns.

The analysis makes use of a fixed fund portfolio comprising twenty investments made, and equity gain realized, over a period of 10 years. An original $1 billion grows, so that once the investments are all exited, a total value of $2.0 billion has been reached. For scenarios where debt has been introduced, the debt service has been fixed at 4.5% per annum compounded. In the simple examples below, cumulative loan interest and principal are paid at the wind-up of the fund.

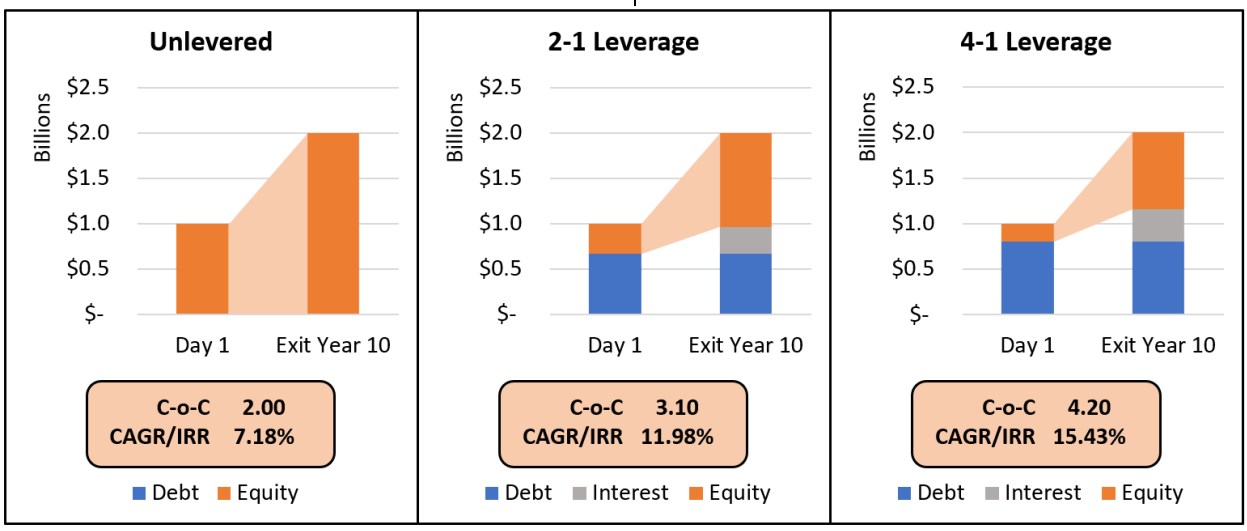

Figure 2 - Higher Leverage Can Dramatically Improve IRRs as shown in this example of a 10 year, 2X exit valuation.

[7] https://www.defense.gov/News/Releases/Release/Article/2944488/defense-department-releases-report-on-strengthening-defense-critical-supply-cha/

- **Scenario 1—No Leverage:** An investor invests $1 billion as 100% equity directly in the portfolio companies' ownership.
- **Scenario 2—Leverage (2:1):** Investor invests $333 million equity and borrows $667 million.
- **Scenario 3—Leverage (4:1):** Investor invests $200 million equity and borrows $800 million.

In the first scenario, the unlevered portfolio returns a Cash-on-Cash ratio of 2.0. In the second scenario, the 2:1 levered fund returns a Cash-on-Cash ratio of 3.10; a 55% increase over the unlevered scenario. In the third scenario, the Cash-on-Cash ratio rises to 4.20; a sizeable increase versus the unlevered portfolio. In terms of CAGR/IRR, the unlevered fund returns 7.18% after ten years. Moving to the 2:1 portfolio, the CAGR/IRR increases to 11.98%. Finally, the 4:1 CAGR/IRR returns 15.43%.

The increased returns seen in the second and third scenarios are functions of the higher leverage models. Increased upfront cash flow allows firms to invest in nascent technologies that would be considered too risky without the backing of FLG capital. By extension, this allows the funds to invest in promising opportunities that can overcome the "valley of death" conundrum which plagues many innovative R&D projects. Furthermore, attracting expert managers, combined with the "at risk" private equity, lowers the risk for the U.S. government.

Safeguarding Taxpayers: Ensuring Accountability and Efficiency in High-Leverage Models

While increased leverage within FLG programs offers exciting possibilities, harnessing its power responsibly requires robust taxpayer protections. Essential safeguards can be designed into such programs to ensure accountability, minimize risk to the DoD, and safeguard public funds.

