



HAL
open science

An empirical analysis of French Arms exports. What consequences of the crisis

Jacques Fontanel, Louis Pilandon

► **To cite this version:**

Jacques Fontanel, Louis Pilandon. An empirical analysis of French Arms exports. What consequences of the crisis. Brzoska & Locke. Restructuring of arms production in Western Europe, SIPRI, Oxford University Press, 1989. hal-02947366

HAL Id: hal-02947366

<https://hal.univ-grenoble-alpes.fr/hal-02947366>

Submitted on 24 Sep 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

An empirical analysis of French Arms exports.
What consequences of the crisis

Jacques Fontanel
Louis Pilandon

Restructuring of arms production in Western Europe
(Brzoska & Locke)

SIPRI
Oxford University Press

Summary : It is difficult to know precisely what arms exports are, because a tool can be both a civilian tool and a military tool. In addition, the transaction price is not always well defined, as contracts contain important obligations regarding spare parts, training or access to technology for the buyer. France exports a lot of arms, both out of necessity (to achieve economies of scale), but also to support an allied country militarily and strategically. The arms industries seem to have to resort more and more to industrial cooperation, except probably for the United States. France is an important arms exporter in the world.

Résumé : Il est difficile de connaître précisément les exportations d'armes, car un outil peut être à la fois d'usage civil ou d'objectif militaire. En outre, le prix de transaction n'est pas toujours bien défini, car les contrats contiennent d'importantes obligations concernant les pièces de rechange, l'apprentissage ou l'accès à la technologie pour l'acheteur. La France exporte beaucoup d'armes, à la fois par nécessité (pour obtenir des économies d'échelle), mais aussi pour soutenir militairement et stratégiquement un pays allié. Les industries d'armement semblent devoir recourir de plus en plus à la coopération industrielle, sauf sans doute pour les Etats-Unis. La France est un exportateur d'armement important dans le monde.

Armament, arms exports, French Arms exports, scale economy

Armment, exportations d'armes, économies d'échelle.

AN EMPIRICAL ANALYSIS OF FRENCH ARMS EXPORTS

WHAT CONSEQUENCES OF THE CRISIS ?

by

Jacques FONTANEL

and

Louis PILANDON

Although arms transfers is a significant component of world trade, they have not been a major concern for economic analysis. This mainly reflects the data difficulties which reduce the quality of estimation, the strategic and political interests which usually dominate the economists' expertises and the old behaviour of arms sellers which sold armaments only on strategic arguments, whereas new sellers include economic reasons¹.

It is difficult to distinguish whether some particular transactions, such as aircraft or electronics components which have a dual use, should be classified as civil and military. The classification is the first source of difficulties for evaluation. The nomenclature is continually changing and some products which were on the list of confidentiality ("confidentialité") become progressively so usual that they lost their strategic interest. Then, intertemporal comparisons are very critical. Nay more, the gap between the orders and the deliveries of the arms exports is rather large (on an average, more than 2 years) and the data sources (Customs, Ministry of Defense or international sources like ACDA or SIPRI) do not publish the same figures. For our study, we use the data from the Ministry of Defense.

In the arms market the transaction price is rarely well defined². The transfer takes place as a part of a package involving the equipment itself, spares, training, access to technology, export

¹ Ron SMITH, Antony HUMM & Jacques FONTANEL : "The economics of exporting arms". Journal of Peace Research, Vol. 2; n° 3, 1985.

² FONTANEL Jacques : "French Arms Industry". Cahiers du CEDSI, n° 10, Université des Sciences Sociales de Grenoble, 1990 (135 pages).

credits, insurance for payment, 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. Moreover, the figures do not represent the effective payments ; they summarize the real transaction and it is usual that the arms importers are unable to pay their debt. In this case, it is usually the national insurance which are in charge of the payment and then the arms transfers become an instrument of development aid in favour of LDCs.

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 partly a consequence of the aggressive commercial policy of French private and public 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 an 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. Now, the international arms market is in crisis and the French arms industry is directly concerned by the reduction of the orders. The main solution which seem accepted by the gouvernement is the international cooperation, mainly with EEC countries.

I. The French arms exports. Figures and facts.

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.

