I. Global trends in arms transfers, 2018–22

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The volume of international transfers of major arms in 2018–22 was 5.1 per cent lower than in 2013–17, but was 3.9 per cent higher than in 2008–12 and 27 per cent higher than in 1998–2002 when arms transfers were at their lowest volume for any successive five-year period since 1958–62 (see figure 6.1 and box 6.1).[1] However, the total volume in 2018–22 was still around 35 per cent lower than the peak reached in the periods 1978–82 and 1983–87, at the height of the cold war.[2]

Despite a 7.5 per cent drop in imports of major arms by states in Asia and Oceania between 2013–17 and 2018–22, it remained the region with the highest volume of arms imports, as has been the case since 1988–92, and accounted for 41 per cent of the global total (see figure 6.2).[3]

The flow of arms to states in the Middle East also decreased, by 8.8 per cent, between 2013–17 and 2018–22, but the region's share of 32 per cent of the global total remained among the highest of any of the seven successive five-year periods after 1983–87 and almost 80 per cent higher than 2003–2007 and 2008–12.

Arms imports to Africa (–40 per cent) and the Americas (–21 per cent) fell between 2013–17 and 2018–22, and these regions' shares of total global arms transfers decreased. For Africa, however, the level of imports in 2018–22 was still higher than in any of the four successive five-year periods between 1988 and 2007. In contrast, the level of imports by states in the Americas was the lowest of any of the eight successive five-year periods since 1983–87.

Imports of major arms by European states rose by 47 per cent between 2013–17 and 2018–22, largely driven by the perception of an increased threat from Russia among most European states. However, the level of imports in 2018–22 was not much different from levels in the three five-year periods from 1993–97 to 2003–2007. The war in Ukraine had only a limited impact on the total volume of arms transfers in 2018–22, but Ukraine did become a major importer of arms in 2022. In addition, most European states substantially increased their arms import orders in 2022 and announced plans for more

[1] In this chapter, the terms 'arms exports' and 'arms imports' are used to refer to international transfers of major arms, as defined by SIPRI. For that definition and a description of how the volume of transfers is measured see box 6.1.

[2] Except where indicated, the information on the arms deliveries and orders referred to in this chapter is taken from the SIPRI Arms Transfers Database. Since year-on-year deliveries can fluctuate, SIPRI compares consecutive multi-year periods—normally 5-year periods. This provides a more stable measure of trends in transfers of major arms. The figures here may differ from those in previous editions of the SIPRI Yearbook because the Arms Transfers Database is updated annually.

[3] For SIPRI's definition of the regions and subregions see SIPRI, 'Regional coverage', SIPRI Databases.

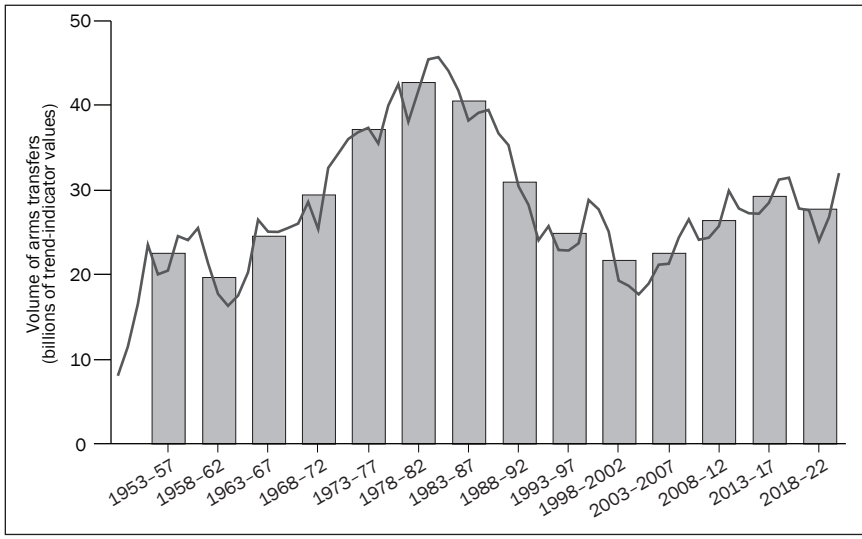

Figure 6.1. The trend in international transfers of major arms, 1950–2022

Note: The bar graph shows the average annual volume of arms transfers for 5-year periods from 1953 and the line graph shows the annual totals since 1950. See box 6.1 for an explanation of the SIPRI trend-indicator value (TIV).

Source: SIPRI Arms Transfers Database, Mar. 2023.

orders in 2023 and the next few years, firmly indicating a further growth of arms imports by states in Europe in the coming decade.

The five largest arms exporters in 2018–22 were the United States, Russia, France, China and Germany, the same as in 2013–17 (see section II). The five states that imported the most arms in the period were India, Saudi Arabia, Qatar, Australia and China (see section III). Three of these were also among the five largest importers in 2013–17, while Qatar and Australia were new to this group.

Increases and decreases, even large ones, in arms exports for individual suppliers measured over five-year periods are not uncommon and are generally a weak indicator of trends, especially for the medium-sized and smaller suppliers. Such changes can often be linked to unpredictable markets with a relatively small group of possible buyers for large volumes of major arms and buyers' willingness to switch between suppliers. Competition within most major arms markets is intense, and winning or losing one or a few large contracts can make a big difference. An example is the 35 per cent decrease in exports by the United Kingdom between 2013–17 and 2018–22, which was largely due to the UK not being able to repeat a major order from Saudi Arabia for Typhoon combat aircraft. Delivery of 48 Typhoon and associated missiles to Saudi Arabia accounted for almost half of all British exports of major arms in 2013–17 but most of the contracts had been fulfilled by the end of 2017.

