



SPADE Defense Index Remains Near Historic Highs *An Attack by Iran on Israel Will Likely See Defense Share Prices Surge*

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- SPADE Defense Index Remains Near Historic Highs

SPADE Defense Index Statistics

3/31/24 Close	11,905.75
12/31/23 Close	10,804.91

All-time Intraday High:
28 March 2024 11,939.35

All-time Closing High:
27 March 2024 11,919.00

Price Return	SPADE Defense	S&P500
YTD	10.19%	10.16%
2023	17.70%	24.23%

Commentary

ETFs: Maybe Performance Actually Does Matter

One of the SPADE Defense Index's talking points is that it has outperformed its primary competitor (ITA) in the 1-year, 3-year, 5-year, 10-year, and 15-year timeframes....yet due to the marketing power of iShares (BlackRock), ITA has twice the AUM as Invesco's PPA (which tracks our SPADE Defense Index). But a deeper look tells a different story. Back in early 2020, ITA peaked at around \$6 billion in AUM, before declining and rebounding to the same \$6B level it is today. Over the same time period, PPA tripled its AUM to \$3 Billion. Additionally, ITA has a 1-year return of 11.84% despite its AUM remaining flat—indicating a loss of shares held by investors. PPA, on the other hand, has

increased its outstanding shares by nearly 30% (growing from 23.05 to 29.83M shares), and provided investors a 1-year return of 23.21%.

New Technology Changing the Balance of Military Power

Roughly every 20 years since the early 1900s, technology innovation has changed the nature of warfare—whether it was the introduction of the tank, airplane, missiles, nuclear weapons, satellite communications, information technology, etc....or systems designed to counter the development of those weapons by adversaries. The defense sector has a long history of investing at the cutting edge to gain an advantage. The recently proposed FY2025 budget

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SPADE Defense Index March 2024 Rebalance

Out: Ball Corp (sold its defense division to BAE); Comtech (no longer met rules of the index).

In: Cadre Holdings (CDRE), extensive security product portfolio, Amphenol (APH), more than \$1B in defense sales

Corporate Actions Affecting the Index During the Quarter

- GE spun off its non-A&D business on April 2.
- Kaman is being acquired by private equity.
- Jacobs is planning to spin its defense business later in 2024.
- Boeing is in negotiations to purchase Spirit AeroSystems.

Dividend

Invesco's Aerospace & Defense ETF issued a dividend of \$0.11448 per share on 19 March 2024. Over the past 12 months, \$0.6246 per share was returned.

Licensed Products

Exchange Traded Fund (ETF)

The SPADE Defense Index has been licensed to Invesco and serves as the underlying index for the Invesco Aerospace & Defense ETF (NYSE Arca: PPA).

A Morningstar 5-Star Fund

Options Trading

Options on the Invesco Aerospace and Defense ETF (ticker: PPA) are available.

Commentary (continued from page 1)

highlights this, by committing \$14.5 billion for cyberspace, \$1.8 billion for artificial intelligence, \$9.8 billion for hypersonic and long-range subsonic missions, and \$33.7 billion for space and space-based systems.

Another technological advancement, unmanned vehicles, is likely to see funding levels accelerate. Already a high priority and a growing element of the US arsenal, the conflicts in Ukraine and the Middle East are proving to be a testing ground showcasing the proliferation of unmanned aerial drones. When UAVs that cost hundreds or thousands of dollars can damage ships, planes, and tanks that cost millions to hundreds of millions, the economics and strategy of fighting a war change. The lessons learned from analyzing these conflicts will influence the direction of this technology.

Two recent articles about drones/UAVs in the *Wall Street Journal* are worth reading. The first is from Elliot Ackerman and James Stauridius on 14 March 2024, "Drone Swarms Are About to Change the Balance of Military Power." Quoting the authors, "On today's battlefields, drones are a manageable threat. When hundreds of them can be harnessed to AI technology, they will become a tool of conquest." The second was published on 10 April 2024, "How American Drones Failed to Turn the Tide in Ukraine." In it the authors state, "In the first war to feature small drones prominently, American companies still have no meaningful presence. Made-in-America drones tend to be expensive, glitchy, and hard to repair...Ukraine has turned to cheaper Chinese products to fill its drone arsenal."

SPADE Indexes Opinion for Investors: This is obviously a big problem at the Pentagon. Expect them to invest a lot more money in the coming years to resolve this.

