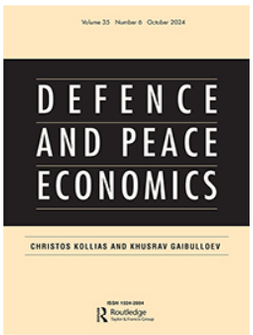

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Developments in Arms Production and the Effects of the War in Ukraine

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ABSTRACT

This article presents global trends in arms production, building on the most recent data from the Stockholm International Peace Research Institute (SIPRI). In 2022, despite Russia's full-scale invasion of Ukraine and heightened tension around the world, arms production fell in real terms by 3.5 per cent to $597 billion. The decrease was mostly due to the performance of US companies – still plagued by the effect of the COVID-19 pandemic – and not offset by increases in other regions. Notwithstanding the global decrease, arms revenue was still 14 per cent higher than in 2015, the year in which SIPRI started including Chinese arms companies. Procurement plans for the replenishment of stockpiles and modernisation of military equipment deployed by states around the world are mostly not yet reflected in the revenue of the arms industry. In addition to the lengthy time lag between orders and deliveries, many companies have faced challenges in scaling up production. However, high order intakes suggest that arms revenue may rise significantly in the years ahead.

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Introducing SIPRI Arms Industry Database

In 1989, in order to better understand the arms industry and track its development, The Stockholm International Peace Research Institute (SIPRI) initiated the Arms Industry Database (AIDB). The aim was to shed light on an otherwise rather secretive industry by providing publicly available information and to support the research on the post-cold war conversion project from military to civilian production.

Today, the AIDB is the only open-source database with a complete time series that hosts information on the 100 biggest arms-producing and military services companies ('arms companies') in the world since 2002. It lists the 100 largest arms-producing companies based on arms revenue measured in US dollars. The database is updated on an annual basis, with the new data usually being published in early December. Due to data availability, the database did not include firms in Eastern Europe, including Russia, up until 2002 and Chinese firms until 2015.

The database provides data points on companies' location, current and previous arms revenue, total revenue, and arms revenue as a share of total revenue. The database enables the research community to conduct quantitative and qualitative analyses of the evolution of the global arms industry, which in turn contributes to academic and policy debates on armament and disarmament.

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The next section of this article introduces the methodology and considerations while using the AIDB data. Section three provides examples of research areas by using the data. Section four presents a historical review of global trends in arms production. Section five touches on key regional developments in arms production, with a focus on the USA, the country with the most dominant presence in the SIPRI Top 100. Section six analyses the effect of Russia's invasion of Ukraine on the arms industry since February 2022 from both the demand and supply perspective. The final section offers some concluding remarks. The Appendix includes the latest Top 100 companies based on 2022 revenue numbers.

Methodology and Limitations of SIPRI Arms Industry Databse

SIPRI's AIDB definitions and methodology serve as a reference for the research community, as there is no generally agreed standard definition of what is considered arms revenue or arms sales.

SIPRI defines arms companies as firms that produce arms and/or provide military services, which cover public and private companies but exclude manufacturing or maintenance units of the armed forces as well as holding or investment companies without operational activities. Arms revenue is defined as revenues of military goods, services, and R&D to military customers domestically and abroad. Military goods and services are those designed specifically for military purposes, excluding dual-use goods for non-military cutomers or general-purpose goods for military customers, such as fuel, office equipment and uniforms, or technical services, such as information technology. They also do not include the peace-time provision of purely civilian services, such as healthcare, catering and transportation. All data for arms companies are based on open sources such as company reports and articles in journals and newspapers. When a company does not report revenue for its defence division, SIPRI estimates arms revenue using various data sources including contract awards, information on the company's activities, and figures provided by company officials in media or other reports.

Several methodological limitations apply while using the database. The scope and the geographical coverage of the data may differ every year due to limited transparency in the arms industry as well as changes in company ownership due to merger, acquisitions restructuring, and so on. Although inclusion of Russian companies in 2002 and of Chinese companies from 2015 enhanced the coverage of the database, it also implies that researchers should use the consistent time series for Top 100 total revenue with caution due to the series break between 2014 and 2015 when Chinese companies were first included in the dataset. The inconsistency in the way companies report their arms revenue or define what they consider as. 'defense' business make comparison between companies problematic. Finally, all data is collected in local currency and current prices and then converted into US dollars in both current and constant terms. Due to fluctuations in exchange rates, the arms revenue data should be interpreted with caution without knowing the relative shares of revenue derived from domestic procurement and from arms exports, particularly for countries with highly fluctuating exchange rates.

Several potential enhancement could further strengthen the breadth and depth of the database. For instance, expanding the dataset beyond 100 companies would better capture the comprehensive size of the arms industry. Tech giants (e.g. Amazon, Google, Microsoft) which are emerging as big defense contractors should be investigated further to determine if their goods and services offered are designed specifically for military application and therefore be included in the database. Furthermore, the database could also cover more data points systematically besides revenue numbers such as companies' backlog and order intake, profitability, employment data as well as share of domestic versus foreign sales which could provide more insights into firm activities and performance.

The Use of Arms Industry Data

The SIPRI AIDB is used by researchers across diverse academic disciplines, including international relations, security and defence studies, defence economics, and peace research. Since most countries do not provide aggregated data at the national level, the database fills the gap in assessing the national arms and military services industries. Thus, while the companies in the SIPRI Top 100 do not include the entire national defence industrial base, for many countries the companies in the Top 100 account for a major share of the country's national arms industry output. With data that can be aggregated at the national level, the AIDB also provides some indication of the revenue of arms and military services at the national level for some countries. With a consistent definition and methodology for arms production in over thirty years, the AIDB allows both cross-section analysis focusing on the arms industry at a specific point in time, and time-series studies looking at the historical trend of the industry for chosen countries and regions.

Conceptually, researchers use the data to develop and refine methodologies for studying the arms industry (Brzoska 2019; Hartley 2018). Empirically, it is the basis for studies of global developments, such as Fleurant and Quéau (2016) who provide an overview of current developments in the political defence economy; or Hartley and Belin (2019) who used the AIDB to select their case studies for their edited volume on *The Economics of the Global Defense Industry*. The AIDB is also useful for studies of local and regional developments. Béraud-Sudreau and Nouwens (2021) used the AIDB to study the location of Chinese arms companies in global rankings; Bitzinger (2015) to explore the progression of arms-industrial capabilities in Asia; Czulda (2020) used it for a case study on Poland; and Palavenis (2021) on Israel. Kleczka, Buts, and Jegers (2020) further used data from the AIDB to understand the challenges in building a pan-European arms industrial base. The arms industry's lobbying power has also been studied with the AIDB as one of the determinants of states' arms procurement, thereby fuelling arms races and in turn leading to a higher risk of war (Brunton 1988; Dunne and Sköns 2010; Ledbetter 2011; Moravcsik 1991; Pearson 1994; Sköns and Dunne 2009). Knowledge of the evolution and scope of the global arms industry is thus crucial for those interested in war and peace.

Furthermore, more potential research can be pursued on the economics behind the arms industry, including sectoral/national/regional concentration, monopolies and arms industry impact on wealth and employment. The interaction between domestic weapon procurement and arms industry revenues will enable quantitative and qualitative analyses of countries' levels of self-sufficiency from both the demand and supply side.