Box 6.1. Definitions and methodology for SIPRI data on international arms transfers

The SIPRI Arms Transfers Database contains information on deliveries of major arms to states, international organizations and non-state armed (i.e. rebel) groups from 1950 to 2022. A new set of data is published annually, replacing the data in earlier editions of the SIPRI Yearbook or other SIPRI publications.

Definitions

SIPRI's definition of 'transfer' includes sales, manufacturing licences, aid, gifts, and most loans or leases. The item must have a military purpose: the recipient must be the armed forces or paramilitary forces or intelligence agency of another country, a non-state armed group, or an international organization.

The SIPRI Arms Transfers Database only includes 'major arms', which are defined as (*a*) most aircraft, including uncrewed aerial vehicles; (*b*) air defence missile systems and larger air defence guns; (*c*) air refuelling systems; (*d*) most armoured vehicles; (*e*) artillery over 100 millimetres in calibre; (*f*) engines for combat-capable aircraft and other larger aircraft, for combat ships and larger amphibious and support ships, and for most types of armoured vehicles; (*g*) guided missiles, torpedoes, and most types of guided bombs and shells; (*h*) larger sensors (radars, sonars and many passive electronic sensors); (*i*) most ships; (*j*) larger ship-borne weapons (naval guns, missile launch systems and anti-submarine weapons); (*k*) reconnaissance satellites; and (*l*) most gun or missile-armed turrets for armoured vehicles.

In cases where an air refuelling system, engine, sensor, naval gun or other ship-borne system, or turret (items c, f, h, j and l) is fitted on a platform (vehicle, aircraft or ship), the transfer only appears as a separate entry in the database if the item comes from a different supplier from that of the platform.

The SIPRI trend-indicator value

SIPRI has developed a unique system for measuring the volume of transfers of major arms using a common unit, the trend-indicator value (TIV). The TIV is intended to represent the transfer of military resources. Each weapon has its own specific TIV but similar systems have similar TIVs. Second-hand arms, and second-hand but significantly modernized arms, are given a reduced TIV. SIPRI calculates the volume of transfers by multiplying the weapon-specific TIV with the number of arms delivered in a given year. SIPRI TIV figures do not represent the financial values of arms transfers.

Source: SIPRI, 'Sources and methods', SIPRI Arms Transfers Database.

Discussions on a new order for 48 Typhoons had been going on at least since 2008 and seemed to be at an advanced stage in 2020.[4] However, by the end of 2022 there had been no further public discussion about the proposed order. France, meanwhile, has succeeded in gaining large orders for Rafale combat aircraft against competing designs (including the Typhoon) from other supplying states that had previously been more successful (see section II).

[4] BAE Systems, *Half-yearly Report 2020*, 30 July 2020, p. 32.

	Africa	Americas	Asia and Oceania	Europe	Middle East	Other	Total
1983–87	16.1	20.4	53.8	47.6	60.9	3.7	202.5
1988–92	6.6	12.6	58.2	41.8	35.3	0.2	154.7
1993–97	3.3	11.0	49.3	22.9	37.5	0.1	124.0
1998–2002	5.0	8.6	47.7	21.0	26.1	0.1	108.5
2003–2007	6.4	10.9	46.0	24.9	24.0	0.1	112.3
2008–12	13.2	14.5	60.1	19.9	23.7	0.5	131.9
2013–17	11.6	10.2	61.1	15.5	47.0	0.2	145.6
2018–22	6.9	8.1	56.5	22.6	42.9	1.2	138.2

Figure 6.2. The trend in international transfers of major arms, imports by region, 1983–2022

Note: Figures are billions of SIPRI trend-indicator values (TIVs). See box 6.1 for an explanation of TIVs.

Source: SIPRI Arms Transfers Database, Mar. 2023.

Key developments in 2022 related to arms transfers

Supply chain disruptions

By 2022 the worst impacts of the Covid-19 pandemic that started in early 2020 were largely over. During the pandemic, several exporters, importers and producers reported delays in some arms programmes, as supply chains were disrupted, deliveries were rescheduled due to travel restrictions, or funding priorities changed. However, the data on transfers of major arms from 2020 onwards shows that the pandemic and the resulting global economic downturn had only marginal direct and indirect effects on production, deliveries and orders for major arms.[5]

The main problems encountered seemed to be in supply chains and the most enduring effect will likely be an awareness of the importance of reliable supply chains, all the way down to minor components and raw materials. This may lead states to rethink their dependence on foreign suppliers for major arms and to increase efforts to strengthen their national industrial

[5] See also Wezeman, S. T., Kuimova, A. and Wezeman, P. D., 'International arms transfers and developments in arms production', *SIPRI Yearbook 2021*; and Wezeman, S. T., Kuimova, A. and Wezeman, P. D., 'International arms transfers', *SIPRI Yearbook 2022*.

base for arms production.[6] Many of the larger arms-importing states were already moving towards more local production and design, and the pandemic is likely to accelerate this trend.[7] Moreover, the sudden pressure on arms production capabilities and supply chains due to the war in Ukraine in 2022 will likely have led to further efforts to reduce dependence on foreign suppliers.[8] These factors seem to suggest that acquisition of major arms from national production (in the form of indigenous designs or designs resulting from cooperation between several states that are long-standing allies) will become increasingly important. In turn, this may result in fewer major arms imports by more developed states.

