

Grandeur policy

Defence policy have always been the subject of considerable theoretical and political debates. With Louis XIV, Napoleon and the colonialist wars, the policy of grandeur is one of the main characteristics of the French policy. In 1914, France appeared to be a military superpower, at the same level than Great Britain and Germany and between the two World wars, France maintained the illusion of military forces and seemed to be a threat for an aggressive State. At the end of the last World war, with the feeble Fourth Republic, the French economy is destroyed by four years of occupation. The idea of Grandeur de la France is clearly forgotten, and the main popular faces of this country became Sartre and his existentialism, Camus and his revolted man or Monet and Schuman with the idea of Europe. Till 1958, the idea of Grandeur is defended only by the gaullism and with the crisis of the political institutions, the end of the Algeria war and the failure of the Communauté, France seemed to be decadent. With the gaullism, France inaugure again the policy of Grandeur, but at a reduced level. It is not like Louis XIV to be the sun of the world, or like Napoleon to dominate Europe, it is the clear will to be a voice in the world and to be independent of the great superpower. After the Force de Frappe, an aggressive word, France come back to a more modest Deterrence Force du faible au fort. The Policy of Grandeur is the main result of the political will of independence.

OTAN

Under the Fifth Republic, France single-mindedly pursued a policy of national independence by developing nuclear forces, which became the main symbol of national unity. Its defense is based on the notion of proportional deterrence, i.e, the French nuclear forces are expected to inflict greater damage on an adversary than the expected gain from attacking French vital interests. French governments have jealously guarded French independence and refuse to identify if, when and how French forces will be available to the alliance in response to a Soviet aggression. During the disarmament process, France has pursued a distinct line of action, modernizing its tactical nuclear forces and creating a Rapid Action Force in order to strengthen France's deterrent manoeuverability. It rejects any limitations of its forces which would weaken its unilateral capacity to preserve the effectiveness of its deterrence policy. For François Mitterrand, "France cannot accept that a part of our nuclear armament is negotiable, because if that were so we would fall into a level at which our deterrent capacity would be destroyed... France's international position

refuses prohibitions. We refuse to accept the prohibition of others"¹. France could accept substantial decreases in Soviet and United States offensive striking power, if no separate Eurostrategic balance is defined apart from the global balance, if conventional balances in Europe favouring the Soviet Union are rectified and if the superpowers do not agree to a reduction in the development of defensive capabilities. At the present time, all major parties in France are opposed to drastic cuts in the French military effort and are suspicious of being drawn into talks which would limit French strike forces and modernization plans. With the new "Programmation Militaire", the nuclear warheads of France will be multiplied four or five times, with the objective for the 21st century of having the capacity to destroy nearly half the human beings in the world. French military policy has always had a close relation with foreign countries.

- the creation of a nuclear force
- the importance of the military expenditure,
- the development of an autonomous armament industry and
- arms exports.

The creation of a nuclear force

The Commissariat à l'Energie Atomique (CEA) was created on 18 October 1945 by Général de Gaulle and it was presented at that time as an indispensable tool for French nuclear and economic development. No nuclear military programme was developed till December 1954, when Pierre Mendès France expressed his commitment to a secret research project on nuclear weapons and atomic submarines. Major financial subsidies were then deducted from the Defense budget and transferred anonymously to the CEA without specifying their use. In the French case, civil nuclear R&D was very useful for nuclear weapons, not the opposite.

In 1986, the resources devoted to military and civilian nuclear were almost equal, although it is difficult to quantify them very precisely, because of the inseparability of some civilian and military uses. There is a synergy between military and civilian research. The plutonium requirements for new French nuclear weapons programmes are not being met by the output of military reactors alone. Superphénix is therefore important, indeed essential, to support the technical base for France's "force de dissuasion". Thus civil nuclear energy is still important for the military nuclear sector. Since 1962, military nuclear has probably exerted some positive action on civilian nuclear, in the fields of both fundamental and applied research (uranium supplies and fuel fabrication, enrichment, reprocessing, reactors, optimization of the PWR channel). From 1980 to 1988, greater importance was given to nuclear forces, with special support for tactical nuclear forces. In 1989, nuclear and space will absorb 34.2 per cent of payment allocations for defense equipment.

The French civilian nuclear industry is in crisis, as is the world civil nuclear industry. No orders for exports (except a contract signed in 1987 with China concerning the construction of the Daya-Bay power station), excess capacity, social and political opposition are drastically reducing the potential of this industry, which was particularly representative of high technology in modern French growth. The crisis is perhaps a direct consequence of new developments of military nuclear. If civilian nuclear is threatened because of proliferation and due to prohibition on material and technology exports, military nuclear is clearly accepted by public opinion. There is little possibility, however, of

¹ Ministère de la Défense : "La politique de défense de la France", Mai 1982, page 8.

verifying what is exactly the right sum to spend on developing a deterrence strategy. Although the French nuclear industry is very competitive and is able to satisfy national demand, the military nature of nuclear production reduces the opportunity of important spin-offs from nuclear R&D. Thus the civil value of nuclear R&D is reduced, and perhaps, the latest French efforts in nuclear weapons can be seen as an industrial policy in response to the recession of the civil nuclear sector. The nuclear lobby is trying to obtain an increase in military nuclear public allocations in order to compensate the decline in civil nuclear orders. At the Commissariat à l'Energie Atomique, there is a Direction des Applications Militaires, which in 1989, will use about 50 % of the total credits and employ 10400 people (8,200 in 1968) including 2000 engineers.

Table n^o 1 - The cost of the "deterrence forces" (billion current francs)

Years	"Force de frappe" costs (FPC in billion current francs)	FPC/Military budget	FPC/GDP
de Gaulle			
1960	0.54	3.25	0.21
1961	0.91	5.22	0.31
1962	1.25	6.98	0.38
1963	2.43	12.48	0.67
1964	3.70	18.77	0.92
1965	5.04	24.16	1.17
1966	5.57	25.31	1.19
1967	6.28	26.41	1.23
1968	6.27	24.59	1.15
1969	5.37	20.57	0.86
Pompidou			
1970	5.09	18.48	0.73
1971	5.08	17.37	0.65
1972	5.09	16.05	0.58
1973	5.52	15.70	0.55
1974	6.22	15.74	0.55
Giscard d'Estaing			
1975	6.41	13.88	0.50
1976	7.02	13.42	0.48
1977	7.96	13.58	0.50
1978	9.27	13.58	0.50
1979	10.86	14.08	0.51
1980	12.42	14.02	0.52
1981	14.86	14.20	0.54
Mitterrand			
1982	17.75	14.38	0.58
1983	19.30	14.54	0.56
1984	21.74	15.30	0.59
1985	23.39	15.57	0.60
1986	25.27	15.95	0.60
1987	27.80	16.43	0.63
1988	30.55	17.52	0.65
1989	31.53	17.29	0.64
1990	32.09	16.93	0.63
1991	31.07	15.97	0.59

Sources : Jacques PERCEBOIS (1985), Jacques FONTANEL (1989) and Rapports Parlementaires

Table 10 - Capital expenditure devoted to French nuclear forces in billion of current francs

Years	Strategic nuclear forces	Tactical nuclear forces	Total
1980	11850	730	12580
1981	13730	870	14600
1982	16190	740	16830
1983	17830	1470	19300
1984	19300	2440	21740
1985	20214	3172	23386
1986	20967	4301	25268
1987	21759	6039	27798
1988	23651	6895	30546
1989	24785	6743	31528

Table 11 - Capital expenditure devoted to French nuclear forces in millions of constant francs (1981)

Years	Nuclear Forces	Total equipment	% nuclear forces
1981	14.3	47.7	29.97
1982	13.9	50.2	27.69
1983	15.7	49.7	31.59
1984	16.6	50.7	32.74
1985	16.9	51.7	32.68
1986	17.6	52.6	33.46
1987	18.7	57.9	32.30
1988 (e)	20.0	59.5	33.58

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consequence of new developments of military nuclear. If civilian nuclear is, temporarily or not, condemned because of proliferation and prohibition of material and technology exports, military nuclear is clearly accepted by public opinion, although without any possibility of verifying what is exactly the right sum to spend on developing a deterrence strategy. Although the French nuclear industry is very competitive and is able to satisfy national demand, the military nature of nuclear reduces the opportunity of important spin-offs from nuclear R&D. Thus the civil value of nuclear R&D is decreased, and perhaps, the new French effort on nuclear weapons is an industrial policy in response to the recession of the civil nuclear sector. The nuclear lobby is trying to obtain an increase in military nuclear public allocations in order to compensate the decline in civil nuclear orders. At the Commissariat à l'Energie Atomique, there is a Direction des Applications Militaires, which in 1989, will use about 50 % of the total credits and employ 7,000 people (8,200 in 1968) including 2000 engineers.