An armament export control has existed since 1939, with a classification which, at present, is defined by an "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. The main reason for this export crisis is certainly the gamble by French arms enterprises on the development of the US market 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 have in mind, that usually, orders are higher than deliveries, the arms industry will be in a bad way in the near 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 powerful, 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 has been substantially reduced by the "demonstration effect" involving both new arms producers, like West Germany, Japan and Brazil, and even the two superpowers. Thus, the competitive position of the French arms industry is declining. In 1984, for Brzoska and Ohlson¹, France exported 50 percent of its arms production (42 % for United Kingdom, 20 % for West Germany and 70 % for Italy).

¹ Michael BRZOSKA & Thomas OHLSON : "The Trade in Major Conventional Weapons", in SIPRI, World Armaments and Disarmament, SIPRI Yearbook 1985, New York, Oxford University Press, 1986, p. 136.

Table 1 - French export arms deliveries (billion current and constant francs)

Year	DELIVERIES			Percentage exports/ Arms production
	current francs	1986 francs	1983 dollars	
1970	2.7	11.3		19
1971	3	11.9		20
1972	4	15		24
1973	5.2	18.4		26
1974	6.7	22.1		30
1975	8.3	24.1	2.89	32
1976	11.6	30.2	2.22	37
1977	14.7	34.8	2.58	41
1978	17.3	37.5	2.78	40
1979	20.5	40.8	2.94	40
1980	23.4	41.9	2.98	40
1981	28.5	45.0	3.21	41
1982	28.9	40.2	2.91	38
1983	33.1	41.3	3.04	38
1984	41.9	47.8	3.59	42
1985	43.9	46.5	3.56	42
1986	43.1	43.1		40
1987	34.1	32.2		30
1988	38.2	36.1		32

Table 2 - French arms production (billions current francs)

Sectors	1980	1984	1987
Electronics	14.9	25.6	34.1
Aeronautics and spatial	22.8	34.7	33.1
Shipyards	4.9	10.5	9.0
Land armaments	10.1	17.1	18.2
Nuclear	3.1	5.5	5.8
Others	2.7	4.9	6.8
Total	58.5	98.3	107.0

Table 3 - Share of exported arms production (%)

Sectors	1980	1984	1987
Electronics	44	47	33
Aeronautics and spatial	45	47	39
Shipyards	27	43	21
Land armaments	47	49	38
Nuclear	0	0	0
Others	16	16	15

Table 4 - Distribution of French exports deliveries (in percentage)

Countries	1974	1976	79	82	83	84	85	86
North Africa and Middle East	57	58	52	66	56	77	39	38
North America & Europe	25	23	11	9	14	10	42	42
South America	3	6	14	16	7	9	5	nc
Far-East	5	2	4	4	4	2	5	nc
Black Africa	2	2	4	1	1	1	2	nc
Others	8	8	4	1	1	1	2	nc

Table 5 - Distribution of French export deliveries (in percentage)

Year	Orders (current francs)	Orders (1986 francs)
1974	18.3	60.4
1975	16.5	47.9
1976	18.9	49.1
1977	27.4	64.9
1978	21.7	47
1979	25.1	50
1980	37.4	67
1981	33.8	53.4
1982	41.6	57.8
1983	29.1	36.4
1984	61.8	70.5
1985	44.5	47.1
1986	25.3	25.3
1987	28.9	27.9
1988	37.5	35.4
1989	20	18

Table 6 - Geographical structure of arms export orders for France (1985 and 1986) in billion francs

Regions	1985	1986	1987
Europe and North America	18.5	10.1	11.8
North Africa and Middle East	17.5	9.3	11.3
South America and Caribbean countries	3.3	0.4	0.6
The Far East	2.4	3.6	2.9
Black Africa	2	1.6	2.0
Others	0.8	0.3	0.3
Total	44.5	25.3	28.9

Table 7 - Geographical structure of French arms exports deliveries in billion francs (1985,1986, 1987)

Regions	1985	1986	1987
Europe and North America	6.2	7.2	8.5
North Africa and Middle East	26.4	23.1	18.4
South America and Caribbean countries	2.1	4.6	2.0
The Far East	7.0	5.6	4.0
Black Africa	1.6	2.2	0.9
Others	0.6	0.4	0.3
Total	43.9	43.9	34.1