How the war in Ukraine is affecting military technology choices

The full-scale, high-intensity war in Ukraine that began with Russia's invasion in February 2022 has already started to have a major impact on global arms transfers. Aside from the significant supplies to Ukraine, it also has dramatically increased tensions in Europe resulting in increased acquisitions of major arms by many states in the region (see below). Moreover, the war has also divided world opinion, with ramifications in other parts of the world.[9] Many states will be drawing lessons from full-scale warfare between two large and modern armed forces, including evaluations of the performance of specific weapons and technologies.[10] Together, the increased tensions, the global political schism and the technical lessons from the war in Ukraine are likely to have a profound impact on arms transfers in the near future.

In the first months of the war, Russia lost large numbers of tanks from short-range, light, cheap and easy-to-use anti-tank weapons employed by Ukraine, including thousands supplied by Western states as aid and integrated within weeks in the Ukraine forces.[11] Ukraine also used armed uncrewed aerial vehicles (UAVs), supplied by Türkiye before and during the war, with great

[6] For examples of such rethinking see Lopez, C. T., 'DOD addresses supply chain resiliency with Lone Star State industry', US Department of Defense (DOD) News, 22 June 2022; Wirth, A. J. et al., 'Keeping the defense industrial base afloat during COVID-19', RAND Corporation Research Report no. RR-A1392-1, 2021; and Australian Industry Group, 'Defence industry development: Australian defence industry policy post COVID-19', Aug. 2020.

[7] For examples in Asia and Oceania see Béraud-Sudreau, L. et al., *Arms-production Capabilities in the Indo-Pacific Region: Measuring Self-reliance* (SIPRI: Stockholm, Oct. 2022).

[8] European Defence Agency (EDA), 'EDA study analyses defence industrial strategies', EDA News, 11 Oct. 2022; and European Commission, High Representative of the Union for Foreign Affairs and Security Policy, 'Defence investment gaps and measures to address them', Joint Communication to the European Parliament, the European Council and others, JOIN(2022) 24 final, 23 May 2022.

[9] On the global divisions over the war in Ukraine, see chapter 1, section V, in this volume.

[10] 'What weapons are significant for current and future warfare? Lesson learned from recent conflicts', Panel session at SIPRI Stockholm Security Conference, 8 Nov. 2022, YouTube, 12 Dec. 2022; Venckunas, V., 'Eight lessons air forces are learning from the war in Ukraine', AeroTime, 8 Jan. 2023; and Philip, S. A., 'How "graveyard" of Russian tanks in Ukraine is upending armour doctrines worldwide & for India', *The Print*, 30 Oct. 2022.

[11] Cranny-Evans, S., 'How anti-tank weapons shaped the early phase of the Ukraine war', Army Technology, 17 June 2022.

effect in the first months, while crewed combat aircraft used by both sides have been rather less effective throughout 2022.[12] There was widespread use of artillery, which was most effective when using guided rockets and shells, and in combination with advanced fire controls, while air defence systems supplied by the West proved themselves capable of defending Ukraine against most Russian missiles and aircraft.[13] Due to the rapidly changing battlefield dynamics, however, it is difficult to learn lessons from the war on exactly which types of major arms are likely to be most useful in future warfare. This lack of clarity is reflected in the diversity of arms acquisitions announced in 2022 in Ukraine and elsewhere. Armed UAVs that had already shown their use in other recent wars, such as the 44-day Azerbaijan–Armenia War in 2020 over the Nagorno-Karabakh region, were much in demand by many states, as were smart munitions for artillery and aircraft.[14] Japan even announced in late 2022 that it will replace all of its combat and observation helicopters with uncrewed systems.[15] Other states, however, remained confident about combat helicopters, with Poland, for example, ordering up to 96 combat helicopters and Australia 29 from the USA in late 2022. And despite the seemingly poor showing of tanks in the war in Ukraine, there was renewed interest in them in Europe, most notably in the large Polish order in 2022 for almost 1300 tanks, the largest European order for tanks since the 1980s, and the supply of hundreds of tanks to Ukraine (see below).

Conventional weapons and nuclear weapons

The spectre of the use of nuclear weapons has become more of a concern as several states, most recently Russia in 2022, have threatened or hinted such weapons could be used.[16] Several conventional arms acquisition orders and decisions in recent years have links to nuclear weapons as potential dual-capable delivery systems or as a nuclear weapon proliferation concern. Germany, for example, ordered 35 F-35 combat aircraft from the USA in late 2022, following orders for the same aircraft by Italy (2006), the Netherlands (2008) and Belgium (2018). In each of the four states, one of the roles of the F-35 combat aircraft will be to function as delivery systems for US tactical nuclear bombs stored in the state, replacing existing aircraft that perform

[12] Gordon, C., 'Russian Air Force "has lot of capability left" one year on from Ukraine invasion', *Air and Space Forces Magazine*, 15 Feb. 2023; Peck, M., 'Ukraine war proves big guns are back', *National Defense*, 16 Sep. 2022; and Chapple, A., 'The drones of the Ukraine war', RFE/RL, 17 Nov. 2022.

[13] Szondy, D., 'Invasion of Ukraine shows artillery still rules the battlefield', *New Atlas*, 20 Nov. 2022; and Garamone, J., 'US, allies work to supply Ukraine air defense needs', US Department of Defense News, 29 Nov. 2022.

[14] Shabazov, F., 'Tactical reasons behind military breakthrough in Karabakh conflict', *Eurasia Daily Monitor*, vol. 17, no. 155 (3 Nov. 2020).

