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Dynamics of Military Procurement

Changes in Military Consumption Patterns

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1. Change dynamics

Introduction

Worldwide military spending has fallen from a peak of over one trillion US dollars during the mid 1980s to approximately 675 billion in 1996, a reduction of roughly one-third. Although the rate of reduction has slowed down during recent years it still amounts to approximately three percent annually (BICC, 1997 and 1998; see also Figure 1).

The scope of this global disarmament process is historical, comparable only to the adjustment after the end of major wars. Considering, however, the magnitude of present day military budgets, the arms production capacities, the still existing stocks of weapons—both conventional and weapons of mass destruction—and the size of the armed forces in the world, one can argue that disarmament in the 1990s falls short of expectations. During the Cold War, war-like armed forces were maintained in many parts of the world. But the end of the Cold War did bring forces down to historic peace-time levels in only a few countries in the world. Large quantities of scarce human and material resources are still invested in the military sector, resources which are badly required to improve development and human security.

Obviously, earlier high expectations of global disarmament were partly misplaced because the Cold War was only one, though dominant, cause for high levels of armaments. True, a changed—generally more benign—security environment with the former East-West antagonisms which disappeared and decreased the priority of defense spending enhanced by sharp budgetary constraints, resulted in cuts from which—in contrast to previous times—the military has not been spared. But in a number of countries, especially in Asia and the Middle East, military expenditures are increasing. Some of the evidence, with the emphasis on arms transfers, is reviewed in the next section of this paper.

However, there are other breaks to further cuts in armed forces after the end of the Cold War, which are, if not by necessity, though in practice, linked to its end. Dynamics are at work which already have begun to fundamentally affect the basis of arms production and arms transfers and have the potential to severely change military consumption patterns, in the industrialized countries as well as in developing countries. These dynamics are embedded in more general trends which are at the forefront of global change at the turn of the millennium:

- technological change: new and expanded uses of electronics and computer sciences which are mostly developed in the civilian industry; allowing militaries an emphasis on real-time information and precision of weapons instead of massive numerical military capabilities but necessitating the military to reorient towards dual-use technologies, effectively ending its overall claim of technological supremacy

- economic change: commercialization and globalization—also in geographical terms—of trade, consumption patterns and production in the civilian sector which puts into question the prior symbiotic relationship between nation states and national defense forces

The quality and magnitude of these changes already have been broad and are likely to be even more sweeping. Within the scope of this paper, only some of the issues can be dealt with, with a strong focus on the production of and trade in weapons. The two sections of this paper following a brief review of data on procurement of and trade in arms, give a further outline of the challenges for the current arms production and trade system and on the already noticeable extent of adaptation to those changes.

However, much remains speculative. As one can also see from the data on armed forces, arms procurement and arms trade, dynamics are contradictory and do not provide for simple or clear-cut patterns:

- Reductions in holdings can actually lead to increasing fire-power through the introduction of fewer, but more-deadly, new weapons, thus leading to pressures to develop new arms technologies
- Disarmament reduces weapon holdings in those countries which disarm but makes additional ‘surplus’ weapons available globally, leading to larger weapon holdings in recipient countries
- Reductions in procurement in arms producing countries puts pressure on industries to increase exports and, thus, the level of arms spending in recipient countries
- Oversupply of weapons in the international market allows recipient countries to get better deals, which include offset arrangements where additional arms production capacity is built-up in recipient countries
- New military technology which is largely based on dual-use in technology may end the comparative advantages of traditional national arms producers and lead to major relocation in the global arms production base
- Economic globalization erodes the decision-making power and effective functioning of states which are in turn the constitutive basis of armed forces.

This list could easily be extended. In order to make at least a few of its elements more visible, the paper closes with three brief case studies of particularly relevant issues.

Figure 1: Global decline of the defense market

Push and pull factors of military consumption

One more issue shall be dealt with in this introduction, namely the question what factors influence the level and structure of military consumption, specifically arms procurement and arms transfers.

Obviously, both push and pull or supply and demand factors contribute to the arms procurement and transfer pattern. Recipients have various interests in purchasing or receiving free-of-charge weapons

- to be armed against external enemies
- to be armed against internal opponents
- to keep the military establishment content
- to use arms deals as a method to receive kick-backs
- to use weapons as a symbol of power
- to use weapons as symbols of a State's international relations, signaling where alliances and allegiances lie, etc.

The importance of demand factors can be seen in the regional distribution of weapons imports. Three regions—Europe, the Middle East and Asia—have become the predominant centers of demand for imported major conventional weapons. Among the importers of major conventional weapons, ten recipients, all located in these three regions, namely Saudi Arabia, Turkey, Egypt, Taiwan, Japan, China, Greece, South Korea, India and Germany (in the order of the quantities of their imports between 1992 and 1996, see Figure 2) together accounted for over half of total deliveries (SIPRI, 1997).

Typically, demand factors are closely linked to the internal, regional and international political situation of recipients. Individual combinations of the above mentioned pull-factors can therefore only be analyzed case-by-case, a task beyond the scope of this paper.

Figure 2: The Top 10 Arms importers, 1992-1996

The motivations of suppliers makes the arms market quite distinct from that of other commercial products such as automobiles, textiles or computers, where there are rarely any other motivations than money. Historically, weapons supplier motives have been broken down into economic and political motives. “In the former category are business profits (or government ‘profits’), employment, balance of payments, amortization of research and development costs, and maintaining a warm base for cyclical arms industries dependent on high levels of external threat. In the latter category are a plethora of factors involving the cementing of alliances, ties between military officers’ corps, maintenance of regional balances of power, base acquisitions, the forestalling of nuclear proliferation, political leverage or influence, and so on” (Harkavy, 1994, p. 15). With the end of the East-West competition political motives have lost their top priority while at the same time, due to the shrinking market, the economic

motives for arms exports have gained in importance. Some discussion on individual arms exporters is found in the following section.

The interaction between pull and push factors has already been changed in the Post-Cold War era. For one, the combination of cuts in military expenditures and procurement budgets, reduced levels of arms imports, the availability of surplus weapons which had been taken off active duty and with arms producers seeking new markets, the arms market has become even more a 'buyers' market in which the few countries which had or made hard currency available for arms imports gained additional leverage (BICC, 1997). Secondly, the increased emphasis on the commercial side of arms transfers has meant that customers had to pay for weapons and could count less on free gifts, with the exception of 'surplus' weapons where supplier saw no chance of selling.

The combination of overcapacity, oversupply and a more commercial approach to arms deliveries gives recipient countries more freedom to choose among various consumption patterns. Elements of a three-tiered arms transfer market have already developed:

- 'light-weapon' armed forces predominantly importing and equipped with artillery, light vehicles, and small arms, as well as cheaply-acquired, but numerous, 'second-hand' major weapon systems
- 'high-tech' armed forces, opting for the latest in technology of which, depending on resources made available, only very few items might be bought
- 'home technology' armed forces, where the emphasis in procurement is on domestically supplied weapons, and thus, imports consist mostly of components and foreign technology instead of complete weapon systems.

In practice, armed forces of individual countries may mix these approaches, for instance have a high-tech airforce and a light-weapon army.