Index: 2Q24 Additions, Removals, M&A Activity

The most recent quarter (1Q24) and the March rebalance saw a number of changes to the SPADE Defense Index:

- The sale of Ball Aerospace to UK defense firm BAE closed on February 16th. At the rebalance, Ball was removed from the SPADE Defense Index.
- GE spun off its energy business on April 2, with GE Aerospace (NYSE: GE) becoming essentially a pure-play in the Aerospace & Defense sector.
- Two firms were added to the SPADE Defense Index during the March 2024 rebalance -- Cadre Holdings (NYSE:

CDRE) went public in November 2021 and is a roll-up of firms providing security hardware and services such as body armor, explosive demolition robots, etc. to federal agencies, first responders, and related markets. Amphenol (NYSE: APH) is a supplier of electronics hardware to a variety of markets including defense, where it generates more than \$1 billion in annual sales. It manufactures high-performance interconnect systems for harsh environment defense applications used on ground vehicles, avionics, naval, ordnance and missile systems, radar systems, rotorcraft space programs, and UAVs.

- Comtech (CMTL) was removed from the Index after it failed to meet the minimum market cap rule for ongoing inclusion.

On the Horizon

- Jacobs Engineering (J) remains on track to spin off its defense business later in 2024. Its Critical Mission Solutions and Cyber and Intelligence Government Services business will merge with Amentum to create a government services firm with \$13 billion in annual revenues.
- Boeing (BA) is investigating whether to re-acquire its supplier Spirit Aerosystems (SPR), a firm it spun off in 2005, in order to maintain tighter control of its quality assurance.
- Raytheon (RTX) is planning to spin off its cyber and intelligence business, Nightwing (per *Defense News*).
- Kaman (KAMN) is being acquired by private equity firm, Arcline, for \$1.8B (\$46 per share in cash). It is expected to close later this quarter (2Q24).

Economics/Policy and the Defense Industrial Base

This is obviously a topic that could (and does) generate hundreds of pages by analysts and government researchers. The following is the reply by a 30+-year defense sector consultant and executive to the question...what are you seeing?

- FY24 budget finally signed on 25 March 2024 (good). The White House also released their proposed FY2025 budget with \$849.8B for DoD. (good)
- Stalemate continues in Congress on Ukraine/ Israel/ Taiwan support bills. (not good)

- If 80% of foreign defense funds are spent here, that is

Commentary (continued from page 2)

a nice addition to the defense industry; however, the bill remains stalled. Increasing comments from retiring congresspeople wondering if their colleagues realize they are being misled by Russian propaganda highlights that bipartisan action is the only way to pass vital support to Ukraine. Support for Israel will also need bipartisan support to overcome objections. That said, in this Congress, bipartisan action is rare to unheard of and a potential \$105 billion supplement spending bill for overseas support has languished. (not good)

- Supply chain continues to ramp up. (good)
- Inflation is tapering. (good)
- Workforce (attracting skilled workers) is still a challenge. (not good)
- Upcoming election paralysis (sad). Continuing budget resolutions confound DoDs ability to execute long-term contracts (Will there be a final budget passed by October 1? Not likely in an election year.)

It Remains a Dangerous World

For investors in the defense sector, nothing matters more than if government and people believe it is necessary to invest in safety and security. In times like this, defense is more than investing in a thematic sector; it should be considered an element of a “defensive” portfolio (with upside of course).

Our take on the major conflicts:

Russia—Ukraine

- Ukraine is on the verge of being overrun without additional weapons aid from the United States.
- NATO nations are evaluating, “who’s next”.
- The terrorist attack in Moscow by ISIS-K in March weakened Putin momentarily, but his iron-grip is not likely to be overcome by this single incident. Mounting opposition after Navalny death, the war effort’s toll on the economy, and people upset about their children on the front line is increasing but the overall response has been muted due to fear of retribution by the government.

- New sanctions are being proposed by the US against Moscow but with “back-channel” customers for its oil, it probably won’t have much impact.

After more than two years of fighting to a virtual standstill, Russia appears poised to make significant gains in their war with Ukraine in the coming months. According to Gen. Christopher Cavoli, the top US commander in Europe and NATO, the Russian military has been able to boost its front-line troop strength to 470,000 soldiers from 360,000 at the beginning of the war and it has been able to replenish its heavy tank losses on the battlefield and other military hardware faster than previous estimates. In contrast, as stated in his talk before the Senate Armed Services Committee as reported by Politico, Ukraine is still “almost entirely dependent” on outside support, in particular US artillery shells and air defense interceptors. Without additional military equipment and support from the United States Congress, the likelihood that Russia overcomes the recent stalemate is rapidly increasing. Ukraine is barely holding on. New funding and access to weapons has become critical.

