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▶ **To cite this version:**

Jacques Fontanel. The economic significance of military expenditure and the economic impact of disarmament. [Research Report] UNIDIR, United Nations Institute for Disarmament Research. 1991. hal-02960094

HAL Id: hal-02960094
https://hal.univ-grenoble-alpes.fr/hal-02960094

Submitted on 7 Oct 2020

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The economic significance of military expenditure and the economic impact of disarmament

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UNIDIR
GE.91-02289
UNIDIR/91/54
Genève, 1991

Résumé : L'analyse de l'impact des dépenses militaires sur les économies nationales produit souvent des résultats différents selon l'espace de temps étudié (court ou long terme) et les pays (producteurs ou non d'armements). Les dépenses militaires dans une Nation sont supposées produire un effet positif sur la sécurité d'un pays, mais ce service reste difficile à évaluer, car le budget de défense n'est pas nécessairement bien utilisé dans le cadre d'une stratégie de dissuasion ou de conflit. Cependant, il est intéressant de mesurer leur influence sur l'emploi, l'inflation, la croissance économique ou l'investissement et de déterminer les économies éventuelles produites par un contrôle international des armements et les coûts et avantages politico-économiques à relier développement et désarmement.

Summary: The analysis of the impact of military spending on national economies often produces different results depending on the time span studied (short or long term) and the countries (arms producers or not). Military spending in a nation is supposed to have a positive effect on a country's security, but this is difficult to assess because the defence budget is not necessarily well used as part of a deterrence or conflict strategy. However, it is interesting to measure their influence on employment, inflation, economic growth or investment and to determine the possible savings produced by international arms control and the political and economic costs and benefits to be linked between development and disarmament.

Mots clés : dépenses militaires, inflation, croissance, emploi, désarmement pour le développement, industries d'armement, course aux armements.

Keywords: military spending, inflation, growth, employment, disarmament for development, arms industries, arms race.

Analysis of the economic advantages of disarmament has all too often been tersely reduced to the celebrated dictum "guns or butter". The great majority of economists have always regarded military expenditure as unproductive, as a burden to be minimized to the greatest extent commensurate with security constraints, so as to increase the potential for economic growth. That is tantamount to saying that, all other things being equal, a decision to disarm was seen as a procedure conducive to economic growth. The thesis is, however, one that has been disputed by such widely differing economists as Marx (1860), Galbraith (1960) and Benoit (1978) and called into question by the programmes of the Brazilian and Indian arms industries based on policies of economic development through import substitution and "industrializing" industries. That amounts to the assertion that the dividends of disarmament seem no longer to be a positive inevitability but a potentiality to which restrictive hypotheses may apply, at least in the short term. Until recently, in fact, economists have not derived any real inspiration from disarmament. Strictly speaking, it cannot be said that there is an economic theory of disarmament, but rather that there are some often contradictory economic analyses of armament (Fontanel, 1990b). There are five main arguments in support of this attitude:

(1) On its own, economics is a discipline that is incapable of encompassing all the problems of defence. For half a century past, economists have attempted to establish the existence of regularities and laws that did not fit in well with the real constraints of power, impending danger and conflicts. This attitude has been an essential element in the continuous neglect of the multidisciplinary aspects of defence.

(2) The United States was for long persuaded that it was one of the aims of Stalin and his successors to impel the countries with market economies to expand their unproductive disarmament expenditure to the point of ruination. The Soviet leaders were of the opinion that the free world was incapable of maintaining its way of life and

simultaneously generating vast military capacities. Historically speaking, the mobilization of considerable resources in peacetime for the acquisition of permanent military forces is a recent phenomenon; the volume of military purchasing in the interval between two war situations was previously very low. According to Schelling (1966), this "cost-imposing" strategy is rational only for a zero-sum game, which is not often the case. The two powers involved do not, in fact, improve their security by simultaneously increasing their military expenditure. Being imbued with economic considerations of the exhausting effects of the arms race, the economists of the two systems have, however, concerned themselves all too rarely with the economic advantages of disarmament.

(3) War is often synonymous with profound social transformations. The basis of war is not exclusively economic; it exists in the context of the struggle for power, and of religious and ideological convictions. Under these conditions, only massive armament is open to negotiation. Coexistence of the two economic systems, the capitalist and the socialist, is deemed to be impossible in the long term because they are both imperialist and antagonistic. Disarmament seems highly unlikely. Two contrasting analyses are possible in the present situation of reform in the Eastern countries. On one view disarmament has become a possibility because "socialism" in the form in which it existed is now on the way out, while the other makes the assumption that the convulsions of the economic and political reforms in the countries of Eastern Europe are occasions for social conflict and rearmament heralding war situations (Fontanel, 1990d).

(4) States have to protect their wealth or run the risk of being deprived, ultimately, of their rights over the distribution of the world's wealth, a situation pithily summarized in the maxim: "Money to get the power and power to keep the money". The economist, however, cannot be content with this recommendation, despite the fact that it is often borne out. He must also consider what burden of defence the economy of a country can assume without putting its growth at risk. Defence expenditure is a vital necessity for developed countries that do not wish to be plundered. Japan and Germany are special cases, in the sense that their armed protection has been entrusted to other powers, and

they are thus left free to realize their full potential in the economic sphere. In a war situation, defence takes over the whole of the national economy. In peacetime, governments faced with a military reluctant to see defence imperatives subordinated to economic considerations have to take into account the balance that must be maintained between expenditure that may prove to be impoverishing and the maintenance of national security. There is, therefore, a choice to be made between today's and tomorrow's security, a choice dependent on the nature and strength of international tensions. The defence effort, which we know to be covered by unproductive expenditure, may have adverse effects on the economy as a whole. When the State and the Nation are one and the same, military expenditure is public property in the full sense, so that its quantitative and even its qualitative determination are independent of the market. Under those conditions the government has to make a choice, which it may sometimes be free to make (particularly in a war situation), but which is often at least partly determined by the inertial effects of military expenditure, the extent of the strategic threat and the country's actual economic situation. The State must therefore settle on the "razor's edge" of spending just the amount needed to give itself military protection in the short term without threatening the increase in wealth needed to maintain the defence effort. It is extremely rare for what is militarily rational also to be economically rational. Furthermore, the economy of the day is a battlefield, and any limitation of the defence effort may lead to a progressive alteration in the global geography of the satisfaction of needs. The possible effects of a reduction of military expenditure or of disarmament are not confined to improvement of the macroeconomic results of the country concerned; they also modify the distribution of the advantages of growth, and effect a partial redistribution of the cards of international competitiveness, thereby transforming some quite delicate balances and giving rise to the at times unbearable tensions inherent in periods of change.

(5) Does disarmament give rise to economic factors or do they stem from it? If disarmament is a "discrete" (not economically deterministic) decision of a political nature, reduction of military expenditure is then seen as an instrumental or exogenous variable

that modifies the conditions of economic growth. If, on the other hand, economic factors condition the disarmament process, it becomes more of a consequence of a state of crisis in society brought about by failure to satisfy national consumer requirements or by an increase in the rate of unemployment. Disarmament and development would appear to exert simultaneous relationships, each being at the same time both the cause and the result of the other. Advocates of the New Economic Order see disarmament more as a consequence of development. Under those conditions disarmament processes initially follow a course of the development of the poorest countries and even in some instances of a more equitable distribution of world resources. Conflicts are not confined to arms production, but also find expression in economic, political and cultural domination. There is therefore no point in negotiating disarmament if nothing else is done to reduce or eliminate the causes of the arms race. In an increasingly interdependent world, geopolitical considerations involve a definition of security that is both economic and military. Underdevelopment is a threat to world peace (Declaration of the Panel of Eminent Personalities in the Field of Disarmament and Development).

Present day economic analysis is not such as to permit a clear reply to the three fundamental questions of the economics of defence and consequently of disarmament:
What choice should be opted for between guns and butter (i.e. the opportunity cost of military expenditure in civilian production)?
What is the explosive power of a dollar (the "bang for a buck"), i.e. the explosive power of a dollar spent on national defence?
How much has to be spent and in what way must it be spent (i.e. the search for the optimum level of military expenditure)?
These questions are, moreover, very closely interconnected, since the explosive power of a dollar is worth knowing as an indication of how much must be earmarked for national defence in a situation of relative scarcity. Economists concern themselves mainly with the first and third of these questions. There are many myths connected with thinking on the dividends of peace, which are supposed to be considerable, and capable of solving the

economic and social problems of countries, despite some inherent costs and difficulties (Hartley, 1990a). In the context of a study of disarmament, economists have to give consideration to:

(1) the scientific methods employed in the economic analysis of disarmament;

(2) whether military expenditure is endogenous or exogenous;

(3) the forms of disarmament, which produce different economic situations;

(4) the foundations of disarmament in economic thought;

(5) historical experience of the relationship between the economy and disarmament;

(6) the application of empirical and quantitative methods to the economic analysis of military expenditure;

(7) the results yielded by the main economic models of disarmament; and

(8) the economic significance of disarmament for the development of developing countries.

I. Methods for the economic analysis of disarmament

All the methods in general use in economic analysis may be applied to the economics of disarmament. No economic situation is ever repeated in exactly the same form. The experimental approach is practically impossible in economics, and in any case the information that it yields is limited because events do not repeat themselves. Under these conditions the methods of analysis most employed are deductive analysis based on postulates, empirical simulation models, evaluations of reduced forms, input-output tables, and historical and monographic studies (Smith, 1989). Nevertheless, the theoretical problem and the practical difficulty of demonstrating the validity of models argue in favour of the use of several methods simultaneously or in an iterative procedure.

I.1. Theoretical deductive analysis

For the rationalist method (the method of testing the truth of axioms), economic theory consists of a set of logical deductions based on unverifiable premises that cannot be objectively experienced. The validity of theories depends on the definition of the symbols that they embody and on the rules of deductive logic. The conclusions are

dependent on the axioms and validation of the theory amounts to demonstrating its internal coherence. Nevertheless, "rationalist" economists have very frequently ignored the military reality which, it must be quite clearly stated, was very far from the rational forms of behaviour of economic man. "Deductive" analyses of the economic effects of armament (or disarmament) have not led to a unified view of the nature of military expenditure and its impact on the basic economic variables of a Nation; that is clearly not surprising when we recognize the extent and the diversity of the debates to which political economy gives rise. By way of synthesis, however, it may be said that economic theory suggests that the defence effort has not inconsiderable economic effects, particularly on the volume of public demand, the structure of supply, the organization of production, trade and distribution, and on the competitiveness of companies and, consequently, on economic growth.

The thrust and extent of the impact of military expenditure on the national economy are dependent on chance contingencies such as the pressure of effective demand, industrial organization, the economic policies pursued etc. It has been argued in several deductive studies that the (long term) structural effects may differ from the effects of the situation. Thus, an increase in military expenditure may, in the short term, have a favourable effect on economic growth when the situation is one of underemployment, but it is also liable to give rise, in the longer term, to inertial effects harmful to socioeconomic development. Having regard to these developments, that are contradictory over time, and to the specific nature of the economic relationship of each State to defence (whether it produces or imports arms, the comparative importance of its defence effort in the light of the actual economic situation etc.), it could be said that economic theory was incapable of providing an unambiguous reply to the question whether a greater military effort was likely to slow down or accelerate economic growth (Faini et al., 1984). It has been commented that the comparison of these theoretical models with the statistical series of military budgets compiled annually by several bodies, with a view to verifying the capacity of the various models to provide explanations, is no easy matter owing to the

obvious deficiencies in the specification of the variables and parameters adopted in most models, and in explaining their dynamic functioning (Schmidt & Dussauge, 1983).

I.2 Simulation studies

A catalogue of facts does not give rise to any theory because it is necessary to go beyond the observation of events in order to arrive at a proper understanding of their reality. Deduction rests on observation and vice versa, and there cannot be any induction in the absence of initial hypotheses. The validity of a model cannot be restricted to the truth of the hypotheses, but must also be dependent on the capacity of the system as set out to predict the behaviour of the real system, even if, in some instances, the cause and effect relationships or simultaneous relationships misrepresent or simplify the reality. The "positivist" economics advocated by Phelps or Friedman emphasizes that a model is valid if it yields correct information on the actual operation of the system. The first step in the construction of a model is the creation of the information. Formal systems are merely artefacts, products of human ingenuity, that imitate how events appear and are characterized by functions. Models have to be evaluated in terms of how well they communicate and the quality of the information created in relation to the objectives laid down at the time of construction. The economist has therefore to consider which variables should be accepted, the level of their aggregation, the relationships being tested and the basic aims of the study. For example, military budgets may be disregarded in a macroeconomic growth model concerned with the relationship between labour and output, whereas a study of the economic impact of the defence effort requires military expenditure to be adopted as a key variable of the formalized system. Nevertheless, this methodology is not without its shortcomings, prominent among which are the dubious significance of the results obtained, the obvious risk that the relationships will be unstable and the low degree of relevance as a tool in economic decision taking.

Simulation studies require the establishment of strategic-economic models that emphasize the economic effects to be expected from ongoing disarmament. The econometric results are based on the empirical characteristics of the national economy

under consideration, while relationships and military and economic "feedback effects" are established by the system of equations. Theoretical experimentation affords new scope for an understanding of the economic phenomena involved through multiplication of the possible scenarios. Nevertheless, macro-models do have their limitations, which are well known, and the results remain specific to the country under investigation. There is a need to develop empirical tests on the conclusions derived from the simulation model. Comparison of the results of the simulation with the actual facts may then result in the partial abandonment of the theoretical hypotheses, with the economist seeking to determine the areas of application arising from the experiment. With this method economists may, however, conduct theoretical experiments on the impact of military expenditure or investment on the key economic variables. The present situation is that the main makers of models have not always built the dimension of national security into their formalized system, and that when they have done so it has all too often been after the core of the model has already been constituted, with the result that the variables of the defence economy are tagged onto it. Even so, these studies have very interesting results, although they are not always easily explicable, having regard to the complexity of the model. Many specific models make use of information drawn from several countries in a horizontal (cross-sectional) approach, thereby neglecting chronological analyses. Moreover, it is of some interest to note that multiplier effects are typically analyzed on economic information of the same year (horizontal spatial analysis) and with respect to more than one country, depending on the criteria of homogeneity specific to each study. Econometric models in which chronological series of data are used lay the emphasis on short-term effects, since all the information considered relates to the recent past. Conversely, models based on a sample of data concerning a broad range of countries in different stages of development generate parameters of long-term impact. Taken in conjunction, these two types of analysis provide a good overall view of the effects of military expenditure on development.

I.3 Evaluation of reduced forms

Simulations employ structural relationships that emphasize the basic connections between the main variables in the economic process. In the absence of models of this type, the evaluation of reduced forms of simple equations or of small formalized systems yields interesting information on the relationships between investment, unemployment or prices and the economic variables of defence (Smith, 1980; Fontanel, 1980). The formalized system will be deemed valid if, in the event, it confirms the calculated prediction within a degree of accuracy laid down in advance. This method is of value for the detection of statistically significant relationships corresponding to the initial hypotheses. It is applied heuristically (especially to back up the researcher's intuition regarding the nature of the basic macroeconomic relationships), but is also used to verify the application of a theory on a concrete example.

It is an intuitive assumption of this highly empirical method that observation is the main source of knowledge. In fact, the economist analyses events by creating and trying out hypotheses. The main question is to determine the dynamic relationships of feedback in order to identify the Grangerian causality of military expenditure on the other economic variables (Chan, Hsiao & Keng, 1982; Georgiu & Smith, 1983). These relationships do not really explain the basic relationships of the process; they operate in accordance with the "black box" procedure and consequently yield little information on the mechanisms of transmission and on what needs to be done to alter the "course of events".

I.4 Historical studies

History serves as a means of confirming or invalidating conclusions from explanatory theories in all current research on the validity of models. The inadequacies of quantitative analyses make it essential to utilize qualitative information, and that implies historical research on the influence of the variables of defence on national economies. History is, however, unable to make allowance for the logic of the subsequent sequence of the constituent parts of economic situations. Even when there is

systematic data gathering, no more than a trace of the structures and behaviours is retained, and the tools of history are scarcely adequate to translate the complicated succession of events in dynamic systems. The drawing of an analogy between past and future events comes up against the difficulty of the description of situations observed at different periods and in different terms with quite precise structures. The past is gone for ever in economics. The great lesson of history is the diversity of events and the relativity of laws. Social reality is unique and historical; it is the end and the beginning of other series of events. The method is a very useful one for the study of situations in which the hypothesis of structural stability cannot obtain, in particular during periods of war or intensive disarmament. Furthermore, historical studies bring out political and social factors that do not lend themselves readily to calculation and statistical analysis. Times of great change call for qualitative historical analysis.

I.5 Case studies

Case studies may play a similar role at the microeconomic level to that of historical studies in macroeconomic analysis. A thorough examination of armaments manufacturers or of the cost of weapons systems yields details of value for an understanding of broader economic phenomena, and in particular for assessment of the quality of hypotheses on the behaviour of the military sector. Although such studies are uncommon, on account of the secrecy that surrounds military matters, they are often of interest (Hartley, 1983).

All the methods here reviewed may help to improve our knowledge of economic phenomena, but none can lay claim to monopoly in that respect. Economic analysis is devoted to reasoned observation, i.e. to statistical criticism and rational construction. A theory is verified when its consequences are borne out by observation. Following Karl Popper, it is worthwhile seeking to establish how far the preferred model is confirmed rather than to pursue its unattainable absolute verification. Confidence in the formalized system is increased if empirical tests fail to yield negative results. Gradual confirmation of the law replaces definitive attempts at verification. To sum up, there is an apparent

need to use combinations of methods in the treatment of economic problems relating to military expenditure.

II. The economic determinants of military expenditure

The basic question where disarmament is concerned is to know whether it is self ordained or whether it is the result of an endogenous systemic process. If armed conflicts do not always stem from imperial fiat, there may be economic factors at the origin of conflicts, along with the quest for power and ideological considerations. Nevertheless, States may always opt to control their levels of armament, either because they fear that massive stocks of arms could harm all Nations, or because they seek an agreed reduction in the level of such unproductive expenditure. If other conditions are equal, such a decision will alter the conditions under which national economies operate.

II.1 The special nature of military expenditure

Economic theory makes the assumption that military expenditure does not directly satisfy an economic need (in which sense such expenditure would reduce the resources available for the common good) and that it is unproductive (Fontanel & Smith, 1985). As regards armament, we may consider how the State can make strategic choices that are also economically effective. What do soldiers produce (what is their output)? What types of armament (or disarmament) should be demanded? It is difficult to provide answers to these questions, and all are open to dispute. The theory of public financing provides interesting ideas on the optimum level of government expenditure of public property. Public property is endowed with some remarkable properties in economic theory: it is indivisible, and there is no rivalry or exclusion in its consumption. Defence is usually analyzed as public property pure and simple, with no rivalry or exclusion in its consumption, which remains true in the context of a military alliance (Olson & Zeckhauser, 1966). The view is, however, one that is not always borne out because defence strategies may modify this monolithically public nature of the satisfaction of the need for international security. Nuclear deterrence from the weak to the strong and the balance of terror are strategies that verify the three basic properties of public property

pure and simple. On the other hand, the non-violent strategies of Gandhi's India and of the civil defence developed in particular by the Swiss Confederation make it impossible to continue to define the defence effort as public property pure and simple, since they imply greater autonomy in the taking of decisions by those involved. Hewitt (1991a) is of the opinion that, despite appearances, military expenditure does not lend itself readily to the traditional economic analysis of public expenditure. The optimum level of military expenditure is a concept that is prescriptive, political, strategic, psychological, economic and even moral, with the result that theoretical analysis of public property is relatively powerless when it comes to revealing the financial choices of defence. That is not to say that the economist can neglect the economic analysis of military expenditure, but there is the need to be aware that it has its limits and that it has a bearing on only one part of a multidisciplinary body of thought.

Economists generally regard military expenditure as an element or cost needed to ensure national security. Defence is therefore an output measured in terms of the level of security ensured by the size of the military expenditure relative to the external threat and the actual political situation. Just like the idea of utility, however, the concept of defence is scarcely such as to permit the definition of cardinal units capable of providing clear indications of the degree of security of each country. That being the case, economists regard the level of defence as a monotonic function of military expenditure, whatever its form, the strategy and the arms that it procures. Introduction of the idea of conflict and security makes a distinction between cosmopolitan economics (as the science whose subject is the economics of material well-being) and political economy (as a project by which a State achieves prosperity, security and power). Only occasionally does economic rationality coincide with political and strategic rationality (Saby, 1991). Thus, the military expenditure of one country constitutes a threat to other countries and that helps to accelerate the arms race. The connection between military expenditure and the benefits of defence is the subject of conflicting debates over, in particular, the dangers of invasion, and the correspondence between military expenditure in the prevention of an

attack, the quality-cost estimates of each force or arm (which should be the same for all the instruments of defence in an economic optimum concept), the sectorial, regional and temporal redistribution of the economic profits and losses of the military effort and the potential satisfaction of other collective aims from the costs of the military sector.

Military expenditure is not, in general, taken as a variable in national or international macroeconomic models, and when it is such expenditure is treated as an exogenous variable unilaterally determined by the State. This view is unsatisfactory because military expenditure as an instrument of defence or of war is in the category of essential economic variables whose impact is not confined to discrete actions (in the mathematical sense of the term) of possible disarmament agreements or armed conflicts, but is also expressed in the continuity of the national defence effort needed in the long term. Depending on the immediacy of the threat and the power of the States, economic factors are more or less heavily involved in the determination of military expenditure (a fact frequently presented as the choice between guns or butter). Collective choices both of what is an acceptable economic defence effort and of the establishment of concrete measures of national security are however often influenced to a considerable degree by other factors, notably strategic and political factors, such as the imminence of war, the ideological struggle, and the view taken of the risk of international and even national conflicts, having regard to the costs involved and the risks entailed by the foreseeable defence systems.

II.2 Military expenditure and the structure of public expenditure

Through the inertial effects that they exert on economic flows, military budgets maintain the activity of whole branches of industry, ensuring them some financial security and an additional growth potential through the development of economies of scale and effects of domination. Relying on a study of the proportions of military expenditure and private expenditure in the GDP, Russett (1969, 1970) concludes that military expenditure modifies investment, individual consumption and State and regional expenditure. According to him, there is a substitution effect between social expenditure and military

expenditure in the United States. However, this hypothesis has not always been borne out when reexamined by more sophisticated methods and over a longer period of time (Russett, 1982). A similar conclusion was arrived at by Domke (1983) for the United States, the United Kingdom, West Germany and France.