Nuclear weapons are not very expensive. If you compare nuclear expenditures with the strategic importance of this weapon system in contemporary defense thinking, this conclusion seems to be undeniable.

The importance of the military expenditure

France's military budget is both a cost which the nation must bear and an indicator of the country's defense effort. France's military expenditure is generally estimated using the budget of the Ministère de la Défense. There is however defence expenditure that does not come under this ministry's budget but, for example, under the Prime Minister department or "Ministère de l'Intérieur".

The percentage of GDP devoted to military expenditure, which had fallen regularly from the end of the Algerian War, increased in the years 1977-1982 but the share of the military budget in the State budget has declined continuously.

Years	Army	Navy	Air force	Defence spending
1970	7.87	4.72	6.04	27.19
1971	8.30	5.22	6.27	28.86
1972	8.01	5.54	6.71	31.23
1973	9.20	6.10	7.28	34.80
1974	10.27	6.42	8.03	38.22
1975	11.69	7.11	8.89	43.79
1976	13.76	7.93	10.06	50.00
1977	15.96	9.69	11.59	58.41
1978	18.62	11.80	14.04	67.65
1979	21.31	13.60	18.90	77.11
1980	24.37	15.82	18.98	88.60
1981	28.36	19.20	22.81	104.44
1982	31.66	23.01	26.86	122.86
1983	35.78	24.81	29.32	133.22
1984	38.37	25.97	30.17	142.10
1985	40.20	27.80	31.80	150.20
1986	42.30	29.60	33.40	158.40
1987	45.10	31.80	35.70	169.20
1988	45.50	33.30	35.90	174.30
1989	47.70	35.60	38.10	182.40
1990	49.00	37.51	39.52	189.40
1991	50.01	38.44	40.28	194.55
1992(e)	50.87	38.63	40.37	195.27

Source : Rapports Parlementaires

Comparisons

Table n°3 - Annual defence spending - total and by each Service (army, navy, air force). Credits of Payments (without pensions in billion constant francs 1990)

Years	Army	Navy	Air force	Military spending
1970	33.30	25.28	26.63	127.69
1985	46.83	32.27	36.81	174.98
1986	48.08	33.57	37.88	179.63
1987	49.61	34.98	39.27	186.12
1988	48.73	35.66	38.45	186.68
1989	49.32	36.81	39.40	188.60
1990	49.00	37.51	39.52	189.40
1991	47.11	36.55	36.94	182.95

Sources : Rapports parlementaires

We can make three main observations :

- 1) Since 1970, French military expenditures has increased considerably (45% for the 1970-1990 period)

2) Military expenditure in 1990-1991 is set to rise in real terms, despite the increasing clamour for a reduction of military expenditure and disarmament.

3) The structure of French defense spending is concerned by "inertness effects", although the level of spending on the navy has shown a constant relevant increase.

b) Defence expenditure as percentage of GNP

Table n^o 4 - Share of defence spending in national output (1970-1991)

Years	Initial military budget/ Initial State budget	Initial military budget/ GDP
1958	27.0	6.0
1959	28.2	5.9
1960	28.5	5.58
1961	26.8	5.2
1962	24.7	4.79
1963	23.9	4.59
1964	23.0	4.41
1965	22.5	4.3
1966	21.8	4.21
1967	20.7	4.17
1968	20.1	4.07
1969	17.8	3.76
1970	17.6	3.47
1971	17.9	3.31
1972	17.7	3.17
1973	17.7	3.12
1974	17.4	2.99
1975	16.9	3.02
1976	17.1	2.98
1977	17.4	3.10
1978	16.9	3.16
1979	16.8	3.16
1980	16.9	3.30
1981	16.9	3.36
1982	15.6	3.46
1983	15.1	3.42
1984	15.2	3.39
1985	15.1	3.32
1986	15.4	3.24
1987	16.1	3.28
1988	16.1	3.17
1989	15.8	3.15
1990	15.6	3.11
1991	15.4	3.09
1992(e)	15.0	3.00

Sources : Rapports parlementaires, SIRPA, CEDSI.

c) Share of defence spending in government expenditure

Table n_j 5 - Share of defence spending (pensions included) in national output (PIBm) and government output

Years	D/Y	D/G
1985	3.87	18.3
1986	3.87	18.9
1987	3.90	17.8
1988	3.76	18.6
1989	3.63	19.2
1990	3.56	18.6
1991	3.37	18.4
1992 (e)	3.26	18.0

Source : for Defense Spending : "Verts budgŽtaires" and for National output ; INSEE "Les Comptes de la Nation" (Yearbook).

Table n_j 6 - Breakdown of total defence expenditure (million ECU)

Expenditures	1988	1989	1990	1991	1992
Personnel	8.223	8.434	8.925	9.466	9.52
Maintenance	6.390	6.696	7.031	7.216	7.38
Procurement	6.514	6.929	7.058	7.028	6.85
R&D	3.641	3.893	4.449	4.312	4.25

Sources : Parliamentary reports, Ministry of Defence and ECU conversions from CEDSI

The problem of the "professionalization" of military personnel is becoming a question for discussion in France, and former PrŽsident ValŽry Giscard d'Estaing argues for the end of conscription. Here, it is possible to recall the democratic interest in conscription as a solution to an excess or potential excess of power or to insufficient relations between civilian people and military personnel on the one hand, and the low efficiency and relatively high opportunity costs (although low-paid conscripts can be a substitute for expensive civilian employees) of conscripts.²

Arms products are made by an immense and diversified industrial structure, with enterprises from various economic sectors. Armament is not at all an activity branch as identified and conceptualized by macoeconomic analysis and thus the national Accounting concept "Naval Shipyards, aeronautics and armament" (Constructions navales et aŽronautiques, Armement), which includes civil and military materials and armament, seems to involve only small weapons from the Arsenals.

Military equipment is a very large economic aggregate in France, in comparison with other developed countries. Since 1980, there have been deep changes in the structures of

² FONTANEL Jacques : "Defence costs and budgeting in France" in "Franco-British Defence Co-operation. A new entente codiale" edited by Yves Boyer, Pierre Lellouche, John Roper, The Royal Institute of International Affairs, London, L'Institut Fran • ais des Relations Internationales, Paris, Routledge, Biling and Sons Ltd, Worcester, London, 1988.

French military spending. Perhaps France has become the first major State to spend more money on its military equipment than on its operating costs.

After the Algerian war, France gave priority to capital expenditure, mainly in order to develop its nuclear deterrent. From 1978 onwards, the modernization of the army's equipment became a strong priority in spite of the no substantial delays that were being experienced in terms of the objectives of military planning.