What emerges from a Russia victory is likely authoritarian rule with small-scale Ukrainian freedom fighter attacks thus eliminating any hope of stability in the region. Moreover, analysts expect that Russia will likely be emboldened to take additional action in other nations, as they have confirmed the West won’t directly engage.

SPADE Indexes Opinion for Investors: Ultimately, the war will end but that doesn’t mean that military spending in the US and NATO nations will decline as the threat of new aggressions remains high.

Middle East: Complicating the Discussion

- In late March, Hezbollah fired dozens of rockets into Northern Israel (*NY Times*). Israel later attacked the Iranian consulate in Damascus, killing an Iranian general responsible for coordinating Iranian proxies.
- Iran said it will continue to support various proxies such as Hezbollah and Houthis as a means to destabilize Israel.
- There is growing concern by US intelligence forces that a wider war is just starting and a direct attack by Iran on Israel is forthcoming.

Commentary (continued from page 3)

Six months have passed since Hamas engaged in a brutal terrorist and hostage-taking attack of Israeli citizens resulting in a response that has decimated much of the Gaza strip. Instead of being closer to an end to the fighting, it is quite possible that the conflict in the region is just beginning. Despite the brutality of attacks by Hamas and other Iranian proxies such as Hezbollah and the Houthis, Iran has stated that it plans to continue to support these groups (and others) financially and with weapons as a means to destabilize Israel. While losing the battles on the ground, Hamas has succeeded in turning public opinion against Israel.

But this may be just the first domino to fall. As reported by Bloomberg News, the US intelligence community believes that Iran could strike Israel directly with a missile or drone attack before the end of April. “The assault...is seen more as a ‘when’ and not ‘if;’” and widen the conflict in the region significantly. Iran has vowed to retaliate Israel’s attack on the Iran consulate in Damascus, Syria which killed top Iranian commanders. Israel’s foreign minister replied to comments made by Iranian Supreme Leader Ayatollah Ali Khamenei on Twitter/X with “if Iran attacks from its territory, Israel will respond and attack in Iran.”

SPADE Indexes Opinion for Investors: An attack by Iran on Israel will escalate the conflict and bring it to a whole new level. Members of Congress objecting to providing military support to Israel in its conflict with Hamas in Gaza would likely retract their issues and be wholly supportive of a response against Iran—boosting supplemental spending to provide US manufactured weapons and systems to support Israel and work to stabilize the volatile Middle East region.

What’s Going On with Boeing?

The one company found in the SPADE Defense Index that has generated the most questions lately is Boeing. Since a door plug panel came off a new Alaska Airlines 737 Max jet on January 5, there have been seemingly routine news reports about mechanical issues on Boeing manufactured commercial aircraft. And although some of these incidents may very well be due to improper maintenance by the airlines or its MRO (maintenance, repair, and overhaul) suppliers—and have nothing to do with Boeing—there is no question that the firm remains plagued with engineering and quality control issues on their commercial aircraft. Since the 737 Max 8 crashes in 2018 and 2019, issues with Boeing’s com-

mercial aircraft seem to be happening at an alarmingly increasing rate—costing a number of executives at the firm their jobs.

Likewise, anyone tracking the company is aware of the impact that cost-overruns on fixed price contracts is having on profitability—such as the aggressive bidding on projects such as the new Air Force One and the KC-46A next generation tanker (the firm has eaten \$7 billion in cost overruns over nearly 13 years for a program with a contract value of \$4.9 billion.) Boeing has stated that they have sworn off fixed price contracts. This issue is impacting other firms as well. Northrop Grumman in 4Q23 announced a \$1.6 billion charge on its B-21 Air Force Future Bomber program. Both firms are living with the consequences of fixed price bidding.

Meanwhile, Boeing’s Defense and Space Business, according to Forbes, claimed nearly 1/3 of the sales under the US Government’s Foreign Military Sales (FMS) program in 2023—more than \$25 billion for rotorcraft, patrol aircraft, tankers, and munitions such as the JDAM used by 36 countries. Additionally, *Forbes* stated that Boeing has a good chance of winning the Air Force’s next combat aircraft (Next Generation Air Dominance Fighter) since Lockheed Martin has the F-35 fighter and Northrop Grumman is building two legs of the nuclear triad; the Pentagon has historically liked to spread out its very large contracts in order to maintain the defense industrial base.