For example, FLG-backed leverage models must comply with:

- OMB Circular A-129[8] which mandates rigorous cost-benefit analyses and performance measurement for federal programs.
- Federal Credit Reform Act of 1990 (FCRA) which establishes sound credit risk management practices for federal lending activities.
- Additional sector-specific regulations: Ensuring compliance with relevant defense procurement and technology export controls.

Beyond regulatory compliance, two key principles can further protect taxpayer interests:

- Equity at Risk: Implementing mechanisms that ensure the private sector shoulders much of the downside risk. This can be achieved through Subordination – that is private capital claims rank behind government guarantees in case of default, incentivizing prudent investment decisions.
- Dual-Use Concept: Prioritizing investments in technologies with both civilian and military applications. This broadens potential markets, reducing risk and increasing the likelihood of profitable exits for smaller defense companies.

These measures promote responsible risk sharing and align incentives between public and private partners. To further reduce risk, we recommend additional taxpayer protections to ensure expert fund managers are selected to serve as the general partner of the leveraged fund.

Expertise at the Helm: Managing the Leverage Model Effectively

Selecting a top-tier fund manager is crucial to increase success of the critical technology, optimize returns, and minimize risk within the high leverage model. Ideally, the fund manager would:

[8] https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A129/a-129_main.pdf

- Be a Proven General Partner: A track record of success in managing complex investment structures and generating strong returns.
- Have Wall Street Credibility: Recognized by major rating agencies, allowing issuance of government-backed bonds with favorable ratings, lowering financing costs.

This ensures the expertise and market access necessary to attract reputable investors and navigate complex financial markets effectively.

"The Secretary of Defense established the Office of Strategic Capital. Use public funds to match private funds for larger early-stage investments in critical technologies. The purpose is to partner with private capital providers to fund transition from prototype to initial product development."[9]

-**Heidi Shyu**, Under Secretary of Defense, Research & Engineering

By implementing robust taxpayer protections and selecting a qualified money manager, the full potential of leverage can be realized while increasing the likelihood of success of the critical technology and minimizing risk and ensuring responsible stewardship of public funds.

Conclusion: Investing in Our Future, Securing Our Tomorrow

The complex and evolving nature of defense technology presents unique challenges that traditional financing models struggle to address. This white paper posits increased leverage within Federal Loan Guarantee (FLG) programs provides a powerful solution that will unlock much-needed capital and fund manager expertise to bolster the resilience of critical defense supply chains.

With any FLG program, responsibility and accountability must be at the forefront. Implementing this solution necessitates robust taxpayer protections, including compliance with relevant regulations, adherence to the dual-use concept, mechanisms ensuring private investors share the risk, and selecting a proven and reputable money manager is crucial for managing the leverage model effectively.

Next Steps: A Legislative Call to Action

In a partnership formed with Pelion Venture Partners (www.pelionvp.com), NEXA Capital Partners (www.nexacapital.com) is pursuing a legislative program to establish a $1 billion pilot program to prove the high leverage model works effectively and can more predictably aid the warfighter. This includes:

- A $200 million structured LP venture equity capital commitment targeting entrepreneurs creating "Dual Use" critical technologies who can fulfill national defense goals.
- An $800 million public bond program backed by FLGs (100% of both equity and debt funds to be provided by private investors and lenders.)
- The $1 billion fund ($200 million private equity and $800 million private debt backed by a FLG) is expected to require less than $25 million in DoD appropriated funds.
- Fully compatible with federal loan guarantee regulations used by SBA, DOT, DOE, but uniquely tailored to DoD defense needs.
- Full taxpayer protections and Trusted Capital protections.
- First pilot FLG fund to be managed by Pelion, an experienced venture partner with 20+ year track record in top 1 percent of US fund managers.
- Success of the first FLG fund will lead to more FLG-critical technology funds with sufficient capital and manager expertise to revitalize the defense supply chain to ensure our national security and the U.S.'s leadership role in the world.

We refer to this essential new funding model as "Transformational Venture" because the investment thesis provides a much higher dollar amount per portfolio transaction. CAPEX, R&D and other capital-intensive costs can be supported, and the capital return will be enhanced with leverage to attract private capital, expert fund managers, and talented

[9] https://www.cto.mil/osc/

critical technology entrepreneurs to address the unique needs of the defense supply chain.