



2022 Was a Monster Year for Aerospace & Defense Investors!
Year-End Review, 2023 Forecast, Black Swans & Wall of Worries to Watch

- S&P 500 – Down 19.4% / NASDAQ 100 – Down 31.1%/SPADE Defense Index – **Gained 8%+**
- Assets invested into ETF tracking SPADE Defense Index – Rose Nearly 200% to \$1.7 Billion
- Current Defense Department Budget Rises to Record \$817 Billion – Up 9% (~\$80 Billion)
- European Ally Defense Spending Soars in 2022 and 2023 in Response to Russian Invasion
- Commercial Airline Orders Rising: Post-Pandemic Air Travel and Air Cargo Levels Return
- The Top 10 in 4Q22 Saw Stock Gains Ranging from 26.2% to 176.4% [in the Quarter]

Commentary

“Have to admit...who would have thought a year ago that 5% of the US defense budget would destroy well over 50% of Russia’s military in less than a year (and without US boots on the ground.) And we are still holding back the really good stuff.”

– blog post on SeekingAlpha, KC-Phx 1/13/23

“We find it to be one of the more difficult times we’ve seen to make a call on defense stocks. Geopolitics are tense, but could deescalate...it will be easy to have a decelerating or negative growth rate at some point.”

– Noah Poponak, Goldman Sachs (Most online comments disagreed heartily.)

* * *

Our Prediction

We anticipate 2023 will be another year of the SPADE Defense Index outperforming the broader markets...especially if there is a recession in the United States. This forecast is fueled by increased spending on military and defense products by the United States, rising international sales to its allies, and continued growth in commercial aerospace and space markets.

Reviewing our 2022 Predictions

When 2022 began, we forecasted that gains in the SPADE Defense Index would beat the broader stock market...but the 28% outperformance surpassed any expectations.

Continued on page 2

More Reading

<https://www.defensenews.com/opinion/commentary/2022/03/21/how-sanctions-on-russia-impact-western-defense-companies/>

<https://www.investorideas.com/news/2022/defense/01121Stocks.asp>

SPADE Defense Index Statistics

12/31/22 Close	9180.25
12/31/21 Close	8456.65

All-time Intraday High:	
2 December 2022	9409.11

All-time Closing High:	
2 December 2022	9388.08

Price Return	SPADE Defense	S&P500
2022	8.56%	[19.44%]
4Q22	21.48%	7.08%
3Q22	[7.84%]	[5.28%]
2Q22	[10.44%]	[16.45%]
1Q22	8.25%	[4.95%]

**SPADE Defense Index
December 2022 Rebalance**

There were no changes to the Index holdings.

Corporate Actions Affecting the Index During the Quarter

Leonardo DRS closed its acquisition of RADA Electronics in late November. The ticker for this changed from RADA to DRS.

Dividend

Invesco’s Aerospace & Defense ETF issued a dividend of \$0.075 on 19 December 2022. YTD, \$0.647 was been 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) began trading in November 2019.

Commentary (continued from page 1)

We did predict the possibility of a Russian invasion of Ukraine but thought it unlikely. We also hit on predictions that inflation and rising interest rates would impact the market but didn't foresee how fast and how high it would go. Increasing China/Taiwan tensions, the rise of fascist-leading political leaders, an Afghanistan in crisis after the US pulling out its troops, and North Korean saber rattling have all happened to some degree, but none have directly impacted investors.

With all the attention focused on economic news (inflation and rising interest rates) and soaring energy prices (and the gains by oil companies)—even with regular war news from the Ukraine—most people (especially financial reporters) seemed to be oblivious to how good a year defense stocks had in 2022. In a year when the S&P500 was down nearly 20% and the NASDAQ 100 declined by more than 30%, the SPADE Defense Index GAINED 8%+. The Index has displayed remarkable stability over the past 20+ years—outperforming the broader US market by 120%+ in each of the past two decades and we believe it will outperform this decade as well. Near-term, 2023 should be another banner year for defense stocks...but there is always the potential for a black swan event that could derail this.

Top market gainers in 2022

- ATI (formerly Alleghany Technologies) 87.45%
- Maxar Technologies 75.21%
- Northrop Grumman 40.96%
- Aerovironment 38.09%
- Parsons 37.44%

Our Thoughts on 2023

#1 Perception: The defense budget will decline significantly in 2024 as the Republican-controlled House of Representatives seeks to reduce total spending by the US government.

