Appendix 10C. Sources and methods for arms transfers data

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The SIPRI Arms Transfers Project reports on international flows of conventional weapons. Since publicly available information is inadequate for the tracking of all weapons and other military equipment, SIPRI covers only what it terms *major conventional weapons*. Data are collected from open sources in the SIPRI arms transfers database and presented in a register that identifies the suppliers, recipients and weapons delivered, and in tables that provide a measure of the trends in the total flow of major weapons and its geographical pattern. SIPRI has developed a unique trend-indicator value (TIV) system. This value is not comparable to financial data such as gross domestic product, public expenditure and export/import figures.

The database covers the period from 1950. Data collection and analysis are continuous processes. As new data become available the database is updated for all years included in the database.[1]

I. Revisions to sources and methods in 2005

New published information on arms transfers often includes new delivery data. This is also true for data on individual systems, which may necessitate a new calculation of their TIV. From time to time, however, more significant and generic modifications are introduced to reflect the changing reality of arms transfers or to make use of new sources of information. For example, in the 1980s radar systems were added to the database. In 2005 several generic changes were introduced into the coverage of the database while the calculation of the SIPRI TIV for production under licence was reviewed and modified. These changes have been made retroactively for the entire database in order to preserve a meaningful time series from 1950.

Revisions to the range of coverage

In 2005 the coverage of the database was expanded to include: (*a*) engines for military aircraft, for example, combat-capable aircraft, larger military transport and support aircraft, including helicopters; (*b*) engines for combat ships, such as fast attack craft, corvettes, frigates, destroyers, cruisers, aircraft carriers and submarines; (*c*) engines for most armoured vehicles—generally engines of more than 200 horsepower (hp) output; and (*d*) anti-submarine warfare (ASW) sonar systems for ships. None of these systems are standalone, but rather components belonging to platforms

[1] Thus, data from several editions of the SIPRI Yearbook or other SIPRI publications cannot be combined or compared. Readers who require time-series TIV data for periods before the years covered in this volume or who require updated registers should contact SIPRI, preferably via the website at URL <http://www.sipri.org/contents/armstrad/>.

classified by SIPRI as 'major weapons'. As such they are similar to many of the radar systems added to the SIPRI coverage in the 1980s.

These sub-systems are only included when they are supplied from a country other than the supplier of the platform on which the systems are mounted; for example, a K-8 trainer aircraft transferred from China to Egypt would also lead to an entry for the transfer of a TPE-731 engine from the United States. However, the transfer of an F-16 combat aircraft from the USA to Oman would not lead to an entry for an engine, since that is also supplied from the USA. The above systems are also included when used for modernization of existing platforms. Generally, the number of items is derived from the number of platforms, but where available, exact numbers of ordered and delivered items are used. These sub-systems are included because they provide a more complete picture of arms transfer relations between suppliers and recipients, and because they are for the most part technically advanced systems and as such important (and often export controlled), and because major platforms are becoming more and more dependent on such components supplied from other countries. It also makes it possible to capture at least part of the trend for 'cooperative' weapons. They can be included because they are discrete items that can be identified from open sources as a specific 'measurable' component.

With regard to the register, this means that additional information is available on some of the major components of conventional weapons. For the TIV tables the value of the platform would be reduced by the value of the components, and the TIV of the components would show up as coming from a supplier different to the supplier of the platform. Alternatively, in cases of components supplied for indigenous platforms, the TIV of the component would be listed where previously nothing would have been listed.

Revisions to the SIPRI trend-indicator value

The SIPRI TIV for weapons produced under licence was reviewed in 2005 and many systems previously listed as 'produced under licence' had their status changed to 'direct delivery'. Only weapons with a low input from the licenser (below 50 per cent) are now regarded as licensed production and calculated as such. The systems with a higher input from the licenser are considered as being 'assembled' and are given the full TIV. This change was introduced because the previous calculation of the percentage of input from the licenser was always problematic and margins of error large, especially in cases with a high input from the licenser.

II. Selection criteria and coverage

Selection criteria

SIPRI uses the term 'arms transfer' rather than 'arms trade' since the latter is usually associated with 'sale'. SIPRI covers not only sales of weapons, including manufacturing licences, but also other forms of weapon supply, including aid and gifts.