Boeing, however, is not standing still. They have recently shaken up their leadership; announced discussions to reintegrate a major structural hardware supplier for their commercial aircraft, Spirit Aerosystems (which they divested in 2005 as a cost savings action); and (rumor per Bloomberg) have been evaluating whether to divest a number of their stand-alone defense businesses—such as their Digital Receiver Technology Inc unit, its Argon ST sensors subsidiary, and its stake in the United Launch Alliance, co-owned by Lockheed Martin. Like any large, complex business, things don’t always go smoothly but they have the resources and capital to weather the storm.

Inside the Approved FY2024 Defense Budget

It took until early March before the Congress presented the President with a budget bill to sign for the fiscal year that began the prior October. Here are some of the highlights.

Commentary (continued from page 4)

Key among them is the ability to issue multi-year procurements on certain programs—a concept welcomed by the defense industrial base that should save the government money and allow companies to plan better.

- \$825 billion, up \$27 billion over the prior year enacted.
- \$1 billion for the Defense Innovation unit.
- \$300M to accelerate the procurement and fielding of innovative technologies.
- \$200M for Replicator effort to field thousands of drones over the next two years (with \$300M more requested).
- Multi-year procurement for munitions such as AMRAAM, Naval Strike Missile, GMLRS, Patriot Advanced Capability-3 as well as for the Columbia and Virginia class submarines – this is a big win for DoD and defense companies as it lowers the cost per unit and provides the industrial base with more stability.
- Naval Vessels: Funds 8 battleships—2 DDG-51 guided missile destroyers, 2 Virginia fast attack submarines, 1 Columbia ballistic submarine, 2 frigates, 1 T-AO Fleet Oiler, \$500M for advanced procurement of 1 San Antonio amphibious ship, \$585M for 4 ship-to-shore connectors.
- Aircraft: Fully funds: 16 F-35B for the Marine Corp, 19 F-35C for the Navy and the Marines, added \$675M for 5 CMV-22 Osprey tiltrotor aircraft, \$1.8B for 10 P-8A Poseidon Maritime surveillance, \$431M to keep the E-2D Advanced Hawkeye production going with two more planes, \$119M for 1 KC-130J. It also zeroed out the \$546M requested for the MQ-25 tanker drone (check on this last one).
- Air Force: While missile procurement declined from \$5.5B to \$4.7B, Aircraft gained slightly from \$20.3B to \$20.8B and R&D increased from \$46.6B to \$47.3B.
- Space Command is seeking \$1.2B to counter threats and protect its in-orbit assets as chatter about Russian counter-space plans increases.

Inside the FY2025 Defense Budget Proposal

On 11 March 2024, the White House published its proposal for defense spending in the next fiscal year. The budget request reflects continuity with the FY2024 budget amid the political deadlock in Congress and the budget caps found in the Fiscal Responsibility Act (passed June 2023).

Considering the inaction by the current Congress, it is likely that no budget will be passed for the fiscal year beginning in October and a continuing resolution is used instead to keep the government from shutting down. This would delay approval until after the election and defer decisions to the next Congress.

- \$895.2 Billion in discretionary defense spending
- \$848.8 Billion for the Pentagon

This includes:

- \$167.5 Billion in weapons procurement, \$143.2 Billion for R&D, \$339.6 Billion for Operations and Maintenance.
- \$181.0 Billion for Personnel; \$17.5 Billion for Military Construction, and \$45.5 Billion for other programs.
- \$14.5 Billion for cyberspace.
- \$1.8 Billion for artificial intelligence.
- \$9.8 Billion for hypersonic and long-range subsonic missiles.
- \$33.7 Billion for space and space-based systems including \$4.7 Billion to develop resilient missile warning and missile tracking architectures.
- \$49.2 Billion for nuclear deterrence.
- \$28.4 Billion for missile defeat and defense.

