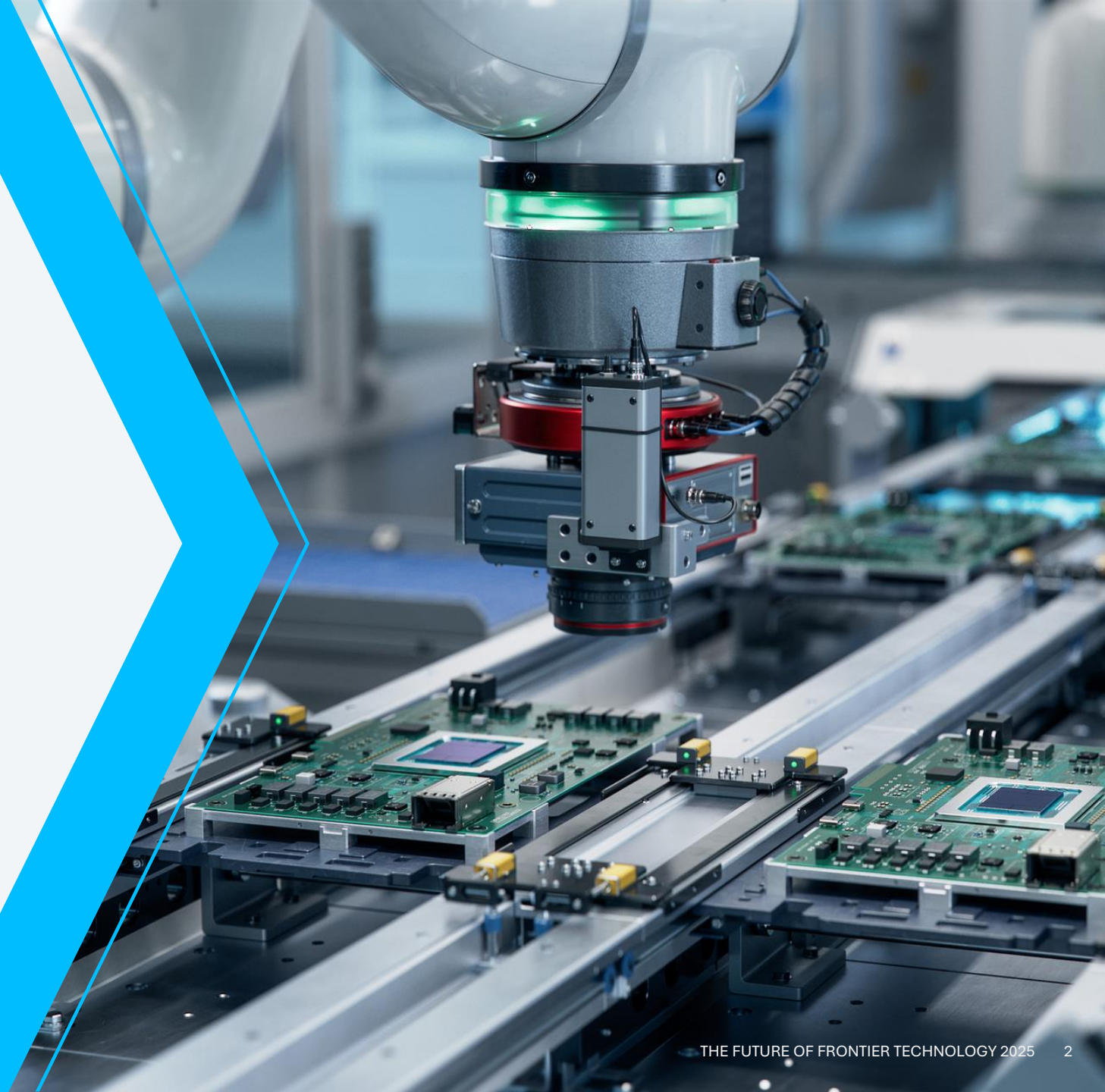
svb Silicon Valley Bank
A Division of First Citizens Bank

The Future of Frontier Technology

A look at the technologies impacting the physical world

June 2025

Contents



svb Silicon Valley Bank
A Division of First Citizens Bank

A Tariff-Full Moment Meets a Promising Age for Hardware

If you blinked while opening this report, you probably missed a tariff update. Changes to US trade policy have been fast and furious in the first months of the Trump administration, with proposed duties on foreign imports poised to be the highest in nearly a century. Meanwhile, companies are scrambling to adjust and manage the implications.

In the innovation economy, no sector is more exposed to supply chain disruptions than those on the frontier of technology, applying digital capabilities to the physical world. From robotics and rockets, to compute infrastructure and autonomous drones, this cohort relies on complex global supply chains that can't be easily unspooled. Tariffs present founders with a choice — either eat the cost or pass it along — a losing proposition either way. Given these conditions, you might expect investors to flee from hardware companies. In fact, the opposite is happening. Frontier tech companies are booming.

US venture capital (VC) investment in frontier technology is up 47% year over year, and VCs have never been more enthusiastic about leveraging frontier tech for fundraising. In 2024, more than one in three dollars raised VC managers went to a fund focused on hardware investment, the highest share in a decade. While tariffs and economic uncertainty are creating headwinds, there are three promising tailwinds propelling frontier tech forward. First, compute for AI capabilities: The age of agentic AI is driving demand for new, purpose-built chip architecture and data processing systems. Second, defense tech: Governments are embracing VC-backed technology in an era of geopolitical tension and rising global conflict, and founders are increasingly answering the call. Third, industrial automation: As robot prices fall and labor costs grow, factory automation is only accelerating. In the US, this trend is further fueled by onshoring trends as critical supply chains are decoupled from offshore suppliers.

In our *Future of Frontier Technology* report, we leverage our sector expertise and proprietary data to dig into these themes. Not only are all frontier tech sectors showing signs of growth, our analysis shows that many sci-fi-like technologies are moving closer to reality.

Paradigm-shifting technologies such as quantum computing, hypersonic weaponry and humanoid robotics are no longer the stuff of Saturday morning cartoons. They exist as proofs of concept or prototypes achieving real-world milestones. The potential addressable market for technologies such as companion robots, AI-accelerated chips or space manufacturing is almost unfathomable, and more investors are recognizing that these far-flung technologies are closer than they appear.

Jack Garza
Managing Director,
Head of Frontier Tech
jgarza@svb.com

> "Paradigm-shifting technologies such as quantum computing, hypersonic weaponry and humanoid robots are no longer the stuff of Saturday morning cartoons. They exist as proofs of concept or prototypes achieving real-world milestones. The potential addressable market for technologies such as companion robots, AI-accelerated chips or space manufacturing is almost unfathomable, and more investors are recognizing that these once far-flung technologies are closer than they appear."

Click Through to Key Takeaways

Frontier tech companies face a disproportionate impact **from tariffs.**

Jump to Page 9

Industrial automation rides tailwinds to adoption.

Jump to Page 18

Scenario analysis: **Tariff impacts** on VC-backed companies vary widely.

Jump to Page 10

VC funds a new generation **of defense tech primes.**

Jump to Page 20

Frontier tech is taking the highest share of **fundraising dollars** in 10 years.

Jump to Page 12

Compute hardware ramps up for the age of **agentic AI.**

Jump to Page 21

VC investment in frontier tech has second highest year in 2024.

Jump to Page 13

Frontier unicorns are raising capital more actively than other tech sectors.

Jump to Page 24

svb Silicon Valley Bank
A Division of First Citizens Bank

Perspectives on Frontier Tech Innovation

US Suppliers? Hard to Find.

"It's still significantly more expensive, or sometimes impossible, to manufacture in the US at scale. For most sectors, the US doesn't have the capacity or cost efficiency yet. If you're building robots or consumer electronics, for example, you can't get the right cost and price point to do it here."

Aidan Madigan-Curtis
Partner

ECLIPSE

GenAI Makes Robots More Intuitive.

"Generative AI is accelerating robotics development, not just in code generation but as a new interface. I can now talk to a robot, and it can interpret that via a large language model. It's fundamentally changing how we interact with machines, making robotics more intuitive and accessible."

Fady Saad
Founder and GP

CYBERNETIX VENTURES

Labor Shortages Drive Automation.

"Adoption in construction tech is difficult. It's a fragmented industry with thousands of small players. But we are seeing movement now, largely driven by labor shortages. Automation is becoming a necessity, not a nice to have."

Alice Leung
Principal

BRICK & MORTAR VENTURES

Missing the Foundation?

"People are excited for AI in robotics, but it's not the same as ChatGPT. That worked because everyone already had phones and browsers — there was instant distribution. Robotics doesn't have that. To enable a Microsoft for robotics, we still need an IBM."

Haomiao Huang
Founding Partner

MATTER VENTURE PARTNERS

Digital Natives Turn Policymakers.

"We're seeing a new type of younger, more digitally native policy maker figuring out how to make policies and investment decisions differently. That, combined with the emergence of AI, which D.C. can't ignore, has helped shift the conversation. We're seeing this shift in leaders who understand the tech natively, as well as those who are willing to test how the public sector engages with it."

Jacqueline Tame
Operating Partner

playground

For AI Uses, the Best is Yet to Come.

"We're very much in the early innings of AI. It's removing the drudgery of white collar work. But making a robo-accountant or a robo-lawyer is not a true AI application. People abuse that term. Real AI applications are those building things that don't currently exist. If you look at Lockheed Martin, it's not an aluminum company, it's an aviation company. RCA wasn't a solid state transistor company; it put a radio and later a TV in every home. We're looking to invest in companies that could not exist without GenAI."

Shahin Farshchi
Partner

LUX

Talent Becomes a Tailwind.

"A combination of things have changed to accelerate defense tech. Increased global conflict, sensor costs falling, and one of the hardest to quantify but most impactful: the talent. You've got brilliant 20-year-old engineers who used to build for Shopify or Meta now saying, 'I want to build for national security.' That wasn't happening five or ten years ago."

Connor Love
Partner

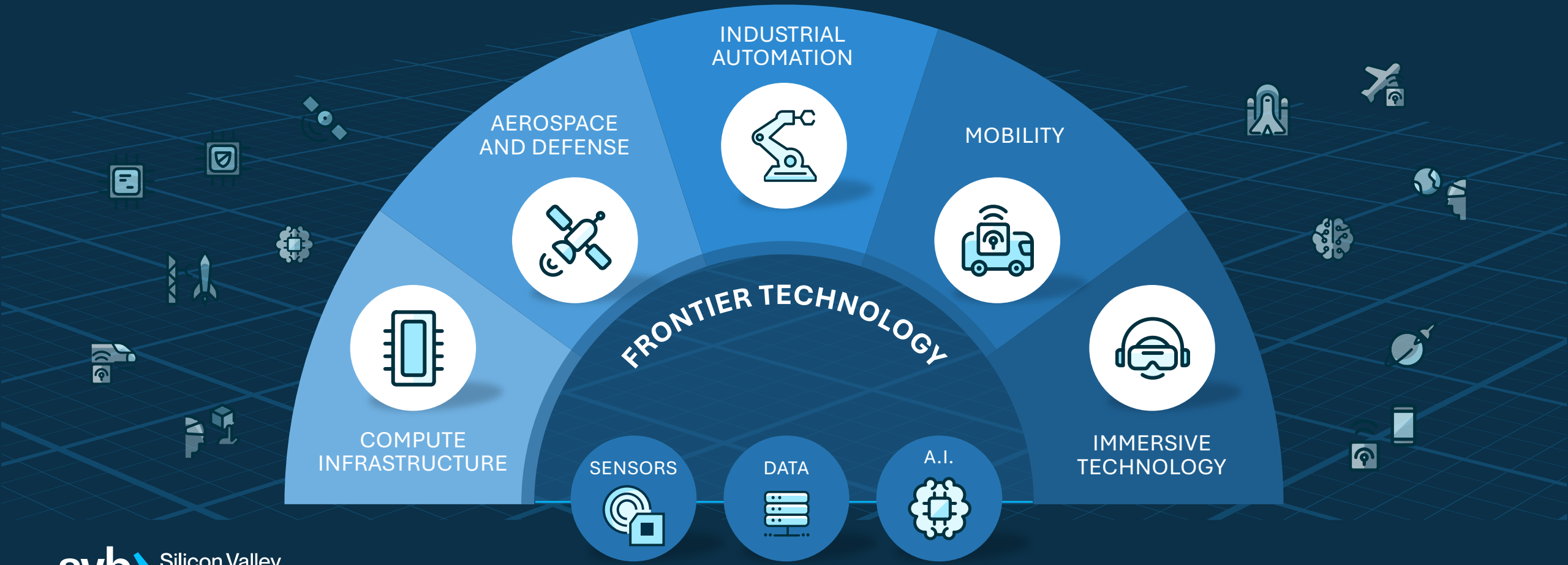
Lightspeed

svb Silicon Valley Bank
A Division of First Citizens Bank

Source: SVB interviews with investors.

What We Mean by “Frontier Tech”

Frontier technology (aka deep tech, hard tech) encompasses cutting-edge technology powered by engineering innovation or scientific advances. Frontier technology enables the convergence of hardware, software and data. SVB categorizes frontier technology sub-sectors as follows:



svb Silicon Valley Bank
A Division of First Citizens Bank

Macro Environment

Tariff-ic Macro Uncertainty

The optimism that pervaded the tech sector after the November election has warped into uncertainty in the first half of 2025. The Trump administration's dramatic changes to US trade policy have largely overshadowed its more favorable stances toward M&A deals and rollbacks in regulations. This is resulting in elevated market volatility, increased recession fears and lower consumer confidence.