Historical Review of Global Trends

Trends Since 2015

In 2022, the combined arms revenue of the world's largest arms-producing and military services companies (the SIPRI Top 100) was $597 billion. In real terms, the figure represented a 3.5 per cent decrease in the arms revenue from 2021. The fall in the global arms revenue was mostly driven by overall decreases in the arms revenue of companies in the United States and – to a lesser degree – Russia. Given the prominence of US arms companies, events affecting them are bound to reflect on global trends. The decline in total arms revenue happened despite Russia's full-scale invasion of Ukraine and geopolitical tensions around the world prompting governments to announce extensive arms procurement plans, driving a strong uptick in demand for specific weapons and military equipment. Efforts to increase production capacity were hindered by the effects of the long tail of the COVID-19 pandemic on national economies. Many arms companies lamented labour shortages, rising costs and supply chain disruptions. Nevertheless, the 2022 total Top 100 arms revenue was still 14 per cent higher than in 2015. Furthermore, large backlogs in orders and surging demand for weapon systems during 2022 and 2023 suggest that the total Top 100 arms revenue may rise significantly in the years ahead.

Since 2015, the number of companies per region has mostly remained stable, with the Americas averaging 44 companies, followed by Europe (26), Asia and Oceania (21), the Middle East (5), and Russia (4).[1] The arms revenue regional share of the Top 100 (see Figure 1) illustrates how the different regions contributed to the global arms revenue over the eight years: the Americas averaged 50 per cent, followed by Asia and Oceania (22 per cent), Europe (20 per cent), Russia (5.7 per cent), and the Middle East (2.5 per cent). If compared to the 2015 counterparts, 2022 American companies increased their revenue by 13 per cent and gained 2.9 percentage points in the total Top 100 share (48 per cent in 2015 v. 51 per cent in 2022), despite listing one company less (44 in 2015 v. 43 in 2022). Compared to 2015, most regions recorded arms revenue growth: Middle East + 71 per cent, Asia and Oceania + 29 per cent, Europe + 16 per cent, and Americas + 13 per cent. The only exception was Russia, which registered a 41 per cent drop. It is mostly due to the progressively declining transparency of Russian arms companies since the beginning of the full-scale invasion of Ukraine. In 2022, Almaz-Antey released a press statement declaring it would have stopped providing data to organisations such as SIPRI, fearing further sanctions (TASS 2022a). Therefore, whereas the 2020 Top 100 listed nine Russian arms companies, the 2022 list features only two. The loss of access to figures for major companies such as Almaz-Antey and Tactical Missiles Corporation entails a lower resolution and an underestimate of the size of the Russian arms industry.

One interesting facet of the Top 100 is constituted by its concentration. Employing the Herfindahl – Hirschman Index, Figure 2 shows that, after peaking in 2002 at 0.05, the HHI started a declining trend that reached its lowest point at 0.03 in 2017. While it is complex to interpret the trends in concentration, the main feature remains the wave of consolidation within the global arms industry (excluding China) that started in the 1990s. The subsequent decrease is explained by Dunne, Sköns, and Tian (2022) as the probable result of the growing relevance of emerging arms producers on the global level. The flattening of the line in 2015 could be due to the introduction of Chinese companies. Since 2018, the index started picking up again, despite the loss of data access to major Russian arms companies.

Since 2015, on average, the first ten companies constituted 48 per cent of the global arms revenue. Of these, five were based in the USA (Lockheed Martin, Raytheon Technologies,

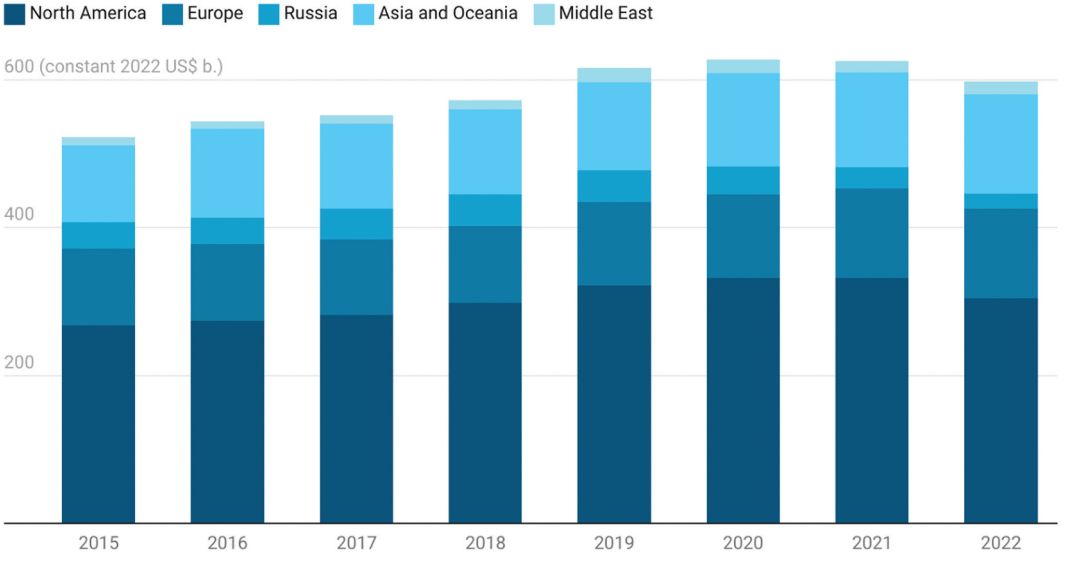

Figure 1. Total arms revenue of companies in the SIPRI top 100 by region, 2015–22. Note: The data in this graph refers to the companies in the SIPRI Top 100 in the respective year (meaning that the data covers a different set of companies each year). The series begins in 2015, the first year that SIPRI started to include Chinese companies.

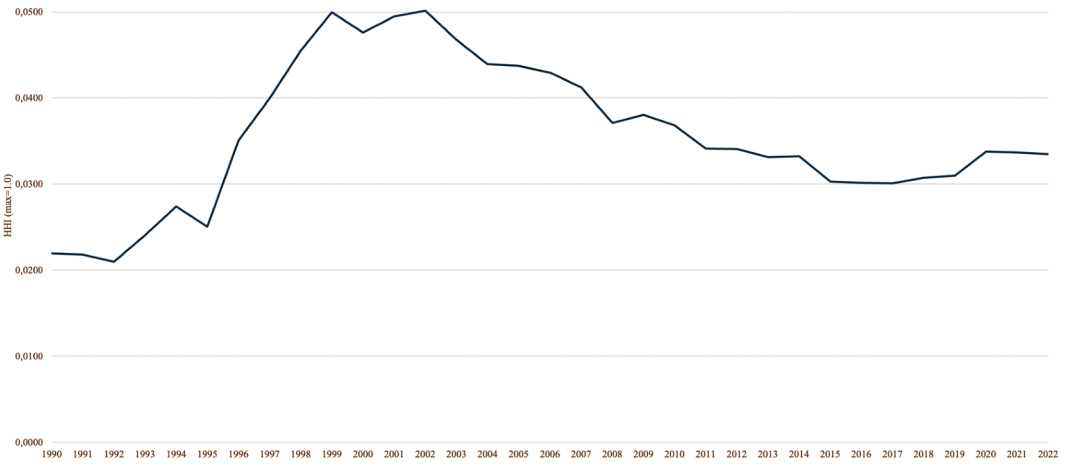

Figure 2. Herfindahl–Hirschman index (HHI) on concentration for top 100 arms companies, 1990-2022.

