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Defense Spending Outlook

2025

Europe the Focus as Global Tensions Mount and US Elects Trump

Europe may need to almost double its defense spending to $720 billion a year to meet the challenge of Russian aggression on its doorstep, particularly as US support appears uncertain. European NATO nations need greater military capabilities if they hope to press foreign policy divergent from the US, with the incoming administration of Donald Trump bringing isolationist tendencies, focusing on engagement in the Pacific and Mideast and managing budget limitations. Ground forces appear to be most depleted, which could lead to sustained purchases of battle tanks, artillery pieces and infantry fighting vehicles from companies such as BAE Systems, General Dynamics, Rheinmetall, Krauss Maffei-Wegmann and Leonardo. Support aircraft such as tankers, cargo and sub-hunters are also lacking and could be purchased from Airbus, Boeing and Dassault. Fighter aircraft are in a better position, though top-ups are likely from the Eurofighter consortium (Airbus, Leonardo, BAE Systems), Viggens from Saab, F-35s from Lockheed Martin or even F-15s from Boeing.

- **Multiyear Trend:** European NATO's defense reinvestment may take more than 10 years given the region's production capacity diminished significantly during decades of underinvestment.
- **Buying at Home:** Purchasing from European contractors could limit fiscal damage via multiplier effects, though the region's smaller defense industrial base probably won't be able to supply all that's needed in the near to medium term.
- **US Contractors Gain**: US defense primes and contractors will likely gain as well, with a much larger defense industrial base that makes battle-proven products, boosting their allure. Larger production runs help drive down costs of manufacturing and development.

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More detailed analysis and interactive graphics are available on the Bloomberg Terminal

Section 1. Executive Summary

$200 Billion
Needed investment in armor and aircraft

10 Years
How long reinvestment in defense capabilities and production could take

10%
European defense contractors' P/E gap to US defense primes

A Wake-Up Call for European Defense Spending

The 15 largest European members of the North Atlantic Treaty Organization might have to ramp up military investment by as much as $340 billion annually to $720 billion as they manage threats on their doorstep and prepare to conduct a divergent foreign policy from the US. The election of Donald Trump may disrupt trans-Atlantic relations as he presses NATO to spend more on defense, even as a Republican-run government turns increasingly isolationist, the focus shifts to threats in the Middle East and Asia, and the federal budget is at records for debt and deficit, which limits military spending. Though European budgets are stretched, we believe core NATO countries could afford significant spending increases, with the impacts on debt and deficits eased by local equipment production. Consolidating Europe's fractured purchasing of home-built military gear would help. Based on lessons learned from Russian's invasion of Ukraine, European NATO's needs include at least $200 billion in armor and aircraft from companies such as BAE Systems, Airbus, Boeing, Saab and General Dynamics.

Key Research Topics

- **Production Capacity Depleted:** Europe has underinvested in its militaries since the end of the Cold War, requiring an extended period of investment to reconstitute fighting forces. Contractors' backlogs are swelling, though products will be built over several years since aerospace and defense supply chains are already stretched.
- **European Contractors Favored:** Regional manufacturers such as BAE and Leonardo will likely receive orders when their technologies are close to state of the art. Other contractors like Rheinmetall will see additional gains as US equipment is partially built in the region. We expect defense products with high costs and large run rates to be built in the region to boost local economies and offset increased government debt.
- **Real Risk Will Require US Products:** US products, such Lockheed's F-35 fighter and Precision Strike Missile or Boeing's Apache attack helicopter, may get the nod in some cases, given they have better capabilities after being developed over decades and tested in battle.

Performance and Valuation

Shares of European defense companies have outperformed those of US defense prime contractors and the broader markets this year, with an average 50% increase compared with gains of 20% for US peers, 26% for the S&P 500 and 5% for the STOXX Europe 600. The performance reflects expectations of rising European defense spending, primarily due to two factors: The first is a multiyear investment cycle that should boost the top- and bottom-lines for the region's defense contractors, and the second is the uplift from commercial aerospace since European companies are less pure play than US peers. Valuations for both groups are near peaks, with European peers commanding a 21x forward P/E multiple and US defense primes trading at 20x. The European defense contractors' historical 10% valuation discount has evaporated, instead inflecting to a 5% premium.

Section 2. Catalysts to Watch

Extended Order Gains

European defense budgets are poised to continue rising, with orders to be placed with contractors in both Europe and the US. Boosting these military postures will take years of investment, training and production, leading to expanding backlogs. Gains for US contractors will likely be smaller as home-country counterparts are favored. Europe's production capacity needs to be ramped up, though supply chains are already burdened by demand from commercial aerospace and constraints such as talent shortages.

Critical Milestones:

- **January-February 2025:** Rising backlogs and defense revenue to be reported during earnings at key European and US military contractors including, Leonardo, BAE Systems, Rheinmetall, Airbus, Rolls-Royce, Saab, Lockheed Martin, RTX, Northrop Grumman and Boeing
- **Mid-2025:** German, Polish, French, Italian and Spanish draft 2026 budgets, which should include increased defense spending
- **July-August 2025:** Pivotal defense companies including, Leonardo, BAE Systems, Rheinmetall, Airbus, Rolls-Royce, Saab, Lockheed Martin, RTX, Northrop Grumman and Boeing Rising will report backlogs and defense revenue earnings.
- **Autumn 2025:** UK draft defense budget likely to include increased spending

Section 3. European Defense Spending

No US? Rearmed Europe Could Add $2.8 Trillion to Debt

European defense spending could undergo a sustained expansion following Russia's invasion of Ukraine, as Trump's election puts US support in doubt and its military is weighed down by budget challenges and focused on China, aiding revenue for Leonardo, Airbus, BAE Systems, MTU and Rolls-Royce. We calculate that spending could rise by hundreds of billions of dollars if significant threats persist, yet aligning key European defense budgets to the US level — 3.3% of gross domestic product — could add up to $2.8 trillion to the debt load by 2034.

3.1 Russia, US Limits May Drive European Defense Spending

Less than three years into its invasion of Ukraine, Russian aggression has already spurred increased defense spending in Europe. However, more may be required to support Ukraine, counter Moscow's broadly aggressive regional posture and address deepening strategic competition with China.

These factors have given impetus to European calls for greater strategic autonomy, especially with the US increasingly concentrating on China and the Middle East. Considering NATO members' defense spending is approaching NATO's modest 2% target, getting there will likely require major spending increases.

Defense spending by NATO's 15 biggest European members jumped about 20% in 2023 from a year earlier, according to the Stockholm International Peace Research Institute (SIPRI), yet still trails the US. As noted in Figure 1, the group spent 1.8% of GDP on defense, equaling about $380 billion, vs. budgeted US outlays of 3.3% of GDP, or $905 billion. By comparison, Russian President Vladimir Putin has doubled his country's military budget since 2001 to 6% of GDP.

To meet NATO's 2% goal, the group's spending needs to rise about $30 billion to $410 billion, based on 2023 data. Yet given Europe's wealth, population size and increased risk, we believe spending closer to that of the US is appropriate and the newly elected US President will likely push for it. The 15 nations account for about 80% of European NATO's defense spending, generate about 80% of US nominal GDP and have a population about 1.75 times larger.

Outlays commensurate with GDP would be a robust step, though might be unlikely in the near term given fiscal constraints, requiring an almost doubling to add $340 billion. As Figure 2 shows, that could lead to a significant increase in total debt by 2034, potentially mitigated by the economic boost from domestic defense industries.

Europe still wouldn't get as much capability as the US for that amount of spending since it's so fractured among the allies, burdened by duplicative leadership structures and inefficiencies like lower purchasing volume and less-capable military equipment. Bridging the difference by only half as much, or $170 billion, would still be significant, adding more than two Lockheed Martins by sales to the global defense industry.

Potential growth in European defense spending will likely depend on the size of the threat and the level of US backing. If Russia's invasion of Ukraine is prolonged, we believe European nations will be far more likely to spend well above 2% of GDP on defense. Trump's victory in the November presidential election could also motivate European governments to boost spending, given his oft-repeated promise to withdraw support for NATO unless its members increase their defense spending.

Conversely, if Russia's invasion ends in defeat and withdrawal, which currently doesn't seem likely, the impetus to spend could sharply decline.

European NATO members may already be well invested in personnel, meaning increased spending might go disproportionately toward munitions and weapons systems. Key European NATO members have more than 2.4 million military personnel, including reservists and similar positions, vs. the US military's 1.8 million. That may be deceiving, given Turkey accounts for 600,000 troops; without them, Europe would be at parity with the US.

Force projection could regain importance for European militaries due to diminished US capabilities, making fighters, bombers, transports and aerial tankers critical. European fighter programs (Eurofighter and Dassault Rafale) lack stealth, leading to robust US F-35 sales. Development programs need to be consolidated to improve competitiveness given Europe has two sixth-generation fighters in development: the Global Combat Aircraft Program from the UK and Italy and the Future Combat Air System from France, Germany and Spain.

No European bomber programs exist, and aerial tanker and transport fleets are small. This could mean more opportunities for aerospace companies including Airbus, Safran, MTU, Rolls-Royce, BAE and Dassault.

European NATO members may need to invest in ships as the US fleet leans toward the Pacific Ocean rather than the Atlantic. Ship manufacturers that could benefit include BAE, Fincantieri, ThyssenKrupp and Saab, along with propulsion providers like Rolls-Royce and MTU. Though the naval balance of power appears to favor the US and its allies, the US Navy has deployed most of its fleet to the Pacific as a counterweight to China.

Russia appears focused on its invasion of Ukraine and might not have the budget to maintain its navy. Ships have the longest production lead times and are typically built by home-country contractors. Most of Europe's fleet is from France, the UK and Germany, which isn't likely to change. Greece and Turkey have sizable navies, yet they're showing their age and have fewer capabilities.

Air defense could be an area of considerable growth for European defense companies in an age of ballistic and hypersonic missiles, as well as drone threats. US defense primes have bolstered backlogs with Patriot sales, presumably as the Eurosam consortium has limited capability to build similar SAMP-T systems.

Eurosam is jointly owned by MBDA – a joint venture of Leonardo, Airbus and BAE – and Thales Air Defence. SAMP-T has limitations on radar range, while Raytheon's Patriot program benefits from the imprimatur of the US Department of Defense. Europe has spent $48.8 billion on Patriot systems since 2010 – more than half of total overseas sales of $90.1 billion – led by Poland's $29.5 billion.

Figure 1: US, European NATO Defense Spending

	Nominal GDP (USD) 2023	Percent of Total	Military Expenditures (USD) 2023	Military Spend as % of GDP 2023	Growth Rate	Nominal GDP (USD) 2022	Military Expenditures 2022	Military Spend as % of GDP 2022
United States	27,360		905	3.3%	8.0%	25,744	838.00	3.4%
Europe NATO Members Total	20,703	100.0%	380	1.8%	20.3%	19,027	316.0	1.7%
France	3,032	14.6%	61.3	2.1%	14.1%	2,780	53.7	1.9%
United Kingdom	3,345	16.2%	74.9	2.3%	16.9%	3,100	64.1	2.1%
Germany	4,457	21.5%	66.8	1.5%	18.8%	4,086	56.2	1.4%
Italy	2,256	10.9%	35.5	1.6%	2.2%	2,069	34.7	1.7%
Spain	1,581	7.6%	23.7	1.5%	16.6%	1,419	20.3	1.4%
Poland	808	3.9%	31.6	3.8%	106.3%	688	15.3	2.2%
Turkey	1,109	5.4%	15.8	1.5%	46.6%	906	10.8	1.2%
The Netherlands	1,117	5.4%	16.6	1.5%	21.6%	1,010	13.6	1.4%
Greece	238	1.2%	7.7	3.2%	-12.1%	218	8.8	4.0%
Norway	486	2.3%	8.7	1.6%	-0.3%	594	8.7	1.5%
Sweden	593	2.9%	8.8	1.5%	13.4%	590	7.7	1.3%
Belgium	630	3.0%	7.6	1.2%	10.7%	584	6.9	1.2%
Denmark	405	2.0%	8.1	2.0%	48.8%	400	5.5	1.4%
Romania	346	1.7%	5.6	1.6%	8.1%	301	5.2	1.7%
Finland	301	1.5%	7.3	2.4%	65.3%	282	4.4	1.6%
Remaining 15 Countries						1,361	20.87	1.4%

Source: SIPRI, CIA Factbook, Bloomberg Intelligence

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The UK, Germany and France lead European NATO defense spending

Figure 2: The (High) Price of More Defense by 2034

(USD Billion)	Debt Under Baseline Defense Spending	Additional Spending Under 2.6% Scenario	Additional Spending Under 3.3% Scenario
UK	5,516	134	447
France	5,197	193	463
Italy	4,636	301	511
Germany	3,299	573	948
Spain	2,363	229	375
Poland	741	6	68
Total	21,753	1,436	2,813
Total (with Growth Effects)	21,753	613	1,177

Source: Bloomberg Economics

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3.2 European Debt Might Constrain Defense Spending

Debt may serve as a constraint on increased defense spending. Even without the new investments, Europe's big sovereigns can expect debt to grow significantly. Combined debt for the six largest European NATO members is already on track to reach $22 trillion by 2034, with Italy's exceeding 145% of GDP.

An overriding factor has been relatively weak economic growth since the pandemic. Other drivers include rising interest rates, increased social spending due to aging populations, and growing demands to spend on climate action and economic competitiveness.

These debt dynamics pose risks to defense budgets and other government priorities. If the US reduces its commitments to NATO or Ukraine, Europe's current defense spending would be inadequate fill the gap. Still, security worries could prompt European leaders to compensate for US military capabilities – especially high-tech platforms – by aligning spending to the US defense budget, at about 3.3% of GDP.

That would require nearly doubling collective defense budgets to around $720 billion from $380 billion. Countries like Germany and Poland could manage the jump, given their relatively low debt levels, highlighted in Figure 3. But France, Italy and Spain – where debt-to-GDP ratios exceed 100% – would have to borrow heavily or make tough budgetary trade-offs to reach 3.3%.

If fresh defense spending is entirely funded by borrowing, the big six European economies' collective debt could jump an additional $2.8 trillion above baseline forecasts by 2034. As Figure 4 shows, most of the countries' debt ratios would explode, with Italy's reaching 163%, 16 percentage points above the baseline. Germany – with a declining baseline trajectory – would jump to 70%, 6 points above baseline.

Under a more modest option, European NATO members could allocate about 2.6% of GDP for defense – the midpoint between current spending and US levels. That may be enough to boost arms procurement and improve readiness levels but would likely fall well short of compensating for absent US capabilities.

