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brief 1

**Conversion
of the Post-Soviet
Defense Industry:
Implications for
Russian
Economic
Development**

february 95

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brief 1

Conversion of the Post-Soviet Defense Industry: Implications for Russian Economic Development

*by Ksenia Gonchar, Yevgeny Kuznetsov
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february 95

Zusammenfassung

Summary in German

Die Rahmenbedingungen für die Konversion der russischen Rüstungsindustrie haben sich gegenüber den ersten sowjetischen Ansätzen maßgeblich verändert. Konversion wird nicht mehr als politisches Sonderproblem betrachtet, sondern ist Bestandteil des allgemeinen wirtschaftlichen Reformprozesses geworden. Das Reaktionsverhalten der Betriebe auf die sich rasch ändernden Bedingungen ist zentral nur bedingt steuerbar und läßt eine Vielzahl betrieblicher Anpassungsstrategien zu. Die staatliche Industriepolitik ist entsprechend nur kurzfristig orientiert und durch häufige Kurswechsel gekennzeichnet. Rußlands wirtschaftliche und soziale Zukunft ist ungewiß. In der vorliegenden Studie werden alternative Szenarien der Konversion und der wirtschaftlichen Entwicklung Rußlands aufgezeigt und analysiert.

Im „koreanischen“ Szenario gelingt es der Regierung, die Inflationsrate auf 25-30 Prozent jährlich zu senken, günstige wirtschaftliche Rahmenbedingungen zu schaffen und ausländische Finanzmittel zu binden. Im „brasilianischen“ Szenario setzt die Rüstungslobby protektionistische Maßnahmen zum Schutz vor ausländischen Konkurrenten durch. Das „argentinische“ Szenario ist gekennzeichnet durch Hyperinflation und erratische Schwankungen des wirtschaftspolitischen Kurses. Die Szenarien wirken unterschiedlich auf die Konversion des Rüstungssektors. Im ersten Fall kann der Rüstungssektor langfristig zu einem bestimmenden Faktor der Marktstruktur werden, im zweiten Fall sind in begrenztem Umfang Investitionen zu erwarten und im letzten Fall stehen Haushaltsziele im Mittelpunkt der Umwandlung der Rüstungswirtschaft.

In Reaktion auf die Senkung der russischen Rüstungsausgaben haben sich in den vergangenen

zwei Jahren im wesentlichen drei betriebliche Anpassungsstrategien herausgebildet: Produktion von zivilen Defizitgütern, bei denen russische Betriebe komparative Preisvorteile besitzen, Zusammenarbeit mit Investoren sowie Anbindung an Betriebe der Erdöl- und Erdgasindustrie, um Finanzressourcen in den eigenen Betrieb zu leiten. Entsprechend zu den Szenarien der wirtschaftlichen Entwicklung werden unterschiedliche betriebliche Interessen formuliert. Im „koreanischen“ Fall ist der Unternehmer an makroökonomischer Stabilität, klaren wirtschaftsgesetzlichen Vorgaben sowie an einer liberalen Wirtschaftspolitik interessiert. Im „brasilianischen“ Szenario wird sich die Rüstungslobby für verstärkte staatliche Eingriffe und protektionistische Maßnahmen einsetzen. Im „argentinischen“ Szenario werden sich die Rüstungsbetriebe durchsetzen, die sich am schnellsten der Inflation anpassen können. Sektorale Prognosen für einzelne Rüstungsbranchen können derzeit nur vage sein. Viel wird hier von der Implementation der föderalen Konversionsprogramme und der Militärdoktrin vom 2.11.1993 abhängen.

Welche Probleme, Erfahrungen und Möglichkeiten bestehen hinsichtlich einer Beteiligung des Auslands am Konversionsprozeß in der Russischen Föderation? Die Hauptprobleme auf gesamtwirtschaftlicher Ebene sind sicherlich die fehlende makroökonomische Stabilität, die ungenügende Wirtschaftsgesetzgebung und die teilweise unklaren Eigentumsrechte. Als Hauptform ausländischer Aktivitäten werden relativ kleine Gemeinschaftsunternehmen mit russischer Mehrheitsbeteiligung identifiziert. Abschließend werden mit der Zusammenarbeit auf dem Gebiet der Forschung und Entwicklung von „dual-use“ Produkten in „high-tech“-Rüstungsbetrieben erfolgreiche Kooperationsbeispiele

benannt. Als Auswahlkriterien werden Betriebsgröße, Eigentumsverhältnisse und Branche diskutiert.

Der gegenwärtige Kenntnisstand über die Anpassung von Rüstungsbetrieben gibt Anlaß zu vorsichtigem Optimismus. Dieser Optimismus basiert zu einem großen Teil auf (langsamen) Lernprozessen der Rüstungsmanager in einem marktwirtschaftlichem Umfeld sowie auf der wachsenden Erkenntnis, stärker auf eigene Ressourcen als auf staatliche Hilfeleistungen zu vertrauen. Während im Jahr 1992 das einfalllose „rent-seeking“ Hauptform der betrieblichen Anpassung war, verfolgte das Management 1994 eine Strategie der Umgestaltung und Reduzierung. Dieser Prozeß ist allerdings noch nicht stabil. In den Jahren 1992 und 1993 sowie im ersten Halbjahr 1994 war sogar die Produktion ziviler Güter rückläufig, wenn auch weniger stark als die der Militärgüter. Entlassungen wurden weit weniger vorgenommen, als dies unter rein ökonomischen Aspekten notwendig gewesen wäre.

Der Erfolg der Umorientierung hängt von wenigstens drei Faktoren ab: der Verkleinerung der Betriebsgrößen, der Wiederbelebung der Volkswirtschaft und der Ausweitung der betrieblichen Planungshorizonte, wobei die makroökonomische Stabilisierung notwendig (aber nicht hinreichend) ist. Während die erste Aufgabe auf Regierungsebene gelöst werden sollte (z.B. durch Identifikation der zu schließenden Betriebe), gestaltet sich die Aufgabe der volkswirtschaftlichen Wiederbelebung wegen simultanem Markt- und Regierungsversagen als besonders schwierig.

Gegenwärtig zeichnet sich eine institutionelle Reaktion auf diese Problematik ab, wobei Rüstungsdirektoren und Banken lose Allianzen zur Streuung der Risiken schließen und interne Kapitalmärkte bilden.

Introduction

This paper can be summarized in three main points. First, the problems of Russian defense industry conversion are also prevalent in civilian industry restructuring. Civilian industries have experienced a dramatic economic decline, in particular in capital goods manufacturing; from 1990 to 1993 there was a 47 percent decline in industrial production, resulting in a 38 percent decline in GNP. Defense industry conversion has largely lost the special place it occupied in the policy debate in 1989–91. The focus is now on economic restructuring in general, on the sectoral and regional levels. Second, a rapid process towards a more heterogeneous defense industry and general economy has begun in Russia. A growing variety of adjustment patterns are emerging, even within the same industry. We therefore describe the industrial profiles of the defense industry not along sectoral lines but in terms of enterprises' emerging adjustment patterns. Third, because of the growing segmentation of the economy, the challenge of implementing intelligent governmental industrial policy is becoming a truly daunting task. The likely result of this is erratic changes in government policies. If only for that reason, the economic and social future of Russia remains highly uncertain.

This uncertainty can be reduced through a number of qualitatively different scenarios for conversion and economic development strategies in Russia. Three such scenarios are outlined in this paper. Since aggregate data on the Soviet military–industrial complex (the MIC, which is now economic history) have been presented in previous papers (Kuznetsov, 1993; Gonchar, 1994; and Kuznetsov & Ozhegov, 1993), they are not studied in detail

here but are summarized in Table 1. The table also contains aggregate indicators of the Russian defense industry in 1992–94.

Section 2 focuses on the general economic context of economic demilitarization by outlining three stylized scenarios of Russian economic development and conversion. Section 3 discusses various patterns of defense enterprise adjustment in 1992 and 1993¹ and sectoral profiles of conversion. Section 4 presents the location of the Russian defense industry. Section 5 summarizes international development in the field of conversion and outlines the criteria for foreign business activity in this area.

¹ Our research indicates that patterns of defence industry adjustment changed significantly in 1994. These new facts and data are not taken into account in this paper.

The economic environment of Russian defense industry conversion

This section outlines three scenarios for Russian defense conversion and economic development as discerned in the current policy debate and interest group bargaining. We have identified at least five different and sometimes mutually exclusive lines of industrial policy concept which are competing at the level of political lobbying: (1) that presented by the Government; (2) that of the Defense Ministry; (3) that of the State Committee for Defense Industries and the State Committee for Industrial Policy; (4) the independent line of the powerful group of defense enterprise managers united in the League of Defense Enterprises; and (5) the actions of the President himself, which can scarcely be defined as industrial policy but in fact strongly influence policy direction.

The borderline between these lines of defense conversion and economic development lies in an understanding of the nature and instruments of structural policy, federal and regional programs, and the institutional framework—mainly in the context of privatization and formation of so-called financial-industrial corporations. Although the actual choice of concepts and practical mechanisms applied to the defense complex may be

influenced by the goals of these policies, it is clear that defense industries will be dependent on the evolution of ideas originating from the State Committee for Defense Industries and the Defense Ministry rather than impulses from other state institutions. It seems that the government has given in to the defense establishment in questions of control over defense industry and its civilian restructuring, which will remain under the supervision of the Defense Ministry and the State Committee for Defense Industries (which, it should be noted, do not at all advocate the same concepts and exhibit conflicting interests in various fields).

