

**European Defense Industries:
Politics, Structure, and Markets**

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European Defense Industries: Politics, Structure, and Markets

The European defense industries, and the role they play in the global defense market, are currently undergoing rapid mutation. Political and economic changes in Europe and the Soviet Union, while reducing tensions that have made defense cooperation necessary, have also made it increasingly difficult for NATO to function as a U.S.-European defense industrial coordinating structure. Europe may be headed toward a consolidated security and defense pole independent of the United States, despite setbacks to European integration caused by the Persian Gulf War.

European economic integration has forced significant changes in the structure and activities of European defense firms. At the same time, defense production overcapacity, falling defense budgets associated with the end of the Cold War, and shrinking defense export markets have caused a deep recession in the defense industries worldwide. These factors have catalyzed profound structural reorganization of the European defense industries. Finally, the Iraqi invasion and occupation of Kuwait and the response of the U.S.-led coalition has presented the world with much more complex security and defense industrial problems than imagined in the days following the fall of the Berlin Wall.

European firms are increasingly competitive with the United States in a wide range of defense technologies, both in terms of price and quality, and they face strong pressure to export these systems. But more important, worldwide distribution of European weapons poses considerable security problems for the United States, as demonstrated in the Persian Gulf War. In the future, U.S. defense planners will have to pay greater attention to defense against weapons produced by our allies, but used by third parties.

Changes in the European defense industries are, therefore, of considerable importance to the study of the global defense business and the challenges it presents the United States. This chapter focuses first on the security context of European armaments production, and then turns to the economic and

structural changes that affect European defense firms and how they do business.

ADJUSTMENTS TO NEW STRATEGIC AND ECONOMIC REALITIES

The decline of Soviet power in Central Europe, the unification of Germany, and the Persian Gulf War are events that could scarcely have been anticipated a short while ago. The hitherto orderly preparations for the economic integration of Western Europe into a single integrated market at the end of 1992 have been thrown into disarray by recent events. The outbreak of war with Iraq has increased concern about Germany's place in Europe, raised a new dimension of the perennial "burden sharing" issue, called into question European arms export practices, and exposed deep tensions among NATO members. A new Europe is in the process of creation, but what its ultimate form and substance will be remain clouded in the rush of events.

It appears beyond question, however, that the Warsaw Pact cannot be reconstituted as a serious menace to the security of Western Europe.¹ Thus the Soviet threat to NATO's central front, which has dominated U.S. and European strategic thinking since the end of World War II, has been virtually eliminated in the course of 1 year. This implies a series of political and economic consequences that directly affect the environment in which the European armaments industries operate.

The Conventional Forces in Europe (CFE) negotiations are scheduled to continue, and circumstances are such that both the United States and the Soviet Union may be constrained to draw down from the central front both in larger numbers and earlier than limits set by negotiation. The spreading economic and social disorganization within the Soviet Union, and the demise of Soviet-controlled regimes in Eastern Europe make it doubtful that the Soviets will be able to maintain large numbers of effective forces in Central Europe. Over 100,000 U.S. troops in the

¹On Apr. 1, 1991, the Warsaw Pact was formally dissolved.

NATO area have been transferred to the Persian Gulf, and are unlikely to return in view of the reduced Soviet threat and domestic budgetary pressures. This is likely to remain true despite the fact that U.S.-Soviet negotiations under CFE have recently been clouded by unilateral Soviet changes in previously agreed troop counting arrangements combined with a souring of bilateral relations following Soviet repression of independence movements in the Baltic republics.

Western European public support for military spending, which at least by U.S. standards has never been strong, has been low throughout most of the last decade. The current shift in the balance of power in Central Europe will put further downward pressure on Western European military budgets, as attention shifts to the social and economic challenges of European integration and dealing with the ravaged economies of Eastern Europe. By one estimate, total European defense spending will fall from \$147.4 billion in 1990 to \$145.1 billion in 1995, without considering the effect of inflation;² assuming a 5-percent rate of inflation, this comes to about \$112 billion in 1990 dollars, a 23-percent reduction.

The effect of the war with Iraq on European defense spending will probably be small, given the modest European military contribution to the coalition. Furthermore, as U.S. force allocations for NATO decline under budget pressures and the need for redeployments to meet military contingencies in Iraq and elsewhere, the "burden sharing" argument for maintaining Western European military budgets at current levels loses much force.

Germany has proposed to reduce its forces from 445,000 to 370,000 troops (including East German forces) and is set to pay the Soviets about \$7 billion for housing and other costs associated with the repatriation of Soviet forces now stationed in the former Democratic Republic. Furthermore, lack of a credible Soviet threat has eroded some support for continued involvement in the European Fighter Aircraft (EFA) consortium beyond the R&D phase, a project that had as its military justification a requirement to counter sophisticated Soviet MiG-29 fighters. In addition to costs of reunification, Germany will be thrust into the lead in regional economic rehabilitation of Eastern Europe, both to



Photo credit: General Dynamics Corp.

The NATO Stinger man-portable anti aircraft missile program, for which Dornier and Diehl are the main contractors, is supplying weapons for Germany, Belgium, Greece, Italy, the Netherlands, and Turkey. Switzerland is also producing the Stinger. General Dynamics began development of the system in the early 1970s, and it was first deployed in West Germany in 1981.

protect its extensive commercial investments and to forestall waves of immigration that would inevitably accompany economic disintegration within the region. All this will put the German budget under great strain, and the defense sector is a likely source for much of the required funds. The 1991 defense budget presented to the Bundestag reflects a 15-percent decrease from the combined Federal and former Democratic Republics.³

The French are also set for a lowering of defense expenditures in the light of a diminished Soviet threat perception. The French "Armees 2000" force rationalization plan proposed by former Defense Minister Jean-Pierre Chevenement to respond to lessening tensions calls for "a lessened rate of rise in defense appropriations, and a continued decline in troop strength." Defense spending in 1990 declined

²Giovanni de Briganti and Theresa Hitchens, "War Further Pinches European Defense Firms," *Defense News*, vol. 6, No. 6, Feb. 18, 1991, p. 15.

³"Germans Trim Budget," *Defense News*, vol. 6, No. 8, Feb. 25, 1991, p. 2.

Box 4-A—Security Arrangements in Europe

Large uncertainties about the future of NATO, in particular the political will and economic ability of the United States to continue spending hundreds of billions of dollars for European defense in the face of a rapidly receding Soviet threat, and the as yet undefined role of a reunited Germany within Europe, have given rise to much speculation about the need for new European security arrangements. Although the security interests of each European state differs in detail, the tasks facing European defense planners generally are:

- . assuring that Germany—now the strongest state on the continent—will be closely bound politically and economically to the rest of Western Europe;
- containing the threat posed by highly armed and unstable Islamic regimes spread across the North African littoral, through the Persian Gulf, and beyond;
- . bringing the newly democratic states in Eastern Europe and the Soviet Union into a more normal economic and security relationship with Western Europe.

There is as yet little agreement among the major European powers as to the priorities of these tasks and the international modalities best suited to accomplish them.

France, which appears to be most worried about the emergence of a strong and independent Germany, wishes to speed along both the economic and monetary unification of Western Europe, and involve Germany in a defense relationship centered perhaps on the European Community (EC) or a drastically modified NATO essentially under European control. In line with this policy, France has been one of the chief catalysts for sponsoring intra-European industrial and arms cooperation through the Independent European Producers Group (IEPG) and through technical cooperative programs such as BRITE, JESSI, EUCLID, etc.

For its part, Germany perceives advantage in moving quickly on economic union under the EC but at the same time has strong commercial and strategic interests in Eastern Europe and the Soviet Union. It thus appears to many Germans that activating and strengthening some European forum more inclusive than the EC, such as the now largely dormant Conference on Security and Cooperation in Europe or the Western European Union should receive high priority as well. The United Kingdom is the most reluctant of the major European powers to cede political and defense autonomy to a centralized European authority, although its fragile economy is now so dependent on the cooperation and prosperity of partners on the continent that it can only delay, but probably not decisively alter, the establishment of a new European security framework.

