Military conversion and transition in Russia

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In Soviet times, advanced technologies and expertise in research and production were concentrated in the defence industry. The industry fully met the armed forces' requirements for armaments and produced a large amount of the best civilian products. During the " Cold war ", Soviet military expenditures are estimated to have amounted to nearly 20 to 30 percent of GNP; more than 60 percent of all the products of engineering industry, 75 percent of the whole investment package for science and between 6,5 to 14.4 million of workers were allotted to military needs. After the Cold war, the conversion program was not a success, because the break-up of the Soviet Union and the reforms under the government of Yegor Gaidar. The defence industry has been in a very difficult position, caused by the decrease in budget allocations, the loss of its research, technological and production potentials and the weakness of the State.

Aggregate world military expenditures kept on declining in 1997, but in the case of Russia, the lack of reliable information on defence spending still makes it difficult to determine a meaningful figure (Table 1). In this way, the new world order has hit the heart of the Russian Soviet-style economy, the defence industry. The disarmament led to the destruction of the old economic system as well as of the social equilibrium in the former USSR countries, through a profound economic crisis, which yielded investment deficits. The greatest part of the former Soviet defence industry was located in Russia (more than 80 percent of the Soviet Union's military-industrial potential, 90% of the aircraft industry, 81% of the general machine-building enterprises). This inheritance is not easily manageable for Russian leaders, because military activities stressed the organisational, economic and technological monopolism, an isolation from the rest of the economy, the exclusive priorities in financing and supplying, the lower prices for components and materials, the privileges for the personnel and the guarantees of product sales.

Table 1. Military expenditures (ME), Gross National product (GNP), Arms exports (AE), Total exports- Total imports - in million constant (1997) dollars - and Armed forces (AF) - in thousands - of Russia from 1992 to 1995, in the same way as ME/World military expenditures and AE/ US arms exports (USACDA, 2000)

Years	ME	AF	GNP estimates	AE	Exports -Imports	ME/ World ME (%)	AE/ US AE (%)
USSR 1988	398,300	3,900	3,130,000	27,470	4,300	29.48	1.57
1992	79,000	1,900	983,000	2,772	6,000	8.3	10.0
1993	67,400	1,500	900,000	3,779	27,420	7.6	13.8
1994	65,200	1,400	786,000	1,798	18,010	7.6	7,6
1995	42,400	1,400	750,000	3,935	20,860	5.1	16.6
1996	38,300	1,300	721,000	3,152	20,100	4.7	13,5
1997	41,700	1,300	724,000	2,300	14,720	5.0	7,2

Source : USACDA (1997) and U.S. Department of State, Bureau of verification and compliance (2000).

Three ideas will be developed :
1) The causes of the end of the Russian military power are mainly economic.
2) Conversion in Russia has actually hardly any chance for success when considering the dramatic decline of the whole economy.
3) The "peace investment", which was at first analysed as an excellent opportunity for the Russian economy, proved not to be a panacea.

I. The conversion crisis, a result of the economic crisis of the transition process

Defence is one factor of the actual Russian economic crisis, which has structural causes. Defence may be considered as both a factor of development and a cause of the recession. However, the process of conversion is closely linked to the global economic transformation and the privatisation and liberalisation processes.

I.1. The Soviet cause of the Russian economic crisis

In spite of some interesting achievements of the former planned economies (with high economic growth and full employment), planning is generally analysed to have been a disastrous failure. But the Soviet-type planning was not suitable, because it was detailed at the enterprise activities level Moreover, the relative failure of the former planned economies in the late 1970s and in the 1980s was due in large measure to inappropriate economic choices. In particular, the doctrine of preferential growth of heavy industry (which was certainly efficient at the first stage of the USSR economic development) and the military strategies, prevented more investment funds to be allocated to the consumer goods and services industries. The effects on innovation and productivity were negative (Samson, 1998). Today, the factors that formerly guaranteed the Soviet economic growth blocked the Russian economic evolution (Sinelnikov, 1997, Ulyukaev, 1997).

– Economic power was concentrated at the medium level of the sectorial Ministries economic administration, and that limited the role of the Gosplan and produced lobbying systems. This increased inertial effects, and reduced the learning and innovative ones. Moreover, no institution was able to give the useful economic information to the enterprises.

– The socialist system was able to develop major innovations, but not the continual flow of minor innovations which is a main condition of a cumulative economic growth. The failure to follow the revolutions in electronics and computers weakened the Soviet economy. The Russian economy still suffers from this technological gap (Samson, 1997).

– The large share of investment in GDP led to penury crises rather than permitting "primitive accumulation", because of the blind application of this dogma on a long period of time (seventy years!). Today, the central authority is questioned by more local power bases. Moreover, the criminalisation of industries and markets has limited the efficiency of state macroeconomics policies, weakened by the inefficiency of the taxes system.

– With the end of the Comecon organisation based on an international socialist division of labour, regular economic relations are disrupted or disorganised. The collapse of the Soviet empire has thrown the process of production into considerable disarray (Malakhov, Bondarev, 1995).

– The USSR military-industrial firms had special organisation and

behaviour. They were monopolistic enterprises, dependent of the MIC, isolated from the civilian economy and highly privileged. The armament industries were important producers of consumer goods[2], research and development and developed high-level technologies. The refusal of many Russian economic institutions to separate production from social welfare aspects has prevented most potentially competitive firms to take advantage of the embryo of mass consumption.

- The large geographic concentration of the high technological military and civilian research in some regions was supposed to produce efficient economies of scale. It was not the case because in Soviet system the regional network spin-offs were often drastically reduced (except for energy supplies and the basic infrastructure) and the vertical link with the specialised ministry was preferred (Brunat, 1995). However, the consumption goods production was mainly defined by regional planification, because sales outside the regions were forbidden and enterprises were only concerned with local supply (Malakhov, 1998). Today, consumption goods markets are still mainly regional, and this trend is reinforced by the development of local protectionism and the insufficiency of transport and telecommunication infrastructures, as well as of the marketing system (OECD, 1996).

I.2. The State crisis

The "shock therapy" was supposed by its supporters to be the more efficient strategy, certainly without alternative. The concept of economic "therapy" implies a shock, but also a therapy. Well then, the main indicators of the Russian economy are not excellent (Table 2). It is still in recession, and there is no prospect of economic growth in the near future, unlike other former USSR economies. Most certainly, inflation has been reduced from 1500% in 1991 to less than 50% in 1996, and the international trade is very dynamic, mainly on raw materials and petrol and energy. The short-term recession reflects a structural crisis. Markets have partially destroyed the old institutional and cultural forms, such as sectorial ministry organisations. They have not yet been able to generate new entrepreneurs or institutions, who would replace definitively the old power. A second impediment to economic transition is the lack of infrastructure, market institutions (such as a national legislation, its general support and its control) and

of a real service sector. But there was an important federal budget crisis, foreign and domestic investments levels are still low and structural reforms have been delayed. Accordingly, State intervention seems necessary, but even the minimal core government functions, as well as the macroeconomic stability, was threatened by a complex and arbitrary tax systems, with about 17% firms regularly paying taxes, a third publishing no account (Summers, 1997) in 1997. Today, the economic role of the State is not so weak, but it is always threaten by a large feeling of fragility.

Table 2 - Main economic indicators of Russia (1992-1999)
in percent or million dollars

Years	growth rate GDP (%)	growth rate industrial ourpur (%)	growth rate Investment (%)	Debt service % of federal budger expenditures	Consumer Price Index
1992	- 14	- 18.0	- 4.0	-	2,510
1993	- 9	- 14.1	- 12.0	-	840
1994	- 12.7	- 20.9	- 24.0	8	220
1995	- 4.2	- 3.3	- 10.0	17	130
1996	- 4.0	- 4.0	- 18.0	31	22
1997	+ 1.0	+ 2.0	- 5.0	26	11
1998	- 5.0	- 5.0	- 7.0	25	84
1999	+ 3.0	+ 8.0	+ 1.0	29	37

Source :Ekonomicheskoye Razvitye Roqqii, 1999, June/July, State Committee for Statistics, 2000.

The Russian economy is in crisis, with a negative sign of the growth rate, a decrease in investment and industrial output, enterprises operating at a loss (50%) and the difficulties to create new enterprises or to attract foreign direct investment. However, data are certainly not very precise and they forget the underground activity. Moreover, official statistics omitted the production of new private industries and companies. Besides, the firms undervalue their sales, in order to reduce their taxes. For Malakhov (1998), the recession exist, but is not so important, because the Russian industry structure was not substantially modified (except for the military sector). The economic figures are

improved, but the 1999 GDP is still largely inferior to the 1991 GDP, the unemployment represents 12 % of the active population (4% in 1992) and the average age of plant is now 18 years old (12 years old in 1992). In order to reduce the consumer price index, imports were supposed to be a solution, but the arms industries were in the incapacity to be competitive in a so short time of conversion. Moreover, a process of conversion which is costly is limited by the build-up of the public debt (debt servicing absorbs 40 percent of the federal budget revenue) and the foreign debt (which, in 2000, represents US $150 billion, eight times the annual budget), mainly (two thirds) inherited from the Soviet period. Rescheduling the Russian external debt seems difficult, and the IMF warned that it stops his grants if the defence expenditures affect the federal budget. In 2000, with the tripling of energy prices and the reduction of imports, the external current deficits is now transformed in a substantial surplus. This process has to be confirmed and it depends mainly of the prices of energy.

Russian economy suffers from the " Dutch disease " effect, with coexisting declining and booming aspects in the export sector, and this may be a factor of the de-industrialisation process (Fontanel, Borissova, Ward, 1995). The increase of raw materials amount and availability deteriorate the competitive potential of other sectors in the long-term, because of higher prices which then delay economic growth. Because conversion implies the manufacturing of both civilian durable consumer goods and heavy equipment, armament industries are also affected by the " Dutch disease " effect, which could be limited by a redistribution of the funds, an active industrial policy and a political consensus. "The stabilisation of transition is a double process of (i) making consistent together the economic dynamics, the institutional dynamics and the political dynamics, (ii) accumulating the three systemic goods as outputs of theses dynamics : profits as result of economic processes, information as result of institutional process, legitimacy of policy makers and government institutions as a result of the democratisation" (Samson, 1995).