Our View: After decades of stating that their party is strong on defense, many think it would be political suicide for Republicans in the US House to cut spending on defense, especially in a presidential election year. Could US House Republicans and Democrat progressives stand together and find a common ground that

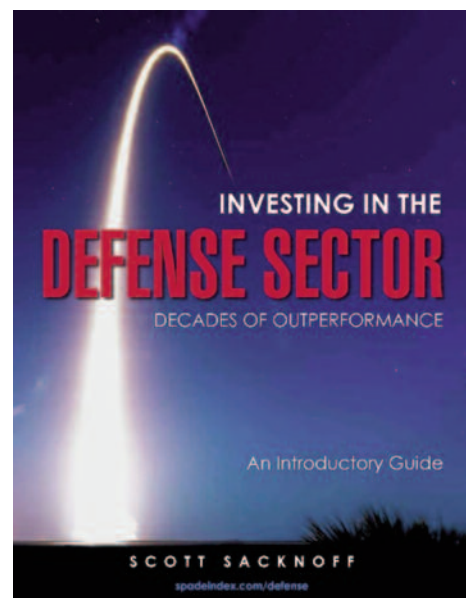
enables them to reduce defense spending? Certainly, but it is highly unlikely. The question investors should ask is which is more probable—US House Republicans vote to reduce defense spending during a time of conflict or any of the following: Putin gets Belarus to join in the attack of Ukraine, Russia invades Finland, a China/Taiwan military conflict starts, or Congressional staffs determine China is no longer a threat?

According to *Bloomberg News*, implementing a total discretionary cap would lead to chaos and unpredictability as Democrats in the House and Senate would never support a plan that significantly curtails domestic spending, especially Social Security, Medicare, and Medicaid. This leaves two possibilities—a cut in defense or a US government funded through continuing resolutions which would handicap the Pentagon (Ed: This would limit how they allocate funds for operations and procurement of

Continued on page 3

Download a free copy of our 56-page guide, *Investing in the Defense Sector*

https://spadeindex.com/Files/Investing_Defense_Sector_Guide.pdf



A complete archive of *The SPADE Investor* including our commentaries and industry data can be found at—
[www.spadeindex.com / defense](http://www.spadeindex.com/defense)

weapons, essentially making the agency less flexible to handle threats). Slashing defense also wouldn't sit well with GOP defense hawks on the Armed Services and Appropriations committees that have spent years pushing for major increases in national security. The increase in FY2023 spending for defense underscored bipartisan concerns about strategic competition with China and the Russian invasion of Ukraine.

Ultimately, putting a cap on 2024 discretionary spending at 2022 levels would mean returning national defense spending to the \$782B level in FY2022. This would roughly be a \$75 billion decline; some of which would come from a planned reduction in troop levels. Thus, revenues by US defense contractors would be roughly equal to this most recent year, offset by a revenue boost provided by growing international sales to NATO and other US allies as well as an expanding market for commercial aerospace and space products and services.

#2 Perception: The War Between Russia and Ukraine will end sooner than later.

Our View: As the war approaches the one-year mark, this war has been a slugfest and neither side appears willing to budge in their belief that they must be victorious. Russia has shown incredible operational weakness, which along with the use of poorly trained soldiers, has resulted in an extended conflict. A much smaller Ukrainian force has held Russia at bay and made them look foolish on the international stage. Even so, considering the massive damage being wrecked on Ukraine's infrastructure, there is a great concern about how long Ukrainian forces can hold out. But there are a lot of wildcards. How will the fighting be impacted by the winter cold and storms? How many and how quickly will European and US tanks be delivered to Ukrainian forces? Will Russia be successful in getting Belarus to join in the fight? Will internal strife led by Russian oligarchs lead to Putin's downfall or death? Will the US and NATO acquiesce and provide Ukraine with the long-range missiles and tactical drones that they seek?

#3 Perception: If Russia wins the war in Ukraine, things will return back to the prior status quo.

Our View: While that may have been the case after Russia annexed Crimea in 2014, the brutality and destruction wrecked upon Ukraine over the past year has truly changed the beliefs of leaders throughout Europe. If Russia is to emerge victorious, the world will be seen as less safe and Vladimir Putin a greater threat. Moldova, Finland, Kazakhstan could be among his next targets.

"It won't end with Ukraine. The whole of Europe could be at risk if Russia isn't challenged," – Dutch Prime Minister Mark Rutte speaking to the 2023 World Economic Forum

#4 Perception: Once the war between Russia and Ukraine concludes, defense spending will decline.