The influence of the military budget on French industries is very important. The largest part of military R&D allocations, which roughly represent 30 per cent of national public R&D, are used by industrial companies. According to the National Accounting System, about 67 % of the military purchases from French economy are located in the industrial sector. An increase in expenditure may reflect only an increase in the State's financial effort and not a substantial improvement in the country's nuclear capability. Conversely, one can easily imagine that priorities may be met while holding steady or reducing military expenditure, if the productivity of the arms industries improves and results in lower costs. The pattern of resource allocation is quite stable. This stability has sustained the group of defense contractors, commonly identified as members of the "military-industrial complex". The same group of firms are maintained in leading positions in the defense market, because of their ability to respond to new technology and military requirements. For ten years, capital expenditures have been growing faster than military personnel costs. The French army is becoming more and more capital-intensive and a wider range of objectives have to be set for conscription traditionally devoted to the collective feeling for national defense and the reduction of soldier costs, by reducing the costs of electronic, high technology, scientific or management personnel needed for the effectiveness of an organization with high level equipment and relatively unskilled soldiers. Arms enterprises are really in favour of conscription which reduces personnel costs, permits the increase of military equipment orders and facilitates the introduction and use of complex technologies.

There are 50000 men in the Federal Republic of Germany, 9500 in New Caledonia, 8000 in the West Indies and French Guyana, 5000 in Polynesia, 3900 in Djibouti, 3300 in the Indian Ocean, 1900 in Chad, 1750 in the Lebanon (FINUL-UNIFIL), 1200 in Central African Republic, 1200 in Senegal, 500 in Ivory Coast and 500 in Gabon.

Si les effets des DM sont clairement négatives, il s'agit nécessairement d'une politique de grandeur. Inversement si les effets sont clairement positifs, on pourrait penser plutôt à une politique économique de type keynésienne. Or, dans ces deux études faites avec deux périodes différentes, les résultats n'apparaissent pas toujours très significatifs. Pour Aben & Daures, there is probably no structural peculiarity of ME concerning its influence on the economic system.

J. Aben and N. Daures (1993), Chalks vs guns : Some economic consequences of an announced French scenario, Defence Economics, 4,4. PP.353-364.

**Probl me des retomb es entre d penses militaires et croissance  conomique. Cf
Aben et Daures.
Fontanel**

The development of an autonomous armament industry

With the introduction of firearms³ in the fourteenth century, the French government assumed monopolistic control over the production of powder. Arms production fell under gradual State control, with Colbert who created arsenals at Rochefort and Toulon, developed the foundries at Strasbourg, Douai and Lyon and the search for arms standardization which became effective by the end of the eighteenth century for the production of heavy equipment. After the fall of the crown, the Comit  de Salut Public created hundred of arms enterprises under state direction in order to eliminate potential internal subversion. By the end of 1794, France was producing more than 750 muskets a day, more than the rest of Europe. With the Industrial Revolution, France's armaments industry experienced a crisis through the gradual superiority of Prussian arms.

In 1885, the Third Republic decided to create a modern arms industry and private enterprises, supposed to be motivated by profits and patriotism, obtained priority over State arsenals, for economic and technological reasons of efficiency. The quality and quantity of French arms production in World War I was rather good and similar to those of Germany. France was able to obtain leadership in aircraft production and to equip the American expeditionary army. After 1918, the French arms industry declined with peacetime and a defensive strategy which relaxed national demand on the arms production system. With the German rearmament in the 1930s, this policy was re-examined, and the Front Populaire decided to nationalize selected private firms engaged in producing arms.

The Defeat and the German occupation of French territory decimated the arms industries. The Fourth Republic, after the end of the war, tried to reconstitute and renovate French arms production in the general effort to develop French industry and to support the colonial wars (from Indochina to Algeria). Arsenals and shipyards were gradually rebuilt and the aircraft industry was reorganized in 1949, with the first military jet aircraft sold to the French air forces (Ouragan 450 produced by Dassault, which was purchased by India and Israel). Armoured vehicles, missiles, helicopters, aircrafts became gradually very competitive on the international markets and the decision to produce nuclear weapons confirmed the French will to develop a large and powerful arms industry. An Atomic Energy Commission was established in 1946, legally for civilian uses, but very early military nuclear uses were analyzed.

³ KOLODZIEJ Edward A. : "France" in "The Structure of the Defense Industry". Edited by Nicole Ball and Milton Leitenberg, Croom Helm, London and Canberra 1983.

Under the Fifth Republic, the government changed three main characteristics of the Defense system : the development of a national nuclear force, the removal of French armies out of the integrated military organization of the Atlantic Alliance and the development of French arms production.

1) At the end of the colonial wars and the beginning of the Fifth Republic with de Gaulle, the French Parliament reluctantly accepted the development of a national nuclear force, with the warlike denomination "force de frappe" to the strategic and politically more acceptable name of "force de dissuasion". The French doctrine was labelled as "dissuasion du faible au fort".

2) French armies left the integrated military organization (NATO), to promote an independent military policy, which became possible with the national nuclear forces. But France extended the field of intervention of its "Force d'Action Rapide" (Rapid Task Force) to the whole territory of the Federal Republic of Germany, even envisaging a possible nuclear cover of this country. The "pre-strategic" weapons were not to be used on the battlefield but should be used as an ultimate warning to the enemy at the beginning of the nuclear process.

3) French arms production became very important for the national economy and for the technological development. Consequently, French governments were very involved in this development and two main decisions increased both the will of the State to develop the arms industry for strategic and economic reasons and the usefulness of a control over time of the production, in order to prepare the future. Created in 1961, the Direction Générale pour l'Armement (DGA) centralized and coordinated the complex sprawl of manufacturing, research and development centres concerned with arms production. The Lois de Programmation were very useful to prepare the future and to improve the conditions for the independence of French arms production. "These documents establish arms production goals and detail the financial arrangements to support targeted levels of production. Each year the production schedule and appropriations are updated to take account of a variety of factors, including economic conditions, price changes, availability of raw materials, employment problems and technological and scientific developments"⁴.

The analysis of French military industry is not very easy, because secrecy is very high. This is why it is not so easy to obtain clear data on the subject. It is still possible to have indirect information by context analysis and description of the procurement process. Below cases of change and its effects in the contracting system will be studied in order to summarize the key results.

At the top of the French arms industry is the DGA (General Direction for Armament), created in 1961, which is a technical service within the Ministry of Defense with the mission of coordinating the manufacturing, research and development centers concerned with arms design, testing and production. The General Staffs indicate the main military characteristics of the equipment, the number of units to produce, the time scales required.

⁴ KOŁODZIEJ : Op. Cit. p. 83.

DGA defines technical characteristics, implementation procedures, negotiation of prices with enterprises and control of production factories. The operational responsibility of General Staffs is of a different nature to the responsibility of DGA, which is technical and industrial. The functions of direction and supervision occupy to 25,000 people. Since 1988, there has been a "Conseil général de l'armement" which advises the Ministry of Defense on the question of scientific progress, scientific and engineers trainings and other armaments issues. The DZIGuZ général pour l'armement, with the support of Service central des affaires industrielles which both makes proposals to him and controls the execution of decisions, is responsible for armaments industrial policy.

DGA has a two fields of action :

- First, it is an interface between the armed forces and the arms industry. It oversees the arms industry. The relations between managers of the arms industry, DGA personnel and military staff are very close, because they are largely composed of military engineers, with the same training and education, and the same opportunity of working for one of the three organizations.
- Second, it is heavily engaged in arms production, with the direction of the arsenal and shipbuilding complex, responsibility for the direction of the military part of output in cooperation with firms producing civilian and military goods and the control of enterprises which were nationalized in 1981.