The transition towards market economy, which is a long term objective, is not an equilibrium process in Russia. There was a lack of maturation. It needs a progressive constitution of institutions and laws based on private property and democracy, of a payment system based on domestic confidence, as well as a political authority, a large popular support and some solidarity mechanisms. Until then, there are some winners and a lot of losers. Profits are too often based on rent, speculation, coalition or violence. With the development of « futures » on financial markets and the absence of general accounts in a lot of enterprises, the Russian situation appears paradoxical. The Russian economy remains fragile, because of an important economic risk (which generates speculation). However, people have to understand and believe that the transition process is a positive-sum game. The economic transition is and must be an original process. Then it is inadequate to try to copy others societies. After World War II, Japan did not imitate the American society, though it copied the American products. Nowadays, the Russian society is no more obliged to follow the American model, but the liberalisation and the democratisation processes. In 1996, Russia avoided major domestic disturbance, but in a authoritative way, downgrading human rights principles. Democracy can only be obtained through an important apprenticeship process, it needs transparency and the development of stabilised game rules. In that way, the extension of the market logic and the democratisation are difficult to synchronise, all the more because the risks of social unrest or of the restoration of the « old regime » nomenklatura exist, if public opinion assimilates conversion costs and market reforms ones. Indeed, according to Gaddy (1996), Russian citizens tend to blame recent hard times on democratisation and liberalisation without taking into consideration the economic disaster wrought by the enormous defence burden.

Institutional insufficiencies are undoubtedly the main obstacle to restructuring. Notably, the economic influence of crime and corruption has increased sharply; 80% of the businessmen make payments to criminal organisations. Now then, a vacuum of legitimate authority does not yield efficient competition; it permits Mafia and militias, and entrepreneurs must compromise with their arbitrary powers. A basic infrastructure must then be built, to legitimise securities transactions and ownership, establish rights for minority shareholders or eliminate unfair taxes (Summers, 1997), and so attract capital for productive investment. In Russia, even if the return of capital is extremely profitable, the risk is often considered as too high. The Russian state is not strong enough to establish a viable market system, it lacks a competent administration. Moreover, there is a redistribution of property among and within powerful interest groups. Often, firms directors forbid their workers to sell their shares, but to him, in case they leave the enterprises or need liquidities (all the more because often they have more than six months of wage delay). The emerging market economy is highly centralised, rent-seeked and corrupted. According to OECD (1995), the industrial concentration is not more important in USSR than in Western countries, but the "contestability" of the Russian markets is weaker

The state policy may play a central role in preserving the national scientific and technological levels. A reduction in R&D effort could have two main effects: first, the loss of arms industry competitiveness; second, a major crisis in innovation and high technology, as military R&D is not replaced by civil R&D. The solution of dividing responsibilities between Federal executive and regional bodies has never been considered in military area. But as a matter of fact, problems differ depending on whether the region is characterised by a high concentration of employment in heavy industry (like Ural), or in defence research and development (like Moscow); in the former case conversion would be easier (BICC, 1994).

I.3. Defence industry and the privatisation and liberalisation processes

From a macro-perspective, Russia has inherited industrial structures marked by the preponderance of the military sector over the former Soviet economy. The military-industrial complex developed not only its own specific demand pattern during the Cold War, but also its own peculiar supply network. Secrecy was a virtue, but the non circulation of information induced technological gaps. Now then, innovative use of military resources is not sufficient to assure success on new market. Because former networks still remain, ex-Soviet defence managers have adapted to new adjustment strategies at the micro-establishment level, notwithstanding the tremendous industrial output decline. Today, Russian markets have less importance than the functioning of the old networks, based on private relations, which permit the old-new nomenklatura to organise what consumers think to be a market, with clearing chains or the "vzaïmozachety" (Malhakov, 1998). These consist in barter contracts at fixed prices (exchange rate of the products), which guarantee orders and deliveries, stabilise the production and reduce explicit transaction costs of enterprises internal debts. After the first step of market liberalisation, there is certainly a new triumph of the networks, with other goals, particularly in the defence sector. This provokes a liquidity crisis, accentuated by the high interest rates policy.

The complex policy of the State Committee for the Management of State Property, headed in 1992-1994 by Anatoli Chubais, allowed Russia to achieve significant quantitative results in the privatisation sphere, in a relatively short period of time. More than 70% of Russian GDP is now produced by the private and privatised sector, but the privatisation process was not preceded by a restructuring process, towards a deconcentration of state enterprises, or a reduction of their monopolistic rights. Therefore the privatisation may result in highly concentrated controlled (coupled with an excessive dispersion of property rights, with 40% owners from the staff itself) and inefficient monopolistic market structures. This process was then started in a context of imperfect competition but also of high inflation rate. These factors rise risks of erroneous investment decisions, future bankrupts, or of reinforcing rent-seeking groups (mainly from nomenklatura, the former communist oligarchy), opposed to economic reforms towards stabilisation and liberalisation. The Security and Exchange Commission were too lately created (beginning of 1995) to have solved this problem yet. The final result will strongly depend on macroeconomic stability, effective liberalisation and production of basic public goods such as private contracts effective protection or public security. The large process of privatisation has led to a relatively small level of economic change, mainly because the capital redistribution has not been supported by appropriate modes of management.

The Director 's evaluations of the consequences of the privatisation of enterprises in 1995 are interesting (Table 3). The Directors mentioned the increase of the production of new products and the

improvement of the freedom of operation, but in other fields the situation seems to be worse, mainly in finance and size of production. In 1995, for them, (52%), there was a slow down of production, losses and lay-offs. If they are not enemies of privatisation, they were not optimistic on the efficiency of their enterprises.

Table 3 - The Director 's evaluations of the consequences of the privatisation of enterprises in 1995 (in percent)

Problems connected with privatisation	Better	Worse	Unchanged
Freedom of operation	64	0	36
Attitudes to labour personnel	11	20	69
Wages	11	18	71
Financial position	2	43	55
Size of production	7	45	48
Quality of production	5	11	84
Implementation of new technologies	9	26	65
Adoption of new products	49	21	30
Conflicts	16	26	58
Investment activity	11	25	64
Relations with Ministry	7	16	77

Source : Kosals, 2000.

Sixty percent of the defence enterprises were privatised by April 1996, but 469 entities were prohibited for privatisation. The Russian state often seeks to combine ownership and corporate governance functions, in spite of the lack of financial resources or management skills. But privatisation conditions have changed, with respect to new enterprises alliances, bankruptcy procedures and external arbitrage. Moreover, enterprises seek for a better access to external development capital rather than for insolvent government favours.

Only monopolistic enterprises, such as energy, have been able to benefit from the opening of the market. Barter agreements continue to be a large part of the Russian economy (approximately thirty percent of GDP). This structural factor prevents economic development as well as the armaments industries conversion. The Russian State hence has now to face the problem of selling its shares (what to sell, to whom, in which purpose, at which prices), so that the privatisation policy continue. Three main obstacles prevent the State from selling its shares too quickly: the solvent demand, the possible excessive concentration of wealth and power in favour of a lobbyist group which would benefit from the collapse of the share markets and the non-attractiveness of a lot of not profitable enterprises. For Aguanbeguyan (1997), there is no real Russian privatisation, it is more a disengagement of the State.

Most of the companies have no efficient ownership system. In the defence complex, the state-owned are still very important and the non participation to the state to the defence industry is constantly reduced from 36.8 percent in 1996 to 25.2 percent in 1999 (Table 4).

Table 4 - Ownership structures in the defence complex (in percentage of the total number of enterprises)

Years	State-owned	Stockholdings with state holding stocks	Stockholdings without states
1996	34.6	28.6	36.8
1997	42.8	29.5	27.6
1998	42.2	29.1	28.7
1999	41.8	33.1	25.2

Source : TS-VPK Information Agency, 2000, and Gonchar (2000)

There were a lot of tentative reorganisation and conversion of the Russian defence industry, but the results are not very good. The defence industry has been politically marginalised and failed to realise the two objectives of Gorbatchev, i.e. to be an engine of economic recovery and to develop the technological level of the civilian industry. In 1985, the economic potential of the military industry were estimated to more than US $80 billion, now it represents less than US $8 billion. The decline was hard but gradual, with no closure of large-scale plant. « The significant and active part of society appeared to accept the decline of the defence industry as a by-product of the waning of the all-powerful state with which they identified themselves less and less » (Gonchar, 2000, p.4). Two options were possible for the government, but neither of them was chosen, in favour of a hybrid policy, very controversial ; first policy, adapted to the reduction of the Russian procurement budget, was to cut the number of contractors, to isolate the defence industry, to select « national champions », with monopolistic conditions, and to develop a state-owned system, regulated by the government ; the second policy, was based on the civilian-military integration for industrial rationalisation. They were important barriers between the civilian and military sectors, which reduces the economic optimality conditions. It was an idea of Gorbatchev to use the technological spillover to and from the defence sector for the national modernisation of the industry. The new policy doctrine is clearly in favour of this policy. Maybe it is the end of the military complex adherence to « besieged fortress » and of militarism and the beginning of a policy centred on human security (environment, pollution health, emergencies).

II. The failure of the conversion process as a main problem of the transition process

Today, the transition process issued from the Soviet system collapse marked the end of the direct confrontation between nuclear superpowers. The main threats will now be mass destruction weapons proliferation, nationalities problems, the controversial consequences of the economic crisis and the globalisation process, as well as the difficulty to reach an international agreement on political and

strategic world rules. However, interstate economic competition for world hegemony is over, as well as imperialist expansion in its primitive military forms.

Russia's military spending data are not easy to verify. In Russia, subsidies granted to the defence sector, still substantial in 1992, have been constantly reduced. In spite of the fact that Russia still remains one of the more important militarised countries, it obtained one of the best result in the BIC3D index which indicates the importance of disarmament process. The 1997 Russian Defence budget does not exceed 100 trillion rubbles ($18.5 billion), and the accumulated debts represent at least 25 trillion rubbles, with more than $1 billion in back wages for military wages alone (BICC, 1997). In 1995, the Ministry of Defence was only able to purchase two war planes and five helicopters (400 helicopters in 1991). Soviet Union had the largest R&D military sector in the world, today Russia spends on it less than France. Since 1995, despite some specific national policy measures, conversion opportunities are limited by the lack of gouvernmental and private sector funding. Disarmament is indeed costly and would require a short-run market absorption of the national, regional, macro and micro economic crises which it generates. For Putin, the main problems of the defence complex are : « Firstly, hugely excessive capacities specific to the defence industry. Secondly, state arrears. Thirdly, insufficient financing of mobilisation capacities. Fourthly, lack of adequate state support for conversion. The state certainly does not have money for all these undertakings » (TS-VPK Information Agency, 2000). The existence of the defence complex is not clear, with the failure of the armament industry. It includes many plants and firms which are not directly connected, sometimes redundant and producing no arms. Today, the budget buys half of its military weapon outside the defence complex on the basis of commercial transactions.

II.1. The failure of the armament industry, a cause of the Russian economic crisis

National security is a precondition for economic development (Fontanel, Ward,1993). Therefore, if military expenditures provide national security, they directly promote economic development. Thus, defence spending must not only be analysed as economically improductive if they are necessary to preserve the broad social and economic equilibrium which allows economic activity. However, it is difficult to improve the national security while at the same time spending more for military outlays (Galbraith,1993). In the 1970s and 1980s, the Soviet military power was an economic question at issue. On the one hand, the American perceived it as threatening their technological and military competitiveness. On the other hand, Russia had to face an important large technological gap with the United States, an incapacity to follow the computers revolution, a « third-worldization » of its economy, and an incapacity to produce on a mass consumption level, and to reach the Western standards of quality.