The choice among these consumption patterns, however, remains limited even in the post-Cold War era, despite a 'buyers' market, by available resources, conflict patterns and the patterns of military procurement behavior. Countries may not be able or willing, to have more than a 'light weapon army'. It makes little sense to buy very modern weapons for an army that has little manpower to use such weaponry. Therefore, only a few, generally resource-rich, countries in the Middle East and Asia are effectively building up high-tech armies.

'Light-weapon' armed forces are probably best equipped against enemies that are even less well armed which is regularly the case in internal conflicts, the dominating type of conflict in the post-Cold War era. On the other hand, once high-tech weapons are introduced in a region, the other armed forces who want to compete may also have to get such weapons. Action-reaction patterns are very pronounced in military procurement. This is partly due to the fact that even only slightly better weapon systems may give crucial advantage, consider, for instance, the range of air-to-air missiles. Partly, however, it is also due to the military perception that overall military capabilities best be measured by looking at the most advanced weapons in arsenals.

In general, military consumption patterns have been very international for a long time. A number of authors demonstrated already in the 1970s that structures, organizations, and self-perceptions of armed forces were very similar (with some exceptions at the time, such as China, Switzerland and Yugoslavia), and that this also exerted pressures on uniformity of doctrines and procurement patterns (Kaldor/Eide, 1979). Important transformation measures of international patterns included training in foreign countries, but also the mechanisms of international marketing of arms. A hierarchy in the development of norms of military behavior was detected, with the United States at the top, closely followed by the Soviet Union, the industrialized countries in the next tier, followed by some of the newly industrializing countries.

With the end of the Cold War, specifically the end of the Soviet Union and other dynamics discussed above, such as the build-up of domestic arms production in a number of countries in Asia, this hierarchy is challenged but not overthrown. The United States continues to be at the top, both in terms of technology and resources devoted to arms production. It therefore has a high degree of power over what the arms transfer system of the next century will look like. If globalization of arms production increases, the trade in arms may become even more commercial ultimately ending up like the trade of all other goods. However, suppliers, if they could unite, also have the option to make it a highly restrictive system where the trade in arms and in technology to make arms is considered exceptional. Individual suppliers could also try to defy recent dynamics and attempt to return to a power-oriented system where arms are given to friends but not to adversaries. Of course, a hybrid system combining certain of these features is distinctly possible.

What becomes clear from this brief discussion is that while recipients seem to have a greater amount of choice over their military consumption patterns than they had in the past, in fact they are still rather

restricted unless they opt out of a system the structure of which remains to be dominated from the central weapon supplier. The following sections of this paper therefore concentrate on supply factors and present major trends which have contributed to changed consumption patterns in the military sector.

2. Development of arms procurement and arms trade

Procurement expenditure

The general global trend of disarmament was also reflected in expenditure cuts for purchasing weapons. NATO spending on equipment was down to US \$81 billion in 1996 from a level of US \$120 billion in 1987 (see Figure 1). Within the NATO alliance reductions were not equally distributed. Cuts were most pronounced in some of the major producing countries, such as the United States, Germany and the United Kingdom, while several countries with relatively small procurement budgets increased their spending during the last decade, e.g. Greece, Luxembourg, Norway, Portugal and Turkey.

Reductions in procurement expenditure in other countries were even more noticeable. Russia's procurement expenditure is no comparison to the times of the Soviet Union. Due to its dire overall economic performance, only small numbers of new equipment are being ordered these days despite the fact that the armed forces and their equipment are in a dreadful state. In 1996 the domestic defense procurement contracts amounted to a level of 4.6 percent of the 1991 level, according to Alexander Eliseev of the Committee on Conversion and Science-intensive Technologies of the State Duma (*Krasnaya zvezda*, 26 April 1997, p. 4). Other successor states of the Soviet Union (such as the Ukraine and Belarus) are in a similar situation. Countries in Central and Eastern Europe—including those which are likely to become NATO members soon—all reduced their overall military expenditure in real terms during the 1990s, primarily for economic reasons. In addition, spending on procurement of arms has declined over-proportionally, mainly due to an increasing share of personnel cost. Bulgaria, the Czech Republic, Hungary, Poland and Romania increased their share of personnel cost within a shrinking military budget, mainly at the cost of procurement between 1990 and 1996 (SIPRI, 1997, p. 180). Whether this trend is reversed with the expansion of NATO remains to be seen.

Consequences for production

As a result—and despite a substantial downsizing of the defense industry—a large share of the capacity to produce weapons remains idle. Precise figures on actual capacity utilization in the defense industry are difficult to ascertain and variations from country to country and company to company exist. Despite recent mergers and acquisitions, statistics show that capacity utilization for the average US defense electronics company is still less than 30 percent, as a recently completed study of more than 35 US defense electronics manufacturers underlines (Dowdy, 1997). In Russia capacity utilization amounts to

only 10 to 13 percent (*Segodnya*, 19 February 1997). These idle capacities, unless closed down or converted for non-military purposes, will exert a constant pressure and accelerate lobbying activities for additional military procurement beyond security-based rational.

While the global trend has shown a clear downturn in procurement expenditure, several countries, especially in the Asia-Pacific region and the Middle East have invested strongly in new equipment. At the same time, some of these countries (such as Australia, China, India, Indonesia, Japan, South Korea, Malaysia, Pakistan, Taiwan) have domestic arms production facilities at their disposal and are partly building up new facilities or expanding them. The aggregate global figures of reduced military or procurement expenditures obscure the fact that for a number of countries the decline has even been more pronounced.

In addition to the reduction of procurement expenditure in real terms, productivity gains in arms production have to be taken into consideration to arrive at a realistic estimate of the restructuring of the supply side. Assuming an annual three percent productivity increase in defense companies (a conservative estimate for the major producers in the United States and Western Europe), the same volume of arms can be produced today with a 25 percent lower input of resources than a decade ago. In wanting to remain a serious competitor in arms production on the world market, Russia will probably have no choice but to improve productivity in the defense industry. On a global average, the defense industry had to cope with reductions of military expenditures of one-third while additionally requiring one-quarter fewer inputs per unit of output (BICC, 1998).

Global arms exports: On the rise again?

The trade in major conventional weapons was halved between 1987 and 1992. It leveled off at approximately US \$23 billion (in prices of 1990) for a period of four years (SIPRI, 1997). Other sources, based on differing definitions of the arms trade also reported strong declines (see Figure 3). The reductions in arms trade were not evenly distributed among the major arms exporters. Shifts in the market occurred, especially at the expense of producers from Central and Eastern Europe. From the position of the erstwhile number one arms exporter, the USSR, Russia shrank to a medium size exporter and has only in recent years recovered larger shares in the generally stagnant market. West European producers lost business as well, while United States' companies dominate the arms export market.