La Délégation Générale de l'Armement (DGA) has the responsibility for "Maîtrise d'ouvrage" which involves determining the main specifications of weapons. It is mainly a partner of the complex organization used to manage the various units of arms systems and it becomes, by contract with Ministry of Defense, leader of the product (Maître d'oeuvre) for the industrial management of the system.

France has a powerful arms industry, generally considered to be highly competitive on international markets, in spite of occasionally archaic management and a policy of systematic protectionism. There are no studies on the opportunity costs (which are determined by the alternative public or private programmes which are not produced because of military demands on the State budget and on the real resources of the economy) of France's military industry. Outlays are often concentrated in a few industries and in these economic sectors they account for a very high fraction of industry output. It is thus very difficult to know exactly the costs and the advantages of that industry. In the present case, it seems that the French government considers that the independence of arms equipments supplies is essential, whatever the economic and industrial results may be. This is certainly the case for nuclear weapons, which represent more than 30 per cent of the total annual amount of military equipment in France.

French military expenditures has three main characteristics : the initial military budget which is becoming gradually more labour-saving, a very strong nuclear industry connected with the deterrence option and a defense industry providing almost all the arms procurement for national military needs.

Although there remain some disagreements about the implementation of military planning or the distribution of the sums committed among the various types of weapons, the French political parties are not basically in doubt about the strategy of deterrence and the fundamental utility of an independent military industry.

The government decision to construct Rafale is very important, for many reasons :

- For Dassault-Brežuet, the production of Rafale is essential, both for the economic activity of the enterprises of the Group and for the maintenance and improvement of military aircraft technology. In June 1989, twenty-five pilots tested the Rafale and after transformation of the M88 jet engine, new flights are forecast for Spring 1990, with two monoplaces for Airforces, a biplace for training and two monoplaces for naval aeronautics. The operational service of Rafale-D (D for its ability to escape electromagnetic and optic infra-red detections) is programmed for 1996. The development and industrialization costs for eight years should be 40 billion francs, of which 25 % are financed by the constructors themselves. At present, the programming is fairly well realized. The European aircraft has a development cost two-fold higher than the Rafale and the US decision to abandon the Agile-Falcon and Super-Hornet 2000 programs certainly creates an opportunity on future international arms markets.

- The Ans (supersonic antinaval missile), which might succeed Exocet was a good project in collaboration with FRG. This programme between Matra and Mbb has been interrupted for 4 years by Mbb under pressure from German pacifist opinion which condemned it as an offensive weapon. Thus the complete programme is under threat and even the unions accept that France is in danger of technical delays. The question now is whether it is possible to develop this missile alone, as France will have probably to do for the Super-Asmp missile project which is meant to re-equip Mirage IV, Mirage 2000 and Super-Etendard. If the national military industry abandons these projects, technical leadership will definitely be lost.

- The French unions are clearly in favour of the Rafale project, with a forecast total cost of 130 to 180 billion francs (between 20 to 30 billion dollars) because Amd-Ba (Avions Marcel Dassault-Breguet Aviation) is very involved in military programmes (75 to 80 per cent of total turnover) and to drop the project would add 10,000 to the unemployment figures. The Reagan-Gorbachev process of disarmament is still modest and it is not possible to have defense credibility without national space control. France needs 336 units (250 for the Airforce and 86 for the Navy). Thus the forecast scale of production are not negligible. National independence has a price and unions think that it is useful to maintain technological know how for the long run.

- The European programme did not offer as much economic leverage. The United Kingdom, the FRG, Italy and Spain will have to pay 340 billion francs (55 billion dollars) to produce the programme and in this case, cooperation does not reduce the costs. With each country's specifications to take into account its own defense, the Ace aircraft is not adapted to the logic of the deterrence strategy which dominates France's defense effort. The German and British armies want a heavy offensive aircraft (14 tons), even though the French army would prefer a light defensive aircraft (8 tons). If the project had to take account of the French basic specifications, the unit cost would rise and then an economic comparison between Ace and Rafale would not necessarily be in favour of the European project. This is why the DŽlŽguŽ GŽnŽral pour l'Armement exhorts the arms industrialists to pay attention for cost overruns.⁵

⁵ "C'est le programme-phare des dix ^ vingt prochaines annŽes pour l'aŽronautique fran • aise. C'est un outil absolument remarquable, un nouveau fer de lance ^ l'exportation. Nous devons nous fixer de respecter les coŽts et tenir compte de nos rŽcents prŽcŽdents cuisants en mati • re de service apr • s-vente. Il faut fournir ^ nos clients une documentation normalisŽe en anglais ou dans la langue du pays, des pi □ ces dŽtachŽes ^ temps et non surdimensionnŽes, et une assistance technique sŽrieuse ^ des prix raisonnables. J'ai confiance en ce grand programme".

- The missile Mica for Rafale is not clearly defined and nothing has been decided on the location of the plant. It is possible that Matra will decide to produce them in a foreign subsidiary. Matra which is clearly suffering from the crisis of Dassault (it was the main arms equipment supplier for Dassault), has, for example, a project to build, in competition with the U.S. Stinger, the Mistral, a light anti-air missile, which can be launched by an infantryman. For many years, the Mistral will represent the major part of the Matra's activity. More than one thousand eight hundred units per months would be built, but Matra's chairman does not want to invest in new plants, although national capacity does not exceed 500 units. Thus the French Mistral could be kit assembled in Italy or Spain.

The international competitiveness of national armament production

The French arms industry was historically very competitive, but at the end of 1980s, it is in economic crisis.

Table n° 60 - Turnover of the French armament industry (billion francs)

Years	turnover MOD	turnover INSEE	Exports MOD	Exports Customs
1970	14.3	15.7	2.4	
1971	15.0	19.5	2.8	
1972	16.7	19.9	4.0	
1973	20.1	21.3	5.2	
1974	22.5	26.0	6.7	
1975	25.8	33.0	8.3	3.8
1976	31.1	38.2	11.6	6.5
1977	35.8	43.8	14.7	7.9
1978	42.7	45.1	17.3	12.5
1979	50.6	47.8	20.5	12.1
1980	58.7	58.2	23.4	20.2
1981	69.8	76.1	28.5	26.3
1982	75.5	85.1	28.9	26.1
1983	86.1	96.5	33.1	28.0
1984	98.3	110.6	41.9	37.1
1985	104.5	106.4	43.9	36.0
1986	108.0	114.3	43.1	38.3
1987	107.0	113.5	34.1	31.2
1988	116.2	123.0	38.2	33.7
1989	119.9	128.0	37.3	40.7
1990(e)	124.5	130	38.4	34

Sources : DGA publications, Parliamentary Reports, INSEE "Les comptes de l'industrie" (Yearly), and Customs Office "Bulletin Mensuel de Statistiques" (INSEE)

Arms sales abroad are only a very imperfect indicator of the competitiveness of the arms industry. It is therefore difficult to conclude that the arms industry is a prerequisite for France's economic development, or even that it is essential to her immediate security. Indeed, if the prices prevailing in the national economy are significantly higher than those of international competitors, the army will receive fewer arms for the same amount spent. This is the choice that has been made, by Sweden, for example, for her aircraft construction activities. Under these conditions, the country's defense is less well provided for, in the short run, by national production than by

imports. However, all aspects of security and industrial development must be taken into consideration, such as embargos, national independence, the development of the national industrial fabric, etc. It is still the case however that France is unable on her own to finance completely electronic warfare weapons and space defense systems. The idea of a Weapons Common Market is growing. The best example is the French-English Commission which examines the proposals of industrials, with the main use of the criteria of costs, delays, efficiency, without national preference, which is not yet applied to nuclear weapons. The results of this Commission appear to be symbolic yet.