Military expenditures have the same short run macroeconomic effects than other public expenditures. Some economists have argued that, sometimes, the armed forces provide a stimulus for the development of new techniques, partly because the organisation of social labour benefits from order and discipline. However, most empirical studies do reveal the sectoral (the choice between civilian or military industrial activities), the temporal (the choice between the present and the future) and the investment crowding out effects exerted by military expenditures. Therefore, military expenditures do have an adverse effect on economic development, even if, as public expenditures, they may contribute to an upsurge of demand (Fontanel, 1994). As suggested by Lawrence Klein (1990), if the production of

civilian goods was replacing the production of military goods, new productive income flows would thereby be created. Indeed, a civilian investment provides a positive externality that outlasts the period during which it is financed. It may also stimulate other economic activities. As for military goods, a purely economic analyse of their « benefit » most often illustrate the preponderance of costs. Military spending is not governed by market forces, but does produce crowding out effects. Defence industry has considerably decreased the capability of the Russian economy both to perform growth in response to the positive demand from the market of goods and services (i.e. to perform the 'supply response') and to react to price and demand signals in the factor market (i.e. to reduce the large misallocations of dramatically scarce investment resources).

The huge research departments had gradually become autonomous and powerful centres of power linked to their technical ministries; they were therefore disconnected from the real production process. The competition and duplication (for secrecy and security reasons) between the institutes and the research departments contributed to reinforce the economic ineffectiveness of the giant-scale enterprise, free from all effective control. Defence industries provided the bulk of employment in the military regions, but also most of their social assets, such as housing, hospitals or schools. The high concentration of defence-related research- development and production facilities still remains today in Russia. This concentration of a non market culture reduced the development capacity of private activities.

The principles of self-sufficiency made the allocation of limited investment resources extremely counter-productive. The hierarchy of managerial decision-making (which prefers the « cost plus » principle for profits calculations), the oversized capacities (which reduce the development of new products and innovations), and the irrational high degree of non-core business activities (because the firms have to function rather to produce) are the main obstacles of the profitability of the defence enterprises. Economic factors themselves condition and shape the process of armament and disarmament.

At the beginning, the main obstacles to operation of the defence enterprises in 1992 and 1994 were as explained in Table 5 (Kosals, 1995). Financial difficulties are growing, such as high taxation, according to the directors. It seems that these advises are still running.

Table 5 - Main obstacles to operation of the defence enterprises in 1992 and 1994 in Russia (percent)

Problems of defence enterprises	1992	1994
Breaking of the traditional business links between enterprises	80	25
Shortage of the material resources	44	0
Instability of economic policy	23	39
Too high taxes	22	77
Social tension in the enterprises	22	60

Decline of military procurement from State	18	60
Mack of guarantees for the sales	7	32
Financial troubles	N.A.	59
Old equipment	N.A.	17
Overdue payments	N.A.	12
Troubles of privatisation	N.A.	1

Often, the defence industry was described as having very positive externalities on technologies, infrastructures and human capital. The situation is more complex than thought. Certainly, some defence enterprises obtained good results in conversion and in production of externalities, but in terms of opportunity costs, the advantages seems clearly transformed in inconvenient. For the McKinsey report on Russia (McKinsey, 1999), the average labour productivity stands at 20 percent of the US level. The causes are a complex system of subsidies and administrative measures which distorted prices and allow some state firms with low productivity to survive. In this situation, the emergence of new industries, more competitive, is quite impossible. In the defence industry, these mistakes are largely developed, with subsidised pricing, discrimination against private enterprises, grant-seeking. The delays of restructuring defence industry have slow down general reforms and the macroeconomic situation.

In 1997, control of the defence industry was given to the Ministry of Economy, in order to open up the civil-military integration. Another program, just before the financial crisis, was decided, in co-operation between regional and national authorities. After the bargaining procedure, the number of defence enterprises doubled from 300 initially planned to 600 (Gonchar, 2000). The regions had to protect the defence enterprises, which were not allowed to be privatised or subject to bankrupt. Theses agreements proposed a reduction of 30 to 40 percent of the military production capacities, the protection of a defence complex nucleus (with a state guarantee of procurement contracts and profitability), the privatisation of the non nucleus enterprises, the consolidation with mergers and redeployment of production capacities and personnel and an economic assistance to enterprises withdrawn of the military complex of $350 millions (more than 2 billion rubbles). The policy was maintained, but the results are lower than the objectives planned. In 1999, a lot of enterprises did not receive any military procurement contracts. The concentration were slowed by political uncertainties, with only 40 integrated holdings in the defence industry. The main problem is the motivation for integration and mergers, and the divergent interests of the owners, directors, regions and State authorities. There are competition of managers in the aircraft sectors, conflicts for the technical modernisation, chaotic decisions on the choice on R&D.

Since 1999, the State Commission on Military-industrial Affairs was established as the main co-ordinating centre, back to the traditional insulated development, more centralisation of government control and a return to ministerial status. It has the responsibility of the restructuring of 1,600 enterprises, with too small bureaucratic and administrative skills. Today, state control underwent further changes, with the joint control of the new Ministry of Industry, Science and Technology, the former agencies and the co-ordination of the State Commission on Military-industrial affair. The reorganisation indicates the difficulty of the task and the will to change the responsibility at each

beginning of failure, in a generalised failure. The Russian defence authorities failed to have a clear and long run vision of the defence industrial base. The restructuring program is still delayed and there is in preparation a new reform of the defence complex from 2001 to 2005. The main principles seems to be :
- the discouragement of the privatisation of defence contractors, such as, for privatised enterprises, to lose arms export licences or international co-operation,
- the diversification policy of the industry for the privatisation in the defence industry,
- the control of bankruptcies for strategically important defence firms,
- the reduction of unitary enterprises, fully funded by the budget, in order to fight against corruption and mismanagement. Those which are profitable must be transferred to the regional level in exchange of federal debt or privatised. Those which are not profitable will be liquidated or transferred to regional level, if there are some guarantees of their recovery,
- the improvement of the control of state's stock of shares by replacing state representatives.

There are 335 enterprises and 650,000 personnel in the aviation industry (pore than a million in 1990), but the internal demand at best absorb no more than 25 percent of the domestic capacity. There is a strong crisis. The sector need a restructuration, some mergers, with a privatisation for redundant plants. « However, the integration scheme covers no more than one-third of the existing companies. At the time of writing, they were to include groups of companies formed around Ilyushin, Tupolev, MiG, Sukhoy, Mil and perhaps Kamov, aircraft design bureaus and additional survivors dealing in engines, avionics and airbone armaments who have not yet emerged. The rest may be expected to exit the aerospace market » (Gonchar, 2000, p. 33).

The Russian state used a lot of various funding sources for defence industry, which are, to sum up, very insufficient in order to maintain the production series and the modernisation process. The majority of firms has low liquidity and as a result they used delayed payments (arrears). This strategy was quite successful to survive but not for growth and development. The defence sector failed in improved corporate governance, transparency, careful accountings or relearning and change in management. The arms sales and industrial commercialisation had some good results in some cases, but they are not still the panacea.

II.2. The cost of the disarmament process

Disarmament is a prerequisite for peace-building, which implies transition costs from war to peace systems. If these investments were not made, then humanity would be condemned to support the cost of a war system ad infinitum. By late 1994, conversion led to a loss of more than 4,000,000 jobs and a large number of civilians employed by the defence sector, by the cancellation of vital defence projects (Woff,1995). Moreover, there is an important cost of arms surpluses. For example, in 1991 there were in Russia 40 million tons of munitions to destroy; their storage was costly, such as the recycling of some military products components (titanium, aluminium, copper or gold). The elimination of chemical weapons will cost between 20 and 30 million dollars. The Russian government estimated the destruction of 10000 pieces of the Treaty-limited Equipment (Conventional Armed Forces in Europe) at $21 million. Today the only inducement for Russia to ratify was the promise of foreign financial and technical assistance. The Federal Program « Destruction of Chemical Weapons in Russia » (1996) has the ambitious objective to eradicate these weapons, but it is difficult to realise, because of the constant decline of its funds (from 33% in 1996 to 1% in 1997 of the program costs), and of the

atmosphere of suspicion surrounding the destruction methods (BICC, 1997). Implementing START would cost Russia $6 billion. OTA (1992) has estimated dismantlement costs to $5 to 10 billion and the cost for the storage of plutonium to $2 to 3 billion over the next decade. The US government purchases 500 tons of highly enriched uranium for 11.9 billion over the next 20 years. Four million soldiers were demobilised between 1990 and 1995.

The structure of the military expenditure is moving, with main interests for the On-Site Inspection Agency, the START Treaty, the destruction of Chemical weapons, the Nuclear Control Technology and the Conversion/Economic Adjustment (Renner,1994). In USA, the adjustment to lower military expenditures is mainly left to the market, with mergers, job loss and plant closures. In Russia, as in Europe, conversion funding are marginal. State armament orders and R&D represent only 1/10 of those of 1991. The MIC enterprises are asphyxiated by their deficits and their reciprocal debts. Defence industries foreign sales are not sufficient to utilise all existing production capacities, however arms production continues even without consumers or payments. Yet the decrease in employment is less important than in production. There is indeed a disguised unemployment, and the standard of living of the defence sector workers has lowered. In 1988, wages were at least 1.5 times higher in defence sector than in civilian industry. Ten years later, this ratio was exactly reversed (defence sector wages only amounted to 66% of civil ones).

Today, Defence Ministry orders are only addressed to a few selected enterprises, and not to the smaller firms of the MIC. The negative effect is that a decrease of military contracts also implies a decline in civilian production (Privalov and Chernakov, 1996). It is mainly an effect of the decline in military-related activities, which reduces economies of scale below the minimal level, and lack the working capital needed to perform civilian projects. Military contracts should though be considered as economic factors of stabilisation, even if the opportunity cost concept is of limited application to military expenditures reductions. One must consider that the most interesting industries were based on dual purpose technologies (Goskomstat, 1996). Disarmament involves a destruction of the old economic and social equilibrium; therefore it is disequilibrating. Dunne (1996) stressed the problem of « peace penalty », that is the short-term economic adjustment cost .