Our View: Spending for defense rises when threats exists and when safety and security are challenged. There is little doubt that the European Union and NATO nations will continue to ramp up their defense budget for the near future. Billions will be needed by the US and its allies to replenish equipment and supplies used in this conflict. Analysts also are worried that, win or lose, the risk that Russian nuclear weapons will be used by the Kremlin or an unaffiliated party will become a greater.

"The loss of a nuclear power in a conventional war can provoke the outbreak of a nuclear war. Nuclear powers do not lose major conflicts on which their fate depends. This should be obvious to anyone. Even to a Western politician retaining only some trace of intelligence."

– Former Russian President Dmitry Medvedev

#5 Perception: Money and hardware sent by the United States to the Ukraine is a waste.

Our View: Supporting the Ukraine with weapons and resources is a low-cost means of engagement. It keeps US troops out of harm's way and, as a commenter on the financial blog site Seeking Alpha said, "5% of the US defense budget helped Ukraine destroy 50% of Russian military assets."

PPA Dividend History

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

#6 Perception: This is a typical war.

Our View: No, at least not compared to US engagements in recent years. Over the past few decades, the trend has been toward lower intensity conflicts where airpower, precision targeted weapons, and space and information assets played a more important role. The Russia-Ukraine war has been an “old-school,” resource-intensive conflict—a ground-based battle where ammunition use is high and hundreds or thousands of shells are fired every day. Once the war concludes, the United States and its western allies must restore their stockpile of missiles, ammunition, air defense systems, and other weapons.

“We went through six years of Stingers (missiles) in 10 months,”
Gregory Hayes, CEO, Raytheon

#7 Perception: The United States will never directly enter the Russia-Ukraine war.

Our View: In the middle of the prior century, there was a lot of disbelief about the war crimes and atrocities being committed by the Nazis. It took years before the US chose to take direct action. At the time, many thought it highly unlikely that the US would ever commit troops and engage in a war so far from home, especially so soon after WWI. A similar view is held by many today and that only a direct action against the US (like Pearl Harbor) or a NATO ally would force our hand to engage. What the tipping point is for US to enter the war directly is not yet known, but we should not think it beyond the realm of possibility.

#8 Perception: A recession is coming in 2023, so all stocks will do poorly.

Our View: A surge in defense spending should help to mitigate the considerable risks facing the stock market in 2023. Aerospace and Defense is a critical sector that should be insulated from the many risks to equities.

For more than 25 years, investors in the aerospace and defense sector have been continually rewarded. Their patience holding through any period of underperformance (sometimes a positive gain that just underperformed the market) have been quickly rewarded as the SPADE Defense Index rebounded to new highs—historically within three years’ time. There was never a “lost decade.” The SPADE Defense Index has seen gains that have bettered the broader market by 120%+ in each of the past two decades.

Conclusion: There are several black swan events that could derail 2023—i.e., Congressional delays to raise the debt ceiling; a failure to approve a budget for FY2024 that shuts down the government; a deal that provides significant cuts to US defense spending; an event that significantly curtails air travel (COVID-23? Aircraft design issues? Attacks on commercial flights?)—and there is always a possibility that investors rotate out of the sector for any number of reasons creating a self-fulfilling decline. However, from a sales and product/service need standpoint and a primary client immune to recessionary forces (i.e., governments can literally print their own money), the aerospace and defense sector is well-positioned to have a solid 2023 and outperform the broader market.

* * *

Geopolitical and Economic Wall of Worry 2023

(in no particular order)

What Came True in 2022

- Russia invades Ukraine
- Inflation and Interest Rates: how fast, how high? (Faster and higher than predicted)
- Rise of fascist-leaning political leaders worldwide (Italy=yes, Brazil=no, US-midterm elections-not to the degree that some predicted)
- North Korea saber rattling (They had planes fly along the demilitarized zone and “test” fired rockets, but most people didn’t pay attention to the degree they had hoped)
- Afghanistan: The crisis after the conflict. What direction does it take? (The nation enacted fundamentalist policies, especially detrimental to women, however, it has not spilled over outside their borders).
- A significant cyber war incident traced to a nation/state (yes to cyber attacks, no to a major incident)

Additional Holdovers from 2022

None of these happened but all of these remain a concern

- President Joe Biden takes ill
- China annexes Taiwan (Not yet, but China did continue to rattle their sabers and engage Taiwan’s defenses)
- Russia invades Kazakhstan
- Russian submarines disrupt undersea communications cables (a concern raised by the UK)
- A worsening China-US cold war relationship impacts currency / debt markets
- Iran’s nuclear development
- Mid-East conflagration (pick your combatants)
- US social unrest leads to armed conflicts or terrorism (Germany stopped a “Q”-esque conspiracy to overthrow of their government and Brazil saw their capitol experience a January 6th type incident following elections there)
- New variant of COVID has Omicron-like spread but more deadly
- After years of quiet due to pandemic travel restrictions, a terrorist incident targets a Western nation(s)

New Threats

- The Republican-controlled US House of Representatives votes to reduce defense outlays as part of its plan to control budget deficit spending. Can they structure a plan that limits reductions in social spending in a way that Democrat progressives, which support reduced defense spending, will agree to it?