Two recent decrees of the President—'On the peculiarities of privatization and additional measures of state control over the functioning of defense enterprises' of August 1993 and 'On stabilization of the economic situation of enterprises and establishments of the defense industry and measures to guarantee state defense orders' of November 1993—as well as the conceptual document of the State Committee for Defense Industries (State Committee for Defense Industries, 1993; Glukhikh, 1994) are mostly at work within the framework of the perspectives of state defense industrial policy. The key issues influenced by these documents are discussed below.

The decree on economic stabilization of defense enterprises protects these enterprises from tougher financial stabilization policy and confirms the exception of defense industrial restructuring from the mainstream of economic policy. It also confirms that the criterion of economic efficiency cannot be applied to the defense complex and guarantees a number of special privileges: implementation of a 'cash-in-advance' system of progressive payments for state contracts; and special rights to include labor costs equal to 8 minimum wages (or 10 in the nuclear industry) in the costs of production (in non-defense branches this rule is limited to 4 wages). It was earlier stated that since the new models of state investment do not function in the defense complex, it will receive budget allocations according to traditional procedures.

The decree on privatization of defense enterprises exempts 474 establishments (of the existing 1700) from the privatization process; stops all procedures until the new veto list (see below) is produced; and stipulates that privatization of all enterprises belonging to former defense branches can only be undertaken on the condition that an agreement is signed with the government on responsibilities for fulfilling state contracts and protection of state secrets. The decree also states that if a defense enterprise is to be privatized, the profits from state shares are to be invested through special financial institutions in conversion and staff social benefits. Finally, the directors of all enterprises of the defense complex, including those with the right to privatize, are to receive a special certificate from the Council of

Ministers, after a recommendation from the State Committee for Defense Industries. On the other hand, keeping the defense industrial elite under ministerial supervision is accompanied by the closure of obsolete enterprises, easing the burden on the military budget. Those high-technology enterprises whose production is not called for in the new military doctrine may also find themselves among the outsiders (this most probably applies to missile plants).

According to data for early 1994, 642 plants have received privatization permission, mainly those in aviation, shipbuilding, electronics and armaments industries (Glukhikh, 1994). The State Committee for Defense Industries has its own policy towards restructuring of the defense complex. It is based on the one hand on the traditional demand made to the government to 'put defense enterprises in equal position' and to compensate non-profitable state defense contracts with adequate legal and commercial advantages; on the other hand, the vision of the defense establishment concerning the shape of the defense complex has undergone considerable changes. In contrast to the recent past, when the main goal of the MIC was to maintain its spheres of influence, the intention now is to remove the weak and unprofitable plants from the MIC and to consolidate the remaining plants in large financial-industrial corporations and support them financially, exploiting the principle of selective allocation of soft credits.

The concept of financial-industrial corporations has still not been clarified and includes a vast variety of options—from holding companies replacing the former ministries,

to the huge units of commercially efficient plants with arms-producing enterprises and dependent banks. Several associations of this kind were established in the former defense complex, including the 'Vympel' international shareholders' corporation, the NPO 'Energiya' Russian holding company, the 'Leninez' holding company, the 'Antey' shareholder company, and the 'Uralskiye zavodi' financial-industrial company. The intention is to establish at least 20 organizations of this kind by the end of 1994.

So far, several groups that have been formed are based on the principle of mutual technological supplement with the objective of consolidating the contractors general with the supplying and subcontracting units, and sometimes consumers of the manufactured equipment, with the modest participation of banks. It is interesting that, under the threat of the inevitable conversion and privatization of certain defense enterprises, the State Committee for Defense Industries has started to organize new formal and informal alliances with financial institutions, mostly in order to prevent outsiders from participating in the privatization of defense enterprises. For example, the State Committee has signed several agreements with the 'Conversion-Hermes' specialized investment privatization foundation for 'cooperation in the field of investment activity and shaping of the securities market in the interest of privatizing enterprises and organizations of the defense industry', the 'Military-Industrial Complex' voucher investment foundation, the Navy voucher foundation and the 'Investment Russian Federation' concern. Moreover, the State Committee for Defense Industries is trying to gain control over the shares in defense enterprises remaining with the state 'to increase controllability of plants' (Glukhikh, 1994).

An important instrument of state industrial policy—the Federal Conversion Program—was issued several months ago. This program was worked out mainly by the Ministry for Economics in the first half of 1993 and is highly influenced by Gosplan traditions. The program, for 1993–95, states that the main goal of conversion is: preservation of the professional, industrial and technological potential of the defense complex; import substitution of non-Russian production; and investment in the technics and technologies for economizing energy and resources and maximizing capacity utilization. It includes 14 special-purpose programs: civilian aircraft industry, shipbuilding, equipment for fuel processing, forest industry, housing and road construction, equipment for agriculture, textile, food processing, trade, consumer durables, communication equipment, conversion for environment, medical equipment, and the Program of Conversion of the Enterprises of the Ministry for Nuclear Energy.

The cost of the Federal Conversion Program includes 325 billion rubles in budget subsidies and 300 billion rubles in privileges credits (at current prices in early 1993). The expected result is a 12 percent growth in civilian defense enterprise production, which is in strong contrast to the expected further economic decline (forecast by another department of the Ministry for Economics) and the sharp fall in the civilian output of defense enterprises this year. So far, only 1 out of 14 programs is financed; the others are more a product of wishful thinking than a practical venture.

Trying to provide an aggregate picture, one can distinguish three scenarios for Russian economic development (see Table 2).

- In one scenario, the government would be able to bring inflation down to a level of 25–30 percent per year (the government objective), providing a favorable economic environment for foreign direct or equity investment and loans. The dramatic down-sizing of existing manufacturing, in particular that of the defense industries, is accompanied by rapid growth of the new export-oriented private manufacturing sector. Export orientation is a trigger for growth in this scenario—which could be called the ‘Korean scenario’, referring to the export successes of South Korea.

This scenario comprises two stages. In the first stage, the government concentrates mainly on macroeconomic stabilization and creation of a favorable climate for investment. In the second stage, marked by a growing influx of foreign investment or credits, it starts to assume a more active role in the economy. This scenario will be realized only if the Russian Government can reassert itself as an independent decision maker, insulated from short-term interest group pressure. The vital importance of this condition is said to be a major economic rationale for disbanding the Parliament and delegating in the Constitution more decision-making power to the government. However, the same consideration—the necessity of transforming the state into

a national entrepreneur insulated from industrial pressure groups—may later provoke further authoritarian tendencies. It is important to emphasize that the difference between the visions of the Russian economic future of the Russian Government and that of the entrepreneurial strata of the defense industry (which has been able to diversify into the civilian sphere relatively successfully) is a matter of the timing of active industrial policy. Defense enterprise managers now demand federal funds, whereas the government tries to maintain macroeconomic stability.

- One can also sketch a scenario of active industrial policy, supported by a large proportion of the defense establishments, which accept the goal of transition to a market economy but insist on the necessity for high protectionist barriers to minimize foreign competition. In this scenario annual inflation rates remain high (150–300 percent) but facilitate the short-term economic forecasts required for private investments. The government is segmented and largely controlled by industrial interest groups. These industrial groups, however, are assumed to be interested in high investment activity, including foreign investment. The focus on long-term interests then becomes an important factor of macroeconomic stability: the Russian defense industrial establishment is keenly aware that there are certain economic limits to the provision of government subsidies. In other words, there is growing awareness that high inflation is detrimental to the business prospects of defense enterprises. Because of the emphasis of industrial interests on protection and investment orientation, we call this the ‘Brazilian scenario’ (see Table 2).

- Taken to the extreme, the ‘Brazilian scenario’ may turn into an ‘Argentinean scenario’,² characterized by high inflation—close to hyper-inflation—a lack of any explicit industrial policy, and very strong interest-group influence, with a short-term planning horizon. Unlike the Brazilian scenario, in this scenario the government mediates not in the bargaining between various industrial sector interests but rather in the conflict between capital, or industry as a whole, and labor. This—the most pessimistic scenario—will be realized if the conservative strata of the defense industry are not able to adjust to the market environment and continue to extract sizable federal funds to ensure its short-term survival.

Note that in all three scenarios there are strong authoritarian tendencies, although the consequences of these tendencies differ substantially in each scenario. In order to determine which scenario is more likely to become a future reality, one needs to identify the emerging broad patterns of defense enterprise adjustment.

² Needless to say, the country’s name is given to our scenario only to facilitate the discussion. Furthermore, starting from 1991 one cannot refer to the devolution trajectory as the Argentinian trajectory. Thanks to the success of Cavallo stabilization, Argentina seems now to be firmly on the road to prosperity.

Emerging sectoral profiles: patterns of enterprise adjustment

In this section we focus on two interrelated topics: patterns of enterprise adjustment and interest group development in the Russian military-industrial complex in 1992 and 1993. The prospects for conversion of specific defense industries—which currently depend on the implementation of both federal conversion programs and new military doctrine—are also discussed.