Was the decade-long trend of decline in arms transfers reversed in the second half of the 1990s? Is this the first signal of a general change in the trend of global arms production? Some newspaper reports in 1996 and 1997 claimed as much. They were based on newly published data on arms exports from the US Congressional Research Service (Grimmett, 1996) and the International Institute for Strategic Studies (IISS, 1996 and 1997) indicating a rise in the value of weapon deliveries. From about the mid-1980s, delivery values of weapons declined dramatically. Between 1994 and 1995 they were estimated to have

risen by 16 percent (Grimmett, 1997, Table 2A), 20 percent (ACDA 1997, p. 100) and 2 percent (IISS, 1996, p. 274; see also Figure 2). While the IISS records another increase for 1996 (IISS 1997), the Congressional Research Service reports a small decrease for 1996 (Grimmett, 1997, p. 5).

There are two major independent sources, a data series on deliveries of major weapons by the Stockholm International Peace Research Institute (SIPRI, 1997) and a data set maintained by the US government from which selections are published by the US Arms Control and Disarmament Agency (ACDA, 1997) and the US Congressional Research Service (Grimmett, 1997). The IISS also publishes data on global arms exports that are partly based on the US government data, as taken from ACDA and CRS, and partly own estimates.

SIPRI data for major weapons show a stagnation of exports (actual deliveries) in the mid-1990s at a level of about one half of the value of exports of the mid-1980s. ACDA and CRS data on deliveries show an even larger depression of the arms market. Mid-1990 figures are less than one third of the level of the mid-1980s. Major reasons for this difference are the much higher valuation of Soviet arms exports in the US government data base and a higher valuation of used weapons in the SIPRI data base. As Soviet arms trade declined and the trade in surplus weapons increased, the gap between US government and SIPRI data (which covers only the major weapon part of the arms trade) narrowed considerably.

All sources concur that from about 1992, global arms delivery values have been fairly stable. However, the global trend is composed of quite different developments in different regions. East Asia and, at least in the US government data, the Middle East is increasing arms imports while delivery values to European, Latin American and African countries are continuing to decrease. The increase in the figure for 1995 reported by IISS and CRS reflect deliveries of expensive weapons to the Middle Eastern states that were ordered in the wake of the Gulf War of 1990/91.

The US government data base also allows a glimpse into the future since it records order values of arms deals as well as delivery values. The CRS report shows a declining trend similar to the trend for delivery values, except for a 'Gulf War bump' in 1993. Since then, the value of agreements has continued to decline, with a small increase again in 1996 (Grimmett, 1997, Chart 1). This leads to the conclusion that delivery values have stabilized again at a lower level, since the backlog from the 'Gulf War bump' has been worked down.

All in all, export data do not provide a clear picture of the mid-1990s yet, though it is likely that the descent of the late 1980s and early 1990s has slowed down. However, considering the continuing decline in military expenditures and domestic procurement, that trend can provide little relief to the economic problems of the defense industry which still has not cut all those overcapacities that were built-up during the height of the Cold War in the 1980s.

Figure 3: Global arms trade, 1988-1996

3. *Technological changes*

Technological change influences the defense market and military consumption patterns. Weapons development and modern warfare have become science- and technology-dependent, a fact demonstrated to television watchers live during the 1991 Gulf War by the accuracy of air-delivered weapons into Iraq. Two broad trends in technology evolution have influenced and shaped military planning and weapons development: First, dual-use, a term which describes the interrelation between technologies in the military and the commercial sector. Spin-off for commercial use and—vice versa—the spin-in or spin-on of commercially developed technologies for military purposes can be of importance for both sectors. Second, the development of new and revolutionizing technologies which have led to increasing capital investments, an amassment of conventional weapon systems and to a lessened emphasis on manpower.

Dual-use technologies

The term dual-use technology refers to technology that has both military and non-military application. Most technologies are, in fact, multi-purpose and are not specifically designed for only one use. The literature on dual-use technologies in the world of defense and commerce has produced contradictory opinion on the scope and policy implications of dual-use. Defense industry representatives often underline the usefulness of spin-off of technologies from earlier military applications. The counter argument emphasizes that the defense industry has not been able to spin-off as many commercial technologies as the proponents suggest. There were certainly important technological developments initiated or sparked by defense efforts. The Atomic bomb was the harbinger of the new era of science-dependent weapon development with direct implications for the energy supply in many countries. In the sector of nuclear, information or materials technology the pacemaker role of defense technology is recognized. However, a systematic link of spin-off into the commercial sector is lacking (Gummett and Reppy, 1988) and excessive defense sponsorship of research skews the direction of scientific research and might divert vital resources away from the civilian economy (Melman, 1974; Dumas, 1986). A former US Department of Defense official, Lawrence Korb, graphically made the point: “It was clear the civilian sector had use for the 707, but who wants a Stealth Bomber other than the military?” (*Financial Times*, 18 August 1997). The interrelationship between the military and the commercial sector is not characterized by a smooth and harmonious transfer of technologies. On the contrary, high barriers, created by institutional differences and incompatible business practices, separate these sectors (Markusen, 1992).

There is another element of the dual-use debate which, for at least some countries, is potentially the most important future path: the integration of civilian technologies into modern weapon systems. There

is agreement on the general trend of an increasing dependence of weapons development on commercial technology (Alic et al., 1992, p. 7; Gansler, 1997). Military technology, once considered the pacemaker to technological innovation, is falling behind its civilian counterpart in many areas. A defense-driven technology strategy as implied in the spin-off paradigm is becoming less and less relevant in the contemporary world (Alic et al., 1992).

An often quoted piece of empirical evidence is the development of information technology. In the early stages, information technology and the computer industry benefited and in many areas depended on research grants, subsidies and orders of the Defense Department of the United States. This situation has changed completely. As a general rule, software, computers or other information technologies are no longer designed and developed according to military specifications and with the resources allocated from the military budget. On the contrary, many civilian high-tech components and systems perform equally well or better than military ones and weapon developers can often rely on technology freely available on the commercial market and can (and should, for economic reasons) buy off-the-shelf (Gansler, 1995). This is a result of an enormously growing commercial market, especially when compared to stagnant and lately reduced military R&D budgets and the rapid pace of technological development of this market. Similar shifts in technology generation can be observed in other sectors, such as materials and propulsion.

Still, civilian technologies and off-the-shelf components are increasingly used in weapon systems. This practice is likely to increase, especially if predictions for a more frequent use of electronics in warfare become reality (see below).

Future military technologies

The general procurement pattern of the armed forces in the world is characterized, on the one hand, by the desire to deploy state-of-the-art equipment and, on the other hand, by the limited financial and human resources available to operate such systems. As a result, most armed forces in the world have weapons in their inventory which are not necessarily based on the latest but on yesterdays technology; at times, the equipment is of Korean War vintage. Furthermore, in the wars which are presently being fought in the world, the most used weapons are low-tech small arms rather than sophisticated big-ticket-items. Despite these facts and notwithstanding resource constraints, technology developments have a significant influence on weapon developments and procurement patterns. In the country that spearheads the development of modern military technology, the United States, there seems to be little doubt that warfare in the early 21st century will be dramatically different from that of the past. The changes in military technology are so fundamental that US experts do not hesitate to speak of a 'revolution in military affairs (RMA)' (Bracken and Alcala, 1994, Odom, 1993, Gansler, 1997). In the Gulf War some of this new technology was used and tested; this experience actually added momentum to the general

trend of emphasizing the importance of communication, computing, electronics, precision guidance, reconnaissance and other modern technologies. It is likely that the importance of technology to weapons development and military planning will increase even further.