5 percent in real terms from 1989 levels, and perhaps 15 percent more in 1991. In fact, some members of the French parliament are now concerned that force reductions already have gone too far and that combat readiness is threatened.⁴ French troops committed to Germany will decline from 50,000 to 35,000 over the next year. However, the full measure of French feeling will not be revealed until the next defense program law debate in Parliament in October, 1991.

The British military likewise plans significant reductions in defense expenditures and troop levels. In June 1990 orders were canceled for an additional 33 Tornado aircraft and after a major defense review in August 1990 the reduction of the British Army of the Rhine to 50,000 troops in 1991 was announced. Defense budgets are set to decline in real terms, and will fall from 4 percent of gross domestic product in

1990-91 to 3.4 percent in 1993 -94.5 Defense procurement has already undergone significant trimming under Sir Peter Levene, who has cut subsidies to defense contractors, stiffened competition, and promoted defense industry consolidation. His claim is that henceforth the procurement executive is to be guided by the principle of “value for money,” although significant purchases of non-British equipment (apart from U.S. AWACS) have not yet materialized. Officials at the U.K. Ministry of Defense claim that procurement practice changes are now resulting in cost savings of about 30 percent.

The future mission and structure of NATO in post-Cold War Europe is currently under review. The general sentiment on both sides of the Atlantic is that a continued U.S. military presence in Europe would lend “stability” in a time of unprecedented

⁴Jacques Isnard, “French ‘Armees 2000’ Plan: A Difficult Balancing Act,” *Aviation Week & Space Technology*, vol. 133, No. 10, Sept. 3, 1990, p. 65.

⁵“U.K. Defense Spending To Decline Despite Gulf War,” *Aviation Week & Space Technology*, vol. 134, No. 6, Feb. 11, 1991, p. 26.

change, but it is by no means certain that NATO could be restructured to meet this new, if somewhat nebulous, mission.⁶ Two main issues will require resolution. First, while Germany has pledged itself to continue membership in NATO, it remains unclear whether the present or succeeding German governments can withstand popular demands that Germany should be cleared of nuclear weapons. This, in the view of even some strongly Atlanticist strategists, could be the final blow for NATO, at least as presently constituted.

The second and possibly more important issue concerns new goals for NATO. The United States proposed last year that NATO discuss both its reorientation to more political or social ends and coordination of its military activities with such out-of-area states as Japan. These have not met with much resonance by the Western Europeans, who in the 40-odd year history of the Alliance have resisted U.S. attempts to widen NATO's sphere of interest beyond Europe proper.⁷

While the debate between the "wideners" and "deepeners" of the various proposed loci for European security cooperation continues, the Persian Gulf War aroused the attention of Europe, and in particular France and Italy, to the threat posed by Arab nationalist and fundamentalist states armed with advanced imported weapons (see box 4-A). The uncoordinated and tentative collective response of the Western Europeans to the Persian Gulf events has pointed up the political and administrative difficulties the Europeans have in consulting on defense affairs outside Europe.

Perhaps of even greater importance is that the most dangerous weapons in the Iraqi arsenal confronting Western forces in the area—improvements in the Scud missile to strategic ranges; thousands of

Milan, HOT and Exocet missiles; top-of-the-line Mirage fighters; and sophisticated production facilities for chemical weapons—were predominantly of European provenance. Since the invasion of Kuwait, public attention to events in the Persian Gulf have been the source of an unceasing stream of revelations highly embarrassing to European governments, past and present (see box 4-B).

EUROPEAN DEFENSE INDUSTRIES IN A CLIMATE OF UNCERTAINTY

Unlike the defense markets of the United States or the Soviet Union, European defense markets are individually too small to support purely domestic defense industries.⁸ This has led to three main developments.

First, European defense firms are required to export substantial quantities of defense equipment in order to gain the production efficiencies and cost reductions that lead to affordable armaments and research and development. This strategy was successful in a time of expanding markets, as during the mid-1970s to early 1980s, but with declining demand, the extensive production capacity built up over this period can no longer be supported.

Second, the search for ways to extend production runs and fired increasingly expensive research leads to international collaboration, particularly with close political allies. In the past, the United States was the principal partner for European defense industries, but due, in part, to U.S. restrictions on the export of U.S.-originated technology, Europeans have turned to each other and to developing nations as collaboration partners (see figures 4-1 and 4-2). In general, the Europeans do not buy as much from the United States as in the past.

⁶NATO is reportedly considering a change from a forward deployment strategy to a "forward presence" strategy, in which a small number of @ @J' trained and mobile troops in either national or multinational units will be able to respond to crises. The new strategy counts on air transport to quickly shift troops and tanks into defensive positions while reserve forces are mobilized. This may be combined with national specialization on some tasks, which would reduce costs and provide political benefits for countries that find it difficult to commit front-line troops in a crisis. Michael Mechem, "Reduced Threat, Budgets Driving NATO to New Strategy as Europe Tries To Unify," *Aviation Week & Space Technology*, vol. 134, No. 11, Mar. 18, 1991, pp. 66-67.

⁷As for nonmilitary NATO activities, the U. S.-inspired Committee for the Challenges of Modern Society (NATO CCMS), which sponsors projects ranging from health care to environmental protection, remains rather a side-show, and is sometimes criticized for infringing on matters best left to nonmilitary international organizations, such as the Organization for Economic Cooperation and Development (OECD).

⁸For example, fighter and attack aircraft production becomes profitable only after over 600 planes have been built, due to the time required to learn to build them (learning curve) and the associated economies of scale. At the same time, European countries, even the largest, have requirements for much smaller quantities. For example, in the European Tornado attack airplane consortium, the United Kingdom maintains in its current arsenal only 310, Germany 326, and Italy 97 airplanes. Similar numbers obtain for other collaborative aircraft projects, such as the European Fighter Aircraft (EFA). In the same vein, the French Air Force has only 246 of approximately 670 Mirage F-1s produced through 1986, while the rest were exported to at least 10 foreign countries.

Box 4-B—European Arms Sales to Iraq

Revelations of the nature and extent of German industrial involvement in developing Iraqi capability to produce weapons of mass destruction have provoked wide public comment. Over 80 German firms, including such respected enterprises as MBB and Karl Zeiss, have been implicated as suppliers for Iraqi unconventional weapons capability. The Karl Kolb firm has been identified as the principal contractor for the Iraqi nerve gas plant at Samara, perhaps the largest in the world. Beyond the exposure of extreme German laxity in the enforcement of its export controls, evidence has emerged that governmental assistance was provided for some of the most dangerous technology exports to Iraq, such as the compressors used to improve the range of the Scud missile.¹

With \$3 billion in sales for such items as Mirage fighters and Exocet missiles, the French have been the most prominent western supplier of complete weapons systems to Iraq. The Iraqi invasion of Kuwait provoked something of a crisis in the French Government, eventually leading to the dismissal of Defense Minister Jean-Pierre Chevenement, a founding member of a French-Iraqi friendship society. Before leaving government, Chevenement provided an interesting historical sidelight on the sale of the Osirak reactor to Iraq, which the French had steadfastly declared to be solely capable of nuclear research. Referring to the former prime minister at the time of the sale, Chevenement declared: "Let Mr. Chirac be asked about the circumstances in which he authorized a certain number of big contracts, including the nuclear one in 1975."²

Besides France and Germany, other European countries shown to have made significant weapons or strategic technology sales to Iraq include Italy, Spain, Greece, and Austria. Thus far, only Austria—which sold 200 artillery pieces to Iraq that may well be superior to any in the coalition arsenal—appears to have launched a full-fledged investigation of possible misconduct by top government and industry officials.³ The leadership of other European governments have been less forthcoming on the issue to date. While the Kohl administration has offered Israel \$300 million, presumably in reparation for damages caused by Scud attacks, it has been essentially silent on the government's role in arming Iraq.⁴ French President Mitterrand seems to have attempted to convert previous arms sales to Iraq into an asset, noting that these "add moral weight to France's entry into the coalition. The ambiguous French position in the coalition has been highlighted by such incidents as its support of Iranian cease-fire initiatives, limitation of French air strikes to Kuwait, and delays in providing the United States with information on French arms sales to Iraq. In contrast, President Gorbachev has issued a frank apology for the Soviet arms supply to Iraq, which in retrospect appears to have been considerably more discriminating than the Europeans concerning strategic and nonconventional weapons.