Studies on the relationship between military expenditure, expenditure on health and expenditure on education yield contradictory results for developing countries. While the reports of Brandt (1980, 1988), Palme (1982) and Thorsson (1981) assert that military expenditure is a threat to economic growth and development, and therefore to future security, they condemn the use of public funds in the military sector to the detriment of health and education. As was the case for the developed countries, econometric studies on the negative relationship between expenditure on health and military expenditure yield contradictory results. Thus, while Deger and Looney confirm this hypothesis, it is questioned by Kennedy (1974), Ames and Goff (1975), Hayes (1975) and Verner (1983). In fact, we may question the permanency of a relationship that may change with the actual economic situation in which choices are exercised by governments. Most of the analyses that have been made in developing countries conclude that countries in which military expenditure is low are also modest consumers as regards education and health (and vice versa), that military expenditure is just as vulnerable as other forms of public expenditure to a reduction of the State budget, and that there are scarcely any consequences on appropriations for health and education following an increase in military expenditure. In the recent study by Harris, Kelly and Pranowo (1988), the hypothesis that the greater is the amount of public expenditure allocated to military expenditure, the lower is the share of expenditure on health and education was borne out in only 40 per cent of cases examined relating to 50 countries. Effects of substitution between military expenditure and social expenditure are weak and military expenditure is found to be quite sensitive to a reduction of public expenditure, at all events clearly more so than is social expenditure. In developing countries military expenditure is first and foremost a matter of personnel costs, and this characteristic reduces the ability of a government drastically

to modify the level of such expenditure. There is therefore an inertial effect that is all the stronger to the extent that employment is a factor in the decision. The analysis of Hicks and Kubisch (1983, 1984) emphasizes that social expenditure is less vulnerable than expenditure on defence and administration to a reduction of public expenditure in developing countries, and far less vulnerable than the productive sectors and the infrastructure. This analysis has been verified for developing countries by Hewitt (1991a) and by De Masi and Lorie (1990). In the first case governments were confronted with a rise in interest rates; they tackled this by increasing their public expenditure and reducing the importance of some sectors, in particular military expenditure and expenditure on economic services. Social expenditure, on the other hand, tended to be maintained or even to increase. According to the authors of the second study, military expenditure was slightly reduced when the adjustment programme requested by the World Bank called for a tight fiscal policy. On the other hand, when public expenditure could be increased it was the non-military sector that took priority. The inertial effects of military expenditure were higher than those of other public expenditure. There was therefore a stabilizing effect, referred to by Galbraith (1968) as the safety margin.

II.3 Military expenditure as an endogenous variable

The last decade has witnessed the development of a number of formalized studies, often backed by econometric research of varying degrees of complexity, the aim of which was to explain the economic foundations of military expenditure. The results obtained have not always been either coherent or generalizable on account of the contradictory analyses in time and space that they prompt. However that may be, current economic analysis is still failing to produce decisive results in this field of thought, in which most studies are relatively recent, mainly post 1965. In the economic context, military expenditure is limited by the available resources, although national security implies costs that are often determined by other than economic considerations, such as the extent of the threat, how the possible conflict is viewed, the will for power of those concerned etc.

Military expenditure may be regarded as a variable that is half endogenous and half exogenous. That is how authors who take a marxist line come to consider that military expenditure serves both to offset the weakness of internal demand (Cypher, 1974; Krell, 1981), and to soak up the surplus that monopoly capitalism secretes (Baran & Sweezy, 1966), or to weaken the socialist economies obliged to accept the arms race in order to survive (Gerbier, 1984). More generally speaking, several economic determinants of military expenditure have been discovered:

the more powerful is the State, the more likely is it to have significant resources. There is a positive relationship between the civil budget of the State and military expenditure (Lotz, 1970; Harris, 1986; Fontanel, 1980), from which it would appear that the vagueness that is a feature of the options of governments in matters of security was countered by an inertial effect inducing governments to set military expenditure at a more or less constant proportion of the public budget from one period to the next;

military expenditure is often seen as an economic burden. The larger is per capita income in a country, the less, proportionally, is the State inclined to increase its military expenditure (Lotz, 1970). This is the analytical expression of the choice between guns and butter;

as a factor of development, urbanization also exerts a positive influence on the level of military expenditure, probably because the regrouping of the population carries with it the threat of new internal dangers (demonstrations, conflicts, etc.) and external threats (Lotz, 1970);

the availability of petro-dollars is a factor that tends to increase military expenditure in developing countries, both to curb the territorial, political or economic ambitions of neighbouring countries and to take up the surplus of abundant resources, giving way to the "demonstration effect" in emulation of richer countries (Deger & Smith, 1983);

cyclic movements of the economy (Griffin, Wallace & Devine, 1982; Galbraith), in particular the attempt to maintain full employment in the short term (Smith & Deger, 1983), are not unimportant cause variables of the military expenditure of developed

countries. Under those conditions, the status of military expenditure vacillates between the endogenous and the exogenous, it being understood that endogenous stimuli restrict the possible scope of a partly exogenous decision, making it the object of a vote and of a spectrum of possibilities, the width of which will vary with the immediate economic, political and strategic circumstances;

the existence of a military and industrial complex tends to have a positive effect on military expenditure (Melman, 1974; Kidron, 1970; Griffin, Wallace & Devine, 1982). Such a complex is undeniably economic in nature, even if the epithet does not suffice to characterize its social and political scope. Militarization of the economy is briefly defined as a particular social attitude according to which war, the threat of war or preparation for war are a major collective concern, implying a substantial degree of legitimacy, considerable political influence of the military sector over government decisions and a significant allocation of national resources to cover the constraints of national defence. Militarization embraces the sociological, political, economic and social dimensions of the production, sale and use of arms. For Ron Smith (1983), militarization involves the level of military expenditure, the militarization of internal social relationships, trends towards war or the use of force in international relations, and the proliferation of nuclear arms. In a broader setting, and with reference to the United States, Adams and Gould (1987) point out that the extent of military expenditure is dependent on national security (and mainly on ideas relating to "the margin of superiority" or "windows of vulnerability"), but also on the workings of the Pentagon, stemming in particular from competence, but also from the services promoting themselves and from the rivalries between them, from the realities of the competition between arms manufacturers and the perception of insecurity. The "iron triangle" or "the government within the government" (the government, the arms industries and the Congress) has some impact on the choice of materials, their quantity, their make-up and their cost, with all the wastage that such a situation implies, and it operates by virtue of a great complicity of special interests based on close working relations, with considerable links between Federal officials and arms

firms and increasingly tenuous contacts with the democratic machinery of government. Under these conditions it is no longer the Head of State and the constitutional bodies that decide the level of military expenditure, but a network of interests

The debate on the matter has been enriched by three new studies. For Gonzales and Mehay (1990), military expenditure is dependent on population, on the military expenditure of allied and opposing countries (although this has not been confirmed for developed countries), on the per capita Gross National Product, and on the democratic nature of the societies concerned or constitutional limitations on expenditure. Hewitt (1990b) used a two-equation model for simultaneous determination of the level of central public expenditure and military expenditure. The public budget is dependent on the availability of funds, both national and international, on the material well-being of citizens, on the political situation and on the ideological priorities of governments. The results show military expenditure to be dependent on economic, financial, political and geographical variables. Military expenditure has a favoured position in the sense that the greater is the National Product and the less the richness effect, the more positive is the effect on it. On the other hand, whereas indebtedness tends to reduce the defence effort, the situation is different for public international aid, although this hypothesis is refuted by Cashel-Cordo and Craig (1990). Furthermore, the existence of wars, both civil and international, monarchies, military governments and socialist States are, in decreasing order of importance, factors that increase military expenditure. Geographic variables such as land area or land frontiers (and sea frontiers, to a lesser degree) have a positive effect on the defence effort. Lastly, it should be noted that consideration of the military expenditure of opposing and allied countries sometimes plays a not inconsiderable part, especially in highly conflict-prone regions. In the third study, Rajmaira and Ward (1991) establish that the United States and the USSR differ in their recollection of what was done by the other; The United States tends to recall the long history of its conflict with Moscow, whereas the USSR harks back rather to the very brief period of cooperation of the last few years with Washington. In other words, the United States is adjusting more

slowly to the attempts at cooperation between the two great powers. This characteristic is to be seen in the evolution of the respective military expenditure of the two countries.

It remains the case that factors other than economic ones are more generally advanced as explanations for military expenditure. They include the bureaucratic procedures involved in the allocation of military resources (Treddenick, 1985), ideological struggles (Thee, 1982), elections (Nincic & Cusack, 1979), the power struggle (Terrell, 1971; Grindle, 1986; Griffin, 1982), changes in society (Grindle, 1986), dictatorship (Kende, 1980), the militarization of society (Maizels & Nissanke, 1986; Thee, 1982; Whynes, 1979), the arms race (report of the United Nations on the Economic and Social Consequences of the Arms Race ..., 1982), strategy (Fontanel & Smith, 1990c) and imperialist rivalries (Gerbier, 1984; Thee, 1982). Empirical studies are dependent on the measurement of military expenditure and it is possible to have different theoretical interpretations of the factors that explain the evolution of military expenditure conditioned by how the dependent variables are defined and calculated (Fontanel & Smith, 1990e). Comparable studies should be undertaken to elucidate the different econometric results obtained as a function of the statistical sources. Although governments do make choices over military expenditure, their freedom of choice is very limited by all the partial cause variables, the basis for which is strengthened to the extent that the international strategic and economic situation evolves slowly.

III. The forms of disarmament

There are four main forms of disarmament: Destruction of military materials, cuts in military expenditure, a ban on the production of certain types of armaments, and thoroughgoing disarmament. These four procedures, which do not have the same economic significance, may moreover be carried out simultaneously.

III.1 Destruction of military stocks

This may initially involve the reduction of excess levels of armament, in which case one has to define what is meant by an excess level. Given that the destruction of weapons is a costly business, its initial effect is to tend to increase the economic burden

of defence, even if the appreciable savings on the storage of weapons soon offset this factor. A saving of a billion dollars on the budget of the Pentagon has as an immediate result the loss of 38,000 jobs. In other words, disarmament taking the form of the destruction of military materials now appears as a cost, and the possible transfers of resources will initially serve to offset the costs that this collective decision entails. The disarmament process currently in progress under the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter Range Missiles (the INF Treaty) is finding its initial expression in the destruction of existing stocks (some 4 per cent of the total nuclear missiles) but also in the foreseeable and seemingly unilateral limitation of military expenditure. Disarmament is, however, currently more "political" than economic, even if the estimates of world military expenditure for 1991 have not yet been revised downwards. On the other hand, a disarmament process involves control and verification, the cost of which is obviously not inconsiderable and must be allowed for and allocated between the various Parties to the Agreement itself. Even if no procedure is effectively established the States will themselves verify the reality of disarmament by the opposing Party, for which purpose they will have to undertake a new form of expenditure based in particular on observation satellites and systematic data gathering.

Table 1. Impact of the INF Treaty on net military expenditure (in millions of constant 1987 dollars)

Fiscal year	1988	1989	1990	1991	1992-2000
Reduction of military purchases	-474	-230	-159	-99	-209
Reduction of military personnel costs	0	-126	-236	-173	-456
Treaty setting up and verification costs	+160	+138	+106	+48	+51
Reduction of net costs implicit in setting up the INF Treaty	-314	-218	-289	-224	-614

For example, the cost of the INF Treaty is quite considerable. Gregory Bischak and Michael Oden (1989) have attempted to compare the reduction of military purchases, operational and maintenance costs and personnel costs with the financial commitments occasioned by the destruction of arms and the verification of the agreement. According to them, the effect of such an agreement is to lead to an overall reduction of military expenditure (Table 1).

III.2 Prohibition of the production of specific weapons

A ban on the production of certain weapons (nuclear, chemical) is indirectly an expression of the willingness to control armaments, and as such may be likened to a disarmament procedure. Thus, the decision not to produce very short range nuclear missiles modifies the output of the enterprises working in that sector. There are several factors that complicate the change-over, notably the difficulty of using specialist equipment for civilian production, the dangers inherent in use of the specialist skills of the military personnel without additional training, differences between the behaviour of monopsonic markets or bilateral monopolies and the competitive markets of the civilian sector, and the practices associated with small-batch production. Having regard to the smallness of the disarmament under the INF Treaty, conversion to the civilian sphere is rarely carried out. That is why the cancellation of orders for GLCM products from the Titusville plant of McDonnel Douglas was compensated by contracts for ground and air cruise missiles. Conversion may have perverse effects. Converted industries faced with increased international competition may in particular seek new outlets that imply competition with the exported or locally marketed products of developing countries. Unless the poorest countries engage in real protection, their national concerns may suffer loss of competitiveness under those conditions and they may suffer economic collapse or, at best, the establishment of foreign industries may drastically reduce the freedom of the State to manage the economy.

Under the Ricardian theory of international trade, for example, the United States does not have any obvious interest in reducing its output of cruise missiles under an

agreement on disarmament. The government normally seeks to keep those arms for which it has the greatest comparative advantage. Economic considerations will therefore be involved in the negotiations. They become all the more important, but remain as difficult to analyze, as the forms of defence become more diversified. When all other things are equal, it is in the interest of a great power to opt for the agreement that is most costly in economic terms to its potential adversary. If two States are productive both of security and prosperity, each country should be aware of the conditions of production of these sectors and of the elasticity in the supply of workers and scientists. If prosperity is a product that makes high demands on the numbers of scientists for country A, despite restrictions on the supply, whereas the supply of labour exceeds the demand, and if the converse holds for country B, it will be in the interest of country A to demand disarmament relating to the types of arms that create bottlenecks in its own civilian economy, having regard to its situation over the factors of production. Country B will have less advantage under this proposal. Lastly, there are great inertial effects in existence for the defence effort from the very fact of the size of the flows and the stocks in this sector. This should lead us to ponder the determining factors of military expenditure.

III.3 Reduction of military expenditure

Politicians have often demanded the reduction of military expenditure. It must be said that disarmament may be imposed by disastrous economic conditions nationally. In other words, should modern armament have a recessionary effect on the economy it may hold back future arms production and consequently affect future defence. The dynamics of military expenditure is progressively undermining the economic basis of the great powers, especially when the international political and social climate complicates economic exploitation of the possible effects of domination generated by the balance of strength of national armed forces. Reduction of military expenditure must be analyzed in opportunity cost terms. At the global level it is expressed in the very short term by loss of jobs or regional recession which may be offset after some time by expenditure on

education, health or the infrastructure. National economies are, however, heavily subject to inertial effects that greatly limit flexibility over the work force and industrial equipment. There are time lags that may give rise to considerable economic difficulties in a branch of the economy or in a region. This situation may be overtaken rapidly by the positive effects of expenditure, unless failure to achieve the minimum activity threshold leads to the establishment of a vicious circle that complicates the use of substitutable resources. Reduction of military expenditure, if negotiated, raises problems of international comparison and comparison over time that are difficult to resolve, but for which it has already been possible to find some interesting solutions (Cars & Fontanel, 1985). The economic factors are likely not to be the best source of reliable indicators. On the one hand, having regard to the international agreements in force and the technological features of the munitions, some types of delivery vehicle, e.g. nuclear missiles, are clearly more effective than conventional weapons, and at a relatively low cost in terms of the strategic, military and political advantages that they confer. On the other hand, relations of strength are often expressed in terms of thresholds and a homothetic reduction of military expenditure does not necessarily result in the former balance of forces being maintained. Disarmament by reduction of defence budgets implies that the structure of expenditure be taken into consideration. Thus, a great power could reduce its expenditure by the order of 20 per cent by increasing its financial investment in the nuclear sphere and by deciding to substitute a less expensive conscript army for an army of professional soldiers. Because military rationality and economic rationality do not have the same values disarmament cannot be determined solely by comparisons of national reductions in military expenditure.

III.4 Thoroughgoing disarmament

Thoroughgoing disarmament may have several causes - economic, political, strategic and even ideological. In fact, this form of disarmament appears on the scene when military expenditure becomes more of an endogenous variable than a true instrumental variable determined at will by the government. It is possible to conceive of

two scenarios that have not been presented in analysis of the cause variables of military expenditure. In one case military and strategic considerations are secondary to the economic reality; in the other, the view taken of defence costs leads States to achieve a better quality to price ratio for the arms of value for defence.

The policy of easing trade restrictions in the military sector (Dunne & Smith, 1991) inevitably appears as a progressive factor of disarmament, bringing to mind the idea of Schumpeter that military activity is the least bourgeois of social functions. When defence objectives are subject to market rules, the pricing system is no more than a pale reflection of the criteria of public service favoured by technological quality, relations based on networks of interests, and cost-plus contracts. Economic competition involves cost reductions, better information on the basic rules of defence, the search for international cooperation, some opening up of the market to foreign companies, privatization of national undertakings, limited intervention by the State in industrial policy, and the pursuit of economies of scale, notably in the transition from military R & D to civilian R & D. Under these conditions the defence sector loses its priorities and military expenditure is truly regarded as a burden, which undoubtedly tends to promote a form of disarmament that finances the defence effort.

The pursuit of new international cooperation over armaments is almost invariably dictated by the reduction of unit costs that have become very expensive. When it works properly, which is rarely the case (Fontanel & Smith, 1991), this international cooperation leads to a reduction of military expenditure (with equivalent military quality) and stimulates new effects of interdependence conducive to the reduction of tension and a more equitable calculation of the expenditure to be collectively undertaken (the theory of alliances).

Disarmament ought not to be seen exclusively as a transfer of resources in favour of the civilian economy; it ought also to be analyzed in a dynamic setting of reduction of the opposing forces and the maintenance, in the final analysis, of balances that are of a fragile nature while the major strategic and economic variables undergo appreciable

modifications.

IV. The economic foundations of disarmament and the deductive method

Reasoning in the usual way for cosmopolitan economics, modern economic science tends to obliterate all non-economic conflicts, despite the fact that the strategies adopted by States do exert some influence on international economic relations as a whole. In a world of sovereign States the security of Nations is both a priority and a constraint that economists have not always viewed in the same way. The history of economic thought is instructive in this context (Fontanel, 1987a).

IV.1 Armed defence as a factor in development

In this type of theory disarmament cannot be accompanied by development. For mercantilists, the might of the Prince is the basic objective of any national economy (Silberner, 1957). Under these conditions, what is economically the best has no intrinsic significance, since it is always preferable for a Nation to be less rich if the other States are proportionally even poorer. The defence of a country encourages national feeling and victorious war enriches the State. Under such conditions disarmament makes no sense. These ideas were to be taken up again in different forms by List (1957), an out and out advocate of the national system of political economy, who suggests that liberal laissez-faire leads to the domination of the strongest and that Nations must protect themselves against foreign domination. Most current thought on economic warfare can be traced back to these lines of thought. In modern analyses of game theory applied to international relations (Brewer & Shubik, 1979), the thesis of unequal exchange (Emmanuel, 1969), the theory of underdevelopment as a product of the development of the great powers (Freyssinet, 1969), and concepts of economic warfare (Baldwin, 1985) are all examples of reasoning that perpetuate this economic analysis in terms of power.

Bouthoul (1961) regards war as a necessary evil that permits a harsh solution to excessive population growth. It is irreplaceable in that it carries out the functions of socio-demographic rebalancing and readjustment. This suggestion is expanded on by Mandel (1975), who considers that conflicts or threats of war eliminate unemployment by

creating an artificial shortage and that they accelerate technical progress. In the view of Galbraith (1968), disarmament accompanied by a reduction of international tension would be liable to have adverse effects on the American economy and society because the subordination of its citizens is dependent on international security, the threat of war is essential in keeping social discord and antisocial trends under control, and the factors likely to be associated with the social functions of armed conflicts and relations of dominance over other States are essential to the wealth of the great powers. Jacques Attali (1978) even regards war as an extreme manifestation of industrial competition, the creation of demand and the employment of the factors of production. Conflict provides a stimulus to production and transforms the patterns of consumption and social habits. Thinking along the same lines, Marc Guillaume (1976) distinguishes the code of capital and the code of power; the former demonstrates the social significance of commodities as the basis of their value; the inequalities that this occasions lead to a continuous struggle against scarcity and have the inevitable result of maintaining class demarcations in a highly oppressive capitalist system. The code of power, on the other hand, is built up from the bureaucratic hierarchy and the monopoly of knowledge, and is the will for power. If civil war is inherent in the code of capital, international war is written into the code of power.

To sum up: any disarmament procedure that does not confine itself to the reduction of excess levels of armament does not necessarily make for human and economic progress.

IV.2 Armed defence as a political constraint and as economic wastage

For the classical British economists, State intervention in the economy should be kept to the minimum because individuals have complementary interests in generalized freedom of trade. War and preparation for war are explicit variables of the monopoly spirit, on which grounds both Adam Smith (1776) and David Ricardo (1817) were to condemn mercantilist thought dominated by the hegemonic drive of the ruler. Armed conflicts are analyzed exclusively as political phenomena. Nevertheless, it is advocated

that armed forces be established to ensure the sovereignty of States threatened by less developed economies. The disarmament processes of rich countries are dangerous, having regard to the covetousness with which they are regarded, a covetousness that may possibly be given a military expression, depending on the relations of armed force. Nevertheless, Ricardo wishes for negotiated disarmament, since he considers that the uninterrupted growth of military expenditure leads inevitably to war. Malthus (1803) analyzes war as being the result of the inadequacy of economic development to population growth. He even recognizes that, in the short term, an increase in military expenditure may increase overall demand and may therefore have positive effects on the economy as a whole. In the long term, however, the pauperization to which it inexorably gives rise is a basic source of conflict. For the classical British economists, generalized development precedes development (sic). These ideas were to be picked up by the French liberals - once in a while does no harm - with Jean-Baptiste Say (1816) at their head taking the view that a policy of free trade is conducive to disarmament and vice versa. The utopian socialists (Saint-Simon, Fourier, Proudhon) of the 19th century were to consider, in general, that the material well-being of the populace was at odds with the development of military expenditure. They even developed the idea that war was tending to disappear with the emergence of the industrial class, because it was eliminating pauperism, the true cause of wretchedness (Silberner, 1957).

Generally speaking, most liberal economists considered that the military function should be kept to the minimum so as to improve the performance of national economies in the struggle against scarcity. Nef (1949), for example, thinks that peace stimulates the economic activity of States, while Seymour Melman (1971), in counterpoint, stresses the harmful effects of military expenditure on the American economy: loss of competitiveness, development of the bureaucracy, reduction of productive investment, and the appearance of military-industrial complexes. On this view, disarmament is conducive to development but, conversely, generalized disarmament is impossible in the absence of universal economic development.