1Q24 Leaders

1	Kaman	91.52%
2	General Electric	37.53%
3	Palantir	34.01%
4	BWX Technologies	33.74%
5	Parsons	32.28%
6	Eaton	29.84%
7	Howmet	26.44%
8	Transdigm	21.75%
9	AeroVironment	21.61%
10	AXON International	21.12%

1Q24 Laggards

1	Iridium	[36.44%]
2	ViaSat	[35.28%]
3	Boeing	[25.96%]
4	Mercury Computer	[19.13%]
5	Kratos Defense	[9.41%]
6	Triumph Group	[9.29%]
7	CAE	[4.40%]
8	AAR Corp	[4.05%]
9	Teledyne Tech.	[3.80%]
10	Honeywell	[2.13%]

2024 YTD Results

1	Kaman	91.52%
2	General Electric	37.53%
3	Palantir	34.01%
4	BWX Technologies	33.74%
5	Parsons	32.28%
6	Eaton	29.84%
7	Howmet	26.44%
8	Transdigm	21.75%
9	AeroVironment	21.61%
10	AXON International	21.12%
11	Leidos	21.11%
12	Parker Hannifan	20.64%
13	Textron	19.29%
14	Jacobs Engineering	18.44%
15	CACI Intl	16.97%
16	Amphenol	16.36%
17	Booz Allen	16.05%
18	Raytheon Tech.	15.91%
19	Oshkosh Truck	15.04%
20	KBR	14.89%
21	Curtiss Wright	14.88%
22	Barnes Corp.	13.85%
23	Spirit Aerosystems	13.50%
24	Woodward	13.22%
25	ATI	12.54%
26	Huntington Ingalls	12.26%

27	OSI Systems	10.67%
28	Cadre Holdings	10.37%
29	Moog Inc.	10.27%
30	Leonardo DRS	10.23%
31	General Dynamics	8.79%
32	Heico	6.78%
33	SAIC	4.88%
34	Northrop Grumman	2.25%
35	L3 Harris	1.18%
36	V2X	0.58%
37	Lockheed Martin	0.36%
38	TTM Technologies	[1.01%]
39	Hexcel	[1.22%]
40	Elbit Systems	[1.42%]
41	Ducommun	[1.46%]
42	Keysight Tech	[1.70%]
43	Honeywell Intl	[2.13%]
44	Teledyne Tech.	[3.80%]
45	AAR Corp	[4.05%]
46	CAE	[4.40%]
47	Triumph Group	[9.29%]
48	Kratos Defense	[9.41%]
49	Mercury Computer	[19.33%]
50	Boeing CO	[25.96%]
51	Viasat	[35.28%]
52	Iridium	[36.44%]

Morningstar Says:

PPA is a Five-Star Fund *****

Low 3-Year Risk in the Industrials Category

ETF Statistics (NYSE Arca: PPA)
Invesco Aerospace & Defense

Exchange / Ticker Symbol: NYSE / PPA
 Assets (3/31/24) \$3.0 B
 Closing Price (3/31/24) \$101.57
 Dividend Yield* 1.12%
 1Q24 Volume** 9,971,800
 Turnover* 19%
 Morningstar Rating ***** (5-Star)

source: * Morningstar & ** Yahoo Finance 3/31/24

Capture Ratio*	3-Yr	5-Yr	10-Yr
Upside	89	86	102
Downside	55	76	78

Portfolio Price / Earnings*	23.18
Portfolio Price / Book*	3.67
Portfolio Price / Sales*	1.87
Beta (3-year) *	0.80
Alpha (3-year)*	8.09
R-squared (3 year)*	50.32
Long-Term Earnings*	13.32%
Historical Earnings*	0.94%
Sales Growth*	5.12%
Book Value Growth*	6.85%

source: * Morningstar 3/31/24

By the Numbers

18 of 31 - NATO member projected to allocate at least 2% of GDP to defense this year, up from just 3 allies meeting this target in 2014.

\$1.2T - Congress passed a spending bill to fund the government until September and avoid a shutdown.

\$238B - In 2023, US military equipment sales to foreign governments increased by 16%.

\$54B - The European Union approved an aid package to Ukraine.

\$28.48B - Amount the US Air Force intends to invest, starting in 2025, on the Next Generation Air Dominance and Collaborative Combat Aircraft. This program will replace the F-22 by 2030 and fund production of at least 1,000 aircraft, with combat ready units expected by 2027.

\$26B - Amount the US is preparing to spend annually on military simulation and training to boost military readiness and response capabilities

\$18B - The global military drone market is expected to reach this level by 2033 according to GlobalData.

\$6.6B - Army to Textron Systems and General Dynamics Land Systems over the 2022-2032 period for the Advanced Reconnaissance Vehicle program. Textron Systems' Cottonmouth software will be incorporated.

\$5.6B - NATO to a Raytheon and MBDA joint venture, COMLOG, for 1,000 Patriot Guidance Enhanced Missiles needed to strengthen Europe's air defenses.