Northrop Grumman, Boeing, and General Dynamics). Compared to 2015, their combined arms revenue grew by 22 per cent and – on average – it amounted to 31 per cent of the whole Top 100. In addition, over the eight years considered, the revenue of British BAE Systems decreased by 1.1 per cent and, in 2018, the company dropped from ranking 3rd to 6th, cementing the position of the US companies at the top of the list since. In 2015, Trans-European Airbus was ranked 10th, but it has since been overtaken by Chinese companies NORINCO, AVIC, and CASC (the latter was briefly substituted by CETC in 2019). Among the top ten companies in the Top 100, those based in China increased by 3.9 percentage points to constitute 10 per cent of the global arms revenue in 2022, their highest share to date. Russian holding company Rostec peaked between 2017 and 2019 when it listed 7th. Its arms revenue then started declining as NORINCO, AVIC, and CASC were growing to claim rank 7 to 9.

Regional Developments in Arms Production

USA

The USA is the country with the largest presence in the Top 100, as has been the case for every year of SIPRI's data set. In 2022, there were 42 American-based companies in the Top 100 with a recorded revenue of $302 billion and accounting for 51 per cent of the Top 100 total. In recent years, the number of US-based arms companies and their share in the Top 100 has remained remarkably stable. Since 2015, the year in which SIPRI included Chinese arms companies, the share of revenue for US companies in the Top 100 have ranged from 48 to 51 per cent of the Top 100 total and the number of companies has remained at between 42 and 44.

Despite the notable increase in demand for weapons in 2022 fuelled by heightened geopolitical tensions and a need to replenish stockpiles, arms revenue by US companies fell by 7.9 per cent in 2022. One reason for the fall in arms revenue is the lingering effects of the COVID-19 pandemic on labour shortages and supply chain constraints. Of the 42 US companies in the ranking, 32 reported a drop in arms revenue. The fall in US arms revenue was especially noticeable and driven by the largest US producers. Four of the top five US arms companies recorded decreases in arms revenue, with Northrop Grumman's (ranked 3rd) arms revenue remaining unchanged.

Lockheed Martin, the world's largest arms company, recorded an arms revenue drop of 8.9 per cent in 2022 to $59.4 billion. The decrease was mainly due to supply chain problems. Raytheon Technologies (ranked 2nd) revenue fell by 12 per cent compared with 2021. Boeing

(ranked 4th) recorded a 19 per cent decrease caused by lower production volumes of military aircraft. The arms revenue of General Dynamics (ranked 5th) fell by 5.6 per cent.

An additional reason for the non-increase of US arms revenue was the time lag between new orders placed late in 2022 and production. This meant that the surge in demand was not reflected in companies' 2022 revenue. Instead, arms revenue generated during the year was from orders placed well before the Russian invasion. Given the issues faced by the industry of ramping up production, and existing long production times, it is likely that the orders related to the war in Ukraine will only become visible in future years' arms revenue.

To mitigate the issues faced by the US arms industry, in January 2024, the US Department of Defense released a National Defense Industrial Strategy (NDIS), indicating resilient supply chains as critical and detailing actions to be taken to strengthen them (Clark 2024). The NDIS has a horizon of three to five years, but the plan to implement the recommendations has already been postponed from March to the summer of 2024 (Robertson 2024).

Recent Developments in the US Arms Industry

Mergers and Acquisitions

Over the past three decades, the US arms industry has undergone profound changes with trends ranging from companies exiting arms production and diversifying immediately after the end of the cold war to government initiatives to stimulate mergers and acquisitions. The most recent of these merger and acquisition trends started around 2017. Motivated by the new US policy of military modernization, some companies sought to broaden their product portfolios to better position themselves against rival companies and win various contracts put forth by the US Department of Defense. This has resulted in some large-scale mergers among the top 10 US arms producers as well as their acquisitions of IT and other high-tech business units from other defence and civil companies.

Some examples of prominent recent mergers and acquisitions in the USA include the 2020 merger between Raytheon and UTC, which was viewed as one of the largest mergers in the history of the global arms industry. Known as RTX from 2023, it is the second-largest arms-producing company in the world. There was the multibillion-dollar merger of L3 Technologies and Harris in 2019. The resulting company, L3Harris Technologies, was the 12th largest company in the Top 100 in 2022. The trend of mergers and acquisitions was particularly pronounced in the space sector. For example, in 2018 Northrop Grumman acquired Orbital ATK, a space systems contractor for approximately $9.2 billion while the acquisition by KBR of Centauri, a provider of space and directed energy capabilities, was finalized in 2020.

Despite worries that a wave of mergers and acquisitions could stifle competition and leave the United States dependent on a limited number of suppliers, thereby posing a risk to national security, significant acquisitions continue to take place. In a notable example from 2022, L3Harris Technologies completed the purchase of Aerojet Rocketdyne for $4.7 billion. However, it should also be noted that studies conducted on the 1990s mergers and acquisitions found no evidence pointing towards an increase in procurement costs (Carril and Duggan 2020) and that the 2022 Herfindahl – Hirschman Index is of 0.03, far lower than the 0.15-0.25 bracket that would label the sector as `moderately concentrated` according to the US Department of Justice.

Private Equities

Another important development related to mergers and acquisitions is the visible trend of acquisitions of larger arms companies by private equity firms. Some recent examples of this include the private equity firm Advent International's purchase of two British arms-producing companies, Cobham in January 2020 and Ultra Electronics in July 2022, and the purchase in May 2021 of Cubic Corporation by Veritas Capital and Evergreen Coast Capital (Liang et al. 2023).

The acquisition of arms companies by private equity firms raises several concerns. One involves decreasing levels of transparency. These firms are not obliged to disclose financial reports and this

lack of disclosure becomes more problematic when transactions occur among private equity firms, potentially further obscuring an arms company's operations from public view. The growing presence of private equity in the defence sector complicates efforts in monitoring the sector's trends and developments and presents challenges to oversight and accountability in a field that is integral to national security (Scarazzato and Lipson 2022). In addition to concerns about transparency, private equity acquisitions of arms companies have been found to negatively affect US national security due to the debt leveraged onto the companies during buyouts which ultimately can diminish arms companies' ability to complete their defence contracts (Mahoney, Tkach, and Rethmeyer 2022).

New Civil Technology Companies

Advances in the application of information and communication technologies (ICT) over the past two decades have changed the character of war and military industrial base (Cronin 2013). One result of this increased application of ICT has seen increased involvement of high-tech companies entering the arms industry first through receiving grants for technological development and second to become major suppliers of software components, software services, IT services, and Internet software and services (Dunne and Sköns 2021). Major high-tech companies that have entered the sector are Amazon, Apple, Google, Microsoft, and Oracle. While in terms of arms revenue, these are not among the SIPRI Top 100, these companies can have a significant impact on the industry.

Notable instances of technology companies engaging in defence-related activities include Microsoft's provision of advanced visual augmentation systems to the US Army, a deal signed in 2021 and valued at $22 billion over ten years. Additionally, in 2020, the Central Intelligence Agency allocated a cloud computing contract to a consortium that includes Amazon, Google, IBM, Microsoft, and Oracle. This agreement is estimated to be worth tens of billions of dollars and will extend across 15 years.