IV.3 The inherent contradictions of the capitalist system make a disarmament procedure illusory

For Marx and Engels (1860), peace and, by extension, disarmament have no intrinsic moral virtue. War and conflicts relate to the superstructure and are conditioned by antagonistic social relations. Disarmament is desirable only if capable of producing economic development induced by the radical break with capitalism and the emergence of socialism, since it is not truly compatible with the continued existence of capitalism. These analyses were continued by, in particular, Rosa Luxembourg (1913) and Lenin (1916). The former considered military investment to be very useful for the development of capitalist economies, in the first instance as a catalyst of primitive accumulation; then as an instrument of colonial domination; and lastly as a hegemonic factor of the struggle between the capitalist countries to divide up the world. Lenin also thought that imperialism, the highest stage of capitalism, necessarily stigmatized by total wars and the capitalist exploitation of the world, ruled out any non-economic disarmament process without the advent of socialism. These theses have been taken up by contemporary authors.

Baran and Sweezy (1968) argue that military expenditure serves to absorb the economic surplus that monopoly capitalism secretes; on that view the arms race matches the logic of capitalism, which seeks to maintain a constant ratio between production and solvent demand through unproductive expenditure. The surplus may be taken up through consumption by capitalists, through wastage, and through civilian governmental expenditure, but military expenditure is more effective in this role; in effect such expenditure is in line with capitalism in that it does not redistribute income to those whose productivity is low, while it does stimulate collective values. Disarmament is incompatible with capitalism, which constantly generates international tensions that find expression notably in armed conflicts or in the increased squandering of resources constituted by arms expenditure. The thesis of the economy of continuous arms (Kidron, 1970) takes the view that military expenditure exerts a positive influence on profits, on

capitalist technology and on the demand for labour. Ron Smith (1977) disputes this analysis; he prefers to see capitalism's need of armaments in the struggle against communism, the maintenance of American hegemony and the will to maintain the existing international order. Lastly, Gundar Franck (1972) considers that colonialism is the original and lasting cause of underdevelopment. Military strength enables other nations to be exploited, either through the occupation of territory, or through intimidation, or through the giving of power to national collaborators. Conflicts are inherent in capitalism; only their forms change. The idea of disarmament is dissatisfying in the context of triumphant capitalism.

IV. 4 Negotiated disarmament in the context of coexistence between rival economic powers

The Keynesian analysis is more concerned with the economic and social consequences of the arms race than with the social and political conditions of disarmament (Keynes, 1921). As Keynes saw it, military expenditure reduces the national investment potential, so that the choice between guns and butter remains in force in a situation of full employment. Military expenditure remains of use to improve international security and to confront the threat from planned economies, mainly the Soviet Union. By virtue of the excessive generalization of their analysis, the Keynesians reduced it to a purely political and economic concept of national security in which considerable scope remained for negotiated disarmament.

As far as neo-classical analysis is concerned, there is in every society a function of social well-being that is maximized under constraints. Expenditure on security contributes to the definition of this optimum. The arms race is rational only if it can counter socialist imperialism. The theories of models of the arms race such as the model of Richardson (Brito & Intriligator, 1967) demonstrate that budgets preparing for war increase the likelihood of war. Military force is an important instrument in the redistribution of consumer rights between countries. Although dissuasion may be conducive to the establishment of a stable equilibrium, it may also lead inexorably

towards war.

V. Application of the historical method to economic analysis of armament and disarmament

History teaches us that armaments have been at the source of effects of domination, have modified world maps of international competitiveness (notably when used in world wars or regional conflicts), and have greatly affected civilian technologies.

V.1 Effects of domination and new maps of competition

Colonial wars are historically seen as basic, although not exclusive causes of underdevelopment (Fontanel, 1990d). They promoted export crops to the detriment of the crops that provided food for the population, and they had the effect of stimulating the mining industry and destroying local craft industries; meaningless national frontiers were established and the economy developed in a disjointed way, entirely geared to the economy of the colonial power. These relationships of strength, which take various forms, some of them less blatant, have still not really been challenged, as is shown by the relative stability prevailing in the most underprivileged regions that are largely dependent on spheres of influence inherited from the antagonisms of the great powers and from colonization. Major international economic negotiations provide reminders of the existence of relations of conflict and the importance of the status of a nuclear power. The threat of armed force is always a decisive factor in the spread of the dominant modes of production and in the maintenance of existing powers. Moreover, the major economic powers use military and non-military aid to maintain their political, economic, ideological and even moral influence. The economy of a country is, however, even more affected when a partner exerts a structural ascendancy over it on the basis of military relations. Western technology is strongly influenced by the militarization of the advanced economies, which is still dominant in contemporary economic development despite the examples of Germany and Japan, where the contrary holds. The developed countries are therefore very favourably placed to make contracts, by virtue of spheres of influence that are often defined by force or by military agreements. Good relations with the United

States government are of assistance in obtaining credit facilities from major international financial bodies. The existence of danger and the determination of States to oppose subjugation are factors that are largely dependent on the arms race of the great powers, and that are responsible for the subordination of economics to military and strategic constraints (Chatelus, 1982). Under these conditions, disarmament definitely does modify relationships of strength, and this is also reflected in the economic sphere.

Economic factors become weapons in constant use that cannot be constantly deflected from their essential functions for purposes of regeneration (Fontanel & Bensahel, 1991). The economy has become an instrument of power often applied to relations of conflict between States. Insecurity is dependent on the arms race, on inequality, international domination, and even social exploitation. Indirect strategies of dissuasion, economic forms of retaliation, embargoes and boycotts are all powerful weapons with economic and political effects dependent on defence measures, international expressions of solidarity and the potential for substitution (Baldwin, 1985). The economic weapon frequently comes within the scope of military conflicts since the economy provides the military resources by which to combat the enemy. All the dimensions of social life, of which the economy is a part, have to be taken into consideration in international strategy. Economic weapons are used with the aim of weakening the potential enemy. Direct (military) strategy is made difficult by the strength of nuclear forces and by the doctrine of the balance of terror. The number of degrees of freedom is very limited at super-Power level. States are therefore led to follow a strategy of "indirect manoeuvring" defined as the exploitation of the narrow limits for freedom of action avoiding nuclear dissuasion by other means.

In particular, the matter is one of not providing the enemy with weapons that could be used against the exporter. The idea is to sell only those products that would not improve the economic growth of the country receiving them more than that of the country selling them. In other words, unequal exchange is something to be demanded, desired and sought. Any supply of sensitive equipment must be considered and rejected if the

opposing military sector is liable to gain therefrom. There are many differences of opinion as to the usefulness of these measures. Some authors are of the opinion that the grain embargo does not adversely affect the Soviet economy, but American governments have calculated differently. Other authors consider that it is advanced technology that should be at issue. Kuttner (1991) thinks that the defence of the industrial base undertaken by the Pentagon has proved to be extremely costly and has gradually eroded the competitiveness of the American economy. This policy was initially based on three essential principles: that the United States is an economic leader and can therefore control advanced technology; that the exports concerned are not overly important for the American economy and the cost of such controls would be relatively slight; lastly, that dual-purpose technologies are relatively few in number and can readily be isolated. These hypotheses no longer hold, all the more so because the Exports Control System has become increasingly strict and now covers United States patents on goods manufactured abroad. This has led to mistrust among potential customers, who have switched to other, less restrictive suppliers offering equivalent technology. With the new international strategy, this supervision by the Coordinating Committee on Export Controls (COCOM) will tend to disappear and it is expected that American products will become more competitive.

Impoverishment resulting from the strain of preparing for war, a favourite strategy for the mercantilists, is often presented as one of the basic reasons for the collapse of the Soviet economy. An arms race reduces the development potential of States, but the poorest are the most rapidly impoverished, with the result that the might of the richest countries is increased. Under these conditions, a State seeks supremacy by roundabout means, not so as to gain short-term military supremacy, but so as to weaken the enemy to the point of social destabilization.

The strategy for effecting the break is Manichaean. The aim is to create economic problems in the rival country so as to increase its political and social difficulties. Flows of trade and finance are broken off in the attempt to destabilize a country unilaterally

exposed to such a decision. An embargo is an instrument of reprisal or dissuasion capable of changing the behaviour of a potential enemy, but it is a weapon that is dangerous to the user. All in all, it is not clear from recent experience that the first victims are those who were intended. Prolonged interruption of trade flows may lead to a permanent loss of outlets (notably for the importer, through the introduction of new, local products, through the search for national substitute products, and through approaches to new importers).

The aim of the containment strategy is to develop ties of economic interdependence capable of ensuring peace. The dissuasion of aggression stems from the new economic interdependence thus created. In particular, it was long considered in Ostpolitik that commercial ties had a moderating role on ideologies. This strategy, which Nixon and Kissinger defended in their day, is easier to carry out, but has perverse effects. It lacks all effect as an offensive weapon, and its impact cannot really be measured in the abstract.

The aim of the strategy of political violence is to take economic power when it is hostile and progressively to weaken the dominant social groupings. The political forces of the machinery of State and the trade unions must be brought under control to that end. Those who hold the economic power in a country can be legally and officially divested of it, notably by nationalization or through control of the trade unions.

The strategy of domination leads the dominant countries to influence the military and strategic decisions of the countries that they dominate. The economic weapon enables a country or a group of countries to dominate another country through exercise of the power conferred by exercise of a monopoly over the supply of goods and services vital to the country's survival. The United States often uses food as a weapon against developing countries. It has both the means needed to create dependence and the will to use the weakness of the dominated countries to improve the terms of trade and its global strategic situation. In that case, the economy is no longer the quest for material well-being, but one of the means of ensuring social domination. Given that the confrontation

is global and total, all the dimensions of national life are concerned. The use of economic weapons is, however, effective only if backed by impeccable military and political forces. Disarmament that failed to take into account the insecurity constituted by economic arms would not be very durable. Food is not a new weapon. Present day grain production could supply more than 3,000 calories a day for everyone. The diversion of two percent of grain production to those in need would suffice to eliminate malnutrition (Fontanel, 1984). According to the Secretary of State for Agriculture in the Reagan administration, food was the most important weapon available to the United States in 1981 to ensure world peace. Furthermore, foreign aid is often part of a package with military aid.

In other words, if military expenditure weakens the national economy, it is advisable to determine the best path between the current threat and tomorrow's needs. The modern economy is seen as a battlefield; a process of disarmament may well lead to a progressive change in the global geography of the satisfaction of needs. The economy of the Third World remains highly dependent on the developed countries. Most international organizations are calling for the establishment of a New International Economic Order (Fontanel, 1981), but although colonization is undoubtedly responsible for the underdevelopment of many regions of the world (cultural integration, political inequalities, economic exploitation), it is also a highly convenient scapegoat for all mistakes in running the economies of Third World countries. Fontanel (1991) has said that under the Charter of the United Nations demilitarization implies respect for the sovereign equality of its Member States, prohibition of the use of force or the threat of its use against the territorial integrity of States, recognition of the inviolability of frontiers, renunciation of any action against independence and national unity, non-intervention in the internal affairs of other States and not giving assistance to terrorism. These principles could be respected by the systematic exchange of military information, publication of military expenditure, withdrawal of troops from frontier areas, and the establishment of rapid and direct systems of communication between the civilian and military authorities.

However, some economists (Benoit, 1978) consider that the militaristic outlook is capable of stimulating and mobilizing savings, and that the military in Third World countries are capable of increasing the rate of exploitation of available resources and reducing consumption in favour of productive savings, and of establishing the basis for economic development. Under those conditions disarmament that reduced the part played by the army in society would not seem desirable in terms of this "civilian" view of the military.

The current political situation, which is favourable to disarmament, is probably connected with the economic crisis of the major military powers, which is obliging them, in the absence of incontrovertible military superiority, to seek a breathing space favourable to new economic growth. Under these conditions, disarmament would be the result of a readiness to "redeal" the cards of competition, given that all the players have a blocking hand increasingly opposed by public opinion (Lambelet & Luterbacher, 1987; Brito & Intriligator, 1987). In a situation of economic crisis it proves increasingly difficult to manage a heavily militarized economy. This situation produces much debated possible knock-on effects created by the freeing of trade and the upsurge of new effects of domination favourable to the developed countries and responsible for the constant bogging down of the economies of Third World countries. Nevertheless, the opening up of economic frontiers is not the panacea for generalized economic development since, in the absence of a real international organization laying down rules to protect vulnerable economies, such a policy inevitably leads to power balances and hence to international conflicts.

V.2 Military technology and economic development

Economists were convinced in the 19th century that military technology was corrupting its civilian counterpart (Edgerton, 1987). This outlook was gradually modified by some extraordinary technical performances by the military sector and there are many theories stating that such militarization is capable of having positive effects on the national economy. Robert Merton (1938) is of the opinion that the military sector exerts a considerable outside influence on the development of science and technology. This

relationship is not of very recent date. For example, the theses of Galileo were demonstrated thanks to the practical applications of theoretical work on projectiles needed by the army. From Descartes to Papin, taking in Newton, Bernouilli, Euler and Leibniz on the way, many scientific discoveries have been due, in origin, to the problems raised by the art of war, equally with those stemming from the economy and the intransigent values of puritanism and protestantism. The traditional system of patronage was conducive to this relationship between men of science and the army, but a new model of it began to appear with the industrial revolution. Lewis Mumford (1934) even thought that only the military sphere and war offered sufficient scope for the use or absorption of the output of the new capitalistic installations. The army was a consumer perfectly tailored to the industrial system and the economic interests of industrialists and military men were complementary. This was the first version of the idea of the military and industrial complex. There are many factors that support this thesis, for example the rational model of management and the application of Taylorism in military arsenals. Industry has learnt a great deal from war as regards organization, discipline, standardization, the coordination of transport and supply operations, the separation of functional and hierarchical services, and the division of labour. The basic principles of the American industrial system as regards machine tools, spare parts, and serial production were extended to the civilian sector from arsenals, armouries and military sub-contractors. Furthermore, given the volume of modern R & D investment, civilian industries have not been able to keep up. The army has contributed its mass effect.

The mechanization of military operations came onto the scene with the First World War. New technologies tried out for the first time during the combat included tanks, radio equipment, poison gas and aviation. Under these conditions, science and technology were deliberately organized and maintained for military purposes. The war itself, however, was not won by the scientists, who did no more than modernize old weapons employed in conservative and rather unimaginative strategies. The war was one of attrition rather than of technology. In contrast to the First World War, the nuclear

weapons and the technical know how that emerged at the close of the world conflict of the mid twentieth century differed considerably from the arms that existed at the outset. The authorities began to invest in science for reasons of security. The post-war period was even marked by the pursuit of scientific secrecy, by the capacitation of defence, and by a massive influx of scientists into the military-economic complex. The ready availability of finance for scientific projects, the ability successfully to carry out projects that would have been unrealizable under other circumstances, and the acquisition of a special status in society were essential elements of this mutual attraction. The law of secrecy became the rule from 1950 onwards, with the making of the hydrogen bomb, decided upon by Truman, despite the opposition of his scientific advisers. The national economy and national science would henceforward be at the disposition of the government. The power of the military-industrial complex was increased with the setting up of national industrial "think tanks" such as the Rand Corporation in the United States to work on the new problems of national security. The war had taught scientists and other academics to work together and had shown them the effectiveness of team research; it had also brought about decisive changes in the method, spirit and scale of laboratory research. Scientists sometimes found themselves hostages, caught between the desire to continue their research and the more readily available funding in the military sector. This procedure has been more recently maintained with the Strategic Defence Initiative (SDI). Little is to be expected in economic results from this military R & D of the SDI programme. Only a very small proportion of the patents are of interest to the private sector because they are too much concerned with the products of craftsmen and too little with improvements to processes. The armed forces of the United States hold many patents, but only one per cent of those developed by the Navy have actually become the subject of licensing agreements. The arms race became chiefly responsible for the chaotic development of the sciences and remained so until the 1980s, when Germany and Japan were to open up new paths little explored by the other powers, which had been too preoccupied with their military leadership.

VI. The main effects of variations of military expenditure by econometric methods

Armed conflicts and threats of war are almost always omitted from economic analysis at the present time. Be that as it may, the choice of defence system may be influenced by the use of the direct or indirect effects of military expenditure on the economy, leading to its relentless militarization (Smith, 1983). The results yielded by econometric analysis are often divergent. A synthetic approach to the impact of disarmament (expressed through a reduction of military expenditure) on the economy as a whole shows, on the one hand, that variations of military expenditure have little effect in the short term on the basic variables of the economy and, on the other, that the relationships arrived at by the econometric method are of a circumstantial and historical nature. It should be noted that whereas there are many studies of the effect of military expenditure on national economies, analyses specifically devoted to disarmament are less common. Macro-economic analysis of military expenditure is generally examined in relation to seven key economic variables: investment, growth, employment, the balance of payments, inflation, research and development, and economic development. The idea of economic growth does not take in socio-economic development, growth being a means towards development, i.e. improvement of the material quality of life, the flourishing of the rights of individuals and the establishment of the conditions for a qualitatively satisfying life as regards culture, sport and play.

VI.1 Economic growth

"The arms race represents a waste of resources,..., a hindrance to national development efforts and a threat to democratic processes... Military outlays have no long-term positive effects on economic growth" (United Nations Publication F.83.IX.2, paras 7 and 97). The armaments sector is assumed to be non-productive and redistribution in favour of the civilian sector can have only positive effects. However, the impact of military expenditure on growth is dependent on effective use of the production capacity of national economies. Some economists (Galbraith, 1968; Schmidt, 1974) consider military expenditure to be a safety margin with great inertia, partly

destined to control the growth of the surplus. As a real economic regulatory instrument of capitalism, military expenditure is the organized squandering of resources, the creation of an artificial demand capable of disposing of the surplus (Baran and Sweezy, 1966). It has been considered in other analyses that the military sector has benefitted the civilian economy with important technological spin-offs, key innovations and productivity effects (De Grasse, 1983). In opportunity cost terms, civilian investment is, a priori, more conducive to economic development than is military investment. However, this is an assessment that needs qualification, partly because not all civilian investment is equally profitable (notably investment that prompts demonstration effects or effects stemming from a mistaken appreciation of the market), and partly because orders placed by the military sector may maintain the level of production and the competitiveness of entire branches of the economy, as is often the case for aeronautics, the computer industry and ship building. Through their inertial effects on economic flows, military budgets underpin the activity of whole branches of industry, providing them with an assured outlet and additional growth potential through the proliferation of economies of scale and possible effects of domination. The existence of a national armaments industry is a factor making against disarmament, especially when arms production is heavily integrated into the industrial fabric.

Econometric studies generally developed in the framework of a macro-economic model let it be understood that increased military expenditure appears to be associated with a weaker real rate of growth (Smith, 19178; Leontieff & Duchin, 1980; Fontanel, 1980a; Deger & Smith, 1983; Georgiu & Smith, 1983; Faini et al., 1984; Biswas & Ram, 1986). This result has, however, been called into question by several empirical analyses (CBO Study, 1983; Benoit, 1978; Weede, 1983). The main debate is concerned with the multiplier effects of military expenditure. The Keynesian school regards military expenditure as a means of combatting the under-consumption crisis of market economies, the more so because the excess production cannot always be taken up by social expenditure which lowers the incentive to invest through an excessive reduction in

inequalities of income. This view is moreover not accepted by Paul Samuelson (1964), who suggests that military expenditure has, at best, a neutral multiplier effect, that the ending of the cold war should even facilitate American economic growth and that it is better to promote public non-military expenditure. This view is more strongly defended by Dumas (1987), who thinks that the security of the United States is at least as much dependent on its economy as on arms, and that military expenditure squanders the work force, capital and technology of a private enterprise economy in a situation of harsh competition, thus detracting from its effectiveness in the long term and producing a bureaucratic and military organization that is little concerned with the rules of international competitiveness.

However, Browne (1988), who made a close examination of the American economy, did not find any clear indications of the responsibility of military expenditure in the low productivity of American industries, since there were only a few effects of the supplanting of technology and loss of jobs. In a recent study (Alexander, 1990), taking a sectorial model distinguishing exports, defence, government expenditure and the rest of the economy, it is considered that military expenditure does exert eviction effects between these sectors, but that the overall result does not necessarily indicate a negative connection with growth following an increase of military expenditure, even if the military sector proves, for all that, to be less productive and less economically efficient than the other sectors. This analysis leads us to assume that it may be difficult to analyze the negative effects of military expenditure on the national economy in the short term; it would gradually erode the very foundations of the economy, mainly by limiting its competitiveness.

The effects of military expenditure on economic growth are transmitted through four main channels, namely the possible reduction of investment, the effects of substitution of the work force (especially, skilled workers), the application of a military technology that has less respect for the economic rules of profitability, and the growth of effective demand. The expansionist effects of military expenditure have often been high-

lighted. In a situation of underemployment, military expenditure boosts the economy, but at the same time it has inertial effects in the longer term that are capable of impeding future growth. Other expenditure could be envisaged to combat the recession. Whereas increased military expenditure is capable of promoting economic growth, it does not necessarily produce the cumulative effects that are a feature of economic development. Although it is possible to use the military infrastructure for civilian ends, it is rash to think that such a situation is optimal (Chatelus, 1982). Besides, it is paradoxical to note that economists have sometimes explained the growth of Germany and Japan between 1930 and 1940 by investment on armaments while explaining the economic miracle of the same two countries since the last world war by the weakness of their military expenditure. It has to be conceded that there are far more essential arguments to account for these two periods. On the other hand, the expenditure on imported arms of small countries that do not produce arms limits the reserves of scarce foreign exchange; military imports overtake productive imports and result in indebtedness. Should this military investment be financed by international aid, there will still be substitution costs. Under these conditions, military expenditure has a direct and very unfavourable effect on economic growth. In the case of developing countries, military expenditure redistributes the capital available for investment, and absorbs resources that may however increase internal demand and have a spin-off in modernization. According to Deger (1986), a percentage point reduction in military expenditure increases economic growth by a third of a point and completely eliminates the external capital requirement of the least advanced countries. The competitiveness of the economy is increased and the deficit on the trade balance is reduced. Furthermore, when real income is very low, military expenditure has a negative effect on growth. The effect is positive for countries with a medium income, and becomes negative once again for countries with a high income. The graph of the relationship is an inverted U.