In 1991–93 the general decline in military production was 78.1 percent. The production of military aircraft decreased by a factor of 3.8; tanks by 5; ammunition by 4.5; and military electronics by 5.4 (Glukhikh, 1994, p. 3). This caused the near halt of procurement of conventional armaments and hardware; most procurement was by the strategic missile forces. Arms exports also decreased—from a value of US \$12.2 billion in 1989 (for the entire USSR; SIPRI, 1990) to US \$2.15 billion in 1993 (Glukhikh, 1994, p. 4). This sharp decline in demand should be assessed against the background of the steady decrease in defense orders which began in 1989.³

There is an almost uniform view that Soviet conversion in 1989–91 was a failure. Yet the assessment of failure or success should be made not from the perspective of what conversion could have achieved,

but in the context of modern experience throughout the world with the reallocation of military resources to civilian uses.

According to Hughes (1991), in the United States the average time from decision to finished product was 18 months, as a result of commercial down-sizing of the market. In the 1970s conversion attempts in the USA normally resulted in failure. A comparison of restructuring opportunities in the USA—with a highly developed capital market and elastic product and factor markets—with the pervasive supply rigidities of the Russian economy raises the question of how defense enterprises were able to increase the output of certain high-technology consumer durables within six months of the announcement of conversion. The shortage economy of 1989–91, with its notoriously high demand for even low-quality goods, undoubtedly provides part of the explanation; the successful expansion of low-quality output

³ From 1988 to 1991, the output of aircraft decreased by a factor of 1.8, tanks by 2.1, strategic missiles by 2.4, ammunition by 2.8, and infantry machinery and armoured personnel carriers by 4.4 (Scherbakov, 1991). It should be noted, however, that while many programmes were diminished, others (mainly aircraft-carriers and nuclear submarine programmes) were expanded. Thus in 1989–91 conversion entailed a combination of reallocation of resources within the military sector and a reduction of resources. From 1988 to 1992, the output of tanks decreased by a factor of 5.2, bombers by 35.0, and artillery pieces by 4.4 (DIA estimates).

today, when the economy has started to face competition from the world market, is correctly viewed as a waste of resources. However, after a period of three years commercially viable output was produced (for example, various types of medical equipment designed and produced by the space and missile enterprises). In 1992 domestic civilian demand was clearly not sufficient to sustain these programs, but the enterprises were not yet ready to compete in high-technology goods on an oligopolistic world market, with its high barriers to market entry.

Four broad adjustment patterns can be identified (see Table 3).

The first is sustainable real adjustment, of which there are three types.

The first is diversification of civilian output into market niches in which an enterprise has a comparative advantage in both quality and costs. The examples that we observed included inter-mediate manufacturing goods like certain machine tool parts—not consumer durables or final goods. The importance of simultaneous and significant quality and cost advantages is significant. Enterprises were previously so inexperienced in the market outside the former USSR that in many cases it was Finnish, Swedish or other Western entrepreneurs who took the export initiative. Later, contacts were established by Russian actors. In the border regions where this strategy is flourishing, neighboring countries like Finland or Turkey are the primary markets.

It should be noted, however, that although for late-comers simultaneous cost and quality advantages were a viable basis for export expansion, this is a fragile basis for Russian military enterprises. As far as quality is concerned, these

enterprises can produce a wide range of relatively high-quality intermediate goods; indeed, this is what they did during the past 30 years. The problem is the cost of this output. For energy enterprises it rose by a factor of 15 in 1992, compared to 5 in 1991. In addition, with monthly wages at about US \$50–100, labor-intensive manufacturing becomes competitive almost regardless of the domestic costs. The relative export expansion of many defense industry enterprises based on existing cost and quality advantages (that is, without any investment) is a transitional phenomenon which will soon wither away, as perceived by enterprise directors.

Which strategies seem to be emerging out of this current transitional strategy? One can identify at least three such strategies.

■ In the first strategy, some enterprises consider it profitable to move away from the external market and focus on the manufacturing of intermediate and investment goods that were formerly or still are imported. Specifically, enterprises commit a significant proportion of the engineering staff to look for appropriate agricultural equipment designs, for example. Manufacturing of capital goods for the gas industry (the indisputably leading sector of the future) is considered attractive, the problem of course being the imperfections of the credit market that preclude the supply of long-term finance. (We outline below how credit market imperfections are circumvented.) A second approach is to continue export promotion but with an explicit focus on high-quality and high-technology exports of investment and certain intermediate goods like medical

equipment, composite materials, enriched uranium (for civilian purposes), space equipment involving a steep learning curve, and significant economies of scale in the pursuit of technological rent.

The third approach is to concentrate on unsophisticated, low-quality, labor-intensive manufacturing such as the assembly of personal computers.

■ The second broad strategy is from the start to seek an alliance with investment partners to exploit the former military enterprises' comparative advantages. This is a difficult strategy: on the level of financial accounting, the civilian and military parts of enterprise are currently indistinguishable—in other words, one cannot guarantee the leakage of civilian investment into the military sphere or vice versa. The privatization law allows the organizational separation of military and civilian parts of an originally diversified military plant. In the majority of cases, the incentive for undertaking such separation is the expectation of an alliance with a foreign or domestic partner which would bring direct investments.

■ The third strategy—of which we found only a few cases, although there are indications that it is becoming more widespread—is to form closer ties with enterprises in the oil and gas sector (the only sector with export revenues) in an attempt to acquire financial resources for monitored and targeted restructuring. The Tyumen oil producers, for example, have substantial funds waiting to be invested as well as a need for relevant machinery. In certain cases, this combination has resulted in short-term loans of these funds by the oil producer to the prospective machinery supplier (usually the defense-related enterprise which has already displayed its ability to

produce efficient manufacturing goods) to design and produce the relevant equipment.

Three characteristics of such loans are noteworthy. First, loans are short- and medium-term (from three to six months to a few years) but are extended if they are 'to a certain extent' repaid by the output of the manufacturing enterprise in question, supplied directly to the oil producer. Television sets are the typical example. Second, the criterion for extending a loan is personal trust in the ability of the manufacturing plant manager to 'get things done' (based on his prior performance) rather than the financial record of his enterprise. Third, there is a substantial degree of slackness in debt repayment, and the real interest rate is often negative. This slackness is more pronounced the greater the personal trust. In other words, the string of short-term loans is viewed as a long-term subsidy to the manufacturing unit in the expectation that it will later somehow be acquired by the oil producer.

In some respects, the nascent Russian informal credit market resembles the credit market of developing countries, characterized inter alia by short maturity and personal trust as the means to overcome fundamental informational asymmetries between the borrower and lender. There is nothing peculiar in the reliance on short-term credits to finance relatively long-term projects. In Taiwan, for example, entire plants were erected exclusively on short-maturity loans. The more perceptive observer, however, would interpret the informal credit market of the type described above as a transitory phenomenon, signaling the emergence of diversified business groups based on long-term relations between vertically and sometimes horizontally *integrated* producers.

In the case of only gradually emerging competition, one should look for transitional (and necessarily fragile) incentives to restructure. Our case studies of Samara and the St. Petersburg region show that the impulse for real adjustment sometimes comes from the charismatic manager of a (typically peripheral) plant who identifies himself with the plant he directs and is fairly certain that as a result of privatization he will effectively become the owner of the plant. At the same time, because of the low leverage on central authorities, this manager has to rely on his firm's business revenues rather than on soft credits. This is a Schumpeterian entrepreneur of the last century: he has a vision of the business future of his enterprise, and his decisions are shaped more by this 'vision' than current profitability (as long as profit is positive). He is the business loner who does not share his vision with anyone—if he leaves, the performance of the enterprise will inevitably deteriorate.

The 'voice' of valued employees whom it would be undesirable to lose acts as a catalyst to restructure and diversify into civilian production. The desire to avoid this 'brain drain' serves as an incentive to start civilian production (usually for export) and augment the real income of valued workers. In return, labor seems to be willing to accept the resulting real wage differentiation in exchange for reduced layoffs and higher future real wages. Indeed, wages tend to be lower (at least for an initial period of time) in enterprises that started restructuring compared to those that succeeded in receiving subsidies and soft credits to finance accumulation of a stock of unsold output.

We have focused so far on real adjustment.

The second type of adjustment pattern is fragile real adjustment.

The contrast between fragile and sustainable real adjustment is shown in Table 3; however, we would emphasize one important difference. In many cases adjustment is fragile because it is strongly linked to the entrepreneurial qualities of the manager. Should this Schumpeterian manager leave his enterprise (for example, by accepting an offer from a joint venture), the adjustment of the enterprise in question would falter. This is yet another illustration of how individuals matter more than (weak and fluid) economic institutions in transitional economies, as in the developing economies. Yet in certain (rare) cases, strong management teams ensure the sustainability of initial success in adjustment.

It should be noted, however, that the average amount of conversion credit is quite small (about US \$40,000 in 1993). There is a tendency to reduce the share of GDP allocated to subsidized direct credit and budget subsidies for conversion: in 1992 it amounted to 0.78 percent of GDP, but in 1993 it was reduced to 0.35 percent of GDP (Freinkman, 1994, p. 18).⁴ This is one of the reasons why enterprise management increasingly finds it more expedient to start real adjustment rather than to continue a long search for subsidies. According to our estimate, the share of enterprises following the fragile real adjustment strategy has increased from 25 percent in 1992 to 50 percent in 1994, while the share of enterprises pursuing 'rent-seeking' has declined from 35 percent to 10 percent (see Table 4, final column).