Jacques Gansler, who in the summer of 1997 was nominated Under Secretary of Defense for Procurement and thus responsible for procurement in the US Department of Defense, in a recent study defined six broad characteristics which will be required for the next generation of weapon systems and which will therefore drive the direction of future technology development:

1. Low cost: Financial constraints make it absolutely essential to reverse the historic trend of ever increasing cost of weapons from one generation to the next.
2. Short Cycles: Recognizing the speed of technology development in commercial sectors, the general practice in weapon development of spending 10 to 20 years on design, development and testing and then assuming the system will be deployed for the next few decades is simply no longer valid.
3. Modern logistics: Military forces have to change from a "just-in-case" philosophy to a "just-in-time" logistics system.
4. Large firepower with small forces: Smaller forces will be lighter, but will have the capability to draw on precise intelligence information and will have the ability to call on, or deliver, precision strike capability.
5. Continuous operations: While conflicts will be short in duration, armed forces will operate on a 24-hour, all-weather basis.
6. Simulation-based planning and training: The extensive use of advanced computer modeling and simulation will improve military effectiveness and reduce costs (Gansler, 1997).

A whole range of new technologies are offered for the next generations of weapons and for military operations. Development and application of advanced technology, such as lightweight materials, reconnaissance equipment, sensors, information technology, precision guidance, stealthy designs and materials, directed energy technology etc., will spearhead weapon development.

Whether such far-reaching transformations are going to be implemented or remain partly or largely utopian or whether they will be feasible only to the technologically most advanced and economically richest countries is an open question. Some of these prescriptions for modernizing the armed forces seem to be close to realization, others seem far-fetched. Whether the large and bureaucratic organizations of the armed forces can actually reform to the extent suggested or whether they will largely hold on to past practices instead and defend their traditional turf remains to be seen. In all these areas of technology development there is clearly a trade-off between cost and performance. Not all the

equipment which might be attractive to military planners is affordable—and some of the advantages which future modern military technology might offer will be wiped out by counter-measures. Furthermore, with an improving security environment, voluntary (unilateral or multi-laterally negotiated) renunciation of some of the technologies might be possible. Although, the history of restraining the integration of new technologies into weapons or putting a cap on military R&D expenditures with a view of preventing a technology oriented arms race has not been very successful, it does not mean that in today's world advance in this direction is impossible.

The general direction of development is probably to reduce the role and number of persons in the armed forces and to increase the importance of capital and technology. Industrialized countries prioritize capital investment, technology development and military hardware while the armed forces in developing countries are personnel intensive. This is also reflected in the expenditure per soldier in the armed forces of the different regions of the world which fluctuate from approximately US \$6,200 per year in CIS countries and US \$7,000 in Africa and South Asia to US \$93,400 in NATO countries.

Figure 4: The rising capital cost of armed forces

The trends of modernizing technology and integrating them into weapon systems are likely to result in new (not necessarily additional but alternative) consumption patterns of the military. A shift in demand away from traditional weapon platforms towards electronics and other modern technologies will benefit some sectors and companies at the expense of others. The country in which such a trend is likely to be most pronounced will be the United States. A further intensification of US dominance in modern technology is probable. It seems also possible that the linkage between civilian and military technology will grow stronger as more civilian technology is being used in weapon systems.

4. Pressures to internationalize versus national orientation

Different economic indicators signal that the economy has become more globalized in recent years. Although the term 'globalization' is defined differently and has emerged as a catchword for a variety of different economic developments it seems to indicate the internationalization of markets. Large companies operate—both in their resource input of capital, technology, know how and labor as well as in their marketing strategies—on a global scale. More and more products are produced on the basis of inputs from various countries and are designed for and sold on the global market place. Not all branches of industry have globalized to the same extent at the same time. Labor intensive branches, such as textiles and shoes, were among the first, followed by capital intensive branches, like automobiles, machinery, chemical products. Technology intensive branches, such as electronics and telecommunication, intensified their international activities in the 1980s while the dominating 'globalizers' of the 1990s are within the finance, service and media sector (Stopford and Strange, 1991).

In contrast to a number of industrial branches which are increasingly operating on a global level, the defense industry is less affected and remains determinedly nationally oriented. This is favored by governments who continue to assist and subsidize their national champions in defense production. Capital investments or takeovers by foreign companies are often banned and home markets are protected against competitive imports. Most of the weapons are produced for the domestic market and international competition is largely confined to those countries which have none or only limited arms development and production facilities. Pork-barrel politics which foster local commercial and labor interest reinforce the resistance against broad-based internationalization of the defense industry.

Neither the broad international debate on disarmament to make the world and its people (not a particular nation) safer nor multilateral military action (such as expanded and intensified United Nations peace keeping operations) have altered the principal national outlook of defense procurement and defense production. The industry has purposely or by default spent the last years transforming itself, however, without the same globalization of its base as occurred in other industrial branches. The transformation process is probably most advanced in the United States while the pace of consolidation in Europe (East and West) and in some developing countries like China, South Africa, India and Pakistan is still lagging behind.

Internationalization of arms production is, even in a period of rapid 'globalization', full of contradictions. Both fostering and inhibiting trends influence this process.

The pressure to internationalize

The technological developments described above result in an inflation of development costs, a process which is imposed by the monopsonistic buyer of weapons while the size of the market is constrained by fiscal considerations. This creates a chronic tendency for military production to occur at levels that are too low to achieve unit cost savings and, as technological needs expand, a tendency for unit costs to grow. Since production levels are low from an economic perspective and production runs short, this means that there is chronic excess capacity in military production. In contrast to modern civil high-technologies where markets continue to grow substantially, technological development in the military becomes a vicious circle. Thus, there is a strong pressure to seek new markets outside the narrow domestic procurement of weapons.

Furthermore, the trend towards integrating dual-use technology is also a driving force of internationalization. Since commercial technologies in many sectors are developed by globally operating companies, defense producers cannot only buy domestically. The incentives for global sourcing of components and subsystems are growing. At the same time, these activities are slowed down by strategies of national independence in defense technology.

In addition, importing countries often insist on license production or other forms of collaboration in production (like assembly, subcontracting or off-set agreements). This trend (described below) also forces companies to set up new production facilities despite the drive of many defense companies to downsize and consolidate.