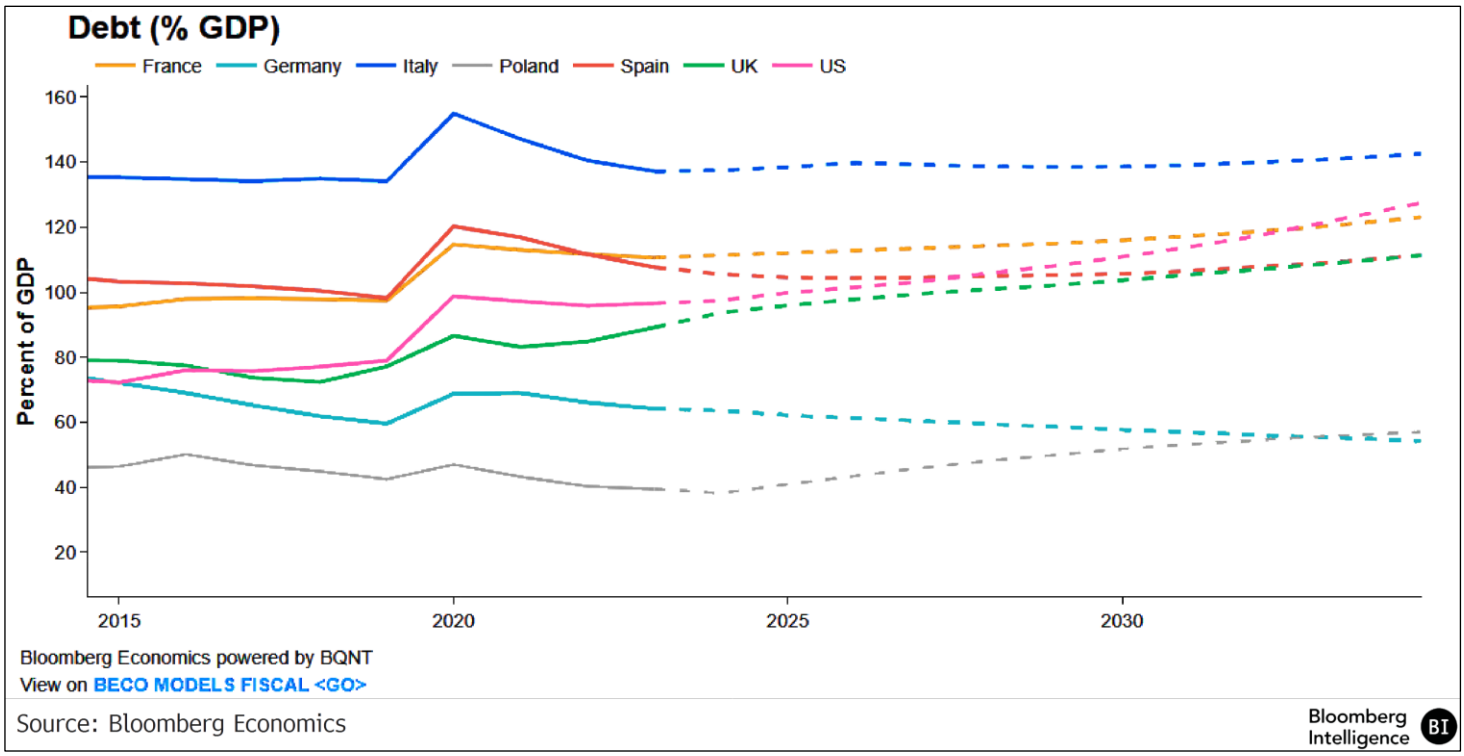
Germany's debt ratio would stay constant at 64% instead of declining, while Italy's and Spain's could still increase to 156% and 113%, up 9 and 10 points, respectively. If funded by borrowing, this intermediate option would add just over $1.4 trillion in combined debt by 2034. Though more manageable, it could still force trade-offs for other European spending priorities and add to borrowing costs.

How the money is spent is just as important as spending levels. Though US defense spending is often criticized for its inefficiency, Europe's fragmented approach is arguably much more inefficient in aggregate. Unlike the US, Europe's defense is planned and funded among many countries with their own priorities and politics. That yields unbalanced procurement choices and limited interoperability.

Tallying Europe's combat aircraft or main battle tanks means little if they can't work together. European Union efforts toward strategic autonomy have sought to corral defense decision-making and procurement – with limited success. At issue is EU members' willingness to hand key powers to Brussels. Beyond token contributions, this is a red line for states that see defense policy as the most meaningful aspect of their residual sovereignty.

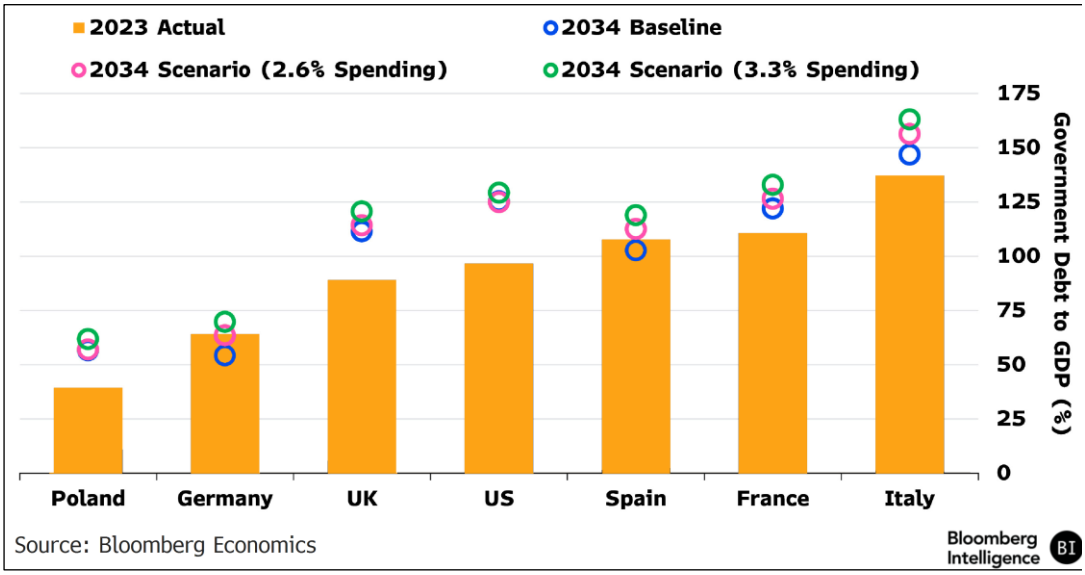
European governments don't share a strategic outlook. Though the Russia-Ukraine War has helped unify the continent, some countries (such as Hungary and Slovakia) are less concerned about Russia. Still, quantity has a quality all its own. Without greater efficiency, the best way to mobilize more European combat power is more European defense spending. But fiscal concerns loom large without ways to offset new debts.

Figure 3: European Debt Already Climbing



Debt of Italy, France and Spain already exceeds 100% of GDP

Figure 4: Defense Dollars Worsen Debt Outlook



3.3 Domestic Turn Can Limit Europe Defense Debt Rise

As previously noted, raising defense investment to the US level of 3.3% of GDP could add more than $2.8 trillion to major European economies' debt load by 2034. With the region already mired in sluggish growth and high debt, that price tag may seem out of reach. Even a smaller increase to 2.6% of GDP would add $1.4 trillion in borrowings.

However, the net effect on debt may depend on the scale of domestic investment. If Europeans keep more of that defense spending at home – as opposed to buying arms abroad – demand-side growth could help more than halve the increase in the debt burden, as indicated by the scenarios shown in Figure 5.

Our first scenario assumes domestic investment is limited, given Europe's smaller and more fragmented defense industries. We assume the US spends 75% of its defense dollars domestically, while major European powers spend 50% – except for Poland at 25%, given Warsaw's typical reliance on foreign (often US) arms. This reduces new borrowing to $1.7 trillion, or about 40% less than the $2.8 trillion without growth multipliers.

Without growth effects, our analysis shows Italy, Spain and Germany would experience the largest increases to debt ratios by 2034. With growth effects, debt would rise the most in Germany, Spain and Poland relative to other countries. Italy's 2034 debt burden increases 7 percentage points with limited growth effects – less than half of the 16-point rise it would otherwise see. Germany's net debt would increase 12 points as it more than doubles defense spending.

In our second scenario, the US domestic share rises to 100% of defense spending, European states' to 75%, and Poland's to 50% – in line with efforts to boost domestic defense production. Due to this maximum domestic investment, Europe's additional borrowing rises $1.2 trillion, with Germany, Spain and Poland posting the largest increases in 2034 debt ratios.

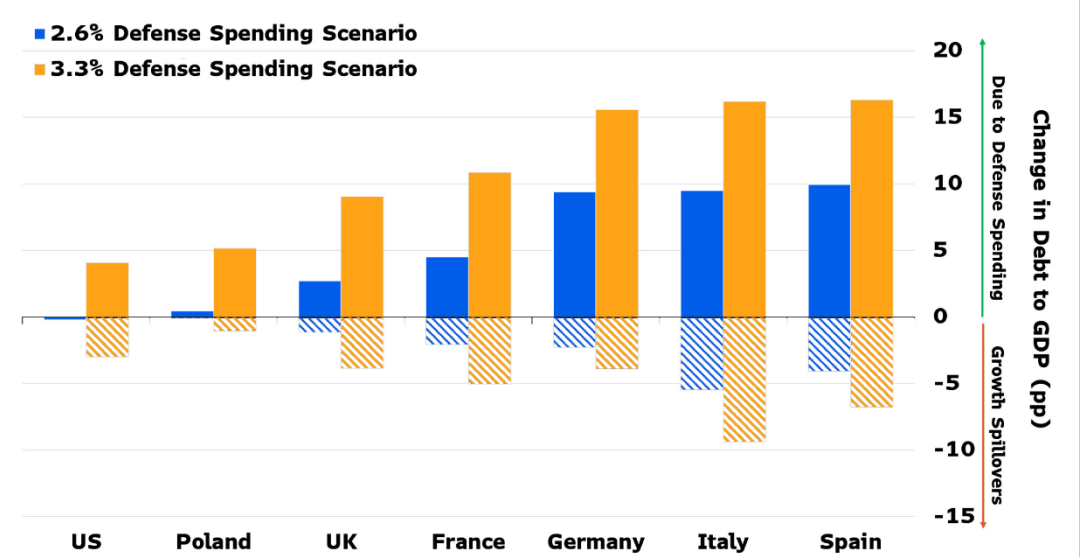
The more spending that's domestic, the more countries restrain their debt increases. That's particularly the case for Italy, whose debt burden would rise 2.3 points with a defense budget at 3.3% of GDP and focused heavily on domestic spending – compared with the 4-point rise in debt if it were to spend 2.6% of GDP on defense with only a limited domestic focus.

A stronger European defense industry would be able to develop more lethal capabilities and greater capacity to make arms at lower unit costs when purchased in higher volumes. The fragmented nature of Europe's defense industry has costs and benefits. It's less efficient, but the competition could result in greater long-term efficiency if the sector becomes a growth industry.

Given Russia's aggression against Ukraine and threats to Europe, European nations may decide a little extra debt for defense is worth it – especially after accounting for demand-driven growth.

Defense spending pressures debt-to-GDP ratio, especially for Spain, Italy and Germany

Figure 1: Defense-Spending Scenarios



Note: This chart assumes limited domestic investment from the two additional defense spending scenarios (US – 75%, Europe – 50%, and Poland – 25% domestic spending)

Source: Bloomberg Economics

Section 4. US Defense Spending

Budgets, Priorities to Disperse Spending, Production

The US military faces pressure from budgets, deficits, debt and other priorities, which will mute its global influence and push nations in Europe and elsewhere to hike spending, boosting the global defense industry. Countries with the largest economic blocs, like EU members, may be better able to keep production local. The shift could drive more collaboration, akin to the F-35.

4.1 Defense Expansion Limited by Budget

The US military's sphere of influence is shrinking, with budgets unable to support its role as the global enforcer. As spending shifts toward other priorities vs. defense, and a go-it-alone strategy becomes less feasible, the US will find it increasingly important to ally with like-minded countries to accomplish goals.

Allies among the largest economies, such as Japan, South Korea, Australia and European nations, will be asked to shoulder more of the common defense of democracies. Jointly manufacturing weapon systems such as the F-35 – where Lockheed, Northrop Grumman, RTX, Rolls-Royce, BAE and Rheinmetall are involved – will become more important. Other countries or blocs may opt to focus on developing or expanding a domestic defense industry.

As shown in Figure 6, US federal debt as a percentage of GDP has ballooned since the late 1990s, leading to record debt and deficits, with no end in sight. Increased outlays during the global financial crisis and the pandemic could curb defense spending for years. These constraints, combined with the higher cost of everything, especially high-tech defense equipment, mean not only less money to spend as a percentage of GDP, but also less capability per dollar outlay.

Defense Department resources also are being squeezed by other priorities. Nominal defense budgets are rising again after the post-Iraq and Afghanistan lull but remain a smaller portion of outlays than historically, as seen in Figure 7. Meanwhile, social-security spending, interest costs and entitlements have expanded since 2020 and will keep rising.

With Treasury bonds' 30-year yield above 4%, interest on the debt consumes 11% of the US budget, a return to double-digit percentages last seen in 2001. In absolute terms, the increase is to $60-$80 billion a month from $20-$40 billion before 2021. Mandatory programs rose to 61% of spending in 2023 from 54% in 2001.

US doctrine revisions in 2018 changed the military's posture, to one focused on the ability to win one war while deterring opportunistic aggression, from doing so while denying objectives in another region. This reflected the unsustainable cost of building and maintaining a military that's ready to handle multi-theater wars. The adjustment places allies at risk should attacks take place in two regions at the same time.

As a result, US partners globally might need to increase defense spending and capabilities to offset US limitations. For example, a more aggressive Russia creates the risk that if war flares up in another region, some allies may need to fend for themselves until the US military is freed up. If

the engagement is with a near-peer power, it could be months or years before the US puts its full weight into a second front.

US politics also have trended toward isolationism among groups that were traditionally pro-defense, which could influence allies' defense spending. For example, Republican lawmakers have expressed reservations about defending or arming Ukraine against Russia aggression. The US House of Representatives showed resistance to funding Ukraine aid in February, with the speaker, a Republican, isolating the bill to secure enough Democrat votes to pass.

Trump is also on the record saying he wouldn't defend Europe from Russia if countries didn't spend the agreed 2% share of their budgets on defense. Though this might be rhetoric, a faction of traditionally defense-supportive Republicans appears more worried about the tight budget than the geopolitical chess game.