*In 2022, we wondered if a Democratic-controlled Congress would target defense spending to pay for social programs. With the Russia-Ukraine war happening, they decided instead to **significantly boost** military spending and provide military and social aid to Ukraine*

- Belarus joins Russia in its invasion of Ukraine
- Russia invades Finland? Moldova?
- Turkey attacks the Kurds in Syria
- Iran manufacturing facility is attacked to prevent its drones being sold to Russia
- Israel destroys nuclear facilities in Iran to prevent them from developing weapons
- Social unrest in Iran overthrows the existing regime
- Resolution of war in Ukraine leads investors to pull their investments in the sector
- Supply chain issues continue and delay production on certain projects. This causes individual firms to write down losses

4Q22 Leaders

1	Maxar Technologies	176.39%
2	Boeing	57.33%
3	AXON Int'l	43.35%
4	Aerojet Rocketdyne	39.86%
5	General Electric	35.34%
6	Spirit Aerosystems	35.04%
7	Leonardo DRS	32.71%
8	Honeywell Intl	28.35%
9	Howmet	27.42%
10	CAE	26.16%

4Q22 Laggards

1	Telos Corp	-42.74%
2	Palantir	-21.03%
3	Kaman	-20.16%
4	Planet Labs	-19.89%
5	Elbit Systems	-13.74%
6	L3 Harris	0.18%
7	Kratos Defense	1.57%
8	Aerovironment	2.76%
9	Huntington Ingalls	4.14%
10	ViaSat	4.70%

Morningstar Says:

PPA is a Five-Star Fund *****
Avg Risk in the Industrials Category

2022 Results

1	Alleghany Tech	87.45%
2	Maxar Technologies	75.21%
3	Northrop Grumman	40.96%
4	Aerovironment	38.09%
5	Parsons	37.44%
6	Lockheed Martin	36.88%
7	Leonardo DRS	35.67%
8	SAIC	32.71%
9	Iridium	24.49%
10	Howmet	23.81%
11	Huntington Ingalls	23.53%
12	Booz Allen	23.27%
13	BWX Technologies	21.30%
14	Curtiss Wright	20.42%
15	Aerojet Rocketdyne	19.61%
16	General Dynamics	19.01%
17	Leidos	18.32%
18	Raytheon Tech.	17.27%
19	AAR	15.04%
20	Hexcel	13.61%
21	CACI	11.66%
22	KBR	10.88%
23	Moog	8.39%
24	Ducopmmun	6.82%
25	Heico	6.53%
26	AXON Int'l	5.69%
27	Honeywell	2.78%

28	TTM Technologies	1.21%
29	Transdigm	-1.04%
30	L3 Harris	-2.36%
31	Boeing	-5.38%
32	Elbit Systems	-5.79%
33	Textron	-8.29%
34	Teledyne Tech.	-8.46%
35	Parker Hannifan	-8.53%
36	V2X	-9.79%
37	General Electric	-11.31%
38	Woodward	-11.74%
39	Jacobs Engineering	-13.76%
40	OSI Systems	-14.68%
41	Keysight Tech.	-17.16%
42	Mercury Computer	-18.74%
43	Oshkosh Truck	-21.75%
44	CAE	-23.38%
45	ViaSat	-28.94%
46	Planet Labs	-29.27%
47	Spirit Aerosystems	-31.31%
48	Triumph Group	-43.23%
49	Kratos Defense	-46.80%
50	Ball Corp	-46.88%
51	Kaman	-48.32%
52	Comtech	-48.75%
53	Palantir	-64.74%
54	Telos Corp.	-66.99%