II.3. The « illusory » peace dividends

The IMF (Gupta, Schiff, Clements, 1996) measured the peace dividend by comparing actual spending with that which would have resulted from an unchanged military spending-to-GDP ratio. Since 1991, the world military burden reduction is then estimated at $350 billion per year. Countries that had realised large cuts in military expenditures usually benefited from a reduction of non military spending, as well as of fiscal deficit, and from an encouragement of private investment. Hence, such a policy is an investment process (UNIDIR, 1993, Fontanel, 1995, Intriligator, 1996). Military expenditures and economic growth are indirectly linked, via investment and interest rates. On a world level, disarmament ought to modify the competition conditions and the international division of wealth and labour.

Disarmament generates, though a decline of indigenous weapons industries, an employment reduction in the military sector and a huge devaluation of its industrial capital stock. Moreover, the lack of new weapons programmes and the suspension of the existing ones, the design bureaus incapability of ensuring competitive salaries may be factors of an economic recession, which would add to transition

problems. Surely, Russian defence industry is today in deep crisis. However, performances differ between hardware and high-value-added industries, the latter being more depressed. In the first years of reforms, military build-down was partly substituted by some types of civil manufacturing, but later civilian production also declined dramatically, especially in 1994. Except some emerging market niches dominated by former defence companies (oil and natural gas drilling equipment, food processing, and machines for trade and light industry), most of the traditional civilian markets of defence enterprises are highly depressed; consumer electronics and communication industries are in the worst condition, followed by aviation and radio sectors. Arms, shipbuilding, space and atomic industries, yield better results. None of the 20 most profitable nor of the 20 most productive firms, belongs to the defence sector (Expert 1996, n°33, September 2). Today, the best ranks are occupied by raw materials, oil, gas, electric and food-processing firms, partly reflecting the conversion process. In 1996, armament firms privatisation was slowed, because it was criticised about the assets under-evaluation, the new privatised enterprises financial difficulties, and its consequences on national security. However, privatisation remains the main form of industrial restructuring.

The effects of military spending reductions (or increases) appear by three stages : (i) the immediate short-run effects of changes in final demand structure; (ii) a transition process, as resources are either transferred to different uses or left idle ; (iii) longer term supply side effects of the new resources allocation on domestic economy. These effects must be analysed 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 inertia effects that greatly limit flexibility over the work force and industrial equipment. Time lags may give rise to considerable economic difficulties in some economic branches or some regions. The economic adjustment speed will also depend on (i) the inherent flexibility of the economy concerned ; (ii) the degree to which new demands for resources match the characteristics (location, skill etc.) of the old resources freed by the reduction in military spending ; (iii) any regional or industrial policies which will aid adjustment. The failure to achieve the minimum activity threshold leads to the establishment of a vicious circle that complicates the use of substitutable resources.

Defence communities, which were created by the government for national security and/or regional development reasons - such as Zhukovsky which was a classic "naukograd" or science city, dedicated to aerospace research and development -, are completely dependent on the central government for their livelihood, since the government is the sole or largest purchaser of the local industry's output. The existence of these communities depends on governmental will. Regions have often the burden of the costs of conversion, without any Federal funding. They have to develop an economic framework attractive for foreign investment, and their restructuring should generate positive externalities for the whole nation.

Many economists analyse disarmament as an exogenous variable. Moreover, econometric modelling assumes that the responses to increasing or decreasing military expenditures are symmetric; yet, this may be not appropriate when considering a large reduction in military expenditures. Economic benefits of Eastern Europe countries disarmament have not been sufficiently econometrically or quantitatively demonstrated. Li and Pauly (1996) show that reduced defence spending will have not only short-term but also longer-term negative impacts on Russian economic growth. For Jaromir Cekota (1990), using a Leontief-Marx-Sraffa model, since the production of military hardware constitutes a non-basic industrial activity (its output is not used as input), technological change in the military sector

cannot induce any input-output multiplier effect on the sectors of the production system, as it should be the case for a comparable basic sector. This analysis is confirmed by empirical analysis. With a reduction of military expenditures and the application of R&D on basic sector, the crowding in effect on high technology must be important. But the main problem is the no-replacement of military R&D by equivalent civilian R&D, because of the deep economic crisis.

Russia, which has made substantial progress toward a market economy, after a short-period attempt to implement an ambitious transition package, did not succeed in restoring the economy. The process of transition is still ahead. Some internal, direct or indirect, price regulations still remain, in spite of gradual internal liberalisation process. Given that most of the shocks had a 'macro-economic' rather than defence build-down nature, much depends on the general economic environment in the region and in the industries. As resources devoted to military activity cannot be reallocated, a reduction of military expenditures has a negative economic multiplier effect. The new fixed capital investment declines, mainly in chemistry; construction, agro-industrial or machinery, but it increases in transport communications, social (health, education, housing construction, municipal and communal services) and energy.

Fontanel and Smith (1985) state that growing military spending has a crowding out effect on private (and public) investment, primarily because of depressed private demand and reduced profits expectations. This effect is accentuated by an increase in real interest rates which further suppresses investment, all to the detriment of a wide range of governmental programs. In addition, military activities are weakly productive by providing employment, and they bring about a brain drain from the civilian to the military sector, particularly in highly technical fields. Then, the civilian sector becomes less productive and potentially less competitive at the international level. Lower rates of investment tend to be associated with lower rates of growth. One version of the argument suggests that over the medium run, the share of public and private consumption is independently determined and relatively stable. This stability shows that normally, military spending is considered as provision for the future. However, military spending increases should be made at the expense of investment (again public plus private). Moreover, a reduction of military expenditures reduction should induce an increase in domestic investment. But it was not the case in Russia: the reduction of investment was more important than the diminution of consumption. In time of major war and national survival, it becomes a provision for an immediate need, therefore investment is sacrificed.

Military conversion is not synonymous with economic depression. Conversion is mainly, but the cultural differences, a temporary adjustment process, linked to a drop in economic activity or a fluctuation in demand, as in any other civilian activity (J.Varley, 1996).

II.4. Conversion, as an economic constraint

Conversion can be simply defined as the re-allocation of defence plants resources to civilian uses. The main question is how military resources can be re-used. In USA, a macro-economic approach of conversion was adopted, which studied the impacts of reduced military expenditures on the whole economy. For the former USSR, the micro-economic approach, a plant-by-plant conversion, was mainly preferred but it entails economic risk.

II.4.1. Armament firms crisis and the Russian policy

The conversion policy, launched in the Soviet Union in late 1980s, was based on three main expectations: (i) Governmental resource allocation in favour of civilian manufacturing would induce both an economic growth and a compensation of employment cuts; (ii) the spread of military technologies in the civil sector would quickly improve the technical and commercial quality of its products; (iii) defence-related technologies and products should be easily marketable on the international market. Arms exports were considered as a way to finance conversion; besides, Soviet military technology should attract foreign investments flows, necessary for the success of systemic transition. However, the defence industry suffered from a dynamic of production decline.

Conversion from military to civilian spending confronts other numerous impediments. The simultaneous conversion of military organisation, military production, and military personnel is a long and slow process. Especially, the MIC used to meet the bureaucratic requirements of the national security industry, and is not adapted to civilian market conditions. Defence companies were heavily product oriented and technology driven; but they lacked organisational flexibility, because of their rule based relations with the Ministry of Defence. The projects time horizons were long and prevented a fast adaptation to the market changes. Their priority lay more in performance maximisation, than on cost minimisation. Defence firms have no market experience. That is why so many conversion plans emphasise the need for a governmental demand of new products. The predictable failures of defence enterprises conversion will proceed from the low skill and under-development of the marketing and sales departments, the lack of knowledge on competitors, the low managerial competence (rent-seeking and market-oriented types of adjustment are often exploited by the same team of managers), the over-estimation of the marketability of costly conversion products, the financial distress of the firms. Moreover, the conversion success will depend on competition structure (technical monopoly or large concurrence), products specialisation, opportunities of commercial diversification and quality of know-how, organisation and productivity. Still, macro-economic stabilisation policies and conversion programs do not take into account these micro-economic evidences. Furthermore, defence plant mangers are used to inelastic relations between supply and demand. Huge investments were thus wasted and brought market failure. Less than one percent of conversion projects are made in the R&D sector.

Firms conversion strategies may take several forms: layoffs and shrinkage (the practice of 'hire and fire', common in the USA), production facilities sales (with privatisation, joint venture or concentration processes), and diversification or conversion into civil production. In some cases it may be more effective to simply close industries and redeploy economic forces into other sectors and locations. For example, can military airports be easily converted into needed civilian airports ? Military facilities are not necessarily suited for this purpose and their locations are often isolated._Besides, decades of cold war have led to the concentration of the best Russian workers and professionals in the military sector. Their quality was limited by the habit of paternalism, of guaranteed employment and their absence of adaptation to rapid economic changes (Fontanel, Skharatan, 1998). Hence, Russian workers labour potential went through a very quick disqualification process.

Some industries should be more easily converted than others. Nuclear weapons are not convertible, but electronic components are. Brunat and Malhakov (1998) verify, on the Williamson analysis (1989), the assets specificity of military products. They explain that aircraft production has a very high level of specificity for the brand name, dedicated assets, human and equipment systems, but a low level for the site requirement. For electronic, the high level of specificity is for brand name, human and equipment systems, the two other criterias being low. Then military electronics can be considered

as an easy dual purpose technology, which is not the case for aircraft production. While military R&D focuses on maximum performance, the main concern of the civilian sector is optimal performance with minimal costs. The government spent more current money for defence R&D, but with the inflation rate there is a huge reduction is constant rubbles. One-third of basic research funding is estimated to have a foreign source, but less than two percent of these funds are devoted to conversion projects. This represents a very minimal level of involvement in the Russian conversion process. However, the arms procurement plan show a new very significative effort of the government in favour of defence industry. It is even more important if we include the debt recovery of the defence industry (Table 6)..

Table 6 - Arms procurement budget plan (billion current rubbles and index in 1996 prices)

Years	Current prices	Index 1996 prices
1994	8,442	100
1995	10,287	49
1996	13,213	49
1997	19,964	36
1998	15,148	47
1999	16,0	46
2000	27,3 52,3 (including debt recovery)	76 145

Source : Gonchar (2000)

II.4.2. Internal conversion

In the long run the market solution may be more efficient than the attempt to convert defence plants, whose closures and redundancy for defence employees may appear extremely wasteful, in a time of rising unemployment. Therefore, the arms industries reaction to the national disarmament process may include: (i) the development and promotion of an export market (however this market is in sharp decline globally), (ii) the restructuring of the corporation to include massive downsizing and layoffs, as well as production relocation (with the difficult question : « where will the start-up money come from ? »), (iii) the identification and specialisation of niches which may yield large profits, (iv) the search for and development of dual technologies and (v) the widespread closing of production facilities. Thus, there are two main obstacles : namely the fact that a large part of military technology is simply not applicable to the civilian sector and the difficulty in financing investment for conversion during a period of recession (Fontanel,1995). The macro and micro-economic strategies does not guarantee a high success rate.