Figure 6: US Debt and Deficit

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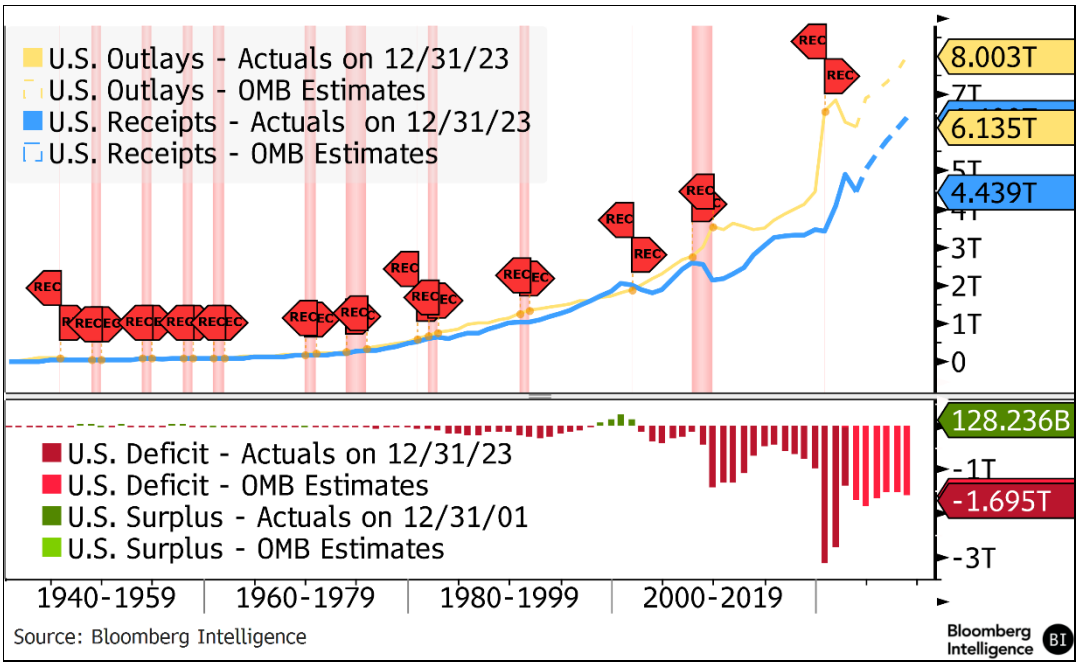
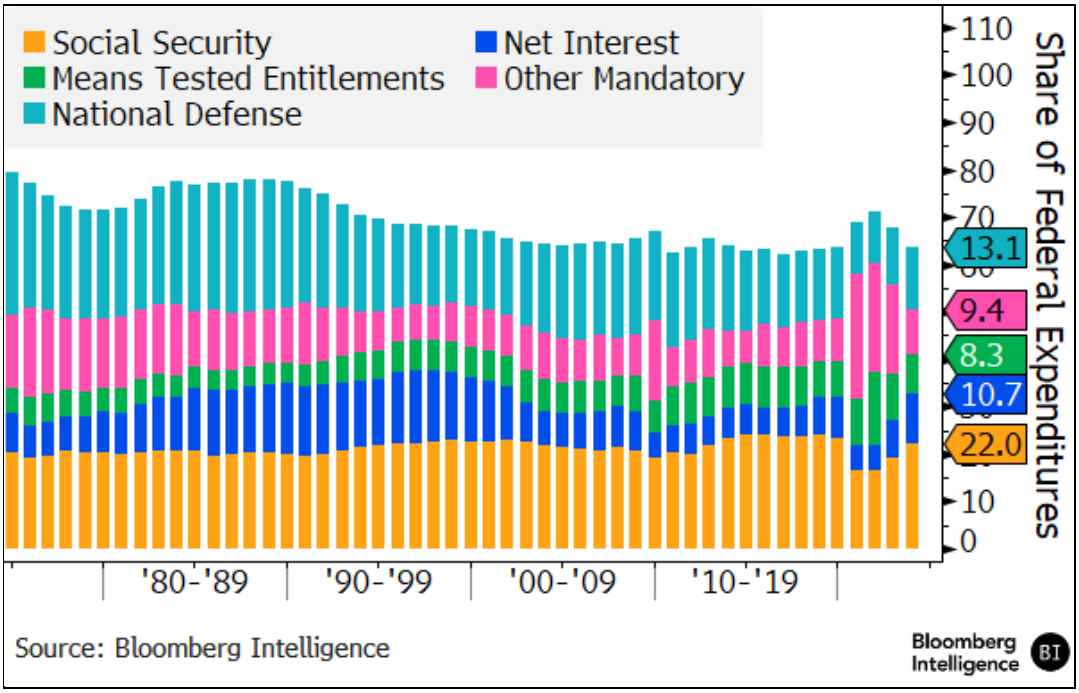
US outlays exceed receipts through at least 2029



Defense share of US spending has shrunk as entitlements and interest grow

Figure 7: Share of Federal Spending



Section 5. Russia-Ukraine Lessons

Some Weapons Stand Above Rest in Ukraine Invasion

Europe should focus on what's working in Ukraine to guide purchases. Lockheed Martin's air defense, General Dynamics' tanks, BAE's artillery and Boeing's small bombs are among the most effective weapons in Ukraine, yet given advanced electronic-warfare capabilities and cheap drones, some less-technical weapons have reigned supreme. Short-range systems and adaptable solutions remain paramount amid constant moves and countermoves on the battlefield.

5.1 Air-Defense Systems, Drones, Tanks Show Value

Paramount to the fight in Ukraine is air defense, with Raytheon's Patriot and Raytheon/Kongsberg's NASAMS and HAWK surface-to-air missiles proving their mettle. Constant barrages by Russian artillery and rockets have extensively damaged Ukraine's critical energy infrastructure and military command and control assets, which are essential to sustaining the war effort. Given that Russia is producing a sustainable supply of missiles, as noted in Figure 8, the steady arrival of air-defense support is imperative to maintaining momentum by Ukraine, which will require more Patriot, NASAMS and HAWK batteries from Canada, Norway, Spain and the UK.

After GPS jamming rendered many GPS-guided munitions less effective, Ukraine's military returned to an old reliable: field artillery. BAE's M777 howitzer and Paladin, Nexter Systems' Caesar self-propelled howitzer (155mm) and Ukraine's 2S22 Bohdana howitzer lead the close 3-15-mile fight. More than 80% of all casualties in the conflict have been caused by artillery.

The key for many of these systems is supply-chain concerns for 155mm artillery-shell production, with many plants having been decommissioned and in need of repair to restart. The US Army is producing 36,000 shells a month, with a goal of about 100,000 monthly by late 2025.

Boeing's GBU-39 Small Diameter Bomb has proven itself a highly jam-resistant munition with more than 90% accuracy. The bomb also has been praised by forces there for its explosive power, availability and delivery (it can be fitted to F-16s and MiG-29As). Key factors to its success are its small size and use of a GPS-aided inertial-navigation system, which protects against electronic-warfare jamming. At six feet in length and 7.5 inches wide, the GBU-39 is difficult to intercept and can be carried in large numbers. Russia's similar D-30SN guided bombs also have had success on the battlefield.

This is the first war where drones have been widely used. China's DJI Mavic 3, Russia's STC Orlan-10 and the Bayraktar TB2 from Turkey's Baykar are the go-to drones in Ukraine, but there are plenty of options. Drones are used as reconnaissance assets (to identify targets and guide artillery), bombers or kamikaze weapons.

Drones, depending on their size and complexity, cost $1,500-$100,000, much less than Stinger missile, at almost $500,000. GPS jamming is a concern, but new generations of drones are being built to counter the issue. Shield AI and their V-BATs are providing Ukraine with longer-range drone capacity that has proven success against current Russian jamming capabilities.

Lockheed Martin and RTX's Javelin and Saab/Thales' next-generation light anti-tank weapon (NLAW) – both highlighted Figure 9 – top the Ukrainian desirability list of such systems, providing soldiers with smaller, more agile options to destroy enemy armor than just rolling in a tank. Both systems are fire-and-forget weapons that let troops aim, lock and launch from an optical headset. Once fired, the system does the rest, letting a soldier hide and avoid discovery.

Javelin wins the distance fight by destroying tanks up to 2.5 kilometers without an operator having to hold a laser on the target until it explodes. NLAW's lightweight design and nonexplosive ejection system is designed for close engagements inside cities and is more cost-effective ($40,000 a system) compared with the Javelin ($178,000).

BI **Lockheed and Mitsubishi interceptor capacity trails Russian missiles and drones**

Figure 8: Russian Offensive vs. Western Defensive Capacity

	Deployed Munitions: First 2 Years of Conflict	Russia Production Capacity Per Year
Missiles	**8,000**	**400-1,000**
Drones	**4,630**	**6,000 - 8,500**
Production Capacity for Interceptor Missiles		
Lockheed Martin		**550**
Mitsubishi Heavy Industries		**60**

Source: Bloomberg Intelligence, Reuters

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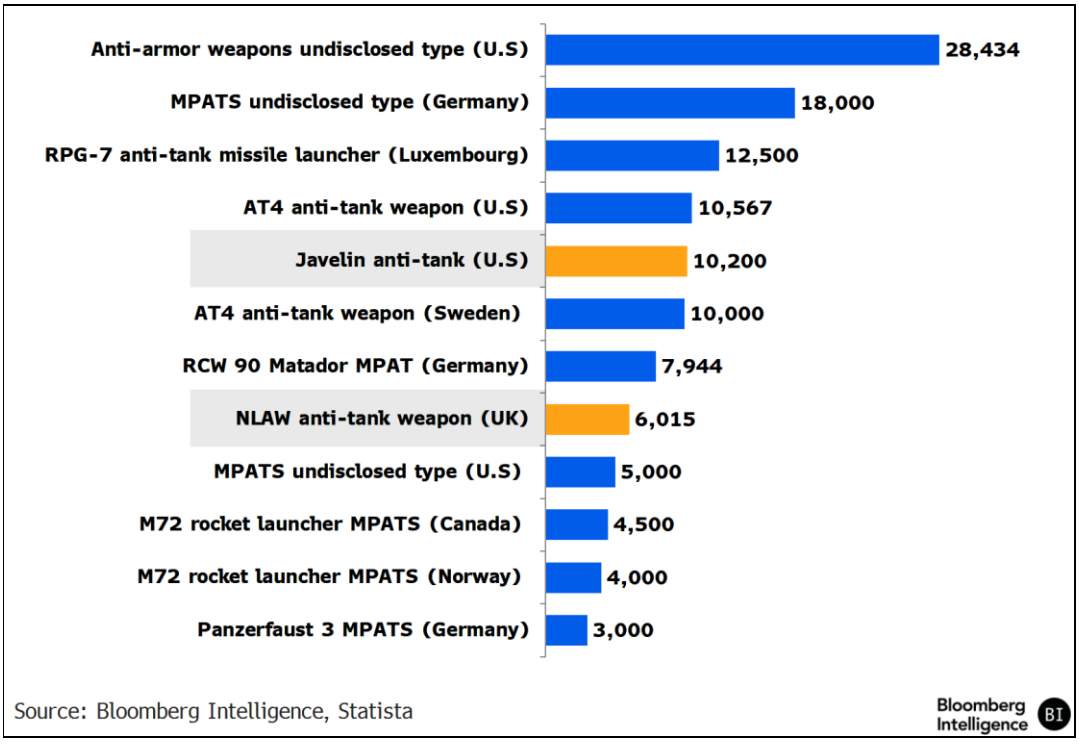
BI **Javelin and NLAW anti-tank weapons have been key to Ukraine's defense**

Figure 9: Anti-Tank Systems in Ukraine (Type and Country)



Source: Bloomberg Intelligence, Statista

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Tanks have shown themselves effective for offense and defense. Though Russia and Ukraine took heavy losses early in the war due to anti-tank weapons and poorly trained tank crews, new

technology and better tactics have extended demand momentum for the armored vehicles. KNDS Deutschland's Leopard 2, Hyundai Rotem's K2 Black Panther, Vickers Defence Systems' Challenger 2 and General Dynamics' M1A1/2 Abrams tanks will remain critical to Ukraine's defense.

The better Ukraine's tank crews are trained, the more they can leverage the machines to destroy Russian armor and support troop movement. With speeds of 37-45 mph, these tanks can engage the enemy and disengage quickly, as seen in Ukraine's Kursk offensive.

Active-protection systems (APS) are key to tank survivability in Ukraine and elsewhere. Early in Russia's invasion, tanks were destroyed easily and quickly by small squads with shoulder-fired anti-tank rockets like Russia's 9M133 Kornet and Lockheed Martin's Javelin. Tank companies had a problem: adapt or die. Rafael's Trophy APS and Hanwha Systems' Korean APS (KAPS) top the list of systems that can help tank companies adapt without going back to the drawing board.

Trophy and KAPS can be retrofitted for about $700,000 to older models. At a time when European defense spending is increasing, it may be feasible to double down to protect $10-$20 million tanks.

SpaceX's Starlink, Firefly Aerospace, Maxar and ICEYE are companies leading the tactically responsive commercial-space revolution supporting military operations in Ukraine. Given the overwhelming power of Russia's electronic-warfare capabilities against military GPS, proliferated low-earth orbit satellites have shown great resiliency against jamming and GPS spoofing.

Further, the use of commercial imagery from Maxar and ICEYE in this low-level orbit has been vital to Ukrainian Forces' intelligence collection for early target identification and post-strike confirmation. Starlink has been essential to keeping constant communication across the front lines, and the quick-launch capability of Firefly's VICTUS NOX shows the responsiveness of this new wave of space-based warfare.

5.2 Ukraine, NATO Seek to Adapt to Lessons From Invasion

Militaries and suppliers have learned some key lessons from the war in Ukraine: Fighter jets keep their range short to avoid air defense, Rheinmetall and Epirus are moving to counter drone swarms and General Dynamics and BAE are adapting to an insatiable demand for artillery shells, tubes and propellant.

As we noted earlier, the 155mm artillery shell is among munitions most sought by Ukraine. It's also used by several NATO members, including BAE's M777 howitzer and AS 90, KNDS Deutschland and Rheinmetall's PzH 2000 and Nexter's Caesar. Manufacturing of the shells remains critical, as shown in Figure 10, with General Dynamics and BAE aiming to boost production to 100,000 by October 2025 from 36,000 now. Rheinmetall seeks to produce 700,000 through next year.

Day & Zimmerman, General Dynamics, Metallus, Nammo and American Ordnance are the lead companies ramping up production of propellant charges for Ukraine. After the US Army's Joint Program Executive Office for Armaments and Ammunition awarded contracts worth more than $961 million at the end of 2023, keeping up with propellant production is vital to Ukraine's effort

to thwart Russian advances. Ukrainian forces were using the maximum number of charges on every shot, hastening the depletion of propellant (known as energetics) faster than anticipated.

The quick reaction by Congress and the Army helped those companies accelerate production to meet the need for more than 14.2 million pounds of bulk energetics, 270,000 primers and 678,000 fuses. Rheinmetall Waffe Munition doubled production capacity for its 155mm howitzer barrels, while Nexter, General Dynamics Ordnance and Tactical Systems and BAE implemented production hikes of their own.

The overwhelming success of artillery by Ukraine against Russia has led to shortages in not just shells, but the tubes needed to fire them. Existing tubes are burning out from overuse and Ukraine requires replacements to keep military pressure on Russian forces. In April, Congress recognized the need, authorizing $13.4 billion for the Defense Department to replace weapons sent to Ukraine.