The about-face in economic sentiment is reflected in the latest *Wall Street Journal* poll of economists. In January, only 22% of economists predicted a recession in the next 12 months. By April, 45% predicted a recession, the most negative reading in two years and the most dramatic swing since the COVID-19 outbreak. Those fears further compounded by a weak Q1 GDP reading, a 0.3% contraction, the first decline in 12 quarters.

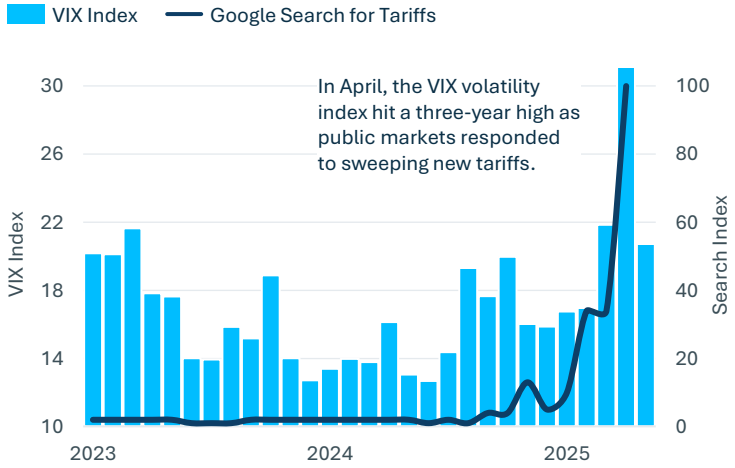
The upshot of all this uncertainty is that businesses are less likely to invest. Compared to five months ago, US businesses expect to hire fewer employees and are bracing for weaker sales in the year ahead.

Consumers are also gearing up for higher prices, even as the hard data has yet to indicate that shift. While the Federal Reserve's inflation model is not yet predicting much change in inflation next year, consumers expect a 7% increase in prices within 12 months, the highest outlook in 44 years.

svb Silicon Valley Bank
A Division of First Citizens Bank

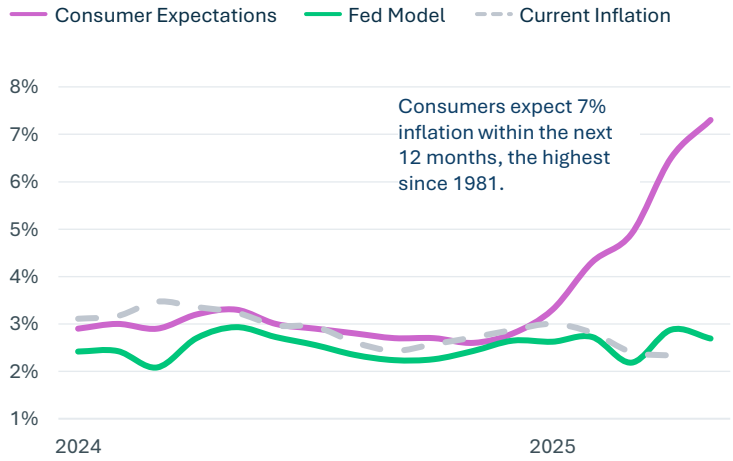
Volatility Spikes Amid Tariff Uncertainty

VIX Volatility Index and Google Searches for Tariffs



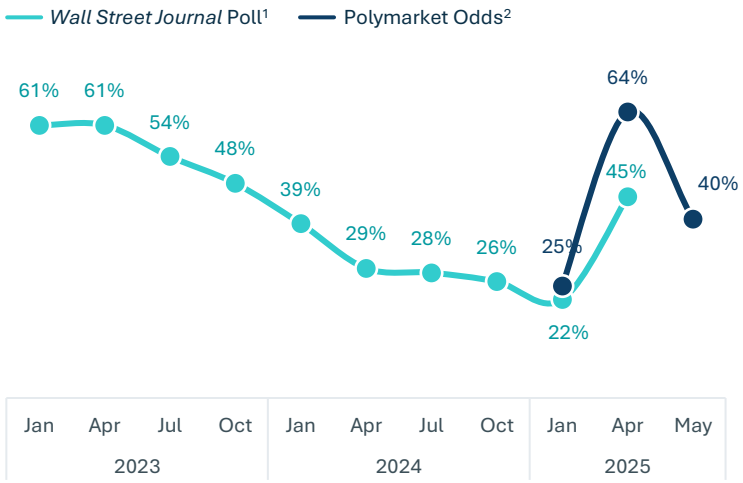
Consumers Brace for Price Hikes

12-Month Inflation Expectations: Consumers vs. Fed



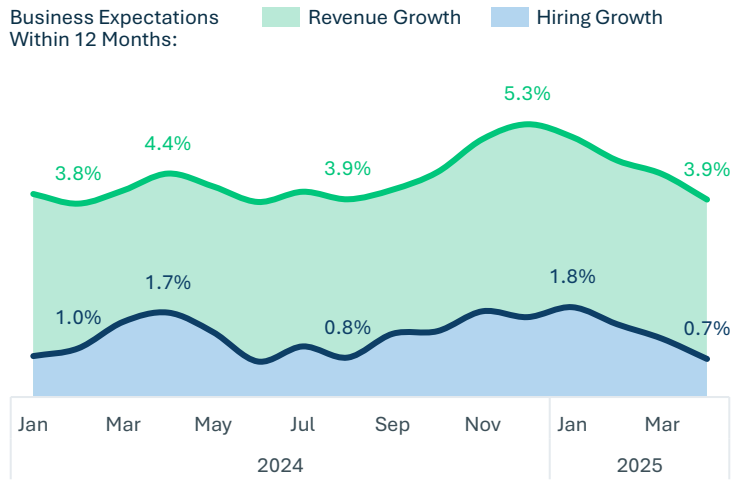
Show of Hands: Who Expects a Recession?

Likelihood of a US Recession Within 12 Months



Company Expectations Dampen

US Business Expectation of Revenue Growth and Hiring Growth



Notes: 1) *Wall Street Journal*'s quarterly survey of US business economists. 2) Odds on the last day of the month.
Source: Google Trends, Polymarket, US Federal Reserve Banks of Atlanta and Cleveland, *Wall Street Journal*, University of Michigan and SVB analysis.

Supply Ch-ch-ch-Changes

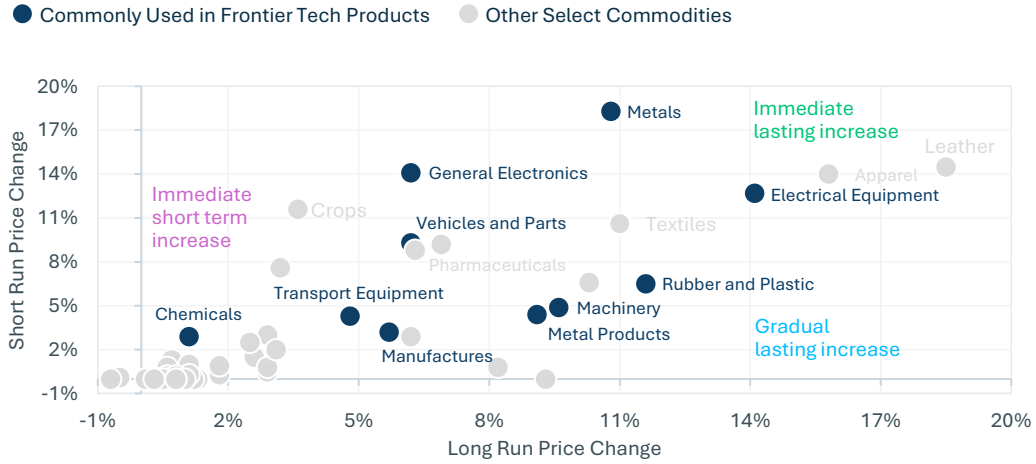
The flurry of tariffs announced since February would raise $2.7T in revenue over the next decade, but those gains would be offset buy an even larger drop in GDP, resulting in a net loss of nearly $400B in domestic revenue, according to the Yale Budget Lab. Overall, US consumers face an effective tariff rate of 17.8%, the highest since 1934. These higher costs on imports would directly result in a 1.7% increase in prices within a year.[1] Consumer clothing faces a 14% increase, for example. **Some of the sharpest price increase are for components used in hardware and robotics.** General electronics face a 14% price increase in the near term. In the long term, electrical equipment faces a 12% increase and metals face an 11% price hike.

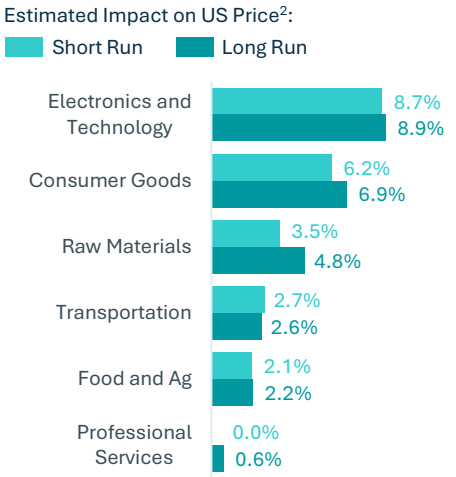
Consumers and businesses responded in Q1 by stockpiling goods ahead of anticipated tariffs. Imports have jumped 22% since November, while exports have stayed flat. The US GDP contracted by 0.3% in Q1, the first decline in three years and a sign that the US economy may be poised to enter a recession. So far, most companies appear to be responding with a wait-and-see approach. **Increases to tariffs were expected by many and welcomed by some in the tech industry who see the US as over relying on foreign suppliers for crucial inputs, but the scale and pace of the increases caught many off guard.** "There is a bipartisan understanding that we need to think differently about the core supply chains in the US," said Aidan Madigan-Curtis, Partner at Eclipse Capital. "The question is what level of intensity will be applied. The devil is in the details."

svb Silicon Valley Bank
A Division of First Citizens Bank

Tariff Impacts Both Short-Term and Long-Term

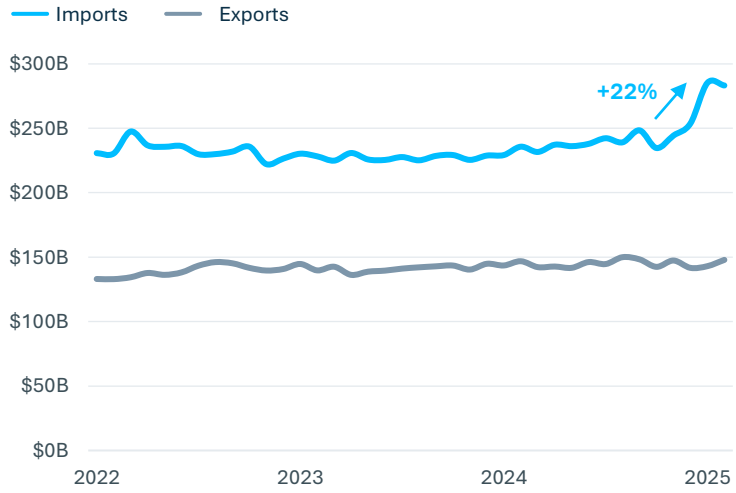
Estimated Price Change to Select US Commodities[1]





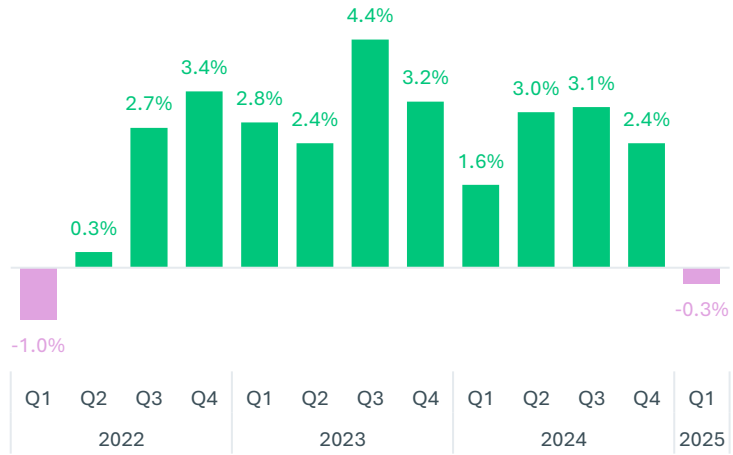
Imports Swell as Companies Stockpile

Monthly Value of US Imports and Exports Since 2020[3]



GDP Shrinks for the First Time in Three Years

US Change in GDP From Prior Quarter



Notes: 1) Estimates by the Yale Budget Lab based on tariffs as of May 12. 2) Based on SVB's grouping of commodities analyzed by the Yale Budget Lab. 3) Through February 2025.
Sources: Yale Budget Lab, US Census Bureau, SVB interviews, US Federal Reserve and SVB analysis.

Tariff-ied of Getting Caught With Your Margins Down?

We ran three scenarios to show how hardware companies of different supply chain mixes could fare under the current tariff policies. The takeaway? Impacts of these higher tariff rates will be muted for most companies, slightly hurting margins but not posing existential threats. However, for companies with the most exposure to affect markets, tariffs pose a more serious challenge, in some cases shifting positive gross margins negative. Follow the charts below to see where your company may fall.