The question is whether national arms production is still justified. Several economic arguments are generally put forward :

- the importance of military research is fundamental to the competitiveness of national R&D ;
- national industries need military orders in high-technology sectors (like computers and aeronautics) ;
- imports are subject to price fluctuations stemming in particular from erratic exchange rate variations (at a time when the value of the dollar was continually increasing, Sweden had to increase its defense budget, by a multiplier coefficient mainly determined by the exchange rate of the dollar, in order to satisfy its military planning) ;
- national production saves foreign currency and improves the balance of payments and
- the arms manufactured exactly meet the nation's defense requirements.

Technological success is dependent upon educational systems, the volume and distribution of research and development investment and innovative orientations. Despite the emergence of new arms suppliers, the technological hierarchy of defense production remains in place. A reduction in R&D effort could have two additional effects : first, the French arms industry would lose its military competitiveness in the quality of weapons and so would abandon its markets ; second, military R&D would not be replaced by civil R&D and so there would be a major crisis for innovation and high technology in the country. Without a continuous increase of arms components imports, especially certain kinds of sophisticated products which are too expensive for domestic production, there would be repeated upwards revisions of the rate of increasing costs for R&D : higher costs would reduce the competitiveness of French arms in international markets. Reduction of exports has a negative effect on military R&D because of the growing share of self-financing.

These arguments are difficult to evaluate from a strictly economic point of view, especially as the French industry has definite handicaps - such as the limited domestic market which leads it to look for outside outlets on which it becomes dependent ; the inadequate productivity of French aerospace compared with the American industry ; and the dissipation of industrial effort among all types of arms. If the domestic market is not adequate in depressed conditions, the risks of selling at a loss abroad and of paying the research and development costs and part of the fixed costs for one's customers are considerable ; in this case, it is the desire for independence and security which leads to the additional costs. Some exports impoverish a country, although not the enterprises concerned. It is not obvious that, over the long run, France's arms exports do not fall into this category. From 1975, arms exports were financially very interesting for French enterprises and maybe for French economy, but since 1983 this situation changed. Given the size and volatility of the international market, the poor demand and the entry of many

new competitors the likely return from arms exports is not great, particularly in terms of opportunity costs.

France imports few arms, about 1 per cent of the equipment bought each year according to US Arms Control and Disarmament Agency (USACDA) estimates. However these figures are misleading because they do not take into account equipment manufactured collaboratively, of arms manufactured under licence or imported components useful for the manufacture or assembly of arms. In fact, much of France's production is dependent on imports. For instance, armaments exported induce 30 per cent of components imports. There is some ambiguity about what distinguishes an import : whether the crucial characteristic is that it is made in France, made by a French-owned firm or made with French technology. In several sectors of manufacturing, the products of foreign-owned companies are more French than the products of French-owned companies.

Compared with foreign countries, France does not apparently have high production costs. In particular, French military R & D costs seem far lower than those in the the United States, Italy or United Kingdom. Moreover, an exporting armaments industry is normally able to supply products at satisfactory prices for its own domestic market, if it does not allow itself to be tempted by dumping or by selling at a price which only covers fixed costs. If a weapon is imported the buyer may gain part of the advantage accruing from the seller's longer production run. For short production runs there is little return in investing heavily in cost-reducing equipment and process innovation. Thus, the cost of a weapon is often reduced by imports, but the exceptional quality of the weapons, the absence of competition for technical or political reasons or the importance of international military supply may be more appreciated characteristics. Conversely, the foreign buyer sometimes pays for part of the research expenditure, particularly when the product concerned is much in demand, when the arms market is not too saturated by competitive tenders or when the export contract is awarded even before the product concerned has been developed.

A further uncertainty is added to the costing when the equipment is imported : fluctuations in the exchange rate, although commercial firms have a wide variety of methods of hedging longer-term contracts against exchange rate risk. Arms import contracts tend to be complicated, involving offset deals, credit terms, counter-trade and various elements of a complete package. As a result the real price is difficult to estimate. The bargaining power of buyers and sellers will depend on the extent of the competition. If the equipment supplied by various firms is very similar, or even identical, the buyer has scope to substitute and the price will be forced down. If the supplier is in a monopoly situation and the equipment is essential to the potential importer, then the price may be high. Currently, the arms export market is very competitive and many governments have subsidized the development of indigeneous national industries for political and sometimes economic reasons. This creates strong pressures to export, with cheap credit for importers, and sometimes prices get forced down towards marginal production cost which is much less than average cost. In the past, arms exporting countries tried to obtain political advantages, now importing countries want low prices, without political implications.

There are three broad categories of military products :

- goods destined only for defense market (nuclear warheads) or markets reduced by military secrecy (sonar equipment),
- common products with significant differences between defense and civilian markets (aeroengines) and
- products which are identical or nearly identical (memory chips).

The military yields to civilian innovation increases with the similarity of products and markets. The present trend seems to be to develop completely specialised and sometimes unique goods (without any economies of scale) and so military conversions to civilian applications are more and more rare, thus reducing the efficiency of the military sector for national economic development. But the components of products are not so different. Since 1980, military products have used more and more civil components, such as electronics. Military goods are constantly changing in quality over time. This means that the cost structure of military items constantly changes from one period to another.

Military R&D is very significant in the French economy and its actors, contracts and procedures are of a particular kind. Three characteristics of technology developed by military R&D are of particular importance :

- 1) A propensity to the highest and most sophisticated technology not suitable for civilian production,
- 2) An inherent capital-intensiveness, without regard to production costs,
- 3) An excessive secretiveness.

The concept of R&D covers a vast range of diverse activities, such as basic research or the improvement of production procedures. Military R&D is not exclusively devoted to making advances in the area of destruction but also protection, both swords and shields. But it is very difficult to obtain very precise figures on R&D. In France, official publications give different figures, with the same title. The comparison of data between sectors is not very easy, because for a nuclear submarine, it is very difficult to define exactly what is development and what is production. The relative weight of military R&D in the total national R&D programme gives rise to continued debate.

The high technology industries require very heavy investments in R&D and their civilian and military strategic roles are essential for the improvement of products, production method and the modernization of defense equipment. Since 1960, French governments have intervened in high technology sectors, mainly for military objectives. The military authorities financed R&D and ordered new products. There is an interdependence between civilian and military technology in the contemporary economy, but the Defense Ministries lost their decisive role in innovation to the main benefit of commercial activities (electronics, computers...).

Developing countries comprise the major source of demand for internationally traded weapons. In the 1970s and 1960s weapons transactions became more commercial, as OPEC oil revenues provided an alternative source of finance for purchase. Alongside these quantitative changes, there were important qualitative changes in demand. Initially, the

weapons transferred to the Third World had largely been obsolete, outdated or second-hand. During the 1970s the most modern weapons systems produced by industrialised countries were being sold. This change is a consequence of the aggressive commercial policy of French private military enterprises.

International sales of arms and technology were progressively detached from foreign policy and strategic objectives. The economic reasons invoked for exporting arms tend as a result to become the usual rule on the market and the buyers are able to obtain the highest technology products for conventional armament. The French government wanted to maintain a national arms industry, mainly to ensure national independence of supply and access to the latest military technologies. In these conditions, exports sales at prices above short-run marginal cost made some contribution to investment costs. In political terms, by supplying arms, France had the potential to influence directly or indirectly the behaviour of customers and to assist its friends. The 1980s have seen the beginning of a trend towards appropriate technology weapons, cheaper and better tailored to Third World needs, sometimes supplied by Newly Industrialised Countries. Therefore there is powerful economic pressure for exports. Military development is a voracious user of scarce scientific and technical resources, depriving the civilian economy of skills useful for improving productivity and competitiveness. In this case, the economic value of arms must be computed and compared with a civil use of the additional resources involved in exports. It is certainly dangerous to think that, for France, the promotion of arms exports is a profitable proposition. The growing dependence of particular interests on arms exports has created a powerful economic lobby, with enterprises, unions, parliamentarians, regional councillors, despite the lack of any established economic or commercial logic.