⁴ In comparison, in 1992 budget subsidies and direct credits for agriculture amounted to 10.4 percent and in 1993 to 4.15 percent of GDP (Ibidem).

The third type of adjustment pattern is sophisticated rent-seeking.

In general, sophisticated rent-seeking would include getting credit and relending it to a customer deemed to be trustworthy. If the loan is repaid, a high profit margin is assured. The lender thus capitalizes on his better access to information (compared to a financial institution) and thus receives informational rent. Another example is to establish a joint venture with a foreign partner with the primary aim of getting high personal revenue for a manager to the detriment of restructuring goals. A variation on this theme is to establish a joint venture with the goal of accruing sufficient revenue to continue to be a 'lazy monopoly', i.e., to delay the unpopular measures that real adjustment entail. A foreign partner is extremely attractive in this respect; in fact, with the disappearance of Gosplan and the Military-Industrial Commission (which formerly provided assistance to troubled enterprises and coordinated their financing), foreign business is viewed by some managers as a new source of personal revenue. Monetary rent from controlling an enterprises substitutes for the former type of privileges.

From 1989 there were a number of attempts to establish joint ventures with the enterprises of the military-industrial complex, very few of which have succeeded. There are many reasons for this but one of the most important is the 'prisoners' dilemma'. In negotiations with a foreign partner, there are inevitably many participants from the Russian party, each with an effective veto right. Many of those participants are so preoccupied with their immediate interests that they make excessive claims on the rents from property which they

in one way or another control. A foreign partner either cannot accommodate all these claims or may not even want to do so because he interprets such rent-seeking as a signal to withdraw. There are other examples of sophisticated rent seeking—for example, sponsoring a bank which will in effect be the enterprise's treasury department, defensive privatization as a means to avert the threat of down-sizing by the government, and the like; defensive privatization is usually pursued by large enterprises which expect that simply because of their size they will continue to receive soft credit regardless of their ownership status. It should be noted that privatization creates 'corrective uncertainty' (compared to corrective inflation) which temporarily diverts incentives away from restructuring to rent-seeking, for the following reasons.

First, there are many claims on a plant's property, which creates a 'fight for shares' in which the time and energy of management are increasingly diverted to bargaining with workers' trade unions on which privatization scheme to adopt and in negotiations with the numerous agencies that regulate privatization. This time could be spent in elaborating and implementing the restructuring plan but is increasingly devoted to a 'fight for shares'.

Second, the tensions between the current management, would-be owners, and employees of the enterprise (who influence the decision regarding which privatization scheme to adopt) normally result in a situation in which management buys the loyalty of employees with a no-layoff policy. The anti-productive corporatist coalition between workers and management becomes even stronger.

There is a common feature in all these versions of sophisticated rent-seeking which should be emphasized. Being socially inefficient, sophisticated rent-seeking is a type of market behavior which capitalizes on market imperfections (costly information is the typical case) or deficiencies in government regulation (e.g., wild-cat banks). Initial rents (which might be small) received from government allocations (e.g., soft credit) are amplified in this type of adjustment by taking advantage of market imperfections. Quite often, the borderline between socially inefficient sophisticated rent-seeking and welfare-improving real adjustment is unclear. An example of a close relationship between the two is a firm which receives cheap government credit and relends it to the private sector, filling the function of financial intermediary.

The fourth type of adjustment pattern, is unsophisticated rent-seeking.

In contrast to the 'market friendly' sophisticated type, the unsophisticated rent-seeking is a behavior emerging either within a hierarchy or as a consequence of government intervention. Examples include arbitrage of goods bought at a price fixed by government and reselling them at an equilibrium price; foreign exchange speculation (using negative interest rate credits to buy and then resell foreign currency); organizing a labor strike to show popular discontent over austerity measures; and other means for showing the government the dangers involved if it does not grant a subsidy to the enterprise in question.

Which major factors determine the choice of adjustment pattern? In Table 3a we suggest two such factors: the planning horizon of management and whether management tries to restructure the entire enterprise or only certain potentially competitive parts of the enterprise.

The planning horizon, in turn, is affected by the expectation of whether the management will remain in control after completion of privatization. The evolution of interest groups is based on the emerged patterns of enterprise adjustment. Unsophisticated rent-seeking creates an explicitly anti-market orientation, while the remaining three modes of adjustment envision a market-friendly approach (although to widely varying degrees) to the transformation of defense industries. Putting aside anti-market pressure groups represented by pro-communist organizations, whose resurgence in the near future is unlikely, one can discern the formation of the following types of industrial interests (see Tables 2, 3 and 4).

- 'Korean' business orientation: enterprise management emphasizing macroeconomic stability, an enforceable business code and limited state intervention based on strict performance standards. This interest group emerges on the basis of real sustainable adjustment.
- 'Brazilian' business orientation: management seeking heavy state involvement in particular to protect newly emerging civilian manufacturing, on the basis of defense conversion, from foreign competition. This interest group unites business leaders involved in fragile real adjustment.
- The 'Argentinean' scenario: enterprise leaders that learned how to live with and take advantage of persistent high inflation (traditional and private rent-seeking).

It is currently extremely difficult to assess the prospects for conversion of specific defense industries; much will depend on implementation of the Federal Conversion Program adopted by the Russian Government in the summer of 1993 and the new Russian military doctrine adopted by the Security Council on 2 November 1993.

In the new military doctrine, priority is given to maintaining defense strategic nuclear forces, high-precision weapons, communication systems, systems for intelligence and battle management, and radio-electronic military equipment. A balance is supposed to be established between weapon systems and military infrastructure, innovations and armament modernization, levels of fighting characteristics of systems and their operational qualities, developing military hardware and software. The maintenance of research and development in the defense industries and support for dual-use technologies are the other key points of the military doctrine (Izvestiya, 18 November 1993)

Apparently, the competition for Ministry of Defense funds is heightening not only between different industries, but also between different groups of enterprises inside the same industry (especially between their leaders, and design bureaus with their prototype plants). This is particularly relevant for redundant capacities which are producing duplicate types of armaments or duplicate weapon systems. There is a proposal to cut significantly the number of weapon system types purchased by the army in the future. This process has already started: for example, in 1992 the Ministry of Defense decided not to purchase some types of military aircraft in favor of other types.⁵

With respect to the regional impact of defense demand cuts, one can distinguish two types of defense industries.

■ The first type are industries in which scientific organizations, design bureaus and pilot (prototype) plants are located mainly in Moscow (with satellite towns such as Zhukovsky, Kaliningrad, Lubertsy, Zelenograd, Fрязино, etc.) and St. Petersburg, but where serial plants or the main

production facilities are allocated to other regions. Examples of such industries are first of all the aircraft, rocket-missile, electronics, and radio-electronics industries and producers of communications equipment, whose main scientific and design facilities are located in the Moscow region, and shipbuilding, whose main scientific-design facilities are located in St. Petersburg (for example, the Rubin design bureau, which develops submarines), and the main production facilities in St. Petersburg as well as in other regions (submarines are also produced in Severodvinsk and Nizhniy Novgorod).

■ The second type are industries in which both the scientific-design facilities and production capacities are located mainly in peripheral Russian towns with only relatively small parts in the regions of the 'two capitals'. These include the nuclear industry (former Ministry of the Middle Machine building) and the ground forces equipment industry (former Ministry of Defense Industry).

⁵ For example, MiG fighters, designed by the Mikoyan Design Bureau. The Air Forces decided to develop the Su-27 (designed by the Sukhoi Design Bureau) as the main fighter type and to develop several modifications—the reconnaissance aircraft, fighter-bomber, all-weather interceptor, etc. Then there was a decision not to purchase the MiG-29 fighter and MiG-31 interceptor, although MiG aircraft previously were the main type of fighter for the Soviet Air Forces. Such decisions are not made easily; they usually face strong lobbying by the group of defence enterprises, which are the losers. A typical case is the struggle for military orders between two helicopter design bureaus: the Mil and the Kamov design bureaus, which developed Mi-28 and Ka-50 fire-support helicopters, respectively. In addition, the main type of military (and civil) helicopter in the USSR was developed by the Mil Design Bureau. In 1992 there was a decision not to purchase Mi-28 helicopters but to produce the Ka-50. However, in 1993, after lobbying by the 'Mil group, the final decision was to supply both helicopters to the Russian Air Forces.

In the first case the future of serial plants (from the point of view of military orders) in the regions hardly depends on the survival and future prospects of their 'central' design bureaus. Particularly, enterprises which were producing Sukhoi fighters (aviation plants in Novosibirsk, Komsomolskna-Amure) or both Su and MiG fighters (aviation plants in Irkutsk, Ulan-Ude) are in a better position than serial plants which had worked only with the Mikoyan design bureau and were specialized in MiG fighters alone (the Moscow Aviation Plant named by Dementiyev, MAPO; and the Nizhniy Novgorod Sokol, or 'Falcon', aviation plant).