¹The West German firm *Havert* received \$1 million in Hermes export guarantees for the compressor. See Marc Fisher, "Germany Pledges \$5.5 Billion More Toward Gulf War," *The Washington Post*, Jan. 30, 1991, p. A23. West German officials claim that Hermes is a self-financed, private insurance operation. However, as with Export-Import Bank guarantees, the insurer of last resort is the government.

²Cited in "French Minister's Stand On War Draws Criticism," *The Washington Post*, Jan. 24, 1991, p. A30. France and the United States, among others, voted for the U.N. resolution condemning Israel for destroying the reactor in 1981.

³The Austrians already had under investigation illegal sales of the same artillery to Iran, produced by the state-owned *Voest* company. Officials indicted include former chancellor *Fred Sinowatz*. See "Austrians Convicted of Arms Sales to Iran," *The Washington Post*, Feb. 2, 1991, p. A14.

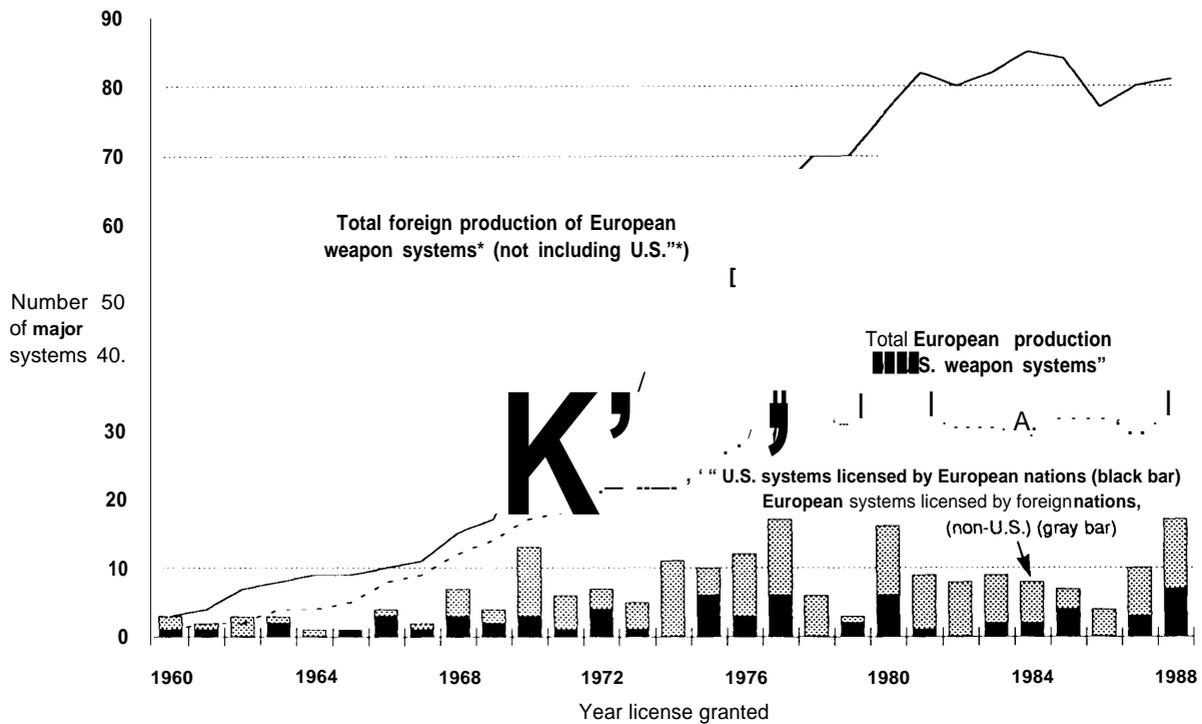
⁴Note, for example, statements of top Kohl intelligence adviser *Bauenschlager* and former Economics Minister *Lambsdorff*, "Frontline" broadcast, Public Broadcasting Service, Feb. 7, 1991. Both underscore that the German Government acted correctly in granting export licenses for dual-use technology, despite persistent news reports and official U.S. and Israeli warnings that these exports were destined for the Iraqi war machine.

However, despite the requirement for collaboration to make defense equipment affordable, European nations wish to maintain as much as possible their own defense industries, both to assure themselves access to defense technology for national security and for domestic industrial and trade reasons. The solution, developed over several decades, is that countries permit their defense firms to collaborate on specific projects and work out details

of workshares and production to a highly refined degree.

Finally, in the major European defense industrial countries, France, Great Britain, Germany, and Italy, overcapacity so far has not caused defense firms to engage in extensive translational mergers or acquisitions. Industry consolidation and reorganization has taken place for the most part within countries, and has resulted in the creation of de facto defense

Figure 4-1—Estimated Licensed Production of Major Conventional Weapon Systems in and from Europe, 1960-88



* Estimates based on the assumption that an average system is produced under license for 12 years.

** U.S. production of European systems is negligible: only 7 systems produced from 1965 to 1987.

SOURCE: Office of Technology Assessment, from data in Stockholm International Peace Research Institute, SIPRI Yearbooks, 1970 through 1990, *World Armaments and Disarmament*.

industrial monopolies.⁹ Defense companies in the other European countries have taken subcontracting roles or have been acquired by defense firms in the major defense industrial countries, such as France's GIAT Industries purchase of Fabrique Nationale, the Belgian gun manufacturer.

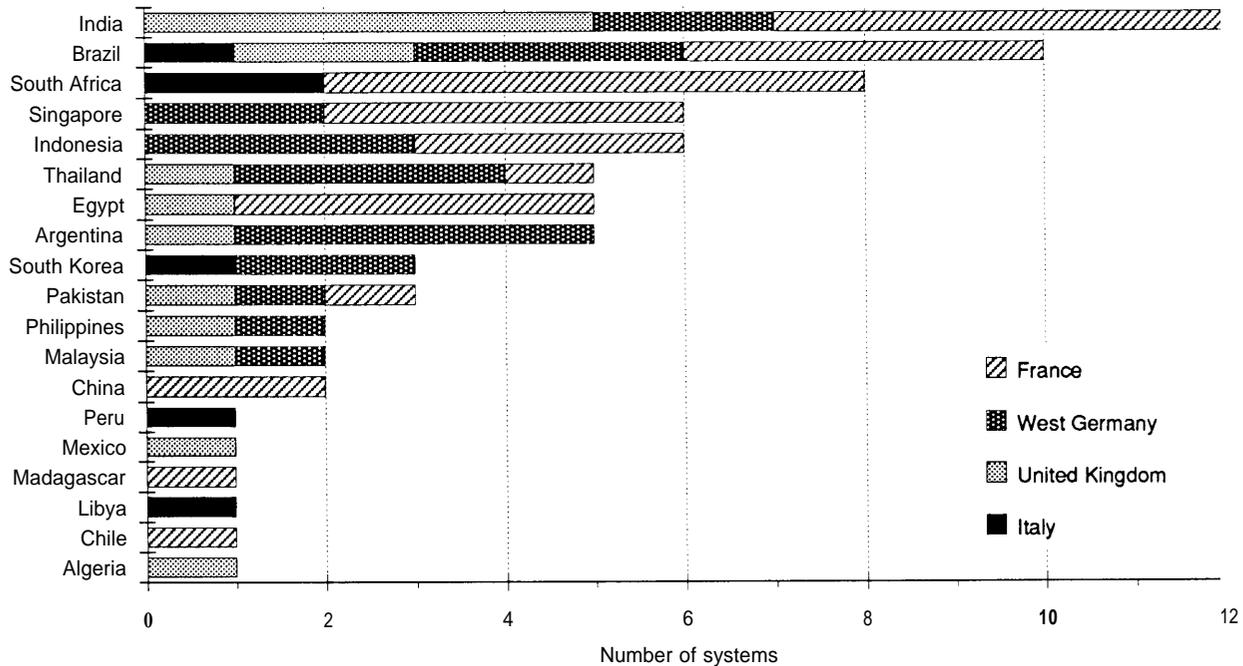
European defense suppliers currently operate in an atmosphere in which very little can be confidently predicted. Their production and research structures, domestic and export markets, profits and employment are intimately connected to the decisions of governments groping to adjust to the new political and economic realities. The European defense market, already small by U.S. standards, appears destined to shrink still further, and R&D investments necessary to field competitive new weapons systems will become ever more costly.