Taken over all, military expenditure has positive effects in developing countries, but the net effects remain basically negative. Econometric analyses seem relatively

incapable of providing indisputable information on the existence of the negative or positive relationship under consideration. The ultimate effect of military expenditure on economic growth depends on the functional combination of several parameters concerned in particular with its cause variables, namely investment, consumption, the balance of

payments, inflation and unemployment.

Table 2. Effect of military expenditure on economic growth by development level (Deger, 1986)

Development level	Channels of military expenditure growth effect	Net effect
Weak	Resource redistribution	Negative
	Modernization	Positive
Medium	Resource distribution	Negative
	Modernization	Positive
	Technical progress	Positive
	Utilization of capacity	Negative
	Creation of demand	Positive
High	Technical progress	Positive
	Utilization of capacity	Negative
	Creation of demand	Positive

VI.2 Investment

The existence of a negative relationship between investment and military expenditure is a fairly old hypothesis, one that had already been advanced in his day by Pigou. Williamson (1983) has shown that the burden of the military expenditure of the Napoleonic wars caused investment to be appreciably reduced in Great Britain. Most econometric studies, which are, moreover, often confined to reduced forms, tend to provide empirical confirmation of this hypothesis (Pryor, 1968; De Grasse, 1983; Smith, 1980; Faini, 1984; Fontanel, 1980; Deger, 1986; Percebois, 1986) and to give three explanations for it, namely the eviction effect, the objectives of social consumption, and the constraints of industrial capacity.

The taxes required to finance military expenditure depress private demand and reduce the profit hoped for from investment. Possible debts connected with the financing of the defence effort result in increased interest rates and are therefore conducive to a cutting back of private investment. Lastly, the defence effort reduces or slows down other government programmes, which are often free to be decided. These supplanting effects cannot be denied, but the extent of their impact varies with the time and place.

Military purchases are the specialized output of certain specific industries, such as aeronautics, ship building and the computer industry, typically sectors producing capital goods. If military demand takes priority, these industries are no longer able to supply the civilian demand for capital goods, particularly in times of rapid rearmament. Under those conditions, military expenditure creates bottlenecks that reduce the possibilities of investment and cause inflationary trends. Gansler (1982) is of the opinion that the American aeronautical industry experienced considerable bottlenecks consequent upon the policy of military redeployment decided upon by Reagan.

The objective of social consumption raises the problem of division of social resources between current and future needs. Private or public consumption, such as expenditure on health, is a current "concern", whereas military expenditure does not yield immediate benefits except in a period of open conflict, and is therefore a "future" good. Private civilian priorities may cease to correspond to government priorities (Hartland-Thunberg, 1988). Societies have a relatively stable objective for social consumption, with a fixed proportion of revenue devoted to the present. Within that proportion and independently from it there is a distinction between public and private property. The only adjustments possible are in the part devoted to investment (representing the future) and consumption (representing the present). It is therefore possible to substitute public consumption and private consumption, on the one hand, and military expenditure and investment on the other, but the substitutions between the two groups prove to be limited. This analysis is of interest because it can explain why the relationship of substitution between investment and military expenditure is not always operative. Should the

economic effort of defence be perceived as a present need yielding immediate profits or responding to an urgent situation, military expenditure is substituted for global consumption. It is therefore the immediacy of danger and its national perception that determine the quality of the substitution between military expenditure and investment.

There are, therefore, four factors that may invalidate this relationship, namely social acceptance of the financial effort of defence, the structure of military expenditure (the ratio of personnel costs to capital or infrastructure costs), the level of economic growth (in a period of economic stagnation, military expenditure is more directly in competition with investment), and the existence of a strong arms industry. If the population is prepared to accept the defence effort, in particular in a situation of oppressive and identified international danger, then, as has been stressed by Schultze (1981), it may make up its mind to reduce its consumption. The fact that the increase in military expenditure is not leading to a reduction of global investment at the present time, comes about because the citizenry do not yet see clearly that the danger of war is imminent. There is therefore a discrepancy between the needs expressed by economic interests and the attitude of the State, which may, moreover, be due to the availability of different strategic information. This provides a vindication of Boulding (1973), who has shown that although military expenditure in the United States in the years 1929-1969 adversely affected expenditure on personal consumption, there was only a slight down turn in gross investment. This analysis is confirmed by the studies of Russett (1970) and Weidenbaum (1990). This was all the more so because the American arms industry had some dominating effects on all the industrialized countries. Lastly, Looney's analysis (1988) confirms the hypothesis that arms industries may benefit from an increase in military expenditure, and that this may have positive effects on the investment of developing countries. This analysis may, however, be contested on methodological grounds. The establishment of an infrastructure, the modernization of ways of thinking and education in national feeling and in the collective interest that are features of the militarization of economies make it possible for the less advanced countries to oppose the

swallowing up of production capacity and the potential for innovation (Deger, 1986). It makes no odds that the effects of military expenditure must be analyzed more closely, having regard to the nature of outlays (personnel, conscription, current operations, R & D, investment) and the supplier (national, multinational or foreign undertaking). Given that military expenditure is incontrovertibly unproductive, it is difficult to see how, at least in opportunity cost terms, military expenditure can be the best possible investment for economic development, save perhaps when a conflict exists.

VI.3 Employment

There is no real consensus on this matter. Anderson (1975), Bezdek (1975), Boulding (1979), Smith (1978), de Grasse (1983), Szymanski (1973), Fontanel & Smith (1975), and Anderson, Frisch & Oden (1986) all consider that military expenditure tends to have a negative effect on employment. The general conclusions are, however, unsatisfactory. If the increase in military expenditure applies mainly to personnel costs, the effect on unemployment is liable to be positive, whereas an increase in military capital expenditure would not have a positive effect. Wider conscription is capable of reducing underemployment in the short term, but is a decision that may restrict the development potential in the long term, particularly if job losses lead skilled workers temporarily to leave the production sector; under these conditions it may lead to increased unemployment. Aben (1981) has, however, shown that a drastic reduction in military expenditure inevitable leads to increased unemployment, at least in the short term. This hypothesis is partly disputed by Smith and Dunne (1987), who are of the opinion that the adverse effect is brought into play only if there is no additional public expenditure to offset the reduced military expenditure. In a later work (1990), the same authors concluded from a simple dynamic macroeconomic equation model for the United States, the United Kingdom and 11 OECD countries that the unemployment rate was not significantly affected by the proportion of the national product devoted to military expenditure. It may be concluded that military expenditure does not have to be specifically considered in an analysis of employment, but also that disarmament may not

be systematically associated with a rise in the unemployment rate.

Adams and Gould (1987) think that the number of jobs created by military expenditure is not a good indicator of the impact of defence expenditure on the jobs market. Such expenditure creates jobs in some regions, but not in others, at certain levels of specialization or skill, in particular branches or industries, and for certain firms. The first effects to be felt are substitutions, the long-term effects of which are difficultly quantifiable. It is, in fact, of greater interest to consider which will be the regions and the sectors in which jobs will be created, and in whose favour? More generally speaking, the economic consequences of military expenditure on employment may be analyzed only by taking several cause variables into consideration:

the existence of conscription;

the ratio of expenditure on personnel to capital expenditure;

the relationship between military pay and wages in the civilian sector;

national arms production;

the nature of the jobs in the arms industry;

whether the employment situation is one of underemployment or full employment.

If we confine our attention to public expenditure, it is clearly apparent that military expenditure "generates" less jobs than the education system. However, given that these two types of expenditure do not satisfy the same objectives, this answer is no more than a very general indication, an a posteriori gloss on the situation, it being understood that some social values such as equality, justice, legitimacy and security transcend the imperialist pretensions of the economist in collective choices. The fact of admitting that military expenditure does not create many jobs ought not to be seen as prescriptive.

VI.4 Inflation

Two aspects must be considered in this type of analysis; the first involves considering price movements in the military sector, while the second lays the emphasis on the macroeconomic effects of a change in military expenditure.

The first effect tends to be inflationary in arms-producing countries (cost-push

inflation). Skons (1983), Boulding (1979), Gansler (1980), Dussauge (1985), Adam and Gold (1987), and Aben and Maury (1987) consider that military prices tend to rise faster than prices for civilian products. However, although considerable unexpected increases are indicated by analysis of some products, it is scarcely possible to arrive at adequate quantitative conclusions owing to the lack of information on and/or the secrecy surrounding military price indices and how they are calculated.

The second effect is more controversial. It is also dependent on the economic conditions of full employment or underemployment, on the production capacity of the arms industries, the arms effort required over a short period of time, changes in the remuneration received by military personnel, the social status of the military etc. Lester Thurow (1982) was of the opinion that only a significant deficit in the public budget could finance the defence effort of the United States, and that it would contribute to great instability of the financial markets and the development of inflationary tensions. This situation could be the source of "compulsory saving" or of ostentatious consumption. Taken overall, military expenditure appeared to fan inflationary tensions. However, this relationship has not been clearly established for France (Percebois, 1986; Fontanel, 1981; Aben & Maury, 1987), or for the United Kingdom (Starr, Hoole, Hart & Freeman, 1979).

Actual economic situations differ too much over time and in space for it to be said that the existence of a necessarily positive relationship between price rises and the upsurge of military expenditure is a rule or an inevitability. On the contrary, rapid rearmament leads inescapably to inflation, as a general rule. Although there has not been any real study of the impact of disarmament on inflation, it is not obvious that effects directly in line with the increase in military expenditure would be obtained.

VI.5 The balance of payments

Two aspects of the impact of the military effort on the balance of payments must be examined: Whether, on the one hand, arms exports or imports play an important role in the stability of the balance of payments, and how, on the other hand, the

macroeconomic effects of the defence effort influence international trading and financial transactions. If the country is an arms importer, the arms imports worsen the situation of international transactions. If the country is an exporter, an account must be compiled of the imports induced by intermediate consumption and the time-lags between the payment of amounts owing and amounts due, a basic time-lag that may destabilize the national currency. However that may be, the arms-producing countries of the Third World are reducing their arms imports, according to Looney (1988), which justifies the policy of import substitution.

If all the arms purchases of a State are imports, its trade balance is adversely affected by the defence effort, at least in the short term. In fact, the economic proposal should take into account the comparative advantages or what accrues to the factors of production on the understanding that a country may improve the situation of its balance of trade by not producing its own arms and by specializing in other, more profitable activities. The recipient is multiply dependent on the perception of the danger, its degree of autonomy over arms purchases, its capacity to initiate or step up national arms production, the diversification of arms supply, the availability of alternative sources of supply from which to purchase, the reliance placed on foreign suppliers regarding spare parts, the degree of training and the maintaining of self-sufficiency. It is, however, true that, other things being equal, importing countries are only the main beneficiaries in the short term, when there is a concerted reduction in military expenditure, if their imports have been linked to national exports by an intergovernmental agreement. A recent econometric study (Pearson, 1989) has given prominence to the variables relating to arms imports by geographic zone, by testing the following five hypotheses: national characteristics (e.g. area, population), government (military State or democracy), military characteristics (such as defence budgets), economic characteristics (such as the degree of wealth or the level of trade), and international characteristics (such as the international disputes in which these countries could have been involved). In general, it is military considerations that dominate the explanation of how arms imports are determined

(especially the level of military expenditure), as well as the inertial effects that highlight a veritable market with buyers and sellers involved practically every day in negotiations. Brzoska (1983) has demonstrated that the total indebtedness of Third World countries would be something like 20 per cent less were there to be no arms imports. A disarmament drive would possibly be able to reduce this dangerous connection, even if there is always the risk in the short term of an arms enterprise seeking to resell the surpluses that the developed countries, held back by international agreements, would be led to disregard.

On the other hand, arms exports make it possible to develop learning effects, to improve economies of scale, and to apportion fixed costs to larger series; they are an active component of foreign policy and defence policy which establishes links of interdependence at both the military and the commercial level. Such exports often look like support for the existing political system, but arms exporters must take imports of intermediate consumables into consideration, along with payment periods and non payments, and the effect of the time-lags between delivery and financial settlement on exchange rates and the competitive position of the national economy. Exporting is not necessarily a lucrative activity for industrialized countries (Smith, Humm and Fontanel, 1985) and it does not reduce the national armament effort despite the possible economies of scale, which seem rather to favour the importers. Examination of the forms that purchases take shows that the economic arguments in favour of the protection of national arms industries are quite open to dispute.

Thurow (1981), Melman (1974) and Rothschild (1973) all consider that military expenditure reduces industrial competitiveness and promotes a trade deficit. Adams & Gold (1987) even think that military expenditure, being inherently inflationary, is bound to weaken the competitiveness of American enterprises and may lead to a worsening of the trade balance. Under these conditions, the international arms market would be less congested. It is now being asserted that the arms industries have weak industrializing effects, notably because the spin-off from military technology is relatively limited for the

civilian sector and because the arms export war is probably as costly for the community as it is profitable for the many middlemen (Schmidt, 1984). Looney (1988) considers that the arms-exporting developing countries come out of the situation better than their importing opposite numbers, in particular because of an improvement in their balance of trade. It is quite difficult to arrive at any final conclusions concerning the impact of military expenditure on a trade balance subjected to influences that are as different as they are opposing.

VI.6 Military research and development

Military research and development constitutes more than a third of civilian R & D in the United States. Given that there has now been half a century of almost continuous involvement in military and space R & D, the United States government has forgone the equivalent of nearly 20 years of civilian R & D. What contribution this wastage has made to the loss of competitiveness of the American economy is a question that has been widely debated. Mary Kaldor (1982) referred to baroque technology because the weapons were so sophisticated that they were bound directly or indirectly to have harmful effects on civilian technology. However, Browne (1988) thought that there was little to indicate that military expenditure would have a pernicious effect on American innovativeness; nevertheless, no relationship could be established for the short term spin-off of military technology onto its civilian counterpart. Weidenbaum (1990) additionally considered that military R & D did not enter into competition with civilian R & D, and that the two sectors were mutually independent in their operation. There was therefore no financial switching of amounts allocated to one or the other. This presentation is, nevertheless, still ambiguous. There are many relationships between military technology and civilian technology in which the former naturally utilizes the results of the latter, whereas the latter, restricted by secrecy and by the considerable difference of highly sophisticated products manufactured in small series, is only indirectly influenced by the major decisions taken by the State in the main branches of basic research. Thus, should the government opt for nuclear weapons, the two sectors will have the benefit of atomic energy, but the

civilian sector will find that its own freedom of choice regarding energy will be restricted by the very size of the research contracts awarded to nuclear technology.

The arguments put forward in condemnation of the influence of the military sector in modern technology are not however always consistent between those who consider both that the civilian applications of military research and development are very slight (the baroque arsenal theory) and that present day societies are undergoing a militarization of the economy (the theory of the military-industrial complex), and those who take the view that military research is an essential vector of present economic development (the theory of human capital and training) while at the same time considering that it must be protected against civilian diffusion that would be bound in the long run to favour the evil designs of potential adversaries (the theory of unequal exchange). These ambiguities in analysis are explicable by the diversity of the necessarily close relationships between military technologies and their civilian counterparts at the sectoral, regional and national levels, and over time. Because there is no a priori reason for military rationality to be in phase with economic rationality, opportunity costs may prove to be very high in a world of scarcity, notably because the adding of additional constraints modifies the conditions for realization of the economic optimum (Fontanel, 1989f).

VI.7 Development

Development is a broader concept than growth; it also introduces the idea that well-being is irreversible or that entitlement is flourishing (Sen, 1983). The question is one of knowing whether or not a prolonged military effort is a brake on economic development. Comparison of the recent experiences of the USSR and the United States with those of Japan and Germany seems to provide an answer, although one that is not as clear as might seem a priori. Deger (1986) thinks that there is a negative relationship between socio-economic development and military influence, even if this basic hypothesis is not always supported by oversimplifying econometric studies. There are at the present time four main approaches to economic development: the seeking of comparative advantages through the easing of restrictions on trade; development based on exports; the

expansion of industrializing industries; and the policy of import substitution.

The easing of restrictions on trade affords little opportunity for developing countries to attain their own independent advanced arms industry. Liberal theoreticians take the view that the opening of economic frontiers is egalitarian in promoting economic and social progress and favourable to peace. Every country ought to specialize in products for which it is reasonably cost-effective. It is pointless to produce arms for their own sake, because the trader and the manufacturer ought to supplant the warrior. The production of the arms essential to security ought to be carried out in allied States that have the best comparative advantage. Vernon's theory of the product cycle (Fontanel & Saraiva, 1976) stresses the progressive transformation of the world economic landscape, a feature of which is the irreversible trend for some sectors of industry of the developed countries to shift to the developing countries. In its first phase the new product is manufactured in the developed countries, which are havens of scientific and technical research and are the principal purchasers. The developed product is better known, and demand for it increases considerably owing to the diffusion of technology and the appearance of new competitors. The product becomes increasingly international and the conditions are established for the manufacture of the standardized product, the features of which are a good knowledge of the manufacturing processes and their simplification. If the labour input of the product is heavy, the price elasticity high and the transport cost low, the developing countries are able to gain a place in the market. These products even have a tendency to drift outwards. The manufacture of traditional weapons that change little, are not shrouded in military secrecy and do not require sophisticated manufacturing processes may follow Vernon's cycle. In that context, however, the developing countries are unable to take on production of the arms needed for their security on their own and their production responds above all to purely economic considerations and is confined to ordinary munitions. The United Kingdom of Mrs Thatcher accepts these new constraints, but it is also experiencing additional economic difficulties in the short term and definitely a loss of control over its own defence (Dunne & Smith, 1991). Were one or two

countries to prove to be the most competitive in this sector, it is likely that after several years of near monopoly they would progressively use this power to subjugate all their customers. The arms industry is not an activity like all the others, but one that calls security and freedom into question.

The policy of import substitution seeks to replace imports by a product manufactured within the country. It was at the outset a matter of ensuring the manufacture of imported intermediate goods and consumer durables. The principle of the theory is a simple one: given that an internal demand exists, what has to be done is to produce locally what is bought abroad. In this sense, the pursuit of endogenous development is opposed to liberal theories based on comparative advantages and the contributions of factors. Early in the seventies there were many agreements for the manufacturer of arms under licence. If it be true that arms production is favourable to national supply industries, it also permits the penetration of foreign capital and the conversion of military industries into transnational industries. This policy is nevertheless estimated to economize on scarce foreign currency. Purchases of munitions abroad place a heavy strain on the trade balance; they are sometimes the source of a deficit that may have grievous consequences through its effects on speculation, worsening of the terms of trade, and the emergence of cumulative effects that aggravate the deficits and inflationary tensions. Nevertheless, the arms industry does not really promote economic growth and even less does it promote industrial integration because the multiplier effects are, empirically, fairly weak, having regard to the divorce between civilian activities and military activities, the fact of military secrecy, and the economic dislocation. It may lead to a very considerable increase in costs, to dependence for intermediate consumables and patents, to a break between the protected military sector and a civilian sector in a competitive situation, and to eviction effects, notably at the level of employment and finance capital, to the advantage of military activities etc. The influence of scientists has upset international strategies. In the absence of good military research and development, the security of countries is under constant threat, unless it is covered by a military

alliance. Technological competition, which is unending, accelerates obsolescence. That is why it is difficult for developing countries to assert their economic independence, since they are obliged to seek foreign licences - generally for the production of what is already on the way to obsolescence - for the equipment essential to their defence. It is easier to import sophisticated equipment than to obtain the licences required for its production. Under these conditions, national production may even run counter to the very security of the country.

The strategy of development through exports is extremely dangerous when applied to the military sphere. The trade balance will not necessarily benefit, at least not initially, since allowance must be made for the imports required for the manufacture of national equipment (more than 30 per cent of the cost of the military equipment exported by France), for the price competitiveness of nationally produced arms in relation to their foreign counterparts (on pain of temporarily replacing a deficit of the trade balance by a budget deficit or of redistributing public expenditure), and for time-lags (purchases from abroad are rarely paid for in cash, but imported components for military equipment are, which may cause unacceptable bottlenecks). The need to export in order to cut costs by economies of scale also gives rise to economic dependence. The exporting of arms is often regarded as a highly lucrative activity, although few studies have been specifically concerned with this point. In fact, this function appears to have been quite poorly fulfilled for several years past. Sales are in effect accompanied by credit conditions that are especially favourable to the purchaser, and at times they do not involve any reciprocal financial transactions, notably for heavily indebted or developing countries: furthermore, some equipment is on occasion sold more cheaply abroad than to the country's own armed forces, and there is such a thing as impoverishing exportation, i.e exports that tend to weaken the country economically, notably when they are a factor in worsening the terms of trade. Lastly, having regard to the requirements of purchasers, the economies of scale expected to accrue from serial production are not always very great, except for very ordinary equipment from which little profit is expected, by virtue of the competition. It

should be recalled that munitions have the highly specific attribute of being goods that are destroyed. Furthermore, a decision to disarm would then be highly prejudicial to the national economy as a whole. Under these conditions, there would evidently be less scope for the application of policies of import substitution or of the principle of industrializing economies and the return on investment would be bound to be sufficiently disturbing to cause serious problems regarding the survival and conversion of companies (moreover, companies that are often nationalized).

Arms industries as industrializing industries or poles of development are an idea that has been strongly developed in Brazil and India. Economic development must be brought about through stimulating investment, since it is impossible, initially, to achieve harmonized and balanced development. What is therefore needed is to invest in activities that have the effect of providing an impulse through sequences of induced investments that ensure vertical and/or horizontal complementarity of the country's industry. The effectiveness of investment is measured by these induced knock-on effects. In this sense, military industry is a pole of development either through the backward linkage effect, which reveals the increased demand of all the production sectors feeding the sector in which the investment is made, or through the forward linkage effect, which is felt further down the line. Production of military equipment stimulates the civilian sector through the purchase of intermediate consumables on the internal market and through the creation of new jobs. Nevertheless, these stimulating effects are not decisive for development, since there is considerable risk of obsolescence in an economy in which there is already little innovation, there is considerable risk in exporting to achieve acceptable economies of scale, except for products that provide little stimulus, the risk of penetration by foreign capital is far from negligible, and military industries make great demands on capital, which a scarce factor of production for Third World countries. The policy of import substitution - i.e. the creation of a national supply corresponding to an expressed internal demand for imported products - may be selected in this case so as to promote internal industrial supply. Arms production leads to militarization of the economy and reduces the

disarmament potential. It cannot be denied that whole groups of national industries may go rapidly into recession unless military orders are replaced without delay by civilian orders, but it is also logical to expect that positive effects will emerge from disarmament, possibly in other sectors or other regions. This is probably one of the reasons that led the Soviet Union to be so keen for a pause in the arms race. Mikhail Gorbachev developed this idea when he asserted that development and international relations were modified by the arms race and the militarization of ways of thinking. Reconversions scarcely seem to pose major problems in the short term in planned economies, having regard both to the urgency of measures to boost the economy and to the civilian activities of most of the arms industries. Half the Soviet Union's steel, a quarter of its railway equipment and more than a fifth of its consumer goods are in fact produced by the military sector (Cooper, 1988).