Low-Impact Group

Example: Security company using low-cost, US-made sensors and subscription software. Minimal hardware product/service contributes to a high gross margin pre-tariff.[1]

Effective Tariff Rate: 10%

COGS[2] Impacted by Tariffs: 10%

Moderate-Impact Group

Example: Robotics company manufacturing in Mexico with a subscription software layer. This company represents a "typical" company.[3]

Effective Tariff Rate: 25%

COGS Impacted by Tariffs: 30%

High Impact Group

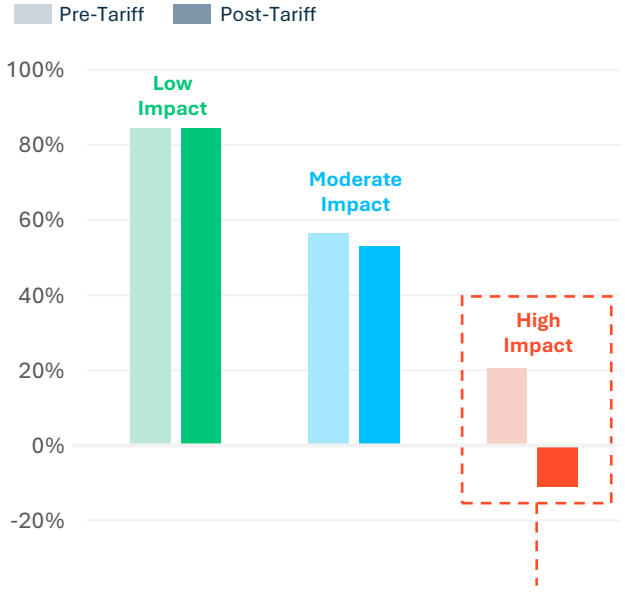
Example: Drone company with manufacturing in China. Hardware-intensive, commoditized product contributes to low gross margin re-tariff.[4]

Effective Tariff Rate: 50%

COGS Impacted by Tariffs: 80%

Higher Tariffs Squeeze Margins

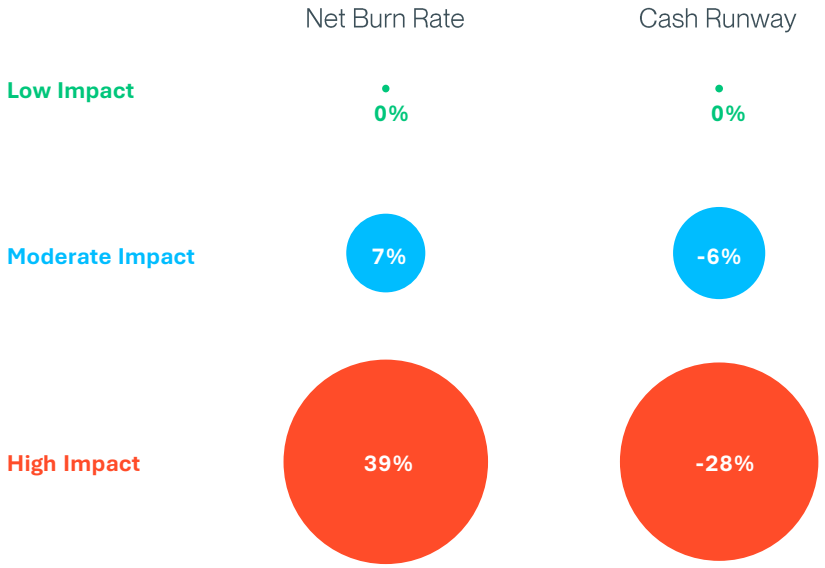
Median Gross Margin by Impact Group/Scenario for US VC-Backed Frontier Tech Companies Assuming Constant Prices



Companies with **high impacts** from tariffs could see negative gross margins. Without substantial changes to supply chains and manufacturing, these companies may look to global markets to avoid loss-making sales in the US. It's unlikely these companies would be able to increase prices without disrupting sales to continue operating with the same supply chains in the US.

Higher Burn and Lower Runway

Median Change Post-Tariffs by Impact Group/Scenario for US VC-Backed Frontier Tech Companies Assuming Constant Prices



For unprofitable VC-backed frontier tech companies, paying higher tariffs will often lead to higher burn rates. As net burn rates rise, cash and cash equivalents will burn more quickly, reducing cash runway. For many companies that are less exposed, changes in runway are minimal. **In the moderate impact group a company with 18 months of runway would see declines of just over 1 month. But for companies with high impacts, they could see runway fall by 5 months.**

svb Silicon Valley Bank
A Division of First Citizens Bank

Notes: 1) Gross margins in the top quartile of companies. 2) Cost of goods sold. 3) Gross margins in the middle 50% of frontier tech companies. 4) Gross margins in the bottom quartile of frontier tech companies

Source: SVB proprietary data and SVB analysis.

Fundraising and Investment

Frontier Funds Fly Into Focus

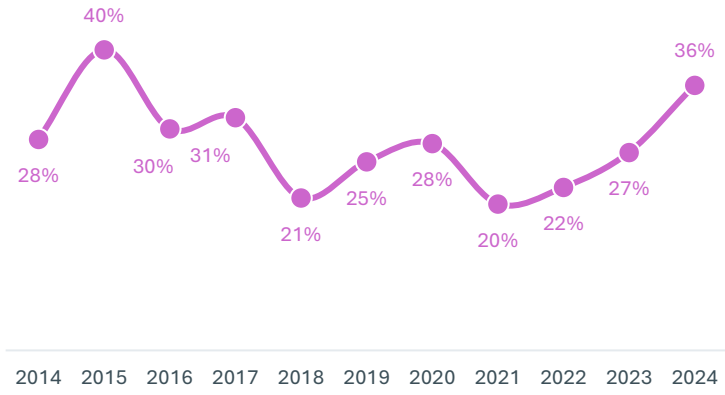
Relative to other VC sectors, investors are pouring money into frontier-focused funds at the highest rate in a decade. **In 2024, more than one in three dollars raised for VC deployment went to a fund with a stated focus on frontier technology.** That's the highest share since 2015. Fund managers such as General Catalyst, Tiger Global, and Andreessen Horowitz raised billions from limited partners (LPs) to invest in a broad spectrum of segments, with physical technologies — from climate tech to robotics — central to their investment focus. Increasingly, investors are finding that physical AI represents compelling investments, not just for the distant future, but also for the near-term. Four years ago just 20% of fundraising dollars went to a fund with a stated hardware focus. Why the shift? In part, hardware is getting easier to build.

The old adage that hardware investing is hard may remain true, but barriers to entry are falling. Software tools for robotics are proliferating, and the availability of off-the-shelf parts and high-quality computer chips have boosted supplies and lowered startup costs. It seems the fund managers have found success integrating hardware investment into their larger strategies, despite the associated challenges with hardware investing such as longer time horizons and higher capital costs. A look at fund performance shows that funds with a focus on hardware perform in near-lockstep with more general funds, both in terms of IRR and DPI[2], the latter a metric that remains woefully low across the venture ecosystem.

svb Silicon Valley Bank
A Division of First Citizens Bank

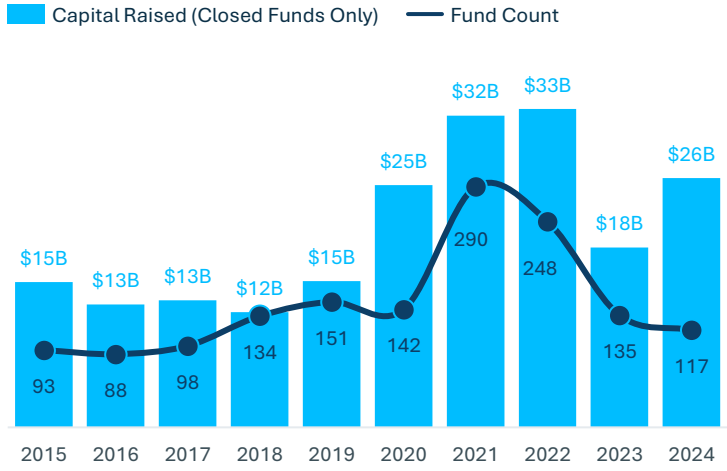
Highest Fundraising Share in a Decade

Percentage of Raised US VC Fund Dollars With a Focus on Physical Technology[1]



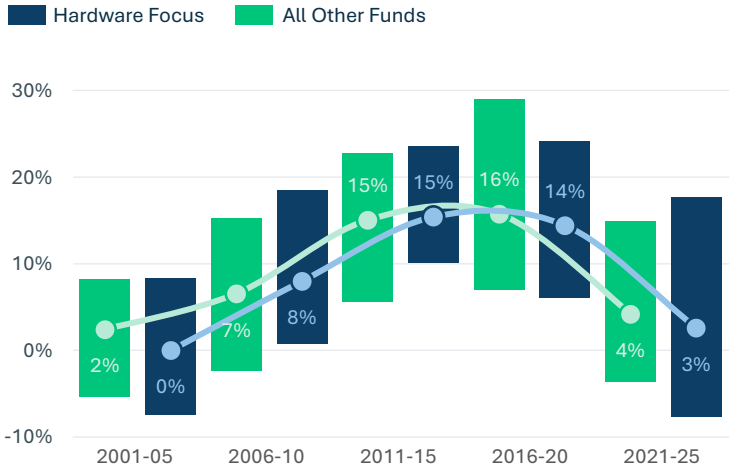
Deeper Pockets for Deep Tech Investors

US VC Funds Raised With a Sector Focus on Frontier Tech



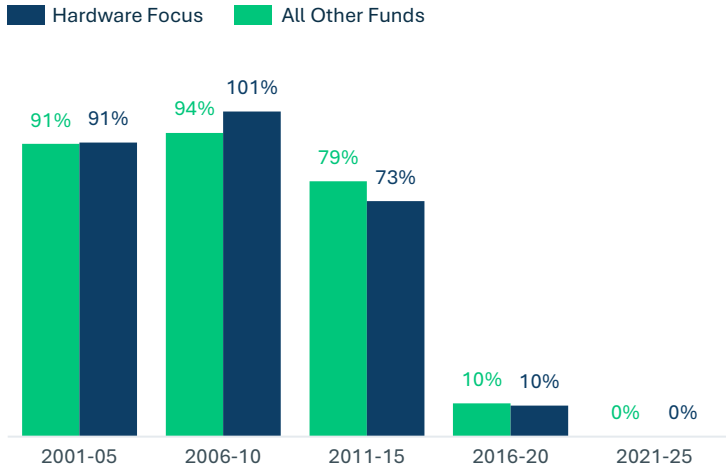
Hardware Returns Keep Pace With Software

Median Net IRR for US VC Funds by Year Raised



… But Payouts Are Lagging Behind

Median DPI for US VC Funds by Cohort



Notes: 1) Industries include industrials such as aerospace and construction, and IT hardware such as electronics and semiconductors. 2) Internal rate of return and distribution to paid-in capital.
Source: Preqin and SVB analysis.

Second to None (Except 2021)

Frontier tech investment is rebounding. Capital has returned to late-stage startups, pushing the share of mega-deals back to 2021 levels and driving a strong year for hardware investment. The rebound is driven by fewer but much larger checks in hardware-intensive segments like aerospace and defense, where companies such as Anduril and SpaceX raising multi-billion-dollar rounds.

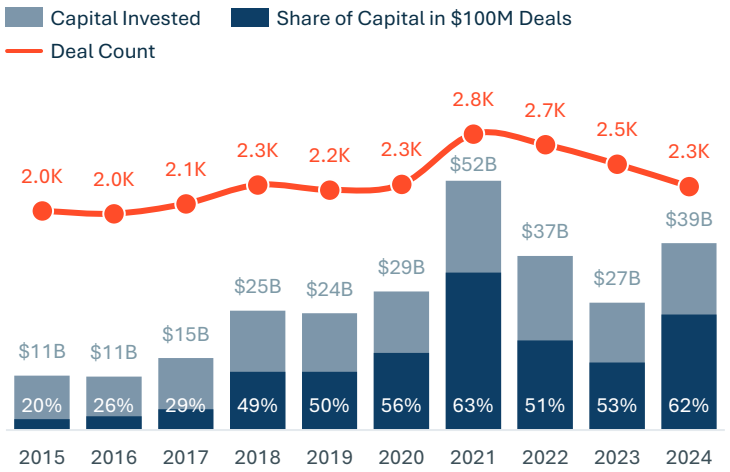
Median time between rounds has lengthened at every stage, with timelines stretching to nearly two years in 2024 — a sign that founders are under increased pressure to make every dollar stretch further. When companies are raising capital, they are going big. **Median deal sizes have climbed across all stages, but most noticeably at the later stage, where investors have re-engaged on large deals for capital-intensive companies.**

Yet, curiously, this capital concentration has not sparked a wave of new company formations. First fundings for frontier tech companies in 2024 remain below 2020 levels and continue to lag compared to overall venture activity. As legacy industries face disruption and software sectors grow saturated, interest in frontier tech is rising. Though relatively high capital requirements compared to software startups are keeping formations in check, while at the later stage, companies that have de-risked their technology and have proven demand are raising significant sums.