Consequently, military procurements, at least on the weapons system level, both in the United States

and NATO Europe are tending increasingly towards domestic suppliers (see table 4-1). The Europeans have long believed that the U.S. direct procurement market is essentially closed, and the only way it can be penetrated is at the industrial level by means of joint ventures or acquisition of U.S. defense firms (see table 1-1 inch. 1). The major European supplier nations have achieved high levels of autonomy in arms procurements by domestic production and intra-European teaming. Furthermore, it appears that the principal defense industrial countries of Europe have targeted the smaller defense producing countries, such as the original F-16 countries (Denmark, Belgium, the Netherlands, and Norway) —the only remaining U.S. market in Europe for complete systems. The sales of U.S. components may also be affected, as suggested by the proposed European Commission directive for a tariff on defense components.

⁹Andrew Moravcsik, "The European Armaments Industry at the Crossroads," *Survival*, vol. 32, No. 1, January/February 1990, p. 69.

Figure 4-2-Licensed Production of European Major Conventional Weapon Systems by Developing Countries, 1960-88



SOURCE: Office of Technology Assessment, from data in Stockholm International Peace Research Institute, SIPRI Yearbooks, 1970 through 1990, *World Armaments and Disarmament*.

Complicating the problems for the European arms manufacturers is that exports, on which the Europeans rely to a much greater extent than U.S. producers, have become much more difficult (see figure 4-3). Saturation, developing nations' debt, lower OPEC revenues, and competition from newly industrialized countries have combined to lower European export performance. European arms exports reached a 10-year low in 1989.

In addition, the Europeans perceive additional threats to their traditional export markets from the Soviets and the Eastern Europeans, who desperately need hard currency and who have large surplus weapons stocks and weapons production overcapacity. Beyond these factors, European arms suppliers believe that U.S. producers will compete fiercely for shrinking markets. The war with Iraq, however, may provide fresh opportunities for increased sales to the Middle East, absent agreement among major arms suppliers on sales to the region.¹⁰ Efforts to promote

such arms control agreements are at very early stages, but several countries, such as Germany, have tightened their national export control systems. It remains to be seen whether more comprehensive agreements will be forged.

REORGANIZATION FOR SURVIVAL: NATIONAL CHAMPIONS AND MULTINATIONAL CONSORTIA

Increasing reliance on domestic suppliers has created substantial overcapacity in defense industrial production. The question that faces European governments and industry is how to organize, on a national and multilateral basis, so that arms suppliers are provided some cushion against severe market uncertainties and to insure that Europe retains a competitive defense industrial base. The spate of mergers, take-overs, stock-swaps, teaming arrange-

¹⁰The decisions of European governments participating in the coalition against Iraq may be seen at least partially motivated to protect current arms markets or create new ones. The United Kingdom's early and staunch lineup in the coalition parallels its interests in Saudi Arabia as the prime customer for British arms exports. The initial French refusal to bomb strategic targets in Iraq may have been prompted by hopes to retain its privileged position as weapons exporter to post-war Iraq, and its more recent tilt towards Iran may reflect interest in cultivating further potential arms buyers.

Table 4-1—Major Weapons Procurement Sources in the Major European Defense Industrial Nations, 1985-89 (percent)

Country	Domestic	Codevelopment	Coproduction	Imports
France	80%	15%	0%	5%
United Kingdom	75	15	0	10
West Germany	45	25	20	10

SOURCE: Andrew Moravcsik, "The European Armaments Industry at the Crossroads," *Survival*, vol. 32, No. 1, January/February 1990, p. 66.



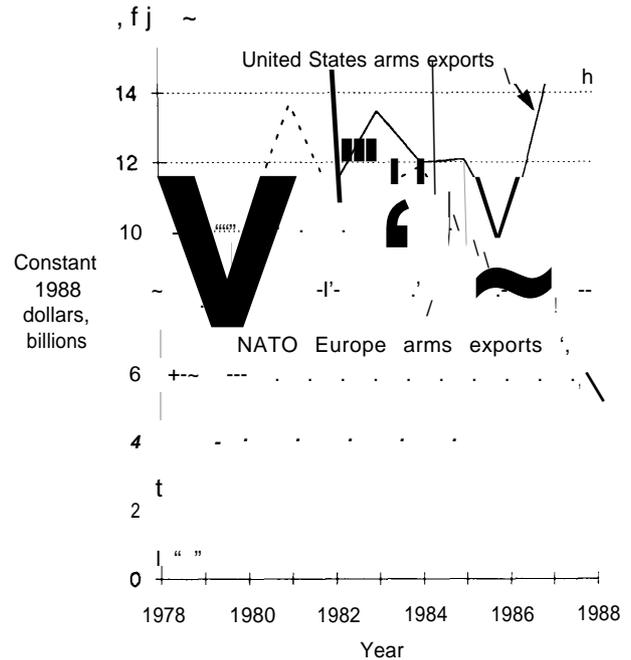
Photo credit: General Dynamics Corp.

Since the mid-1970s, General Dynamics' F-16 Fighting Falcon has been produced in Belgium, the Netherlands, Denmark, Norway, and Turkey, the so-called "F-16 countries."

ments and other forms of alliance that has swept the European defense industries in the past several years has been in response to the overcapacity problem. While the process might appear superficially somewhat chaotic, the overall trends have been carefully guided by governments in the major arms producing states, and reflect their long-standing economic and defense priorities (see box 4-C).

The major suppliers—France, Germany, and the United Kingdom—are the only nations in Europe that possess the industrial, research, and financial capacity needed to produce a broad array of complete weapons systems. The policies of these countries dominate the overall arms production situation in Europe and will determine its future size and shape. Italy stands in a somewhat half-way position.

Figure 4-3—NATO Europe and U.S. Arms Exports, 1978-88



SOURCE: Office of Technology Assessment, from data in U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1989* (Washington, DC: U.S. Government Printing Office, 1990).

It has industries that can serve as prime contractor in only one weapon system (helicopters) and one major subsystem (electronics). The other Western European states lag behind.