[15] Yeo, M., 'Japan to replace attack, observation helicopters with drone fleet', *Defense News*, 9 Feb. 2023.

[16] On Russian nuclear doctrine in 2022 see chapter 1, section V, and chapter 7, section II, in this volume.

this task.[17] In 2022 Russia delivered a small number of Iskander-M surface-to-surface missiles (with a range of 500 kilometres) to Belarus. Announcing the deal in June 2022, President Vladimir Putin specifically mentioned that the missiles were nuclear-capable.[18] As at the end of 2022, there was growing speculation that Russia might instigate a nuclear 'sharing' arrangement with Belarus, with the nuclear warheads to be placed in Belarus but remaining under Russian control—the first such arrangement for Russia, which Putin later confirmed.[19]

As part of a new trilateral security partnership between Australia, the UK and the USA (called AUKUS) created in 2021, which is widely seen as a counter to China in the Indo-Pacific region, the USA and the UK will supply Australia with up to eight nuclear-powered submarines. The selection of specific designs and decisions about orders are expected in 2023, although delivery of the submarines is not expected to start before at least the 2030s.[20] The submarines are likely to use highly enriched uranium (HEU) in their nuclear reactors, following the practice for reactors in British and US submarines. HEU can be used in nuclear weapon programmes and these would be the first transfers of HEU reactors and their fuel to full control by a non-nuclear weapon state.[21] Australia has said that, as a signatory to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons, which includes strict safeguards to prevent diversion of HEU, it will neither seek nuclear weapons nor produce the HEU or process it after use.[22] However, concerns remain that other states might use the Australian case as a precedent for acquiring their own nuclear-powered submarines with an unsafeguarded HEU fuel capability, which may then be used for a nuclear weapon programme. AUKUS would be less of a

[17] On the US nuclear 'sharing' role in Europe see chapter 7, section I, in this volume.

[18] At the same time, Putin also announced that Russia will modify Belarusian combat aircraft to be able to carry tactical nuclear weapons. Adamowski, J., 'Russia to provide nuclear-capable missiles and fighter jets to Belarus', *Defense News*, 27 June 2022; and 'Russia to send Belarus nuclear-capable missiles', Deutsche Welle, 26 June 2022.

[19] Drennan, J., 'Possible Russian nuclear deployments to Belarus could shift Europe's nuclear balance', US Institute of Peace, 30 June 2022; 'Russia gave Belarus Iskander system that can carry nuclear weapons, Putin says', TASS, 25 Mar. 2023; and 'Putin says Moscow to place nuclear weapons in Belarus, US reacts cautiously', Euractiv.com, 26 Mar. 2023.

[20] Liptak, K., Atwood, K. and Liebermann, O., 'US is expected to sell Australia at least 4 nuclear-powered submarines', CNN, 8 Mar. 2023.

[21] Kuperman, A. J., 'Fixing a fatal, nuclear flaw in AUKUS', *Breaking Defense*, 7 Mar. 2023. This will not be the first transfer of a nuclear submarine using HEU: In 1988 the Soviet Union delivered one to India, which was at the time not yet in possession of nuclear weapons. However, this was on a time-limited lease. In 2012 Russia delivered a replacement and this will itself be replaced in 2025, in both cases also on lease. Unlike Australia, India is not a party to the Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT). For a summary and other details of the NPT see annex A, section I, in this volume.

[22] Wong, P., Australian Minister of Foreign Affairs, 'AUKUS won't undermine Australia's stance against nuclear weapons', *The Guardian*, 23 Jan. 2023. See also Wezeman et al., *SIPRI Yearbook 2022* (note 5), p. 301.

precedent according to some experts if Australia were to instead use low-enriched uranium (LEU) in the submarines.[23]

Conflicts, tensions and arms transfers

Active armed conflicts and increasing tensions between states are arguably the main drivers of arms acquisitions by states. At least 5 of the top 10 importers of major arms in 2018–22 (Egypt, India, Pakistan, Saudi Arabia and the USA) were engaged in armed conflicts in 2022.[24] In some cases the conflicts were within their own state (e.g. Egyptian and Indian state forces against internal non-state armed groups), some were interstate (e.g. Indian state forces against Pakistani state forces), while others were external interventions in support of other states against non-state armed groups (e.g. Saudi Arabia in Yemen, and the USA in Somalia). All these conflicts involved the use of major arms and, except for those used by the USA, most of these arms were imported. Three other members of the top 10—China, Japan and the Republic of Korea (South Korea)—while not engaged in armed conflict, were nonetheless embroiled in interstate tensions in 2022. In those cases, major arms were used as a show of force to indicate resolve: by China in the South China Sea and on its disputed border with India; by Japan and China in the East China Sea; and by Japan and South Korea against the Democratic People's Republic of Korea (DPRK, or North Korea).