International arms producing companies

Most defense companies—in contrast to such global players as Coca-Cola, IBM, Mitsubishi, Shell and Siemens, to name just a few companies of the commercial world—are still based in a single country and many of the defense companies have no or only limited productions outside the country of origin. Often, arms production abroad is limited to collaboration in production because importing countries insist on such collaboration. This type of activity mainly aims at targeting export markets and is (so far) not driven by the strategies of global sourcing and global production. This, however, might change in future. Upon merging with McDonnell Douglas, Boeing's defense and space division chairman declared: "We want to be more like Shell or Coca-Cola. Wherever you are you must be a local company" (Grant, 1997, p. 8)

At present, defense companies' share of exports in total turnover often remains small. Lockheed Martin, the world's largest defense company in 1996 and one of the most international of the United States' defense companies, exported but 18 percent of its production and only 6,000 of its 190,000 employees worked outside the United States. Similarly, only 10,000 of Raytheon's 127,000 staff are located overseas. Due to its small domestic market, some European companies have a somewhat different record; British Aerospace, for example, the largest European defense company, exports 87 percent of its sales overseas. But here again, only 9,000 of 43,000 employees are based outside the United Kingdom (all figures taken from Grant, 1997). Two of the true multinational arms producing companies in the 1970s and 1980s in Western Europe, Philips and Oerlikon-Bührle, proved to weak to compete in the 1990s and left the defense sector completely (Philips) or reduced its defense dependence (Oerlikon-Bührle).

Companies in Central and Eastern Europe and Russia play, so far, a marginal role in this contradictory but emerging internationalization process. The pain of downsizing and closure of companies in the former Eastern bloc has even translated into a gain for companies in the West as they have been able to take hold in some of the traditional arms markets of the former Soviet Union.

These statistics, although not comprehensive, demonstrate that the defense industry remains a special case and is far from a globalized industrial branch. In most countries the domestic market still plays the primary role, nonetheless, international business is of growing importance. While nascent trends of internationalization can be observed in the defense sector, large-scale or systematic globalization has certainly not emerged yet.

Arms exports as an indicator

The international trade in armaments is the most visible measure of globalization in the military sector (United Nations, 1997). Arms sales declined more rapidly than military expenditures in the first half of the 1990s, with the ratio of arms exports to global military expenditures, dropping from 6.1 percent in 1987 to 4.6 percent in 1995, after hitting a low of 3.0 percent in 1992 and 1994. Similar 'southwards' trends can be observed by using other sources (SIPRI, 1997). By way of comparison, global merchandise exports rose from 11.8 percent of world GDP in 1987 to 15.8 percent in 1995. As a consequence the share of arms exports in global merchandise exports decreased from 2.7 percent in 1985 to 0.7 percent in 1995 (ACDA, 1997, p. 100).

Figure 5: Share of arms exports in military expenditures

The concentration of the arms trade on a few major exporters also points in the same direction. This trade has always taken place within a highly concentrated group of states. Figure 6 (based on SIPRI statistics) indicates that the 6 largest suppliers (USA, USSR/Russia, Germany, UK, France and China), observed across the period, supplied close to or over 90 percent of all major conventional weapons traded. This trend, however, is, somewhat contradicted by the fact that more and more second-hand or surplus arms have been delivered in recent years which are available from a whole range of countries and not only from the traditional arms producing countries (see for case study on surplus weapons below).

Other than the major suppliers—such as the Netherlands, Canada, Israel, Italy, the Czech Republic and some of the successor states of the former Soviet Union—account for small shares but seem to be increasing their importance as arms suppliers.

Figure 6: Percentage of arms exports of the major suppliers

The available data on arms trade thus does not support the hypothesis that there is growing and systematic internationalization in the global arms market. For some defense industries, such as the Russian, the share of exports in total production has grown, while for others, such as the French, it has declined. However, the decline in military exports may conceal that a more direct internationalization of production has supplanted trade in complete (end-product) weapon systems. The trade may have shifted from complete weapon systems to components and technology.

5. Three case studies: Supplier policies, demand driven countertrade and surplus weapons

A new round of fighter aircraft arms race in South America?

For almost 20 years until the mid-1990s, air forces in Latin America have procured few modern fighter aircraft. They made do with the upgrade of models purchased in the 1970s, the importation of small numbers of used aircraft or with simpler fighter aircraft, such as the joint Brazilian-Italian AMX fighter. Argentina's armed forces imported a few modern French Etendard bomber aircraft before the South Atlantic war of 1982; a larger order was later canceled by the democratic government. The Peruvian government of Belaunde Terry ordered French Mirage fighter aircraft in 1982; the newly elected government of Alan García tried to cancel the order in 1984 but was rebuffed by the French government who insisted on delivery.

The major reason for such restraint was probably economic. Economic growth was low, governments were under pressure to reduce deficits. In addition, democratic governments who began to replace military dictatorships in the early 1980s introduced tougher civilian control over the armed forces and their expenditures. Finally, leaders in Latin America got together several times with the goal to jointly limit weapons procurement. In 1984, for instance, at the initiative of the then-President of Peru, Alan García, Presidents from a number of South American countries signed the Ayacucho Declaration calling for restraint in arms purchases.

The restraint was supported from the outside. Specifically, US governments had had a policy, introduced in 1978 by then-US President Jimmy Carter, not to introduce new weapons into the region and to exercise a policy of restraint with the presumption of denial. This policy was continued by the Reagan administration, with one exception, the delivery of F-16s to Venezuela (justified as a measure against Cuban armaments).

The economic situation of many South American countries has improved in the 1990s. However, a number of earlier security threats have also subsided. Democratically elected governments in Argentina and Brazil have buried their traditional rivalry; the relations between Chile and Argentina have improved, as have those between Brazil and its Northern neighbors. The one major remaining conflict is between Peru and Ecuador.

Even in the absence of specific arms control agreements, the demand for imported modern fighter aircraft in South America has remained small, arguably including the cases of Peru and Ecuador. As was widely reported, the Air Force of Ecuador purchased 4 Israeli Kfir fighter aircraft in 1995. The Peruvian government responded by importing 12 used MiG-29 aircraft from Belarus. However, neither of these

purchases can be regarded as a major improvement of military capabilities. The Kfir is a copy of a 1960s-vintage French Mirage aircraft, while the MiG-29s reportedly are in poor condition.

Judging by the level of tensions, South American countries, including Peru and Ecuador, have fared well with restraint in the purchase of modern fighter aircraft. The clashes between these two countries remained limited with comparatively low numbers of victims. With more capable bomber and fighting aircraft, the conflicts might easily have escalated.

However, the situation is in danger of changing before the turn of the century and it seems that the armed forces are in the process of being tempted into changing their past procurement pattern. The air forces in all the larger countries in South America have been the target of marketing drives by companies selling modern fighter aircraft. Reportedly, it was quietly arranged that Brazilian Air Force generals could fly F-16 aircraft produced by Lockheed Martin in Puerto Rico (Waller, 1997). A more impressive array of military planes than ever was displayed at the bi-annual Chilean air show, FIDAE, in 1997, including the B-2 Stealth bomber and F-16s. South America had long been seen as minor market by the large arms corporation producing expensive aircraft. The former United States Assistant Secretary of State, Alexander Watson, reported that until early 1996 “nobody in Latin America showed any interest in buying these jets” (Waller, 1997). However, with declining sales at home and in foreign markets, interest in selling there increased again. Traditional market analysis showed that these countries ought to buy since they had not bought modern fighter aircraft in such a long time. Lockheed Martin reportedly found that Latin America was a “growing market with unlimited potential.” Manufacturers estimate that South America holds up to \$7 billion in future aircraft orders (*Arms Sales Monitor*, No. 25, 6 August 1997).