There is also another side of the problem: the situation may change dramatically if the government or foreign investors decide to provide funds to such competitive (in the long run) enterprises as MAPO or Sokol to conduct far-reaching conversion and to organize the manufacture of only civil aircraft (regional Il-114 aircraft at MAPO, etc.). Because orders were reduced even for serial enterprises which produce the remaining types of weapon systems (in our case, Su fighters), the final result can be better for enterprises with 100 percent conversion than for enterprises which had to maintain production capacities for smaller military output. The latter situation is typical for enterprises in the second group, which have powerful scientific capacities located in peripheral districts together with manufacturing enterprises.

The major problem is that the depressed Russian economy is not able to generate either financial resources for conversion or effective demand for its output. The Federal Conversion Program was developed to address this problem. Its main priorities are the following: creation of import-substitution facilities; development of highly effective resource-efficient equipment; use of advanced technologies and new materials; development of export-oriented facilities; and use of existing technologies for development of ecologically clean manufacturing. The program includes 14 sub-programs, some of which are developed according to the criteria of enterprises belonging to the corresponding industry. In this category are five sub-programs: civilian aircraft, with total expenditures of 136 billion rubles in 1993; civilian shipbuilding, 61 billion rubles; communications equipment, 40 billion rubles; electronics, 68 billion rubles; conversion of nuclear industry, 88 billion rubles—that is, 393 billion rubles of a total of 937 billion rubles. Other sub-programs are more common for all defense industries and are targeted on development of durable goods or some special types of equipment. Nine sub-programs fall in this category: durable goods, with total expenditures of 258 billion rubles; medical equipment, 47 billion rubles; equipment for the fuel and energy, 43 billion rubles; equipment for food-processing industry, 34 billion rubles; equipment for light industry, 17 billion rubles; conversion for ecology, 13 billion rubles; equipment for housing and road construction, 8 billion rubles; equipment for trade, 5 billion rubles; and equipment for the forest industry, 5 billion rubles.

Conversion sub-programs for investment in industries which already produce civilian equipment (aircraft industry, shipbuilding, communications equipment, electronics, etc.) or are developing and manufacturing equipment for 'rich' industries, such as fuel and energy, and sometimes durable goods (in cases where there is not strong competition from Western durables), seem much more realistic than development of basically new equipment for light industry or for the food-processing industry.

The major problem is that the sources of finance for these programs are far from clear. In addition, because implementation of federal programs is not obligatory, it is more likely that enterprises will try to take advantage of their comparative advantages on the foreign and domestic markets. In this case, the prospects for adjustment to the civilian market seem much more positive for enterprises of the communications equipment industry (now the Telecom concern), aviation industry, and shipbuilding (excluding the submarine sub-branch) but much worse for the rocket-missile industry and ground forces equipment industry. This general rule is confirmed by the behavior of the foreign partners of Russian defense enterprises, discussed in section 5 below.

The location of the military industry in Russia

The regional dimension of the Soviet and later Russian defense industry has been discussed mainly by researchers outside the former Soviet Union. The most well-known work is probably that of Cooper (1991), who has assembled a very representative database on defense enterprises and research facilities in the defense industry at the local level, supplemented these data with information on the structure of employment, and identified regions with unusually high concentrations of defense-related activity.

Sapir (1994) has gone further, stressing the regional nature of conversion and its role in the process of economic differentiation and political autonomy of strongly militarized regions. Although some of the conclusions are disputable—mainly those concerning the shift of economic activities to the east, the particularly impoverished and underdeveloped zone between St. Petersburg and Moscow, or more surprisingly the close correlation found between resilience to depression and the weight of the military-industrial complex in major economic regions in Russia and conclusions drawn from a comparison of the dynamics of industrial production and military shares of industrial employment—the work itself is very interesting, challenging and stimulates discussion, especially in identifying emerging different types of regional economies.

Rather valuable basic figures about the location of Soviet defense industries may be found in the latest CIA report (1993), which gives a number of maps and tables, illustrating a heavy concentration of arms production in two republics of the former Soviet Union (a map is appended to the report).

However valuable these works are, some of the regional aspects of defense industrial dynamics are unclear because of the lack of reliable information, chaotic and contradicting state industrial and regional policy, and the large variety of scenarios of near-term economic development.

Below follows an analysis of the role of Russia in the defense industry of the former Soviet Union, identifying the spheres of dependence on defense procurement in the former Soviet republics; a study of the location of defense industries in the economic regions of Russia; and a presentation of scenarios for future development of the highly militarized economic regions of Russia.

Russia in the Soviet defense industry

Along with the losses and problems originating from the disintegration of the former Soviet Union, Russia has received some economic benefits, divesting itself of some of the costs of the empire. These 'dividends' definitely do not include getting rid of the oversized arms industry, which was concentrated in Russia much more than any other field of economic activity (except crude oil production).

According to official data, in 1990 Russia (or RSFSR at that time) had a population of 147.3 million (51.3 percent of the Soviet population), 20.1 million in industrial employment and produced 59 percent of GNP, 59.9 percent of industrial output, 52.6 percent of consumer goods, and 46.7 percent of value added in agriculture. Russia also accounted for 90 percent of Soviet oil output, 79 percent of natural gas, 56 percent of coal production, 80 percent of production of trucks and 62.7 percent of total investment (Narodnoye khozyaystvo Rossiyskoy Federacii, 1993; Rossiya, Soyuz, Zarubezhniye strani, 1992). On the other hand, there are estimates that over 80 percent of defense industrial output and 90 percent of military-oriented R&D were located in Russia (Krasnaya zvezda, 23 December 1992), where industry is structured more poorly (for the goals of conversion and economic transformation) than in any other republic of the former Soviet Union.

Major weapon production and final assembly took place mainly in five republics of the former Soviet Union (Russia, Ukraine, Georgia, Uzbekistan and Kazakhstan), while Belarus and the Baltic republics were important suppliers of military electronics and key components. Strategic, geographical, and economic factors resulted in vast cooperation between enterprises that were widely dispersed in various regions and republics.

It is still believed that the defense industry remains one of the most important integrating factors between the republics of the former Soviet Union for many reasons: because of the regional distribution of military production, high degree of interdependence in the mutual

supply of components and spare parts, economic weakness that does not permit the establishment of a full-scale independent defense industry or reliance on the international arms market in all countries (except Russia) and, unfortunately, a growing demand for weaponry from conflict areas. To sum up, only Russia—because of the size and diversity of its defense industry—is capable of independent production of major weapon systems. On the other hand, it also faces the most acute and complex problems in efficient restructuring of its oversized arms industry. Nevertheless, the interdependency of the defense economies of the top four republics in the list still plays a significant role both in the plans for defense procurement and conversion.

According to data of the Centre for Estimation of Political Risks and Conflicts (Voenno-Promyshlenniy kompleks, 1992) based on an investigation of 750 main production and research enterprises from all defense branches (including 550 industrial units and 210 research institutes and design bureaus) for 1991, the level of concentration of defense-related R&D in Russia is even higher than that of defense production (84 percent and 72 percent, respectively, measured in the number of enterprises). Among the former Soviet ministries within the military-industrial complex, the enterprises of the Ministry for Aircraft Industry are the most 'Russian'—90 percent are located on the territory of Russia—while electronics (produced by three branches: electronics, radio-electronics and communications industries) and shipbuilding are the least 'Russian'—65 percent and 72 percent, respectively (see Tables 5 and 6).

As a result, the dependence of the former republics on external supply is relatively high in the shipbuilding industry (22 percent of Soviet defense shipbuilding capacities are located in Ukraine), computer, anti-aviation, anti-missile and navigation systems, radars and communication equipment (over 35 percent of production capacities are located outside Russia). Another important line of defense industrial dependence on Russia is the supply of certain strategic materials. Russian authorities have chosen a policy of import substitution by domestic production (if possible) at a new, higher technological level or the practice of closing down 'foreign' enterprises and concentration of production at a lower level in Russia (the latter refers mainly to the nuclear industry).

The most complicated consequences of the interdependence of arms economies became apparent in Russian-Ukrainian relations. It should be noted, for example, that every ministry (from nine Soviet ministries engaged in defense production) had in Ukraine no less than 15–20 enterprises on different scales. In Ukrainian engine production, 90 percent of the components and 90 percent of the demand came from Russia, and some of the components crossed the very relative agreed borders at least five times (Izvestiya, 15 January 1993).

It is clear that disintegration, political tensions, and debt and payment problems have made this complicated cooperation very burdensome for both sides.

Although several agreements on cooperation in defense production were signed by Russia and Ukraine this year, it is evident that the Russian military establishment is trying to rid itself of most of the dependencies in arms production. Thus, the new military doctrine of Russia states that among the main directions guaranteeing military security and rational use of defense industrial potential will be industrial restructuring, ensuring the military-technical and economic independence of the Russian Federation under the conditions of market transformation (Izvestiya, 18 November 1993). Taking into account the considerable decrease in military demand, oversized defense industrial capacities, and the need to replace the 'lost' valuable but very often technologically obsolete capacities by small-scale but more advanced production, these plans seem realistic and correspond to the new line in the general relations of Russia with the former republics (with the exception of the Baltic states): a shift from a policy of cross-subsidizing that proved to be ruinous for the Russian economy in transition to a policy of the former parentstate to the former colonies with a more pragmatic and rigid approach.