The mergers that have occurred tend to consolidate at the national level those portions of the arms industry that governments perceive as both essential to their survival as major weapons producers and integral to their overall economic development plans. These industries are aerospace, missiles, and defense electronics, and are closely associated with the "sunrise" civilian industries (i.e., civil craft and engines, space satellites, telecommunications, computers, and electronics) that also have been fostered by governments. The defense and associated civil sector industries are usually merged in a

Box 4-C—European Defense Industrial Restructuring

Strategy	Examples
Internal reorganization	Fiat (Italy) subsidiaries Gilardini and SNIA-BPG, which each had some defense work, restructured to put all Fiat defense activities in one entity.
Refocusing on main business	Philips (Netherlands) has sold off its defense subsidiaries, thereby leaving defense.
Cross-equity participation	General Electric Co, (U.K.), Daimler-Benz (Germany), and Wallenberg (Sweden) have each separately exchanged a small percentage of shares with Matra (France), in order to promote both high-level consultation on collaborative ventures and some technology sharing.
Taking over to diversify	Daimler-Benz (Germany) takeover of Dornier, MTU, AEG, and MBB (all Germany), and their consolidation into Deutsche Aerospace (DASA), British Aerospace (U.K.) acquisition of Rover, Royal Ordnance, Ballast Nedham, Arlington Securities (all U.K.), and numerous other British firms.
Creation of new company	British Aerospace and Thomson-CSF (France) may merge their guided missile businesses in Eurodynamics. Thomson-CSF general avionics business combined with Crouzet, Sfena, and Electronique Aerospatiale (all France) into new company called Sextant.
Strategic alliances	British Aerospace (BAe) and General Dynamics (GD) (U. S.) have made long-term commitments, including BAe's recent failed effort to sell GD's M1A2 tanks to the British military. United Technologies Corp. (UTC) (U. S.) and Daimler-Benz have formed a strategic alliance, one aspect of which is a new jet engine to be developed by UTC's Pratt & Whitney and Daimler's MTU.
Internationalization	Eurocopter (Aerospatiale and DASA); Eurodynamics (Thomson and British Aerospace merger of their respective missile businesses).
Multinational consortia	Panavia produces the Tornado attack jet (U. K., West Germany, Italy). Eurofighter is developing the European Fighter Aircraft (U. K., West Germany, Italy, Spain).

large conglomerate or “national champion,” although mergers with unrelated industries take place as well. Such organizations generally hold the monopoly on national defense business in their sectors.

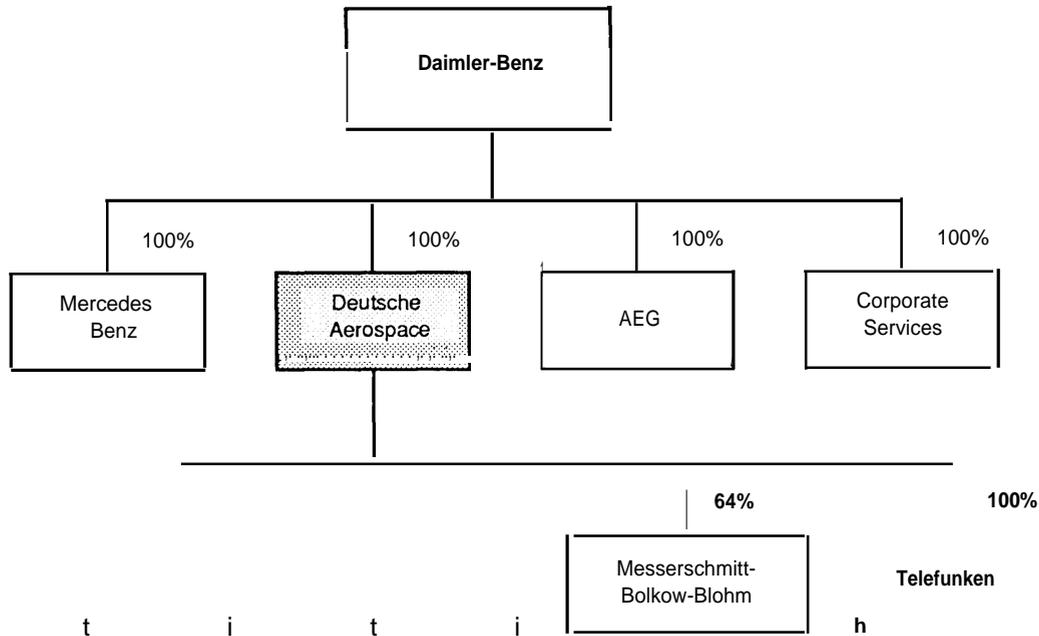
The process of consolidation is typified by recent mergers in the German aerospace industry. Messerschmitt-Bolkow-Blohm (MBB), itself a product of previous mergers, was united with Dornier to form Deutsche Aerospace, which was then united with the auto giant Daimler-Benz. The new conglomerate now covers all of the German civil and defense effort in space, aircraft, and missiles¹¹ (see figure 4-4). The

equivalent U.K. national champion is British Aerospace, which is also associated with an auto producer, Rover, and which recently acquired the armaments producer Royal Ordnance. France still has two defense aircraft producers, Aerospatiale and Dassault, an independent missile producer, Matra and a major defense electronics firm, Thompson-CSF. Many observers expect that Dassault, currently short of orders and under serious financial pressure, will soon be folded into Aerospatiale, the state-held aerospace firm (see table 4-2).

The rush towards national defense industrial consolidation was provoked by the realization that

¹¹The creation of Deutsche Aerospace was declared illegal by West German courts on antimonopoly grounds, but this ruling was subsequently overturned by the Economics Ministry. At the same time, the government ordered MBB to divest itself of its small naval defense activities, a move widely considered a sop to public opinion. Several German observers have noted to OTA privately that the government was particularly anxious to consummate the merger with Daimler-Benz to remove from the federal budget the subsidies paid to MBB for its participation in the Airbus consortium.

Figure 4-4-Daimler Benz Organization Chart, 1990



Percentages indicate portion owned by Daimler-Benz

SOURCE: Messerschmitt-Bolkow-Blohm.

Table 4-2—Principal European Defense Firms, 1990

Country	Aircraft	Tanks	Missiles	Electronics
France	Dassault Aerospatiale	GIAT	Matra Aerospatiale	Thomson-CSF
United Kingdom	British Aerospace	Vickers	British Aerospace	General Electric (U. K.)
Federal Republic of Germany	Daimler Benz/MBB	Krauss- Maffei	Daimler Benz/MBB	Siemens

SOURCE: Office of Technology Assessment, 1991.

for the foreseeable future, the European domestic market was too small to permit all-out competition among prime contractors at either the national or European level. Intra-European teaming among national champions thus became the safest and preferred route to produce new major weapons systems. To be considered a national champion at least two conditions must be met:

1. the organization must possess sufficient technological and financial depth to attract partners, and
2. must be able to offer these partners markets not otherwise available to them.

National champions meet these conditions by combining the relevant R&D resources, adding

financial stability through association with a large civilian sector industry, and providing entree to its domestic defense market, and possibly foreign markets as well.

These national champions become the participants in European-based defense consortia such as Panavia, Eurofighter, Euromissile, Eurocopter, etc. (see table 4-3). In a typical project, workshares for each country are apportioned according to how much of the final product each country intends to purchase. For example, in the Panavia consortium, which produces Tornado attack airplanes, the United Kingdom has 48 percent, Germany has 40 percent and Italy has 12 percent of the workshares, with each country obligated to purchase an equivalent percentage of a 900 aircraft production run. EFA is similarly

Table 4-3--Selected European Defense Industrial Consortia and Joint Ventures

Consortium/Weapon System Project description	Firms (percent control)	Countries
Alpha Jet	Dassault (50)	France
	Dornier (50)	West Germany
EHI	Agusta (50)	Italy
Antisubmarine warfare helicopter	Westland (50)	United Kingdom
Eurocopter	MBB (50)	West Germany
Antitank helicopter	Aerospatiale (50)	France
Eurofighter	MBB (33)	West Germany
Tactical fighter	British Aerospace (33)	United Kingdom
	Aeritalia (21)	Italy
	CASA (13)	Spain
Euroflag	Aerospatiale	France
Tactical transport study	British Aerospace	United Kingdom
	MBB	West Germany
	Aeritalia	Italy
	CASA	Spain
JEH	Agusta (38)	Italy
Multirole light attack helicopter study	Westland (38)	United Kingdom
	Fokker (19)	Netherlands
	CASA (5)	Spain
NH 90	Aerospatiale (35)	France
NATO frigate helicopter	MBB (35)	West Germany
	Agusta (25)	Italy
	Fokker (5)	Netherlands
Panavia	British Aerospace (48)	United Kingdom
Tornado attack aircraft	MBB (40)	West Germany
	Aeritalia (12)	Italy
Sepecat	British Aerospace	United Kingdom
Jaguar strike aircraft	Dassault	France
Euromissile	Aerospatiale	France
HOT antitank missile	MBB	West Germany
Milan antitank missile		
ANS antiship missile		
Roland mobile antiaircraft weapon system		
Air-launched antiship missile		
OTOMAT antiship missile	OTO Melara	Italy
	Matra	France
Dragon	Thomson-CSF	France
Twin gun antiaircraft gun system	Thyssen	West Germany
Seaguard	Contraves	Switzerland
Close In Weapon System	Oerlikon	Switzerland
	Plessey	United Kingdom
	British Manufacturing & Research	United Kingdom
Martel	British Aerospace	United Kingdom
Air-to-surface missile	Matra	France
Apache	MBB	West Germany
Container weapon system	Matra	France
Mobidic	Aerospatiale	France
Modular stand-off weapon	Dornier	West Germany
	Thomson-Brandt	France
	Diehl	West Germany
Short Range Stand-Off Missile (SRSOM)	Dornier	West Germany
	Aerospatiale	France
	Thomson-Brandt	France
	Diehl	West Germany
ANIUSD-502	Canadak	Canada
Reconnaissance drone	Dornier	West Germany
	SAT	France
Brevel	MBB	West Germany
	Matra	France
Advanced Short Range Air-to-Air Missile (ASRAAM)	British Aerospace	United Kingdom
	Bodenseewerk	West Germany