The weapons transferred must be destined for the armed forces, paramilitary forces or intelligence agencies of another country. Weapons supplied to or from rebel forces in an armed conflict are included as deliveries to or from the individual rebel forces, identified under separate 'recipient' or 'supplier' headings. Supplies to or from inter-

national organizations are also included and categorized in the same fashion. In cases where deliveries are identified but it is not possible to identify either the supplier or the recipient with an acceptable degree of certainty, transfers are registered as coming from 'unknown' suppliers or going to 'unknown' recipients. Suppliers are termed 'multiple' only if there is a transfer agreement for weapons that are produced by two or more cooperating countries and if it is not clear which country will make the delivery.

Weapons must be transferred voluntarily by the supplier. This includes weapons delivered illegally—without proper authorization by the government of the supplier or the recipient country—but excludes captured weapons and weapons obtained from defectors. Finally, the weapons must have a military purpose. Systems such as aircraft used mainly for other branches of government but registered with and operated by the armed forces are excluded. Weapons supplied for technical or arms procurement evaluation purposes only are not included.

Major conventional weapons: the coverage

SIPRI covers only what it terms *major conventional weapons*, defined as:

1. *Aircraft*: all fixed-wing aircraft and helicopters, including unmanned reconnaissance/surveillance aircraft, with the exception of microlight aircraft, powered and unpowered gliders and target drones.
2. *Armoured vehicles*: all vehicles with integral armour protection, including all types of tank, tank destroyer, armoured car, armoured personnel carrier, armoured support vehicle and infantry fighting vehicle.
3. *Artillery*: naval, fixed, self-propelled and towed guns, howitzers, multiple rocket launchers and mortars, with a calibre equal to or above 100 millimetres (mm).
4. *Radar systems*: all land-, aircraft- and ship-based active (radar) and passive (e.g., electro-optical) surveillance systems with a range of at least 25 kilometres (km), with the exception of navigation and weather radars, and all fire-control radars, with the exception of range-only radars. In cases where the system is fitted on a platform (vehicle, aircraft or ship), the register only notes those systems that come from a different supplier from the supplier of the platform.
5. *Missiles*: all powered, guided missiles and torpedoes with conventional warheads. Unguided rockets, guided but unpowered shells and bombs, free-fall aerial munitions, anti-submarine rockets and target drones are excluded.
6. *Ships*: all ships with a standard tonnage of 100 tonnes or more, and all ships armed with artillery of 100-mm calibre or more, torpedoes or guided missiles, with the exception of most survey ships, tugs and some transport ships.
7. *Engines*: (*a*) engines for military aircraft, for example, combat-capable aircraft, larger military transport and support aircraft, including helicopters; (*b*) engines for combat ships, such as fast attack craft, corvettes, frigates, destroyers, cruisers, aircraft carriers and submarines; (*c*) engines for most armoured vehicles—generally engines of more than 200 hp output; and (*d*) ASW and anti-ship sonar systems for ships.

The statistics presented refer to transfers of weapons in these six categories only. Transfers of other military equipment—such as small arms and light weapons, trucks, artillery under 100-mm calibre, ammunition, support equipment and components, as well as services or technology transfers—are not included.

III. The SIPRI trend indicator

The SIPRI system for the valuation of arms transfers is designed as a *trend-measuring device*. It permits the measurement of changes in the total flow of major weapons and its geographical pattern. The trends presented in the tables of SIPRI trend-indicator values are based only on *actual deliveries* during the year or years covered in the relevant tables and figures, not on orders signed in a year.