Table 8 - Military equipment exported (deliveries and orders)

Trade	Orders		Deliveries	
	1986	1987	1986	1987
Arms	23.0	18.2	14.4	15.6
Air	11.1	12.7	8.5	7.8
Land	8.2	3.2	2.4	5.5
Ships				

Arms production is characterised by high overhead costs for research and development, learning curves (costs decline with experience) and economies of scale. Large producers can produce more cheaply. Thus, arms exports became an economic condition for an efficient national armament industry. French companies would not undertake the deals if they did not expect them to be profitable, and profitability often depends on subsidies from the supplier government, especially in R&D, credits and official aid and approval for exports. The benefits of arms exports appear directly and accrue to particular interests. The costs are less directly obvious and depend on the alternative use of funds.

The advantages of exports are often difficult to measure. The sale of 40 Mirage - 2000 to the government of Greece was dependent of a more general agreement on industrial investments, on purchases of products and services and on tourism training. For a contract of 8 billion francs, the four firms Dassault, SNECMA, Thomson and Matra must offer 4.8 billion compensations, with 1 billion (628 million in industrial investment, 350 million for exportations and 27 million for tourism training) from June 1985 to June 1989. Thus, it is not easy to know whether the French economy really benefit from this programme.

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 suggest¹ 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.

In order to explain the evolution of french arms transfer during the last years, it is useful to examine if empirical links exist between the percentage of arms transfers in the arm production (EAP), the annual rate of growth of "Titre 5" (capital expenditure) in national military budget (T5) and the percentage of equipment spending in the military budget (DEBD). We think that these relations are very complex, but that the coefficients have to be usually negative in the short run, because of the crowding-out effects, and positive in the long run, because of the scale economies in growth path obtained by national arms production. What very approximative conclusions about the results could be obtain from these regressions ? The empirical results are not very significative. May be a link can be existing between the equipment spending and the arms transfers during the current year, but the regression results for DEBD and T5 are not good and then it is not really clear that there is a relation between the percentage of arms transfer in the arms production and the percentage of equipment spending or the

¹ FONTANEL Jacques and SMITH Ron : "The Economics of Exporting Arms".
Journal of Peace Research, Vol. 2, n° 3 - 1985.

annual rate of growth of "Titre 5" in the national military budget. Arms exports are usually regarded as a complement for the national defense equipment. In the 1980's additional military equipment sales by France have compensated the losses of arms industry in international market shares. But this industrial policy is not confirmed by econometric results, certainly because the period 1977-1989 is heterogeneous : before 1983, the international arms markets is still dominated by furnishers, while after 1984, they became very influenced by buyers. A high level of national arms production is necessary to conserve the competitiveness of Arms industry, but this policy cannot be continued for many years in the future without cooperation with the others developed countries, particularly in Europe.

Table 1 - Regressions (data origin, SIPRI for French arms exports and French Ministry of Defense for French military budget).

Variables	EAP(-1)	EAP(-2)	EAP	Cte	R squared
DEBD	- 0,059 (0,21)			7,36	0,004
DEBD		- 0,056 (0,21)		7,26	0,004
DEBD			-0,415 (1,584)	21,06	0,201
DEBD	0,468 (1,214)	-0,550 (1,240)	-0,774 (2,149)	38,25	0,366
T5			0,189 (1,07)	5,043	0,189
T5	0,432 (1,085)		-0,169 (0,373)	2,507	0,172
T5	0,330 (9,018)			-	0,162
T5		0,339 (8,831)		-	0,191
T5	-0,131 (0,128)	0,441 (0,605)	-0,008 (0,016)	1,510	0,194

guerre (CIEEMG), chaired by the Secrétaire Général de la Défense Nationale, with the representatives of the Ministers of Defense, Foreign Affairs and Economy and Finance and the General Staff of Military Forces. There are the "Clause de la destination finale" (end use control, but without any analysis of re-export possibilities) and the control of export operations and more generally the Coordinating Committee (COCOM).

Arms industry cooperation become very important, because of the growing costs of the military equipment. Then it is very difficult to save the strategic necessity of independence and autarky and the economic constraints.