It is interesting that econometric models can suggest that a country's military expenditure has conflicting positive and negative effects on arms exports. For France, if total military expenditure seems to have rather a positive effect on arms exports, the annual increase of military expenditure produces a negative effect. These results indicate that when arms exports forecasts suggest the emergence of a crisis, military expenditure is increased in order to compensate the arms industry for the lack of demand. The present attempt at modernization of French armaments and the exceptional increase of equipment as against operational costs must be partially explained by the pressure of the French arms lobby, with blackmail on employment, exports problems and the argument about the destruction of the competitiveness of this industry. Usually, arms exports are analysed as a complement to national defense equipment needs, in order to reduce the collective costs of armaments. In the 1980s, additional military equipment sales to the French government have compensated the losses of the French arms industry on international markets.

Parliamentary Report on French Military industries explained the international market crisis of the weapons trade by the decrease of resources of French buyers, the emergence of new arms producers and the weakness of the French system of arms sales, with some financial rigidity and the aging of the marketing companies. Some commercial success of Great Britain are given in example with their barter agreements with Saudi Arabia (Tornado) and Malaysia. The Parliament Report recommends improvements in the financial and insurance statements of arms exports and the systematic use of certain diplomatic

decisions for commercial agreements.⁶ For instance, Paris will help India to design its aircraft carrier at Cochin in the Kerala State with the assistance of French technical personnel.

Desire for weapons does not constitute an effective demand unless finance is also available, and thus in a world crisis, it is difficult to maintain arms transfers in the long run without any financial guarantee of effective payment. But, for the French arms industry, it is vital to export and the parliamentary report pleads for a new products policy better defined for international uses, quality research, a wider geographical market, commercial attempts at direct foreign implantation, improvement of risk insurance for the military sector and improvement of French and European industrial collaborations. This is a political, not an economic decision.

It is difficult to distinguish some particular transactions, such as aircraft or electronic components which have a dual use, should be classified as civil and military. In the arms market the transaction price is rarely well defined. The transfer takes place as a part of a package involving the equipment itself, spares, training, access to technology, export credits, insurance for payments, offset agreements and counter-trade arrangements. Hence, the national export figures are very difficult to analyse. The net costs or revenues to the countries concerned may be different from the nominal prices.

Developing countries comprise the major source of demand for internationally traded weapons. In the 1970s and 1980s weapons transactions became more commercial, as OPEC oil revenues provided an alternative source of finance for purchase. Alongside these quantitative changes there were important qualitative changes in demand. Initially, the weapons transferred to the Third-World had largely been obsolete, outdated or second-hand. During the 1970s the most modern weapons systems produced by industrialised countries were being sold. This change is a consequence of the aggressive commercial policy of Western (mainly French and British) military enterprises.

International sales of arms and technology were progressively detached from foreign policy and strategic objectives. The economic reasons invoked for exporting arms tend, as a result, to become the usual rule in the market and buyers are able to obtain the highest technology products for conventional armament. The French government wanted to maintain a national arms industry, mainly to ensure national independence of supply and access to the latest military technologies. Under these conditions, export sales at prices above short-run marginal cost made some contribution to investment costs. In political terms by supplying arms, France had the potential to influence directly or indirectly the behaviour of customers and to assist its friends. The 1980s have seen the beginning of a trend towards appropriate technology weapons, cheaper and better tailored to Third World needs, sometimes supplied by Newly Industrialised Countries. In 1987, although it was a good year for the weapons trade, the exports of the French arms industry were reduced by 18.6 per cent in comparison with 1986, with reductions of 14 per cent in the developing countries and 50 per cent in the industrialized countries' markets. From 1984 to 1986, French arms export orders were for 61.8, 44.5, and 25.3 billion francs respectively, because of the impoverishment of French customers, the fall of the dollar exchange rate and international competition. During this time, FRG and U.K. arms exports were growing. From 1986 to 1991, the exports of the French arms industry were considerably reduced (Table n^o 23 and Table n^o 24).

⁶Assemblée Nationale, Première session ordinaire, Tome V, Défense, Recherche et industrie d'armement, par Jean-Guy Branger, 13 Octobre 1988. "Troisi^{ème} remarque et c'est sans doute la plus importante. J'observe qu' la différence de leurs coll^ègues britanniques, les dirigeants politiques fran^{çais} ont toujours prouvé de fortes r^{és}tances devant l'idée de tirer un certain parti commercial de certaines de nos prises de position diplomatiques. Les ministres de la Défense paraissent en g^{éné}ral plus sensibles à ce probl^{ème}, mais ils sont malheureusement per^{us} dans les pays tiers comme l'ont, avant tout, des ministres techniciens. Il serait sans doute souhaitable que les ministres paraissant plus politiques aux yeux des acheteurs potentiels partagent mieux leurs pr^éoccupations". Page 17.

An armament export control has existed since 1939, with a classification which, at present, is defined by the "arrêté du 2 avril 1971". Arms exports need authorizations from the State, and more precisely from the Secrétariat Général de la Défense Nationale which represents the Prime Minister.

Table n° 23 - French military exports and imports in billion constant 1990 French francs

Years	Military equipment Exports	Military equipment Imports
1985	51.14	6.06
1986	48.88	4.65
1987	37.51	5.28
1988	40.91	9.96
1989	38.57	13.96
1990	38.40	6.70

Sources : Rapports Parlementaires for exports and customs data (Bulletin mensuel de Statistique de l'INSEE)

Table n° 24 - French military exports and imports in billion current French francs

Years	Military equipment Exports	Military equipment Imports
1970	2.4	0.4
1971	2.8	0.5
1972	4.0	0.7
1973	5.2	0.9
1974	6.7	1.5
1975	8.3	1.7
1976	11.6	2.1
1977	14.7	1.5
1978	17.3	1.6
1979	20.5	2.0
1980	23.4	2.3
1981	28.5	2.5
1982	28.9	2.8
1983	33.1	3.3
1984	41.9	3.9
1985	43.9	5.2
1986	43.1	4.1
1987	34.1	4.8
1988	38.2	9.3
1989	37.3	13.5
1990	38.4	6.7

Source : Rapports Parlementaires

Table n° 25 - French military exports by regions (%)

Country	1985	1986	1987	1988	1989
Maghreb & Middle East	60.2	53.6	54.0	47.9	56.0
Europe & North America	14.1	16.7	24.9	32.2	31.6

Far East	16.0	13.0	11.7	12.3	5.4
Latin America	4.8	10.7	5.9	3.9	4.6
Black Africa	3.6	5.1	2.6	3.1	1.6
Others	1.4	0.9	0.9	0.5	0.8

Sources : Rapports Parlementaires

One reason for this export crisis is the gamble by French arms enterprises, incited by the RITA success, on the development of the US market - which more or less reduces the competition on the international trade of the US arms enterprises - just when the State deficit obliged the US government to reduce the growth of military expenditure. It is interesting to note that the arms exports of French industry are not really in crisis yet, because deliveries lag behind orders, but present orders are very low. If we bear in mind that orders are usually higher than deliveries, the arms industry may be in serious trouble in the foreseeable future.

A supplier with an effective monopoly of a desired weapon system is able to extract a high political price. This is rarely the case for France which produces arms in competition with many alternative sources of supply. Thus its exporting position is not so strong as it was because of the new competition, characterised by the absence of political conditions, between arms enterprises. During the 1970s, France made skilful use of its special status and relative independence from the two superpowers, and of the weakness of political conditions on French arms sales, to obtain a share of the international weapons market. During the 1980s this advantage was substantially reduced by the "imitation effect" involving both new arms producers, like West Germany and Brazil, and even the two superpowers. Thus, since 1980, the competitive position of the French arms industry is in decline. The main French industrial and defence problem is to know the structural meaning of this new trend.