Europe

From 2015 to 2022, the number of European arms companies in the Top 100 has shown stability while their combined arms revenue has demonstrated a gradual upward trend, reaching $121 billion in 2022. Compared to the previous year, the increase in arms revenue of the region is 0.9 per cent. However, since 2015, Europe saw its share of total arms revenue decrease from 22 to 20 per cent. The trend reflects the twofold pressure European arms companies are facing: from major US and Chinese producers and from emerging countries such as Israel, South Korea and Türkiye (Hartley 2023). The 2022 arms revenues are in stark contrast with the intuitive assumption that the full-scale invasion of Ukraine would have meant a windfall for the European (and global) arms industry. Because of the Russian invasion of Ukraine, many European governments pledged to boost their military expenditure and the continent witnessed its Central and Western subregions increase their spending by 3.6 per cent to reach $345 billion in 2022, the highest level since the end of the cold war (Tian et al. 2023).[2]

More military expenditure is not necessarily linked to increases in procurement, and especially not procurement from European companies.[3] However, if the NATO-reported estimated percentage of military budgets dedicated to *Major equipment, including related R&D* is to be taken as a proxy for the whole of Central and Western Europe, in 2022, it averaged 28 per cent among European NATO members – cohort that in 2022 amounted to 92 per cent of the subregion military expenditure—. The average procurement outlay marks a 3.7 year-on-year percentage point increase, and a 14-percentage point increase compared to 2015. Projections for 2023 see the same average reaching 31 per cent (North Atlantic Treaty Organization 2023).

However, similarly to the US arms industry, there often is a lengthy time lag between the initial demand for weapons and the subsequent scaling up of production and delivery by European companies. After the end of the cold war, the arms industry in Europe switched to

peacetime production to accommodate the different warfare paradigm that states were facing. Asymmetric and small-scale conflicts were the new reality, and weapons procurement was tailored accordingly with low production volumes and long lead times. The return of a symmetric large-scale conflict upended the situation, taking states and companies aback and resulting in massive order intakes. One instance is provided by BAE Systems (ranked 6th). Despite an almost null year-on-year increase, the company maintained its leading position as the largest European arms industry and – like many other arms companies – BAE Systems registered the effects of increased demand for weapons: its order intake grew by 58 per cent in value to a record $45.7 billion. Compared to 2015, the year following the Russian invasion of Crimea, BAE Systems' book-to-bill ratio – the financial metric that compares the value of new orders received by a company to the revenue over a specific period – doubled. Going from 0.8 in 2015 to 1.6 in 2022 (BAE Systems 2016, 2023a), BAE Systems' book-to-bill ratio hints at future revenue growth. Coupled with announced increases in military expenditure, the fact that major European arms producers witnessed an unprecedented uptick in their order book and the contrast this draws with their 2015 situation underlines a renewed focus on armaments.

The focus is also reflected in the activities of the European Union. The European Union has been promoting policies and programmes to support its arms industry since 2009. However, the full-scale invasion of Ukraine prompted a flurry of new policies and mechanisms. The latest development to date has been the European Defence Industrial Strategy (EDIS). Released in March 2024, EDIS outlines a vision to strengthen the European arms industry, in a timeframe spanning to 2035. While the contained provisions reflect the European Union's ambition to tackle some of the issues plaguing its arms industry, doubts persist about the financial backing of coordinated actions and therefore on its short-term efficacy.

Over the period between 2015 and 2022, the composition of the European arms industry has remained mostly unaltered. The United Kingdom has consistently held the most prominent position in the region – with its seven companies contributing $41.8 billion or 7.0 per cent to the total Top 100 arms revenue in 2022. The UK is followed by France whose companies experienced the highest increase in arms revenue when compared with 2015. France lost a Top 100 company in 2021 when Nexter associated with German KraussMaffei-Wegmann to create KNDS and started being considered by SIPRI as a Trans-European company. Despite that, over the eight years, France still registered a 30 per cent increase in its arms revenue. The upturn was mostly driven by Dassault (ranked 23rd) which – notwithstanding annual swings due to Rafale combat aircraft exports – grew by 157 per cent compared to 2015. In 2022, the combined arms revenue of companies based in France amounted to $26.0 billion, with Thales (ranked 17th) consistently remaining the biggest French company. Trans-European companies Airbus (ranked 14th), MBDA (ranked 32nd), and (from 2021) KNDS (ranked 44th), have held the third largest share ahead of Italy with its Leonardo (ranked 13th) and Fincantieri (ranked 46th). Ukraine has figured – with one company – among the European arms companies since 2015. In 2022, UkrOboronProm[4] (ranked 81st) recorded a 10 per cent decrease year-on-year. The fall in arms revenue is attributable to soaring inflation, as the company grew by 8.7 per cent in nominal terms. Furthermore, in 2022, the company was involved in talks for joint ventures with major NATO arms industries to produce ammunition and repair military vehicles.

Russia

In the 2022 Top 100 ranking, two Russian companies featured a combined arms revenue of $20.8 billion, reflecting a 12 per cent decrease from the previous year. The average share of the Top 100 held by Russia from 2015 to 2022 was 5.7 per cent while – over the same period – the combined arms revenue of its companies fell by 41 per cent. However, the figures hide a more complex picture that is not explained only by the industry performance or the economic environment. Declining levels of transparency, especially following Russia's invasion of Ukraine, also heavily affected data collection and analyses relative to the Russian arms industry.

Notably, Rostec was included in the ranking at 10th place with $16.8 billion in arms revenue, owing to the absence of data for other Russian arms companies. Rostec had previously been excluded from the SIPRI Top 100 due to its lack of direct manufacturing capacity. Companies like High Precision Systems, KRET, Russian Electronics, Russian Helicopters, United Aircraft Corporation, United Engines Corporation, and UralVagonZavod – which all featured in previous editions of the Top 100— were excluded in 2022 due to data unavailability and replaced by Rostec, their holding company. Additionally, the diminished transparency in the 2022 Top 100 excludes data from Almaz-Antey (arms revenue of $7.6 billion in 2020) and Tactical Missiles Corporation (arms revenue of $4.8 billion in 2021). These companies, not part of Rostec, produce equipment in high demand due to ongoing conflicts, such as air defence systems and missiles. The absence of their figures from the Top 100 means that Russian figures are likely an underestimate.

Rostec's arms revenue declined by 9.9 per cent, primarily attributed to heightened inflation in Russia in 2022. United Shipbuilding Corporation (USC), ranked 36th, experienced an 18 per cent decrease in arms revenue to $4.0 billion. Despite these shifts, arms revenue as a percentage of total revenue remained stable for both companies, standing at 55 per cent for Rostec and 79 per cent for USC in 2022.

The Russian arms industry faced challenges in 2022, notably a decline in arms exports, with exports totalling $8.0 billion between January and November (TASS 2022b), a significant drop from the $15.8 billion recorded in 2021 (Defence News 2022). However, this only constituted an intensification of a trend that started before the war in Ukraine (Wezeman, Gadon, and Wezeman 2023). Moreover, Western sanctions on Russia further impacted arms companies, exemplified by USC reporting delays in military vessel deliveries due to limited access to components (Paris 2023).

Contrary to government reports of increased arms production and a 21 per cent rise in military research and development spending, there was no substantial growth in arms revenue or a notable shift towards military production in 2022, according to data from Rostec and USC. This apparent disparity may be attributed to factors such as high inflation rates, declining arms exports, delayed government payments to arms companies potentially offset by bank loans, and companies reporting refurbishment of arms from Soviet-era stockpiles as new production, which generates lower revenue.