How arms-producing Third World countries cope with the existence of technical and human capital made obsolete by a political decision and a new international situation after heavy investment has already been made in that sector will be instructive regarding the intentions of the developing countries, and even perhaps, in a broader context, of the real potential for lasting disarmament. Furthermore, the changeover from military activities to civilian activities right on the industrial site often proves to be a particularly delicate operation, having regard to the fact that the equipment is unsuited to the constraints of civilian demand, so that there has to be a compromise between technical specifications and cost. Two basic economic reasons are usually advanced to justify arms industries: the saving in scarce resources and the industrializing effects. Analyses of import substitution policies and of industrializing effects are not very encouraging in this respect. The opportunity costs of using highly skilled personnel in the military sector, the heavy investment involved, the pace of innovation and the rapidity of obsolescence in the military sector, the imports necessarily occasioned, the length of the production cycle, the intervention of multinational corporations, and the weakness of the industrial base needed if the best-performing products are to be competitive are deterrents at the purely

economic level against national production of arms in developing countries.

VII. Case studies on the economic impact of disarmament in developed countries

There are two complementary types of analysis: simulation by economic models of varying degrees of complexity and statements of economic policy based on what must be done in the context of disarmament.

VII.1 National economic models

Whereas a number of economic models have been constructed to analyze the impact of increased military expenditure, there are few formal analyses of the economic effects of disarmament. The application of simulations based on the reduction of military expenditure involves the hypothesis that the effects on the national economy of an increase or a decrease in the economic effort of defence will be to some extent homothetic. Now, it is probable that threshold effects will emerge to render such a generalization questionable, above all effects of stocks or of property. There are few economic studies on the economic effects of disarmament on national economies, and they are not always applicable to the present situation of contractual disarmament by mutual agreement desired by the great military powers, faced with the failure of the socialist system tried out for more than seventy years by the Soviet Union.

As regards France, a very simple model focusing on chronological series (Fontanel, 1980) shows that progressive disarmament has a weakly positive effect on the gross domestic product of France. This impact is due mainly to reduction of the inflationary tensions to which the armament effort gives rise and to the appreciable increase in national investment. Above all, however, the essential idea which is rather poorly developed in most economic models and is present in this analysis is consideration of the dual nature of military expenditure: as public expenditure it exerts important effects on global demand and is therefore capable of exerting Keynesian multiplier effects; as military expenditure in the strict sense it must be analyzed in comparison with other forms of public and private expenditure. Under these conditions military expenditure has quite high opportunity costs, notably because it reduces the public and private investment

potential for production. The effects of a 40 per cent reduction of military expenditure on the main sectors of the economy and on employment were studied in another model of input-output type (Aben, 1981). The following results were obtained:
reduction without the substitution of civilian expenditure for military expenditure led to an appreciable decline in national production (34 per cent for the armaments sector, shipbuilding and aeronautics and 3 per cent for smelting and metal working) and a loss of 400 000 jobs (300 000 for the military sector alone);
were civilian expenditure to be substituted for public civilian expenditure, several hypotheses were envisaged depending on the structure of the new allocations. None of the possibilities for the reconversion of defence activity made it possible to avoid a worsening of the employment situation in the short term (a loss of the order of from 140 000 to 213 000 jobs). This conclusion must, however, be heavily qualified, on the one hand because conscripts are not very costly and would readily find work in the civilian sector at an equivalent price, and on the other hand because very few economic activities subjected to such a reduction of their credits would emerge with such a satisfactory result (the loss of between 13 and 20 per cent of their labour force). Lastly, with the exception of the sensitive sector of armaments, shipbuilding and aeronautics, no sector received more than 2 per cent of its direct and indirect orders from the military sector in 1980. The harsh, disturbing result of the enforced loss of jobs resulting from disarmament in France is therefore considerably tempered on the one hand by the relative lowness of the figures obtained and, on the other hand, by the positive effects in the medium term of the replacement of military expenditure by more efficient civilian expenditure, unless the State should decide to make economies on extravagant items of expenditure or on expenditure as unproductive as defence costs.

As regards the United Kingdom, Dunne and Smith (1984) are of the opinion that disarmament is more of an opportunity than an economic problem. Using the CGP model (CGP = Cambridge Growth Project, Warwick University) they made several simulations of the economic impact of disarmament in Great Britain. They tested two hypotheses of a

reduction of one billion pounds (1970 prices) in military expenditure. In the first (hypothesis A) the reduction was offset by public expenditure; in the second (hypothesis B) there was no compensation. The results are interesting. The first type of disarmament produced a slight improvement in the balance of payments, a limitation of inflationary tensions of the order of one per cent (which abated from the second year onward), the creation of new jobs connected with the labour-intensive nature of the defence expenditure relative to the civilian governmental expenditure, and additional growth, of the order of 0.5 per cent, starting with the first year. Policy B, on the other hand, led to a reduction in the GDP of the order of 1.46 per cent, a fall of 0.15 per cent in the price index, and a worsening of the jobs situation (with 149 000 new unemployed in the first year and 200 000 at the end of 5 years). This situation was, however, brought about more by the deflationary policy than by the actual reduction of military expenditure (Table 3).

Table 3. The main macroeconomic effects of a reduction in military expenditure of the order of 35 per cent (difference by comparison with the "normal" situation of no disarmament)

Variables	Simulation A		Simulation B	
	Year 1	Year 5	Year 1	Year 5
GDP (%)	0.57	0.43	-1,46	-1.28
Prices (%)	-0.95	-0.42	-0.15	-1.51
Jobs	200 000	257 000	-149 000	-191 000

More detailed analysis suggested that there would be more than 250 000 jobs thus affected by disarmament, but a comparable reduction in the public sector would have led to a severe worsening of unemployment involving something like 350 000 jobs. The structural changes were, however, mainly of a microeconomic and mesoeconomic order and highly heterogeneous. Several questions were then raised concerning the appropriateness of a national arms industry, its export capacity, its global effects on the balance of payments, its technological competitiveness, and the existence of dual commodities. The adjustments came up against inertial effects, mainly at the level of individuals, the region, the company and the industry itself. These structural effects are

difficult to demonstrate in a macroeconomic model that is necessarily an overall synthesis. However, the authors assert that the results are in line with the historical experience of the United Kingdom (Chalmers, 1983) and with studies that stress the effects of substitution of military R & D to the detriment of civilian products (Kaldor, 1980), poor use of military technology (Maddock, 1983), and the effects of eviction of investment (Smith, 1980a). Disarmament eases the constraints on financial policy, the scarcity of technological ability, capital formation and the balance of payments; this, according to the authors, represents a major contribution to the regeneration of the British economy. Hartley's more qualified study (1987) emphasized the difficulty of actually determining the reductions of military expenditure, the fact that there need not necessarily be a correspondence between disarmament and the reduction of military expenditure, and the somewhat negative effect of military expenditure on the growth of the United Kingdom, an effect also manifested by health expenditure.

The impact of disarmament on the Canadian economy has been analyzed (Bernard and Truchon, 1980; Galligan and Herring, 1987) using the macroeconomic model of the Canadian Institute of Statistics (National and Inter-Regional Input-Output), which is based on the structure of the purchases of each sector and the distribution of the various demands for a given year. There are, therefore, no time relationships, which detracts considerably from the significance of the study, given that disarmament is a process that is necessarily progressive and dynamic. The results lay stress on the serious difficulties of the aeronautics industries, shipbuilding and communications equipment, the decline in the productivity of the industries concerned and the regional heterogeneity of the effects of military expenditure. At the national level, the multiplier of military expenditure over national expenditure would be of the order of 1.75 in 1985. The results obtained undoubtedly lack clarity in the context of an examination of disarmament.

The decline of the American economy has been emphasized over the last few years by the way in which innovation has lagged, low productivity, the twin deficits, and problems of competitiveness. Paul Kennedy (1987) formulated the hypothesis that these

problems could be due to too high a level of military expenditure in the United States. The argument is certainly not a new one, but econometric analysis does not yield any very clear results in its support. The statistical data do not provide irrefutable proof of a negative relationship between capital formation and military expenditure, and the productivity problems of American industry cannot be ascribed to the defence effort alone. The available scientific tools are inadequate to support such propositions (Gold & Adams, 1990). Kinsella (1990) demonstrated by the use of an autoregression vector that no substantial causal relationship existed between military expenditure and prices, unemployment and the interest rate. A direct positive relationship (without time lag) did exist between military expenditure and national output, but only for monthly or quarterly information, notably when the economy was in bad shape and thus was under the effect of the Keynesian multiplier. The fact that no delayed relationship between the national product and the economic effort of defence was significant pointed to the weakness of the causal relationship between these two variables. Huang and Mintz (1990) confirmed this analysis. Atesoglu and Mueller (1990) thought that there was a positive relationship between military expenditure and economic growth, but that the multiplier was very small. Unless reduction of military expenditure was very considerable and abrupt, the effects of highly progressive disarmament on American economic growth would be negligible. This relationship might imply that the United States had relatively too few opportunities for investment and that the increase of military expenditure was a Keynesian opportunity of increasing creditworthy demand.

A study by Ward and Davis (1990) demonstrated the multiplier effects of governmental, military and civilian expenditure on the national economy and revealed the existence of contradictory effects, the resultant of which was dependent both on the magnitude of defence expenditure in the economy of the United States and on the importance of the military effort in the State budget. The relative weight of military expenditure in the national economy is a burden for the economy, whereas public non-military expenditure tends to have a positive effect. In other words, periods of increased

defence effort tend to restrict economic growth. Conversely, by virtue of the difference in the productivity of governmental expenditure itself, the share of non-military expenditure in government expenditure tends to have a negative influence on growth, unlike that of military expenditure. It must be pointed out that the State often has to be responsible for activities that are not very productive but are necessary for society as a whole, and that cannot be handed over to the private sector for economic considerations of profitability or the principle of public service. Thus, the defence of justice, freedom and the rules of democracy does not always make sense in terms of economic value added, even if these principles are superintended by administrations that have to satisfy the criteria of good management within the restricted framework of their constraints. Ward and Davis concluded that the global effect of American military expenditure during the period (1952-1988) had been very slightly positive, but that its contribution to national productivity had declined, in contrast to that of governmental civilian expenditure. Lastly, a simulation relating to a 5 per cent reduction of military expenditure indicated that were investment and employment to remain constant, growth ought not to be affected in the short term. This brings us back to the hypothesis of Atesoglu and Mueller (1990). Furthermore, Aschauer (1989), who applied an empirical test to productivity, was of the opinion that whereas the expenditure of the State infrastructure had very positive effects on growth, the same could not be said of military capital expenditure.

To sum up, it seems that military expenditure has tended to have a very slightly positive impact on the national economies of developed countries, quantitatively speaking. In terms of opportunity cost, however, it does not appear that the defence effort is the best economic investment in today's world, and this may explain the progressive loss of competitiveness of countries that maintain a raised level of military expenditure over long periods. A distinction should also be drawn between arms-producing countries (for which the effects of disarmament may be positive or negative in certain cases), great powers (which may benefit from effects of domination) and middle-level powers in their desire to maintain adequate national security. Lastly, let us stress that, as a process, disarmament

is not symmetrical to armament, since the effects of stocks are very different. When the capital of the military sector is underemployed, disarmament indisputably increases the sectorial crisis of armament, whereas when the situation is one of its full employment, the effects may be positive, thanks to the easing of market conditions. At the global level, on the other hand, the freeing of resources in a situation in which there are favourable opportunities for investment may have positive effects on the economy as a whole. Situations in which military expenditure rises are not necessarily comparable to disarmament situations. Substitution effects appear when there is full employment. In a period of underemployment military expenditure exerts a Keynesian growth influence that could equally well be exerted by other public expenditure (Colard, Fontanel & Guilhaudis, 1981).

VII.2 Analysis of economic policy

Were the situation of the possible disarmament of the major nuclear powers to be rapidly analyzed, the effects would differ globally in accordance with the actual situation of each national economy. Paul Kennedy (1987) was of the opinion that the United States had to confront the dilemma of the military obligations of a great power and of industrial decline aggravated by agricultural problems, the twin deficits and progressive loss of international competitiveness. Under those conditions, peace dividends from disarmament could appear as much in favour of social programmes as of national productivity. The reduction of defence expenditure did further the competitiveness and the productivity of American enterprises, all the more so since the technological spin-off from the military sector was considered to be inefficient and costly (Melman, 1974). Joshua Goldstein (1988) suggested that war and prosperity were closely connected in a relationship of repulsion and that one per cent of American military expenditure relative to the GDP destroyed 1.5 per cent of annual economic growth. It should be added that disarmament by the United States would be of global significance (certainly of structural significance) only provided that the allies did not increase their own military effort under an agreement for the sharing of the defence burden (Sandler, 1987). Furthermore, a changing

economic situation is sometimes the source or the cause of new potential for conflict and rearmament (Russett, 1983).

Lawrence Klein thinks that the effect of disarmament on the American economy will be bound to be positive (Klein, 1990a). The production of civilian capital goods will be very useful when it takes the place of military production, because the former creates new income flows, whereas the latter is used to destroy or to be destroyed without any economic return. Thus, a motorway will still have utility far beyond the expenditure period and will further the expression of other utilities. Where military equipment is concerned, the first condition is not always guaranteed, and the second hardly ever. All conversion of the civilian to the military leads, a priori, to an indisputable economic gain, even if certain situational or regional problems may sometimes arouse a hint of doubt. However, the reduction of military expenditure ought not to result in a limitation of global demand, and the government ought simultaneously to pursue a policy of compensatory public expenditure or reduction of the budget deficit. Thus, disarmament that did not involve international transfer of the whole or a part of the savings made would inevitably lead the government of the United States to pursue a policy of limiting the public deficit (thought to be critical), restoring national savings and progressively reducing interest rates. Under those conditions, the entire world economy is likely to experience profound transformations. Should the American deficit decrease, the eviction effects of civilian investment will be reduced, at the same time as the pressures on interest rates will tend to diminish. In the short term, however, some major national enterprises will suffer a considerable reduction in their public orders, notable McDonnel Douglas, General Dynamics, General Electric, Teneco and Raytheon, which together have a total of more than 130 billion dollars worth of Pentagon contracts. In the medium term, lower interest rates will lead to more investment, and that situation will favour both international trade and reduction of the public deficit. It is noteworthy that changes of interest rates would be bound to have important effects on the exchange market. Lastly, military expenditure exerts undoubted inflationary pressures, because the economy

provides salaries without a flow of goods being produced in exchange. The result, in addition to the situational, regional and structural problems of the conversion or the closing down of certain armament activities, should therefore be an increased propensity for investment. Furthermore, the changes in interest rates, the confidence shown by international financial operators in this change in international relations, and the very nature of the disarmament procedure will inescapably produce effects on exchange rates, the non-mechanistic nature of which makes it impossible, a priori, to evaluate the structural modifications that will occur in the comparative value of currencies. As far as the United States is concerned, Klein therefore recommends a progressive reduction of the public deficit, the initial consequence of which would be reduction of the interest rate, followed by a limitation on the cost of the debt, and ultimately by an improvement in exporting situations. The LINK model posed the question of what the effect would be of a 3 per cent reduction in military expenditure, accompanied by a more flexible monetary policy. The main answer was that there would be an appreciable reduction, of the order of 2 per cent, in interest rates. There would then be a revival of heavily indebted economies, that would receive a real subsidy from the reduction of interest rates and would then be in a position once again to import American products.

Charles Schultze of the Brooklyn Institute is putting forward a plan for a progressive reduction of military expenditure of the order of 50 billion dollars over five years (falling from 287 to 237 billion between 1989 and 1994); the "savings" thus made would be compensated and one fifth would be devoted to Federal civilian expenditure for high-priority programmes, while the rest would go to reduce the public deficit. It was the case a few years ago that when the United States had a cold, the western countries contracted bronchitis. Now Europe is progressively becoming the economic centre of the world and its regular process of integration should have important positive effects for the whole of the world economy. The government of the United States no longer plays the dominant economic role that it has had since the last world war, and the developing countries can hope only for indirect effects from a reduction of the military expenditure

national economy to withstand the shock of the increased obsolescence of national investment without great harm to economic growth.

VIII. Disarmament for development in favour of the developing countries.

Disarmament and development are two essential objectives of our time. What we need to know is whether it is desirable that they should be linked. It may be recalled that successive French governments have frequently called for the establishment of an international fund of disarmament for development that would enable the amounts saved on arms to be used to develop productive activities that would speed up economic development and extend it through aid arrangements to the developing countries (Klein, 1990; Fontanel & Smith, 1987). Consideration must be given to the negative consequences of military expenditure for security itself, it being understood that the measures that ensure the defence of one country are seen as a threat by the others; the non-productive nature of the arms race is asserted under those conditions. However, in the absence of confidence in the balance of forces, national strategy cannot be satisfied with such a proposition. Demilitarization of the economy frees additional resources, the reallocation of which calls for strategic decisions and an economic policy reconciling the objectives of growth and the redistribution of resources to the benefit of the least well endowed. Disarmament for development is generally analyzed, on the one hand, in the absence of any international transfer of the resources saved through disarmament and, on the other, in the context of increased aid for the most destitute countries.

VIII.1 The internal effect

If military expenditure is unproductive, it follows that anything that tends to reduce it while maintaining an equivalent level of security is economically desirable. Nevertheless, it cannot be denied that considerable problems may arise as a result of ongoing disarmament: increased unemployment for young conscripts who are not called up; a reduction in the number of jobs for military personnel whose abilities are sometimes too specialized to be easily fitted into the civilian economy; reduction in the activity of garrison towns and arsenals (Dunne, 1986), and so on. It is assumed in the reports of the

of the United States, principally through the channel of the progressive reduction of interest rates.

The countries of the East are currently confronted by two basic problems: the restructuring of their economy and the reduction of military expenditure. For a long time the USSR pursued an approach of "paradoxical militarism" (Sapir, 1989), in which the strategic accent was on the ostentatious aspect of strength whose political and strategic end was often realized to the detriment of the real efficiency of the armed forces. At the present time the Soviet Union does want ongoing disarmament, because the economic impact of military expenditure is too onerous for an economy of scarcity. Mikhail Gorbachev has given clear expression to this wish in asserting that "development and international relations have been altered by the arms race and the militarization of ways of thinking". That is an essential point of the new Soviet strategy. Klein considers that a 5 per cent reduction of military expenditure in Poland is associated with a 3 per cent expansion in civilian expenditure on consumption. Having regard to the fact that the arms markets operated on a highly developed quota system, there is a new opening for international trade that should strengthen interdependence and solidarity. However, we do not know of any econometric or quantitative studies from which to demonstrate the economic point of disarmament in the countries of eastern Europe. Reconversions scarcely seem to pose short term problems in the context of a planned economy, even though the urgency of measures to revitalize the economy makes most changes both tricky and necessary. Furthermore, conversion should raise less problems than in the western countries because many military enterprises are already working in the civilian sector. Cooper (1988) asserts that half the electric steel, a quarter of railway equipment and more than a fifth of the consumer goods are already being produced by the military sector, a fact which shows that there are good prospects for reconversion in a country in which private consumption remains quite modest and wide open for development.

It is, therefore, not enough to say what form disarmament will take. We must also indicate the economic policy that will provide the support that should enable the

national economy to withstand the shock of the increased obsolescence of national investment without great harm to economic growth.

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United Nations that the arms race reduces world growth potential and limits the scope for economic development by its squandering of scarce resources. It is, nevertheless, likely that increased military expenditure is made possible by the high growth rate of the economy, and not vice versa. The well-known study by Benoit (1978), partly confirmed by Frederiksen and Looney (1982), which suggested that military investment would be conducive to industrial modernization, to training and knowledge, to the improvement of infrastructures, to full use of the productive capacities of the economies of developing countries, and to the sense of order and discipline, and which also suggested that the desire for independence would not be an obstacle to their economic development, has been strongly questioned both as regards its form (Deger & Smith, 1983) and its content. This relationship is basically highly disputable, because there is a considerable difference between the modernization of defence forces and of the economy. It even happens frequently that competition develops between the military sector and the civilian sector over the hiring of the best skilled personnel, and under those conditions the effects of eviction reappear as strongly as those initially affecting the formation of civilian capital. The analysis of Deger and Smith (1983), while disputing the form of Benoit's analysis, arrives at opposite results by the use of a small, three-equation model. Whereas military expenditure has a positive effect on growth in the short term, by reducing savings, it has a negative impact on economic development in the longer term.

There are three substitution effects in countries in which resources are scarce: temporal (the choice between the present and the future), sectorial (the choice between the military and civilian spheres) and by category (the investment eviction effect caused by defence expenditure). Augusto Varas (1986) considers that the effect of military expenditure differs with the development level of countries, influencing the material well-being of Third World countries and the growth of developed countries. The militarization of developing countries is not conducive to their economic development in the long term (Smith & Smith, 1983), despite the mobilization of the surplus to which it may give rise. The theory of the diversion of resources (Melman, 1974) sets out the view that an

economy in which a large amount of critical resources is allocated to unproductive activities considerably reduces its capacity for efficient production, either because the national industry becomes less competitive, or because of the corrupting effect of the behaviour of economic agents. Under those conditions disarmament does eventually improve the national average standard of living and increase the world economic development potential. The substitution relationship between investment and military expenditure which is henceforward quite generally accepted for developed countries, at least when the strategic threat is quite weakly perceived by the private sector, is less accepted for the developing countries, which suffer the pangs of chronic underconsumption. Other effects may be involved. Thus, military infrastructures may be suitable for civilian production, and demobilized soldiers back in civilian life are capable of improving national productivity. Nevertheless, Gyimah-Brempong (1989) is of the opinion that the military expenditure of African countries is not capable of being passed on to economic growth, since the positive effects often instanced are largely offset by the reduction of investment occasioned by this defence effort.