Diversification reduces a company's dependence on defence by acquisition or organic growth of non-defence operations, such as the ability to create alternative products. It supposes an important growth in costs for public and private firms, mainly on R&D and the search of new markets. In addition there are additional costs associated with the establishment of new commercial networks, entailing new partners and new relationships. The arms industry is by nature poorly prepared for such a situation. There are four basic types of diversification that have proven important : market (with dual technologies), geographic (relocation of production to new industrialising societies), portfolio

diversification (mergers and acquisitions) and production (stabilisation of local economies and employment in current production sites). Diversification leads to an increased markets heterogeneity and supposes a reduction of the firm military dependence reduction and a staff redeployment towards civilian production. It includes conversion, but it is not the same process.

The target of conversion is to convert the company, with less dependence on military expenditures, local economic base and workers. There are three main processes of conversion ; (i) by command (the first Soviet military enterprises received orders on what to produce) ; (ii) by diffusion within the context of market rules, with a decision taken by the enterprises themselves on what to produce ; (iii) by community, with the emergence of new actors (trade unions, local community, peace movement). Arms industry as a whole still constitute the most protected sector of the Russian economy (Gonchar, Kuznetsov, Ozhegov,1995). However, in 1997, conversion financing represented only 8% of Russian military budget. Significantly influenced by the former Soviet planning, the federal program on conversion, established in 1993, protected the commercially inefficient military technologies and encouraged import substitution policies. But only one conversion programme in fourteen has been financed to date. The serious crisis of the federal budget, which has become obvious by late 1996, has significantly worsened the position of all defence sectors.

The main economic impediment to conversion is the need for large financial inputs, which defence enterprises lack; indeed, their location specificity often deters private investors who seek for quick returns on capital. With no government funding and too high interest rates, many conversion programs have been stopped. However, defence enterprises are consolidated through direct mergers or the shaping of financial-industrial groups, created to save the technological level of the military sector by promoting industrial and banking co-operation. These news entities are criticised by liberal economists, because of the risk of monopoly and of renewing with former central planning institutional arrangements, such as large commercial protection, budget subsidises and state purchases priorities. They are holdings which benefit from protectionism. Most particularly, the banks interests and the military firms ones are diverging. Now these holding companies are largely dependent on the banks good will. The creation of those financial industrial groups has so far remained limited by the end of 1996 but the process is still going on and at the end of 1997 they were more than 100 (Malakhov, 1998). This process of "cartelisation" influences the State policy. State encourages the concentration processes and the centralisation of the production and capital. The most famous example is the Moscow Aircraft Production Organisation, MAPO, formed in January 1996 by Presidential decree, of the Kamov helicopter and the MIG aircraft, employing in excess of 100,000 workers. This competitive enterprise has rationalised former military enterprises.

Western countries aid to Russian conversion is very low : it has financed less than two percent of Russian conversion projects (Gonchar, Kuznetsov and Ozhegov,1995). It is in fact difficult to implement industrial corporations with other countries : the military staffs requirements are not exactly similar, it is difficult to reach an agreement on export policies, each government tends to support its own national industry, and the costs are high. The joint ventures are not yet very advanced. They are concentrated mainly in trade, services, and small-scale manufacturing as well as in certain regions (Moscow, St. Petersburg, the Far East). Major international collaborations have proved to be more complex than expected, and most of them have failed. Besides, investors in Russia encounters serious problems, such as the slowdown of the privatisation and structural reforms pace, an arbitrary and complex taxation, a high level of criminal and corruption activities in the business. Nevertheless, United

Technologies/Pratt & Whitney and Russian NPO Energomash develop a conversion project of redesigning rocket engines used by the Soviet military into engines for launching telecommunication satellites; the Clinton administration implements an Eximbank financing agreement for 1 billion dollars to finance the export of US aircraft components for the construction of 20 Russian IL-96 aircraft, improving access for US built aircraft into the Russian access. However, over a 7 year period, only 2% of the establishments of multi-plants firms shifted their primary output to a new product line classified in a different industry.

National self-sufficiency and independence in arms is a policy which can prove both expensive and dangerous. However, with weapons collaboration, the typical pattern is that development costs are shared between the partners, cutting the costs to each, if and only if the defence organisations need exactly the same weapons. On the economic side, it is argued that domestic procurement creates employment, boosts tax revenue, improves the balance of payments and produces technological spin-off for civilian production. If co-operating countries do not want exactly the same weapon, new costs occur in meeting the needs of each partner, and then the advantages of large scale production can be insufficient to compensate for the increase in costs. Production takes place on a national basis and there are losses if compromise designs are more expensive to produce. Collaboration itself adds a cost penalty arising from co-ordination expenses and transport needs. There are always complicated, politically rather than economically negotiated, work sharing and compensation arrangements.

The co-operation objectives are the need to obtain specialised, high and varied technical competencies which are difficult to develop for a single enterprise, the necessity to reduce research and development investments for each firm, the desire to spread substantial risks and the possibility of enlarging the markets, developing mass production and reducing unit costs of each products. However, there are some risks in the definition and implementation of industrial corporations with other countries, such as the basic needs of the military staff which are not exactly similar, either on the time horizons or on the strategic interest for each State, the difficulty of deciding on agreed export policies, the tendency of each government to support its national industry, although national competitiveness is not very good, the delays in the conception and execution of the programmes and the magnitude of the costs. Today, the Russian ccoperation armament perspectives are not very large and attractive.

II.4.3. Export conversion

In the arms market the transaction price is rarely well defined. The transfer takes place as a part of a package involving the equipment itself, spares, training, access to technology, export credits, insurance for payment, offset agreements and counter-trade arrangements. Hence, the national export figures are very difficult to analyse. The net costs or revenues to the countries concerned may be different from the nominal prices. Moreover, the figures do not represent the effective payments ; they summarise the real transaction and it is usual that the arms importers are unable to pay their debt. In this case, it is usually the national insurance which are in charge of the payment and then the arms transfers become an instrument of development aid in favour of LDCs.

It is difficult to distinguish whether some particular transactions, such as aircraft or electronics components which have a dual use, should be classified as civil and military. The classification is the first source of difficulties for evaluation. The nomenclature is continually changing and some products which was on the list of confidentiality ("confidentialité") become progressively so usual that they lost

their strategic interest. Looking at these factors the future prospects for Central European ar industries—developed to supplement the Soviet industry—seem very limited. While the advantage t they have in terms of price may lead to some successes in the short-term, they are unable to ol assurances of security guarantees or leading edge technologies. They are also unable to offer financ arrangements or offsets. Currently, the arms export market is very competitive and many governme have subsidised the development of indigenous national industries for political and sometimes econor reasons. This creates strong pressures to export, with cheap credit for importers, and sometimes pri get forced down towards marginal production cost which is much less than average cost. In the pa arms exporting countries tried to obtain political advantages, now importing countries want low pric without political implications.

The capacity utilisation rate of defence industry plants only amounted to 20-25 per cent. T is why they try to develop arms exports. This may permit to benefit from scale economies, as with development of collaborative ventures with foreign firms. Arms exports have fallen from about billion dollars in 1982 to about 2 billion dollars in 1993. However, official reports still plead for a n products policy, directed towards international markets (Table 7). Moreover, the share of arms expc in military sales is clearly growing (Table 8)

Table 7 : Numbers of Russian weapon systems manufactured for national and international sales (19 1999)

Weapon systems	Domestic demand	Exports sales
Ships	2	11
Tanks	31	435
Submarines	2	10
Aircraft	7	278
Helicopters	8	98
Air defence systems	1	22
Armoured vehicles	17	217

Source : Gonchar (2000), p. 40.

Table 8 : Share of arms exports in military sales in Russia, in percent (1996-1998)

Years	1996	1997	1998
Aerospace	66.1	60.7	84.0
Armaments	40.4	41.8	46.5
Shipbuilding	16.9	1.0	59.1
Radio	21.4	15.2	68.4
Communications	3.6	18.4	19.4
Electronics	5.0	4.6	6.8

Source : Gonchar (2000), p. 38.

The strategy of financing conversion with arms export profits has appeared to be rather ruinous for small enterprises, which are not technologically competitive on the world market. Export orders, even without signed contracts, resulted in a huge arms overproduction and resources waste. It has become obvious that the ever shrinking world arms market will never been able to compensate declining domestic market. Arms exports were useful in a few cases, notably some clearing operations with an important commercial partner (such as it was the case with India), or the reduction of a huge international debt (Hungary with a contract of $800 million). The former WTO countries elaborate new military doctrines of independent security policies, but they seem indeed to be « captive markets », because of the lack of finance for new military technologies development. Arms export controls are not very efficient and a lot of second-hand armament were sold in foreign countries. The derogation are easy to obtain and arms enterprises are often exempted of tariffs for currencies availability. For *Kommersant-Daily* (26 December, 1995), civilian exports of products and technologies developed by the defence complex represented one-fourth of that of the military (US $630 million), and tends to grow. The Russian armament prices are very low: in 1992 the MiG-29 was proposed at $20-25 million (compared with $40 million of the equivalent US model, the F/A-18). The price of the T-72 was $1 million compared with the similar US $3million M-1A Abrams. The price competition between Russian armament enterprises benefited to purchasers but also corruption. The illegal exports level is indeed substantial but, in 2000, the controls are more important.

Some disarmament treaties state export agreements. Export sales of the Ministry for the Atomic Energy reached US $1.65 billion in 1995 (Gonchar, Wulff, 1998), without including the construction of nuclear power plants in Iran, China and India (additional US $500 million per year). There is also a twenty years contract with the United States on sales of highly enriched uranium from dismantled nuclear war-heads, to be processed into nuclear fuel, for US $140 million in 1995, $280 million in 1996 and up to US $400 million till 2000. These revenues have significantly supported conversion projects and helped to soften the social tension, especially in the closed scientific and industrial nuclear sites. The risks of selling at a loss abroad and of paying the research and development costs and part of the fixed costs instead of the customers are considerable. Sometimes prices get forced down towards marginal production cost which is much less than average cost. In the past, arms exporting countries tried to obtain political advantage, now importing countries want low prices and barter advantages, without political implications. It is interesting that econometric models can suggest that a country's military expenditures has conflicting positive and negative effects on arms exports. Some exports impoverish a country, although enterprises are not concerned (Fontanel, 1996).

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 industrialising 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 nationalised).

Conversion is therefore a very difficult process which drastically challenges the existing economic culture. Conversion is not only a risk, it is also an economic opportunity. « Russia's ability to maintain and build up the production and export of high-tech defence and civilian products will largely decide its future in the world economy ; whether it will integrate into it as an exporter of raw materials and importer of equipment and consumer goods, or as an industrially developed country with advanced industries and sciences » (Maslyukov,1998).