\$3.68B - The US Defense Security Cooperation Agency authorized the sale of air-launched missiles to Poland. The package includes RTX AIM-120C-8 AMRAAMs and RTX AIM-9X Block II Sidewinder missiles, with related equipment, training, and support.

\$3.05B - General Dynamics Ordnance and Tactical Systems and Northrop Grumman Systems will compete for contracts on medium caliber training cartridges through 2029.

\$2.5B - Poland entered into an agreement to acquire Northrop Grumman Integrated Battle Command System with deliveries spanning 2024 to 2031 for integration with its Patriot and Narew missile systems

\$2.5B - Space Development Agency awarded contracts to L3Harris, Lockheed Martin, and Sierra Space (private) to build 54 missile defense related satellites as part of the Proliferated Warfighter Space Architecture.

\$2.28B - Bell Textron Canada from the Royal Canadian Air Force for maintenance and sustainment of CH-146 Griffon helicopters, extending its service life until at least the mid-2030s.

\$2.2B - Bahrain received US State Department approval for a FMS transaction to acquire 50 M1A2 SEPv3 Abrams main battle tanks and associated equipment. Suppliers include General Dynamics Land Systems, BAE Systems, and others.

\$1.2B - Germany signed a contract with Raytheon for Patriot air and missile defense systems.

\$1.2B - HII from the US Navy for engineering overhaul of the Los Angeles-class submarine Boise.

\$1.1B - Boeing from US Navy for 17—F/A-18 E/F Super Hornets and a comprehensive technical data package. Include mix of Lot 46 and Lot 47 aircraft along with Phase One of the technical data package to support the sustainment of both F/A-18 and EA-18G aircraft.

\$913M - Newport News Shipbuilding for the overhaul of the USS *Harry S. Truman*.

PPA Dividend History

YTD	\$0.115	2017	\$0.363		
2023	\$0.619	2016	\$0.708	2010	\$0.155
2022	\$0.647	2015	\$0.501	2009	\$0.202
2021	\$0.426	2014	\$0.215	2008	\$0.145
2020	\$0.598	2013	\$0.383	2007	\$0.055
2019	\$0.651	2012	\$0.444	2006	\$0.051
2018	\$0.444	2011	\$0.199	2005	\$0.022

Total Return (Annual %)

	SPADE Defense Index
1-Yr	26.98%
3-Yr	12.58%
5-Yr	12.86%
10-Yr	13.22%
15-Yr	16.72%
Inception	12.08%

Through 3/31/2024
(Morningstar, PPA as proxy)

Index Price Performance (ex div)

	SPADE Defense Index	S&P500	Alpha (bps)
YTD	10.19%	10.16%	3
2023	17.70%	24.23%	[653]
2022	8.56%	[19.44%]	2800
2021	6.61%	26.89%	[2028]
2020	[0.73%]	16.26%	[1699]
2019	38.49%	28.88%	961
2018	[8.15%]	[6.24%]	191
2017	28.92%	19.43%	949
2016	17.95%	9.53%	842
2015	3.23%	[0.73%]	396
2014	11.77%	11.39%	38
2013	48.27%	29.60%	1867
2012	16.30%	13.41%	289
2011	[2.75%]	[0.00%]	[275]

	SPADE Defense Index	S&P500	Alpha (bps)
2010	9.62%	12.78%	[316]
2009	21.71%	23.45%	[174]
2008	[38.03%]	[38.49%]	46
2007	22.17%	3.53%	1864
2006	19.33%	13.62%	571
2005	5.30%	3.00%	230
2004	20.47%	8.99%	1148
2003	37.27%	26.38%	1089
2002	[2.87%]	[23.37%]	2050
2001	0.94%	[13.04%]	1488
2000	4.98%	[10.14%]	1512
1999	15.31%	19.53%	[422]
1998	6.63%	26.67%	[2004]

Price Return by Decade (ex div)

	SPADE Defense	S&P500	Alpha (bps)
2020-YTD	49.01%	62.64%	[1363] (13.63%)
2010-2019	310.26%	189.73%	12,053 (120.53%)
2000-2009	97.07%	[24.11%]	12,118 (121.18%)

About the SPADE Defense Index

The SPADE Defense Index (NYSE: DXS) provides an investment benchmark for the value that the market ascribes to companies involved with defense and its homeland security, and space components.