Saadet Deger (1986) and Nicole Ball (1988) regard national armament as a cause of underdevelopment, whereas Robert Looney (1988) thinks that this relationship can really be accepted only for countries that are not arms producers. Looney's econometric results indicate that: (1) political and administrative influences do more to determine military expenditure than do international rivalries; (2) the substitution effects are greater in arms-producing countries than in countries that merely import the arms that they need for their defence; (3) military expenditure has made only a slight contribution to the increased indebtedness of Third World countries, notably those in the Southern Hemisphere. Be that as it may, military expenditure has not, according to Ball, played the essential role that some would have wished, a posteriori, to have seen it play, since national arms production has some advantages, such as the savings on scarce foreign currency, technological expertise and the possible introduction of an industrialization policy stemming from military investments that would not, in any case, have been made

for civilian purposes. Nevertheless, no Third World country is capable of sustaining such a policy unless it already has a sufficiently strong and diversified industrial sector (Wulf, 1983). David Whynes (1983) even suggests that only large developing countries, notably Brazil and perhaps Indonesia, in the area investigated, are really in a position to derive sufficient multiplier effects from their military effort to exceed the eviction effects that the military sector undoubtedly exerts on the civilian sector. Lastly, the growth of arms industries in the developing countries also leads to an increase in military expenditure liable, in the long term, to raise serious difficulties in national economic development (Fontanel and Saraiva, 1986). Even so, Michael Ward (1991) demonstrates that the military programmes in Brazil and India are tending to be globally positive. If account is taken of the fact that other public expenditure is even more satisfactory for growth, opportunity cost is a question that still has to be considered. This hypothesis has, however, encountered objections that cannot be resolved either by the analysis made by Lakhami (1986) or by that of Looney (1986), predisposed to the establishment of a military industry in the developing countries, having regard to the descriptive approach and the empirical statistics that they employ exclusively and systematically.

In the absence of transfers, for countries that do not have an arms industry, the effects of a reduction of military expenditure will be positive even in the short term, provided that they are not offset by an equal or greater expenditure on the maintenance of internal order or on the purchase of imported luxury goods, since they make for the more efficient use of scarce resources. For arms-producing countries, disarmament may have perverse effects in the short term, notably for the industries and regions directly involved in the industrial activities of armament. The economic impact should be positive in the long term, provided that the situation of economic decline triggered by the reduction of internal arms purchases does not lead to irreversible effects, notably as regards conversion of activity. It is even likely that good management of the reduction of military expenditure would have positive long-term effects on civilian research and development, on the real productivity of national economies, and on confidence in

international trading relations that cannot be quantified by econometric studies, that in general apprehend only short-term developments in which the past (characterized by the arms race) is repeated in the future. However, although many developing countries do devote a not inconsiderable part of their resources to military purposes, the large sums tied up in armaments should be concentrated in a small number of countries. Basically, disarmament appears to have favourable effects on the national economy in Third World countries, even if the arms-producing countries risk experiencing some difficulties over conversion in the short term, which will be largely offset by the reduction in imports relating to the military industrial effort and by the matching increase in civilian public expenditure.

The effects of disarmament cannot be measured in isolation from the economic policies implemented by governments. A voluntary reduction in military expenditure cannot be satisfied with reasoning of the "all other things being equal" type. The theory of underdevelopment as a product of development takes the view that the economic situation of Third World countries may worsen if, for example, reconverted enterprises in the developed countries enter into competition with national products, or if the developed countries cease to buy the raw materials that constituted the greater part of their export resources. This latter fear would not appear to have been borne out, since the model of Leontieff and Duchin (1980, 1983) reveals the increase in the demand for raw materials that should result from ongoing disarmament. The conversion from military to civilian activities may, however, lead to a search for new outlets and to increased competition for the products of Third World countries. Similarly, a reduction in expenditure on military research and development to the benefit of the civilian sector may widen the technological gap and lead ultimately to greater economic inequality.

VIII.2 International aid

The question is differently analyzed when the military effort is accompanied by assistance from a developed country. In that case, the effects of modernization may have free play, without the economic constraints of limitation on investment being apparent.

Partial transfers of the resources economized by a reduction in the military expenditure of the Great Powers may have positive effects on Third World countries. Irrespective of the improvement in international relations that would stem from disarmament and improvements in international interdependence, aid linked to disarmament, if expressed in convertible currencies, should normally have the same effects as existing traditional forms of aid. There are no grounds for expecting its influence to be greater or less, except perhaps at the level of the size of transfer, which may exceed the threshold above which the solidarity accorded has significant economic effects. It should, however, be noted that not all transfers are equally favourable to the economic development of destitute countries. Disarmament can have favourable effects on economic development only if the saving that it makes possible is not confiscated by a social grouping that decides to devote it to unproductive uses (exports of capital or imports of luxury goods, for example). In other words, a transfer makes economic sense only if it finds expression in a highly productive activity. A transfer may on occasion be capable of having an adverse effect, notably by aggravating inflationary trends owing to the appearance of demonstration effects. A resource transfer may also be the occasion of new markets for the developed countries and new dependence for the poor countries. Thus, James Lebovic (1988) succeeded in demonstrating that political and military considerations were just as uppermost in American foreign aid during the presidency of Carter, with its heavy emphasis on defence of human rights, as during that of Reagan, when the pursuit of the military might essential to American security was a strong influence. Transfer therefore satisfies political and military considerations, in the first instance, then the economic interests of the donor, and only lastly the economic development needs of Third World countries. The developing countries must therefore avoid the transfer being, on the whole, impoverishing. Should the transfer be made in a nonconvertible currency, the recipient country will be obliged to buy from the donor country, which may take advantage of this to reintroduce unequal trade flows. Should the transfer be in kind it may not be evident that the product concerned satisfies the development needs of the

recipient countries; for example, if the aid relates to a commodity that competes directly or indirectly with the national industry of the poor country, the end result may perhaps be very negative for the Third World, the more so because every product bears the stamp of a culture and the dominant values of the society in which it was created.

Lastly, aid from developed countries may lead to distorted development, especially if it is not disinterested. Some forms of transfers prove ultimately to be costly, notably in operating costs, and political constraints are rarely absent from such an undertaking by rich countries. Furthermore, "aid to developing countries may be devoted to prestige expenditure, to the increasing of social inequalities, and to furthering the development of societies in which human rights are not necessarily respected. Transfers may also be the subject of sordid calculations of interest tending to accustom populations to a type of consumption that renders them dependent on the industrialized countries..." (Fontanel, 1984). Taken overall, the results are favourable to disarmament for development because, although the developed countries may experience a slight reduction in their growth rate in the short term, the effects tend to be positive in the longer term, even if not very significantly so, statistically speaking. The result is to narrow the disparities in growth that would exist in the absence of such a transfer. The question then becomes on of whether the developed countries desire such an outcome, it being understood that disparities of income are interesting indicators of the satisfaction of the needs of populations. These effects are felt more deeply and more rapidly if there are existing measures for the easing of market restrictions and the freeing of the currency, but the possible gains may also disappear because of changes in the terms of trade, in national interest rates and in debt repayments. In fact, the statistical significance of the models is relatively weak in this context, it being understood that the hypothesis of all other things being equal that prevails in the application of econometric techniques is largely brought into question by the exceptional event that real ongoing disarmament would be.

VIII.3 In the world economy

A reduction of military expenditure has been simulated in several models of the

world economy (Fontanel, 1989b), five of which yield interesting results.

(1) The transfer of resources to poor countries furthers their economic development in the model of Leontieff and Duchin (1980a,b, 1983). Disarmament for development is therefore desirable. Ongoing disarmament would have a positive effect for all the regions of the world and the transfers of resources would appreciably increase consumption and the per capita GDP of the arid countries of Africa, and the low-income countries of Asia and tropical Africa (Table 4). Three scenarios of the evolution of armament expenditure and transfer of the resources made available were tested (inter alia):

the Base scenario represents a projection of the arms race at the beginning of the eighties, leading to world military expenditure in the year 2000 of 646 billion (1970) dollars, purchases of military equipment of 266 billion (1970) dollars, and an arms trade of 37 billion (1970) dollars;

DIS1 represents a disarmament process with the United States and the USSR at parity, making use of only two-thirds of the military expenditure of the Base scenario. The financial defence effort is also reduced for the other countries by an amount of the order of 25 per cent for 1990 and 40 per cent for the year 2000;

DIS2 takes the same figures as DIS1, but introduces the transfer of resources from the developed countries to the poorer countries (45 per cent for the low-income countries of Asia, 30 per cent for the countries of tropical Africa, 15 per cent for the arid countries of Africa and 10 per cent for the Latin American countries with middle-level incomes), up to a limit of 15 per cent of the amounts saved through the reduction of military expenditure for 1990 and 25 per cent in the year 2000.

However spectacular these results may seem to be for the sparsely populated underdeveloped countries, they are not statistically very significant. Thus, an annual reduction of military expenditure by 1.2 per cent between 1980 and the year 2000 would further the economic growth of almost all countries (except for the OPEC countries), by 1 per cent for Japan, 1.5 per cent for North America, 3 per cent for Europe, 10 per cent for the planned-economy countries of Asia, 20 per cent for the low-income Asian

countries and tropical Africa over a period of 20 years. It may be noted that aid for development appreciably improves the situation of the poorest countries. However, the discrepancies of growth and development tend to increase strongly during this period, which makes the reduction of international tension extremely hypothetical. In opposition to the hypothesis of a decline in the demand for raw materials following a reduction in military expenditure, the model of Leontieff and Duchin shows that the new growth generated by this disarmament does not endanger the economy of the countries that produce raw materials, most of which belong to the Third World.

Table 4. Per capita Gross Domestic Product (in 1970 dollars) for the year 2000 as indicated by three scenarios of military expenditure

Country or group	Per capita GDP in the year 2000			
	DIS1	DIS2	Base	Growth rate (Base/GDP 1970)
Eastern Europe	4891	4894	4745	203%
Japan	6805	6801	6734	252%
North America	7937	7937	7814	69%
Oceania	5412	5411	5386	93%
USSR	5790	5791	5635	215%
Western Europe, high income	5924	5922	5859	127%
Western Europe, moderate income	996	961	940	35%
Southern Africa	1320	1320	1320	68%
Latin America, high income	1455	1375	1338	202%
Latin America, moderate income	488	423	418	-30%
Oil-rich Middle Eastern & African countries	3888	3868	3951	1280%

Tropical Africa	382	251	244	46%
Arid countries of Africa	353	163	143	-30%
Asia, planned economies	372	372	380	14%
Asia, low income countries	190	140	136	128%

Table 5. Evolution in the demand for raw materials under conditions of disarmament or maintaining the arms race

Resource	Maintaining the arms race	Disarmament
Petroleum	3.9	1.0
Nickel	3.1	2.2
Copper	-0.3	2.4
Zinc	-0.3	2.7
Bauxite	-1.1	3.0
Tin	-1.8	3.2
Iron	-3.9	3.4
Coal	-5.5	4.0
Natural gas	-6.5	3.4

Nevertheless, the econometric results obtained do not seem to us to be very significant. They give only a very global idea of what the economic impact of disarmament means. However, the model of Leontieff and Duchin is not very adequate as a reflection of the ways in which the groups of countries under consideration were growing in 1990. For example, the excellent results foreseen for the planned-economy countries are very wide of the mark, because the formalized system had to use optimistic figures (based on bureaucratic planned prices) supplied by the socialist governments, and it was scarcely possible to analyze the latent political and economic crisis of the Eastern countries on the basis of the raw official data.

(2) Capelin, Bjerkholt and Gleditsch (1982) make several simulations of the World model, applying the same methods. They tested four main hypotheses: the base scenario, a true projection of the strategic and economic situation of the early eighties, a

progressive reduction of military expenditure of the order of 15 percentage points every ten years, without any reconversion effort, and an equivalent reduction, but with either an internal reconversion effort, or a desire for conversion directed exclusively towards the developing countries. In the first case it is the developed countries that are the main beneficiaries of ongoing disarmament. With international aid, on the other hand, the gap between rich and poor countries tends to narrow (Table 6).

Table 6. Per capita GDP in 1980 and 2000 (in US dollars of 1970)

Type of country	1980	BASE	DIS	REC.1	REC.2
Donors	1972	3388	3456	3459	3480
Beneficiaries	172	186	197	317	440
Other regions	837	1180	1224	1302	1392
Developed countries	3323	5475	5655	5663	5709
Resource-rich countries	711	1867	1829	1943	2059
Developing countries with few resources	184	241	244	320	399
Total	1115	1663	1701	1773	1842

These simulations yield the same types of results and conclusions as those of Leontieff and Duchin, and the same criticisms may be levelled at them.

(3) A simulation based on the UNITAD world model (Royer, 1985) simultaneously examines the economic impact of disarmament and of disarmament for development. In an initial scenario disarmament is not accompanied by an international redistribution of the amounts saved, while a second type of simulation studies a policy based on the satisfaction of basic needs (with the promotion of small-scale, highly productive economic activities in the developing countries). Two cases are analyzed:

disarmament that permits realization of the objective of public assistance for development amounting to 0.7 per cent of the GNP;

one third of world military expenditure is transferred to development programmes for the developing countries , partly through direct aid from the developed countries corresponding to an additional expression of solidarity of the order of one third of their savings on military expenditure, and partly through a transfer of internal allocations from military resources to civilian productive activities.

Job creation seems quite modest for the developed countries. On the other hand, the situation for the developing countries is very appreciably improved. Whereas the reduction of military expenditure depresses demand and causes an increase in unemployment in the short term, its spin-off is expressed in the longer term in the growth of the developing countries by an increase in demand for the most developed areas. If the improvement in the amount of international assistance is based on a policy that accords priority to basic needs, the result is considerable additional growth and job creation. These effects will be strengthened by measures for the easing of trade and currency restrictions. It should be noted, however, that these gains may rapidly become losses if this development is accompanied by an increase either in interest rates or in the amount of the annual repayments of the debt burden of the developing countries. Disarmament may relax some economic constraints (and may, in some cases, tighten them), but it cannot, on its own, resolve all the problems of the developing countries. Thus, for example, even on the most satisfactory hypothesis, the real per capita consumption in Africa south of the Sahara will continue to worsen because the population is growing at too fast a rate, and because of the endemic weakness of agricultural production. The material well-being of the African population cannot be improved without substantial improvements in agricultural productivity. Lastly, the governments of these regions have to realize that they must rely first and foremost on themselves to set their countries on the road to economic development.

Table 7. Simulations of the economic consequences of disarmament

Hypotheses	Mean growth rate (1990-2000), % p.a.			
Disarmament hypotheses	Developed countries		Developing countries	
	Without income redistribution	Basic needs	Without assistance	Basic needs
Disarmament with public assistance, 0.7 % of GNP	3.3	3.6	7.7	8.9
Disarmament: 1/3 of military expenditure	3.5	3.7	8.6	9.4
	Jobs created (millions)			
Public assistance, 0.7 % of GNP	2	8	19	127
Disarmament: 1/3 of military expenditure	7	10	73	169

(4) A specific version of the SARUM model (Gigengack, de Haan and Jepma, 1987) introduces the military sector into a world economic model from a model of the arms race inspired by the studies of Richardson (1960) and of Brito and Intriligator (1976). Several scenarios are analyzed in a situation of peace, of war, of peace with a heavy incentive to investment, of world peace combined with strong expansion, and of war with governmental control of investment. These analyses are only secondarily concerned with the economic and social consequences of disarmament, especially as military expenditure

may become endogenous variables in the model. The "Peace" scenario has regard to the hypothesis that the internal forces influencing military expenditure are decreased, notably the pressures exerted by the military-industrial complex and the view of internal unrest taken by governmental elites. Under these conditions, Richardson's coefficients of response to external aggression are reduced, following which there is a heavy reduction in government budgets. Nevertheless, the growth rates of all the regions concerned increase. On the other hand, in a situation of the voluntary reduction of military expenditure decided upon by NATO, and assuming proper conversion of the resources thus freed in the form of productive investments, military security is followed by economic security and the process of economic development begins in all regions.

(5) The results yielded by the LINK model (Luckham, 1986) are not without interest. For example, a 10 per cent reduction of military expenditure accompanied by an improvement in international assistance put at 0.7 per cent of the GNP of the developed countries is capable, in the best case of a transfer relating exclusively to capital goods, of leading to a 1.7 per cent growth of the GNP in the developing countries and an 0.2 per cent growth in the developed countries. However, assistance is not always used advisedly. Should it be squandered, the growth rate of the developing countries would not experience any negative shock in the short term, but the developed countries would experience a negative effect of the order of 0.3 per cent of their annual growth. For this transfer to be positive for all parties (donors and recipients), 60 per cent of the aid must be expended on capital goods. In another scenario of the LINK model, were the United States, the USSR and Japan to be the main donors of 53 billion dollars down to 1993, arising from their disarmament and in favour of the development of Third World countries, the growth path of the world economy would rise from 0.9 to 1.7 per cent annually, but the developed countries would experience an annual decline of the order of 0.2 per cent relative to the normal trend, whereas the developing countries would receive an additional impetus ranging from 10 per cent for the countries of Africa south of the Sahara to 2 per cent for the petroleum-exporting countries of the Middle East (Klein,

1990b).

Disarmament cannot, however, be confined to quantitative choices on the limitation of military expenditure. In effect, we must not forget that national governments must always defend the interests of the peoples whom they represent in an international environment that is seen as hostile. Disarmament calls for a range of decisions on political priorities, the international economic order, the nature of development, the rate and direction of the technological progress that could be developed in a less militarized society, the management of the natural environment, and the reallocation and redistribution of economic resources.

Conclusion

The militarization of economies (defined as a situation in which war, the threat of war or preparation for war are a major collective preoccupation involving a high degree of legitimacy, much political influence in governmental decisions and a significant allocation of national resources) is still very strong (Fontanel, 1991). Many countries have based their industrialization on arms production, which is dangerous from an economic point of view, notably when stagnation develops in the international arms market, and which is a reducing factor, by virtue of the political and military constraints that are bound to emerge, and that restrict the degrees of freedom of civilian and military governments over disarmament (Kolodzjej, 1987). Even so, a serious economic study could provide evidence that some exporting activities are impoverishing, notably when payment conditions become difficult or even impossible, and when the largely subsidized arms industry is persuaded to sell at a loss... to the community (Smith, Humm & Fontanel, 1985; Chesnais, 1990).

Militarism appears with the State system. The social position of the military is important. The army is often the symbol of national unity, even if its position in the military-political complex is the central one. The military hold their power in the name of their competence to defend the basic interests of the Nation. That is why societies that have conscription seem to be less productive of militarism. Militarism is born from

clashes of interest, as well as from belief in violence and force. Disarmament sets the scene for the "civilization" of modern societies, the retreat of the ideas of militarism, the hierarchy, discipline, nationalism, patriotism and xenophobia. Outlooks and behaviour do not decree why this should not be so. The economy of disarmament does not stop at the mere reduction of military expenditure; it must also apply itself to the reasons on which the disarmament is based and which, if possible, make it irreversible. This latter point is not, however, one that can be tackled by economists on their own, for it involves consideration of the very nature of humankind.

Articles et recherches citées dans le rapport

- ABEN Jacques (1981) : "Désarmement, activité et emploi", Défense Nationale, Mai.
- ABEN J. & MAURY J.P. (1987) : "Pour en finir avec l'inflation militaire". Défense Nationale, août.
- ADAMS Gordon & GOLD David (1985) : "The Economics of Military Spending. Is the military dollar really different ?", in "Peace, Defence and Economic Analysis", Schmidt & Blackhaby (eds.), Mac Millan Press, London
- ADAMS Gordon & MUNZ Eric (1988) : "Fair Shares. Bearing the Burden of the NATO Alliance". Defence Budget Project at the Center on Budget and Policy Priorities, March.
- ALEXANDER W.R. (1990) : "The Impact of defence spending on economic growth: a multi-sectoral approach to defence spending and economic growth with evidence from developed countries". Defence Economics, Vol. 2, n° 1, Harwood Academic Publishers, Chur et London..
- AMES Barry & GOFF Ed. (1975) : "Education and Defense Expenditure in Latin America 1948-68" in LISKE, LOEHR, McCAMENT eds. : "Comparative Public Policy : Issues, Theories and Methods". John Wiley, New York.
- ANDERSON M. (1975) : The Empty Pork Barrel : Unemployment and the Pentagon Budget". Congressional Record, June 4.
- ANDERSON M., FRICH M. & ODEN M. (1986) "The empty pork barrel. The employment cost of the military build-up". Employment Research Associates, Lansing Michigan.
- ANTONY Ian, COURADES ALLEBECK Agnès & WULF Herbert (1990) : "West European Production, Structural Changes in the New Political Environment". A SIPRI Research Report, October.
- - ANTONY Ian, COURADES ALLEBECK Agnès, GULLIKSTAD Espen, HAGMEYER-GAVERUS Gerd & WULF Herbert (1990) : "Arms production". SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- ANTONY Ian & WULF Herbert (1990) : "The trade in major conventional weapons", SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- ANTONY Ian & WULF Herbert (1991) : "The trade in major conventional weapons". SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- ASCHAUER David (1989) : "Is Public Expenditure Productive ?". Journal of Monetary Economics, 23.
- ATESOGLU S. & MUELLER M.J. (1990) : "Defence Spending and Economic Growth". Vol. 2, n°1. Harwood Academic Publishers, Chur et London.
- AVENHAUS R., HUBER R.K., KETTELLE J.D. (1985) : Modelling and Analysis in Arms Control". NATO ASI Series, Series F, Computer and Systems Sciences, Vol. 26, Spinger-Verlag, Berlin, Published in cooperation with NATO Scientific Affairs Division.
- ATTALI Jacques (1978) : "La nouvelle économie française". Flammarion, Paris,.
- BALDWIN D.A. (1985): "Economic Statescraft". Princeton University. Princeton.
- BALL Nicole (1983) : "Defence and Development : a critique of the Benoit Study". Economic Development and Structural Change. Vol. 31, April 1983, pp 507-524.
- BALL Nicole (1983) : "Dépenses militaires et développement socio-économique". Revue Internationale des sciences sociales, n° 1.
- BALL Nicole (1985) : "Converting military facilities: Shared responsabilities and the need for planning". ILO, Geneva, October.
- BALL Nicole (1988) : "Security and economy in the Third World". Princeton University Press, Princeton.