Asia and Oceania

Asia and Oceania is the geographic region with the longest uninterrupted streak of military expenditure growth, with continuous increases since the late 1980s. The growth of resources that the states in the region have dedicated to their armed forces has resulted in improved military capabilities, as evidenced by the introduction of increasingly modern weapon systems.[2] Amid escalating geopolitical tensions and perceived regional threats, governments across Asia and Oceania have implemented policies to foster the growth of indigenous arms-production capabilities, seeking to bolster self-sufficiency in their arms companies,[5] of which supply primarily to their own armed forces. As a result, the trajectories of revenue of arms companies in the region are mostly linked to national procurement and modernization initiatives and are less affected by supply chain fluctuations in the global arms market. In 2022, Asia and Oceania accounted for 22 of the Top 100 arms companies. Their combined arms revenue reached $134 billion, up by 3.1 per cent compared to 2021 and by 29 per cent from 2015, the first year SIPRI included Chinese companies in the database.

China dominates the region in terms of the size of its arms companies, making up on average 79 per cent of the regional arms revenue during 2015-22. It is the only country in the region that has companies that can produce complex weapon systems in all sectors. Arms companies in Australia, India, Japan, South Korea, Singapore, and Taiwan have developed advanced production in niche areas and are also represented in the Top 100. Despite having domestic arms industries, countries like Indonesia, Malaysia, Pakistan, Thailand, and Viet Nam lag behind in terms of both company size and level of self-reliance, focusing primarily on low-technology production and the maintenance of foreign systems. None of these countries has ever been represented in the Top 100. For many

countries at this stage, land and marine systems are often the sectors with the strongest domestic production capabilities, whereas aerospace advances have proven to be slower.

Chinese arms companies have the second-largest presence in the Top 100 accounting for 18 per cent of the top 100 total and nearly matching the scale of all European arms companies in the ranking, although they still lags behind their western counterparts in some key technologies. Total arms revenue by the eight Chinese state-owned arms companies in the Top 100 totalled $108 billion in 2022, up by 2.7 per cent from 2021 and 32 per cent from 2015, the first year they were included in the ranking. NORINCO (ranked 7th), a land systems manufacturer, is the largest Chinese arms company in the Top 100. Its arms revenue rose by 4.4 per cent to $22.1 billion in 2022. AVIC – China's main military aircraft manufacturer – is the second largest Chinese company and the 8th largest in the Top 100. Its arms revenue rose by 4.7 per cent largely reflecting the increased production of its fourth-generation combat aircraft and the fielding of fifth-generation combat aircraft into the People's Liberation Army Air Force. The Chinese company that grew the fastest from 2015 is CASC (ranked 9th), which increased its revenue by 49 per cent in the last seven years, indicating China's rapid development in missiles and Unmanned Aerial Vehicles (UAVs) production.

Four South Korean firms were present in the Top 100 in 2022, achieving a total arms revenue of $6.9 billion. Although there was a marginal 0.9 per cent decrease from 2021, the arms revenue from South Korean companies listed in the SIPRI Top 100 witnessed a 27 per cent increase from 2015 to 2022. South Korea has emerged as a significant player in the export market, a trend accelerated by the aftermath of Russia's invasion of Ukraine in 2022, exemplified in recent deals with Poland, Norway and Australia. Two of the South Korean companies – LIG Nex1 and Hyundai Rotem – that specialized in systems in high demand since the war in Ukraine including ammunition, artillery and other land systems, achieved double-digit growth in 2022. This growth is driven by their flexible production lines and large stockpiles of ammunition and artillery amid perceived threat from North Korea. These allowed South Korean companies to ramp up production and divert existing stocks for export to convert rising orders into revenue faster. Hanwha Aerospace (ranked 48th), for instance, doubled its annual production of K9 self-propelled howitzers, with plans for another doubling in 2023 (Korea International Trade Association 2023). This contrasts sharply with some European companies that reduced production due to declining military spending after the cold war.

The combined arms revenue of the four Japanese companies in the Top 100 reached $7.1 billion, marking a 1.0 per cent increase from 2021. All Japanese manufacturers reported increased orders from their armed forces in 2022, anticipating further growth in arms revenue from 2023 onwards. Taiwan's NCSIST (ranked 50th) experienced significant growth with a 36 per cent increase in arms revenue to $2.6 billion, driven by heightened demand for indigenous uncrewed aerial vehicles, aircraft, and submarines from the Taiwanese government, which seeks to strengthen its armed forces amid perceived growing assertiveness from China.

Three Indian companies featured in the Top 100 in 2022, one more than in 2021. Their combined arms revenue reached $6.4 billion, marking a 7.4 per cent increase, fuelled by significant orders from the Indian armed forces. Mazagon Dock Shipbuilders (ranked 89th) entered the Top 100 with a 28 per cent growth, attributed to successful deliveries to the Indian Navy. This growth reflects the government's strong investments in the indigenous arms industry, in an effort to address lingering concerns about productivity, domestic market dependence, and reliance on foreign resources (Indian Department of Defence Production 2018).

Middle East

When examining the annual percentage growth in arms revenue by region, the most significant jump for the Top 100 arms companies was seen in the smallest. In the Middle East, the arms revenue of seven companies surged by 11 per cent, totalling $17.9 billion. Each of these companies experienced growth, with Turkish firms leading with a 22 per cent surge. The growth in arms revenue among Middle Eastern companies results from the combination of a demand shock

stemming from the war in Ukraine (Calcara, Gilli, and Gilli 2023; Cappella Zielinski et al. 2023; Guiberteau, Hellemeier, and Schilde 2023), and geopolitical and technical idiosyncrasies. For one, the government support given to many Middle Eastern companies to reduce import dependence created a strong network of local suppliers that helped to mitigate the impact of global supply chain disruptions. Moreover, these companies operate in an environment of ongoing security challenges. The continuous demand for military products and services and the matching production pace were preconditions that allowed these companies to speed up deliveries and rapidly meet the surge in orders. For the year 2022, Türkiye had four firms in the Top 100, accumulating a combined arms revenue of $5.5 billion which reflects an increase from two companies the previous year. Baykar (ranked 76th) and Roketsan (ranked 100th) made their first appearance in the Top 100 in 2022. The growing number of Turkish companies in the Top 100 is the result of continuous state-led efforts to enhance indigenous arms production capacities (Kurç 2017). Especially in the past two decades, Türkiye has made significant strides in boosting self-sufficiency in the defence sector by favouring national contractors and investing in original design (Akça and Özden 2021). In contrast with Europe, Türkiye has maintained a sustained production of weapons systems suited for large-scale symmetric warfare. Turkish arms companies have also managed to meet a growing external demand. Most notably, exports of UAVs have risen vertiginously in the past five years. When the full-scale invasion of Ukraine happened, Turkish arms industries were well placed to address the procurements originating from the conflict. In 2022, Baykar – specialized in UAVs and Command, Control, Communications, Computers, and Intelligence (C4I) – achieved a remarkable 94 per cent increase in arms revenue due to the sales of Bayraktar TB-2 UAVs used by Ukraine in the war. The Bayraktar TB-2 is an example of the proliferation of UAVs in contemporary armed conflicts (Davies, Pettersson, and Öberg 2022). It first gained prominence in 2020 after being successfully deployed in combat in Operation Spring Shield by Türkiye and in the Nagorno-Karabakh conflict by Azerbaijan. In both instances, the Bayraktar TB-2 has proven to be instrumental for military gains. Other important recipients of the Bayraktar TB-2 are Morocco and more recently Poland.

In Israel, the total arms revenue of the Top 100 companies went up by 6.5 per cent, reaching $12.4 billion in 2022. Elbit Systems (ranked 24th) saw a 4.0 per cent increase in arms revenue, reaching $5.0 billion, thanks to higher artillery system sales to European nations, a reaction to the conflict in Ukraine. Israel Aerospace Industries (ranked 35th) witnessed a 5.5 per cent rise in arms revenue to $4.1 billion in 2022, the highest in its history, with its backlog of orders also growing to $15.6 billion. Rafael (ranked 42nd) had the most significant rise among Israeli firms in the Top 100, with a 12 per cent increase in arms revenue to $3.4 billion, also connected to the Ukrainian war. Rafael operates a German facility producing anti-tank missile launchers that Germany and the Netherlands have supplied to Ukraine.