SOURCE: Office of Technology Assessment, from data in Jane's *All the World's Aircraft, 1990-91*, 81st ed. (Surrey: Jane's Information Group Ltd., 1988).



Photo credit: U.S. Department of Defense

The French Mirage 2000 is flown by the air forces of Abu Dhabi, Egypt, India, Peru, and Greece. France generally does not cooperate in European or U.S. fighter programs; it has decided to build its own fighter, the Rafale, now under development.

structured, with the United Kingdom and Germany each receiving 33 percent of the workshares, while Italy receives 21 percent and Spain, a relative newcomer to European collaborative efforts, will receive 13 percent. Each nation produces certain portions of the aircraft, but all have their own final assembly lines. This redundancy is claimed to increase total unit cost by less than 10 percent, and is considered an acceptable cost for maintaining an important domestic defense industrial capability.

Once the hurdles of project definition and initial set-up are passed, this mode of organizing appears to work reasonably well. However, there are difficulties. Because domestic employment and balance of payment considerations rank high with each national participant, workshares are subject to intense scrutiny (down to two decimal places in the case of Tornado) and force costly and artificial modifications in production plans.

A more serious problem for consortia arises in export marketing. As a practical matter, the participating country that is designated “project leader” retains control over exports, where prices and profits are much higher than for units purchased domestically. Such “excess profits” are not shared among consortium members, a situation that rankled other Tornado participants when British Aerospace reaped a \$14 billion windfall return with its defense equipment sales to Saudi Arabia. French withdrawal from the EFA consortium, while ostensibly over differences with other members on mission and design parameters, was in essence prompted by

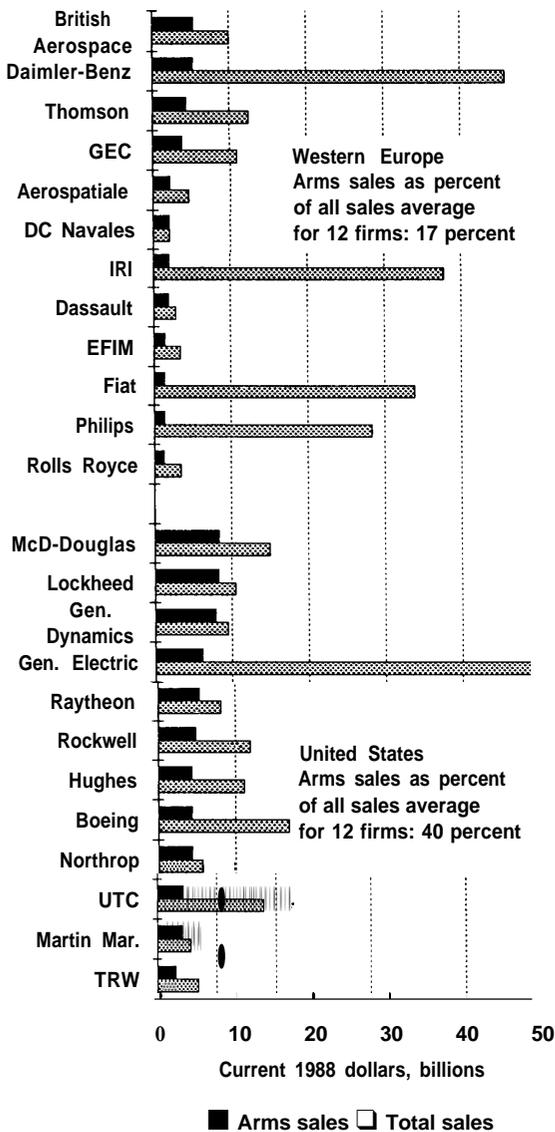
rivalry with the United Kingdom on project leader designation and export profit potential. The French decision to press ahead with its own indigenously produced lightweight export-oriented fighter Rafale has not yet produced the sales results anticipated.

While intra-European alliances among defense suppliers are intense and complex, and bear a resemblance to the phenomenon of global industrialization, there is not yet such a thing as a truly multinational defense producer. The relationships between the national governments and their defense industries are much stronger and more permanent than the ties between the industries themselves. The national governments in the United Kingdom, France, and Germany subsidize their industries both directly and through preferred defense procurements, are active in promoting their industries’ exports, and in many cases own stock in their defense companies. A brisk movement of managers between the national procurement executive and the defense industries is not only tolerated but actually encouraged: as one French Ministry of Defense official put it, “we have a revolving door and are proud of it.” The differences in government-industry relationships between “free trade” Britain and “statist” France seem more a question of style rather than substance. They are more alike than industry-government relationships obtaining in the United States, where the government encourages competition among domestic suppliers, controls much more closely their exports, has no industrial proprietary interests, and discourages revolving door practices.

The net result of the restructuring that has occurred thus far makes the European arms suppliers more like their U.S. counterparts in terms of size (see figure 4-5). However, the dissimilarity between U.S. and European prime contractors has become more pronounced with regard to the amount of defense work as a proportion of overall activities: most of the major European suppliers fall well below the 60 to 80 percent range common for the U.S. primes.

The mergers at the European prime contractor level appear not to have substantially reduced employment in the concerned industries. The real trimming down appears to be occurring at the subcontractor level, as the primes take on more self-subcontracting. The European firms that seem to be in the most trouble are the small and medium-sized organizations heavily dependent on

Figure 4-5-Sales of 12 Largest Western European and U.S. Defense; Firms, 1988 “



SOURCE: Office of Technology Assessment, from data in Stockholm International Peace Research Institute, SIPRI Yearbook 1990, World Armaments and Disarmament (Oxford: Oxford University Press, 1990), pp. 326-328.

defense contracts that, through weakness in technology or financing, are unable to attract teaming partners. The problems these small firms face are remarkably similar on both sides of the Atlantic:

- dependence on one or a small number of buyers,
- concentration on military technologies,

- emphasis on military specifications in design and production,
- difficulties in adapting to commercial production (due to company culture and marketing practices), and
- lack of government support for finding new markets or development of new products.

Sometimes national laws work against the survival of these small and troubled firms. In Germany, for instance, regulations on thresholds for union organization make it extremely difficult for firms with more than 15 employees to reduce employment. The only alternative for such firms, in the face of declining sales, is to go out of business. In turn, the regulatory environment has created a niche for extremely small firms, of 14 employees or less, which can be more flexible in adapting to market fluctuations but are less able to market products or arrange financing.