II. Armament cooperation

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 products.

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 Délégation Générale 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.

European industry has a deteriorating position in high technology, since between 1975 and 1985, the rate of foreign penetration was increased by 8 per cent while exports declined by 2.5 per cent. Thus, there is a need for European cooperation in military research, in order to reduce the technological gap in armaments (especially a strategic computing programme, on design automation, on emerging technologies). The EEC programmes like ESPRIT, BRIT or EUREKA are very advantageous for civil research

and military applications will not be negligible. The Groupe Européen Indépendant de programmes (GEIP) is strengthening cooperation for the structural rationalization of european resources, but the results are not yet sufficient. On specific programmes, French cooperation with individual EC countries seems to be more rewarding.

New agreements with the FRG on fighting helicopters, with european partners on future antitank missiles and with Atlantic Alliance partners on multiple "lance-roquette" or rocket-launcher (MLR) were recently signed. SNECMA and General Electric are to produce C.F.M 56 engines with dual technology and Thomson and G.T.E. are partners on the american version of RITA. There are two military industrial projects with Canada on Drone CL 289 (with the FRG) and an antitank missile (Eryx) for French needs. The success of cooperation projects implies very close common needs on the technical characteristics of materials, well-structured official and industrial organization, serious forecasts of costs in order to measure the advantages of cooperation, an improvement in or maintenance of the competitiveness of the national industries involved in the programme and a good prospect of national initiatives on exports.

Table 61 - European military programmes involving France over the last ten years.¹

Programmes	Finance(%)	Enterprises	Deliveries	Orders	Technology transfers
Missile Hot	France 50 FRG 50	- Aérospatiale - M.B.B.	1974-1991 and beyond	France 17000 FRG 25000 Export 27000	NO (2.1)
Missile Milan	France 50 FRG 50	- Aérospatiale - M.B.B.	1974-1991	France 64000 FRG 90000 Export 62000	U.K. Italy (3.8) India
Missile Roland	France 50 FRG 50	- Aérospatiale - M.B.B.	1977-1988	France 7000 FRG 14000 Export 3500	USA (10)
Minesweepers Tripartite (CMT)	France 33 Netherlands 33 Belgium 33	- D.C.N. - Van der Geissen - Mercantile & Béliard	1983-1989	France 10 Belgium 10 Netherlands 15	NO (2.5)
Helicopters Lynx-WG 13	France 31 U.K. 69	- Aérospatiale - Turboméca - Westland - Rolls Royce	1978-1984	France 40 U.K. 218 Exports 71	NO (2)
Helicopters S.A. 341-342 Gazelle	France 74 U.K. 26	- Aérospatiale - Turboméca - Westland - Rolls Royce	1973-1990	France 343 U.K. 282 Export 426	NO (2.2)
Helicopters SA 330 Puma	France 92 U.K. 8	- Aérospatiale - Turboméca - Westland - Rolls Royce	1969-1989	France 185 U.K. 48 Exports 247	Romania Indonesia (2.7)
RITA (Communication System)	France 95 Belgium 5	- Thomson - Bell Telephone Manufacturing Co	1981-1985	France 1 Belgium 1 Export USA 1	NO (8.3)
Jaguar Aircraft	France 50 U.K. 50	- AMD.BA - Turboméca - B.Ae - Rolls Royce	1972-1982	France 200 U.K. 203 Export 94	NO (9.2)
Alpha Jet Aircraft	France 50 FRG 50	- AMD.BA - Turboméca - SNECMA - Dornier - Rolls Royce	1976-1984	France 175 FRG 175 Export. 151	NO (7.8)

¹ Assemblée Nationale, Première Session Ordinaire 1987-1988, Tome X, "Défense. Recherche et industrie d'armement par Jean-Pierre BECHTER, 8 Octobre 1987. page 35. Senat : Tome IV Défense Section Commune par Xavier de Villepin Session ordinaire de 1987-1988". The figures in brackets into the last column give the financial balance-sheet of the programmes.

There are also management companies that offer products which are the results of joint developments with various companies of the EEC countries and then contract out production competitively. (for instance, Euromissile in 1972 in Paris, for France and FRG and Euromissile Dynamics in Paris for France, FRG and UK in 1976). 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.