II.4.4. The decisive role of the State policy in the success of the conversion process

Why are defence industries obtaining so different results, when the shock of transition was similar for all of them? Several explanations are possible, such as firms size differences, markets uncertainties, various accesses to alternative non-government sources of financing, or governmental economic policy. The conversion failure is the result of the simultaneous combination of market imperfection and governmental weakness (Gonchar, Wulff, 1998). The Russian federal policy is one of the most important cause of economic recession.

Conversion policies may promote national and international mergers, take-overs and the formation of new companies, strategic alliances and industrial cartels, the production of weapons not affected by arms control and budget cuts and increased exports. Government policies may aim at rapid privatisation, (a "hands-off approach", as in Germany) or may delay the adjustment (as in France). From the liberal point of view, the military sector is an economic burden and must be privatised as the rest of industry; then it must either adapt or be dismantled. But though macroeconomic policy in Russia was rather weak during the period under analysis, the radical liberalisation transition process failed. For the defence sector group, the military sector have not to be privatised, that technological performance must be preserved at any cost; it is believed that arms exports could be the key for the financial assessment of the restructuring. In no major arms-producing countries, military production has dropped as sharply as in Russia during the 1990s.

The Russian government followed three main goals which were the definition of the priority technology areas of the arms industry (mainly nuclear), the development of dual-use technologies programs and a sustained technological policy in areas critical to national security. Two governmental

decrees of 1993 defined Russian industrial policy as related to defence (Gonchar, Kuznetsov and Ozhegov,1995). The last one guaranteed certain privileges to the defence sector, including the payment in cash, in advance, for some contracts with the state, as well as the protection of wages levels. Privatisation of large firm has proceeded at a snail's pace. Today, the most important target indicators of the State Conversion Program State are the commissioning extra production capacities able to produce 41.1 trillion rubbles in civilian output worth and 400,000 jobs for the strategy of import-replacing production (for an anticipated reduction of imports of US $1.4 billion). Since 1994 the government has managed to establish control authority in arms export policy, and to increase investment of arms export revenues (Skoens and Gonchar, 1995). Government considers that the exports of high tech products and critical technologies have priority. Today, foreign defence contracts exceeded those of the Defence Ministry by three times.

The State support to the development of regional conversion programs is weak. The regions main responsibility is to facilitate the development of horizontal links, creating synergy between productive units in order to develop coherent local productive systems (Brunat, 1995; Kapstein,1995). There is no culture favouring horizontal co-operation, which is though important for localised co-operative ventures. The creation of regional development linkages is however a worthwhile factor of economic development, in order to encourage study-projects of small-scale productive enterprise and the creation of synergy. Access to sources of financing (outside the government budget) seems to play a key role in sectoral dynamics differences. The space industry is strongly supported by large-scale joint international projects. The nuclear sector has access to the revenues issued from industrial sector sales of electric energy (generated by atomic power stations) and international sales of enriched uranium and pure materials. Thus both sectors benefit from a government priority in the distribution of scarce resources and non-monetary aids. The technologies most often listed as central with regard to the objectives of mobility, flexibility and enhanced productivity (information, space and materials) are not specifically military in nature and the pace of their development is likely to be at least as fast in the civil as in the military area.[ii]. In the first years of reform, conversion was successful for a few defence enterprises, which invested their military export profits (mainly on final products, rather than subcomponent) into civil commercial projects. Then, they have mostly exploited the gap between national and international prices in exporting primary materials from accumulated inventories, which were quickly exhausted. Today, they slowly develop both market niches of high-tech conversion (such as export of commercial space launches or R&D services) which are often marketed by joint ventures and a growing market lower value-added products, with large prices competitive advantages (optics).

Governmental aids still plays an important role in providing conversion credits and tax advantages, as well as guarantees for international deals and protection against competitors. But their importance are slowly decreasing, because the state, such as World Bank, becomes more selective in establishing links with industry, and it asks for a feasibility analysis of conversion projects as well as a private financing. However, restructuring alone often fails under the pressure of macro-economic shocks or micro-economic risks. It involved sometimes the split of enterprises or their concentration for positive synergy. Keeping the money received from the state as an easy-to-pay conversion credit at the deposit account if often more profitable than real market activities. The government will have to take anti-trust measures, abolish regulations for small business and develop new loan funds for new enterprises. The State has to take into account the regional opposite interests, the power dispersion and the alliance games, which clearly reduce its own economic and political legitimacy. Regions have

different status (in contradiction with the Russian Constitution) and an incoherent economic policies concerning armament industries. Though the State received "golden shares" when armament firms were privatised, it has no efficient control of the companies. There is a main problem of power and strategy.

III. The new policy since 1998

With the financial crisis of 1998, there is a relative recovery in defence policy, because the NATO action in Southeast Europe, the Chechen war and the will of the Russian administration to renew with the Russian power. In 1999, as Prime Minister, Putin considered that arms production for domestic requirements was a priority, which partially replace the focus on arms exports or conversion. In some case, it is argued that the new situation requires the conversion of converted defence plants back from civilian to military manufacturing. In 2000, the military budget was increased by 80 %. Certainly this figure is impressive, but it is useful to recognise that the defence budget stated from a low level. However, it represents a main change in security perception, with a new redeployment of the arms industry.

III.1. The new political cards

The post-Soviet security thinking is quite uncertain, notwithstanding the large number of official report on the Military doctrine. Concretely, there is no permanent concept of armament programs (but the nuclear and space doctrines), defence industry restructuring or arms exports (but the will to sell more and more on international markets, without any relations with political objectives). The government had some strategic objectives, but rearmament and modernisation was delayed for economic reasons. Today the main goal seems to be the reduction of the number of defence contractors, by granting procurement contracts to a relatively small number (reduced by a factor three) of competitive firms. The conventional forces was clearly reduced. There is a special law guaranteeing some financial allocations to nuclear sector, with the abandon of the « no first use » doctrine in favour of the « flexible response ». The eventual deployment of a US missile defence contributed to the development of the insecurity in Russia. The main problem is not so much the missile defence itself but the technological advances which is, in the future, a tool to reduce the effectiveness of Russian forces. The Putin government addressed some remarks to the UN Security Council, explaining that for national security Russia does not exclude to turn to a more offensive position. It declares to be clearly against the US policy in NATO and on ABM Treaty. A new arms race cannot be entirely excluded. It is possible that the security needs are one of the most important test for the popularity of the Putin's policy. For Russia, the main security threats are the nuclear power of USA, the development of NATO, the territorial claims inside and outside Russian and former Soviet Union and the internal threats such as religion, drugs trade, illegal forces, Mafia or terrorism.

However, the Chechen war (which costs approximately between 4 to 8 percent of the federal expenditures) can change this analysis and lead to a new priority for the weapons involved in this case of conflict. Some new models were tested in Grozny, with the hidden idea to sell them for exports. Post-Cold war security thinking does not differ so much from Cold war positions. The main security means are invest in favour of advanced weapons systems.

Table 9 : New Russian military doctrine in 2000

Security principles	Weapons systems priorities	Defence industrial base
- Priority of political and diplomatic means. - Nuclear deterrence and flexible response - Priority of strategic forces - Collective security with CIS - Prevention of local conflicts	- Nuclear forces - Space forces - Advanced C3I (Communication, command, control and intelligence systems) -Electronic warfare - Long-range precision guided conventional munitions.	- Concentration of resources and dual technology, based on security interest and the economic possibilities of the country. - State support to military enterprises with technological stability and a large R&D capacity and to closed scientific sites. - Protection of intellectual property rights

There was a military program decided in 1996 and cancelled in 2000. The engagement of Russian troops in military action in Chechnya and the peacekeeping operations change the mission of armed forces. The mission was mainly to deter war, prevent and solve internal conflicts, deter aggression. It implied the maintenance of production capacities of weapons systems which could not be purchased abroad, with a focus on high-tech systems, a standardisation, a reduction of the variety of weapons produced, a reduction of supply costs and a more competitive bidding to a more limited number of arms enterprises. It included a better integration between the military and civilian products and technology, and moreover the possibility to increase very quickly the military production in case of war. This program failed. The new military doctrine is not made public

The general macroeconomic and defence policy environment have an important effect on defence industry. Russian enterprises struggled to adjust to the macroeconomic shocks of the country. Putin government seems to have abandoned the idea of a defence industry comparable to United States. However, if the strong downsizing and the conversion process by the liberalisation process were the main concerns, the industrial modernisation in the civilian and military sectors become the collective objective of the economic policy. With the recession, state is unable to spend more money for defence in the following ten years. It is mainly a problem of priority between defence and non defence spending. Up to now, the contraction of the defence industry was mainly macroeconomic and sectoral problems, involving the change in civilian demand, the monetarisation of the economy, the interest rates or the situation of the international arms market. Military planning has played a less important role in defence industry crisis than the macroeconomic situation.

The equilibrium between the qualitative US superiority compensated with the quantitative Russian superiority on weapons is no more existent. There are Russian overcapacities of old and obsolete armaments and the development of very new and efficient arms, in the context of RMA (Revolution on Military Affairs), in United States. The Russian industry is still able to produce 3,500 tanks per year and the duplication of persons employed in R&D is not very efficient. While the

conversion process had a terrible social and regional costs in Russia, it had been a very important factor of the development of the new economy in USA and of the restructuration of the US companies.

With the reduction of the military budgets, the military's position declined, with its capacity to influence the political decisions in strategy.

III.2. The new efforts for defence industry

For Gonchar and Wulff (1998), conversion problems in Russia do not constitute a failure, but a paradox, as one might think that someone should have known how to liberalise and de-militarise the economy without economic collapse. With reference to some criteria, Russia remains a developing society, characterised by a weak productivity, an important primary goods sector, and the import of most production equipment. But Russian economy has besides some advantages, such as a high level of education, a favourable demography, and a relatively good level of industrialisation in some sectors. There is a choice between guns and butter. The problems are to define which sectors are vulnerable to defence cuts or increases and to know the active part of the defence industry on the economic recovery. The main question is « what kind of defence industry did the Russian political administration want ? »

The defence industry is not an homogeneous institution. It is more and more segmented, dominated by market situations, with strong modification of the ownership relationship, and unequal access to international market and to international corporations. The enterprises are different in size, in specialisation, in defence-dependency, in their relations with the state. « Only one-third of defence enterprises carry out defence orders, while the Ministry of Defence gives many contracts to commercial firms outside the defence complex and even outside Russia. Only one-fifth of the entities within the defence industry show signs of stability and long-term viability, and this has created a new hierarchy of the defence sector and companies » (Gonchar, 2000).

The main problem is that no clear decision must be taken on the organisation of defence procurement or the leading role of the military in decision-making. For Putin, a procurement reform must be undertaken, on the basis of a concentration of orders in the hands of a single state contractor. In this case, it is important to note that Russia depends on supply from foreign countries, mainly the former Soviet Republic. Russia can produce alone only 17 types of weapons systems. The others requires purchases of components (more than 1,500) in the other 10 CIS states. A lot of these systems using imported components are sold in the international market.