svb Silicon Valley Bank
A Division of First Citizens Bank

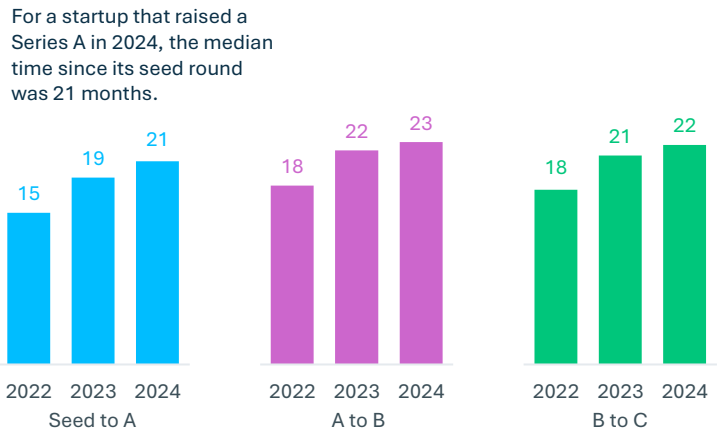
Second Best Year for Frontier Investment

US VC Investment and Share of Mega-Deal Investment[1]



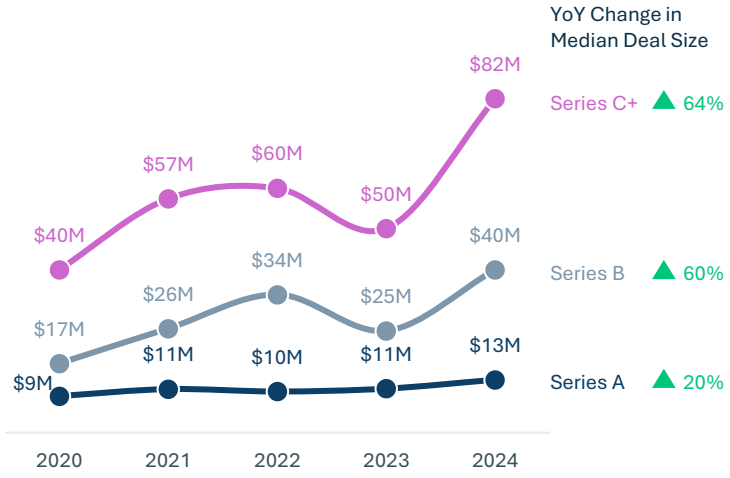
Longer Roads Between Raises

Median Months Between Rounds for US Frontier Tech by Stage



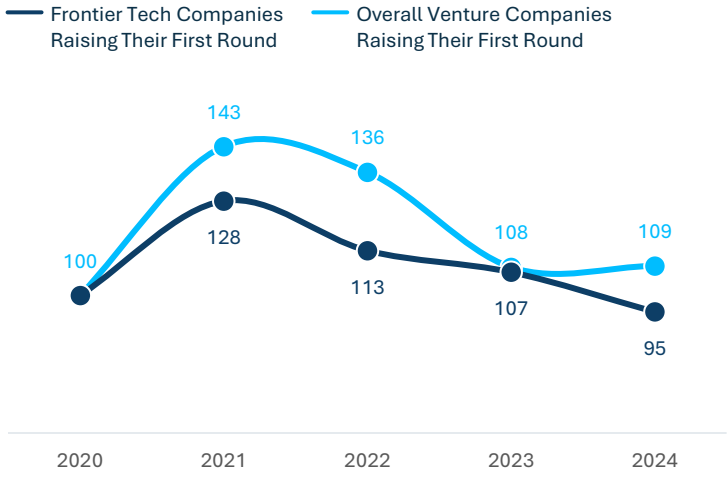
Later-Stage Frontier Deals Grow Larger

Median Deal Sizes for US Frontier Tech by Stage



Compared to All VC, Frontier Formations Slow

Index of US First-Time Fundraisings (2020 = 100)



Notes: 1) Mega-deals are defined as rounds with deal sizes of $100M or more.
Source: PitchBook Data, Inc. and SVB analysis.

From EVs to UAVs: Frontier Realigns

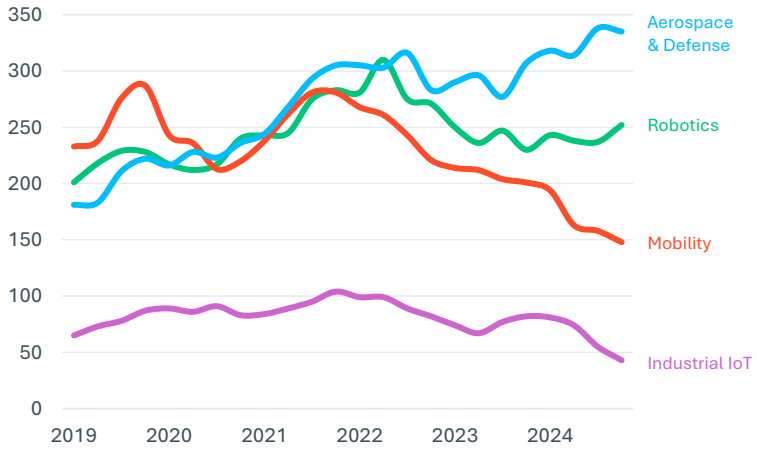
In recent years, frontier tech has moved past consumer-facing themes and into infrastructure bets. Mobility-related deal activity peaked in 2021 and has steadily declined, while hardware infrastructure AI now dominates VC dollars. This shift toward capital-intensive categories that have long term timelines is backed by investment. In 2024, massive deals for AI hardware such as Groq and Tenstorrent contributed to the sector's $8B investment total, more than double the prior year. Meanwhile, immersive tech drew far less VC investment. But are the consumer winds beginning to shift? Perhaps so. **As physical AI gains traction, a handful of deals — most notably OpenAI's recent $6.5B acquisition of iPhone designer Johnny Ive's hardware startup, io — could kickstart a fresh focus on consumer hardware investment.**

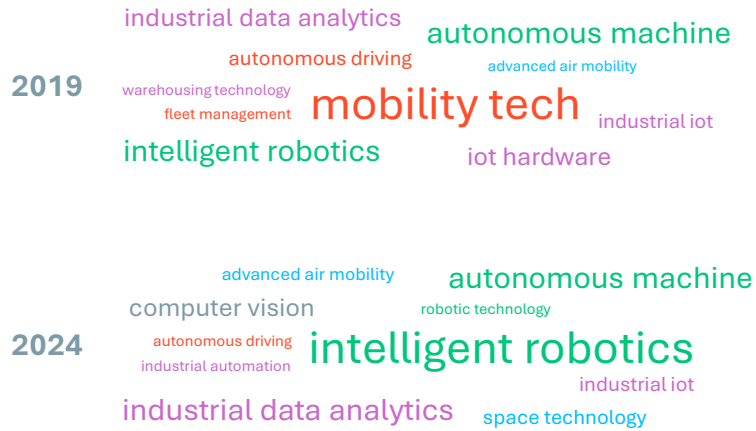
For now, the frothiest hardware sector continues to be aerospace and defense. The sector has punched above its weight for the last three years — and while other sectors saw more investment in 2024, military tech is on pace for a new high in 2025. "What's fundamentally changed is that these businesses are really working," said Connor Love, Partner at Lightspeed Ventures. "They're winning large contracts and commercializing in ways we hadn't seen before. Combine that with increased conflict, cheaper sensors, and top technical talent rushing into national security — it's why this moment is so different."

svb Silicon Valley Bank
A Division of First Citizens Bank

Mobility's Moment Has Passed, Aerospace Takes the Lead

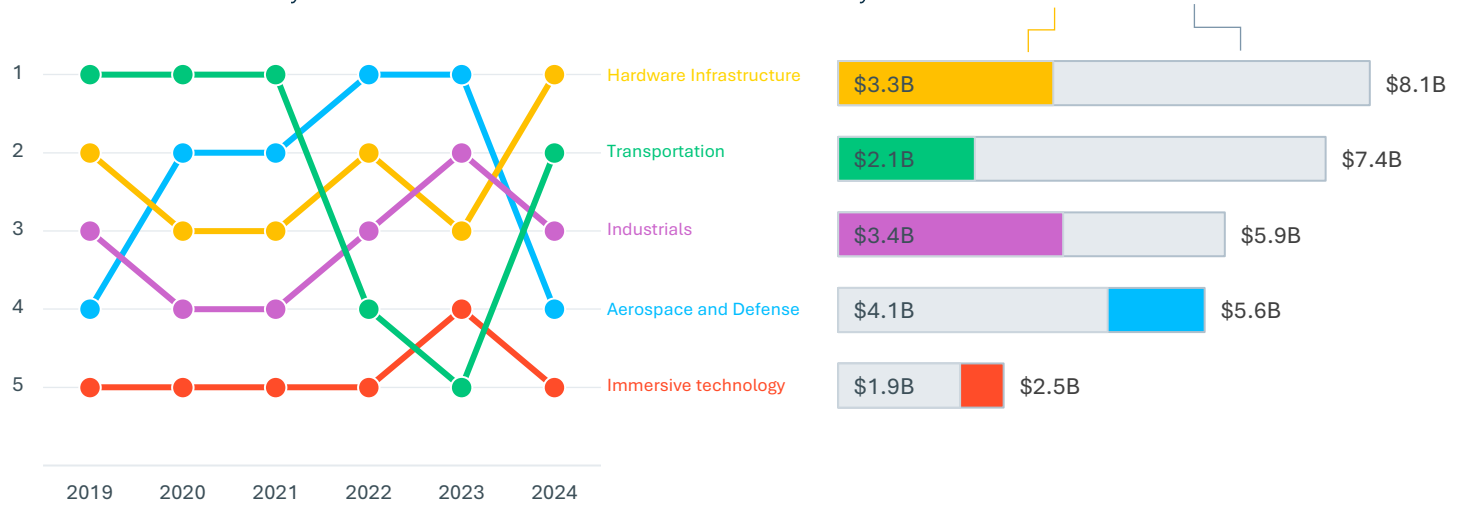
Average Quarterly Frequency of Keywords[1] Among US VC Deals in Frontier Tech





Capital Flows Toward Infrastructure, While Transportation Makes a Comeback

Rank of VC Investment by Frontier Tech Subsector and Total VC Invested by Subsector in 2023 and 2024



Notes: 1) Keyword groups are determined based on PitchBook's company keyword tagging. Climate and energy companies are not included in the analysis.
Source: PitchBook Data, Inc. and SVB analysis.

Revenue Streams Flow Downhill

The financial health of frontier tech companies is a bit of a mixed bag. On the one hand, gross margins and EBITDA margins have improved since they bottomed out in the back half of 2022. This has been driven by CFOs generally focusing on profitability as opposed to growth at all costs. On the other hand, revenue growth rates have fallen and remained stubbornly low, making it harder for companies to reach milestones within their shrinking runway.

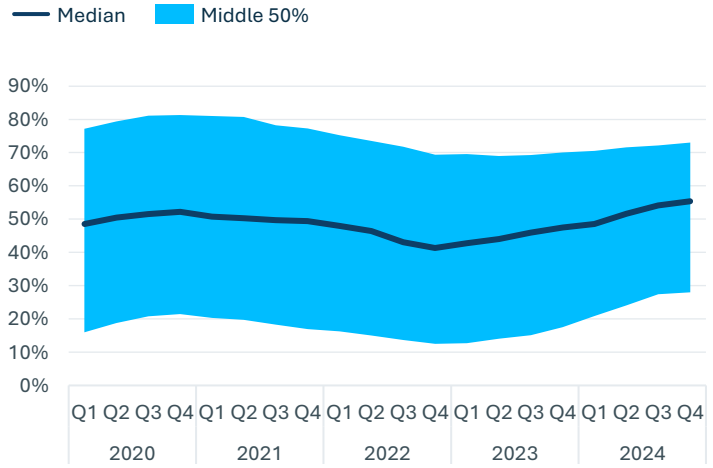
With time between rounds growing, companies need to extend runway as much as possible. Thus, CFOs are increasingly focused on reducing burn to increase profitability. This is particularly true for smaller companies ($10M-$25M annual revenue) that have historically had the worst EBITDA margins. This cohort has improved its EBITDA margin by 90 percentage points in the last two years.