The Effects of the War in Ukraine on the Arms Industry

The repercussions of Russia's invasion of Ukraine have driven higher military expenditure by countries in Central and Western Europe as well as rising arms transfers to Ukraine, both impacting the demand side of the weapons industry. At the same time, the arms companies are commonly discussed in the defence economics literature as the supply side of the industry (Caverley 2023; Fleurant and Tian 2018). Their performance during the first year of the war in Ukraine across countries and regions provides a snapshot of how regional and national arms industries reacted to the rising demand in the aftermath of the war in Ukraine as well as rising geopolitical tensions globally.

Surging Demand for Arms

The 2022 arms revenue of the Top 100 exhibited a surprising decline, contrary to expectations fuelled by heightened geopolitical tensions and the perceived necessity for countries to replenish

and modernize their military equipment. Despite a notable increase in global demand for weapons, the arms industry faced challenges in translating this demand into immediate revenue, underscoring the time lag between the initiation of arms procurement plans and the subsequent scaling up of production and delivery.

The impact of Russia's full-scale invasion of Ukraine in February 2022 played a pivotal role in influencing governments to announce large-scale arms procurement plans. The arms industry of the USA and Europe was suddenly required to switch from peacetime to wartime production. Challenges to ramping up meant that order intakes increased backlogs. Companies' order intake during 2022 serve as indicators of demand and therefore future revenue. Several companies, despite experiencing a decline in arms revenue for the year, anticipate substantial growth in the near to medium term based on their order intake during 2022. For instance, MBDA saw its arms revenue fall by 7.3 per cent to $4.4 billion, but reported arms orders worth $9.5 billion in 2022, marking a substantial 65 per cent backlog increase compared to 2021. Similarly, Saab (ranked 39th) with $3.7 billion in arms revenue – and despite a 0.5 per cent decrease – witnessed a 35 per cent surge in order intake, reaching $6.2 billion in 2022. The company also enjoyed a record backlog of $12.6 billion in the same year, with $4.0 billion expected to materialize as revenue within one year. The trend was also visible outside Europe. In 2022, Hanwha Aerospace – notwithstanding an 8.5 per cent decrease in its arms revenue to $2.8 billion – experienced a remarkable 270 per cent increase in its land systems backlog which grew to $15.3 billion. For all these companies, the book-to bill ratio was higher than 1, signalling that they had garnered more orders than they had invoiced, hinting at future revenue expansion. Industries characterized by a substantial lag between order initiation and revenue acknowledgement – such as the arms industry—, frequently employ the book-to-bill ratio as a tool to evaluate a business's health and future outlook.

In many cases, these increases in backlogs and order intakes were attributed to ongoing national procurement plans that predated the conflict in Ukraine. This suggests that the rate of growth is poised to intensify when more recent orders take effect, potentially leading to a substantial upswing in the coming years. While inflation numbers are not available at the time of writing, second and third-quarter reports for 2023 from major arms industries already point to strong nominal growth for the period: Lockheed Martin reported 3.6 per cent (Martin 2023), Northrop Grumman 8.7 per cent (Grumman 2023), Boeing 7.1 per cent (Boeing 2023), General Dynamics 7.9 per cent (General Dynamics 2023). In Europe, BAE Systems reported 11 per cent as nominal growth in the first half of 2023 (BAE Systems 2023b), while from January to September Thales grew by 6.0 per cent (Thales 2023) and Rheinmetall by 13 per cent (Rheinmetall 2023).

Arms Production in the Wake of the War in Ukraine in 2022

The arms revenue of companies during the first year of the war in Ukraine underscores ongoing trends across regions in the lead-up to the recent conflicts and tensions. The USA continues to dominate global arms production, reflected in the large amount of backlog and orders from governments across all regions. The tepid growth of European companies despite the biggest armed conflict in Europe since the Second World War highlights challenges related to defence planning, production capacity and collective action the European arms industry has long struggled with since the end of the cold war (Calcara 2020; Kleczka, Buts, and Jegers 2020). In contrast, strong growth in Asia and the Middle East amid global supply chain challenges and inflation is an indication of the progress in the pursuit of self-sufficiency and resilient production capacity in these countries (Béraud-Sudreau et al. 2022).

While in aggregate the consequences of the war in Ukraine have yet to be translated into the Top 100 arms companies' revenue, some impact could be seen for some manufacturers of products meeting the perceived requirements of armed forces in a high-intensity conflict in 2022. Growing demand in the USA and Central and Western Europe was centred on specific categories of weapon systems (see Table 1). These included air defence systems, ammunition, armoured vehicles, artillery systems and missiles, as well as UAVs and other uncrewed systems. However, systems like

Table 1. Manufacturers of weapon systems in high demand since February 2022.

Rank	Company (country)	Selected weapon systems supplied to the USA and Europe	Arms revenue change 2021-2022
1	Lockheed Martin Corp. (USA)	ABM; ASM; ATGM; SAM; SSM; artillery	−8.90%
2	Raytheon Technologies (USA)	ATGM; SAM; radars; air defence systems	−12%
5	General Dynamics (USA)	portable SAM; armoured vehicles	−5.60%
6	BAE Systems (UK)	ASM; ATGM; armoured vehicles; ammunition	0.00%
17	Thales (France)	ATGM; SAM; air defence systems	2.50%
24	Elbit Systems (Israel)	artillery	4.00%
28	Rheinmetall (Germany)	armoured vehicles; artillery	6.00%
32	MBDA (Trans-European)	ATGM; SAM; air defence systems	−7.30%
35	IAI (Israel)	uncrewed aerial vehicles	5.50%
39	Saab (Sweden)	ASM; ATGM; portable SAM	−0.50%
42	Rafael (Israel)	ASM; ATGM; SAM; SSM; air defence systems	12%
44	KNDS (Trans-European)	armoured vehicles; artillery	11%
48	Hanwha Aerospace (South Korea)	armoured vehicles; artillery; ammunition	−8.50%
57	Oshkosh Corp. (USA)	armoured vehicles	−22%
66	LIG Nex1(South Korea)	SAM; air defence systems	16%
70	PGZ (Poland)	armoured vehicles	14%
75	Baykar (Türkiye)	uncrewed aerial vehicles	94%
82	Kongsberg (Norway)	SAM; air defence systems	12%
92	Diehl (Germany)	SAM; air defence systems	13%
97	Hyundai Rotem (South Korea)	armoured vehicles	13%
99	Roketsan (Türkiye)	ASM; ATGM; multiple rocket launchers	17%

The data in this graph refers to the companies in the SIPRI Top 100 in the respective year (meaning that the data covers a different set of companies each year). The series begins in 2015, the first year that SIPRI started to include Chinese companies.

ammunition are not manufactured extensively during peace times, which makes many companies that do not specialise in these systems ill-prepared for the surge in demand following the war in Ukraine war.

Most companies in the Top 100 that specialize in these types of weapons reported an increase in arms revenue in 2022. Out of the 21 companies whose products meet current requirements and who supply to the USA and Europe, 7 showed a decrease in their arms revenue in 2022, whereas half (49) of the Top 100 companies experienced a decline. This shows that companies that produced weapons needed in large volumes in the context of a war of attrition and that could respond quickly to rising demand – such as Rheinmetall – tended to see an increase in arms revenue in 2022. Those which produced less advanced types of products – for which production can be scaled up more rapidly – also likely benefited the most. For example, Baykar, which is based in Türkiye and produces UAVs using mostly off-the-shelf components, increased its arms revenue by 94 per cent.