The linkages between arms acquisition and conflict or tensions with other states are also visible in many of the other 157 states identified by SIPRI as recipients of major arms in 2018–22. However, it is also clear that there is not necessarily a direct correlation between the level of imports of major arms and the level of conflict or tension. For example, sub-Saharan Africa had numerous armed conflicts, and internal and bilateral tensions in 2018–22, as well as other security concerns, but no state in sub-Saharan Africa was among the top 40 importers in that period. Collectively, arms imports by sub-Saharan Africa states were significantly lower in 2018–22 than in previous years. Arms imports by Ethiopia in 2018–22, for example, were 51 per cent lower than in 2013–17 and the country was the 75th largest arms importer globally—despite

[23] Kuperman, A. J., 'Fixing a fatal, nuclear flaw in AUKUS', *Breaking Defense*, 7 Mar. 2023; Kuperman, A. J., Interview with H. Lemahieu, Lyndon B. Johnson School of Public Affairs, Texas, 14 Mar. 2022; Pabelliña, K. M., 'The gamble of AUKUS: Eroding the rules of nuclear non-proliferation?', Asia-Pacific Leadership Network (APLN) Policy Brief no. 84, Sep. 2022; Supriyanto, R. A., 'AUKUS and Southeast Asia's non-proliferation concerns', BASIC, 5 July 2022; Center for Arms Control and Non-Proliferation, 'Uranium enrichment: For peace or for weapons', Fact Sheet, 26 Aug. 2021; and Rauf, T., 'Driving nuclear submarines through IAEA safeguards', InDepthNews, 25 Nov. 2021. See also Wezeman et al., *SIPRI Yearbook 2022* (note 5), p. 301.

[24] For a list of all the states or territories involved in armed conflict in 2022, see chapter 2, table 2.8, in this volume.

the 2020–22 war in Ethiopia causing some of the highest casualty rates in the world during those years.[25]

Generally, the major arms imported by states in sub-Saharan Africa have involved relatively small quantities of older or relatively unsophisticated designs, with a low economic or military value. However, these arms are essential for the military operations of states, for example in fighting non-state armed groups. For instance, both Nigeria and Uganda imported only small numbers of combat aircraft and combat helicopters in recent years but, according to their air forces, those imported arms were instrumental in winning their wars against rebel forces.[26] In another case, limited supplies of major arms played an important role in supporting peacekeeping operations in Africa.[27] The five countries that contributed troops to the African Union Transition Mission in Somalia (ATMIS) in 2022—Burundi, Djibouti, Ethiopia, Kenya and Uganda—together accounted for 0.4 per cent of global arms imports in 2018–22. However, some of the major arms they received, in particular 80 light armoured vehicles specifically supplied for ATMIS, were important to sustaining their role in ATMIS.

In other cases, there are concerns about the misuse of major arms supplied to militaries, even when supplied in small volumes, such as those used in military coups or abuses of international humanitarian law and human rights.[28] A military coup in Burkina Faso in 2021 led the USA in 2022 to reassess and then halt its military assistance to the country; the withdrawn assistance was the finance of the supply of light armoured vehicles from South Africa to Burkina Faso for delivery in 2021–22.[29] In 2022 France reportedly halted the supply of four light armoured vehicles to Gabon because of the risk that they could be used in potential violence by the military during the planned Gabonese presidential election in 2023.[30]

The relationship between arms transfers and conflicts or tensions is further highlighted by the pattern of transfers to the other regions of the world (see section III). The only region relatively free from major interstate tensions, and where the three armed conflicts in 2022 were mainly centred

[25] On the armed conflict in Ethiopia see chapter 2, sections I and II, in this volume; and Davis, I., 'Armed conflict and peace processes in East Africa', *SIPRI Yearbook 2022*, pp. 225–29.

[26] Martin, G., 'Nigerian Air Force confirms additional air assets are on the way', defenceWeb, 27 Mar. 2023; and 'Russian attack helicopters turned the tide against the LRA: UPDF', defenceWeb, 28 Mar. 2023.

[27] 'ATMIS 24 APCs better off', defenceWeb, 8 Aug. 2022.

[28] See e.g. Maletta, G. and Héau, L., 'Funding arms transfers through the European peace facility: Preventing risks of diversion and misuse', SIPRI Commentary, June 2022, pp. 14–15.

[29] Savell, S., 'US security assistance to Burkina Faso laid the groundwork for a coup', *Foreign Policy*, 3 Feb. 2022; Mohammed, A. and Pamuk, H., 'US halts nearly $160 million aid to Burkina Faso after finding military coup occurred', Reuters, 19 Feb. 2022; and Arieff, A., 'Burkina Faso: Conflict and military rule', Congressional Research Service In Focus no. IF10434, 17 Oct. 2022.

[30] 'Paris refuse de livrer des blindés à la Garde républicaine du Gabon' [Paris refuses to deliver tanks to the Republican Guard of Gabon], Gabonactu.com, 3 Oct. 2022.

on gang-related violence, is South America, where SIPRI data shows a significant decrease in arms imports by states in recent years.

Arms-exporting states are often direct or indirect participants in the conflicts or tensions affecting the states to which they supply major arms. This partly explains why some arms exporters are willing to supply arms (sometimes as military aid) even when the supply seems to contradict the exporter's stated arms export policies (see section II for several examples).

The war in Ukraine as a driver of arms transfers in 2022

Ukraine imported very few major arms in the period from its independence in 1991 until the end of 2021. This changed after the Russian invasion of Ukraine in February 2022, as the USA, Canada, Australia and at least 23 European states began to send large quantities of military aid to Ukraine.[31] As a result, it became the third largest importer of major arms in 2022, after Qatar and India, accounting for 8.3 per cent of total global arms imports. In the five-year period 2018–22, Ukraine accounted for 2.0 per cent of total global arms imports and was the 14th largest importer. Of the 29 states that supplied major arms to Ukraine in 2022, the main suppliers were the USA, which accounted for 35 per cent of total Ukrainian arms imports during the year, Poland (17 per cent), Germany (11 per cent), the UK (10 per cent) and Czechia (4.4 per cent). Many of the arms supplied in 2022 were second-hand items from existing stocks, including 228 artillery pieces and an estimated 5000 guided artillery rockets from the USA, 280 tanks from Poland and over 7000 anti-tank missiles from the UK. Some newly produced arms were also supplied, such as air defence systems from Germany, Poland, the UK and the USA.