The trend-indicator value system, in which similar weapons have similar values, reflects both the quantity and the quality of the weapons transferred. The value reflects the transfer of *military resources*. The SIPRI TIV does not reflect the financial value of (or payments for) weapons transferred. This is impossible for three reasons. First, in many cases no reliable data on the value of a transfer are available. Second, even if the value of a transfer is known, it is in almost every case the total value of a deal, which may include not only the weapons entered in the SIPRI database but also other items related to these weapons (e.g., spare parts, armament or ammunition) as well as support systems (e.g., specialized vehicles) and items related to the integration of the weapon in the armed forces (e.g., software changes to existing systems or training). Third, even if the value of a transfer is known, there remains the problem that important details about the financial arrangements of the transfer (e.g., credit or loan conditions and discounts) are usually not known.[2]

Measuring the military implications of transfers would require a concentration on the value of the weapons as a military resource. Again, this could be done from the actual money values of the weapons transferred, assuming that these values generally reflect the military capability of the weapon. However, the problems enumerated above would still apply (e.g., a very expensive weapon may be transferred as aid at a 'zero' price, and therefore not show up in financial statistics, but still be a significant transfer of military resources). The SIPRI solution is a system in which military resources are measured by including an evaluation of the technical parameters of the weapons. The tasks and performance of the weapons are evaluated and the weapons are assigned a value in an index. These values reflect the military resource value of the weapon in relation to other weapons. This can be done under the condition that a number of benchmarks or reference points are established by assigning some weapons a fixed place in the index. These are the core of the index, and all other weapons are compared to these *core weapons*.

In short, the process of calculating the SIPRI trend-indicator value for individual weapons is as follows. For a number of weapon types (noted in the register as the 'weapon designation') it is possible to find the actual average unit acquisition price in open sources. It is assumed that such real prices roughly reflect the military resource value of a system. For example, a combat aircraft bought for $10 million may be assumed to be a resource twice as great as one bought for $5 million, and a submarine bought for $100 million may be assumed to be 10 times the resource a $10 million combat aircraft would represent. Those weapons with a real price are used as the core weapons of the valuation.

Weapons for which a price is not known are compared with core weapons. This comparison is made in the following steps.

[2] It is possible to present a very rough idea of the economic factors from the financial statistics now available from most arms-exporting countries. However, most of these statistics lack sufficient detail.

1. The description of a weapon is compared with the description of the core weapon. In cases where no core weapon exactly matches the description of the weapon for which a price is to be found, the closest match is sought.
2. Standard characteristics of size and performance (weight, speed, range and payload) are compared with those of a core weapon of a similar description. For example, a 15 000-kg combat aircraft would be compared with a combat aircraft of similar size.
3. Other characteristics, such as the type of electronics, loading or unloading arrangements, engine, tracks or wheels, armament and materials, are compared.
4. Weapons are compared with a core weapon from the same period.

Weapons delivered in second-hand condition are given a standard value of 40 per cent of the value assigned to the new weapon; second-hand weapons that have been significantly refurbished or modified by the supplier before delivery (and have thereby become a greater military resource) are given a value of 66 per cent of the new value. In reality there may be huge differences in the military resource value of a second-hand weapon depending on its condition after use and the modifications during the years of use.

The SIPRI trend indicator does not measure military value or effectiveness. It does not take into account the conditions under which a weapon is operated (e.g., an F-16 combat aircraft operated by well-balanced, well-trained and well-integrated armed forces has a much greater military value than the same aircraft operated by a developing country; the resource is the same but the effect is very different). The trend indicator also accepts the prices of the core weapons as genuine rather than reflecting costs that, even if officially part of the programme, are not exclusively related to the weapon itself. For example, funds that appear to be allocated to a particular programme could be related to optional add-ons and armament or to the development of basic technology that will be included (free of cost) in other programmes. Such funds could also act, in effect, as government subsidies to keep industry in business by paying more than the weapon is worth.

IV. Sources

A variety of sources are used for the data presented in the arms transfer register—newspapers; periodicals and journals; books, monographs and annual reference works; and official national and international documents. The common criterion for all these sources is that they are open; that is, published and available to the public.

Such open information cannot, however, provide a comprehensive picture of world arms transfers. Published reports often provide only partial information, and substantial disagreement between them is common. Order and delivery dates and exact numbers, or even types, of weapons ordered and delivered, or the identity of suppliers or recipients, may not always be clear from the sources. The exercise of judgement and the making of estimates are therefore important elements in compiling the SIPRI arms transfers database. Estimates are kept at conservatively low levels (and may very well be underestimates).

All sources of data as well as calculations of estimates, while not published by SIPRI, are documented in the SIPRI database.