For a lot of economists, Russia's security still depends on the defence industry, with an army equipped with the latest types of armaments and military equipment (Maslyukov, 1998), which represent less than 25 %, only 5% in 2005 to compare with 60 to 70 percent for USA and NATO. The capacity to produce hi-tech products decide largely of the future of the Russian economy. Defence industry enterprises, located almost in every Russian region, help strengthen the country's integrity and prevent the domestic market from disintegrating. This industry needs top-priority attention of the state, but the actual system in unable to ensure efficient reforms. There is a need for a special federal body to run the defence, space and nuclear power engineering industries and to supervise the defence industry conversion and military-technical co-operation with other countries. This body, headed by a deputy prime minister, formulate the military-technical policy, place state defence orders, determine priority fields in R&D, supervise international co-operation and state-owned companies operating in

this field, supervise the nuclear and space Agencies and co-ordinate co-operation efforts in top priority R&D.

The Soviet defence complex is definitely death. The government must choose between a further isolation of the industry or an improved integration between the military and the civilian sectors. The rationalisation of the defence industry seems to be a necessity, such as the closing down of old obsolete plants, the development or merger, the reduction of duplicated sources, the reduction of the number of prime contractors, the development of dual R&D. The government is not very efficient to impose such measures, because of the opposition of industries and regions. There is a lot of delayed decisions, with the objectives of improvement of Russian exports arms. Today, the government does not encourage the privatisation process of the defence industry and it decides to develop more additional barriers against new private entrants in the market. The military output of the military complex as a whole accounted only one-third of the 1991 level, mainly depressed in communication and electronics, less involved in nuclear and space. The civilian products of this complex are not more important than international arms sales and the conversion successes are rare. The 1998 crisis produce a recovery of defence industry, sustained by a strong political will, which did not exist before. However, the results are not so good for the future. « The study shows that recovery in the defence sector after the crisis of 1998 was mainly the result of import-substitution by middle-sized, privatised entities which sold significant parts of their production in barter transactions and which neglect their social responsibilities. However, while these last two factors can be efficient short-term solutions to crisis, they are hardly healthy in the long term » (Gonchar, 2000, p.5).

Conclusion

Now then, Russia remains a nuclear power and its disarmament does not involve nuclear weapons. With the lost of democracy, allowed by the economic crisis and poverty, military conflict can become a ìnational solutionî for Russia (Intriligator, 1998). In this case, its disarmament would stop and external war could be the issue. No real (decisive) theory of the transition process towards non planned economic structures in Eastern countries has been developed yet. The Russian defence industry is at a cross-roads. The problems of overcapacities, resource constraints and uncertainty are still decisive for the future of defence industry. The main choice is disarmament negotiated with USA and to decide to have a national defence adapted to the rank and the economy of Russia. Conversion and disarmament ensure peace only if a long-term economic development is established. The short-term goal for disarmament is not economic prosperity, but peace and in the long run it requires international solidarity. Development is certainly a condition for peace. Disarmament will be a stage on the road to development, if it allows inequalities and domination effects reduction, and increases the level of satisfaction of human needs (the « entitlements »).

Bibliography

Aganbeguyan, A. (1997), Rapport, Colloque Liberalisatia et stabilizatsia; pyat let spustya, IET, Moscow.

Andreff, W. (1994), La transition désorientée ou réorientée ? Bulletin d'information du ROSES, Grenoble, June.

Arrow, K.J. (1995), Some general observations on the Economics of Peace and war, Peace Economics, Peace Science and Public Policy, Winter, Vol.2, n°2.

Assemblée de l'UEO (1990), Konversiya - La reconversion de l'industrie militaire soviétique, Rapport, document 1249, 7 novembre.

Anthony, I. (1994), The future of the defense industries in Central and Eastern Europe, SIPRI Research Report n°1, Oxford University Press, Oxford.

Ben Ouagrham, S. (1997), Contrôle de l'Etat sur le système de production d'armement en Russie, CIRPES, Colloque, 11 décembre, Paris.

Berkowitz, B.D. (1994), « Why Defense Reinvstment Won't Work, » Technology Review, July, 53-60.

Birman, I. (1991), Sovetskie voennye raskhody, Oktyabr, 9, 1991.

Birman, I. (1991), Ekonomicheskii detektiv, Znanie-Sila, 3, 1991.

Blong, C., Lecky, J. (1993), Converting Defense Industry in Nizhny Novgorod : A preliminary analysis, Washington D.C. Industrial College of the Armed Forces, November.

Bonn International Conversion Center (BICC,1994) Russia : the 1994 economic situation. Bonn, Germany

Bonn International Conversion Center (BICC,1995), Conversion of the post-soviet defense industry : Implications for Russian economic development. Brief No. 1, Bonn, Germany.

Bonn International Center for Conversion (BICC,1997),. Conversion Survey 1997. Oxford : Oxford University Press.

Bonn International Center for Conversion (BICC,1998),. Conversion Survey 1998. Oxford : Oxford University Press.

Bonn International Center for Conversion (BICC, 2000), Conversion Survey 2000. Global Disarmament, Demilitarization and Demobilization, Baden Baden, Germany, Nomos Verlagsgesellschaft.

Bougrov, E. (1994), Conversion in transitional economies : the case of the former USSR and Russia, Defense and peace economics, 5.2,153-165.

Brunat E. (1995), Emergence régionale et dynamique territoriale : essai sur la transformation des économies de type soviétique à partir des exemples Russe et Polonais, Thèse, 452 p., 2 t., Université de Grenoble.

Brunat E., Samson I. (1997), Industrial economics and post-socialism in Russia : some tools for the Kaliningrad Oblast, Vestnik of Baltic Scientific Center, vol. 8, n°1, pp.111 - 118, Kaliningrad.

Brunat, E., Samson, I. (1998), Industry Economics and Russia, Cahiers de l'Espace Europe, Spring.

Brunat E. and S. Malakhov (1998), Production, conversion, specificity of assets and Markets. Constraints for a global restructuring in Russia, in Transformation : an integrated approach in Russia (Brunat, Ed.), Defense and Peace Economics.

Burns, D. (1992), 'What is the defense industrial base ?', Defense Analysis, vol. 8, no. 2, pp. 206–208.

Cars, H.C., J. Fontanel (1987), Military expenditures comparisons, in Schmidt, C. and F. Blackhaby, The economics of military expenditures, for the International Economic Association and the SIPRI, McMillan Press, London.

Cekota, J. (1990), The Soviet military sector and technological progress, Defense Economics, Vol.1, n°4, pp. 311-328.

Center for Economic Analysis of the Russian Federation Government (1996), Rossyia, Moscow

Center for Economic Analysis of the Russian Federation Government (2000), Rossyia, Moscow

Chatterji, M., J. Fontanel and A. Hattori (1996), Arms spending, development and security, Ashish Publishing House, New Delhi.

Cooper, J. (1995), Conversion is Dead, Long Live Conversion, Journal of Peace Research, Vol.32, n°2, May, 129-132.

Cronberg, T. (1993), The Price of Peace. Military Conversion on the Enterprise Level in Russia, Tekster om Teknologivurdering, Technology Assessment Texts n° 10, Lyngby.

Crosnier, M.A. (1997), Russie, Le Courrier des pays de l'Est, n°417, mars.

Despres, L. (1994), Les conséquences économiques du désarmement dans l'ex-URSS : Conversion des industries de défense et exportations d'armes, ARES, Grenoble.

Di ChiaroIII, J. (1995), Conversion of the Defense Industry in Russia and Eastern Europe, BICC, Report 3, April, Bonn.

Di ChiaroIII, J. (1997), Research and Development Conversion in Russia, Report 10, BICC ; Bonn.

Dunne, J.P. (1996), Economic effects of military expenditures in developing countries. A survey, in Gleditsch, N.P., Bjerkholt, Cappelen, Smith, R., Dunne, J.P. eds.1996, The Peace Dividend, Contribution to Economic analysis, 235, Elsevier Science Publishers.

Eisner, R. (1996), Disarmament and unemployment, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

Expert 1996, n°33, September 2

Fontanel, J. and Smith, R. (1985), L'effort économique de défense, ARES, Grenoble.

Fontanel, J. and R. Smith (1987), The creation of an International Disarmament Fund for Development , in S. Deger ans R. West, Defense, Security and Development, Francis Pinter, London, June.

Fontanel, J. (ed.) (1993), Economistes de la Paix, ECO +, Presses Universitaires de Grenoble, Grenoble.

Fontanel, J., M. Ward (1993), Military expendituress, armament and disarmament, Defense Economics n°2.

Fontanel, J. (1994a), Economics of disarmament. A survey, Defense and Peace Economics, Vol.5, n°2.

Fontanel, J., (1994b), La conversion économique du secteur militaire, Economica, Economie Poche, Paris.

Fontanel, J. (1995), Economics of disarmament, in K. Hartley and T. Sandler, Handbook of Defense Economics, North Holland.

Fontanel, J., I. Borissova and M. Ward (1995), The principles of arms conversion in the case of Russia, Defense and Peace Economics, 6.3.

Fontanel, J. Skharatan (1998), Russian MIC Human Capital, in Transformation : an integrated approach in Russia (Brunat, Ed.), Defense and Peace Economics.

Fontanel, J., Coulomb, F. (1998), Le succès de la conversion des industries d'armement, condition nécessaire de la réussite de la transition, in J. Fontanel, L'avenir de l'économie russe en question, PUG, Collection Débats, Grenoble.

Gaddy, C. (1994), « Economic Performance and Policies in the Defense Industrial Regions of Russia, » in Michael McFaul and Tova Perlmutter, eds., Privatization, Conversion, and Enterprise Reform in Russia, Stanford, Ca. : Center for International Security and Arms Control.

Gaddy, Clifford (1996), The Price of the Past : Russian Struggle with the Legacy of a Militarized Economy. Washington, DC : Brookings.

Galbraith, K.J. (1993), Le pouvoir économique autonome, in Fontanel (ed.), Economistes de la Paix, Collection ECO +, Presses Universitaires de Grenoble, Grenoble.

Gleditsch, N.P., Bjerkholt, Cappelen, Smith, R., Dunne, J.P. eds. (1996), The Peace Dividend, Contribution to Economic analysis, 235, Elsevier Science Publishers.

Gonchar, K., Kuznetsov, Y, Ozhegov, A. (1995), Conversion of the Post-Soviet defense industry : implications for Russian economic development, Bonn International Center for Conversion, Bonn, February, 1-28.