Despite these cuts and improvements in profitability, companies are still seeing runway declines — at least for companies with less than $50M in revenue. For the largest late-stage companies, the fundraising environment seems robust enough to support healthy runway levels — 62% of investment into frontier tech companies went to deals over $100M. For frontier tech companies that often require significant capital to scale, exits must be large to provide investors with a return. Growth must return to make that happen.

svb Silicon Valley Bank
A Division of First Citizens Bank

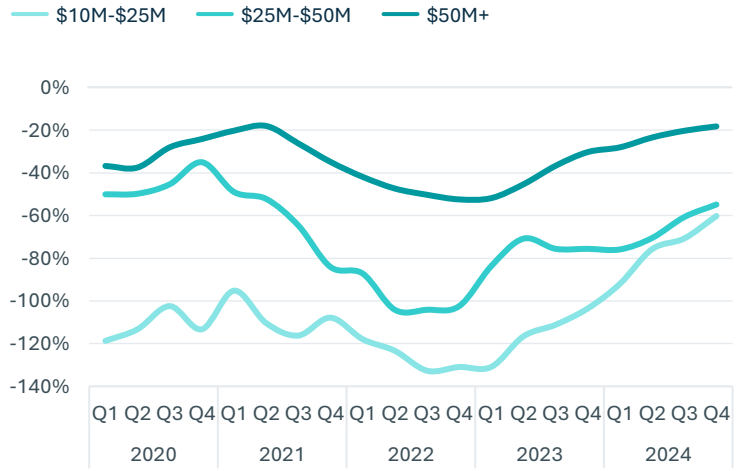
Gross Margins Have Improved Since 2022

US VC-Backed Frontier Tech Company Gross Margins



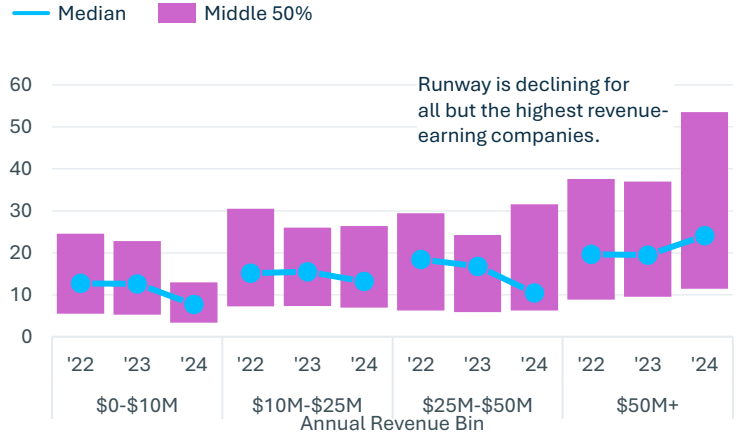
EBITDA Margins Up and to the Right

Median VC-Backed EBITDA Margin by Revenue[1]



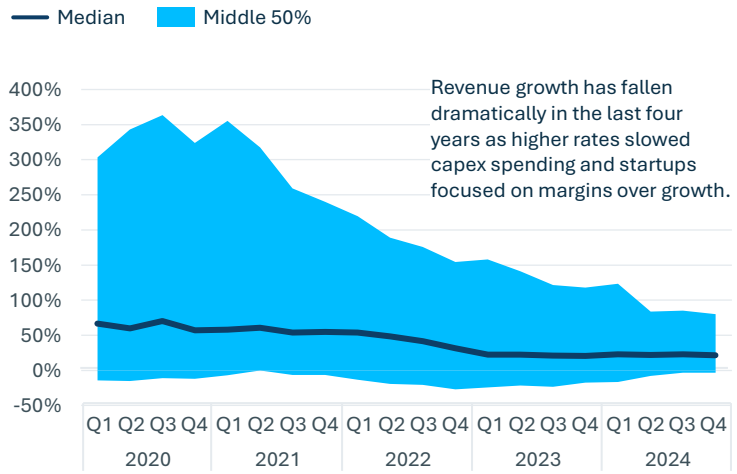
Cash Runway Shortens for Most Companies

Median Cash Runway for US VC-Backed Frontier Tech Companies by Revenue



Revenue Growth Falls Back to Earth

YoY Revenue Growth for US VC-Backed Frontier Tech Companies



Notes: 1) Companies with less than $10M in revenue fundamentally have much lower EBITDA margins and are thus not shown.
Source: SVB proprietary data and SVB analysis.

Hype Curve Your Enthusiasm

While generative AI is reshaping knowledge work, its impact is perhaps less obvious for frontier technologies that have been using AI in their development for decades. Robots, after all, put the *machines* in machine learning. Now, the wave of computing advancements that laid the groundwork for LLMs is leading to new advancements. From quantum computing to space planes, early stage technologies are demonstrating the potential to create such leaps in efficiency that they disrupt entire industries.

Other technologies are nearing the peak of their expected impact. These center around compute hardware and infrastructure needed for the agentic AI wave that is coming. **Edge AI hardware, next generation memory and accelerator chips are quickly being developed to power a new generation of AI-enabled devices, which have sprung up in the last two years.** VC-backed aerospace and defense companies went from less than 20% AI saturation in 2020 to over 40% last year, while manufacturing and other legacy industries are poised for further automation. For example, labor shortages in the construction industry have drastically sped up automation in a fragmented industry that has been slow to adopt innovation at large.

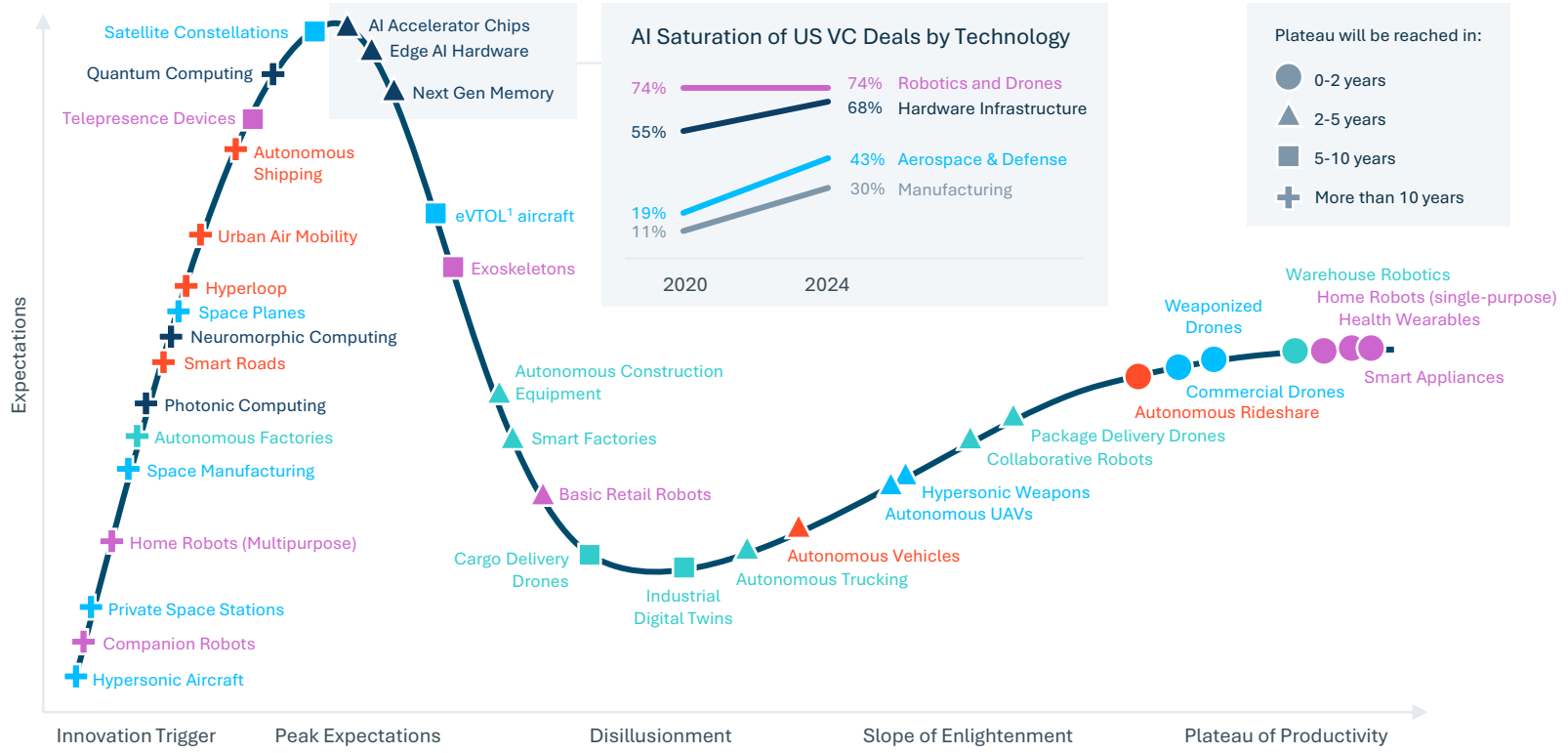
On the far end of the hype curve, technologies such as health wearables, smart appliances and single-purpose home robots (like the Roomba) have all reached the peak of productivity, and it's unlikely that many new entrants will pursue this space.

svb Silicon Valley Bank
A Division of First Citizens Bank

Emerging Technologies Powering the Next Wave of Frontier Innovation

Charting the Adoption of Frontier Technologies

Mobility and Transport · Service and Health Robots · Computer Hardware · Industrial Automation · Aerospace and Defense



VC Perspective: What Technology Is Closer to Productivity Than People Realize?

"**Autonomous heavy industrial equipment** is closer to reality than people think. We're maybe 5-10 years away from buildings being built 24/7."
Aidan Madigan-Curtis
Eclipse

"**Construction is on the cusp of a robotics breakthrough**. Within three to five years, we expect to see major industry players emerge."
Fady Saad
Cybernetix Ventures

"In the next two to three years, we'll start to see the adoption of **task-specific robots** that do multiple tasks in industrial settings."
Haomiao Huang
MatterVP

"**Quantum computing** is much closer to reality and error-corrected deployment than people realize, likely in the next five years."
Jacqueline Tame
Playground

Notes: 1) Electronic vertical takeoff and landing aircraft.
Sources: Pitchbook Data, Inc., SVB proprietary taxonomy, SVB interviews and SVB analysis.

Segment Spotlights

Does Cutting Edge Mean Cutting Jobs?

US VC investment in industrial robotics has increased to an all-time high as labor costs continue to rise and the prices of robots fall. These trends follow a pattern that has been playing out over the last two decades but is now gaining momentum with the prevalence of AI.

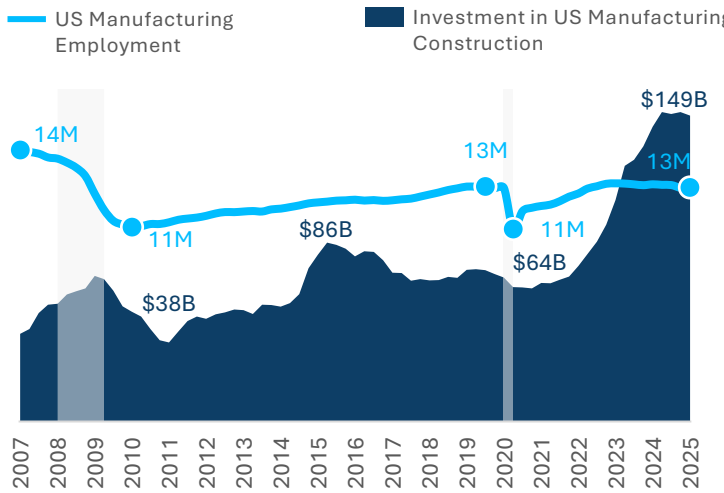
The manufacturing sector shed three million jobs in the Great Financial Crisis (GFC) and never regained full employment. Automation has taken hold in the factory as robots become more cost-efficient compared to human workers. A spike in manufacturing investment from Biden-era spending bills such as the Inflation Reduction Act (IRA), and the CHIPS and Science Act has injected billions into new manufacturing facilities in the US. **However, the capital expenditure is not resulting in a comparative number of jobs. In fact, while manufacturing investment has doubled in three years, employment has remained largely flat.**

AI is nothing new to the robotics field. Machine learning has been integral to robotics from the beginning. What has changed with the advent of generative AI are more adaptive user interfaces. Robots can understand prompts and communicate with people easier, and handle and prioritize tasks better. These advances could help with adoption in fields where they work collaboratively with factory workers or other industries like construction. Much of the investment is flowing to the heartland. Noncoastal companies overtook the East Coast for VC in industrial robotics last year, a shift that could continue if onshoring persists.

svb Silicon Valley Bank
A Division of First Citizens Bank

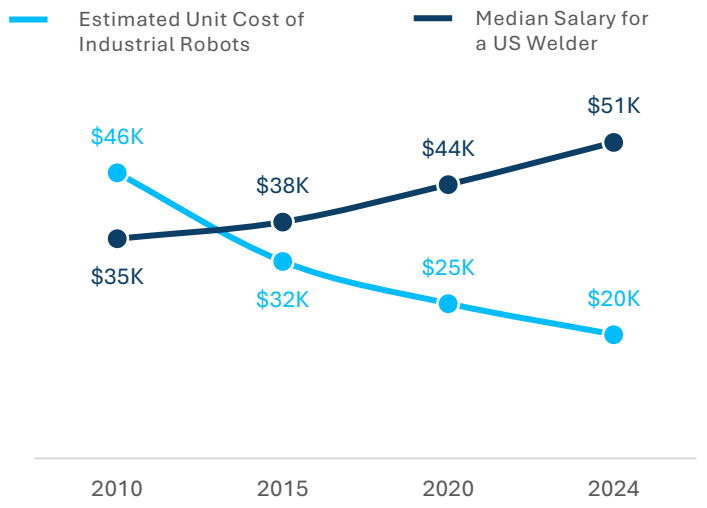
Manufacturing Investment Without the Jobs

US Manufacturing Sector Employment and Private Investment in New Manufacturing Structures (Annual Rate)[1]



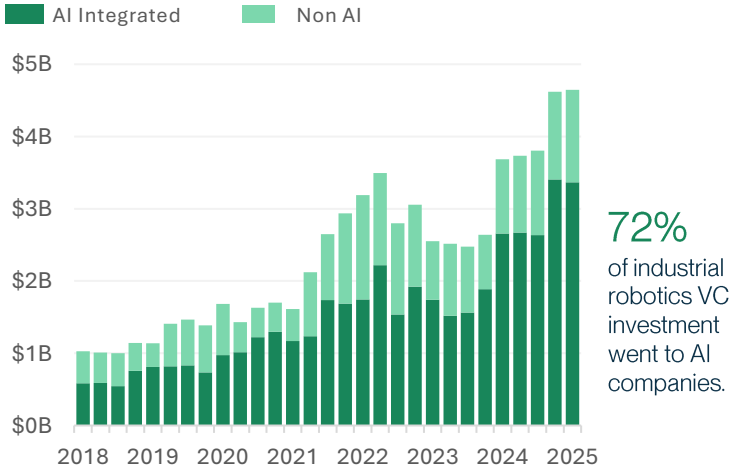
Robots Are Getting Cheaper

Estimated Price of Industrial Robots[3] and Salary of US Welders



Industrial Robotics VC Hits Record High

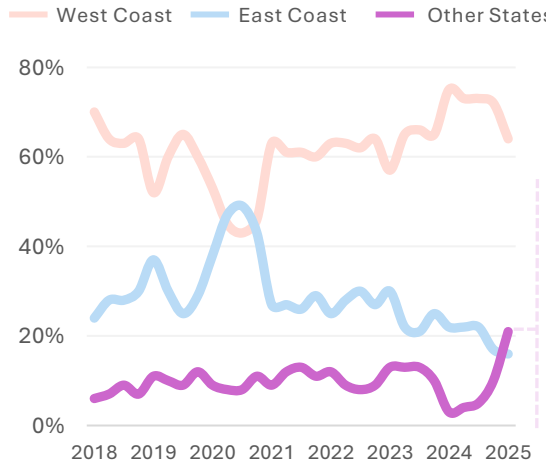
US VC Investment in Industrial Robotics[2] (Four-Quarter Total)



72% of industrial robotics VC investment went to AI companies.