- BARAN & SWEEZY (1966) : "Monopoly Capital". Penguin Book, London.
- BARKER T., DUNNE P. & SMITH R. (1991) : "The Peace Dividend in the United Kingdom". Journal of Peace Research, Oslo, vol. 28.
- BENOIT Emile & BOULDING Kenneth eds., (1963) ; "Disarmament and the Economy". Harper and Row, New York.
- BENOIT Emile (1967) : "Disarmament and World Economic Interdependence". Columbia University Press, New York.
- BENOIT Emile (1973) : "Defence and Economic Growth in Developing Countries". Boston, D.C. Heath, Lexington Books.
- BENOIT Emile (1978) : "Growth and defence in developing countries". Economic Development and Cultural Change, Vol. 26, January, pp. 271-280.
- BERNARD Jean-Thomas & TRUCHON Michel (1980) : "The impact of Disarmament on the Canadian Economy", prepared for the Department of External Affairs of Canada and The United Nations., Québec.
- BISCHAK Gregory & ODEN Michael (1989) : "The INF Treaty and the United States' experience: the industrial, economic and employment impacts". Disarmament and Employment Programme, Working Paper n°11, International Labour Office, Geneva, April 1989.
- BISWAS B. & RAM R. (1986): "Military expenditures and economic growth in less developed countries: An augmented model and further evidence" Economic Development and Cultural Change, 34.
- BOBRAKOV I.U.I. (1983) : "Disarmament and Economics : Problems of Economic Restructuring", Moscow, Novosti.
- BOULDING K (1973) : "The impact of Defense Spending on the U.S. Economy" in UDIS B. ed. "The economic consequences of Reduced Military Spending". Lexington, Mass, Lexington Books.
- BOUTHOUL G. (1961) : "Sauver la guerre", Grasset, Paris.
- BRANDT Willy et al. (1980) : "North-South, a Programme for Survival". For the Independent Commission on International Development Issues, Pan, New York.
- BREMER Stuart and HUGHES Barry (1990) : "Disarmament and Development : A Design for the Future". Englewood Cliffs. Prentice-Hall.
- BREWER & SHUBIK (1979) : "The war game, a critique of military problems solving". Harvard University Press.
- BRITO Dagobert & INTRILIGATOR Michael (1987) : "Arms Race and the Outbreak of War: Application of Principal-Agent Relashionships and Asymmetric Information". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London.
- BROWN & KELLEHER (1970) : "The Impact of Military Expenditure upon the US Economy". Econometrica, July.
- BROWNE L.E. (1988) : "Defense Spending and High Technology Development: National and State Issues". New England Economic Review, September-October.
- BRZOSKA Michael & OHLSON Thomas (1986) : "Arms production in the Third World". London, Taylor & Francis.
- BRZOSKA Michael (1987) : "The impact of arms production in the Third World". Institut für Politische Wissenchaft, Working Papers n° 8. Hamburg.
- CAPPELEN, GLEDITSCH & BJERKHOLDT (1982) : "Global conversion from arms to development aids : macroeconomic effects". Norway Publication N° 5-9. PRIO, Oslo.
- CAPPELEN, GLEDITSCH & BJERKHOLDT (1984) : "Military Spending and Economic Growth in the OECD Countries". Journal of Peace Research, n° 4.
- CARS Hans Christian & FONTANEL Jacques (1987) : "Military Expenditure Comparisons". in "Peace, Defence and Economic Analysis". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and

the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London.
- CASHEL-CORDO P. & CRAIG S. (1990) :"The Public Sector Impact of International Resource Transfers". Journal of Development Economics, Vol. 32, n°1, January.
- CATRINA Christian (1990) : "International Arms Transfers : Supplier Policies and Recipient Dependence". Disarmament, United Nations, Volume XIII, number 4, New York, 1990.
- CBO (1983) : "Defence Spending and the economy". CBO Study, Washington.
- CHAN S., HSIAO & KENG (1982) : "Defence Expenditure and Economic Growth in Developing Countries : A Temporal Cross-Section Analysis", in Anderson & Perryman (Eds) "Applied Time Series Analysis", North Holland.
- CHAN Steve (1985) : "The Impact of Defence Spending on Economic Performance : a survey of evidence and problems". Orbis, Summer.
- CHAN Steve & MINTZ Alex (1991) : "Defense, Welfare and Growth", Boston, MA, Unwin Hyman.
- CHATELUS Michel (1982) : "Le poids des préoccupations militaires et stratégiques sur l'évolution économique du Moyen-Orient", ARES, Défense et Sécurité, Vol. 5, Grenoble.
- CHESNAIS François : "Compétitivité internationale et dépenses militaires". CPE, Economica, Paris, 1990.
- CHESTER E. (1978) : "Military Spending and Capitalist Stability". Cambridge Journal of Economics, Vol. 2; n° 3.
- COBB S. (1979) : "The United State Senate and the Impact of Defence Spending Concentrations", in ROSEN S. (Ed.) : "Testing the theory of the Military-Industrial Complex". D.C. Heath, Lexington.
- COLARD, GUILHAUDIS, FONTANEL (1981) : "Le désarmement pour le développement, un pari difficile". Fondation pour les Etudes de Défense Nationale, Les Sept Epées, Stratégique, Paris.
- COOPER J (1988) : "The scales of output of civilian products by enterprises of the Soviet Defence Industry". SITS Paper n° 3 - CREES, University of Birmingham.
- CUSACK T.R. & WARD M.D. (1981) : "Military Spennding in the United States, Soviet Union and the Peoples' Republic of China". Journal of Conflict Resolution 25, September.
- CYPHER J. (1974) : "Capitalist planning and military expenditure". Review of Radical Political Economy. March.
- Déclaration by the Panel of Eminent Personalities (1986) : "Disarmament and Development". United Nations, New York, 16-18 April.
- DEGER Saadet (1986a) : "Military expenditure in Third World Countries. The economic effects". International Library of Economics. Routledge & Kegan Paul, London, Boston and Henley.
- DEGER Saadet (1986b): "Analyses intersectorielles des dépenses militaires et de la formation de capital, de la productivité, de la croissance économique et de la compétitivité". Assemblée Générale des Nations Unies, Comité Préparatoire de la Conférence Internationale sur la Relation entre le Désarmement et le Développement, New York, 2-13 juin.
- DEGER Saadet & SMITH Ron (1983) : "Military expenditure and growth in less developed countries". Journal of Conflict Resolution. Vol 27, n° 2.
- DEGER Saadet (1985) : "Human resources, Government Education Expenditure and the Military Burden in Less Developed Countries". Journal of Developing Areas, Vol. 20, n°3.
- DEGER Saadet & SMITH Ron (1985) : "Military Expenditure and Development. The Economic Linkages". IDS Bulletin, October 1985.
- DEGER Saadet & WEST Robert (1987) :" Defence, security and development". Frances Pinter, London.

- DEGER Saadet (1990) : "World military expenditure",, SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- DEGER Saadet & SEN Somnath (1990) : Military Expenditure. The political economy of international security", SIPRI, Oxford University Press, Oxford.
- DEGER Saadet (1991) : "World military expenditure",, SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- DE GRASSE R.W. (1983) : "Military expansion, Economic Decline". M.E. Sharpe Inc, Armonk, NY.
- DE MASI Paula & LORIE Henri (1988) : "How Resilient are Military Expenditures ?". World Bank, Washington.
- DOMKE W.K., EICHENBERG R.C. & KELLEHER C.M. (1983) : "The illusion of choice: defense and welfare in advanced industrial democracies: 1948-1978. American Political Science Review, 77.
- DUMMOND-SARAIVA José (1991) : "L'industrie brésilienne d'armement".. Premiers documents d'une Thèse d'économie, CEDSI, Grenoble.
- DUMAS L.J. (1980) : "The Impact of the Military Budget on the Domestic Economy". Current Research on Peace and Violence". Vol. 2.
- DUMAS L.J. (1982) : "The Political Economy of Arms Reduction : Reversing Economic Decay". Boulder, Westview Press.
- DUMAS L.J. (1987) : "National Security and Economic Delusion". Challenge, March-April.
- DUMAS L.J. & THEE Marek eds (1989) : "Making Peace Possible : The Premise of Economic Conversion". New York, Pergamon.
- DUNNE J.P. & SMITH R.P. (1984) : "The Economic Consequences of Reduced UK Military Expenditure". Cambridge Journal of Economics, September.
- DUNNE J.P. (1986) : "The employment consequences of military expenditure: a comparative assessment". Disarmament and Employment Programme n° 5, International Labour Office, Geneva.
- DUNNE J.P. & SMITH R. (1991) : "Thatcherism and the UK Defence Industry", CJE Symposium, Birkbeck College, London.
- DUSSAUGE P. (1985) : "L'industrie française de l'armement". Economica, Paris.
- EDGERTON David (1987) : "The Relashionship Between Military and Civil Technology in History and Historiography". NATO Advanced Workshop on the Relashionship Between Defence and Civil Technologies, Wiston House, Sussex, 21-25 September.
- EMMANUEL A. (1969) : "L'échange inégal", Maspero, Paris.
- FAINI R., ANNEZ P & TAYLOR L. (1984) : "Defence Spending, Economic Structure and Growth : Evidence among Counstries and Over Time". Economic Development and Cultural Change. Vol. 32, n° 3, April.
- FONTANEL Jacques (1980) : "Military expenditures and Economic growth (France, Morocco)". Rapport pour le Groupe d'experts des Nations Unies "Désarmement pour le Développement", CEDSI, Grenoble.
- FONTANEL Jacques (1981) : "Organisations économiques internationales". Editions Masson, Paris.
- FONTANEL Jacques (1984) : "L'économie des armes", La Découverte, Collection Repères, Paris.
- FONTANEL Jacques & SMITH Ron (1985a) : "L'effort économique de défense". ARES, n° Spécial, Grenoble, Lyon.
- FONTANEL Jacques & Ron SMITH (1985b) : "Analyse économique des dépenses militaires". Stratégique, Fondation pour les Etudes de Défense Nationale. Paris, Troisième Trimestre.
- FONTANEL Jacques (1985c) : "L'intérêt d'un Fonds International de Désarmement pour le Développement". Etudes Internationales, Vol. 16, n° 3, Septembre.

- FONTANEL Jacques & SMITH Ron (1986) : "La création d'un Fonds International de Désarmement pour le Développement : Ressources et contributions". Etudes et Travaux, Cahiers de la Faculté des Sciences Economiques de Grenoble n° 5, Grenoble.
- FONTANEL Jacques & GUILHAUDIS Jean-François (1986) : "Le désarmement pour le développement". ARES, La course aux armements et le désarmement, Grenoble, Lyon.
- FONTANEL Jacques (1986) : "The International Disarmament Fund for Development". Disarmament, Volume IX, Number 1, Spring, United Nations.
- FONTANEL Jacques et SARAIVA José (1986) : "Les industries d'armement comme vecteur du développement économique des pays du Tiers-Monde". Etudes Polémologiques, Institut Français de Polémologie, n° 430, Paris.
- FONTANEL Jacques & Ron SMITH (1987) : "The creation of an international disarmament fund for development" in "Defence, Security and Development" Edited by Saadet Deger & Robert West, France Pinter Publishers, London.
- FONTANEL Jacques (1987a) : "Le désarmement pour le développement dans la pensée économique". Cahiers de la Faculté des Sciences Economiques de Grenoble, Université des Sciences Sociales, Grenoble, Juin.
- FONTANEL Jacques (1987b) : "Une dépense raisonnable ? Le nucléaire, une arme à moindre coût" Le Monde Diplomatique, Paris, Août.
- FONTANEL Jacques (1989a) : "L'armement et les pays du Tiers-Monde". Etudes et Travaux, Cahiers de la Faculté des Sciences Economiques, Grenoble, 1989.
- FONTANEL Jacques (1989b) : "Désarmement et pays en voie de développement" in "Désarmement, développement, emploi", Informations et commentaires, n° 68, Revue trimestrielle, Lyon, Juillet-Septembre.
- FONTANEL Jacques (1989c) : "L'industrie chimique de la France, le désarmement et la conversion de la production des armes", Disarmament and Employment Programme n°15, International Labour Office, Geneva, Décembre.
- FONTANEL Jacques (1989d) : "L'armement et la santé dans les pays du Tiers-Monde". Cahiers de la Faculté des Sciences Economiques de Grenoble, Grenoble.
- FONTANEL Jacques et GUILHAUDIS Jean-François (1989e) : "Les experts face aux armements, à la guerre, à la paix et au désarmement" in "La vérification du désarmement." Fontanel et Guilhaudis (Eds), ARES, La course aux armements et désarmement, 1989/1, Volume XI, Grenoble, 1989.
- FONTANEL Jacques (1989f): "Les technologies militaires et le développement économique contemporain", in Fontanel et Guilhaudis ed. "La vérification du désarmement". ARES, Lyon, Grenoble.
- FONTANEL Jacques (1990a) : "French arms industry". Cahiers du CEDSI n°10, Grenoble.
- FONTANEL Jacques (1990b) : "The economic effects of military expenditure in Third-World Countries". Journal of Peace Research, Vol. 27, n°4, november.
- FONTANEL Jacques (1990c) : "Incidences pour les pays en voie de développement de la procédure de désarmement entre l'Est et l'Ouest". Conférence sur les "Conséquences économiques du désarmement", UNIDIR, Léningrad, 17-19 Juillet 1990.
- FONTANEL Jacques (1990d) : "L'économie du désarmement", Stratégique, n°47, 3/90, Paris.
- FONTANEL Jacques & SMITH Ron (1990e) : "The impact of strategy and measurement on models of French military expenditure", Defence Economics, Vol. 1, n°4.
- FONTANEL Jacques (1991) : Aspects économiques de la militarisation et de la démilitarisation dans l'Hémisphère Sud". Colloque "Géostratégie dans l'Hémisphère Sud". Ile de la Réunion, Juin 1990 (à paraître, 1991).
- FONTANEL Jacques & SMITH Ron (1991) : "A Defense European Union ?". Economic Policy, à paraître fin 1991.
- FONTANEL Jacques et BANSAHEL Liliane (1991) : "L'arme économique", ARES, à paraître.

- FONTANEL Jacques & WARD Michael (1991) : "Military Expenditures, Armaments and Disarmament", Defence Economics (à paraître).
- FRANCK G. (1972) : "Le développement du sous-développement". Maspero, Paris.
- FREDERIKSEN P.C. & LOONEY R.E. (1982) : Defence Expenditures and Growth in Developing Countries : Some Further Evidence". Journal of Economic Development, July.
- FREDERIKSEN P.C. & LOONEY R.E. (1983) : "Defence Expenditures and Economic Growth in Developing Countries". Armed Forces and Society 9, Summer.
- FREDERIKSEN P.C. & LOONEY R.E. (1985) : "Another Look of Defense Spending and Economic Growth in Developing Countries". Defense Analysis, September.
- FREDERIKSEN P.C. & LOONEY R.E. (1986) : "Defense Expenditures, External Public Debt and Growth in Developing Countries". Journal of Peace Research, December.
- FREYSSINET Jacques (1966) : "Le concept de sous-développement", Travaux de l'Université de Grenoble, Editions Mouton.
- GALBRAITH (1984) : "La paix indésirable ? Rapport sur l'utilité des guerres". Préface Galbraith, Présentation Christian Schmidt, Calmann-Levy, Paris, 1984.
- GALIGAN C.G. & HERRING P.G. (1987) : "The Economic Impact of Canadian Defence Expenditures FY 1985/86 update". Centre for Studies in Defence Resources Management. The Royal Military College of Canada, Report n° 14, Kingston, Summer.
- GANSLER Jacques (1982) : "The Defense Industry". The MIT Press, Cambridge, Mass.
- GANSLER Jacques S. (1987) : "Needed : A US Defense Industrial Strategy". International Security, Fall, Vol 12, n° 2.
- GEORGIU G & SMITH R.P. (1983) : "Assessing the Effect of Military Expenditure on OECD Countries". Arms Control, n° 1, Vol.4, May.
- GLEDITSCH N.P., BJERKHOLT O. & CAPPELEN A. (1987) : "Military R&D and Economic Growth in Industrialized Market Economies". The Journal og Peace Research.
- GLEDITSCH N.P (1986) : "Dépenses militaires et structures économiques, en particulier dans les économies de marché". Assemblée Générale des Nations Unies, Comité Préparatoire de la Conférence Internationale sur la Relation entre le Désarmement et le Développement, New York, 2-13 juin.
- GERBIER Bernard (1984) : "La course aux armements. Sortir du capital de sa crise par la construction d'une économie mondiale capitaliste sous influence américaine". Communication à l'International Symposium on World Current Economic Crisis, Garyounis University, Benghazi, Lybie, 24 novembre.
- GIGENGACK R., de HAAN H. & JEPMA C.P. (1987) : "Military Expenditure Dynamics and a World Model". in Schmidt C. & Blackhaby F. (1987) : "Peace, Defence and Economic Analysis", Mac Millan Press, London.
- GOLD David & ADAMS Gordon (1990) : "Defence Spending and the American Economy". Defence Economics, Vol. 1. Harwood Academic Publishers, Chur et London..
- GOLDSTEIN J. (1988) : "Long Cycles : Prosperity and war in the Modern Age". Yale University Press, New Haven, CT.
- GORDON S. & McFADDEN eds (1984) : "Economic Conversion : Revitalizing American's Economy". Cambridge, Ballinger Publishing Co.
- GRIFFIN L.J., WALLACE M & DEVINE J. (1982) : "The political Economy of Military Spending : Evidence from the United States". Cambridge Journal of Economics, n° 6.
- GRINDLE M.S. (1986) : "The politics of Military Budgets in Latin America". International Colloquium "Defence, Security and Development". Birkbeck College & Fletcher School of Law and Diplomacy of the University of Tufts. London.
- GUILLAUME Marc (1976) : "Le capital et son double". Presses Universitaires de France, Paris.
- GYIMAH-BREMPONG Kwabena (1989) : "Defense spending and economic growth in Subsaharan Africa : an econometric investigation". Journal of Peace Research, n°1, Oslo.

- HARRIS Geoffrey (1986) : "The determinants of Defence Expenditure in the ASEAN Region", Journal of Peace Research, Vol 23, n° 1, Oslo.
- HARRIS Geoffrey, KELLY Mark & PRANOWO (1988) : "Trade-offs Between Defence and Education/Health Expenditures in Developing Countries". Journal of Peace Research, Vol. 25, n° 2, Oslo.
- HARTLAND-THUNBERG Penelope (1988) : "From Guns and Butter to Guns v. Butter: The Relation between Economics and Security in the United States". The Washington Quarterly, Autumn.
- HARTLEY Keith & LYNK E. (1983) : "Budget Cuts and Public Sector Employment : The Case of Defence". Applied Economics 15.
- HARTLEY Keith (1987) : "Reducing Defence Expenditure : a Public Choice Analysis and a Case Study of the UK". in "Peace, Defence and Economic Analysis". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London, 1987.
- HARTLEY Keith (1990a) : "The Consequences of Conventionnal Disarmament in Europe on the Military Expenditure of the Countries of the Two Alliances". Conférence sur les "Conséquences économiques du désarmement", UNIDIR, Léningrad, 17-19 Juillet 1990.
- HARTLEY Keith & SINGLETON John (1990b) : "Defence R&D and crowding-out". Science and Public Policy, volume 7, number 3, June.
- HAYES Margaret (1975) : "Policy Consequences of Military Participation in Politics: an analysis of trade-offs in Brazilian Federal Expenditures", in LISKE, LOEHR & McCAMENT eds. "Comparative Public Policy : Issues, Theories and Methods". John Wiley, New York.
- HEBERT J.P. (1991) : "Le désarmement (s'il continue) fouettera l'économie". Le Temps Stratégique, Genève, Juin.
- HERRERA-LASSO Luis (1987) : "Economic Growth, Military Expenditure, the Arms Industry and Arms Transfers in Latin America". in "The Economics of Military Expenditures. Military Expenditures, Economic Growth and Fluctuations". Edited by Christian SCHMIDT, Mac Millan, London.
- HEWITT Daniel P. (1991) : "Military Expenditure. International Comparison of Trends", Fiscal Affairs Department, International Monetary Fund, May.
- HEWITT Daniel P. (1991) : "Military Expenditure. Econometric Testing of Economic and Political Influences", Fiscal Affairs Department, International Monetary Fund, May.
- HICKS Norman et KUBISCH Ann (1983) : "The Effects of Expenditure Reductions in Developing Countries". World Bank, Washington.
- HICKS & KUBISCH (1984) : "Cutting Government Expenditure in LDC's". Finance and Development, Vol. 21, n° 3.
- HOLLOWAY D. (1983) : "The Soviet Union and the arms race", Yale University Press, London.
- HUANG Chi & MINTZ Alex (1990) : "Ridge regression analysis of the defence-growth trade-off in the United States", Defence Economics, n° 2.
- HUFFSCHMIDT J. (1991) : "Defence conversion in Europe". Friedrich Ebert Foundation, Research Institute London Office, February.
- HUFFSCHMIDT J. & VOSS W. (1991) : "Military procurement, arms trade, conversion of armaments production in the EC". A study for the European Parliament, Strasbourg.
- INTRILIGATOR Michael (1982) : "Research on conflict theory : analytic approach and areas of application". Journal of Conflict Resolution.
- INTRILIGATOR M.D. & BRITO D.L. (1989) : "Arms Control" in Kolodziej & Morgan P.M., Eds : "Security and Arms Control". Volume 1, Westport, Greenwood Press.