French trade-unions are very suspicious of European military arms cooperation which is accused of being the main cause of the loss of manufacturing activities, to the detriment of regions and workers. For example, the European Space Agency is dependent on co-finance agreements and, as a result, countries call for participation in the production process. There is technology transfer without any counterpart being received by French industry. Thus, there is a strong tendency for the ESA to produce unequal relations among European countries to the detriment of France. For the trade unions, arms industry cooperation between the countries of EEC is not very advantageous in terms of employment or the technology gap in the space industry in favour of France's partners. "West Europeans have relied heavily on collaboration to sustain their military-industrial-scientific-technological system (MISTS). Foreign support is sought not only for specific weapons projects but also for national organizational structures themselves and for their continuing technological advancement. These organizational structures, while indigenously based, depend critically on external technological know-how and on guaranteed markets among collaborating states. The cost of weapons research and development and the high unit costs of exclusively national production, in the absence of available global marketing outlets, generate strong incentives to cooperate. This is so despite in evitably higher average costs of multinational versus national programs. Thus, the markets drives a major portion of Euro-

defense production, although individual states seek general political autonomy in arms production as well"¹

The french arms industry lived with exports. Now it must live with cooperation and exportation.

Jacques FONTANEL
Louis PILANDON

¹Edward A. KOLODZIEJ : "The political economy of making and marketing arms : a test for the systemic imperatives of order and welfare". Paper delivered at the Meeting of the International Studies Association, London, April 1, 1989.

Bibliographie

Aben, J. (1986), *La défense nationale face à l'inflation*, Fondation pour les Etudes de Défense Nationale, Paris.

Aben, J., Fontanel, J. (1990), *Economie de la défense*, Ares "Défense et sécurité" 1990/4, Grenoble

Assemblée Nationale, Première session ordinaire, Tome V. Défense,, recherche et industrie d'armement, 13 Octobre.

Brzoska, M, Ohlson, T. (1985), *The trade in Major conventional Weapons*, SIPRI Yearbook 1985, Oxford University Press, 1986.

Chesnais, F. (1990), *Compétitivité internationale et dépenses militaires*, Economica, Paris.

Dussauge, P. (1985), *L'industrie française de l'armement*, Economica. Paris.

Fontanel, J. (1982), *Military expenditures and economic growth (France, Morocco)*, United Nations Copyright, 1982 (160 pages).

Fontanel, J. (1984) *L'économie des armes*, Edition La Découverte, Paris.

Fontanel, J., Smith, R. (1985), *L'effort économique de défense*, Ares, Défense et Sécurité, n° Spécial.

Fontanel, J., Smith, R. (1985), *Analyse économique des dépenses militaires*, *Stratégique*, n°3.

Fontanel, J. (1990), *The economic effects of military expenditure in Third World Countries*, *Journal of Peace Research*, Vol. 27, n° 4, November

Fontanel, J. (1990), *French Arms Industry*, Cahiers du CEDSI (10) Université Sciences Sociales, Grenoble.

Hébert, J.P. (1988), *Les ventes d'armes*. Syros-Alternatives, Paris.

Kolodziej, E. (1989), *The political of making and marketing arms*. Paper deliver at the meeting of The International Studies Association, London, April.

Martin, S., Smith, R., Fontanel, J. (1987), *Time-series estimates of the macroeconomic impact of Defence spending in France and Britain*. in "Peace, Defence and Economic Analysis" (Schmidt C. & Blackaby F., Ed). Mac Millan, London.

Schmidt, C., Pilandon, L., Aben, J. (1989), *Defence spending in France : the price of independence*, Mimeo, Paris. Smith, A. , Humm, A., Fontanel, J. (1985), *The economics ,of exporting arms*, *Journal of Peace Research*, Vol 2(3).

Smith, R., Fontanel, J. (1987), *Weapons Procurement. Domestic production Versus Imports*, "New Conventional Weapons and Western Defence" (Bellany & Huxley, Ed.), Frank Cass.

Smith, R., Humm, A., Fontanel, J. (1986) *Managing the Cost of Defence. A comparison of the British and French Experience*. *Public Money* , Vol. 5