Ukraine is using Rheinmetall's two Skynex (short-range air defense) systems to protect against Russian drone attacks. The US Army awarded RTX a $197 million contract for Coyote Block 2s, kamikaze drones that attack enemy counterparts. KNDS' Flakpanzer Gepard, a German Leopard tank-mounted anti-aircraft cannon, is also used by Ukrainian forces.

Ukraine has leveraged drone-swarm technology to successfully attack more than 200 targets inside Russia, which has responded in kind. With Russia pushing to double drone production in 2025, Epirus is developing the Expeditionary Directed-Energy Counter-Swarm, which uses high-power microwaves to knock out drones, reducing the cost per shot. The system hasn't reached the deployment stage but will be more portable than the company's Leonidas.

Demand for combat aircraft is robust, but a change may be brewing, with less well-capitalized countries opting for greater volume of cheap and powerful drones, while the US and other wealthy allies adopt a family of missile systems amid resource constraints.

Surface-to-air missile systems, including Raytheon's Patriot and shoulder-fired Stingers, are keeping many of Russia's fighter jets farther from the front lines, while Russia's S-300VMs and S-400s are fending off Ukrainian jets – a sign that neither side is prepared to lose pilots and planes to air-defense batteries. Such systems come at a high price, though, as seen in Figure 11.

BI **Increased production capacity is needed for 155mm artillery round and M777 tubes**

Figure 10: Ukraine Replacement Supplemental (2022-24)

Table 1: Defense Industrial Base Expansion Projects Using Supplemental Funding for Replacement, from February 2022–January 2024

Weapon program	Investment value (dollars in millions)	Actions and projected outcomes
155mm artillery ammunition	2,089	• Expanding current facilities and building a new facility for metal shell production • Modernizing facilities to increase propellant charge production • Increasing the workforce through new hires and adding additional shifts
Guided Multiple Launch Rocket System	121	• Providing advance procurement funds to address obsolescence and long lead challenges
High Mobility Artillery Rocket System	72	• Purchasing new equipment and tooling needed to increase production
Javelin missile	78	• Increasing production of the launch unit and missile
Stinger missile	101	• Purchasing test equipment to increase production rates
Armored Multi-Purpose Vehicle	28	• Improving tooling processes and assembly equipment to increase production
AIM-9X Sidewinder	139	• Increasing production capacity
Solid rocket motors	211	• Investing in suppliers to increase production efficiencies for multiple weapons
M777 artillery tube	28	• Increasing tube production capacity
Total	**2,867**	--

Source: Government Accountability Office

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BI **Raytheon, Lockheed and RTX are among key providers of air-defense systems**

Figure 11: Cost Comparison of Systems

Cost Per Air Defense System	
Raytheon's Patriot	**1,000,000,000**
Rafael David's Sling	**336,000,000**
Rheinmetall Skynex	**100,000,000**
KNDS' Flakpanzer Gepard	**2,000,000**
RTX/Lockheed Javelin	**200,000**
Cost Per Interceptor Type	
Lockheed PAC-3 (Patriot)	**4,000,000 - 6,000,000**
Stunner Interceptor (David's Sling)	**1,000,000**
RTX Coyote (Block 2C Drone)	**100,000**
KNDS' Flakpanzer Gepard (non-missile)	**750**

Source: Bloomberg Intelligence

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5.3 Russian Tech Disruption: Ukraine Weapons Aren't Hitting

Lockheed's High Mobility Artillery Rocket System (HIMARS), Boeing's Joint Direct Attack Missile (JDAM) and Ground-Launched Small Diameter Bomb, and BAE's and RTX's Excalibur Long Range Precision Fires munitions have had their asymmetric advantages reduced by Russia's protection systems. The companies are being heavily to funded to find solutions to regain their technical and tactical edge.

HIMARS was a dominant weapons system in Ukraine in the early months of the conflict. They're still in demand after successes in parts of Ukraine. However, Lockheed continues to play "action and counteraction" against upgraded Russian electronic warfare systems and their effect on Guided Multiple Launch Rocket System (HIMARS' munition), known as GMLRS. In 2023, Ukraine's GMLRS accuracy rates dropped as Russia's EW systems veered the rounds off course.

This hasn't slowed the demand for HIMARS, however; the US Army increased its order to $1.9 billion in June from $861 million in early May. As HIMARS adapts to changing threats, demand will likely be sustained in other NATO countries as well.

Boeing's Joint Direct Attack Munition (JDAM) is another system affected by Russia's GPS-spoofing electronic attacks. In 2023, the accuracy of these air-launched, GPS-aided munitions degraded significantly, causing the rounds to miss their targets by over half a mile.

Efforts are underway to counter this kind of interference. In May, the US Air Force awarded Scientific Applications and Research Associates a $23.5 million contract to acquire "home-on GPS jam seekers," which essentially seek out enemy radio-frequency (RF) energy sources, such as EW assets, and destroy them, clearing the area from jamming until a new jammer arrives. Drones also can be used to target and destroy Russian EW assets before launching JDAMs.

BAE and RTX continue to look for a way to get M982 Excalibur rounds back into Ukraine. Excalibur rounds (GPS-guided 155mm artillery rounds) were once the premier solution for long-range artillery. However, Russia's R-330ZH Zhitels jammer can disrupt GPS signals from 30 kilometers (19 miles) away, altering a round's trajectory significantly. After firing 3,000 rounds at $100,000 each, Ukraine stopped using them and the US stopped shipping them.

Finding an alternative to this GPS reliance will be critical to getting Excalibur back into the fight. These alternatives could consist of jam-resistant technologies for each round, or alternative precision, navigation and timing (PNT) solutions that are still in development.

Air-launched small diameter bombs are still finding their targets, but Ground-Launched Small Diameter Bombs (known as GLSDBs) from Saab and Boeing, such as the GBU-39, struggle when fired from the ground. Boeing is developing technology intended to improve GLSDBs' success.

Fired from HIMARS and the M270 Multiple Launch Rocket System MLRS, the integration of jam-resistant technology has piqued interest from Croatia, Poland, Romania and Lithuania (current purchasers of HIMARS) and could draw other buyers. The US Air Force awarded a new contract for an indefinite number of SDBs through 2035.

Section 6. Land Forces

European Armor Spending Could Rise to $94 Billion

Europe's renewed focus on security may spark over $94 billion in spending on tanks, artillery and armored vehicles from the likes of Rheinmetall, BAE, Krauss-Maffei Wegmann, Nexter and General Dynamics, we calculate. The US focus on China, budget constraints and isolationist trends will boost costs for European NATO nations as they prepare to potentially go it alone.

6.1 Russia Flexes Land Power to Counter NATO Expansion

Russia's increasing antagonism and invasion of Ukraine has unwound the detente progress made after the fall of the Berlin Wall and increases the threat of a land war in Europe, requiring an investment in defense for Europe's NATO countries. Russia has long been a strong land power in the region, having invested significantly in armor and land forces following centuries of being invaded by countries such as France during Napoleonic times and Germany in World War II.

During the Cold War, Russia invested in a strong navy, though recently, like much of its military, readiness has slipped. The army will be significantly easier to resurrect and protects the country against the most proximate perceived threat: the expansion of NATO on its frontier.

European NATO members need to ready themselves to handle the Russian threat without US forces as budgets, politics and the focus on China alter the landscape of western European defense. Increasingly, the US budget is constrained, which will limit its capabilities as forces are stretched between Asia and Europe.

Further, the US focus on competition with China – AUKUS Pillar 1 and 2 – will lead to the development and purchases of different weapon systems. Distances in Asia are typically larger given China focuses on excluding the US from the first island chain, and navies are much more important in the Pacific than in a European fight. Politics also have an effect, as US Republicans have turned a bit isolationist, putting in question the amount of support that can be expected.

Adding capacity to manufacture military equipment in Europe, especially tanks, artillery and infantry fighting vehicles, will be critical for deterrence, showing that NATO members have the resolve to sustain their defense manufacturing base. In an engagement with a peer foe like Russia, battlefield losses are certain, and the potential to make up for them would be key.

Core European countries will likely need to more than double tank fleets to approach parity with Russia without counting on US support, which will cost $30-$40 billion or more. The largest NATO economies in central and northern Europe have 1,878 tanks of six different types, as seen in Figure 12. We excluded other NATO nations with smaller fleets or participation at risk due to preparedness or proximity to Russia.

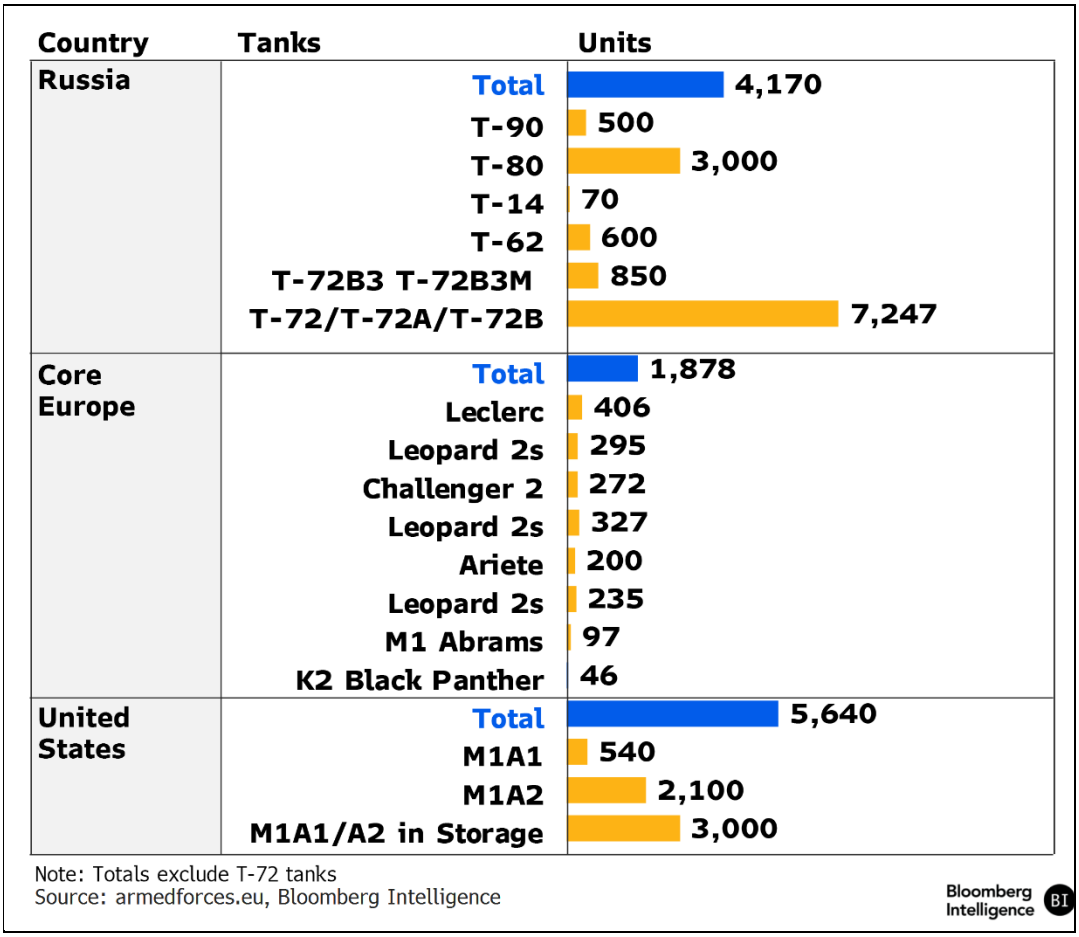
Russian T-72 tanks were also disregarded due to age, capabilities and maintenance risks. In Iraq, the T-72 was solidly trounced by the US Abrams, though the former's performance could improve with crew training. US Army budget documents showed modifications and upgrades to the Abrams at 90 a year cost $14 million, and we suspect the Leopard is similar, though an entire new build is likely significantly more, perhaps $20 million.

Ukrainian tank counts, as in Figure 13, are difficult to pinpoint given war losses, donation timing and serviceability questions, but its military appears to have kept Russia at bay so far with less than half as many tanks. Still, Russia is likely using different tactics in Ukraine than it would in a war with Europe, waiting out a foe with far fewer resources.

Fewer tanks are required in a defensive posture, given losses increase dramatically in offensive operations as tanks expose themselves while advancing. Man-portable weapons like Stinger missiles have taken a toll. It also isn't clear what portion of Russian tanks were war-ready at the outset.

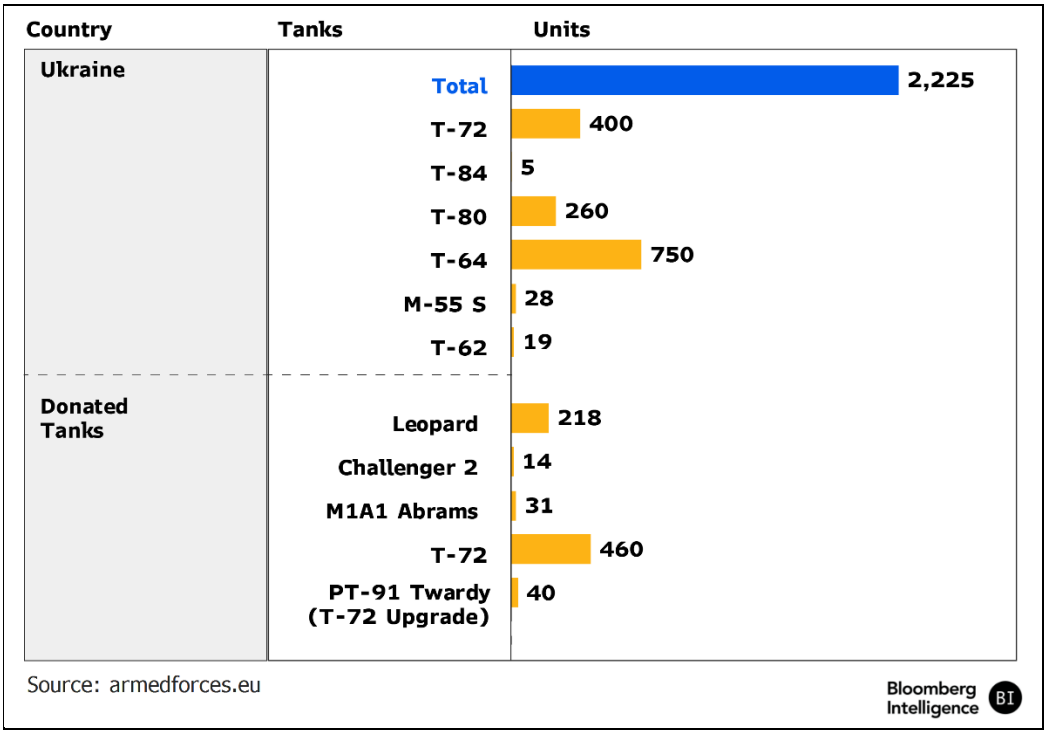
BI **Russia's tank fleet total trails US when older T-72s are excluded**

Figure 12: Select Tank Fleets



BI **Ukraine's tank fleet relies mainly on antiquated Russian models**

Figure 13: Ukrainian Tank Fleet



6.2 Artillery Investment May Reach $34.8 Billion

Russia has a strong conventional artillery advantage at 6,443 vs. core European NATO nations' 301 total, as shown in Figure 14. Convention dictates a 3-to-1 advantage on an attack, requiring Europe to reach to at least half of Russia's numbers to provide a deterrent.