In many cases, the supply of arms by one state was financed by other states or by the European Union (EU) through the European Peace Facility. For example, by the end of 2022, the EU had made €3.1 billion (US$3.2 billion) available to pay for military equipment that EU member states supplied to Ukraine.[32] In other cases, states cooperated to pay for weapons supplied by third countries. For example, the Netherlands and the USA paid for 90 tanks originating from Morocco to be delivered to Ukraine after upgrades by a company in Czechia.[33] Within the North Atlantic Treaty Organization (NATO), member states also supplied NATO-standard weapons to other

[31] On military assistance to Ukraine in 2022 see also chapter 1, section V; chapter 5, section II; and chapter 12, section V, in this volume.

[32] Council of the European Union, 'Ukraine: Council agrees on further support under the European Peace Facility', Press release, 17 Oct. 2022; and Bilquin, B., 'European Peace Facility: Ukraine and beyond', European Parliamentary Research Service, At a Glance no. PE738.221, Nov. 2022. On the European Peace Facility see also chapter 5, section II, and chapter 12, section V, in this volume.

[33] Vergun, D., 'Aid package to Ukraine includes T-72B tanks', US Department of Defense News, 4 Nov. 2022; and 'Le Maroc offre ses chars à l'Ukraine' [Morocco offers its tanks to Ukraine], MENA Defense, 22 Jan. 2023.

member states, which in turn supplied their older Soviet-standard weapons to Ukraine. These weapons could usually be more easily absorbed by the Ukrainian armed forces since they were similar to existing Ukrainian stocks. For example, Germany supplied NATO-standard Leopard-2 tanks to Czechia after the latter had given other major arms to Ukraine.[34]

Ukraine did not receive all the types of arms it asked its supporters to provide and, at different stages during 2022, there were different views among states about what should be supplied. For example, while Poland and Czechia delivered tanks to Ukraine in the first half of 2022, Germany, the UK and the USA only indicated their willingness to do so in late 2022, for delivery in 2023.[35] Other states that supplied weapons remained opposed to supplying tanks. For example, Italy maintained throughout 2022 that it would not supply tanks or other 'offensive' weapons.[36] Despite a growing willingness among states to send a wider variety of arms to Ukraine, at the end of 2022 suppliers were still not prepared to deliver arms with a long-range strike capability, such as combat aircraft and long-range land-attack missiles.

Since April 2022 many of the Western supplies of military assistance to Ukraine have been coordinated through the USA-led Ukraine Defense Contact Group.[37] Nonetheless, government motives—often expressed in short statements without in-depth explanations—for delaying the supply of weapons or not supplying certain types of weapons, have continued to vary. The motives included assessments of what equipment would fit best to the Ukrainian military's capability, for fast absorption and effective use; a reluctance to deplete national arsenals; caution about the risk that certain weapons could be used by Ukraine to attack Russian territory; and concerns that the supply of certain weapons could lead to a direct confrontation with Russia. For example, the USA refused to supply ATACMS ballistic missiles with a range of 300 km as requested by Ukraine, with the main reported reasons being that it would be too aggressive a move and that it would deplete US missile stockpiles.[38] Similarly, the German government throughout 2022 refused to supply tanks (or to authorize other states to re-export

[34] Zimmermann, V. N., 'Die Tschechische Republik erhält aus Deutschland 14 Leopard-Panzer' [The Czech Republic receives 14 Leopard tanks from Germany], *Frankfurter Allgemeine*, 29 Aug. 2022.

[35] Sabbage, D. and Harding, L., 'Ukraine confident UK will send Challenger 2 tanks to help war effort', *The Guardian*, 13 Jan. 2023; and Debusmann Jr, B., Wright, G. and Radford, A., 'Germany confirms it will provide Ukraine with Leopard 2 tanks', BBC News, 25 Jan. 2023.

[36] 'Italy will not be sending "offensive weapons" to Ukraine', Technology Org, 30 Jan. 2023.

[37] Ismay, J., 'A new US-led international group will meet monthly to focus on aiding Ukraine', *New York Times*, 26 Apr. 2022; and US Department of State, 'Special online briefing with Ambassador Julianne Smith, US permanent representative to NATO', Special Briefing, 13 Feb. 2023.

[38] Kube, C. and De Luce, D., 'US military leaders are reluctant to provide longer-range missiles to Ukraine', NBC News, 16 Sep. 2022; Gordon, M. R. and Lubold, G., 'US altered Himars rocket launchers to keep Ukraine from firing missiles into Russia', *Wall Street Journal*, 5 Dec. 2022; and McLeary, P., Seligman, L. and Ward, A., 'US tells Ukraine it won't send long-range missiles because it has few to spare', Politico, 13 Feb. 2023.