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

Exchange / Ticker Symbol:	NYSE / PPA
Assets (12/31/22)	\$ 1.7B
Closing Price (12/31/22)	\$78.40
Dividend Yield*	1.10%
4Q22 Volume	10,795,900
Turnover*	26%
Morningstar Rating	***** (5-Star)

source: * Morningstar & ** Yahoo Finance 12/31/22

Portfolio Price / Earnings*	21.54
Portfolio Price / Book*	3.21
Portfolio Price / Sales*	1.70
Portfolio Price / Cash Flow*	16.56
Beta (3-year) *	1.00
Alpha (3-years)*	6.98
R-squared (3 years)*	60.68
Long-Term Earnings*	8.76%
Historical Earnings*	7.09%
Sales Growth*	[3.23%]
Cash Flow Growth*	[2.15%]
Book Value Growth*	7.64%

source: * Morningstar 12/31/22

Capture Ratio*	3-Yr	5-Yr	10-Yr
Upside	108	115	118
Downside	71	103	102

By the Numbers

\$858B President Biden signed into law federal spending legislation with this amount for defense, up 9.7%

\$70B Textron's Bell division was selected by the US Army to be the prime contractor for the Future Long-Range Assault Aircraft, a program with a potential long-term value of \$70B and a "generational win" for the firm.

\$44B Amount in the 2023 Omnibus budget bill devoted to aid for Ukraine, primarily military equipment and funding to replenish US stockpiles. This would bring US aid to \$100B+ so far.

\$25.4B Budget for NASA in 2023, up 5.6%.

\$8.4B Germany confirmed it will acquire 35 F-35s.

\$7.8B Lockheed Martin for 127 F-35 Lot 16 aircraft.

\$5.1B General Dynamics Electric Boat from the US Navy for spare parts and sustanment on Columbia class submarines and industrial base development.

\$4.7B Proposed amount L3Harris plans to spend to acquire Aerojet Rocketdyne. General Electric and Textron were among the bidders according to the *Wall Street Journal*.

\$3.75B US Defense Security Cooperation Agency agreed to a sale of 116 M1A1 Main Battle Tanks plus support vehicles to Poland

\$3.2B Boeing from NASA for Space Launch Systems core and upper stages that can be used on future moon missions.

\$3B US Air Force Special Operations Command plans to buy 75 modified AT-802U Sky Warden aircraft (OA-1K) offered by L3Harris and Air Tractor. Emirates Airlines for 5 new 777-200LR planes.

\$1.7B Boeing from Ibit Systems from an unnamed defense customer

\$1.5B US Defense Security Cooperation Agency agreed to a sale of 18 CH-47F Chinook helicopters to South Korea along with associated equipment.

\$1.2B Raytheon from the US Army for six additional National Advanced Surface to Air Missile System batteries for the Ukraine.

\$1.1B GE from the US Navy for parts and services for F/A-18 aircraft.

\$1.02B Lockheed Martin for 118 Lot 18 F-35 aircraft

\$1B Qatar is requesting to purchase 10 fixed-site, low, slow, small unmanned aircraft system integrated defeat systems and 200 Coyote Block 2 interceptors from the US. Raytheon and Northrop Grumman would be the prime contractors on the deal, if approved.

\$886M L3Harris from the US Army Communications-Electronics Command to support intelligence, surveillance, and reconnaissance capabilities.

\$619M Pratt and Whitney (Raytheon) from the US Navy for F-35 propulsion system parts.

\$497M Boeing from the US Army for CH-47F helicopters over the next three years.

\$428M US State Department agreed to a sale of aircraft parts to the Taiwan Air Force.

\$406M Northrop Grumman from DoD for operational support of intelligence activities.

\$397.7M Raytheon from the US Naval Sea Systems Command for next-generation shipboard missiles to counter threats from aircraft and missile. Block 2 RIM-162 Evolved Seasparrow Missiles and dual-mode X-band radar.

\$334M Leidos from the USAF Research lab for R&D related to the Mayhem expendable hypersonic platform.

\$323.3M Raytheon from Finland for 40 AIM 9X Block II tactical missiles and 48 AGM-154 Joint Stand-Off Weapons systems

\$200M Elbit Systems from an unnamed defense customer in the Asia-Pacific region for Passive Airborne Warning System and Mini-MUSIC direct IR countermeasures to protect military helicopters from shoulder-fired missiles.

\$78M Ball Aerospace from US Space Force to build a second Weather System Follow-on Microwave satellite

**Total Return
(Annual %)**

	SPADE Defense Index
1-Yr	9.51%
3-Yr	5.62%
5-Yr	8.76%
10-Yr	15.33%
15-Yr	9.87%
Inception	11.26%

Through 12/31/2022
(Morningstar)

Index Performance (ex div)

	SPADE Defense Index	S&P500	Alpha (bps)
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]
2010	9.62%	12.78%	[316]

	SPADE Defense Index	S&P500	Alpha (bps)
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)
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, 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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