The Index is designed to reflect the broad diversity of activities that is representative of companies involved with the sector—naval vessels, military aircraft, armored vehicles, helicopters, drones and remotely piloted vehicles, missiles and missile defense, command and control, secure communications, battlespace awareness, intelligence and reconnaissance, information technology, hypersonics, AI, and space systems, as well as national/homeland security activities including border security, biometric screening systems, and military cybersecurity efforts.

SPADE Indexes specializes in designing and managing equity benchmarks for ETF and other products.

Rules

The SPADE Defense Index was designed to be RIC (registered investment company) compliant for the purpose of enabling financial products. Companies are required to meet an eligibility criteria that includes market valuation (>\$250M), listing on a major U.S. exchange, and have sufficient liquidity. Importantly, each firm must be considered systematically important to the defense of the United States and that their defense business is systematically important to the revenues and health of the firm. We follow an enhanced modified market cap methodology that employs the True Cap™ strategy, which enables the index to more accurately handle firms with diversified operations.

Full details are available at: www.spadeindex.com/defense

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US Security Assistance to Ukraine (updated 12 March 2024)

The United States has provided \$44.2 billion in security assistance since Russia invaded Ukraine.

*** Figures remain the same as 27 December 2023 release ***

Air Defense

Patriot Air Defense Battery and Munitions	1
AIM-7, RIM-7, and AIM-9M missiles	No qty listed
Stinger Anti-Aircraft Systems	2,000
Avenger Air Defense Systems	20+
c-UAS mobile laser guided rocket	10
C-UAS Gun Trucks and Ammo	9+
Anti-Aircraft Guns and Ammo	No qty listed
National Advanced Surface to Air Missile Systems	12
HAWK air defense systems and munitions	No qty listed
VAMPIRE counter-UAS and munitions	No qty listed
Air surveillance radars	21

Fires

High Mobility Artillery Rocket Systems (HIMARS) and ammo	39
Precision guided 155mm artillery rounds	7,000+
155mm Howitzers	198
155mm Artillery rounds	2 M +
155mm Rounds of remote anti-armor mine systems	40,000+
105mm Howitzers	72
105mm Artillery Rounds	500,000+
203mm Artillery Rounds	10,000
152mm Artillery Rounds	200,000+
130mm Artillery Rounds	~40,000
122mm Artillery Rounds	40,000
122mm GRAD Rockets	60,000
120mm Mortar systems	47
82mm Mortar systems	10
81mm Mortar systems	1212
60mm Mortar systems	58
Mortar Rounds	400,000+
Counter Artillery and Counter Mortar Radars	70+
Multi-Mission Radars	20

Maritime

Harpoon Coastal Defense Systems	2
Coastal and Riverine Patrol Boats	62
Unmanned coastal defense vessels	No qty listed

Other

Night vision devices, surveillance systems, thermal imaging optics, laser rangefinders (thousands); generators, satellite communications terminals and systems; commercial satellite imagery; satellite communications antennas (4); port and harbor security equipment, M18A1 Claymore anti-personnel munitions; armored utility trucks (6), 25mm Ammunition rounds (1.8M); explosive ordnance disposal equipment and protective gear, medical supplies, CBRN (chemical, bio, radiological, and nuclear) protective equipment, UAS radars (2)