Russian defense industry and conversion: the regional dimension

Many researchers point out the strong regional economic differentiation and segmentation of Russian market reforms. Differences in prices, income distribution, and extent of economic decline have increased after 1992. For example, the index of differentiation of the minimal consumption budget for 12 economic regions of Russia increased from 1.48 in January 1992 to 2.28 in

October 1993 (see Table 7). The level of defense industrial dependence of certain regions seems to be becoming an important factor that stimulates the growth of regional differentiation and the emerging depression or new growth potential of certain economic zones.

However, this influence seems to be very dynamic, uncertain and difficult to monitor for many reasons: the lack of reliable information, changes in priorities of military procurement and state industrial policy, and occasional advantages received by regions in tax or credit distribution. Therefore, the findings of Sapir (1993) concerning a close correlation between depression and the relative weight of the military sector in the economic regions of Russia seem questionable without corresponding figures reflecting defense industrial dependence at the regional level and clear tendencies in defense and industrial policies and macroeconomic dynamics. Moreover, today's depressed military branches, electronics and missile production, may tomorrow receive support from the Defense Ministry and contribute to temporary stabilization in zones of heavy concentration. Alternatively, they may in the long run lead to a second wave of depression, with enterprises losing defense orders later than their competitors and having to face adjustment challenges in a saturated civilian market.

Taking into account these uncertainties in the regional dynamics of the defense industry and its civilian restructuring, we analyze it within the framework of three stylized scenarios, described in section 2. This shows seven types of regional dynamics.

■ European North and European South, with relatively insignificant defense industrial dependence and good growth potential driven by the primary

resource sector and a favorable geographical position even in the worst scenario.

- The Central Region (except Moscow and St. Petersburg with provinces), with significant defense industries and very uncertain and complicated dynamics under all conditions. This zone exhibits a close correlation between military dependence and economic performance. Conversion prospects depend on the level of state interference and support and to a less extent on personnel activities of defense managers and local authorities. Regional conversion programs (most well-known from the Tula oblast) are oriented mostly towards external investment than towards exploitation of resources and capacities released from the military sector.
- The Ural and Volga region, where the defense industry dominates and defines unstable growth cycles, depression and unemployment, with some prospects opened by conversion of the aircraft industry where there is major state support. Regional conversion programs are based mainly on arms export revenues to be invested in conversion projects, organizational and institutional restructuring (privatization, techno-parks, splitting up of huge establishments, joint venturing with the Western firms and domestic enterprises with good experience and infrastructure at the civilian market). The best program so far was presented by the Perm oblast.
- Moscow, St. Petersburg and their metropolitan areas as a type of regional development, with special dynamics due to an extremely high concentration of defense-related R&D and high-technology manufacturing as well as prospects for exploiting the benefits of capital cities adjustment, mainly in service

and R&D sectors. Conversion activities may be slowed down by plans to ban privatization of the most valuable R&D and production units: Moscow and St. Petersburg are leading in the veto list from the Presidential Decree of August 1993 on the privatization of defense industry. The growth prospects for this type of region may still be defined as very promising.

- Western Siberia. This region, with relatively significant defense R&D and production, is an example of a dual economy with good prospects for conversion-driven growth in the best scenario and depression, unemployment and a substantial brain-drain in the case of unfavorable development. Novosibirsk may develop similar to the Moscow and St. Petersburg model.
- Eastern Siberia, Tomsk and Tyumen. This region has a relatively insignificant defense industry which is concentrated in a small number of cities. We predict depressed manufacturing and a growing primary sector. The booming oil, gas and mining industries may provide not only investment for the conversion of local defense industries but also some demand for the production of equipment for oil and gas pumping and processing.
- The Far East. This region has good prospects for growth because of the prospects for development of the primary resource sector, transport services and exploitation of its geographical position. Uneven development, further regional differentiation with the depressed manufacturing centers and growing cities, where airports and seaports are situated, are typical for two of the suggested scenarios.

Foreign business involvement in Russian defense conversion

A number of general problems confront Western involvement in Russian restructuring: lack of an enforceable business code, unclear property rights, macroeconomic instability, etc. However, despite these problems, the number of working joint projects of Russian defense enterprises with foreign firms has continuously grown, especially during the past two years.

So far, joint projects are not in the form of direct participation of Western firms in ownership of Russian enterprises of the former defense ministries. So far, the overwhelming form of foreign participation in the conversion process is the establishment of joint ventures—relatively small joint-stock companies with two to three owners, frequently with at least 51 percent of the shares held by the Russian defense enterprise. As mentioned above, the industries of the Russian defense complex differ appreciably in their technological level and in their possibilities to adjust to new market conditions. This determines the different directions of joint projects with foreign firms: ranging from establishing scientific centers for basic research together with the leading firms world-wide to creating facilities with technologies for unsophisticated assembly together with partners from South Korea and other countries. The following types of mutually advantageous partnerships can be identified.

Joint ventures with research institutes

Many leading Western firms create joint ventures with well-known Russian research centers to establish cooperative scientific work in the fields of basic and applied research. Such facilities are created mainly in the following industries, in which Russian scientific advantages are recognized.

Nuclear industry. An international center in Dubna, the Moscow region, and some other research facilities were established.

Aviation industry. A joint research center was established with Boeing in Moscow in 1993; there are also many cooperative projects in leading research aviation institutes in Moscow and the Moscow region—the Central Aerohydrodynamic Institute (TsAGI), the Institute of Light Alloys and other leading Russian aviation institutes.

Joint ventures with enterprises in dual-use industries

The existing scientific and technological potential of dual-use industries facilitates the start of serious cooperative programs, taking into account the large potential demand in the domestic market, and sometimes also common programs, oriented towards the needs of foreign consumers (for example, the potential possibility of fiber-optical telecommunication lines, space

telecommunications etc.). In the latter case the list of industries and enterprises is longer.

Aviation industry. Over 30 joint projects have been started or are about to start. The largest projects are for development of Il-96-300 aircraft by the Alation design bureau, the Voronezh aviation plant and Pratt & Whitney (nearly 20 Western firms participate in these projects, including the well-known avionics firm Rockwell International); development of Tu-204M aircraft, which will be equipped with Rolls-Royce engines (the joint British-Russian Bravia corporation was established by the Tupolev Design Bureau, Ulyanovsk Aviation Complex Aviastar and the Fleming Russia Investment Corp., Great Britain, investment company); the joint venture of Perm Motors Corp. with US and French companies (SNECMA and others) is entering development and improvement of the PS-90A turbofan engine, the first Russian engine to receive a Western certificate; and many smaller joint projects with US, French, German, British, and South Korean (Daewoo Heavy Industries) firms.

Space industry. The largest projects of this type are: the cooperation of Energia scientific production with Lockheed in development of Russian Soyuz spacecraft as the rescue vehicle for the US Freedom Station and other projects with NASA; and establishment of the Informkosmos Association, which is developing Sovcanstar-type satellites for international communications together with Canada (on the Russian side, the main participant is the Scientific Production Association for Applied Mechanics from the former closed town Krasnoyarsk-26, the main producer of communications satellites in Russia; establishment by the Moscow Khrunichev enterprise of a joint venture with Lockheed for col-

laboration in space; and a project with Motorola for launching space communication satellites.

Nuclear industry. This industry was already widely diversified. Now, the 'pure' nuclear enterprises have contacts with foreign partners, and some large enterprises of the sub-branches of this industry are searching for new, profitable directions of further development and for foreign partners. One such example is the Scientific Research Institute of Measuring Systems (SRIMS, an institute of the radio-electronics section of the Ministry of Atomic Energy, located in Nizhniy Novgorod). Previously oriented towards defense orders and related production, about 70 percent of SRIMS's orders today are civilian orders for science and technical research. In cooperation with AEG (Germany), SRIMS entered its automation systems and won a design competition for equipment for the 2000-km gas pipeline: as the principal designer, SRIMS is developing modular automation systems and auxiliary equipment, and AEG is working out the software. The SRIMS-AEG project was adopted by the technical council of Severgazprom as the main design for equipment for this pipeline. SRIMS contracts with the 'Gazprom' concern will allow work to start within two years on a large, profitable civilian order for four serial plants of the nuclear industry, which has always been a partner of this research institute. This is a typical example of the gradually spreading inter-regional contacts between defense enterprises and powerful civilian customers. Another potentially large project of the nuclear industry is the development of fiber-optic telecommunication lines with utilization of the capacities of the Chelyabinsk-65 Mayak production association. This project requires not only investments but also the abolition of CoCom restrictions.

Communication equipment industry (and related electronics). This is one of the few Russian industries which are rapidly developing, even in the general economic crisis. International cooperation in this field is quickly expanding. One of the largest programs is the joint project of one of the world's largest producers of telecommunication systems, the French firm Alcatel-Alstom. The LenBell joint venture was established in St. Petersburg by Alcatel-Bell and the Krasnaya Zaria scientific production association for production of communication systems (1.5 million lines annually), and there will be a joint venture with the Angstrom leading electronics scientific production association (Zelenograd, Moscow region) for manufacture of large integral circuits for these communication systems.

Shipbuilding. One of the possible directions of foreign investment is the project for establishing a passenger liner between St. Petersburg and New York, developed by the Baltic Shipyard production association (the main producer of nuclear-powered cruisers).