The Trimming of European defense production surplus capacity is occurring at different rates in the various defense sectors. The aerospace and electronics sectors have thus far been spared major cuts. This is due to their close association with the civil industries that European governments wish to promote, the greater possibility for export sales, and their adaptability to meet new defense requirements, such as disarmament monitoring. On the other hand, the more traditional defense industries—armor, artillery, munitions, and naval construction—appear slated for much sharper paring.¹²

The conversion record of European defense industries to civilian purposes appears to offer few outstanding success stories. Selenia, a major Italian electronics firm, reports it was able to capitalize on its experience in defense air traffic management to win major contracts for civil air traffic control installations. Beyond this rather obvious example, other defense industry representatives express considerable reservations about an easy direct conversion from defense to civilian work, emphasizing the differences in standards, quality control, quantities of production, and marketing practices.

However, since none of the major prime contractors are predominantly reliant on defense work, and the compartmentalization of defense and civilian operations of these organizations is not as strict as in the United States, the chances for civil conversion

¹²de Briganti and Hitchens, op. cit., footnote 2, pp. 15, 30.

seems greater in European industries. A Deutsche Aerospace representative noted, for example, the possibilities for synergy with Daimler-Benz autos in the area of advanced controls display. This type of cooperation between General Motors and Hughes Aircraft would be much more difficult to arrange. In general, European companies aim toward a gradual migration of personnel from defense to the civilian divisions within the same industrial organization, as job opportunities arise.

U.S.-EUROPEAN ARMAMENTS RELATIONS IN THE POST-COLD WAR ERA

The collapse of the Warsaw Pact threat and the inception of the war against Iraq may lay the basis for shifting the focus of the transatlantic dialogue from preparation for a common defense to controlling arms exports. Some of the sharpest and most hotly contested issues developed within the NATO Alliance over the past 20 years concerned questions of arms sales, technology transfer, standardization, interoperability, and the numbers, types, and quality of conventional weapons systems deployed. The United States urged its Western European partners towards greater standardization and interoperability of weapons and larger front line deployments of armor, artillery, and munitions.

In return, the Europeans complained of excessive and unwarranted U.S. demands for conventional armaments and the imbalance in the “two-way street” of arms sales between the United States and Europe. However, discussion of these issues usually could be contained within a relatively small circle of Allied military leaders, their parliamentary counterparts, and the NATO bureaucracy, all of whom had strong professional and institutional interests in avoiding public debates over the basic purposes of the Alliance.

With the Warsaw Pact threat receding and the dangers of uncontrolled arms exports much in evidence, it becomes clearer that conventional armaments policies reflect fundamental differences between the United States and the Europeans, not only in the military sphere but the economic sphere as well. U.S. participation in NATO was, in the main, directed by strategic and military considerations. U.S. military and political leaders believed the threat of Warsaw Pact conventional attack was real

and imminent, and that countering it required a credible NATO conventional defense.

The Europeans, on the other hand, and particularly the West Germans, saw little difference between a devastating conventional conflict fought on their soil and nuclear war and, further, that a fully conventionally armed NATO might induce the Soviets to believe that a conventional attack might be fought in Europe without escalation to a nuclear exchange. Thus, on purely geostrategic grounds, there was a sharp difference between U.S. and Western European policy regarding conventional armaments.

For the first three decades of NATO's existence, the Europeans felt themselves to be lagging behind the United States in both military and civil technology development. The Europeans believed the path to regaining material prosperity was through capturing international markets for manufactured goods, particularly in the high-tech area. In most European NATO countries, some form of concerted action by government and industry was undertaken to catch up. European insistence on licensing and coproduction, rather than purchase, of U.S. weapons systems beginning in the 1960s was an important facet of the strategy of tapping into leading edge U.S. technologies for the purpose of creating a high-tech industrial base that could eventually compete with the United States in both civil and military markets (see figure 4-1).

The German aerospace industry in the Munich area provides an object lesson in how well this strategy has succeeded. The industry was reconstituted there primarily through licensing and coproduction of the F-104 Starfighter. Building on this experience, the industry later was able to participate in production of the all-European Tornado, which successfully competed with U.S. fighter-bombers in both NATO and third-country markets. Presently, the industry, now consolidated into the industrial giant Daimler-Benz-Deutsche Aerospace, is a major partner in the development of the European Fighter Aircraft (EFA), another competitor to present and future U.S. military aircraft. A number of the key personnel now heading the EFA project in Munich had their professional apprenticeships on the F-104 project, living tributes to the durability of German industrial strategy in the aerospace industry. Furthermore, the civil side of the aerospace market was not neglected. Daimler-Benz-MBB is also a major

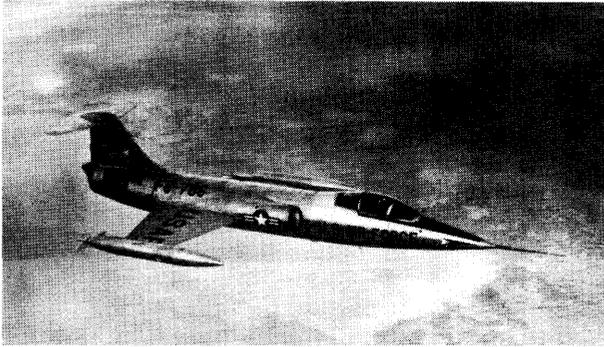


Photo credit: U.S. Air Force

The Lockheed F-104G Starfighter overcame many of the problems that plagued earlier models, and was a hit with many air forces, though not the U.S. Air Force. It was license-produced and flown in Japan, West Germany, Canada, Belgium, Italy, and the Netherlands, and contributed substantially to the development of the military aircraft industries in those countries, especially Japan, West Germany, and Italy.

participant in the Airbus series development and production. While this aircraft is still heavily subsidized, and long the subject of civil trade disputes between the United States and Europe, it has managed to capture 25 percent of the former U.S. world monopoly on wide-body civil aircraft.

Thus, the policies of the major European arms suppliers (France, the United Kingdom, and Germany account for over 80 percent of West European production) may be characterized as primarily oriented by economic rather than strategic considerations. The disputes between the United States and Western Europe over NATO armaments can be seen to be the fruits of a mutual misreading of the partners' national strategies and aspirations. The U.S. demands for greater interoperability, standardization, and even cost effectiveness of NATO weapons systems were seen by the Europeans as an attempt to capitalize on the much greater American investment in military technology and the cost advantage of longer domestic production runs to promote U.S. arms exports to Europe.

Likewise, American insistence on greater European investment in armor, artillery, and munitions appeared to the Europeans as an attempt to force the European arms industry into the lower tech, less exportable, and less dual-use capable end of the production spectrum. The continuing disputes in the Coordinating Committee (CoCom) over exports of dual-use technologies, and U.S. controls over reex-

ports of licensed technology to Europe was interpreted by many Europeans as motivated largely for U.S. economic advantage, as such controls inhibited the ability of European contractors to develop weapon systems, which of necessity relied on some U.S. subsystems or components. Though it has taken some time, Western European arms manufacturers are increasingly turning away from U.S. suppliers and are dealing with each other, to avoid entanglement in U.S. arms export regulations.

Thus, the role of NATO in coordinating and guiding armaments development and production among member nations has steadily diminished. European unwillingness to cede NATO any real influence in armaments decisions is reflected in the coordinated front they present in the Eurogroup, increased activity within the IEPG, and by the numerous European-only, project-specific industrial ventures and alliances. The official NATO approval of a new European weapons proposal is expected only as an acknowledgment of a fait accompli. As an example, when asked what benefit the EFA derived from its NATO designation, a top management official responded that it provided a means for tax-free salaries for scarce engineering talent. Another example of the prevailing European attitude is the remark of a French adviser to the NATO Conference of National Armaments Directors (CNAD): asked about the role of CNAD, he responded that it cannot function as a "top down" organization, and that its chief benefit is in organizing numerous Working Groups, which provide opportunities for



Photo credit: U.S. Department of Defense

The Panavia Tornado program involves the United Kingdom, the Federal Republic of Germany, and Italy. It was a pioneering program in European military aerospace, and built on earlier Lockheed F-104 Starfighter licensed production.

informal discussions among experts and manufacturers similar to those provided by weapons trade expositions. The failure of the Alliance to develop significant cooperative projects, despite the considerable financial stimulus offered by the 1986 Nunn Amendment, is perhaps the most conclusive proof that NATO's ability to foster transatlantic armaments cooperation has passed.