German-made tanks from their arsenals) on the grounds that such a move might escalate the war or could draw Germany directly into the war, and that Ukraine did not yet have the capability to deploy the tanks.[39] However, after months of pressure from allied capitals, Germany confirmed in early January 2023 that it would supply 14 Leopard-2A6 tanks to Ukraine, and gave other states permission to also supply tanks of German origin.[40]

The arms supplied to Ukraine in 2022 were vital for the Ukrainian effort to halt the Russian offensive in February and March; continued to play a major role in Ukraine's defence and counter-offensives against Russia throughout the rest of 2022; and are a necessity for its future survival. Russia, in contrast, relied almost exclusively on domestically produced arms—although from around August 2022 it did import UAVs and many hundreds of flying bombs from Iran. While Iran acknowledged a small number of supplies of such arms to Russia before 2022, it has denied any arms supplies since the start of the war, despite overwhelming evidence to the contrary.[41]

As the war progressed in 2022, artillery gained in importance for both sides.[42] In 2022 many states supplied Ukraine with a total of 532 guns with a calibre of 105 millimetres or more, as well as 55 multiple-rocket launchers, and promised more for delivery in 2023. In addition, the war also emphasized the importance of ammunition for artillery and lighter weapons.[43] Such ammunition has seen very intensive use, to the extent that both sides have reportedly started to run out of stocks and Ukrainian use also outstripped new production of its suppliers.[44] A constant supply of ammunition formed

[39] Metzger, N., 'Warum Deutschland keine Leopard 2 liefert' [Why Germany does not deliver Leopard 2s], ZDF Heute, 19 Oct. 2022.

[40] 'Deutschland liefert Leopard-Panzer an Ukraine' [Germany supplies Leopard tanks to Ukraine], ZDFheute, 24 Jan. 2023; Debusmann et al. (note 35); and Oltermann, P. and Roth, A., 'Germany announces it will supply Leopard 2 tanks to Ukraine', *The Guardian*, 25 Jan. 2023.

[41] The flying bombs are often referred to as 'suicide drones' or 'loitering munitions' but are essentially slow, simple, one-way micro aircraft with a pre-set flight path and target. 'Iran says it shipped drones to Russia before Ukraine war', Reuters, 5 Nov. 2022; and 'Ukraine war: US says Iranian drones breach sanctions', BBC News, 18 Oct. 2022. The import of the UAVs and the flying bombs is banned under UN Security Council Resolution 2231, which placed an embargo on imports from Iran of UAVs and missiles with a range of 300 km or more without specific prior approval by the Security Council. See UN Security Council Resolution 2231, 20 July 2015. On the embargo under Resolution 2231 see chapter 12, section II, in this volume.

[42] Peck (note 12); 'US Army chiefs stress importance of artillery as key lesson of Ukraine war', *Military Watch Magazine*, 14 May 2022; and Cancian, M. F. and Anderson, J., 'Expanding equipment options for Ukraine: The case of artillery', Center for Strategic and International Studies, 23 Jan. 2023.

[43] These types of ammunition are largely not included in the SIPRI data on major arms. This is partly because transparency in ammunition transfers is very low; e.g. they are not included in various multilateral arms transparency mechanisms. They are included here to underline that transfers of ammunition can have a major impact. For the definition of 'major arms' see box 6.1; and on transparency mechanisms see chapter 10, section IV, in this volume.

[44] Rettman, A., 'EU figures show intensity of Russia–Ukraine artillery war', EUobserver, 16 Mar. 2023; Zalan, E., 'EU leaders agree 1m artillery shells for Ukraine', EUobserver, 23 Mar. 2023; Kube, C., 'Russia and Ukraine are firing 24,000 or more artillery rounds a day', NBC News, 11 Nov. 2022; 'Ukraine updates: NATO warns of donor ammunition shortages', Deutsche Welle, 13 Feb. 2023; and Baily, R. et al., 'Russian offensive campaign assessment, December 31', Institute for the Study of War, 31 Dec. 2022.

a significant part of the military aid provided to Ukraine. The USA alone had by the end of 2022 committed to sending Ukraine over 1.5 million artillery shells and artillery rockets, and over 100 million rounds of small arms ammunition.[45]

Russia was also apparently running low on missiles and other ammunition, and the USA and allies at various times in 2022 alleged that Russia was importing artillery shells from North Korea and that it was trying to acquire ballistic ground-to-ground missiles from Iran.[46] North Korea denied any such supplies or plans, while Iran gave conflicting information about the missiles.[47] By the end of 2022 there was no clear evidence of North Korean supplies reaching Russia, whereas the Iranian ballistic missile option seemed thwarted by US and European warnings to Iran of the consequences if it did supply the missiles. In addition, Russia may have been deterred from importing the Iranian missiles on the grounds that it would likely open the door for long-range US missiles to be supplied to Ukraine.[48]

Arms imports and naval build-up in the eastern Mediterranean

Amid ongoing maritime disputes in the eastern Mediterranean, states in the region continued to increase their naval capabilities in 2018–22, with the help of supplies of major arms by other states.[49] In 2018–22 Egypt received four submarines and the first of four frigates on order from Germany, two of three frigates on order from France, and two frigates from Italy. Israel received the first two of four frigates on order from Germany and placed an order for three submarines, in addition to one planned for delivery in 2023.

Greece ordered three frigates and six Rafale combat aircraft, including for use in an anti-ship role, from France in 2022, after it had ordered 18 Rafales in 2021. These deals were closely linked to a 2021 mutual defence agreement between Greece and France. France stressed that the agreement was not directed against Türkiye, but that it aimed to strengthen European sovereignty, including in the eastern Mediterranean, where France and Greece

[45] US DOD, 'Fact sheet on US security assistance to Ukraine', Press release, 21 Dec. 2022.

[46] US Department of State, 'Department press briefing—November 1, 2022', Press briefing, 1 Nov. 2022; and Nicholls, M., 'Russia trying to get ballistic missiles from Iran, says Britain', Reuters, 10 Dec. 2022. On Resolution 2231, which bans imports from Iran of missiles with a range of 300 km or more without specific prior approval by the UN Security Council, see note 41 and chapter 12, section II, in this volume.

[47] 'Iran agrees to ship missiles, more drones to Russia', Reuters, 19 Oct. 2022; and 'Iran denies plan to send missiles to Russia for Ukraine war', Defense Post, 21 Oct. 2022.