Adding 2,900 Panzerhaubitze, a self-propelled gun built by Krauss-Maffei Wegmann and Rheinmetall, would cost about $20 million apiece, or a total of $34.8 billion. Throttling up to parity would double that price. Other suppliers include Nexter's Caesar program and BAE's M109 Paladin and AS90 Braveheart.

Conventional artillery is critical in close-quarter battles and is core to Russian tactics. Dumb rounds that use no GPS aren't thwarted by jamming, which improves reliability, and are relatively cheap at $10,000. Conventional artillery can use GPS-guided rounds, too.

Rocket artillery is critical to the deep fight in an engagement, augmenting the ability to interdict supply depots and critical infrastructure without sending crewed assets into an adversary's airspace. European NATO members' underinvestment has left them significantly outnumbered at about 254 pieces vs. Russia's 4,331.

As with conventional artillery, an adversary typically looks to have a 3-to-1 advantage on the offensive. As Figure 15 makes clear, that would require US allies to invest in about 2,000 rocket artillery launchers to provide a real deterrent. Lockheed's HIMARS is most prevalent, while South Korea and Israel make similar ones. US defense budgets show about a $10 million cost per unit in 2025, including a complement of six missiles. The cost for 2,000 units would be about $20 billion, rising to $40 billion to achieve parity.

Figure 14: Self-Propelled Artillery (Units)

Country	Self Propelled Artillery (Type)	Produced	Units
Russia	Total		6,443
	2S1 Gvozdika	1971-1991	2,120
	2S3 Akatsiya	1967-1993	1,730
	2S19 Msta-S	1988	835
	2S5 Giatsint-S	1976-1991	950
	2S4 Tyulpan	1969-1988	430
	2S35 Koalitsiya-SV	2015	12
	2S7M Malka	1975-1990	316
	2S34 Chosta	1971-1991	50
Germany/France/UK	Total		301
Germany	PzH 2000 (Total)	1998	134
France	Total		96
	AMX 30 AuF1	1977-1995	32
	CAESAR	1994	64
United Kingdom	Total		71
	AS-90	1992	57
	Archer	2010	14

Source: armedforces.eu

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BI **Russia's far ahead of European NATO in self-propelled and rocket artillery**

Figure 15: Rocket-Artillery Pieces

Country	Type	Produced	Units
Russia	Total		4,331
	BM-21 Grad	1963	3100
	BM-27 Uragan	1975	350
	BM-30 Smerch	1989	190
	Tos-l/TOS-2	1988	45
	9A52-4 Tornado	2011	300
	9K720 Iskander-M	2006	160
	9K512 Uragan-1M	1975	6
	Tornado-G	2014	180
Germany	M270 (Total)	1980-2003	33
France	M270 MLRS (Total)	1980-2003	11
UK	GMLRS (Total)	1980-2003	41
Poland	Total		188
	WR-40 Langusta	2010	75
	RM-70	1972	29
	BM -21 Grad	1963	70
	K239 Chunmoo	2014	14
Spain	Total		0
Italy	M270 MLRS (Total)	1980-2003	21
US	Total		705
	M270	1980-2003	385
	M142	2004	320

Source: armedforces.eu, Bloomberg Intelligence

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6.3 Infantry Fighting Vehicle Investment Light on Parity

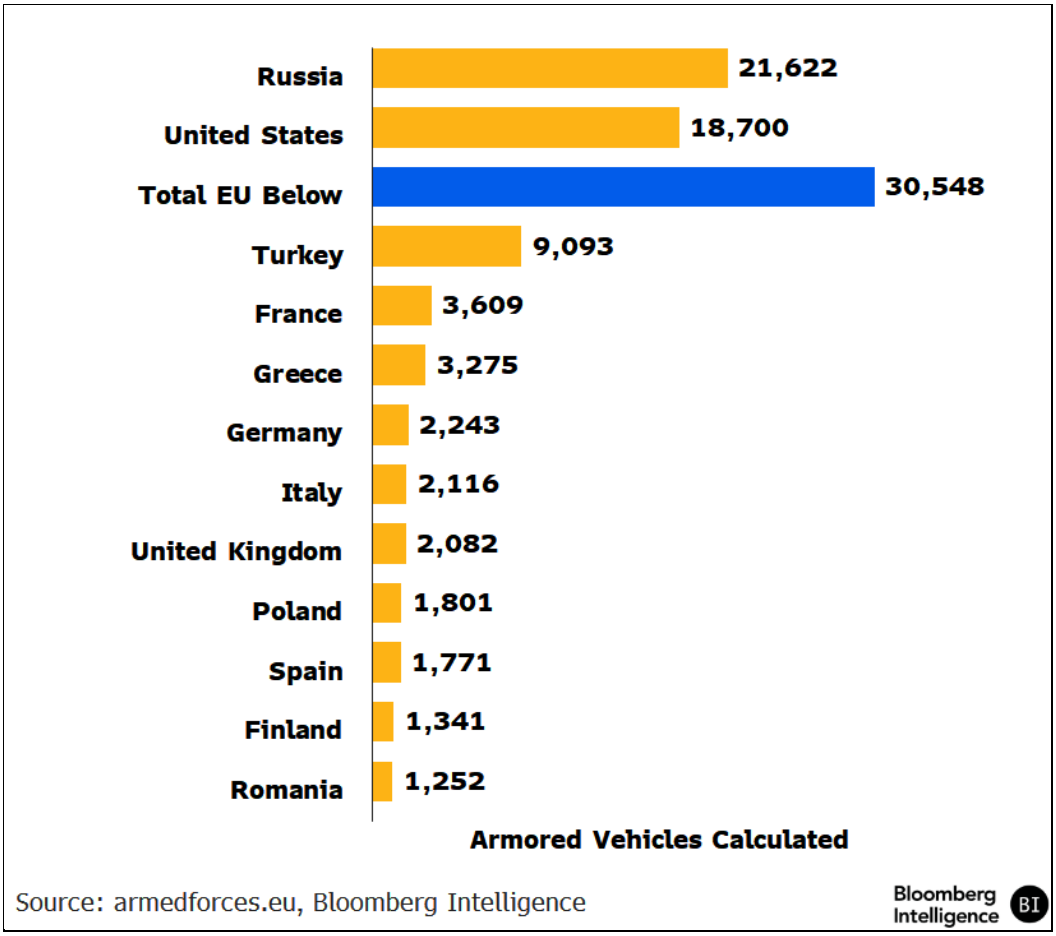
Infantry fighting vehicles (IFVs) may be less in demand given parity with Russia. European NATO allies have over 30,000 IFVs, excluding Mine Resistant Ambush Protected versions, about a third more than Russia. Limiting that total to core western Europe NATO countries shrinks the number to about 18,000, roughly the same as the US and a bit fewer than Russia, as shown in Figure 16.

Further, the MRAPs procured during the Afghanistan and Iraq engagements provide some protection and mobility for troops in areas with road networks and suffice in defensive operations but aren't as capable as IFVs in a conventional war. Key combat-vehicle programs include the Boxer, built by a joint venture of KMW and Rheinmetall, and the Warrior, made by a GKN-BAE joint venture. BAE's M2 Bradley fighting vehicle is a mainstay of the US force.

Ramping up to a desired end state for armored equipment will take years, given a significant jump in productive capacity is expensive and European defense contractors aren't likely to spend their own money for fear a government's resolve may weaken.

BI **European NATO is at parity with Russia in armored vehicles**

Figure 16: Combat-Vehicle Programs



Section 7. Fighter Jets

Europe Gap Needs Billions of Dollars, Hundreds of Planes

European nations are investing billions of euros to modernize and recapitalize air forces, acquiring fighters from Lockheed Martin, the Eurofighter Typhoon consortium (BAE, Airbus and Leonardo), Dassault and Saab. In the absence of US support, core NATO Europe members may need to spend $20 billion or more on their fighter-jet fleets, based on our analysis, to reach parity with Russia.

7.1 NATO Turns to Lockheed's F-35

The largest NATO economies in central and northern Europe combined have 1,489 fighters, made up of 11 different models with an average age of 20 years. Turkey has the biggest such fleet among European NATO members (304 planes) but is excluded from our analysis since its strategic cooperation with Russia might inhibit potential military action. We also omitted some NATO members in the eastern flank, given their smaller fleet size and proximity to Russia.

This represents a 10% shortfall vs. Russia's supply of fighters after decades of underinvestment. In addition, NATO Europe may need another 275 planes to replace aging aircraft approaching the end of their service or lacking competitive advantages. For example, Germany has 86 Panavia Tornados with an average life of 37.6 years. It extended service life by 2,000 flight hours to 8,000, letting the jets operate until 2030.

Italy has 47 Tornados (40.2 years) that it aims to retire by 2025, replacing them with Typhoons and F-35s. Spain has 82 F-18A/Bs (37.3 years) that are expected to remain in service through 2035, though they're too old for active combat. Poland has 60 Soviet-era MiG-29s and Su-22s (36.5 years).

The cost of western-built jets ranges from about €80 million for Saab's Gripen to €160 million for Dassault's Rafale. Dassault, BAE, Airbus and Leonardo rely on export sales to drive greater affordability yet face competition from the US. As seen in Figure 17, international customers have increasingly turned to F-35s since Russia invaded Ukraine, fueling Lockheed's backlog of 325 jets at the end of September.

The US approved the sale of 32 F-35As to Romania in September, valued at $7.2 billion. The deal would expand the F-35's reach to 20 nations. Earlier this year, Israel, the Czech Republic, Singapore and Greece signed agreements for 77 F-35s, valued at about $14.2 billion, based on our analysis. Several European countries, including Norway, the Netherlands and Finland, are replacing F-16s, F-18s and Gripens with F-35s. Orders aren't necessarily one for one; acquisitions average one F-35 for every 1-2 aging fighters that it's replacing.

Boeing is pitching the F-15EX to Poland and Saudi Arabia as they seek to modernize their fighter-jet fleets. In 2023, Indonesia committed to acquiring as many as 24 F-15EXs. The updated two-seater fighter is intended to replace aging F-15C/Ds as a cost-effective alternative to the F-35. It has greater payload capacity and range, a new glass cockpit and a BAE-developed self-protection system that can provide aircrews with greater awareness of RF and airborne threats.

The acquisition cost has jumped, though, to $97 million in Lot 3 from about $80.5 million in Lot 1, before easing to $94 million in Lot 4.

F-35 program acquisition costs surged as well, as seen in Figure 18, yet its unit cost remains well below those of the Eurofighter Typhoon and Rafale, given the US program's much greater planned quantities. The F-35's scale helps dampen unit cost growth, driven by rising development and procurement expenses.

The Pentagon revised its F-35 cost projections in December 2023 and expects total development cost (aircraft and engine) to reach $87.4 billion. This 154% increase over the October 2001 baseline reflects program delays and challenges, including issues with Technical Refresh 3. Total procurement could double to $394 billion and push the average procurement unit cost to $160 million – an amount that assumes volume benefits from the 917 aircraft ordered by international customers.

The F-35A's average flyaway cost under Lots 15-17 is $82.5 million, according to the US Air Force, making it cheaper than an F-15. Though the Boeing jet is a twin-engine and is faster as an air superiority fighter, it lacks the stealth of the single-engine F-35. Israel's recent purchase underscores the capability and desirability of the F-15.

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Germany, Finland and Romania are among biggest F-35 buyers

Figure 17: F-35 International Sales, Interest Since 2022

Customer	Timing	Status	# Aircraft	Contract Value[1]
Romania	Sep '24	Requested	32	$7.2B
Greece	Jul '24	Finalized	20	3.8B
Singapore	Feb '24	Finalized	8	1.8B*
Czech Republic	Jan '24	Finalized	24	5.6B
Israel	Jan '24	Finalized	25	3.0B
South Korea	Dec '23	Finalized	20	5.0B
Singapore	Feb '23	Finalized	8	1.8B*
Canada	Jan '23	Finalized	88	15.0B
Switzerland	Sep '22	Finalized	36	6.3B
Germany	Jul '22	Finalized	35	8.4B
Finland	Feb '22	Finalized	64	9.4B
Morocco		Potential Interest		

Notes: 1) Contract value may include associated equipment like F135 engines, spares and weapons.
* Bloomberg Intelligence estimate

Source: Defense Security Cooperation Agency, Bloomberg Intelligenc

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F-35 program acquisition costs have surged

Figure 18: F-35 Cost Projection

F-35 Program Acquisition Cost	Oct '01 Baseline	Mar '12 Baseline	Dec '19 Estimate	Dec '21 Estimate	Dec '22 Estimate	Dec '23 Estimate	'23 vs '01 % Change
(in $ Billions)							
Aircraft	28.7	44.4	57.5	NA	NA	71.3	149%
Engine	5.7	10.8	12.6	NA	NA	16.1	182%
Development Cost	34.4	55.2	70.1	76.3	79.8	87.4	154%
Aircraft	163.7	282.6	268.6	NA	NA	325.8	99%
Engine	32.9	53.0	53.9	NA	NA	68.0	107%
Procurement Cost	196.6	335.7	322.5	335.9	358.5	393.8	100%
Military Construction Cost	2.0	4.8	5.2	4.0	4.0	4.0	101%
F-35 Program Acquisition Cost	233.0	395.7	397.8	416.2	442.4	485.3	108%
(in units)							
Total Procurement Quantity [1]	2,443	2,443	2,456	2,456	2,456	2,456	1%
Total Planned Quantity [2]	2,457	2,457	2,470	2,470	2,470	2,470	1%
(in $ Millions)							
Average Procurement Unit Cost	80	137	131	137	146	160	99%
Average Development Unit Cost	14	23	29	31	32	36	153%
Program Acquisition Unit Cost	95	161	161	169	179	196	107%

Notes: 1) Total procurement quantity based on DOD's program of record, excludes orders from international partners and FMS customers totaling 917 aircraft as of December 2023
2) Total planned quantity includes 14 research and development aircraft.

Source: DOD, GAO, Bloomberg Intelligence

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7.2 Eurofighter Development Cost Climbs, Quantity Falls

Europe's purchases of domestically produced Typhoon and Rafale fighter jets may be restrained by rising development and procurement costs, driven by overly optimistic projections, requirements creep and insufficient scalability. This pressure is exacerbated by fragmented markets, endemic among European defense programs given geopolitical priorities and nationalism.