Robotics Rise in the Heartland

Share of US VC Investment in Industrial Robotics by Region



Notable Noncoastal Companies (Total Raised)

- GreyOrange — $590M, Georgia
- APPTRONIK — $441M, Texas
- AMP ROBOTICS — $376M, Colorado
- Path Robotics — $291M, Ohio

Notes: 1) Investment reflected in 2022 dollars. 2) VC-backed companies applying robots and drones to industry. 3) Inflation adjusted dollars.

Source: Federal Reserve, US Bureau of Labor Statistics, Ark Invest, PitchBook Data, Inc. and SVB analysis.

VCs Reporting for Duty

War has always been an engine for innovation, from the invention of gunpowder to rocket power. That's no different now. Just as World War I catalyzed the mechanization of the modern world, introducing assembly lines and advanced manufacturing processes, current conflicts are accelerating the development of drones and other autonomous battlefield systems.

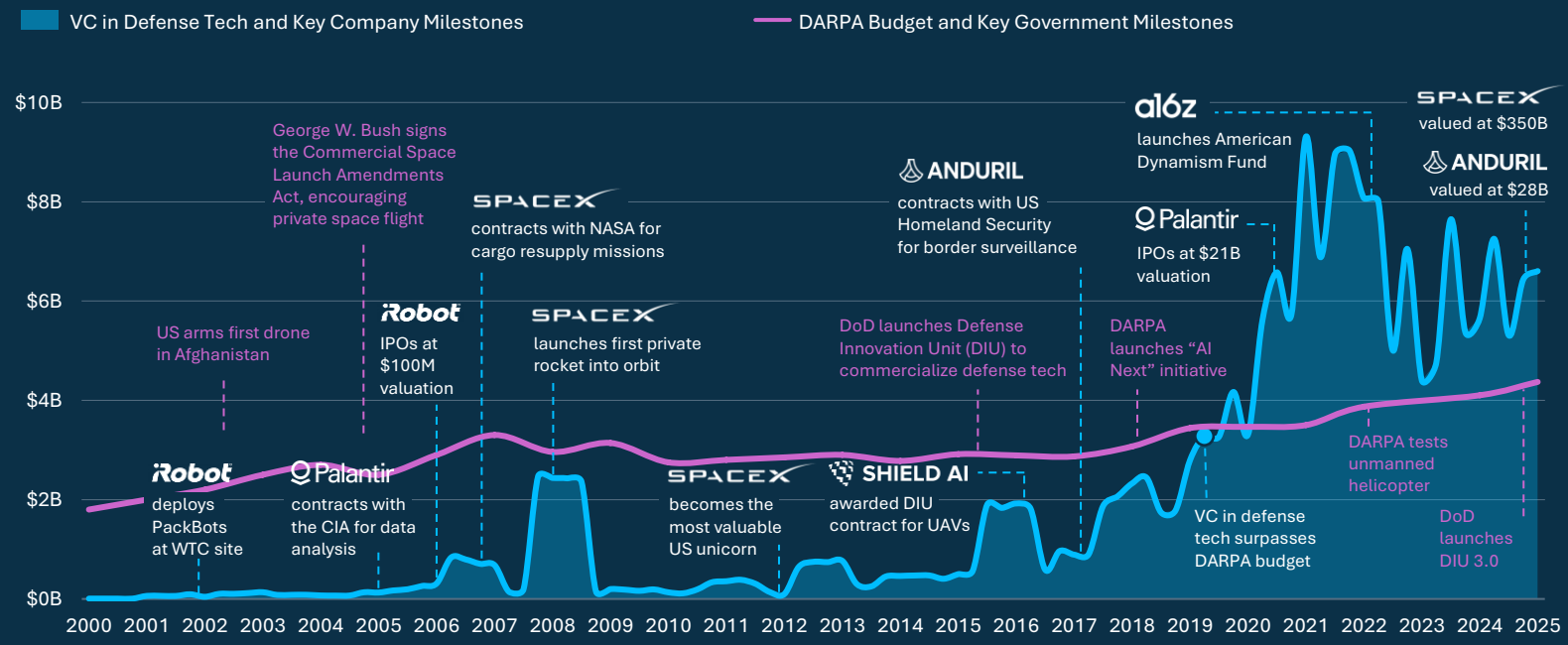
However, VC has historically played a minor role in defense innovation, with government agencies, military labs and established defense contractors dominating the landscape. Now, this paradigm is shifting. Since 2019, annual US VC investment in defense technology has exceeded the annual budget for the Defense Advanced Research Projects Agency (DARPA), a significant shift in how defense innovation is funded.

This change has been encouraged by the success of companies like Palantir and SpaceX, which demonstrated that nimble private companies could successfully compete in industries long dominated by government agencies and massive incumbent contractors. Their achievements have shown VCs that defense and aerospace markets represent viable, scalable investment opportunities rather than impenetrable government monopolies.

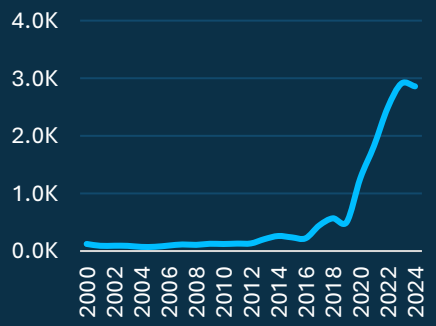
svb Silicon Valley Bank
A Division of First Citizens Bank

Timeline of US Defense Tech Innovation

US VC Investment in Aerospace and Defense and the Budget for the DARPA

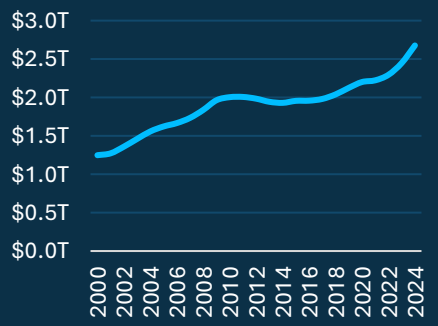


Global Satellites Launched



Index: US Military Arms Transfers[1]

Global Military Spending



Notes: 1) Index of US arms exports with the value in 2000 indexed to 100.
Source: Stockholm International Peace Research Institute, PitchBook Data, Inc. and SVB analysis.

A New Guard of Defense Primes

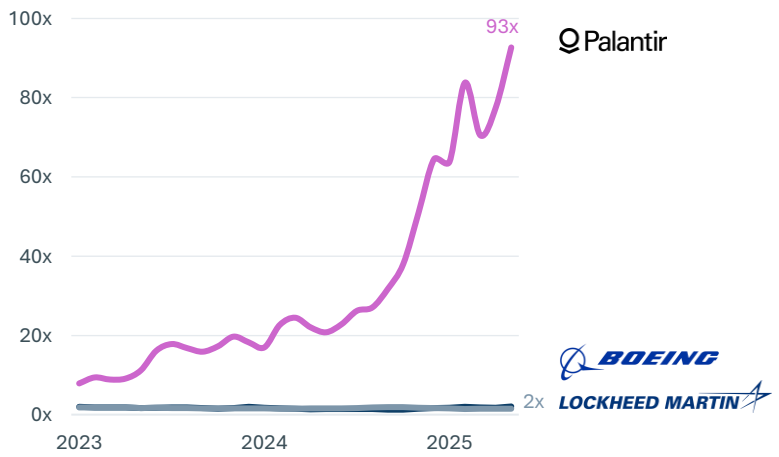
Elevated geopolitical tensions from ongoing conflicts in Ukraine and the Middle East have driven global military spending up 30% over the past five years, creating unprecedented market opportunities. In the US, Palantir exemplifies the sector's potential, trading at a staggering 90x revenue multiple that reflects investor confidence in the future of defense tech applications. Total VC investment in defense and aerospace surpassed $5B through mid-May, more than all of 2024 and on track to hit $12B by year's end. Anduril, developer of autonomous systems and military drones, has achieved a $28B valuation — a fourfold increase from just three years ago. **Acquisition of VC-backed activity is also accelerating, with 19 deals completed in the first five months of this year, positioning 2025 to be the most active year for defense tech M&A.**

One tailwind for VC involvement and defense tech is the encouragement they are getting from the DoD[2]. Initiatives like the Defense Innovation Unit, which specifically focuses on commercializing defense technologies, are helping to bridge the gap between Silicon Valley innovation and military applications. Simultaneously, VC culture, which historically shied away from defense investments due to ethical concerns and regulatory complexity, is increasingly embracing the sector. A notable example is Andreessen Horowitz's American Dynamism fund, led by Katherine Boyle, which specifically targets defense and national security investments.

svb Silicon Valley Bank
A Division of First Citizens Bank

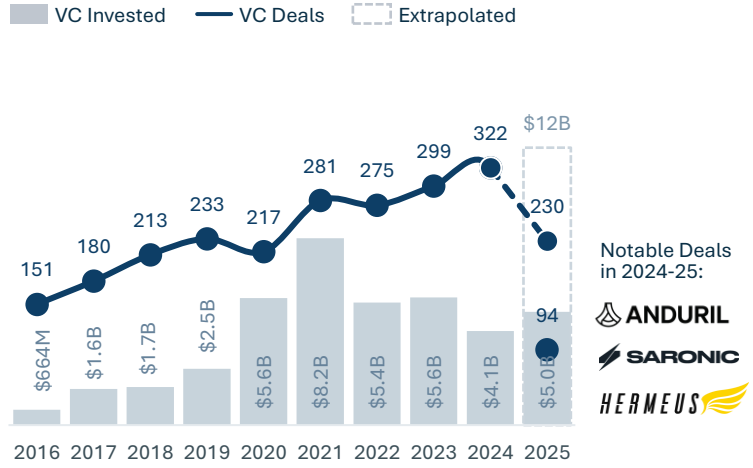
Palantir's Rev Multiple Dwarfs the Primes

Average Monthly TEV/Revenue Multiple[1]



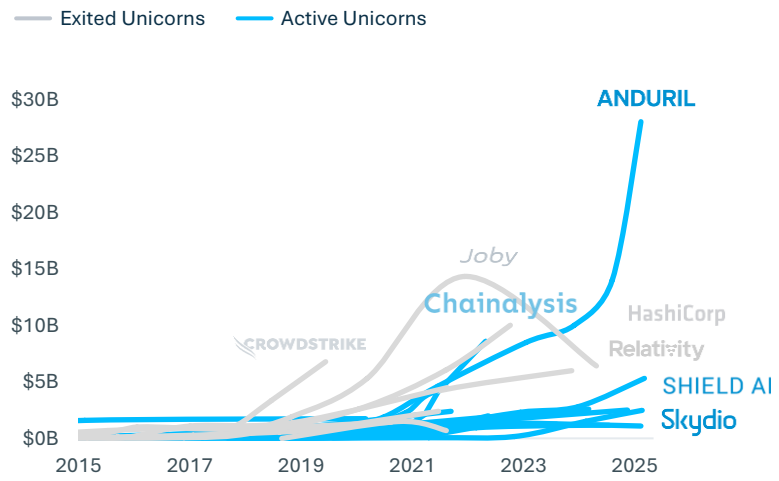
Military Tech Is Booming

US VC Investment in Aerospace and Defense



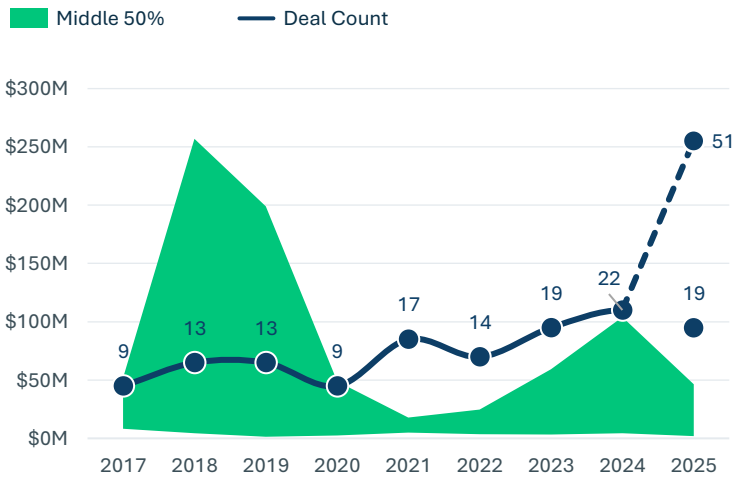
Defense Tech Unicorns Take Flight

US Defense Tech Unicorns by Status and Latest Valuation



Defense Exits Soar as Deals Come Sooner

Defense Tech Deals and Median Raised to Get to Exit[3]



Notes: 1) Total enterprise value/last twelve months revenue. 2) Department of Defense 3) Global deals reported in US dollars.
Source: PitchBook Data, Inc., S&P Capital IQ and SVB analysis.