Ground Maneuver

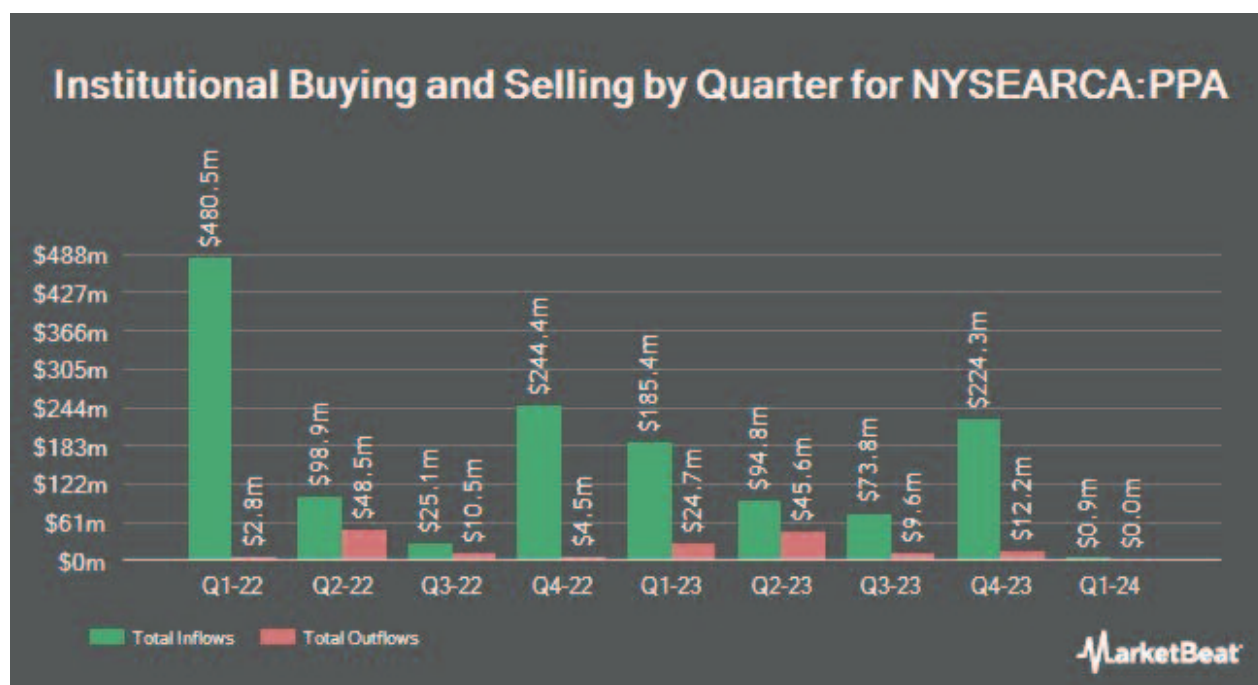
Abrams Tanks	31
T-72B Tanks	45
Bradley Infantry Fighting Vehicles	186
Bradley Fire Support Team Vehicles	4
Stryker Armored Personnel Carrier	189
M113 Armored Personnel Carrier	300
M117 Armored Security Vehicles	250
MRAPS Mine Resistant Ambush Protected Vehicles	500+
High Mobility Multipurpose Wheeled Vehicles	2,000+
Light Tactical Vehicles	200+
Armored Medical Treatment Vehicles	300
Trucks/Trailers to Transport Heavy Equipment	80/124
Command Post Vehicles	10
Tactical Vehicles to Tow Weapons	800
Tactical Vehicles to Recover Equipment	131
Ammunitions Support Vehicles	30
Logistics Support Vehicles	8
Mine clearing equipment and systems	No details
Armored bridging systems	18
Fuel tankers / Fuel trailers / Water trailers	239 / 105 / 58

Anti-armor and Small Arms

Javelin Anti-Armor Systems	10,000+
Other Anti-Armor Systems	90,000+
Tube-launched optically tracked Wire-guided TOW missiles	9,000+
Grenade launchers and small arms	35,000+
Rounds of small arms ammunitions and grenades	400M +

Aircraft and Unmanned Aerial Systems

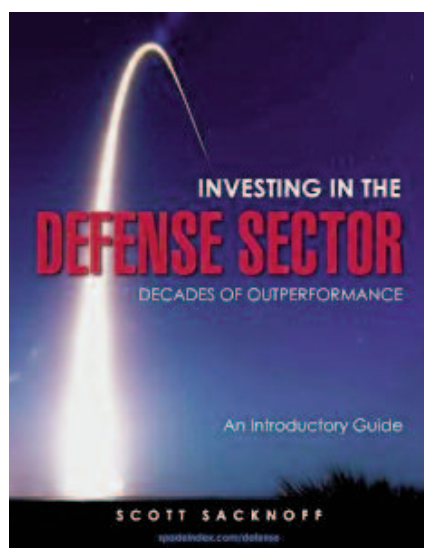
Mi-17 Helicopters	20
Switchblade Tactical Unmanned Aerial Systems	No qty listed
Phoenix Ghost Tactical UAS, Penguin UAS	No qty listed
UAS: CyberLux K8, Altius-600, Jump-20, Hornet	No qty listed
Puma and Scan Eagle Unmanned Aerial Systems	No qty listed
Hydra-70 Aircraft Rocket	20,000+
Zuni Aircraft Rockets	6,000+
High-speed anti-radiation missiles	No qty listed
Precision Aerial Munitions	No qty listed



	31 Dec 2021	31 Dec 2022	31 Dec 2023	31 March 24
PPA AUM	\$648 M	\$1,668.3 B	\$2,621.3 B	\$3.0286 B

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