Climbing development costs for the Eurofighter Typhoon have eroded purchasing power and procurement quantities. Initiated in 1983, the program is a collaboration among the UK, Germany, Italy and Spain, with cost-sharing aimed at defraying the enormity of developing a new fighter jet.

Total development cost could be €39 billion in today's inflation-adjusted terms, we calculate, or €58 million per jet, based on a procurement quantity of 680 by the four partner nations and five export customers (Saudi Arabia, Kuwait, Qatar, Austria and Oman). The Eurofighter consortium aims to buy 529 Typhoons, down from 765 originally. There are 454 in service globally, as shown in Figure 19.

The UK National Audit Office in 2011 estimated the country might spend £22.95 billion to develop, acquire and upgrade a fleet of 160 Typhoons, up 37% from the prior £16.7 billion ceiling for 232 jets set in 1996. Procurement cost was unchanged at £13.5 billion, achieved by reducing aircraft quantities 31% to 160, implying average procurement unit-cost growth of 56% to £73 million, assuming cost of capital remains £11 million per jet.

Development cost more than doubled to £6.7 billion from the original £3.2 billion approved in 1987, and future upgrades could consume another £2.8 billion. Spain pegged its development cost at €4.9 billion in 2015. Germany might contribute a similar amount as the UK. Italy might invest a third less than Spain, based on their work share.

Typhoon's backlog of 73 jet and trainers at the end of August will carry the program into the 2030s, yet a bigger buffer might be welcomed, given potential sixth-generation development and schedule delays.

Possible orders for 64 more fighters could extend production by 6-7 years. Germany plans to order 20 more jets, on top of the 38 tranche 4s in the pipeline under Project Quadriga to replace 33 tranche 1 fighters. Italy is seeking €6.9 billion to buy 24 tranche 4 Typhoons to replace 26 tranche 1 jets.

The Eurofighter consortium will likely split its fighter-jet buys between F-35s and Typhoons to keep some work in its home nations. Turkey may seek 20-40 Typhoons but needs German approval. Germany until early 2024 blocked Saudi Arabia's request to acquire 48 Typhoons, and Saudi Arabia may try to pivot to F-35s.

For Rafale, program acquisition unit cost may have nearly doubled to €208 million in 2018 from projections set in 2000, driven by expense growth and shrinking procurement quantities. This translates to €240 million when adjusted for inflation, comparable to Eurofighter Typhoon's €236 million and a third higher than the F-35's €180 million. France targets 225 Rafales, down from 320 initially. The country's armed forces already have about 140 in service, as broken out in Figure 20.

Dassault's Rafale backlog grew 5% to 235 jets, building on Serbia's decision to buy 12 planes in August, yet remains capacity constrained as the company strives to boost the monthly build rate to three from two. Even at three a month, Dassault has seven years of production. Long wait times might dissuade prospective buyers, adding to competition from Eurofighter, Gripen and the US.

India has yet to finalize its July 2023 decision to acquire 26 Rafales, with an estimated value at about €6.7 billion, and there don't appear to be other pending orders. Dassault is focused on execution and on-time performance, which is challenging amid internal labor and supply-chain disruptions. It expects to deliver 20 Rafales in 2024, and shipments might reach 28 in 2026 and 33 by 2027, given an 11-month working year.

Figure 19: Eurofighter Typhoon Fleet by Operator

BI **UK and Germany have biggest Eurofighter Typhoon fleets**

	In Service		Storage		On order
Operator	# of Aircraft	Average Age	# of Aircraft	Average Age	# of Aircraft
Total Eurofighter Typhoon	454	11.6	12	17.7	63
Royal Air Force	109	12.0	12	17.7	-
German Air Force	102	12.3	-	-	30
Italian Air Force	77	12.8	-	-	-
Spanish Air Force	57	12.3	-	-	16
Royal Saudi Air Force	54	10.9	-	-	-
Qatar Emiri Air Force	16	1.4	-	-	4
Austrian Air Force	15	17.7	-	-	-
Kuwait Air Force	9	1.1	-	-	13
Royal Air Force of Oman	9	7.0	-	-	-
BAE Systems	4	14.6	-	-	-
Airbus Defence & Space	1	16.6	-	-	-
Leonardo (Alenia)	1	13.6	-	-	-

Source: Cirium, Bloomberg Intelligence

Bloomberg Intelligence BI

BI

France has most Rafale aircraft in service

Figure 20: Rafale Fleet by Operator

Operator	In Service # of Aircraft	In Service Average Age	Storage # of Aircraft	Storage Average Age	On order # of Aircraft
Total Rafale B	**99**	**10.5**	**-**	**-**	**-**
French Air and Space Force	57	12.5	-	-	-
Egyptian Air Force	16	6.9	-	-	-
Qatar Emiri Air Force	9	4.7	-	-	-
Indian Air Force	8	4.3	-	-	-
Hellenic Air Force	4	10.5	-	-	-
Direction Generale de l'Armement	3	20.0	-	-	-
Croatian Air Force	2	18.1	-	-	-
Total Rafale C	**124**	**7.4**	**2**	**14.4**	**62**
French Air and Space Force	42	10.3	2	14.4	62
Indian Air Force	28	3.4	-	-	-
Qatar Emiri Air Force	27	4.3	-	-	-
Hellenic Air Force	14	10.5	-	-	-
Egyptian Air Force	8	7.2	-	-	-
Croatian Air Force	4	12.4	-	-	-
Direction Generale de l'Armement	1	19.3	-	-	-
Total Rafale M	**43**	**16.2**	**-**	**-**	**2**
French Navy	41	15.6	-	-	2
Dassault	1	30.8	-	-	-
Direction Generale de l'Armement	1	25.1	-	-	-
Total Rafale B/C	**-**	**-**	**-**	**-**	**159**
United Arab Emirates Air Force	-	-	-	-	80
Indonesian Air Force	-	-	-	-	42
Egyptian Air Force	-	-	-	-	31
Hellenic Air Force	-	-	-	-	6

Source: Cirium, Bloomberg Intelligence

Bloomberg Intelligence BI

Section 8. Anti-Tank Aircraft

Boeing May Win Sales as NATO Blunts Russian Armor Lead

To blunt Russia's armor advantage, core European NATO countries may need to invest more than $12 billion in anti-tank helicopters, we calculate. Potential platforms include Airbus' Tiger, which has suffered from cost overruns and capability gaps. Boeing's Apache is a strong contender and battle-proven – and likely costs less to purchase and maintain given the fleet's size.

8.1 NATO Anti-Tank Helicopter Needs Over $12 Billion

Core European NATO members – Germany, France, the UK, Spain and Italy – may need 400-800 anti-tank helicopters to reduce Russia's strong armor and infantry advantage and supplement US support, which could be at risk given competing needs. A purchase of $12-$24 billion still wouldn't put Europe on par with Russian assets in number.

Europe's attack-helicopter needs could bolster sales of Boeing's AH-64 Apache. Airbus' Tiger is an option but has suffered from reliability challenges that led Germany to exit the program. Australia also stopped buying the Tiger and is considering the Apache.

For the Apache, we used a $30 million price, based off 2024 US defense comptroller documents showing an average of $22 million for a remanufactured one. Poland's commitment to 96 Apaches for $12 billion averages out to $125 million per aircraft, but that includes maintenance and airport and hangar equipment. France and Spain each plan to upgrade portions of their Tiger fleets for €67 million per aircraft, according to Breaking Defense, with the price of new Tigers higher.

European nations could be vulnerable in the event the US can't or won't participate in the defense of western Europe. Air support is key to the air-land battle doctrine, in which infantry and armor are supported by aircraft. As seen in Figures 21-22, the US has the lion's share of NATO's anti-tank aircraft, with 825 AH-64s and some out-of-production AH-1s. Russia has more than 1,500 anti-tank and close-air-support copters designed to destroy armor and artillery pieces or provide firepower to back light infantry units.

Though the Russian fleet is older, hurting capability when it comes to speed or maintenance, its numbers are vastly superior to core NATO, which has just 258 anti-tank copters. Anti-tank copters differ from transports, typically having a smaller cross-section with an armored front to enhance survivability. This is combined with missiles or a gun sufficient to penetrate armor. The British Army Air Corps operates 37 AH-64s, with 66 retired, and could buy more.

Helicopters can deliver direct fire on enemy units and are more agile than aircraft given their ability to hover. They can also deploy stronger munitions on target than a drone, which tends to drop small bombs, small missiles or call for artillery fire (which takes time). In most military engagements, having more options to use against the enemy makes for better outcomes.

Germany has decided to replace the Tiger with the Airbus H145, though this isn't a specialized air-support platform and may be reconsidered given existing threats. Poland's recent order for 96 AH-64s underscores its desirability. The Greek military owns 29, which could be used to defend

NATO. Turkey operates 53 AH-1 Cobras, built by Textron's Bell, but they're relatively old at 39 years, and the NATO partner might not make them available in an engagement with Russia.

BI **The US Army operates more than 90% of AH-64 Apache helicopters**

Figure 21: Boeing AH-64 Fleet Globally

Operator	In Service	LOI to Option	On Order	Retired	Storage
Army Air Corps	37		9	66	4
Hellenic Army Aviation	29				
Netherlands Defence Helicopter Command					28
Polish Land Forces		96			
United States Army	825		15	204	6
Total	891	96	24	270	38

Source: Cirium, Bloomberg Intelligence

Bloomberg Intelligence BI

Figure 22: European NATO Anti-Tank Fleets

Type/Operator	Unit Count	Average Age
AH-1	53	39.1
Turkish Army	53	39.1
AH-64	66	11.9
Army Air Corps	37	2.3
Hellenic Army Aviation	29	24.1
Tiger	139	10.3
French Army	68	11.8
German Army	54	9.5
Spanish Army	17	7.1
Total	258	16.6

Source: Bloomberg Intelligence

Bloomberg Intelligence BI

Section 9. Tankers and Transport

NATO Members Need Support Aircraft, Sub Hunters

Airbus could sell more tankers and smaller transport aircraft, while Boeing may benefit from more demand for its sub hunters as European NATO members find they need more equipment to adequately defend themselves without US support. The planes, along with a few hundred billion dollars for their capabilities, could help the group better match the US, China and Russia.

9.1 European Power Projection Requires Tankers

NATO members France, Germany, the UK, Italy and Spain could spend up to a combined $60 billion to add 200 aerial tankers to their fleets. These gas stations in the sky improve response time and expand ranges for fighters and bombers. They operate behind the forward edge of the battle area, letting fighters refuel faster than landing and returning to the fight.

When supporting ground units, they can loiter in an area to support offensive or defensive maneuvers. Being armed, ready and on station can lead to better operational success, particularly as ground units flush out artillery or armor that might require engagement with more firepower.

The US operates 429 tankers, including aging KC-135s and new KC-46s. Europe doesn't need as many for defensive operations, but it doesn't have enough, with just 33. Its tanker purchases could be largely in-region, given Airbus builds a capable model used by militaries worldwide. The Multi-Role Tanker Transport (MRTT) is a derivative of the popular A330, helping to reduce the price, since development and support costs are spread over civilian and military fleets.

The US has an in-service option with the KC-46, a derivative of Boeing's 767. Its cost overruns and capability challenges appear to have been largely addressed. We expect more European NATO members to buy the Airbus tanker despite a price of tag almost $300 million vs. $200 million for the KC-46.

European NATO nations also may need to invest in more maritime-patrol aircraft amid increased Russian submarine activity, as indicated by the ages in Figure 23. In the UK, a refresh is underway, with the Royal Air Force operating nine Boeing P-8 Poseidons, while Norway has five and Germany has another five on order. France may need a refresh of its 22 Dassault Aviation Atlantique 2s, though the company might supply new planes based on a business-jet platform. Italy and other NATO members could purchase more planes as well, even on a combined basis.

The P-8, which costs about $175 million, is state of the art. The development and operational costs are considerably lower, given it's based on a commercial 737-800 fuselage and CFM engines. The plane offers ample room for technicians and weapons, while its engines generate the electricity needed for sonar and radar.

European NATO air forces lack bombers like those of the US, Russia and China. Bombers typically provide a deep-strike capability to destroy a country's key infrastructure or manufacturing plants as well as strategically important targets. If Europe wants to have the same clout as other superpowers, we believe it will need to invest in such assets. Yet the price of developing and

building a bomber program is great, and we don't think European nations will pursue one. No country in Europe has built a bomber since the mid-1900s.

By contrast, the latest US deep-strike program, the B-21 Raider led by Northrop Grumman, is aimed at building and operating 100 bombers over the next 30 years at a price tag of roughly $203 billion. The US will bootstrap off programs like the B-1 and B-2.

Another area where European NATO countries are deficient is in light-to-medium lift, with 480 aircraft vs. the US' 635, as shown in Figure 24. Light-to-medium lift enables the movement of supplies with more speed and ease than a network of roads. The most used aircraft by far in this range is Lockheed's C-130, with Airbus' A400M a distant second. Though the C-130 is likely more cost-effective, European governments aiming to buy local may turn to the A400M.

Spanish-built CASA aircraft have very little cargo capacity. Embraer has some traction with its KC-390 and might achieve more gains. The A400M costs $150 million, the C-130 about $100 million and the Embraer KC-390 roughly $55 million.

The US is considering the next generation of heavy-lift cargo aircraft, which could open the door to new manufacturing. The US has 272 planes that can haul at least one battle tank – 264 more than European NATO members do. Only the UK has heavy lift in Europe, operating eight Boeing C-17s that cost about $200 million apiece when made; they'd likely run about $300 million now.

Both primary heavy lifters are no longer built. The C-5 Galaxy, the US military's heaviest lift, was built by Lockheed through 1989 and the C-17 through 2015. In Iraq and Afghanistan, these planes, along with Russia-owned Antonovs – some flown by Volga-Dnepr Airlines – supported forward forces. Russian operated Antonovs won't be available given the conflict with Russia, requiring even more heavy lifters.