Conclusion

The full-scale invasion of Ukraine has upended the assumptions on which governments and the arms industry in the USA and Europe used to rely. The mismatch between the expected paradigm of warfare and the new reality on the ground are bound to shape the future of the arms industry.

Much of the revenue for arms companies stems from big-ticket procurements for major weapons systems. Whereas there has been a flurry of such orders being placed, most of these weapon systems are not directly employed in the war in Ukraine. This has underlined the necessity to procure and produce less advanced equipment, including ammunition, a category not correlated with spikes in the companies' arms revenue. Therefore, for the foreseeable future, growth in arms revenue of US and European companies will be attributable to weapons systems ordered because of the war in Ukraine and to a lesser degree by weapons used in Ukraine.

Despite the decrease in global arms revenue, the arms industry's record order intake epitomised a demand for weapons systems that is likely to convert into future arms revenue.

In 2022, companies producing weapons systems needed during a symmetric large-scale war, especially if less sophisticated, were more likely to reflect the effects of the increased demand in their revenue. Looking ahead, quarterly reports from major arms companies point towards increases in their arms revenue already in 2023, prefiguring a surge on a global scale. The upturn is likely only the beginning of a larger trend and, since procurement and production are lengthy processes, a strong inertia could be set in motion, letting envisage significant arms revenue upswings.

However, despite global military expenditure reaching a new high in 2023 (Tian et al. 2024), there is uncertainity on its sustainability. While – as mentioned above – procurement is only one of the components of military expenditure, some scholars argue that many developed countries are already facing high debt and tax burdens. This economic conjuncture reduces their fiscal space, prefiguring future challenging trade-offs in order to maintain increased levels of military expenditure (Dorn, Potrafke, and Schlepper 2024).

The latest developments in arms production offer a baseline and some avenues for future research on global and regional arms industries. For example, it would be interesting to determine the extent to which procurement plans announced by European governments will translate into arms revenue, highlighting timings, geographical links, and the possible kickstarting of a higher reliance on a bolstered European domestic industry. In addition, research could be conducted on the flexibility of the arms industry when gearing up to respond to contingencies. Parallels could be drawn with the reactions and type of orders placed by European countries in the aftermath of the 2014 Russian invasion of Ukraine. It could also be beneficial to track the arms revenue of companies in the Middle East, to determine behavioural changes following the war in Gaza. In Asia and Oceania, arms revenue could constitute a measure to track policy progress towards indigenous arms-production capabilities. Finally – despite lower accessibility – revenue from the Russian arms industry, including the decreasing transparency itself, could be an indicator of the country's military-industrial priorities and ability in sanction circumvention.

Notes

1. For more information on SIPRI's regional breakdown, see Stockholm International Peace Research Institute, Regional coverage, <https://www.sipri.org/databases/regional-coverage>. To maintain consistency, Russian arms company Rostec has been backtracked to 2015. See the section on Russia for more information.
2. More procurement plans have also been announced. In its Integrated Review Refresh 2023, the UK government added £5 billion of additional defence funding over two years, see (UK government 2023) In his *Zeitenwende* speech, German Chancellor Scholz established a special fund of $100 billion to be used to improve the military capabilities of the German armed forces, see (Scholz 2022) France is planning on spending €268 billion of the €413 billion allocated by its *Loi de programmation militaire 2024-2030* on equipment see (Jacques 2023).
3. On the case of procurement abroad in 2022 (Cucino and Scarazzato 2023).
4. UkrOboronProm was renamed JSC Ukrainian Defense Industry in 2023.
5. On South East Asia see (Bitzinger 2013). On China, India, South Korea and Taiwan see (Bitzinger 2017).

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Appendix

The SIPRI Top 100 arms-producing and military services companies in the world, 2022

Figures for arms revenue and total revenue are in millions of US$. Dots (. .) indicate that data is not available.

Rank (2022)[b]	Rank (2021)	Company[c]	Country[d]	Arms Revenue (2022)	Arms Revenue (2021)	Total Revenue (2022)	Arms Revenue as a % of total revenue (2022)	Arms Revenue 2021 (constant 2022 prices)[e]
1	1	Lockheed Martin Corp.	United States	59390	60340	65984	90%	65199
2	2	Raytheon Technologies[f]	United States	39570	41850	67074	59%	45220
3	4	Northrop Grumman Corp.	United States	32300	29880	36602	88%	32286
4	3	Boeing	United States	29300	33420	66608	44%	36111
5	5	General Dynamics Corp.	United States	28320	27760	39407	72%	29995
6	6	BAE Systems	United Kingdom	26900	27490	27712	97%	26887
7	7	NORINCO	China	22060	21570	82537	27%	21133
8	8	AVIC[g]	China	20620	20110	82499	25%	19702
9	9	CASC	China	19560	19100	44458	44%	18713
10	10	Rostec[h]	Russia	16810	15550	30295	55%	18659
11	11	CETC	China	15080	14990	55837	27%	14686
12	13	L3Harris Technologies	United States	12630	13360	17062	74%	14436
13	12	Leonardo	Italy	12470	13870	15025	83%	13414
14	16	Airbus	Trans-European[i]	12090	10850	61805	20%	10340
15	14	CASIC[g]	China	11770	12870	37364	32%	12609
16	15	CSSC	China	10440	10870	51443	20%	10650
17	17	Thales	France	9420	9770	18479	51%	9194
18	18	HII	United States	8750	8570	10676	82%	9260
19	19	Leidos	United States	8240	8030	14287	58%	8677
20	25	Amentum[g]	United States	6560	5020	8750	75%	5424
21	21	CSGC	China	6460	5910	42507	15%	5790
22	22	Booz Allen Hamilton	United States	5900	5600	9259	64%	6051
23	20	Dassault Aviation Group	France	5070	6250	7288	70%	5881
24	29	Elbit Systems	Israel	4960	4750	5512	90%	4770
25	26	Rolls-Royce	United Kingdom	4930	4970	15647	32%	4861
26	32	CACI International	United States	4820	4330	6703	72%	4679
27	23	Honeywell International	United States	4630	5150	35466	13%	5565
28	31	Rheinmetall	Germany	4550	4450	6742	67%	4292
29	30	Naval Group	France	4530	4740	4578	99%	4461
30	28	Peraton	United States	4410	4830	7000	63%	5219
31	33	General Electric	United States	4410	4140	76555	5,8%	4473
32	27	MBDA	Trans-European[i]	4380	4960	4428	99%	4727
33	40	KBR	United States	4270	3530	6564	65%	3814
34	24	Safran	France	4200	5050	20021	21%	4752
35	38	Israel Aerospace Industries	Israel	4100	3870	4973	82%	3886

(*Continued*)

(Continued).