- INTRILIGATOR M.D. & BRITO D.L (1991 to be published) : "Arms races and arms control in the Middle East". Center for International and Strategic Affairs, in Steven L. Spiegel, Editor : "Conflict Management in the Middle East, Boulder, Westview Press.
- JOLLY Richard (1978) : "Objectives and means for linking disarmament to development". in "Disarmament and World Development", R. Jolly (ed.), Pergamon Press; New York.
- KALDOR Mary (1982) : "The baroque arsenal". Abdre Deutsch, London.
- KENDE I. (1980) : "Local wars 1945-76", in Eide E. & Thee M. (eds) : "Problems of Contemporary Militarism". London, Croom Helm.
- KENNEDY Gavin (1974) : "The military of the Third World". Duckworth, London.
- KENNEDY Gavin (1983) : "Defence Economics". Duckworth, London.
- KENNEDY Paul (1987) : "The Rise and Fall of the Great Powers". Random House, New York.
- KEYNES (1921) : "How to pay the war ?". London, 1921.
- KIDRON M (1970) : "Western capitalism since the War". Penguin Press, London.
- KINSELLA David (1990) : "Defence spending and Economic Performance in the United States : A Causal Analysis". Defence Economics, Vol. 1. Harwood Academic Publishers, Chur et London..
- KLEIN Lauwrence R. (1986) : "Disarmement and Socio-Economic Development". Disarmament, Volume IX, Number 1, Spring, United Nations.
- KLEIN Lawrence R. (1990a) : "The Economics of Turning Swords into Plowshares". Challenge, March-April.
- KLEIN Lawrence R. (1990b) : "Disarmament and development" in "Science, war and peace", Jean-Jacques Salomon, Economica, Paris.
- KOLODZIEJ Edward (1987) : "Wither Modernisation and Militarisation, Implications for International Security and Arms Control". in "Peace, Defence and Economic Analysis". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London.
- KRELL G. (1981) : "Capitalism and Armaments : Business Cycles and Defence Spending in the United States". Journal of Peace Research, n° 3.
- KUTTNER Robert (1991) : "How National Security Hurts National Competitiveness". Harvard Business Review, January-February.
- LACHAUX, LACORNE, LAMOUREUX, LABBE (1987) : "De l'arme économique". Fondation pour les Etudes de Défense Nationale. Collection les Sept Epées, Paris.
- LAKAHMI Y. (1986) : "Defense and development : an empirical study of India". Strategic Analysis, February.
- LAMBELET Jean Christian et LUTERBACHER Urs (1987) :"Conflict, Arms Races and War: a synthetic approach" in "Peace, Defence and Economic Analysis". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London.
- LEBOVIC James H. (1988) : "National Interests and United States Foreign Aid". Journal of Peace Research, Vol. 25, n° 2, June.
- LENINE (19?): "L'impérialisme, stade suprême du capitalisme". Editions Sociales, Paris, 1971.
- LEONTIEFF Wassily & HOFFENBERG Marvin (1961) : "The Economic Effects of Disarmament". Scientific American, n° 204, April.
- LEONTIEFF Wassily, MORGAN A., POLENSKE K., SIMPSON D. & TOWER E. (1965): "The Economic Impact - Industrial and Regional- of an Arms Cut". Review of Economics and Statistics. vol. 47, n° 3; August.
- LEONTIEFF Wassily et DUCHIN Faye (1980) : "Worldwide implications of hypothetical changes in military spending". Rapport pour le Groupe des Nations Unies "Désarmement pour le Développement" & USACDA. New York.

- LEONTIEFF Wassily & DUCHIN Faye (1980) : "Worldwide implications of a limitation on military spending". Rapport pour le Groupe d'experts des Nations Unies "Désarmement pour le Développement". New York.
- LEONTIEFF & DUCHIN (1983) : "Military spending : Facts and Figures, Worldwide implications and Future Outlook". Oxford University Press.
- LIN C.Z. (1989) : "Employment implications of defence cutbacks in China", Disarmament and Employment Programme n° 14, International Labour Office, November.
- LINDGREN G. (1984) : "Review Essay : Armaments and Economic Performance in Industrialized Market Economies". Journal of Peace Research, Vol. 21, n° 4, Oslo.
- LIST F (1857) : "Le système national d'économie politique" .
- LOONEY Robert (1986) : "Austerity and Military Expenditures in Developing Countries : The Case of Venezuela". Socio-Economic Planning Sciences, Vol. 20, n° 3.
- LOONEY Robert E. (1988) : "Third-World Military Expenditure and Arms Production" Foreword Robert L. West, Mac Millan Press, London.
- LOONEY Robert (1989) : "Internal and external Factors in Effecting Third World Military Expenditure". Journal of Peace Research, Vol. 26, n° 1, February, Oslo.
- LOTZ J.R. (1970) : "Patterns of Government Spending in Developing Countries", The Manchester School, Vol. 36. n° 2.
- LUCKHAM Robin (1986) : "Disarmament and development in all its aspects with a view to drawing appropriate conclusions". Draft prepared for the UN Department of Disarmament Affairs, January.
- LUXEMBOURG R (1967) : "L'accumulation du capital", Maspero, Paris, 1967.
- LYNCH J.E. ed (1987) : "Economic Adjustment and Conversion of Defense Industries". Boulder, Westview Press.
- MADDOCK Ieuan (1983) : "Civil exploitation of Defence Technology" and observations by the Ministry of Defence, London.
- MAGDOFF H. (1980) : "Militarism and imperialism". American Economic Review, May.
- MAIZELS A. & NISSANKE M.N. (1987) : "The determinants of military expenditures in Developing Countries". in DEGER Saadet & WEST Robert: "Defence, security and development". Frances Pinter London.
- MALTHUS R (1803) : "Principes d'Economie Politique" .
- MANDEL E. (1975) : "Late Capitalism"; New Left Book.
- MARTIN S., SMITH R. & FONTANEL J. (1987) : "Time-series Estimates of the Macroeconomic Impact of Defence Spending in France and the UK". in Schmidt C. and Blackhaby F. (1987) : "Peace, Defence and Economic Analysis", Mac Millan Press, London.
- MELMAN Seymour (1971) : "The war economy of the United States". St Martin's Press, New York.
- MELMAN Seymour (1974) : "The permanent war economy: American capitalism in decline". Simon & Schuster, New York.
- Robert MERTON (1938) : "Science, Technology and Society in Seventeenth-Century England" Osiris, vol. IV; p.2.
- MEYERS W. (1972) : "Conversion from War to Peace, Social, Economic and Political Problems". New York, Gordon and Breach.
- MOLL & LUEBBERT (1980) : "Arms race and military expenditure models". Journal of Conflict Resolution, March.
- MORAN Theodore H. (1990) : "International Economics and National Security". Foreign Affairs, Winter 1990-1991.
- MOSLEY H.G. (1985) : "The Arms Race : Economic and Social Consequences". Lexington Books, Lexington.
- Lewis MUMFORD (1934) : "Technics and Civilization, New York, Harcourt, Brace.
- Nations Unies (sous la Direction de Inga Thorsson) (1981) : "Etude sur les rapports entre le désarmement et le développement", A/36/356; New York, 3 Septembre 1981.

- Nations Unies (1981) : "La réduction des budgets militaires". Série n° 4, New York.
- Nations Unies (1983) : "Conséquences économiques et sociales de la course aux armements et des dépenses militaires". Publication des Nations Unies, F.83.IX.2.
- Nations Unies (1985) : "La réduction des budgets militaires". Série n° 10, New York.
- Nations Unies (1990) : "Transparency in International Transfers", Disarmament, Topical Papers 3, New York.
- NEF U (1949) : "La route vers la guerre totale". Armand Colin, Paris.
- NISHIHAWA Jun (1987) : "Note on the Impact of Military Expenditure on the Japanese Economy". in "The Economics of Military Expenditures. Military Expenditures, Economic Growth and Fluctuations". Edited by Christian SCHMIDT for the International Economic Association, Mac Millan, Paris.
- NINCIC M. & CUSACK T.R. (1979) : "The Political Economy of the U.S. Military Spending". Journal of Peace Research, Vol. 16, n° 2.
- OHLSON Thomas ed. (1988) : "Arms Transfer Limitations and Third World Security". SIPRI, Stockholm, Oxford University Press, Oxford.
- OLSON M. & ZECKAUSER R. (1966) : "An economic theory of alliances". Review of Economics and Statistics, 48 (3).
- OSTROM C.W. (1978) : "A reactive linkage of the US Defense Expenditure Policy-Making Process", American Political Science Review, September.
- PASTIJN H. & STRUYS W. (1984) : "Modelling the defence expenditure dynamics between two potential opponents" Quantitative Defence Economics, Royal Military Academy, Brussels.
- PALME O. (1982) et al (Independent Commission on Disarmament and Security) : "Common Security". Simon & Schuster, New York.
- PEARSON Frederic (1989) : "The corrolates of Arms Importation". Journal of Peace Research, Vol 26, n° 2.
- PERCEBOIS Jacques (1986) : "Dépense militaire et croissance économique : effets d'entraînement ou effets d'éviction?" in "Le désarmement pour le développement", Fontanel & Guilhaudis (eds), ARES, Grenoble.
- PILANDON Louis (1987) : "Quantitative and Causal Analysis of Military Expenditures", in "The Economics of Military Expendtures. Military Expenditures, Economic Growth and Fluctuations". Proceedings of a Conference held by the International Economic Association in Paris, Edited by Christian Schmidt, Mac Millan, London.
- PITE C. (1990) : "Employment and Defence". Statistical News, November.
- RAJMARA S. & WARD M. (1991) : "Reciprocity and Evolving Norms in the Reagan and Gorbachev Eras", Mémo. (Presented at the 1990 Annual Meeting of the American Political Science Association, San Francisco, California.
- RATTINGER H. (1975) : "Armaments, detente and bureaucraty : the case of the arms race in Europe". Journal of Conflict Resolution, December.
- REICH M. (1972) : Does the US Economy require Military Spending ?". American Economic Review, Vol. 72, n° 2.
- RENNER M. (1990) : Swords into Plowshares : Converting to the Peace Economy", Worldwatch Paper 96, June.
- RICARDO David (1817) : "Principes de l'économie politique et de l'impôt" (1817)
- RICHARDSON L.F. (1960) : "Arms and insecurity". Benwood, New York.
- ROSEN S. (1973) : "Testing the theory of Military-Industrial Complex". Heath; Lexington.
- ROYER J. (1985) : "Long-Term Employment Impact of Disarmament Policies". ILO, December.
- RUSSETT B. (1969) : "Who pays for defense ?". American Political Science Review, 63.
- RUSSETT B. (1970) : "What Price Vigilance? The burden of National Defence". Yale University Press, New Haven.
- RUSSETT B. (1982) : "Defence expenditure and national well-being". The American Political Science Review, December.

- SABY D. (1991) :"Rationalité économique et rationalité politique". Colloque du CEDSI, 14-15 juin 1991, à paraître dans ARES.
- SAMUELSON P.A. (1964) : "Economics: an introductory analysis". McGraw-Hill, New York.
- SAPIR Jacques (1989) : "URSS. La conversion de l'industrie militaire vers le secteur civil". Informations et Commentaires, n° 68, Juillet-Septembre.
- SAY J.B. (1816) : "Traité d'Economie Politique".
- SCHELLING Thomas (1966) : "Arms and influence". Yale University Press, New Haven.
- SCHMIDT Christian (1974) : "Guerre et économie". Etudes Polémologiques, n° 14, Octobre.
- SCHMIDT Christian & DUSSAUGE Pierre (1983) : "L'armement" in "L'industrie en France", Bellon et Chevalier (Eds.), Paris, Flammarion.
- SCHMIDT Christian (1984) : "Industrie d'armement et endettement dans les pays en voie de développement : les exemples d'Israël, du Brésil, de l'Argentine et de la Corée du Sud". Congrès International des économistes de langue française, Mai.
- SCHMIDT Christian (1987):"The Economics of Military Expenditures". International Economic Association, Mac Millan Press, London.
- SCHMIDT C. and BLACKHABY F. eds (1987) : "Peace, Defence and Economic Analysis", International Economic Association, Mac Millan Press, London.
- SCHULTZE Charles (1981) : "The Economic Effects of the Defence Budget". The Brookings Bulletin, Vol. 18, n° 2, Fall.
- SCHULTZE Charles (1990) : "Use the Peace Dividend to Increase Saving". Challenge, March-April.
- SCHUMPETER J. (1972) : "Capitalisme, socialisme et démocratie", Payot, Paris.
- SEN Amartya (1981) : "Public action and the quality of life in developing countries". Oxford Bulletin of Economics and Statistics, November.
- SEN Amartya (1983) : "Development : which way now ?". Economic Journal, Vol. 93, December pp. 745-762.
- SEN Somnath (1990) : "Debt, financial flows and international security". SIPRI Yearbook, Stockholm, Oxford University Press, Oxford.
- SILBERNER (1957) : "La guerre et la paix dans l'histoire des doctrines économiques". Sirey, Paris.
- SIPRI Yearbook (1990) : "World Armaments and Disarmament". Stockholm, Oxford University Press, Oxford.
- SIPRI Yearbook (1990) : "World Armaments and Disarmament". Stockholm, Oxford University Press, Oxford.
- SMITH Adam (1776) : "La Richesses des Nations" (1776)
- SMITH Dan & SMITH Ron (1980) : "Military expenditure, resources and development". A report written as a contribution to United Nations study on the relashionship between disarmament and development, Birkbeck College, London, April.
- SMITH Ron (1980a) : "Military expenditure anc investment in OECD Countries 1954-1973". Journal of Comparative Economics.
- SMITH Ron (1980b) : "The demand for Military Expenditure". The Economic Journal, December
- SMITH Dan & Ron (1983) : "The Economics of Militarism". Pluto Press, London.
- SMITH Ron (1983) : "Aspects of militarism". Capital and Class, Spring.
- SMITH, HUMM & FONTANEL (1985) : "The Economics of Exporting Arms". Journal of Peace Research, Vol. 2, n° 3.
- SMITH Ron (1989) : "Models of Military Expenditure". Journal of Applied Econometrics, VOL.0. by John Wiley and sons, Ltd.
- STARR, HOOLE, HART & FREEMAN (1979) : "The Relashionship between Defense Spending and Inflation". Proceedings of the Academy of Political Science, 33.

- STRUYS Wally (1989) : "Défense et économie. Mythes et réalités". Centre d'Etudes de Défense, Bruxelles, n° 26, Mai.
- SZYMANSKI A. (1973) : "Military Spending and Economic Stagnation". American Journal of Sociology. July.
- TERRELL L.M. (1971) : "Societal Stress, Political Instability and Levels of Military Effect". Journal of Conflict Resolution, Vol. XV. n° 2.
- THEE M. (1982) : "Third World Armaments : Structure and Dynamics". Bulletin of Peace Proposals. Vol. 13, n° 2, 1982.
- THORSSON Inga (1984) : "In pursuit of Disarmament. Conversion from military to civil production in Sweden". Report by the Special Expert Inga Thorsson, Stockholm.
- THUROW Lester (1982) : "Rising Armament Expenditures : effects on the civilian economy". Commentary, January.
- THUROW Lester (1980) : "The Zero-Sum Society". Basic Books, New York.
- TINBERGEN Jan (1987) : "World Peace Policy" in "Peace, Defence and Economic Analysis". Proceedings of a Conference held in Stockholm jointly by the International Economic Association and the Stockholm International Research Institute" Edited by Christian SCHMIDT and Frank BLACKABY, Mac Millan Press, London.
- Trade Union Congress (1991) : "A programme for arms conversion" Friedrich Ebert Foundation, Research Institute London Office, February.
- TREDDENICK John (1985) : "The Arms Race and Military Keynesianism". Canadian Public Policy, Vol. XI, n°1, March.
- TUOMI Helena & VAYRYNEN Raimo eds (1983) : "Militarization and Arms Production". London Croom Helm.
- UDIS B. ed. (1973) : "The economic consequences of Reduced Military Spending". Lexington, Mass, Lexington Books.
- UEO (1990) : "Konversiya. La reconversion de l'industrie militaire soviétique", 36ème session ordinaire, Document 1249, 7 novembre.
- UNIDIR (1984) : "Establishment of an International Disarmament Fund for Development", UNIDIR, Geneva, November.
- UNIDIR (1987) : "Désarmement-développement : au-delà des impasses, quelques suggestions pratiques", UNIDIR, Geneva. UNIDIR/86/13.
- UNIDIR (1990) : "Science and technology : between civilian and military research and development. Armaments and development at variance". Marek Thee. Research Papers n° 7, New York.
- United States Arms Control and Disarmament Agency (1989) :"World Military Expenditures and Arms Transfers, 1988", Washington DC, June.
- United States Arms Control and Disarmament Agency (1990) : "Report to the Congress on Defence Industry Conversion", Washington D.C., August.
- United States Arms Control and Disarmament Agency (1990) :"World Military Expenditures and Arms Transfers, 1989", Washington DC, October.
- VARAS Augusto (1986a) : "Military Spending and the Development Process". Disarmament, Vol IX, Number 3, Autumn. United Nations. New York.
- VARAS Augusto (1986b): ""Dépenses militaires et développement". Assemblée Générale des Nations Unies, Comité Préparatoire de la Conférence Internationale sur la Relation entre le Désarmement et le Développement, New York, 2-13 juin.
- VERNER Joel (1983) : "Budgetary Trade-Offs Between Educational and Defense in Latin America : a research note". Journal of Developing Area, Vol. 18, n° 3.
- WALKER W., Mac GRAHAM & HARBOR B. (1987) : " From components to integrated systems : Technical diversity and interactions between military and civilian sectors". Papers prepared for the NATO Advanced Workshop on The Relashionship berween Military and Civilian Technologies, Wiston House, 21-25 september.
- WARD M., DAVIS D & CHAN S. (1990) : "Somebody else's nickle : Economic growth, investment and military spending in Taiwan". Working Paper WP-90-03. Program on

Political and Economic Change, Institute of Behavioral Science, University of Colorado, Boulder.
- WARD M. & DAVIS D.R. (1990) : "Economic Growth and Military Spending in The United States, 1952-1988", National Science Foundation, WPO-90_05, Boulder & Grenoble.
- WARD M., COCHRAN A., DAVIS D., PENUBARTI M. & RAJMAIRA S. (1990) : "Back to Benoit : Economic Growth, Investment and Military Spending in India, 1950-1987", Program on Political and Economic Change, Institute of Behavioral Science, University of Colorado, Boulder, October 3.
- WARD M. (1991a) : "Military Technologies and Economic Development. A Comparison of India and Brazil". ARES "Economie de la défense", à paraître, Grenoble.
- WARD M. & DAVIS D.R. (1991) : "Risky business : An analysis of US defence policy" in Mintz A. (ed.) ; "The Political Economy of Military Spending in the United States, Harper-Collins, New York.
- WEEDE E. (1983) : "Military participation ratios, human capital formation and economic growth : a cross-national analysis". Journal of Political Military Sociology, Spring.
- WEIDENBAUM Murray (1988) : "Economics and the National Security". The Washington Quarterly, Autumn.
- WEIDENBAUM Murray (1990) : "Defence Spending and the American economy : how much change is in the offing ?". Defence Economics, Vol.1, N° 3.
- WEISTING Arthur H. (1986) : "Global resources and International Conflict. Environmental factors in Strategic policy and action". Edition Arthur H. Weisting, Oxford University Press, Oxford, New York.
- WHYNES David, K (1979) : "The Economics of Third World Military Expenditure". Austin, University of Texas Press.
- WILKE P. & WULF H. (1986) : "Manpower conversion in defence-related industry", ILO, Geneva, June.
- WILLETT Susan (1985) ; "The Economic Case for Defence Conversion in Britain". ESRC/CNRS project, Grenoble & London.
- WILLETT Susan (1988) : "The regional and occupational dependence on defence contracting in the Greater London area". ILO, Geneva, February.
- WONG Cary (1981) : "Economic Consequences of Armament and Disarmament". Los Angeles, California State University, Center for the Study of Armament and Disarmament.
- WULF Herbert (1983) : "Developing Countries" in Nicole Ball and Milton Leitenberg, eds : "The structure of the Defense Industry". London, Croom Helm.
- WULF Herbert (1985) : "Arms Production in the Third World" in World Armaments and Disarmament, SIPRI Yearbook, London, Taylor & Francis.
- ZEITLING M. (1973) : "On military spending and economic stagnation". American Journal of Sociology, Vol. 79, n° 6.

Bibliography

Atesoglu, S., Mueller, M.J (1990), *Defence spending and Economic Growth*, Harwood Academic Publishers.

Baldwin, D.A. (1985), *Economic Statescraft*, Princeton University Press.

Cars, H-C, Fontanel, J. (1987), Military expenditure comparisons, in *Peace, Defence and Economic analysis,* MacMillan, London.

Chan, S., Mintz, A. (1991), *Defence, welfare and growth*, Unwin Hyman, Boston.

Colard, D., Fontanel, J., Guilhaudis, J-F. (1981), *Le désarmement pour le développement, un pari difficile*, Fondation Etudes de Défense Nationale. Les Sept Epées, Cahier n° 19

Deger, S., West, R. (1987), *Defence, security and development*, Frances Pinter, London.

Deger, S., Sen, S. (1990), M. *The political economy of international security*, SIPRI, Oxford University Press.

Dumas, L.J., Thee, M. (1989), *Making peace possible*. Pergamon, New York.

Fontanel, J. (1980) Le concept de dépenses militaires. *Revue de Défense Nationale.*

Fontanel, J. (1982) Military Expenditure and Economic Growth: France, Morocco. *report written for the United Nations*, *6*.

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

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

Fontanel, J., Smith.R ; (1985), L'effort économique de défense, *Arès, défense et sécurité.*

Fontanel, J., Smith, R. (1987), The creation of an international disarmament fund for development, in *Defence, Security and Development,* France Pinter Publishers, London.

Fontanel, J., Ward, M. (1991), Military expenditures, armaments and disarmament, *Defence Economics*.

Gyimah-Brempong, K. (1989), Defence spending and economic growth in Subsahjarian Africa. *Journal of Peace Research* , n°1 ?

Hartley, K. (1987), Reducing defence expenditure : a public choice analysis, in *Peace, Defence and economic analysis*, MacMillan, London.

Hewitt, D.P. (1991), *Military expenditure. Econometric testing of economic and political influences*, International Monetary Fund, May, Washington.

Intriligator, M. (1982), Research on conflict theory, *Journal of Conflict Resolution*.

Kaldor, M. (1982), *The baroque arsenal*, Andre Deutsch, London.

Klein, L. (1986), Disarmament and development, in *Science, war and pe*ace, Economica, Paris.

Leontieff, W., Duchin, F. (1980), *Worldwide implications of hypothetical changes in military spending*, United Nations Expert Group Report, New York.

Martin, S., Smith, R., Fontanel, J. (1987), Time-series estimates of the macroeconomic impact of defence spending in France and in the UK, in *Peace, Defence and Economic analysis*, MacMillan, London.

Richardson, L.F. (1960) *Arms and insecurity*, Benwood, New York.

Russett, B. (1982), Defence expenditure and national well-being, *American Political Science Review.,* december.

Schmidt, C. Eds.(1987), *The economics of Military Expenditures*, MacMillan, London.

Schmidt, C., Blackhaby, F. Eds. (1987), *Peace, Defence and Economic analysis*, MacMillan, London.

Smith, R., Humm, Fontanel, J. (1985), The Economics of exporting arms, *Journal of Peace Research*, 2(3).

Udis, B ; (1973), *The economic consequences of reduced military spending,* Lexington Books,