BI **Most of European NATO's maritime-patrol aircraft are decades old**

Figure 23: Maritime-Patrol Aircraft

Country	Aircraft Type	Number	Age in Years	Orders
European NATO		42		
French Navy	Atlantic	22	30	
German Navy	P-8			5
	P-3	2	42	
Royal Air Force	P-8	9	4	
Portuguese Air Force	P-3	3	42	
Hellenic Air Force	P-3	1	58	
Royal Norwegian Air Force	P-8	5	3	
United States Navy	P-8	127	8	3
	P-3	16	47	
Argentine Navy	P-3	1	35	
Brazilian Air Force	P-3	4	59	
Chilean Navy	P-3	2	60	
Indian Navy	P-8	12	9	
Islamic Republic of Iran Air Force	P-3	5	50	
Japan Maritime Self-Defense Force	P-3	50	32	
Pakistan Navy	P-3	6	46	
Republic of China Air Force	P-3	12	52	
Republic of Korea Navy	P-8	6	2	
	P-3	16	44	
Royal Australian Air Force	P-8	12	7	2
Royal Canadian Air Force	P-8			
	P-3	15	44	
Royal New Zealand Air Force	P-8	4	2	

Source: Cirium, Bloomberg Intelligence

Bloomberg Intelligence BI

Figure 24: Light-to-Medium Lift Assets, US and European NATO

	CASA C-212		CASA CN-235		CASA C-295		C-27		KC-390		C-130/L-100 Hercules		A400M		Medium to Light Lift
Useful Load	3.3 Tons		6.6 Tons		9.25		13 Tons		26 Tons		36 Tons		41 Tons		
Operator	Count	Average Age	Count	Average Age	Count	Average Age	Count	Average Age	Count	Average Age	Count	Average Age	Count	Average Age	Total
French Air and Space Force			27	22.2							18	30.6	50	6.4	95
Spanish Air Force	7	46.0	16	32.6	28	20.4							27	4.6	78
German Air Force											6	1.7	53	5.5	59
Italian Air Force							12	16.5			13	21.9			25
Polish Air Force					16	16.8					5	48.9			21
Royal Air Force													21	7.9	21
Turkish Air Force			48	28.8							18	58.6	10	7.1	76
Turkish Navy			7	23.9											7
Portuguese Air Force					11	14.6			5	1.2	4	43.2			20
Others	0		0		9	12.4	25	13.9	7	0.2	29	38.1	8	3.0	78
European NATO Total	7		98		64		37		12		93		169		480
United States Total	5	39.1	23	16.2			21	13.1			586	18.9			635

Source: Cirium, Bloomberg Inteligence

Bloomberg Intelligence BI

Section 10. Performance and Valuation

Rising Global Tensions Spur Valuations Higher

Shares of European and US defense companies have consistently beaten the broader markets this year and since the February 2022 invasion of Ukraine, propelled by heightened global tensions in eastern Europe, the Middle East and Asia-Pacific and subsequent demand for military equipment. The basket of European defense names on average has outpaced US counterparts by 30 percentage points in 2024 to date, as Europe's defense spending is expected to ratchet up, benefiting contractors in that region. US military spending has been more balanced, and so we see less upside potential for defense contractors there, with growth likely tracking to mid-single digits. Not surprisingly, European defense contractors' historical 10% valuation discount to US peers has evaporated and flipped to a 5% premium. That underscores expectations of a multiyear investment cycle that likely boosts the growth outlook and a commercial aerospace uplift since the European peers are less pure play than in the US, with a greater mix of commercial businesses.

10.1 Performance: European Reinvestment Cycle Drives Gains

Stocks of European companies with strong defense exposure have increased sharply since Russia's February 2022 invasion of Ukraine, outpacing broader market indexes and US counterparts. Stocks in the BI European Defense Contractors peer group -- comprising Airbus, BAE Systems, Rheinmetall, Leonardo, Rolls Royce, Saab and Dassault -- increased 207% since the beginning of 2022, compared with gains of 3% for the STOXX Europe 600 and 26% for the S&P 500. The basket of stocks in the BI US Defense Primes group -- Lockheed Martin, RTX, General Dynamics, Northrop Grumman and L3Harris -- gained 42% over this period.

The reasons for the outperformance are twofold.

First, momentum is building for years of investment by European nations after a long period of serial underinvesting and underspending on defense capabilities. Europe's defense industry will likely see robust growth under the second Trump administration, given expectations that the ally's defense focus might shift inward and indications that NATO members may be pressed to invest 3% of their GDP on defense, even as spending is rising toward the 2% threshold. This is evidenced by a 15% gain by the BI European Defense Contractors peer group since the US election.

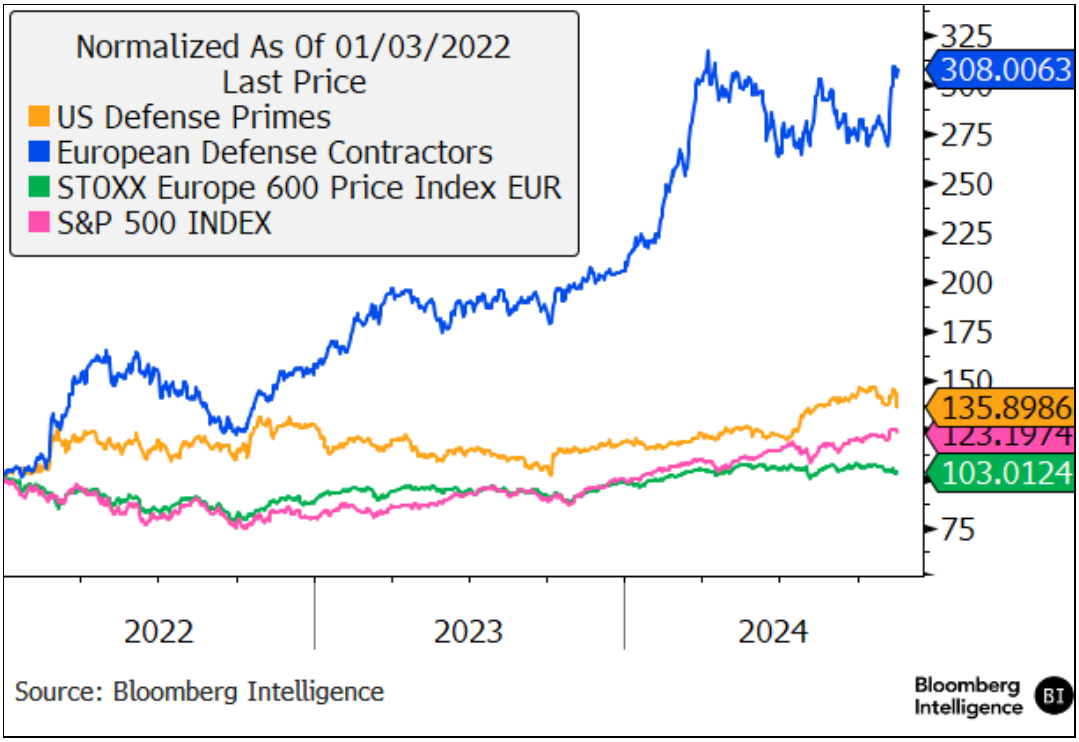
Second, many European defense companies -- like Airbus, Leonardo and Rolls-Royce -- tend to have greater commercial aerospace exposure than major US defense companies that generally are more focused on serving government customers. A substantive portion of Rolls-Royce and Leonardo's stock appreciation reflects market expectations of robust industry demand driving outsized commercial aerospace top-line and earnings growth. Conversely, Airbus' production and supply-chain challenges hampering its commercial airplane deliveries have pressured shares.

Rheinmetall's 587% gain since 2022 leads peers, followed by Rolls-Royce (353%), Saab (321%) and Leonardo (302%). Among European companies, Airbus' 23% gain is the least.

In the US, Lockheed Martin increased 58%, followed by General Dynamics (51%), RTX (44%), Northrop Grumman (35%), and L3Harris (23%). We exclude Boeing, whose stock is down 31% over the period, from the BI US Defense Primes peer group given the company's idiosyncratic headwinds.

BI **European defense shares have performed better than US peers**

Figure 25: BI US, European Defense Contractors Stock Performance

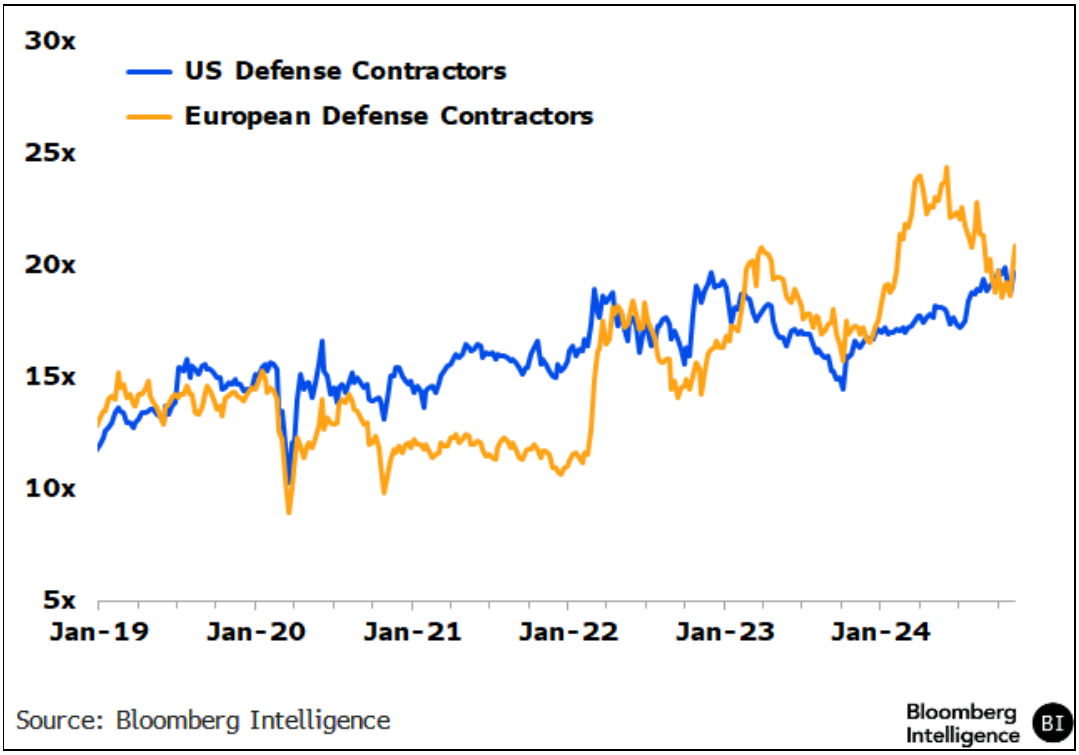


10.2 Valuation: P/E Multiples Trading Near Peak Levels

The BI US and European Defense Contractors' forward price-to-earnings ratios are tracking near peaks amid heightened military spending and growing global tensions. The European defense peer group currently trades at 20.9x, easing from June's top of 24.4x but still above the 18.1x in 2023 and 15.6x in 2022. US defense primes trade at 19.7x, progressively expanding from 17x at the beginning of the year. The peer group's valuation averaged 16.9x in 2023 and 17.5x in 2022.

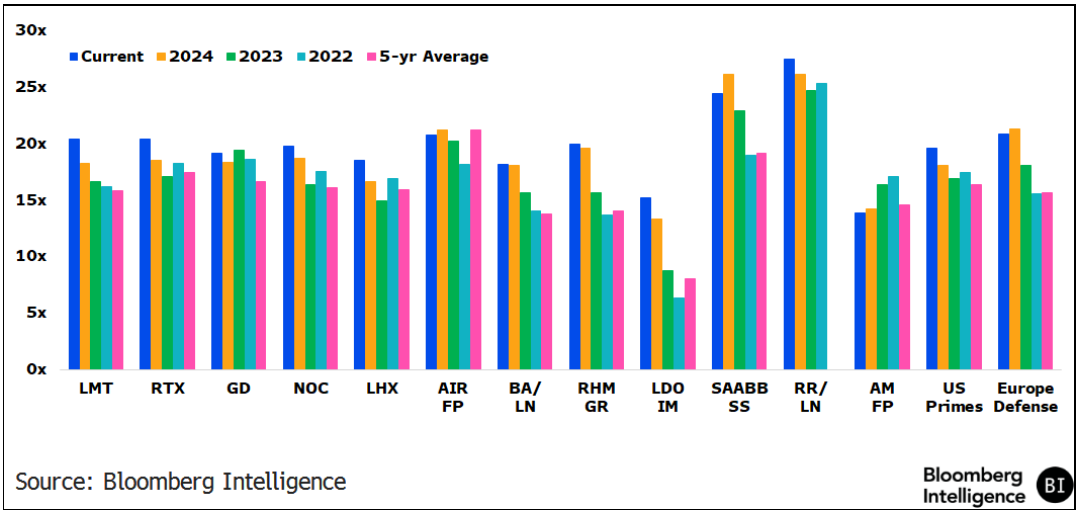
Valuations surged for EU defense contractors after Russia's invasion of Ukraine

Figure 26: BI US, European Defense Contractors BEst Forward P/E Ratio



The basket of European defense stocks trades at a 1.2-turn premium to US defense primes, bucking the 10-year trend through the end of 2022, when Europe's contractors traded about one turn below US peers, or a 10% discount. That dynamic reversed in 2023, with European defense stocks trading at a 1.2-turn premium to US peers in 2023 and 3.2-turn premium in 2024 year to date.

Figure 27: US, European Defense Contractors Forward P/E Multiples



Section 11. Company Impacts

European Defense Contractors to Gain Most

European contractors such as Airbus and Leonardo will likely get a bigger sales boost from increased spending in the region than US peers like RTX and Lockheed. Local defense contractors can supply aircraft, munitions and electronics, but in some cases, they may not be as capable as US systems – or as cost-effective.

11.1 BAE Systems Straddles Both Continents

Market Cap (GBP Bn)		38.87
Share Price (GBp)		1287.00
Earnings Per Share* (GBP)		P/E
2023A	0.63	2036.39
2024E	0.68	1889.73
2025E	0.77	1670.08

* Bloomberg Consensus

£74.1 Billion
Backlog as of 1H

£180 Billion
Pipeline awaits conversion to contracts

Company Outlook: BAE Systems is solidly positioned for high-single-digit sales gains through 2025, bolstered by a robust backlog that climbed to £74.1 billion in 1H24 and a pipeline valued at £180 billion. Book-to-bill remains above 1x, driven by its extensive portfolio and broad geographic exposure to Europe, the US, Middle East and the Asia-Pacific region as customers seek to modernize defense capabilities and replenish inventories. The company has access to the classified US business and high-end munitions via its newly formed Space and Mission Systems unit, with momentum building as it converts pipeline opportunities into contracts.

Defense-Spending Impact: BAE's strong exposure to the perennially strong US defense budget limits upside from increased European security spending. Strength across multiple domains, including aircraft as a member of the Eurofighter consortium with Airbus and Leonardo, armored vehicles such as the Bradley Fighting Vehicle – mainstay of the US infantry – and towed artillery and shipbuilding, provides multiple opportunities for gains.

11.2 Leonardo Includes Strong Electronics Business

Market Cap (USD Bn)		9.04
Share Price (USD)		34.33
Earnings Per Share* (USD)		P/E
2023A	0.73	47.03
2024E	0.90	38.14
2025E	1.05	32.62

* Bloomberg Consensus

3
Years of helicopter and aircraft backlogs

11%
Expected rise in 2024 revenue to €16.9 billion

Company Outlook: Leonardo earnings will likely remain fueled primarily by defense, given the segment has the largest backlog value, best margins and most profit, which should grow on strong demand due to increased global threats. Helicopters and aircraft manufacturing are complementary and support profits, while aerostructures trail with Boeing 787 and ATR turboprop build rates. Helicopters and aircraft backlogs are strong, at around three years, while defense backlogs are well over two. Increased Airbus 321 build rates would also be supportive.