There remained, at least for companies from the United States, the obstacle of the earlier restraint policy. However, industry had little difficulty in enlisting the support of the Defense Department and a number of law-makers in Washington as supporters for a change in policy. Main arguments were that with democratic governments throughout the region, the original reason for sanctions had disappeared. Also, they argued, that other suppliers were snatching up the business US corporations were not allowed to do. The State Department and a group of members of Congress long opposed a change, arguing that restraint had served the interests both of the United States and the countries concerned. There are numerous reports about what tipped the scales, a report in *Time Magazine* detailing the large financial contributions of defense-related companies during the 1996 election campaign (Waller, 1997), other reports linking it to a change of mind in the State Department (Meyers, 1997). On 1 August 1997, the Clinton administration introduced a new policy announcing that it would consider arms sales to South American armed forces ‘case by case.’

The Chilean Air Force did lobby the government to purchase modern fighter aircraft and in early 1996 the government launched a procurement process. The governments of both Argentina and Brazil have said that they prefer not to raise the technological level of their Air Forces, however, that they might have to follow suite if Chile bought modern fighter aircraft. Air Force officials in both countries have claimed that new fighter aircraft are needed.

Until the summer of 1997, it seemed at least to be an open question whether air forces in the 'Cono Sur' would buy modern new fighter aircraft. In a way it was a typical strategic game problem: as long as no country bought such weapons, no other country would do so. Once one purchase was made, though, the others would follow. It is to fear that this change in US policy has made it more likely that such a train of purchases will be set in motion.

Offsets: A prerequisite to stay in the market?

Offsets have become a central feature, even a prerequisite in shaping the financing of the global arms trade. Offsets can take the form of countertrade and involve an arms supplying company agreeing to arrange the purchase of goods and services from the buying country as full or partial repayment, or they can take the form of transfers of know-how, licenses and production technology from the purchasing country to enable the latter to set up production lines of its own. While offsets are a phenomenon which attracted the attention of experts already more than a decade ago (Neuman, 1985), it seems that offsets are increasingly demanded by weapon importing countries (GAO, 1996). Apparently, this new trend is demand driven and consent to offset demands is a sign of competitive pressures. Offsets that enable purchasing countries to set up domestic arms production lines have additional effects: they contribute further to global overcapacity in arms production (see above). They also contribute to the globalization of arms production, at least initially, when domestic arms production is highly dependent upon foreign inputs. Especially in East Asia, the link between offsets and the build-up of a domestic arms industry has been close (Willett, 1997)

The General Agreement on Tariffs and Trade prohibits the practice of offsets in government procurement, except for procurement of military weapons. Thus, offsets are a specific, often practiced characteristic of the arms trade. As the world's largest arms producer and largest exporter of weapons, the United States is at the center of this trend of increasing offsets development, but this trend is not restricted to the United States. Western and East European companies, Russian arms producers as well as companies from developing countries use offset strategies increasingly as an instrument of competition to operate in established markets or to open up new ones.

A study by the Bureau of Export Administration of the US Department of Commerce (BXA, 1996) concludes that the average level of offsets in US defense trade was 57 percent. Interestingly, offsets involving West European companies (as recipients of US weapons) now approach 100 percent of the

value of contracts with occasional offsets of over 100 percent. In the case of Swedish imports from the US between 1980 and 1987, US companies agreed to 173.8 percent of offset obligations, in the case of Spain to 132.5 percent (BXA, 1996, p. 14).

Countries with developed economies, practically all West European countries which import arms, usually encourage offsets directly related to the specific arms deal agreed upon. Agreements typically involve license production, coproduction activities or subcontractor arrangements of the weapon system that is acquired. (See Figure 7).

Industrializing countries, especially the newly industrializing countries in Asia with developing defense and commercial industries such as South Korea, Malaysia, Singapore and Taiwan, but also countries with a tradition in arms production like India and China have pursued both defense-related (direct) and non-defense-related (indirect) offsets. The typical arrangement in the past between India and the Soviet Union (partly also today with Russia) involved the supply of tea and industrial products (such as railway carriages) by India to pay for defense production technology. The agreements with new industrializing countries emphasize work in the defense and aerospace industry. The aim of the importing countries usually is to import production and maintenance know how rather than the finished product.

Especially less industrialized countries such as Kuwait, Saudi Arabia and the United Arab Emirates which are large arms importing countries, generally pursue indirect offsets to help create profitable business and build their country's infrastructure. These countries usually do not enter direct (weapon related) offsets because they have no or only limited advanced technology infrastructures which could attract contract work from foreign arms producers.

Figure 7: Typology of offsets in arms trade (sample of offsets)

The cost and benefits of offsets in arms trade are a debated issue. The possible adverse impact on employment in the supplier country of offsets, the industrial and technology base (transfer of know how) are weighed against the benefits of increased export levels in a competitive buyers' market and additional sales of spare parts and services over the life time of the exported weapon system. The most important result of offsets in the global arms market probably is the expansion of an already excessive arms production, repair and maintenance capacity. Defense offsets are likely to create or enhance competitors in a generally tight and competitive market.

Trading surplus weapons: A negative by-product of disarmament

While international trade in newly produced weapons declined substantially after the end of the Cold War, statistics on surplus of second-hand weapons trade indicated record levels. A combination of push and pull factors has influenced the transfer of surplus. As disarmament treaties and cease-fires in different parts of the world were implemented and armed forces reduced the number of deployed

weapons due to budget cuts, inventories of surplus weapons accumulated to as many as 165,000 pieces of major weapons world-wide. This has had a strong impact on the consumption pattern of the armed forces. More than 18,000 of these surplus weapons were exported or given away internationally between 1990 and 1995. For the first time in 1994, the trade of surplus weapons was larger than the trade in new weapons (BICC, 1997, chapter 2).

Figure 8: Surplus and new weapon systems transferred

Used weapons, still with military value, have become increasingly available. As a rule, surplus weapons are traded at lower—often bargain—prices or free-of-charge within military assistance programs. It is more common to carry out arms deals of new equipment on a strictly commercial basis. The trade of surplus weapons has become a problematic aspect of disarmament: if such weapons are not converted, scrapped or ‘mothballed’, they often end up in areas of conflict. In certain cases, especially in the Aegean and the Middle East, the availability of surplus has fanned regional arms races. Among the 90 countries importing surplus weapons, major recipients are Turkey, Greece, Israel, Egypt, Pakistan, Lebanon, Saudi Arabia and Morocco, but also countries such as Spain and the United States.

Mainly as a result of the growing amount of surplus weapon stocks, the source of supply has diversified. At least 41 different countries delivered second-hand major conventional weapons during the first half of the 1990s. Both the traditional weapon suppliers as well as others are now offering their surplus stocks on the market. Major suppliers of surplus were the United States, Germany, the Netherlands, Russia, Belgium, the United Kingdom and France.

Cost considerations (saving the costs of storing or scrapping) have boosted the trend of exporting surplus, even though the proceeds from such export have been lower than early government expectations suggested, mainly because the market is flooded with these type of weapons. Although, as a rule, governments do not treat the transfer of surplus weapons differently from that of new ones, there seems to be a tendency to apply control regulations less restrictively for surplus, especially if no high-technology is involved.