[48] Rathbone, J. P. et al., 'Russia and Iran hesitate over co-operation as West warns of costs', *Financial Times*, 6 Mar. 2023; Nicholls (note 46); and 'Ukraine warns of threat from Belarus, US says Iran helped Russia operate drones from Crimea', France 24, 20 Oct. 2022. Any such missiles supplied to Russia would also still be against the UN sanctions on Iran. For more on the UN embargo see chapter 12, section II, in this volume.

[49] On tensions in the eastern Mediterranean see Davis, I., 'Key general developments in the region', *SIPRI Yearbook 2022*, pp. 147–48.

Table 6.1. Selected major arms on order or chosen for future orders from the 10 largest arms suppliers, for delivery after 2022

Figures are units of major arms.

Supplier	Combat aircraft[a]	Helicopters[b]	Major surface warships[c]	Submarines	SAM systems[d]	Tanks	Other armoured vehicles	Artillery
USA	1 371	496	5	–	40	634	2 658	401
Russia	84	..	4	1	13	444	55	–
France	210	252	16	5	6	–	552	176
China	94	–	13	9	1	717	–	128
Germany	–	–	11	18	25	85	1 389	137
Italy	115	195	9	–	1	–	1 703	–
UK	20	1	26	–	–	14	2	30
Spain	–	–	2	–	–	..	608	10
South Korea	136	–	3	3	..	990	23	1 232
Israel	18	–	–	–	26	19	69	87

.. = data not available; – = no orders; SAM = surface-to-air missile.

[a] Combat aircraft here include combat helicopters, combat/trainer aircraft and anti-submarine warfare aircraft.

[b] Excluding light helicopters.

[c] Major warships here include aircraft carriers, corvettes, destroyers and frigates.

[d] SAM systems here include only land-based systems and exclude systems for portable/very short-range SAMs.

Source: SIPRI Arms Transfers Database, Mar. 2023.

have crucial interests. Türkiye said the arms deals and the defence agreement threatened regional peace and stability.[50]

Türkiye is able to produce most types of warships, but it remains dependent on imports for certain naval assets such as submarines and helicopters, as well as key components for ships such as engines. However, deteriorating relationships with some of its long-term arms suppliers, mainly with the USA, have jeopardized Türkiye's access to military naval technology.[51] Within the EU there was some debate in 2020 about the possibility of imposing arms export restrictions on Türkiye. Germany, in particular, opposed such restrictions.[52] In 2022 work continued on six submarines ordered by Türkiye from Germany in 2011 for delivery in 2023–27. Türkiye also has an amphibious assault ship on order from Spain for delivery in 2023. Türkiye had planned to equip the ship with F-35B combat aircraft from the USA. However, as part of

[50] 'Greek parliament approves defence pact with France', Reuters, 7 Oct. 2021; and 'Greece approves arms deal with France amid Turkey tensions', *Daily Sabah*, 15 Feb. 2022.

[51] Işik, Y., 'CAATSA sanctions are hurting Turkey's military readiness at a time when NATO can't afford it', Middle East Institute, 6 May 2021; and Özberk, T., 'Turkey develops sanction-busting systems to secure naval helicopters', Shephard, 6 Feb. 2023.

[52] Wezeman, P. D., 'Multilateral arms embargoes', *SIPRI Yearbook 2021*, p. 575.

strained relations between the two states, the USA cancelled a planned deal for such aircraft (see section II).[53] Instead, the ship will now be equipped with armed UAVs produced by Türkiye, to become the first aircraft carrier with an uncrewed air strike force.[54]

Cyprus, which has overlapping maritime claims with other states in the eastern Mediterranean, remains a very minor importer of major arms: in 2018–22 it was the 95th largest globally. It did not acquire any warships or combat aircraft, nor has it announced plans for them, but it did import a limited number of anti-ship missiles from France to double the range of its coastal defence systems to around 180 km.[55]

Estimates of future arms transfers based on known orders

While many states have recently placed orders for major arms or plan to make such orders soon, publicly available information remains limited in most cases. It is extremely difficult, therefore, to provide even rudimentary predictions of global trends in arms acquisitions, no matter whether these are near- or long-term forecasts. Nonetheless, there are indications—especially the perception among many states that security threats are increasing (which acts as a driver of arms transfers) and the continued growth in military spending (which acts as an enabler)—that there will be more, rather than less, demand for major arms in the coming years.[56] Much of this demand will be met by arms imports, as many states are still unable to produce domestically all the major arms they believe they need.

While it is difficult to make predictions about future trends in arms transfers, data on orders can give a rough indication of which states will be among the largest exporters in coming years. The data on combat aircraft and major warships, which have a high military value, is particularly telling. The USA will almost certainly continue to be, by far, the largest exporter of major arms beyond 2022 (see table 6.1), especially as it will supply around 60 per cent of all combat aircraft currently on order. Russia, which was the second largest arms exporter in the world in 2018–22, has a relatively low number of pending deliveries.

[53] 'Türkiye'nin ilk milli uçak gemisi görüntülendi' [Türkiye's first national aircraft carrier displayed], TRT Haber, 24 Mar. 2018.

[54] Suorsa, O. P. and Cannon, B. J., 'Turkey's future drone carriers', War on the Rocks, 20 Nov. 2022.

[55] Hazou, E., 'Cyprus said to be close to selecting new defensive weapons systems', *Cyprus Mail*, 27 Jan. 2022.

[56] On military spending trends see chapter 5 in this volume.