Dollars Follow the FLOPs

As AI agents proliferate, an economic paradox emerges. The per unit cost of inference is plummeting thanks to architectural innovations and algorithmic advancement, yet total compute spending continues to surge as usage explodes exponentially. This dynamic is creating unprecedented specialization in chip design. Companies integrating AI into workflows now face inference-dominated budgets, making hardware efficiency mission critical. Techniques like quantization and pruning, paired with gains in GPU[2] performance have led to significant cost reductions. NVIDIA's latest H100 chip, for instance, delivers more than 22 billion FLOPs[3] per second per dollar, a 3x improvement from the pre-generative AI era.

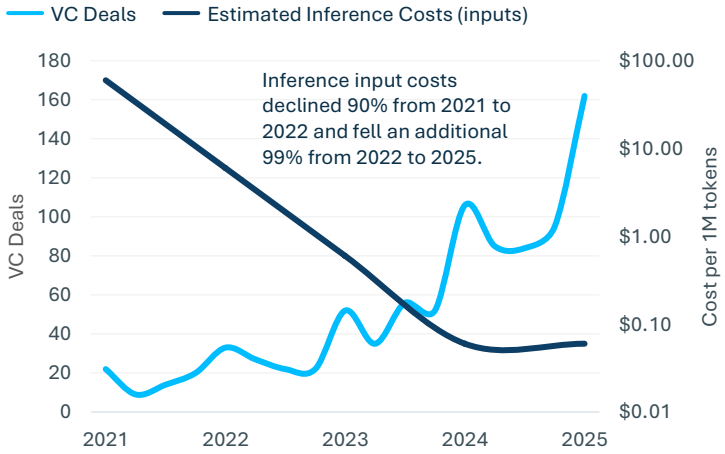
But the next wave of innovation may lie in purpose-built architectures. Investors are going where the efficiency is. **VC investment in AI compute and hardware is on track to hit an all-time high in 2025,** led by mega-rounds in companies tackling inference-specific challenges, from data-flow processors like Groq to photonic chip startups like Lightmatter.

As compute becomes cheaper, smarter and more tailored to inference, VC dollars are shifting to the infra layer. The AI arms race is not just about models, but also the hardware and software running them. For many of these companies, the goal is not to compete with NVIDIA but rather to enable entirely new categories of AI applications that become viable only when inference costs drop sufficiently.

svb Silicon Valley Bank
A Division of First Citizens Bank

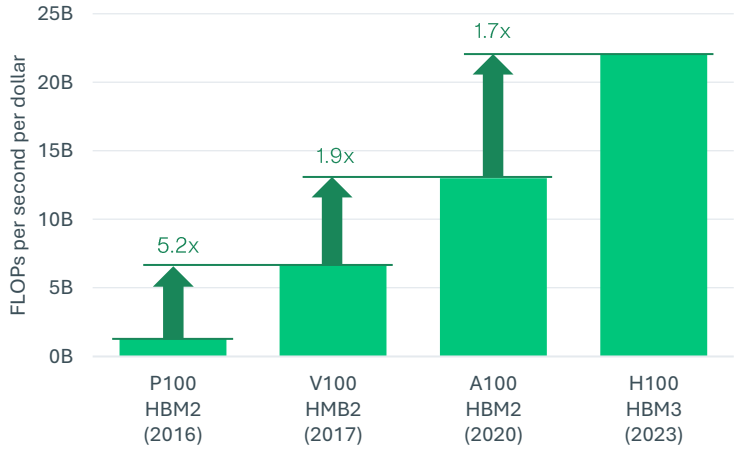
As Inference Costs Drop, Agents Proliferate

VC Deals for LLM[1] Agents and Estimated Cost of LLM Inference



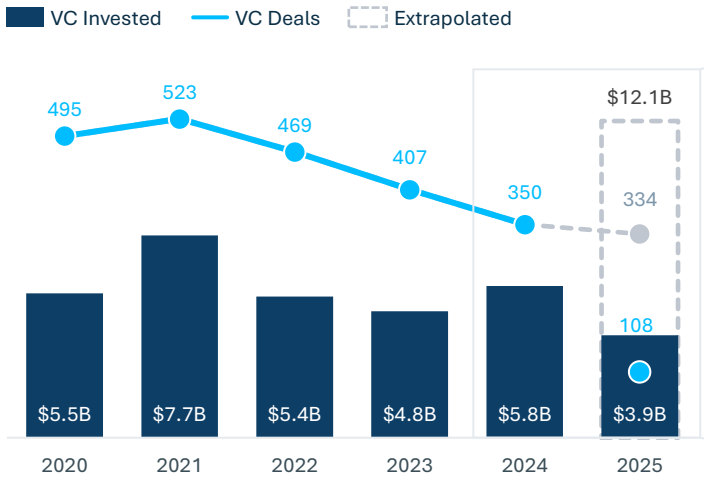
GPU Efficiency is Rapidly Improving

Price-Performance of NVIDIA Data Center GPUs for AI



VCs Triple Down on AI Compute

VC Investment in AI Compute and Hardware



… And Pour Money Into Mega-Deals

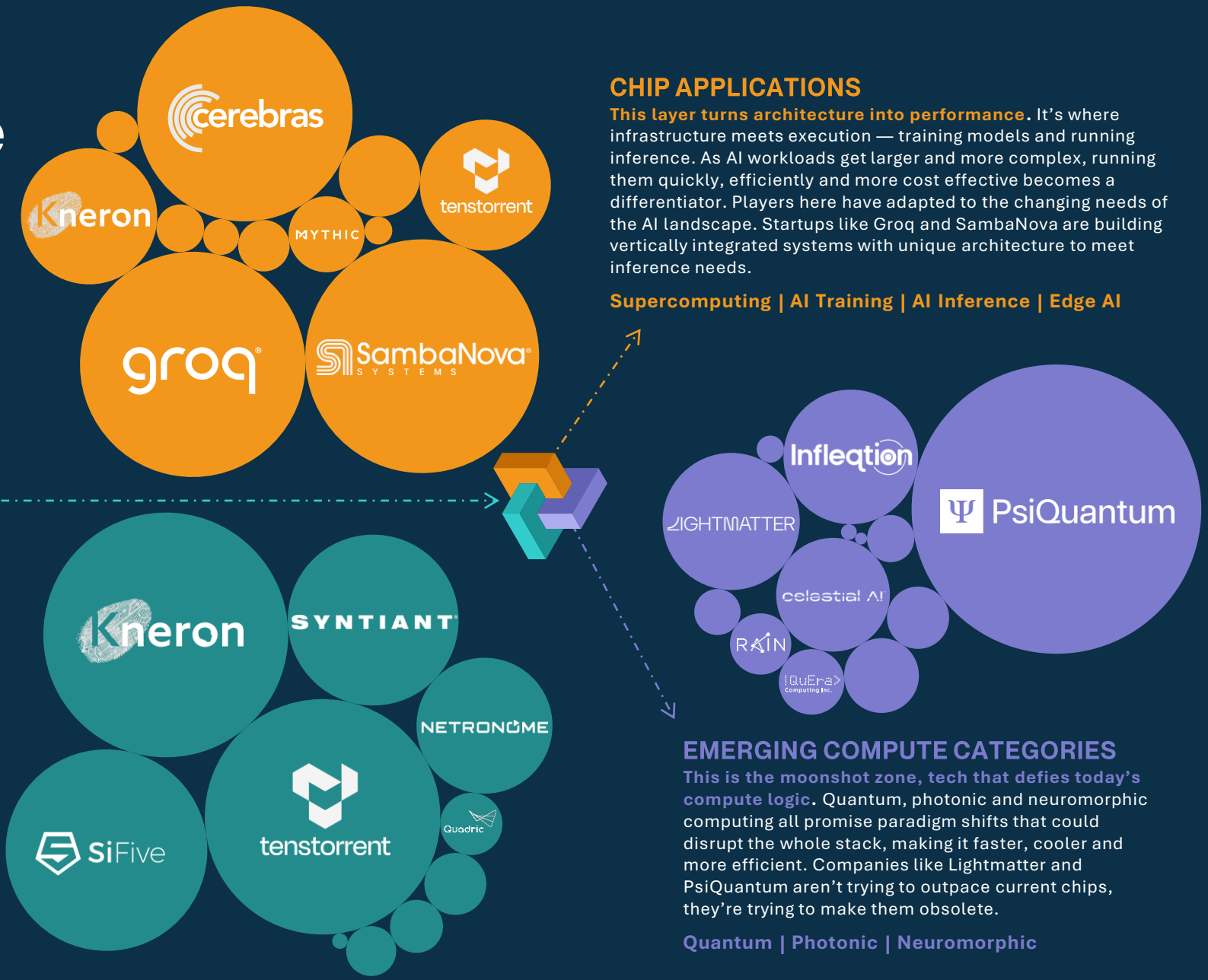
Notable AI Compute and Hardware Deals in 2024 and 2025

Company	Most Recent Deal Size	Deal Date	Focus
groq	$1.5B	Feb 2025	AI inference infrastructure
PsiQuantum	$624M	Jun 2024	Quantum computing
LIGHTMATTER	$400M	Oct 2024	Photonic computing
SYNTIANT	$190M	Dec 2024	Neuromorphic semiconductors
AyarLabs	$155M	Dec 2024	Optical interconnect tools
celestial AI	$250M	Feb 2025	Data center and AI computing platform

Notes: 1) Large language models. 2) Graphical processing units. 3) Floating point operations per second.
Source: Epoch AI, PitchBook Data, Inc. and SVB analysis.

The AI Compute Hardware Landscape

Notable VC-Backed AI Compute Startups Weighted by Total VC Investment Raised to Date



CHIP APPLICATIONS

This layer turns architecture into performance. It's where infrastructure meets execution — training models and running inference. As AI workloads get larger and more complex, running them quickly, efficiently and more cost effective becomes a differentiator. Players here have adapted to the changing needs of the AI landscape. Startups like Groq and SambaNova are building vertically integrated systems with unique architecture to meet inference needs.

Supercomputing | AI Training | AI Inference | Edge AI

CHIP ARCHITECTURE

These processing units serve as the building blocks for AI hardware. While incumbents still dominate this segment, a new wave of startups are rebuilding compute from the ground up, chasing gains in bandwidth, efficiency and memory access. The challenge is to meet AI's appetite without overloading the grid. Players like Tenstorrent and SiFive are designing chips not just to keep up with the needs of model growth, but remove bottlenecks from the process entirely.

GPUs | CPUs | TPUs | DPUs | NPUs | VPUs

EMERGING COMPUTE CATEGORIES

This is the moonshot zone, tech that defies today's compute logic. Quantum, photonic and neuromorphic computing all promise paradigm shifts that could disrupt the whole stack, making it faster, cooler and more efficient. Companies like Lightmatter and PsiQuantum aren't trying to outpace current chips, they're trying to make them obsolete.

Quantum | Photonic | Neuromorphic

svb Silicon Valley Bank
A Division of First Citizens Bank

Notes: 1) Companies are North American HQ'd companies selected based on total equity funding received to date. Companies may appear in multiple categories. Categories are not mutually exclusive.
Source: CB Insights, PitchBook Data Inc. and SVB analysis.