However, the failure of NATO to serve as an effective umbrella organization for European defense industrial activity does not mean that European defense industries do not thrive. On the contrary, a great deal of defense industrial development takes place, for the most part within each country on a company-to-company basis as noted above.

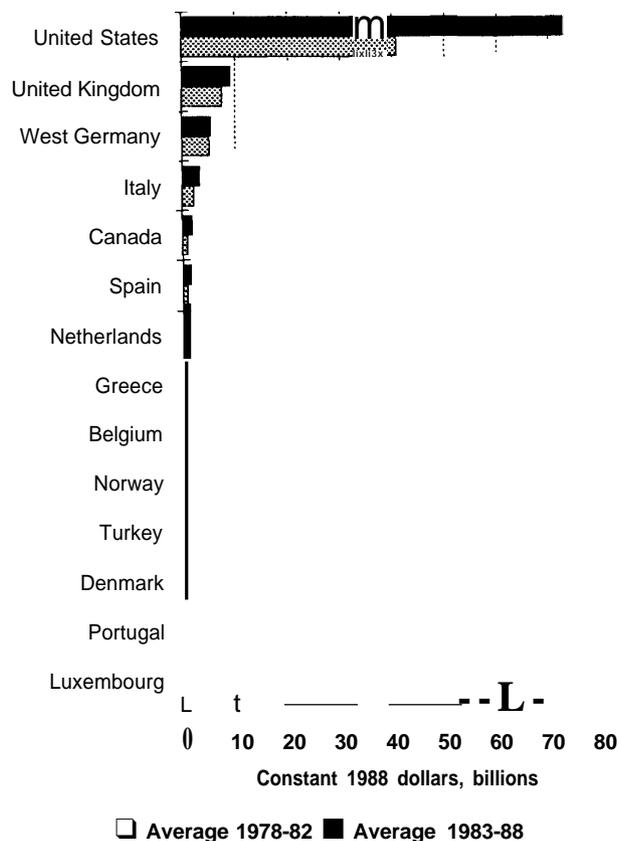
TRANSATLANTIC DEFENSE INDUSTRIAL ISSUES FOR THE 1990s

The United States and Europe present different strengths and weaknesses as they enter the post-Cold War era. At present the United States still leads Europe in its ability to design and produce the highly sophisticated weapons systems desired by third-country customers. The United States starts with a nearly three-to-one advantage over Europe in military R&D spending. In addition, Department of Defense (DoD) procurement is nearly three times that of the combined domestic procurements of Western Europe, insuring for U.S. producers a significant edge in terms of economies of scale over European competitors (see figure 4-6). It is not surprising that the United States, with an average of \$15 billion in arms exports annually, is the single largest Western arms exporter.

However, until the downturn in European arms exports, which occurred after the end of the Iran-Iraq war in 1986, combined Western European arms exports approached and even exceeded U.S. levels (see figure 4-3 above).

Due to the radical restructuring of European defense industries, underway since the mid-1980s, the major European defense industrial nations are now collectively in a better condition than their U.S. counterparts to withstand the economic and technological challenges of the 1990s. Almost all the European prime contractors are now embedded within large industrial conglomerates whose mar-

Figure 4-8-NATO* Procurement Expenditures, 1978-82 and 1983-88



* Not including France

SOURCE: Office of Technology Assessment, 1991.

kets are predominantly in the civilian sector, thus providing a financial cushion for anticipated weak and erratic domestic and foreign defense sales. These organizations have developed an intricate web of industrial alliances and teaming arrangements with other European producers to take advantage of new export opportunities as they arise. The civilian/defense technology barrier is much more porous within these organizations than is the case with U.S. suppliers. This allows civilian sector technologies, often more advanced than similar defense technologies, to flow easily into the defense sector. By contrast, many U.S. prime contractors must labor under heavy specialization in the defense sector, prohibitions against domestic alliances, and DoD procurement regulations and practices that make it difficult or impossible for technology to be transferred from civilian to defense purposes, or vice-versa.

European nations have foreign trade policies that strongly influence their defense research, development, and procurement decisions. These policies are consistent, long-range, and fully articulated, and are designed to promote the domestic development of such fields as electronics, aerospace, telecommunications, and computers, which are technologies and branches of industry with high export potential. As discussed earlier in the case of Deutsche Aerospace, a vital component has been the defense industry: frost as a way to acquire advanced U.S. technology and know-how, which is then used to displace U.S. imports domestically; and then as a means compete with the United States in defense export markets and ultimately in global civilian high-tech markets as well.

The United States, too, can be said to practice “industrial policy” of a sort. Every DoD procurement is the product of a policy decision, and these policies tend strongly to favor domestic producers. However, there are enormous differences in U.S. and European approaches. European governments spend a great deal less of their revenues to support defense R&D and a great deal more to support civilian projects than does the United States. In the United States, defense claims on average 28 percent of the Federal budget, compared to only 7 percent for European NATO members.

In Europe, defense procurement and production decisions are usually the result of government-wide consultations among the senior permanent bureaucracy, with the ministries of trade, industry, foreign affairs, and finance having at least equal voice to the military. Defense producers and financial institutions, which are frequently wholly or partially owned by the government, are also intimately involved in the planning. The civilian and military officials concerned generally have career-long commitments to a defined set of issues.

Also helping to keep long-term strategy on track is the relatively weak role of the European parliaments in defense industrial policymaking. Parliaments retain the power to set an upper limit on the defense procurement budget, but this turns out to be a poor tool for influencing basic strategy since these budgets are multiyear and there is little or no control over line items. European parliaments also generally have little investigatory power on how these budgets are expended.

All this sharply contrasts with the situation in the United States: lack of clear defense industrial goals, concentration of decisionmaking within DoD and the defense committees of Congress, ambivalence concerning defense exports, and failure of DoD to meet the modest tour-of-duty goals mandated by Congress for weapons project managers.

The Europeans value any exports, including military, for domestic employment, balance of trade, national prestige, etc. However, defense trade has other peculiar aspects that raise its importance in the European Perspective beyond other export commodities.

First, there is the issue of economies of scale and national sovereignty. The major European powers wish to maintain an independent capacity to produce advanced weapons systems. Even with intra-European collaboration in production and procurement of weapons, the shrinking domestic markets and huge R&D costs (estimated at \$36 billion for the European Fighter Aircraft alone) lead Europeans to believe that exports are essential for the viability of their defense industrial base. Second, exports of weapons and weapons production technology can have large multiplier effects. For example, the U.K.-led sale of Tornado fighters to Saudi Arabia opened the door to an estimated \$40 billion of civilian trade with the Saudis.

Beyond this is the structural issue of the European defense industrial base. As noted earlier, European defense industries have evolved into national monopolies, closely aligned with their respective governments. This lack of domestic competition would seem a recipe for creeping rigidities in production and marketing practices. To prevent that outcome, government procurement policies are designed to keep the industries competitive and hungry for international business. The French Ministry of Defense, for example, will only support 50 percent of defense R&D costs; the rest must be earned through export sales. A related stimulus for keeping a competitive edge in technology is the necessity to remain attractive as a partner for teaming arrangements with other European arms producers, again, with the export potential of the collaborative project being a major consideration.

With decreasing East-West tensions, the focus of questions facing defense policymakers in Europe and the United States will increasingly shift from the predominantly military sphere-how to protect the

Alliance from a direct military threat-to issues in which economic and commercial considerations will play a more prominent role. In particular, arms exports and their relationship to domestic high-technology employment and the international balance of payments will loom larger in transatlantic armaments relations. To be sure, as Saddam Hussein has demonstrated, such sales can pose military

threats to the exporting nations. But at least for the present these risks are much less than the challenges that faced the Alliance during the height of the Cold War. The defense production relationship between the United States and Europe will thus evolve from a primarily strategic alliance to one in which both sides may collaborate or compete for defense export sales, or cooperate in limiting such sales.