A continued accumulation of surplus in different parts of the world can be expected. Assuming this continued generation of easily available weapon stocks, what is needed is to strengthen the awareness of the fact that surplus is a potentially negative by-product of disarmament. The lessons learned during the implementation of the CFE Treaty and the Dayton Accords need to be applied to situations where surplus is generated to avoid the flow of weapons into other areas of conflict. What is needed, in addition, is a strengthening of national export control mechanisms as well as international policies to provide multilateral controls.

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Figure 1: Global decline of the defense market

Source: Military expenditure: BICC, 1997, Appendix A1; Arms Trade: SIPRI 1997; NATO equipment expenditure: NATO (according to SIPRI 1997, Appendix 6A)

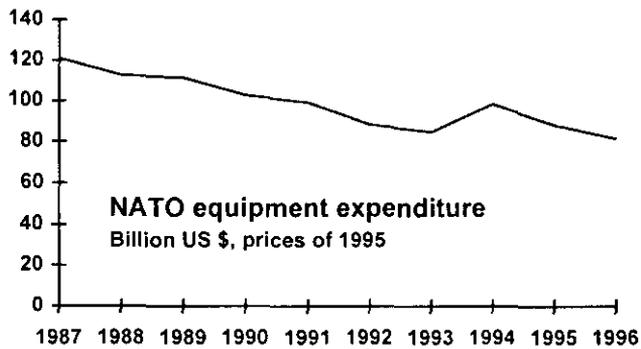
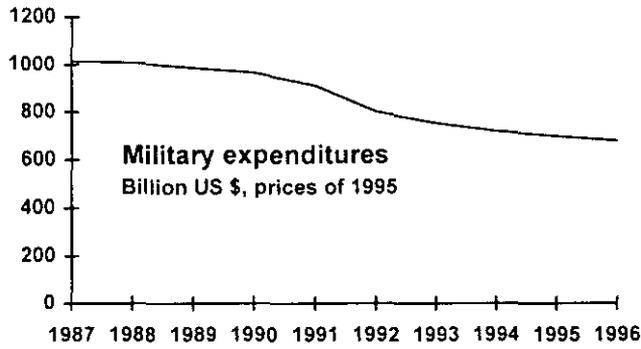


Figure 2: The Top 10 arms importers, 1992-96

Billion US Dollar, constant prices of 1995; data for major weapons only

Source: SIPRI 1997

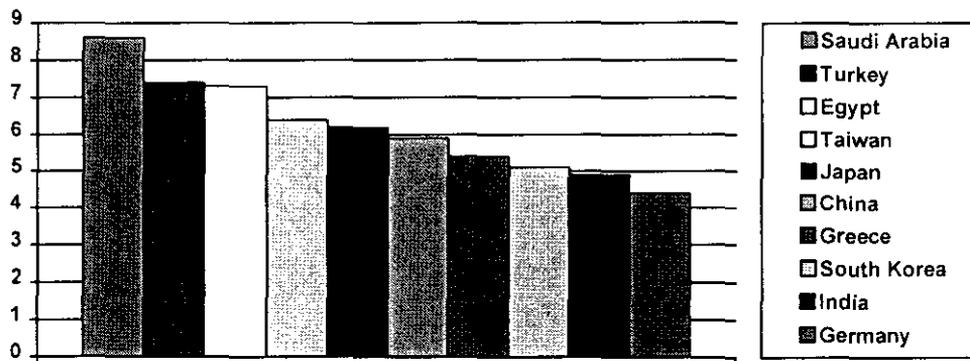


Figure 3: Global arms trade, 1988-1996

Comparison of different sources

In billions of US dollar, constant prices of 1995 (deflated with world GDP deflator); SIPRI data for major weapons only, other sources for trade in all types of weapons

*CRS (Congressional Research Service, reported in Grimmert 1996, 1997): * = Deliveries ** = Value of Agreements concluded during year*

Source: SIPRI, 1997, p.292; IISS, 1997, p. 265; ACDA, 1997, Table II; Grimmert, 1996, pp. 79, 82 and Grimmert, 1997, table 8B, 9A

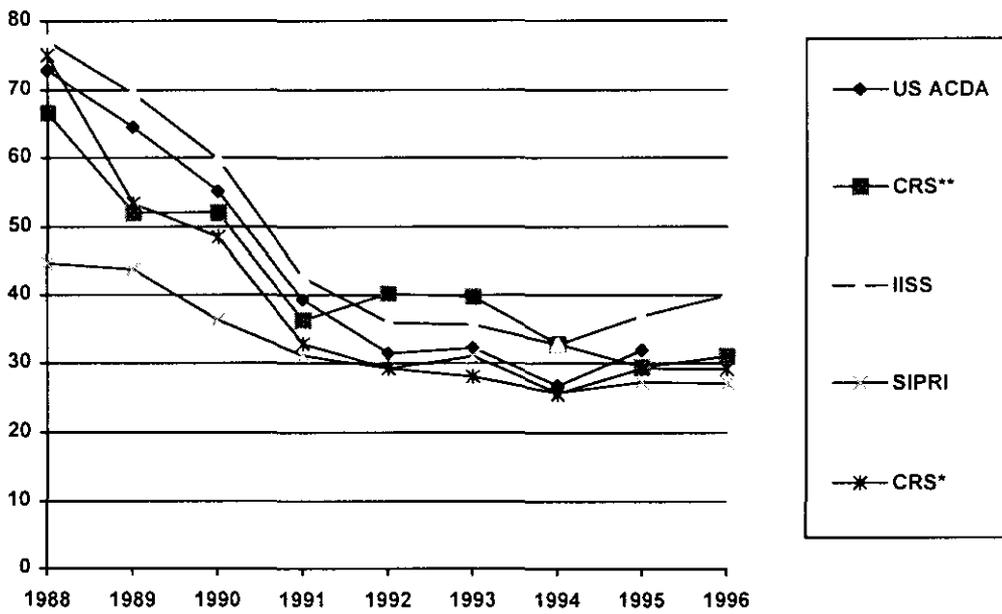


Figure 4: The rising capital cost of armed forces

Source: BICC 1997, Appendix A1 and A3

Military expenditure per soldier in 1,000 US \$ in 1996

Region	Military expenditure in billion US \$	Number of Soldiers 1,000s	Military expenditure per soldier in 1,000 US \$
World	695,040	23,620	29,4
Developing	162,160	14,570	11,1
Industrialized	532,880	9,060	58,8
NATO	443,620	4,750	93,4
ASEAN	13,720	810	16,9
CIS	15,290	2,470	6,2
Africa	14,110	2,020	7,0
Asia	180,190	11,500	15,7
South Asia	13,810	1,970	7,0
South America	8,250	930	8,9