Small joint ventures with high-technology military-oriented enterprises

Defense enterprises and foreign partners often establish relatively small new companies (in the first stage, but with potentially large demand and therefore with good prospects for future growth), utilizing previously developed military technologies, materials, etc. Usually they are the leading high-technology enterprises from different defense industries. Such an example is the joint venture established by the Swedish-Swiss firm ABB and the Saturn design bureau, the defense organization which develops engines for Sukhoi fighters. Saturn will definitely receive the military order, but this will not pre-

vent it from establishing a new production line for manufacturing engines for electric power stations with the foreign partner, who chose this firm because of its technological skills.

Joint ventures of enterprises with main military production lines and idle facilities

These joint ventures are undertaken when defense enterprises are trying to create new civilian production facilities to support employees but which cannot be fully converted because of the requirements to maintain the main military production lines. Such joint ventures are usually based on 'screw-driver' or other unsophisticated technologies for manufacturing consumer durables (electronics, microwave ovens, washing machines, refrigerators, etc.).

Joint ventures with a complete change of the output mix

Since this type of project needs large investments, today there are few such projects. There is usually some kind of investment pool for their fulfillment.⁶

⁶ One example of this type of project is the attempt to organize the production of television tubes and colour televisions in the South Ural by three large defence enterprises (Mayak, another plant of the nuclear industry and an enterprise of the former Ministry of Defence Industry) in cooperation with Phillips. It is estimated that almost 40 percent of the required loan will in the future be paid by local authorities, which are extremely interested in creating these facilities because of the very difficult situation with the conversion process in the region.

Promising directions

Most joint ventures are created in the Moscow region and in St. Petersburg, not only because of the infrastructure possibilities but also because most leading research and design centers are located there. Even in cases where the main production capacities are located in other Russian cities, Moscow firms often are the initiators and crucial participants of joint projects (for example, the Tupolev design bureau in Bravia and the Alation design bureau in a joint project with Pratt & Whitney). It now seems that the defense enterprises of this area will be the most active ones in the process of involving foreign investors.

Despite the overall economic crisis and unfavorable climate for investments in Russia, one can identify certain promising directions of involvement in the defense sector for potential foreign investors. We discuss these directions in the following three-dimensional scheme: size of enterprise, type of ownership, and type of industry.

Size of the enterprise

The defense sector is represented mainly by large (1000–10 000 employees) and very large (over 10 000 employees) enterprises, and in the current situation most of these enterprises are for many reasons not attractive for foreign investors. A preferable scheme is to start a joint project with a medium-size defense enterprise, where it is easier to retrain managers and employees and, in the case of a successful start, where there are good prospects for direct investment and participation in ownership of the enterprise.

Type of ownership

Many defense enterprises are now engaged in the process of 'privatization', but in reality it is a

process of reorganization into joint-stock companies with large state shares. Moreover, there are numerous regulations which can reduce foreigners' interest in buying shares in defense enterprises.⁷

In fact, there will be a small difference between fully state-owned and joint-stock enterprises for a long period after the process of privatization. This means that, regardless of the type of defense enterprise ownership (if they remain manufacturers of military products), the most favorable form for foreign investors will remain the same for several years: creating joint ventures without direct participation in the defense enterprises.

Type of industry

The choice of partners among Russian defense enterprises may be made according to two criteria: the technological level of the enterprise, and the existence of economic niches on the domestic or world markets.

As to the technological level, the leading enterprises are those of the rocket-missile industry, nuclear industry, aviation industry as well as some sub-branches of the former Ministry of Defense Industry (optics, certain types of metal-working, etc.). At the same time not only the defense industries but also the enterprises of the same industry are heterogeneous in their technological level; therefore, even in the electronics and radio industry there are enterprises which can be attractive for foreign investors because of their technological skills. In those cases the start-up investments for re-equipment of such enterprises are much higher compared to enterprises of the aviation and rocket-missile industry. There are some spheres where large and stable demand in the mid- and long-term future is practically guaranteed: telecommunications, which is underdeveloped in Russia and where development is now sup-

ported not only by government programs but also by commercial banks and the private sector; and aviation, naval fleets, other means of transportation, since the existing park of civilian aircraft, ships and locomotives is now worn out, and the non-state companies now being formed (for example, in aviation) are ordering these industrial products. The prospects for participation of foreign investors in programs based on advanced dual-use industries are favorable.

One of the most promising forms of cooperation with foreign partners in both dual-use industries and diversifying enterprises is organization of production of final products in defense enterprises licensed by a foreign partner—with the required minimum of necessary foreign parts, and then gradual substitution by components which would be developed by Russian enterprises.⁸

⁷ Among them are the following: the share of the state in the enterprise's equity cannot be reduced for three years after privatization; the director of the enterprise can be elected only by those with a qualification certificate from the Government; only the Chairman of the State Committee of the Defence Industries can sign the annual contract with the chief manager of the privatized defence enterprise; and when re-organized into a joint-stock company, the defence enterprise, upon receiving a defence order, must sign an agreement with Government representatives and accept obligations concerning the maintenance of mobilization capacities (reserve military production lines) and protection of state secrets.

⁸ In the aviation industry, for example, this could entail production of airliners with Western engines and avionics, but at the same time improvement of Russian engines and development of Russian avionics; in shipbuilding it would entail equipping industrial ships and utilization of foreign materials in the decoration of passenger ships; and in the optical sub-branch of the defence industry it could entail a combination of high-quality Russian optical components with Western mechanical parts, etc.

Conclusion

The available evidence on the adjustment of military-related enterprises gives ground for a very cautious optimism. This optimism is based mainly on the (albeit slow) learning of enterprise managers to operate in a market environment and on their growing awareness that they should rely on their own resources rather than on government subsidies. While in 1992 the prevailing form of adjustment was unsophisticated rent-seeking, in the first half of 1994 management pursued restructuring and down-sizing, although this real adjustment is fragile. In the defense industry in 1992-93 and the first half of 1994, even civilian output was falling, albeit at a slower rate than military output, and yet lay-offs were clearly insufficient. The success of restructuring, then, will hinge on at least three factors: energetic down-sizing of military industrial facilities; restoration of the growth of the economy; and extension of the managerial planning horizon, for which macroeconomic stabilization is necessary (but not sufficient). While the first task should in principle involve government intervention (identification of industrial facilities subject to closure, for example), the restoration of growth is truly challenging because of simultaneous market and government failure.

An institutional response seems to be emerging to address this simultaneous failure, whereby enterprise managers and sometimes banks start to form loose alliances and associations in an effort to diversify risks by effectively setting up an 'internal' capital market which operates within such alliances. Imaginative and entrepreneurial managers with a vision, reminiscent of steel or robber barons at the dawn of industrial capitalism in the United States, will become a key agent of Russian industrial transformation. Close study of the managerial strategies of such industrial entrepreneurs with an emphasis on the 'hidden rationalities' of their behavior should be the priority of international financial institutions.

Table 1.
Performance of the Russian military industries in 1985–91,
1992–93 and the first quarter of 1994

Source: Goskomstat data obtained in interviews, Russia -93 (various issues), Russia -94 (Issue 1).

	No. of enterprises	Employment	Overall (military and civilian) output	Civilian output	Enterprise closures	Average monthly wage compared to civilian industries
1985 - 1991	In the former USSR: 1100 production associations and 920 R&D organizations, 82% of them in Russia. Estimated no. of industrial facilities likely to become independent firms: 5000.	<p><i>Former USSR</i> Industrial personnel: 7.5 million (21% of industrial employment); R&D: 1.5 million; taking into account social facilities (hospitals, housing, etc.), employment in the military industrial complex: 12 million. Including military-driven employment in civilian (metallurgical, chemical, etc.) industry: 20 million.</p> <p><i>Russia (1991)</i> Military-industrial personnel: 5.5 million (20% of industrial employment) R&D: 1.2 million; with welfare-related facilities: 9.0; overall military-run: 14.0.</p>	In 1989–91 was maintained relatively constant.	Civilian share is 58%.	No closures.	In 1985 the average wage in the military-industrial complex was 1.5 times higher than in civilian industry. If other pecuniary income is included (various bonuses), average incomes would be 2 times higher. However, in the military industry, the second economy, which in the civilian sector provided substantial additional income, was developed to a lesser degree.
1992 and 1993	Core (larger) industrial firms: approximately 2500–3000.	<p>By the end of 1992 industrial employment was reduced by 400 000 (7%), R&D employment by 200 000 (17%). Overall industrial and R&D employment has been reduced by 9%; including those involved in the production of military products, by 37%.</p> <p><i>1993 compared to 1992</i> Total industrial personnel: 88%; involved in military production: 82%; civil production: 93%.</p> <p><i>First quarter 1994 compared to first quarter 1993: 88%.</i></p>	<p>1992: 80% (excluding nuclear industry: 70–75%) of the 1991 level Military production: 60% of the 1991 level.</p> <p><i>1993 compared to 1992:</i> 84%; Military output: 70%.</p> <p><i>First quarter 1994 compared to first quarter 1993:</i> 79%; military output: 75%.</p>	<p>Civilian output 76% of overall output, civilian production: 89% of 1991 level. In 1993: 89% of 1992 level. Civilian output: 82% of overall output.</p> <p><i>First quarter 1994 compared to first quarter 1993:</i> 20% fall in civilian output.</p>	In 1992–93 no closures but (Nov. 1992): 21 enterprises stopped (no production at all), 130 are on the verge of ceasing production, over 400 operate 3 days per week. In the first half of 1994 virtually every enterprise operated 2–4 days per week.	<p>End of 1992: Defense complex: 11 452 rubles (\$23), average for an industry as a whole: 18 372 rubles (\$37). Light industry: 13 375 rubles (\$27) End of 1993: 66% of the wages in industry. In electronics-intensive industries: 50% of the average industrial wage.</p>