Defense Spending Impact: Leonardo's defense business has a strong suite of high-margin electronic products, including radars, optronics and avionics, that are key to winning on the modern battlefield. The company's aerostructures, helicopter and unmanned aerial vehicles are complementary to the electronic surveillance systems.

11.3 Airbus Defense Has Room to Run

Market Cap (EUR Bn)		109.37
Share Price (EUR)		138.04
Earnings Per Share* (EUR)		P/E
2023A	5.60	24.65
2024E	4.94	27.94
2025E	6.99	19.73

* Bloomberg Consensus

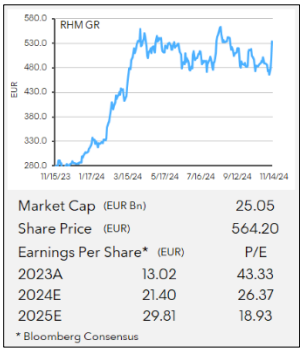
$60 Billion
A330 MRTT opportunity

€65.4 Billion
2023 revenue

Company Outlook: Defense is a small contributor to Airbus' profit and cash flow yet could be an area of large opportunity. A strong commercial-aircraft business and the ability to build large numbers of planes could drive wins in cargo and tanker aircraft, which usually are bought in bulk. The company also participates in the Eurofighter program with Leonardo and BAE.

Defense-Spending Impact: Airbus' opportunities are likely largest for aerial tankers, specifically the A330 MRTT, which could be $60 billion or more. It also has a strong potential to sell more A400M transports, unmanned aerial vehicles and helicopter platforms like transports and its tank-killing Tiger.

11.4 Rheinmetall Supported by Germany's Fiscal Strength



Market Cap (EUR Bn)		25.05
Share Price (EUR)		564.20
Earnings Per Share* (EUR)		P/E
2023A	13.02	43.33
2024E	21.40	26.37
2025E	29.81	18.93

* Bloomberg Consensus

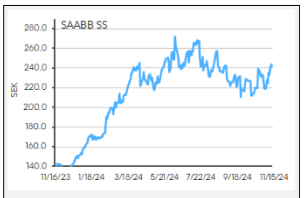
€40+ Billion
In orders expected

69%
Share rise in 2024 to Oct. 30

Company Outlook: Rheinmetall could hit the afterburners as it capitalizes on the defense supercycle, with Europe replenishing stockpiles and modernizing for future capabilities. Its robust pipeline is conservatively valued in the tens of billions of euros through the decade, underpinned by an expected €20-€25 billion order for tanks and combat vehicles by Italy and Germany, €15 billion for Boxer tactical vehicles, €5 billion for F-35 fuselages and billions more for artillery and munitions. The top line might rise by double digits for the next five years, and profit may grow even faster due to an improved business mix and greater efficiencies.

Defense-Spending Impact: Rheinmetall's growth is supported by German defense investment. The country has the best fiscal situation of any large NATO country and has underspent on defense for decades. The company is working with Leonardo on battle tanks and infantry carriers for the Italian military and has shown its flexibility in manufacturing F-35 fuselages.

11.5 Saab Leans Into Missiles, Drones as Backlog Grows



Market Cap (SEK Bn)		127.67
Share Price (SEK)		234.95
Earnings Per Share* (SEK)		P/E
2023A	6.29	37.35
2024E	8.06	29.16
2025E	10.26	22.91

* Bloomberg Consensus

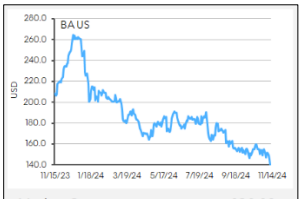
3.5
Years of sales coverage in the backlog

2x
Book-to-bill in 2024

Company Outlook: Saab is solidly positioned to capture incremental demand for defense capabilities, spurred by global volatility and its ability to fully target NATO opportunities now that Sweden is part of the alliance. Booking trends underscore strong interest in ground-combat support weapons, missiles, sensors, radars and electronic-warfare systems, with a book-to-bill of 2x year to date. Its top line could increase by midteens through late in the decade, bolstered by a robust backlog that's up 75% since 2021 and provides 3.5 years of sales coverage. Profit might grow even faster as Saab focuses on margin expansion by leveraging scale, improving efficiency and managing its portfolio.

Defense-Spending Impact: Saab's opportunities include missile systems, unmanned aerial vehicles and aircraft. Heightened demand for missile systems has improved the backlog.

11.6 Boeing's Planes, Helicopters Proven Entities in Battle



Market Cap (USD Bn)		103.39
Share Price (USD)		138.14
Earnings Per Share* (USD)		P/E
2023A	-5.81	-
2024E	-15.41	-
2025E	0.40	348.33

* Bloomberg Consensus

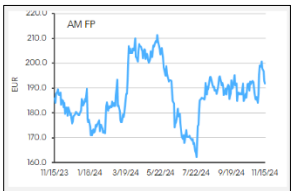
$77.8 Billion
2023 sales

40%
Share drop in 2024 to Oct. 30.

Company Outlook: Boeing's defense business has been mired in losses as key fixed-price programs have turned red with higher inflation, especially labor costs, since the pandemic. Among the most challenged are the KC-46 Pegasus tanker program, the Air Force One replacement, the MQ-25 Stingray refueling drone and the T-7A Red Hawk trainer, built in cooperation with Saab.

Defense-Spending Impact: Despite Boeing's challenges, the company has many tried-and-true defense products that are cost-effective due to program size and US military purchases. These could be sold to European militaries at a good price point. The AH-64 Apache is a strong contender given the challenges and costs of Airbus' Tiger. The P-8 Poseidon sub-hunter is very capable and built off the 737 airframe and engines, driving down support and maintenance costs. The KC-46 tanker could be sold into Europe at a competitive price against Airbus' MRTT.

11.7 Dassault's Rafale a Key in the Defense Portfolio



Market Cap (EUR Bn)		15.14
Share Price (EUR)		191.90
Earnings Per Share* (EUR)		P/E
2023A	10.95	17.53
2024E	11.67	16.45
2025E	14.22	13.50

* Bloomberg Consensus

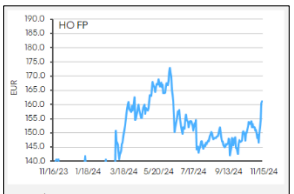
223
Rafales in backlog

25%
Ownership stake in Thales

Company Outlook: Dassault Aviation's Defense products and services are poised to drive revenue and profit growth amid rising geopolitical tensions. Rafale's build rate should rise to three a month, lifting deliveries toward 33 a year by the end of decade, up from 20 expected in 2024. The backlog as of June showed 223 Rafales, with 159 for export. Support contracts to the French army provide long-term, recurrent revenue and cash flows. Business jets, though focused on civil use, are also used for maritime reconnaissance and patrol missions (Albatros). A 25% stake in Thales is an additional tailwind.

Defense-Spending Impact: Dassault's opportunities include further export orders for the Rafale, as well as development revenue for a new F5 standard and a long-term new generation fighter as part of the Future Combat Air System program, in collaboration with Germany and Spain.

11.8 Thales' Electronics, Radar Pivotal for Rafale Fighter



Market Cap (EUR Bn)		31.16
Share Price (EUR)		151.30
Earnings Per Share* (EUR)		P/E
2023A	8.48	17.84
2024E	8.41	17.98
2025E	9.47	15.98

* Bloomberg Consensus

16%
Operating margin targeted in Digital Identity & Security unit

35%
Stake in Naval Group

Company Outlook: Thales' revenue, profit and margin could rise due to demand in its key defense, cybersecurity and aerospace markets, supporting cash generation, dividends and share repurchases. The acquisition of Imperva could help push Thales' Digital Identity & Security unit's operating margin up toward 16% through 2027. Defense's rising backlog offers 3.5 years of visibility amid wars and geopolitical tensions. Thales also owns 35% of Naval Group.

Defense-Spending Impact: Thales is key to Dassault's Rafale platform, supplying electronics and radars to the fighter. Demand for Air Defense solution across Europe supports a ramp-up of SAMP/T NG deliveries. More submarine orders would lift Naval Group's revenue and profit.

11.9 RTX's Raytheon a Familiar Provider in Europe

Market Cap (USD Bn)		156.89
Share Price (USD)		118.92
Earnings Per Share* (USD)		P/E
2023A	5.06	23.50
2024E	5.60	21.25
2025E	6.11	19.48

* Bloomberg Consensus

44%
International share of sales

$68.9 Billion
2023 sales

Company Outlook: RTX's Raytheon defense business strength includes air-defense systems, with core competencies in radars and missiles. It manufactures the Patriot surface-to-air missile-defense system. Backlogs have grown well over 1x recently, and international sales comprise 44% of booked orders, up 10 points from a year earlier.

Defense-Spending Impact: Raytheon is already garnering orders from Europe, with Germany a recent client, as wars in Europe and the Middle East underscore the need for air defense. Supply chains are constraining builds, leading to long lead times. Competitors such as Europe's MBDA will likely take some of this market, though it's likely both companies will build large books of business due to significant needs.

11.10 General Dynamics Produces Essential Artillery, Munitions

Market Cap (USD Bn)		79.25
Share Price (USD)		292.42
Earnings Per Share* (USD)		P/E
2023A	12.02	24.33
2024E	13.92	21.01
2025E	16.07	18.20

* Bloomberg Consensus

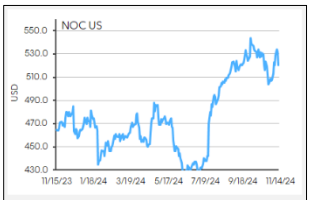
$55.3 Billion
Backlog

4-5x
Expansion of metal parts and propellant capacity

Company Outlook: General Dynamics' defense business includes wheeled and tracked ground combat vehicles; weapon and defense systems for ships, aircraft and vehicles; navy destroyers, auxiliary ships and nuclear-powered submarines; and technology solutions combining electronic hardware with missionized software. Backlog has climbed 22% to $55.3 billion from year-end 2021, with book-to-bill averaging 1.1x.

Defense-Spending Impact: General Dynamics is a key artillery and munitions supplier for the US Army and received government funding to expand its metal parts production and propellant capacity by 4-5x to supply munitions to Ukraine and replenish US stock. Demand for its land combat vehicles from European customers has climbed since Russia invaded Ukraine in 2022. Europe's significant recapitalization need suggests there's room for competitors like BAE, Rheinmetall and Saab.

11.11 Northrop Grumman Triples Export Portfolio



Market Cap (USD Bn)		72.10
Share Price (USD)		500.34
Earnings Per Share* (USD)		P/E
2023A	23.29	21.48
2024E	25.95	19.28
2025E	28.05	17.84

* Bloomberg Consensus

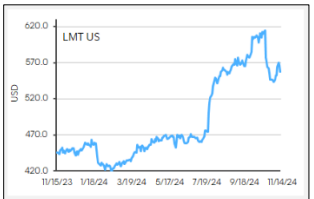
$38.4 Billion
Backlog

12-15%
International share of sales

Company Outlook: Northrop Grumman's defense business is focused on designing and manufacturing high-end military manned and unmanned aircraft systems, integrated air-and-missile defense solutions, advanced radars and fire control systems, satellites and space-based sensors, propulsion systems like solid rocket motors used on GMLRS, missiles and two legs to the US' strategic deterrence (B-21 and Sentinel). The backlog has risen 25% since year-end 2021 to $38.4 billion, supported by a book-to-bill of 1.1x.

Defense-Spending Impact: Northrop's defense portfolio historically has been more restricted than that of other US defense contractors, with international accounting for 12-15% of total sales. The number of programs that can be exported to allies has tripled over six years, and demand could rise for Northrop's open-architecture Integrated Battle Command System (IBCS), which integrates sensors and shooters and AARGM missiles used to defeat air defenses.

11.12 Lockheed Martin Gets F-35 Boost From Russia Invasion



Market Cap (USD Bn)		126.94
Share Price (USD)		538.99
Earnings Per Share* (USD)		P/E
2023A	27.82	19.37
2024E	26.69	20.20
2025E	27.99	19.26

* Bloomberg Consensus

360
F-35 orders since 2022

$71.2 Billion
Expected 2024 revenue

Company Outlook: Lockheed Martin is the defense bellwether, and its expertise includes manned and unmanned military aircraft, integrated air-and-missile defense solutions and components, missiles and rockets, helicopters, and space-based sensors and satellites. It's the prime contractor assembling the F-35 and manufactures the Terminal High Altitude Area Defense (THAAD) system.

Defense-Spending Impact: Lockheed has benefited from a surge in F-35 interest since Russia invaded Ukraine in 2022, garnering orders for 360 F-35s from 11 customers, with half from European allies. As wars in Ukraine and the Middles East continue, demand for its air-defense systems (like THAAD and PAC-3 interceptors) and rockets (GMLRS and Javelins) will likely remain elevated, though supply-chain issues may constrain throughput and extend lead times.

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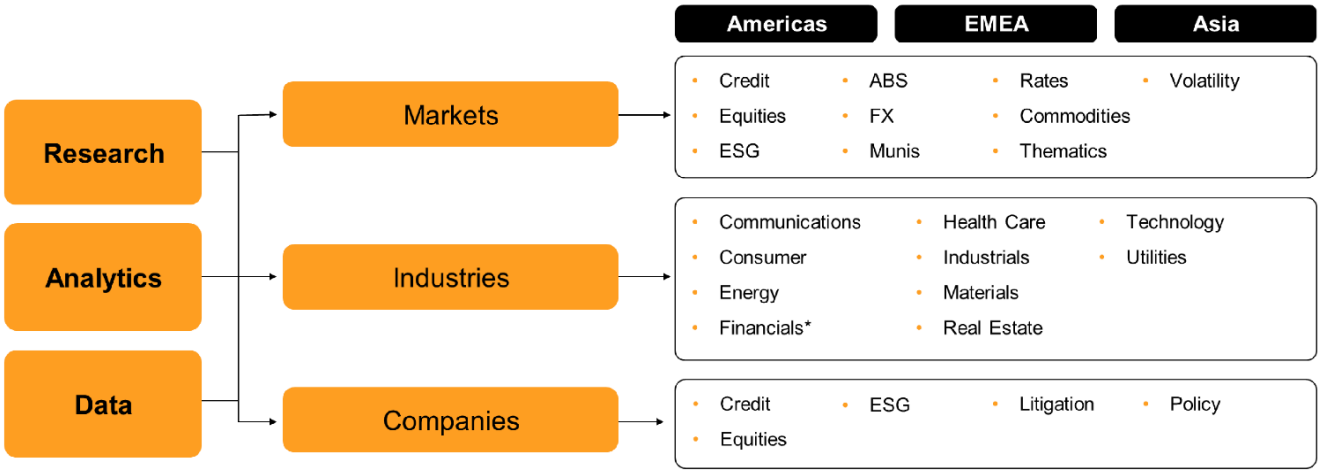

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