Unicorns and Exits

Getting Crowded at the Top

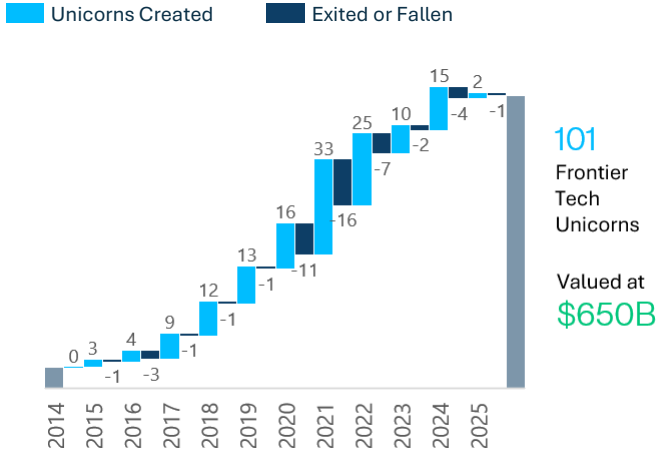
Seventeen new frontier tech unicorns were minted since January 2024, bringing the total active herd to 101 companies worth $650B according to their most recent valuation. More than half of these companies achieved the status during the 2021-22 funding boom, and with hopes all but dashed for an IPO window opening this year, many are planning for longer stays in the private market. **More than half of the active frontier tech unicorns have raised capital in the last two years, twice the share that have raised among other sectors.**

Frontier companies tend to have larger capital requirements than software companies, and it shows on the cap table. At the time of their unicorn deal, the total raised capital for frontier tech companies accounts for about 27% of their total valuation, compared to 23% for other unicorns. Yet considering the massive potential addressable market for companies in this space that are often attempting to disrupt whole economic sectors, the equity is a drop in the bucket. SpaceX, which has remained private since its founding in 2002, has been the most valuable private tech company for the better part of the last 12 years. Its current valuation of $350B[1] is the highest value a private tech company has ever achieved, $50B more than the current value of OpenAI and more than all the other frontier unicorns combined.

svb Silicon Valley Bank
A Division of First Citizens Bank

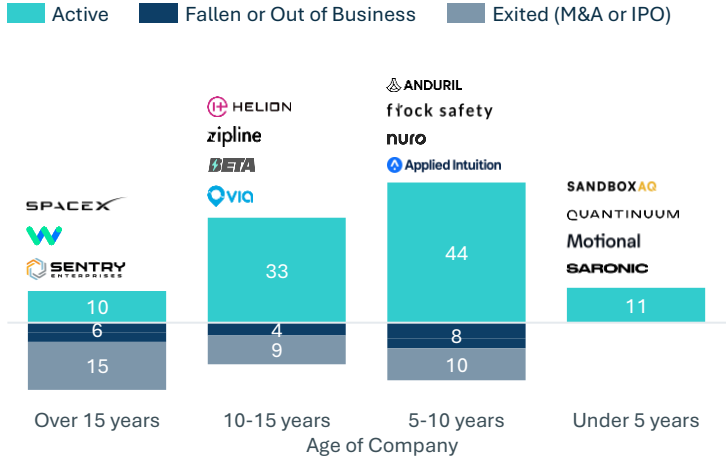
Backlog Grows for Hardware Unicorns

US Frontier Tech Unicorns Created and Ended



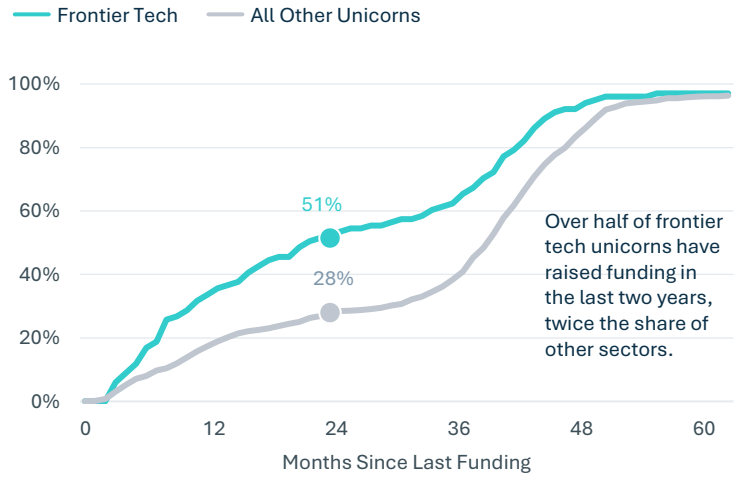
Know Your Frontier Tech Generations

Unicorn Status by Age and Top Active Unicorns by Valuation



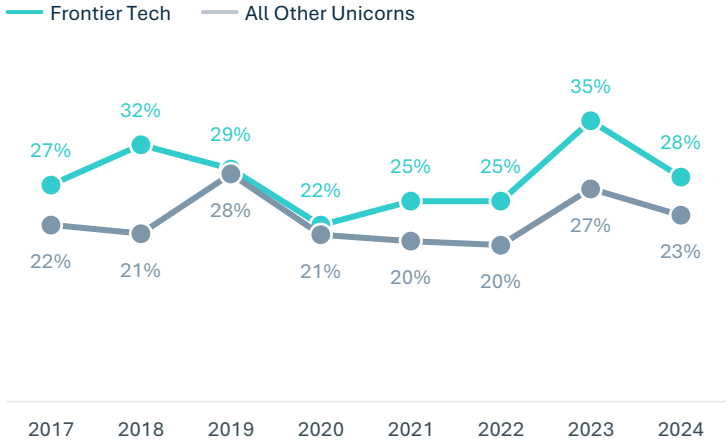
Frontier Tech Has Fewer Zombiecorns

Share of US Unicorns Companies by Most Recent Funding



How Much VC to Make a Unicorn Fly?

Total VC Raised as a Percentage of Post-Money Valuation at Time of Unicorn Status



1) As of the most recent valuation event, a secondary share sale in December 2024.
Source: PitchBook Data, Inc. and SVB analysis.

Have Revenue, Will Exit

When it comes to frontier tech IPOs, revenue matters. The four largest frontier tech companies to go public (Credo, Rubrik, Astera Labs and Pony.ai) have also had the highest performance of the group. Even with strong gross margins, companies with less than $75M in revenue have faced lackluster performance. Admittedly, the sample size of US VC-backed frontier tech IPOs on major US exchanges is small; we have seen just eight companies go public on a major exchange since 2022.

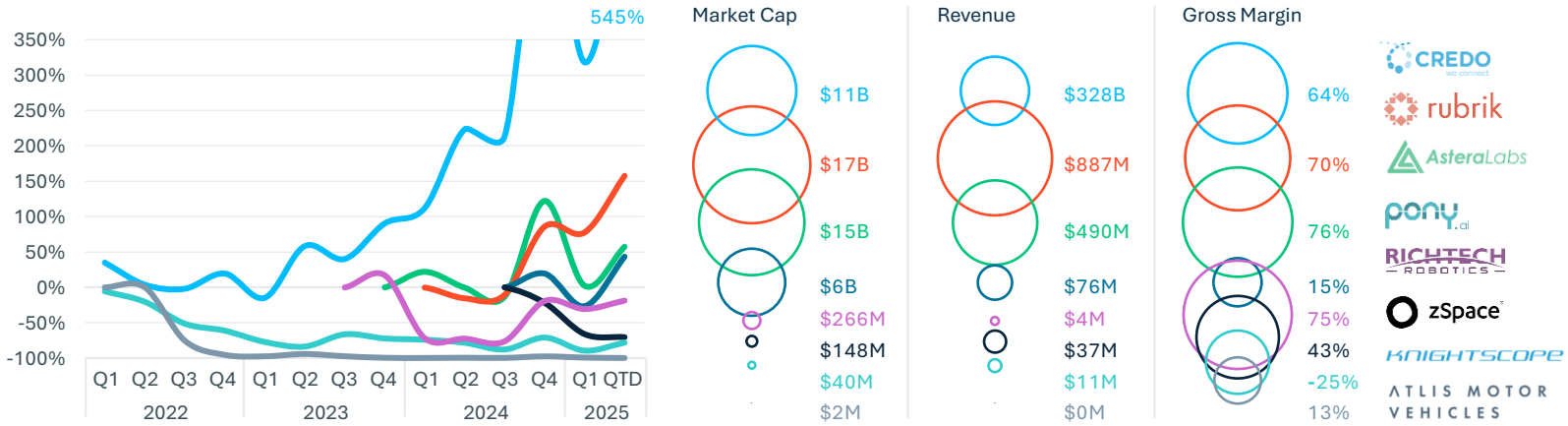
Exit activity in the ecosystem has been limited across all exit types, not just IPOs. **M&A activity is just half what it was in 2021, and De-SPAC activity is just a shadow of its former self.** De-SPACs were especially hit hard as many of the early-stage companies that favored the De-SPAC route faced difficult performance in public markets with little to no revenue.

The dry spell in frontier tech exits — and VC-backed exits in general — is unlikely to improve in the near term. With one quarter of declining GDP in the books and an uncertain trade outlook, many buyers are not looking to make significant purchases, and the volatility of public markets is likely to keep IPOs out of the forecast in the near term. That said, 43 of the 101 US private frontier tech unicorns are now more than 10 years old and may be looking to exit in the near term.

svb Silicon Valley Bank
A Division of First Citizens Bank

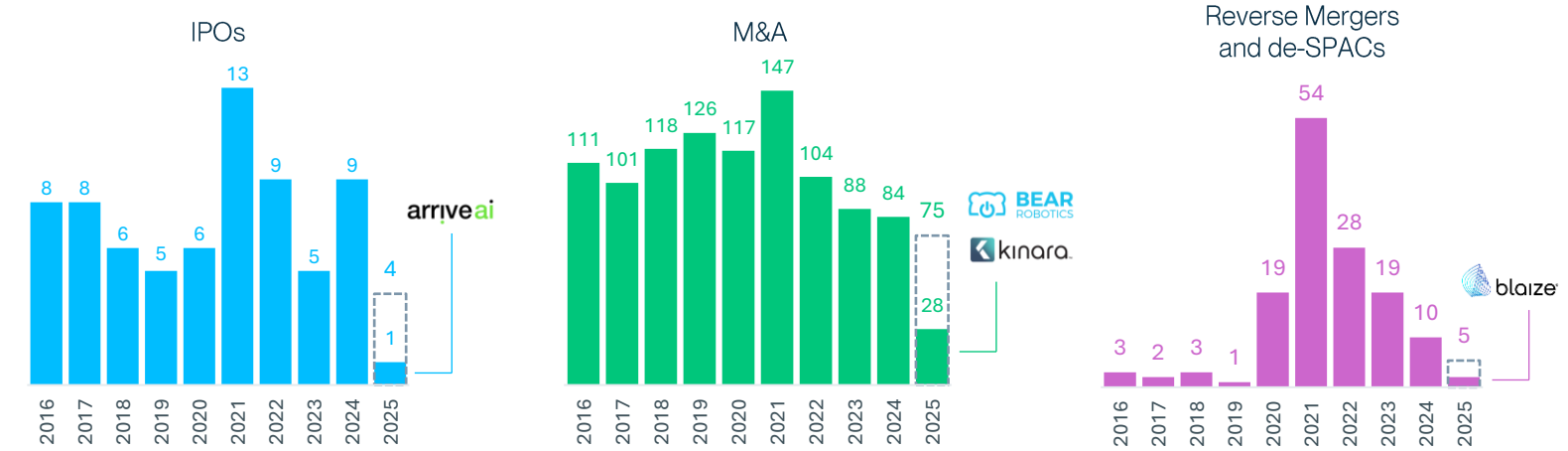
Top Performers Have Greater than $75M in Revenue

Performance as of Quarter End for US Frontier Tech IPOs on Major US Exchanges Since 2022 and Select Financial Metrics



Exit Roads Less Traveled: All Off-Ramps are Tracking Lower in 2025

US VC-Backed Exits and Notable Deals by Type[1]



Notes: 1) IPO listings across all exchanges.
Source: PitchBook Data, Inc., and SVB analysis.

Authors

Lead Authors

Jack Garza
Managing Director, Head of Frontier Tech, Northern California
jgarza@svb.com

Jack guides the bank's frontier tech sector strategy and leads the Frontier Tech Relationship Management team for Northern California.

Jack has held a range of roles across all sectors during his 20 years with SVB, including senior credit officer and the head of Early Stage Lending Innovation.

Previously, he worked for U.S. Bank and City National Bank, supporting both middle market and private bank customers.

Dax Williamson
Market Manager, Southern US
dwilliamson@svb.com

Dax leads the bank's efforts to unite and empower innovators across the Southwestern US, and serves as the national head of SVB's Defense and Aerospace practice.

With more than two decades experience in finance, Dax spends his time supporting organizations and activities that bring focus to emerging markets across the Southern US as innovation hubs.

Prior to joining SVB in 2008, he was an investment manager overseeing more than $1B of client funds in public equities.

Market Insights Authors

SVB's market insights team produces industry-leading research on the innovation economy, leveraging SVB's proprietary insights to report on trends in VC fundraising and investment across all innovation sectors.

Josh Pherigo
Senior Researcher
Market Insights
jpherigo@svb.com

Eli Oftedal
Senior Researcher
Market Insights
eoftedal@svb.com

Anjalika Komatireddy
Analytics Researcher
Market Insights
akomatireddy@svb.com

About Silicon Valley Bank

Silicon Valley Bank (SVB), a division of First-Citizens Bank, is the bank of some of the world's most innovative companies and investors. SVB provides commercial and private banking to individuals and companies in the technology, life science and healthcare, private equity, venture capital and premium wine industries. SVB operates in centers of innovation throughout the United States, serving the unique needs of its dynamic clients with deep sector expertise, insights and connections. SVB's parent company, First Citizens BancShares, Inc. (NASDAQ: FCNCA), is a top 20 U.S. financial institution with more than $200 billion in assets. First Citizens Bank, Member FDIC.

Learn more at svb.com.

Silicon Valley Bank www.svb.com #SVBFrontierTech

Learn more

SVB Hardware and Frontier Tech

We help deep tech and hard tech innovators break new ground in creating the future, now.

See complete disclaimers on the following page and on the corresponding SVB webpages linked above.

Disclaimers

The views expressed in this report are solely those of the authors and do not necessarily reflect the views of SVB.

This material, including without limitation to the statistical information herein, is provided for informational purposes only. The material is based in part on information from third-party sources that we believe to be reliable but which has not been independently verified by us, and, as such, we do not represent the information is accurate or complete. The information should not be viewed as tax, accounting, investment, legal or other advice, nor is it to be relied on in making an investment or other decision. You should obtain relevant and specific professional advice before making any investment decision. Nothing relating to the material should be construed as a solicitation, offer or recommendation to acquire or dispose of any investment, or to engage in any other transaction.

All non-SVB named companies listed throughout this document, as represented with the various statistical, thoughts, analysis and insights shared in this document, are independent third parties and are not affiliated with Silicon Valley Bank, division of First-Citizens Bank & Trust Company. Any predictions are based on subjective assessments and assumptions. Accordingly, any predictions, projections or analysis should not be viewed as factual and should not be relied upon as an accurate prediction of future results.

Investment Products:

Are not insured by the FDIC or any other federal government agency	Are not deposits of or guaranteed by a bank	May lose value