Rank (2022)[b]	Rank (2021)	Company[c]	Country[d]	Arms Revenue (2022)	Arms Revenue (2021)	Total Revenue (2022)	Arms Revenue as a % of total revenue (2022)	Arms Revenue 2021 (constant 2022 prices)[e]
36	36	United Shipbuilding Corp.	Russia	3950	4020	5011	79%	4824
37	37	Sandia National Laboratories	United States	3920	3900	4409	89%	4214
38	39	Science Applications International Corp.	United States	3780	3550	7704	49%	3836
39	34	Saab	Sweden	3700	4090	4154	89%	3720
40	44	Babcock International Group	United Kingdom	3680	3100	5473	67%	3032
41	42	Hindustan Aeronautics	India	3460	3300	3643	95%	3317
42	46	Rafael	Israel	3380	3010	3450	98%	3023
43	35	Mitsubishi Heavy Industries	Japan	3250	4060	32000	10%	3461
44	45	KNDS	Trans-European[i]	3200	3030	3366	95%	2887
45	41	Textron	United States	2910	3350	12869	23%	3620
46	48	Fincantieri	Italy	2820	2870	7825	36%	2776
47	47	CEA	France	2790	2940	6135	45%	2767
48	43	Hanwha Aerospace[j]	South Korea	2780	3250	5561	50%	3037
49	51	Bechtel Corp. [g]	United States	2740	2470	. .	. .	2669
50	59	NCSIST	Taiwan	2590	1970	2859	91%	1904
51	68	V2X[k]	United States	2520	1630	2891	87%	1761
52	52	TransDigm Group	United States	2330	2400	5429	43%	2593
53	65	Parker-Hannifin Corp[l]	United States	2270	2635	19065	12%	2847
54	56	ManTech International Corp.	United States	2190	2080	2690	81%	2247
55	55	ST Engineering	Singapore	2180	2160	6554	33%	2221
56	49	General Atomics[g]	United States	2140	2570	. .	. .	2777
57	50	Oshkosh Corp.	United States	2140	2530	8282	26%	2734
58	58	Jacobs Engineering Group	United States	2090	2040	14923	14%	2204
59	67	Teledyne Technologies	United States	2020	1640	5459	37%	1772
60	54	ASELSAN	Türkiye	2020	2160	2131	95%	1997
61	63	CNNC[g]	China	1940	1810	39046	5,0%	1773
62	53	ThyssenKrupp	Germany	1930	2390	43270	4,5%	2305
63	62	Bharat Electronics	India	1920	1830	2208	87%	1839
64	60	Serco Group	United Kingdom	1850	1870	5883	31%	1829
65	57	Kawasaki Heavy Industries	Japan	1830	2070	13139	14%	1765
66	71	Atomic Weapons Establishment	United Kingdom	1780	1550	1821	98%	1516
67	70	LIG Nex1	South Korea	1720	1590	1720	100%	1486
68	66	BWX Technologies	United States	1700	1650	2234	76%	1783
69	69	Hensoldt	Germany	1660	1610	1795	92%	1553
70	72	QinetiQ	United Kingdom	1620	1510	1949	83%	1477

(*Continued*)

(Continued).

Rank (2022)[b]	Rank (2021)	Company[c]	Country[d]	Arms Revenue (2022)	Arms Revenue (2021)	Total Revenue (2022)	Arms Revenue as a % of total revenue (2022)	Arms Revenue 2021 (constant 2022 prices)[e]
71	76	PGZ	Poland	1600	1430	1775	90%	1409
72	61	Sierra Nevada Corp. [g]	United States	1560	1860	1656	94%	2010
73	64	Korea Aerospace Industries	South Korea	1550	1800	2147	72%	1682
74	75	Parsons Corp.	United States	1540	1430	4195	37%	1545
75	74	Eaton	United States	1520	1460	20752	7,3%	1578
76	100	Baykar	Türkiye	1420	790	1500	95%	730
77	80	CAE	Canada	1420	1280	3230	44%	1318
78	79	Curtiss-Wright Corp.	United States	1390	1380	2557	54%	1491
79	81	Moog	United States	1280	1250	3036	42%	1351
80	77	Fujitsu	Japan	1270	1410	28277	4,5%	1202
81	78	UkrOboronProm[m]	Ukraine	1260	1400	1279	99%	1400
82	83	Turkish Aerospace Industries[g]	Türkiye	1260	1200	1557	81%	1109
83	86	Kongsberg Gruppen	Norway	1230	1170	3309	37%	1095
84	84	Amphenol Corp.	United States	1140	1200	12623	9,0%	1297
85	114	United Launch Alliance[g]	United States	1070	630	1158	92%	681
86	92	Mitre Corp.	United States	1060	970	2200	48%	1048
87	85	Melrose Industries	United Kingdom	1060	1190	9292	11%	1164
88	90	The Aerospace Corp.	United States	1040	1030	1190	87%	1113
89	102	Mazagon Dock Shipbuilders	India	1000	780	997	100%	784
90	88	Navantia	Spain	990	1080	1411	70%	1045
91	95	Austal	Australia	980	940	1101	89%	925
92	93	Mercury Systems	United States	960	960	974	99%	1037
93	96	Diehl	Germany	950	870	3688	26%	839
94	87	Ball Corp.	United States	930	1090	15349	6,1%	1178
95	94	Howmet Aerospace	United States	920	950	5663	16%	1026
96	106	TTM Technologies	United States	860	730	2495	34%	789
97	99	HEICO Corp.	United States	860	820	2208	39%	886
98	101	Hyundai Rotem	South Korea	820	780	2450	33%	729
99	104	IHI Corp.	Japan	790	750	10302	7,7%	639
100	107	Roketsan	Türkiye	790	730	790	100%	675

Note: Percentages shares and changes calculated using the data in this table may not precisely correspond to those stated due to rounding.

[a]Chinese companies, for which data is deemed reliable, are included in the database from 2015 onwards.

[b]Companies are ranked according to the value of their arms revenue at the end of what SIPRI considers to be their financial year. Rankings for 2021 are based on updated figures for arms revenue in the latest version of the SIPRI Arms Industry Database (Dec. 2023). They may differ from those published in any earlier SIPRI publication owing to continual revision of data, most often because of changes reported by the company itself and sometimes because of improved estimations.

[c]Holding and investment companies with no direct operational activities are not treated as arms companies, and arms companies owned by them are listed and ranked as if they were parent companies. Company names and structures are listed as they were at the end of their financial year. Major revisions are explained in these notes.

[d]Country refers to the country in which the ownership and control structures of the company are located, i.e. the location of a company's headquarters.

[e]To allow easier comparison between years, revenue figures are given in constant (2022) US$.

[f]Raytheon Technologies was renamed RTX in 2023.

[g]The arms revenue figure for this company is an estimate with a high degree of uncertainty.

[h]Rostec is a holding company with no direct manufacturing capacity and would therefore usually be excluded from the Top 100 (see note c). It has been included in the 2022 ranking due to the lack of data for almost all other Russian arms companies. Some

of the companies for which data is no longer available are controlled by Rostec and were included in previous Top 100 rankings: High Precision Systems, KRET, Russian Electronics, Russian Helicopters, United Aircraft Corp., United Engines Corp. and UralVagonZavod.

[i]Trans-European refers to companies whose ownership and control structures are located in more than one European country.

[j]Hanwha Aerospace acquired Hanwha Munitions from Hanwha Corp. in the fourth quarter of 2022. Its arms revenue figure for 2022 is pro forma, i.e. it is the combined arms revenue of Hanwha Aerospace and the fourth-quarter arms revenue of Hanwha Munitions.

[k]V2X is the result of the merger of Vectrus and Vertex Aerospace Services Holding Corp. in 2022.

[l]Parker-Hannifin Corp. acquired Meggit in 2022. Its arms revenue figure for 2021 is pro forma, i.e. it is the combined 2021 arms revenue of Parker-Hannifin and Meggit.

[m]UkrOboronProm was renamed JSC Ukrainian Defense Industry in 2023.