The Parliamentary Report on French Military Industries explained the international market crisis of the weapons trade as due to the decrease of resources of French buyers, the emergence of new arms producers and the weakness of the French system of arms sales, with some financial rigidity and the ageing of the marketing companies. Some British commercial successes are used as an example with their barter agreements with Saudi Arabia (Tornado) and Malaysia. The Parliament Report recommends improvements in the financial and insurance statements of arms exports and the systematic use of certain diplomatic decisions for commercial agreements. For instance, Paris will help India to design its aircraft carrier at Cochin in the Kerala State with the assistance of French technical personnel.

For Fontanel and Smith, after the Algerian war, the strategic factors had no clear influence on the level of military expenditure. The nuclear forces was financed primarily by higher defence budgets and lower current spending. There were dynamics interactions between these components.

Fontanel and Smith (1990-, The impact of strategy and measurement on models of French military expenditure, Defence Economics, 1,4, 261-274.

Using a macroeconomic model, Jacques Fontanel and Michael Ward concluded that it was impossible to prove that arms exports had a positive influence in the global performance of the French economy. They used official statistics which do not explained the real payments of the exports. And it seems, that for these fifteen last years, a large share (between 15 and 30 percent) of military debt were not honoured and some of them were financed by offset system. HŽbert. ARES

This observation conduce to the idea of the existence of a policy of Grandeur. But, at the same time, for a lot of French companies it was a kind of promotional argument on the quality of the French high technology.

Fontanel J. and Ward Michael (1990), Les exportations d'armes et la croissance Žconomique : l'example de la France, ARES, XII. 1990-4, Grenoble.

HŽbert J.P. (1990), L'effort militaire franais et ses retombŽes sur l'Žconomie, , ARES, XII. 1990-4, Grenoble.

Desire for weapons does not constitute an effective demand unless financing is also available, and thus in a world crisis, it is difficult to maintain arms transfers in the long run without any financial guarantee of effective payment. But, for the French arms industry, it is supposed to be vital to export and the parliamentary report pleads for a new products policy better defined for international uses, quality research, a wider geographical market, commercial attempts at direct foreign implantation, improvement of risk insurance for the military sector and improvement of French and European industrial collaborations. This is a political, not an economic, decision.

Table n_j 22 - Military R&D in 1990 and 1991 (in billion francs)

Sections	1990	1991
Common section	23.44	23.26
Air	5.8	7.05
Army	4.14	3.23
Navy	3.28	3.34
Total	36.57	36.88

Source : "Verts budgétaires".

The main characteristics are :

- In the computer sector, military leadership is declining and civil products are now more complex than military products. Military computer R&D is sometimes important for development, but not for fundamental research.
- Now, the civilian spin-offs of military naval R&D are very small except for composite materials and very rarely for electronic equipment.
- The relations between military and civil aeronautic products are very ambiguous. Because of the dual applications of these products. But it is very difficult for a country to build an aerospace sector without military purchases.
- There is reduced spin-off from nuclear weapons programmes which could profit the civilian nuclear industry, because results are so secret that access is not permitted for civilians.
- Military R&D represents more than 15 per cent of the military budget, a third of the R&D State budget and more than a fifth of the national effort in R&D. In 1988, more than 24 billion francs went to private or public industrial enterprises for military R&D. In 1989, DGA will entrust 60 per cent of its military research to enterprises, 15 per cent to the universities and 25 per cent to itself. For Aerospatiale, R&D outlays represent 23% of turnover and the military programme, entirely financed by public funds, financed 75 per cent of the total R&D. More than 20,000 highly skilled workers are employed by the Ministry of Defence (mainly by D.G.A.) in military R&D, but this figure seems very low in comparison with international data.
- Military products are voracious of R&D funds and especially of electronics (40 per cent of the new Leclerc tank is devoted to electronics). Actually, R&D represents 30 per cent of the price of military products and this percentage is clearly growing.

Some analysts argue that military R&D has significant spin-offs for the civilian sector and that research in the military field yields civilian applications as a by-product (radar, computers, electronics for example). Spin-offs are also used as an argument for European participation in the Strategic Defense Initiative (SDI) developed by the government of the United States. In this version, SDI would produce goods directly useful to the civilian sector and would be the occasion to obtain insight into modern U.S. technology. The other school of thought considers that spin-offs are weak. For example, integrated circuit or silicon chips were developed by commercial firms mainly with civilian funding. If early development such as radar, jet engine or transport aircraft or more recently semiconductors, fiber optics, lasers, nuclear power, satellite communications, composite materials are presented as successful technology transfers, these efforts to stimulate development and expand markets, represent quite limited contributions, taking into account the importance of civil transfers to military products. The growing importance of new materials, lasers, advanced energy devices, computers will inevitably lead to a growing overlap of defense and non-defense technologies.

For a European Grandeur ?

EEC's wider mandate to coordinate industrial policy in the field of high technology will necessarily effect arms production, because it is often impracticable to distinguish military and civilian R&D and production. "Increased Western Europeanization of seemingly civilian R&D in the wake of the creation of the Single Market increases already strong pressures for a more coordinated framework on military R&D ... Here several economic interests can be distinguished. First, we have national procurement agencies and politicians in charge of procurement, who expect lower prices from a more competitive arms market... Second, arms production companies see chances for economic gains from a more open arms market in Western Europe... Third, options for all parties involved are narrowing because of the increasing costs of weapon systems... Especially, in sectors like space, or electronics it is argued, West European companies need a combined civilian-military approach in order to compete with the highly-subsidized US and the highly-civilian-subsidized Japanese competitors"⁷. There is a US demand for a higher contribution of West European member states to NATO and the European cooperation must be encouraged.

In the "General and Final Provisions" of the EEC Treaty, it is established that "no Member State shall be obliged to supply information the disclosure of which it considers contrary to the essential interests of its security. Any member State is allowed to take measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war materials ; such measures shall not adversely affect the conditions of competition in the common market regarding products which are not intended for specifically military purposes (Article 223). The Commission has the right (unanimous vote of the Council) to modify the list. Title III of the Single Act deals with the provisions on European cooperation in the field of foreign policy, although these provisions remain vague and if some national delegations maintained their opposition in principle to including the armament sector in the scope of the new directives. "Similar problems seem to occur with regard to the Commission's proposal for a Council regulation temporarily suspending import duties on certain weapons and military equipment (COM88 502 final). This proposal aims at enabling the Member States to procure for the use of their armed forces the most technologically advanced military equipment and that Community manufacturers should be able to meet the greater part of these needs"⁸. There is a strong need for a cooperation. The level of duplication and waste is very high : 11 enterprises for anti-tank weapons, 18 for air missiles and 10 for ship missiles, each of them in 7 countries. There is a lack of standardization and of interoperability. The promotion of an European technological base (ESPRIT or EUREKA) is an interesting but insufficient action.

The European Parliament is a driving force for European defense cooperation. In 1975 and 1983, it adopted a resolution expressing the will to strengthen cooperation in the

⁷ BRZOSKA Michael : "The Structure of Arms Production in Western Europe beyond 1992". ISA Conference, London, March-April 1989.

⁸ GRUNERT Thomas : "Security Cooperation in the European Community". Joint Annual Convention of the BISA and the ISA, London, 28 March-1 April 1989.

field of national security and giving a concept of European peace and security, founded on the principles of détente policy, arms limitation and peaceful co-existence between all states and all peoples. A resolution on arms procurement within a common industrial policy and on arms exports was adopted in November 1983. The European Parliament is more and more concerned by security needs and although it remains a relatively weak body, the new consultative powers in the Single European Act enhance its catalytic role on this subject.