Gonchar, K, Wulff, H. (1998), Lessons learned from conversion in Russia and Western Europe, in Transformation : an integrated approach in Russia (Brunat, Ed.), Defense and Peace Economics, 1998.

Gonchar, K. (2000), Ussia's Defense Industry at the turn of the Century, B.I.C.C., Brief 17, Bonn, November.

Glukhikh, V. (1994), Oboronnaya Promyshlennost Rossii : Situaciya i Zadachi v 1994 godu, Konversiya, n°4, pp.3-8.

Goscomstat Rossii (1995, 1996), Osnovnye pokazateli po statistike truda, Moscow, Goscomstat Rossii.

Gregory, W. H (1993), The Price of Peace : The Future of the Defense Industry and High Technology in a post-Cold War World, (Lexington : New York.

Gummett, P. and J. Reppy (1988), The Relations between Defense and Civil Technologies, NATO ASI Series and Kluwer : Dordrecht.

Gupta, S., Schiff, J., Clemente, B. (1996), Worlwide Military Spending 1990-1995, International Monetary Fund Working Paper, WP/96/64, Washington D.C. IMF.

Harkins announces expansion of OPIC services in Russia (1997), Notes on Economic Affairs n° 2/ January 31, US Embassy in France.

Hartley K., Sandler T. eds. (1995), Handbook of Defense Economics, Elsevier Science B.V., Amsterdam, Lausanne, Oxford.

Hébert J.P. (1990), L'effort militaire français et ses retombées sur l'économie, ARES, XII. 1990-4, Grenoble.

Intriligator, M. (1994), Economic Aspects of disarmament : Arms race and arms control issues, Defense and Peace Economics, Vol.5, n°2.

Intriligator, M. (1996), The Economics of Disarmament as an Investment Process, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

Intriligator, M. (1996), The Peace Dividend : Myth or reality, in Gleditsch, N.P., Bjerkholt, Cappelen, Smith, R., Dunne, J.P. eds. (1996), The Peace Dividend, Contribution to Economic analysis, 235, Elsevier Science Publishers.

Izyumov, A. (1990), The National Experience of the USSR, Proceedings of the United Nations on Conversion, Economic Adjustment in an Era of Arms Reduction, Moscow, August.

Kapstein, E.B. ed. (1993), Downsizing Defense, Washington, DC : Congressional Quarterly Press.

Kapstein, E.B. (1995), The Economic transition in defense-dependent regions of Russia, Defense and Peace Economics, The economics of conversion (J/ Fontanel, I. Samson ed.), Volume 6, number 3, pp. 253-261.

Klein, L.R. (1990), The Economics of Turning Swords into Plowshares, Challenge, March-April.

Klein, L.R. (1993), Développement et désarmement. La signification, in Economistes de la paix (J. Fontanel, Ed.) PUG, Grenoble.

Klein, L.R. (1996), Arms Trade : the next step in Arms reduction, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

Kosals, L. (1995), Russia's Military-Industrial Complex: Privatization and the emerging new owners, Panel III, Colloquium, NATO.

Le Guilloux de Penanros and al, (1995), La reconversion des industries d'armement, La Documentation Française, Paris.

Le Houerou, Philippe (1995), Investment Policy in Russia, The World Bank Studies of Economies in Transformation. Washington, DC : The World Bank.

Li, H.-Y. and P. Pauly (1996), Multilateral disarmament : Project link simulations, in N.-P. Gleditsch, Âdne Cappelen, O. Bjerkholt, and R. Smith (Eds.), The Peace Dividend : Contributions to Economic Analysis, pp. 521--533. Amsterdam : North-Holland.

Libicki, M. C.(1989), What Makes Industries Strategic ?, McNair Paper no. 5, (National Defense University : Washington D. C. Nov. 1989

Malakhov, S.V. and V. Bondarev (1995), Conversion in Russia. Problems and Prospects, in Chatterji, M., J. Fontanel and A. Hattori, Arms spending, development and security, Ashish Publishing House, New Delhi.

Malakhov, S. (1998), Les coûts de transaction des marchés imparfaits de l'économie post-socialiste russe, Thèse, Grenoble (forthcoming).

Markusen, A. and Hill, C. (1992), Dismantling the Cold War economy, New York, Basic Books.

Maslyukov, Y. (1998), Russia's future lies with the defense industry, Military Parade, July-August.

McKinsey and Company (1999), McKinsey report on Russia, www:mckinsey.com/mgi.html

Melman (1992), Successful conversion experiences, Dortmund Conference, March.

Menshikov, S. (1993), Economie de la paix en Russie, in J. Fontanel (ed.), Economistes de la Paix, ECO+, PUG, Grenoble, 1993.

Menshikov, S. (1994), Experiences of Soviet conversion, in The Economics of International security (M. Chatterji, H. Jager, A. Rima, Eds.) St Martin's Press, New York.

Nabioullina I. (1995), La conversion en Russie, n Le Guilloux de Penanros and al (eds.), La reconversion des industries d'armement, La Documentation Française, Paris.

OECD (1995), Economic Restructuring and Defense Conversion in a Russian City : The Case of Zhukovsky, Moscow Oblast, Paris, OECD.

OECD (1996), Economic Surveys : the Russian Federation 1995, OECD, Paris.

Opitz P. (1996), No sense to separate defense industry conversion from general industrial restructuring in Russia, in M. Grundmann ed., Transformation and arms conversion in the Baltic Sea region and in Russia, Lit Verlag, Münster.

OTA, Office of Technology Assessment (1993), Dismantling the bomb and managing the nuclear materials, US Congress, US Government Printing Office, September.

Pickering speech to U.S. businessmen in Moscow (1996), Notes on Economic Affairs, n°24, October 25.

Privalov, A. Chernakov (1996), Privatizatsiya VPK, Obratnoy Dorogi Net - Deneg ne Khvatit [Privatization of the Defense Complex : There is no Return Way - Money is not Available]. In Expert. 1996. No. 13, pp. 18-22.

Renner, M. (1994), Budgeting for disarmament, the costs of war and peace, Worldwatch paper 122, November, Washington.

RRCER Rossia (1996), Russian Research Center of Economic Reforms, Moscow.

Sachs, J. (1993), Western Financial and Russia's Reforms, in Making Market (Shafiqui Islam and Michael Mandelbaum, eds.), New York, Council on Foreign Relations.

Samson, I. (1993), Les trois étapes de la transition au marché des économies post-socialistes, in Chatelus, M. and Fontanel, J., Dix grands problèmes économiques contemporains, 2e. Ed., Presses Universitaires de Grenoble, Grenoble.

Samson, I. (1994), The stabilisation of transition in post-communist societies, POMETEE seminar, Orel, Russia (published in Russia).

Samson, I. (1997) Staline contre Internet, ou mondialisation et crise finale de l'économie socialiste, "Crise et Puissance", Colloque organisé en l'honneur de Louis Reboud, Miméo, Grenoble.

Sandler, T. and K. Hartley (1995),. The economics of defense, Cambridge University Press, Cambridge.

Sapir J., Malleret Th. (1990), La politique militaire soviétique : de la restructuration à la réforme, ronéoté, Paris, juin.

Schmidt, C. (1993), Quelle analyze économique, pour quel désarmement ? Economie Appliquée, Tome XI, VI, n° 3, PUG, Grenoble.

Schwartz, R. (1993), Des épées aux charrues, in J. Fontanel (ed.), Economistes de la Paix, ECO+, PUG, Grenoble.

Schwartz, R. (1994), A World Marshall Plan and Disarmament, in The Economics of International security (M. Chatterji, H. Jager, A. Rima, Eds.) St Martin's Press, New York.

Seiglie, C. (1996), Does military spending have an impact on the economy ?, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

Sinelnikov, S. (1997), Le budget de la Russie 1991-1996, Thèse (Direction J.Fontanel), Grenoble.

SIPRI Yearbook, 1997 (1997) World armaments and disarmament, SIPRI, Oxford University Press, Oxford.

Skharatan and Fontanel (1998), Conversion and personnel in the Russian Military-Industrial Complex, in Transformation : an integrated approach in Russia (Brunat, Ed.), Defense and Peace Economics, 1998.

Skoens, E. and K. Gonchar (1995),. Arms Production. In Stockholm International Peace Research Institute (SIPRI). SIPRI Yearbook, 1995, Armaments, Disarmament and International Security. Oxford : Oxford University Press

Summers, (1997), Summers says Russian economic reforms faltering, Notes on Economic Affairs, October, 1, US Embassy in France.

Tinbergen, J. (1993), Paix et économie, in J. Fontanel (ed.), Economistes de la Paix, ECO+, PUG, Grenoble.

Tobin, J. (1996), Defense spending, the budget deficit and the US economy, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

TS-VPK Information Agency (2000), Survey, March.

Ulyukaev, A. (1997), La situation économique de la Russie depuis 1991, Thèse (Direction J. Fontanel), Grenoble.

UNIDIR (1984), Establishment of an International Disarmament Fund for Development, UNIDIR, Geneva.

UNIDIR (1992), Economic Aspects of Disarmament : Disarmament as an Investment Process, United Nations A/47/346, 27 August 1992.

United Nations (1990), Scientific and Technological Developments and their Impact on International Security, UN doc. A/45/568, 17 Oct.

USACDA 1996 (1997), World military expendituress and arms transfers 1996, Library of Congress, February, Washington.

U.S. Department of State, Bureau of verification and compliance (2000), World military expendituress and arms transfers 1996, Department of State Publications, Washington, April.

Varley J. (1996), Le processus économique de reconversion et le rôle de l'Etat, Revue d'Etudes Comparative Est-Ouest, n°2, Juin.

Vinokur, S. (1992), Konversiya i ekonomika : vozmozhen li brak po lyubli ?, Oktyabr, 4.

Walker, W., Graham, M. and Harbor, B. (1988), From components to integrated systems : technological diversity and integrations between the military and civilian sectors, in P. Gummett and J. Reppy, The Relations between Defense and Civil Technologies, NATO ASI Series and Kluwer, Dordrecht.

Weida, W.J. (1996), The political economy of nuclear weapons and the economic development after the end of the cold war, in Arms spending, development and security (Chatterji, M., Fontanel, J. Hattori, A. eds), APH Publishing Corporation, New Delhi.

Williamson O. (1989), Transaction cost economics, in Handbook of Industrial Organization, R. Schmalensee and R.D.Willig eds, Elsevier Science Publishers B.V.

Woff, R. (1996), The armed forces of the former Soviet Union, Brassey's, London.

World Bank (1992), Russian Economic Reform : crossing the threshold of structural change, Washinton D.C. World Bank.

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[i] The Soviet MIC produced 100% of the radios, coulor television sets, magnetoscopes, but the quality of the products were lower than in Western countries.

[ii] Scientific and Technological Developments and their Impact on International Security, UN doc. A/45/568, 17 Oct. 1990.