Figure 5: Percentage of global arms exports in global military expenditures

Source: ACDA, 1997

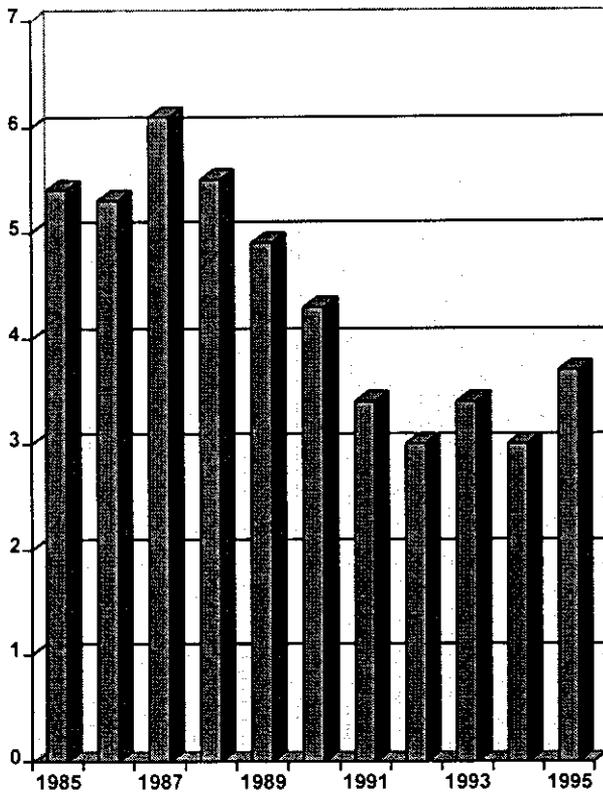


Figure 6: Share of arms exports of the major suppliers

Major conventional weapons

Sources: SIPRI Yearbooks 1996, p. 480 and 1997 p. 268

Exporter	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
6 largest suppliers	88	87	86	88	90	89	88	89	85	83	90
USA	27	28	30	28	34	49	56	52	56	43	45
USSR/Russia	43	40	38	39	35	18	12	15	4	17	20
FR Germany	3	2	3	3	5	10	6	7	11	9	6
UK	4	5	3	7	5	4	4	5	7	7	8
China	4	7	6	4	4	4	5	5	3	4	2
France	9	6	6	7	7	4	5	6	4	4	9

Figure 7: Typology of offsets in arms trade (sample of offsets)

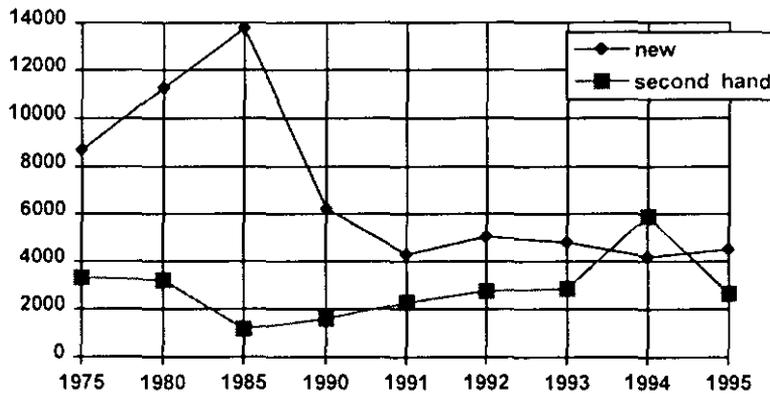
Source: GAO 1996, SIPRI, 1997

Type of recipient	recipient	supplier	direct offsets (in the defense sector)	indirect offsets (non-defense trade)
Developed countries	Spain	Germany	coproduction of 200 Leopard main battle tanks	
	Canada	USA	establishment of service center for C-130 aircraft for sale of C-130	
	UK	USA	large parts of production of US Apache attack helicopters in UK	
	Australia	Sweden	license production of 6 Type-471 submarines	
	USA	Italy	license production of 6 mine countermeasureship	
Industrializing countries	Brazil	Germany	license production of 3 Type-209/1400 submarines	
	Chile	Switzerland	license production of 120 Pirahnha armored personnel carriers	
	China	Israel	license production of air-to-air missile Python-3	
	China	Russia	delivery of production technology for Su-27 fighter	
	India	France	license production of surveillance radar	
	India	Netherlands	license production of fire control radar	
	India	South Korea	license production of off-shore patrol vessel	
	South Korea	USA	development of main battle tank K-1 ROKIT	
	Malaysia	Russia		payment in palm oil for supply of MiG 29 fighter aircraft
	Taiwan	France		civil aircraft technology supply as offset for US \$3.5 billion sale of Mirage fighters
	Taiwan	USA	repair contracts to establish regional aviation maintenance center: obligation for 150 F-16 fighters	
Less industrialized countries	Pakistan	China	license production of Anza-2 surface-to-air missile	
	Abu Dhabi	France		establishment of garment factory, offset obligation for supply of military electronics
	Saudi Arabia	USA	production of components for tanks and aircraft; obligation for weapon sales	
	UAE	USA		establishment of an off-shore investment fund by Chase Manhattan as part of defense offset obligation

Figure 8: Surplus and new weapon systems transferred, 1975-95

*Number of major weapons**

Source: BICC 1997, p. 110, based on SIPRI data



* Included are (1) aircraft, (2) armored vehicles and tanks, (3) towed, self-propelled and naval artillery with a caliber of 100 mm or more, (4) ships with a standard displacement of 100 tons or more or armed with torpedoes, missiles and/or guns of a caliber of 100 mm or more and (5) surveillance and fire control radar and guidance systems for missiles.

Appendix: Data for Figures

Data for figure 1

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Military expenditure	1015	1008	987	966	910	799	751	716	695	675
Arms trade	44,2	38,1	37,4	30,9	26,5	24,8	26,4	21,8	23,2	23
NATO equipment exp.	120,9	112,7	111,4	102,7	99,2	88,1	84,6	98,2	87,8	81,1

Data for figure 2

Saudi Arabia	8.583	China	5.870
Turkey	7.433	Greece	5.426
Egypt	7.320	South Korea	5.117
Taiwan	6.433	India	4.859
Japan	6.233	Germany	4.384

Data for figure 3:

	1988	1989	1990	1991	1992	1993	1994	1995	1996
ACDA	72,9	64,5	55,1	39,3	31,4	32,2	26,7	31,9	
CRS**	66,6	52	52	36,3	40,2	39,7	32,8	29,4	31
IISS	77,1	69,5	59,8	42,6	35,9	35,6	32,7	36,9	39,9
SIPRI	44,7	43,8	36,3	31,1	29,2	31	25,6	27,2	27
CRS*	75,1	53,3	48,5	32,8	29,2	28	25,5	29,2	29,1

Data for figure 5:

	World military expenditures	World arms exports	Share of 2 in 1, in %
1985	971.0	52,9	5,4
1986	1018.2	53,5	5,3
1987	1050.8	63,7	6,1
1988	1080.2	59,9	5,5
1989	1089.0	53,8	4,9
1990	1105.6	47,9	4,3
1991	1048.8	35,6	3,4
1992	973.8	29,2	3,0
1993	912.3	30,7	3,4
1994	878.8	26,1	3,0
1995	864.5	31,9	3,7

Data for figure 8:

	1975	1980	1985	1990	1991	1992	1993	1994	1995
surplus	3302	3219	1170	1599	2268	2760	2871	5911	2637
new	8689	11242	13768	6217	4299	5057	4800	4189	4523