The European Single Act is very important for civilian industry and it is foreseeable that it has some consequences for the military industries. European unity had been badly shaken with the "Sale of Century", the sale by the US of the F16 fighter to Belgium, the Netherlands, Denmark and Norway. For France which wanted to sell the Mirage F-1 this was a major blow. The Eurogroup is weak, because it is unable to harness the French arms industry as a main part of the European effort to challenge the USA, and if it were to challenge the US without French participation the result would be disastrous for European co-operation and unity.

With weapons collaboration, the typical pattern is that development costs are shared between the partners, cutting the costs to each, if and only if the defense organisations need exactly the same weapons. The arguments for the French military industry are based on the idea that French weapons are superior, tailored exactly to the needs of French forces and that a domestic defense industrial base is essential for strategic independence and that "unfair trade" arguments justify protection.

On the economic side, it is argued that domestic procurement creates employment, boosts tax revenue, improves the balance of payments and produces technological spin-off for civilian production. If cooperating countries do not want exactly the same weapon, new costs occur in meeting the needs of each partner, and then the advantages of large scale production can be insufficient to compensate for the increase in costs. Production takes place on a national basis and there are losses if compromise designs are more expensive to produce. Collaboration itself adds a cost penalty arising from co-ordination expenses and transport needs. There are always complicated, politically rather than economically negotiated, work sharing and compensation arrangements.

The cooperation objectives are :

- the need to obtain specialized, high and varied technical competences which are difficult to develop for a single enterprise,
- the necessity to reduce research and development investments for each firm,
- the desire to spread substantial risks,
- The possibility of enlarging the markets, developing mass production and reducing unit costs of each product.

National self-sufficiency and independence in arms is a policy which can prove both expensive and dangerous. That is why, for cost reasons, it will be necessary for France to call for cooperation or specialization with its European partners, unless it wishes to increase its defense spending to achieve the same level of security, with the consequent risk of

burdening the national economy with inadequate industrial productivity which, in the long run, would reduce growth opportunities and national security itself. In a democratic country, good defense is never built on an economy in crisis or recession.

The DŽIŽgation GŹnŹrale pour L'Armement is directing France's military policy towards the twin goals of independence and solidarity. Independence implies autonomy as regards decision-making, in spite of the great complexity of current weapons systems ; it is therefore striving to harness national energies and skills with a view to providing the foundations of her defense from the nation's own resources. Solidarity implies that once a large measure of autonomy as regards decision-making has been obtained, France should collaborate with its allies, at least in the design and introduction of new weapons useful for their mutual security. Under these conditions, the decision to develop an arms industry primarily satisfies the requirements for national independence.

The economic aspects set the limits to industrial activity, in order to control in the best way the investments committed and also to involve arms firms and sectors in the modernization and industrialization of the French economy. But it is more difficult to support a national arms industrial policy, because of the needs for technical progress in high technology and the risks of investment. Co-production is a way to increase competence in arms production, although the different strategies imply various kinds of weapons.

There are some risks in the definition and implementation of industrial cooperations with other countries :

- The basic needs of the military staff are not exactly similar, either on the time horizons or on the strategic interest for each State.
- The French administrative and financial procedures are not often in keeping with those of other countries.
- The difficulty of deciding on agreed export policies
- The tendency of each government to support its national industry, although national competitiveness is not very good.
- The delays in the conception and execution of the programmes,
- The magnitude of the costs.

Is equipment chosen on the basis of lowest cost or under conditions comparable to those that prevail outside France ? It does seem that continual increase in prices is a modern feature of military equipment. The studies which have been carried out on this subject have indicated real rates of growth of prices of 8 per cent and 5 per cent per annum. Military aircraft experience very considerable cost increases, as do fighting ships, and, to a lesser extent, tanks. Development costs are spread over fewer units because of smaller and smaller production runs. It should be noted, however, that it is very difficult to compare the prices of weapons from different generations.

Unit costs of military products are often very imprecise : from 40 to 50 million francs for the Leclerc tank, 65 to 100 million francs for HAC helicopter, 120 to 150 million francs for the Mirage 2000 aircraft, 220 to 350 million francs for the Rafale aircraft, about 1 billion

francs for the light frigate, 2 billion francs for the SNA submarine, 11 to 13 billion francs for the nuclear submarines SNLE and about 14 billion francs for an aircraft carrier, without arms costs, ammunition or other additional equipment. From the forecasting of costs, there were over-runs of 26 per cent for the Leclerc tank, 19 per cent for the new generation SNLE and 13 per cent for BAMO (ocean anti-mines equipment) and the unit price of the French-German helicopters will exceed 70 million francs. There are new delays on the orders of AMX 30 B2, DATCM Mistral Missiles and light armoured vehicles.

Table n_j 19 - National purchasing extent of market

Market	National	E.C.	World
Competitive	<ul style="list-style-type: none"> - Mirage 2000 N - Mirage 2000 DA & N' - ACT Rafale - Mirage 2000 D - Air-to-air missiles 	<ul style="list-style-type: none"> - AstartŽ-Rams□s - Tactical & strategical vehicle - Light cargos - Super Etendard modernisation - Crusader modernisation - surface-to-air short range missiles - air-to-air missiles - air-to-surface bombs - air-to-surface bombs - Ramses development - SATCP Mistral - Logistic transport vehicles - Major armoured vehicles - Helicopters Ecureuil 	<ul style="list-style-type: none"> - AstartŽ-Rams□s - Tactical & strategical vehicle - Light cargos - Super Etendard modernisation - Crusader modernisation - surface-to-air short range missiles - air-to-air missiles - air-to-surface bombs - air-to-surface bombs - Ramses development - SATCP Mistral - Logistic transport vehicles - Major armoured vehicles - Helicopters Ecureuil

Non competitive	Missile M4 - Nuclear submarines rebuilding - Missiles M5 - SNLE-NG - ASMP - Hades - AMX 30B2 - Tank Leclerc - Canon 155 - Nuclear aircraft carrier - SNLE - SNA - Light frigates - Observation frigates - Anti-mine ship - Aircraft carrier - Frigates (la Fayette) - Hydrographic ship (Arago)		
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Table n_j 20 - Joint or collaborate purchasing extent of market

Market	EC	World
Competitive	- Helios - Syracuse II - HAC-HAP - Atlantique NG - Torpedo Murene - Atlantique 2 -Helicopter NH 90	- LRM - AWACS - HŽlico NH 90 - Multiple rockets launchers
Non competitive		

f) Defence R&D

Table n_j 21 - State Defence R&D in billion current French francs

Years	State Defense R&D	% Public budget R&D
1976	5.05	28.3
1977	5.95	29.2
1978	7.55	32.4
1979	9.35	34.3
1980	11.35	35.7
1981	17.67	39.0
1982	17.86	35.5
1983	20.31	33.7
1984	22.98	33.2
1985	23.62	31.5
1986	25.78	34.7
1987	30.75	38.3
1988	32.40	36.5
1989	33.70	36.1
1990	36.6	37.1

Source : "Verts" budgŽtaires and "Rapport annexe sur l'Žtat de la recherche et du dŽveloppement technologique" ("jaune budgŽtaire).

Future French military expenditure

Years	Operatingcosts	Capital expenditures	Military expenditures (ME)	GDPm	ME/GDPm
1991	91.4	103.1	194.5	5770	3.37
1992	92.3	106.9	199.2	5920	3.36
1993	93.2	110.8	204	6074	3.36
1994	94.2	114.7	208.9	6230	3.35
1995	95.1	118.8	213.9	6390	3.35
1996	96.1	122.9	219	6560	3.34

Source : Rapports Parlementaires 1990.

Fontanel and Smith (1990-, The impact of strategy and measurement on models of French military expenditure, Defence Economics, 1,4, 261-274.