Table 2.
Stylized scenarios of Russian defense industry down-sizing and emerging development strategies

	<i>'Brazilian'</i>	<i>'Korean'</i>	<i>'Argentinean'</i>
Development strategy	Gradual transformation from import substitution to export promotion.	'Targeted' development strategy encouraging diversification and export orientation of the existing chaebol-like diversified enterprises.	Import substitution. Lack of consistent development strategy. Constant and chaotic short-run crisis management.
Transformation of defense industrial interest groups	Transformation into high-technology pressure groups that seek to protect existing high-technology industries from competition.	Expansionist and 'aggressive' pressure groups seeking to obtain more investment or favorable terms in return for high performance standard.	Fight for power and prestige. Engaged in redistribution conflict for higher wages.
The role of the state	Developmental but segmented state under the influence of various, primarily former, defense industrial interest groups. State-induced capital formation is essential.	Developmental and strong state capable of imposing strong performance standards on any rent-seekers. The state is national entrepreneur.	The state, similar to the Soviet state before 1990, is completely controlled by various interest groups.
Bureaucratic authoritarian tendencies directed at:	Political stability to avoid labor unrest and encourage entry of multinationals.	Enforcing low (but presumably growing) real wage.	To cope with emerging, from time to time drastic, and unbearable deterioration of economic situation.
Foreign capital participation in conversion and growth	Very broad. Some industries are taken over completely by foreign capital.	Mainly indirect forms of participation or through joint ventures and foreign trade.	Lack of incentive for foreign capital to enter. In the cases it does enter, the foreign enterprise remains an enclave in the national economy.
Role of defense conversion in economic growth	Defense industry is supplier of private entrepreneurs for Schumpeterian growth. Limited provision of capital as a result of conversion.	In the short run it mitigates supply rigidities. In the long run the major determinant of market structure.	Conversion and down-sizing are viewed as a campaign to extract revenues to cover government deficits. Change of policies is erratic, e.g., from outright privatization of defense enterprises to halting privatization campaign.
Defense industry after down-sizing	Small defense industry with highly specialized plants, some of which are explicitly export-oriented.	The absence of institutional dichotomy between civilian and military industry. Military output is included in large enterprises' output mix for business cycle consideration.	Down-sizing without conversion. Substantial (2-3 million) down-sizing-induced unemployment.
Transformation of technological duality (modern defense-oriented vs. 'traditional' obsolete civilian sector)	Brazilian-type duality of production profile. Industries catering to lower-income groups are less technologically advanced than those catering to higher-income groups. The latter industries are former defense industries that have undergone conversion.	Uniform and well-integrated technological structure.	Enclaves comprised of large-scale foreign enterprises vs. relatively small and inefficient domestic enterprises. Domestic-foreign capital duality.
Determinants of military budget	1. The need to improve the well-being of the military. 2. Dual-use military-civilian R&D. Defense budget as a cover for the support of civilian R&D.	1. Requirements of minimal low-cost 'alternative' defense. 2. Need to improve the well-being of the military.	1. Interests of the powerful defense industrial pressure groups. 2. Possible (or 'would-be') civil and ethnic unrest. 3. Social security for the military.

Table 3.
Types of enterprise adjustment

<i>Types of adjustment</i>	<i>Sustainable real adjustment</i>	<i>Fragile real adjustment</i>
<i>General characteristics</i>	Demand-pull, often export-oriented diversification.	Criteria of diversification: ability to produce without large investments and with only secondary attention to demand.
<i>Sophistication of civilian technology</i>	Starts relatively simply, with small start-up costs and quick pay-off, to be able eventually to concentrate on technologies with large start-up costs which would enable it to realize the firm's comparative advantages.	There seems to be a lock-in either in a simple technology with small start-up costs or sophisticated technology which is hardly sustainable (because of inability to perform R&D to update the product/ technology).
<i>Export strategy in civilian manufacturing</i>	Proceeds gradually from occasional subcontracting to long-term subcontracting and, eventually, to export of final products. Subcontracting stage is perceived as: 1) Means to acquire reputation in the world market. 2) Source of learning how to export and deal with a foreign partner. 3) Source of income.	From the start targeted at the export of final products. The source of revenue, however, is the proceeds from subcontracting which are linked to a very low national currency exchange-rate. Export is perceived as a source of revenue only (reputation and learning effects are disregarded).
<i>Ways to raise capital; how the capital is used</i>	Finance is raised for capital maintenance (including selected segments of human capital) and investment from the following sources (in order of importance): 1) Government subsidies and loans. 2) Revenues from sophisticated rent-seeking. 3) Foreign investment attracted on the basis of acquired reputation. 4) Quasi-informal loans from other agents based on trust in business qualities of the firm's manager. 5) Loans from commercial banks.	The same as in sustainable real adjustment, with the possible exception of (3) and (4).
<i>Development of firm's organizational capabilities</i>	A top manager with exceptional organizational qualities and ability to learn is a key decision maker. There is a gradual formation of a managerial team with similar qualities.	Very slow. In the short run hindered by the deadlock created by the tendency of the enterprise to break up into a number of independent firms.
<i>Privatization</i>	Initiated by the top management to retain control over relevant segments of the enterprise. The major objective of privatization is enterprise reshuffle. The manager becomes a turn-around specialist rather than a conventional manager.	Initiated by the management team to clarify conflicting claims of enterprise units on its property. As a result of privatization the enterprise is expected to be split into smaller independent firms. Also for the weak enterprises (case 2) described in column 4.
<i>Estimated share of defense enterprises for which the relevant type of adjustment is prevalent</i>	1992: 10% 1993-94: 5%	1992: 25% 1993: 40% 1994: 50%

<i>Sophisticated rent-seeking</i>	<i>Unsophisticated rent-seeking</i>
Main source of income: income from selling/ leasing of real estate (in particular of the social sphere); financial speculation (on the basis of a bank associated with a firm).	Investment of effort and time to convince authorities to grant subsidies to a firm (e.g. to provoke employees to go on strike).
Highly mobile technologies of real estate intermediation and financial speculation.	Orientation on unsustainable sophisticated technologies with prohibitive start-up costs.
Inertia-led exports: contracts concluded before 1992 are honored, new contracts are not actively sought.	The same as in sophisticated rent-seeking.
Loans from commercial banks are prominent. Acquired capital is channeled into wages. Capital flight is significant.	Government subsidies to ensure short-term survival.
There is a fast learning curve for how to live with and benefit from persistent high inflation.	Insignificant.
1) Defensive privatization (in order to avoid painful real adjustment) in exchange for the continuing subsidies from the center. 2) In the case of the enterprises perceived as viable, privatization is initiated by the overseeing agency to get rid of the clearly unprofitable assets that it makes no sense to support with subsidies. Resort to real estate deals on the part of the enterprises is then a step to slow down the process of going out of business.	Deadlock with privatization because of the alleged or real 'strategic importance' of the enterprise.
1992: 30% 1993- 94: 35%	1992: 35%; 1993: 20%; 1994: 10% Mainly very large enterprises (over 10 000 workers).

Table 4.
Managerial incentive structures in identified types of adjustment

	<i>Planning horizon of the management: long. There is a high probability that the current management will remain the effective owner of the enterprise after its privatization</i>	<i>Planning horizon of the management: short ('fly-by-night' strategy)</i>
<i>Focus of the management's attention: certain viable segments of enterprise. Manager is a turn-around specialist rather than a conventional manager</i>	<p><i>Sustainable real adjustment</i></p> <p>Management perceives that: 1) Certain segments of enterprise are potentially quite competitive. 2) Because of pervasive scarcity of managerial expertise it is bound to remain effective owner of enterprise even after privatization.</p>	<p><i>Sophisticated rent-seeking</i></p> <p>Motivation to extract high personal rents from certain lucrative segments of enterprise and then either retire or set up a new private venture not necessarily related to the production line of the enterprise.</p>
<i>Focus of the management's attention: the entire enterprise rather than segments</i>	<p><i>Fragile real adjustment</i></p> <p>Strategy to maintain all technological and human capabilities of the enterprise, which is not financially feasible.</p>	<p><i>Traditional rent-seeking</i></p> <p>'Fly-by-night' with exclusive reliance on government assistance and favors.</p>

Table 5.
Distribution of defense enterprises among the former republics of the Soviet Union (share of the total number of enterprises under investigation)

Source: "Voenno-Promyshlenny Kompleks: Razmeshchenie na Territorii SNG [The Military Industrial Complex: Location on the CIS territory]," *Konversiya-weekly RICA*, 23 December 1992.

	<i>Industrial enterprises</i>	<i>R&D establishments</i>
<i>Russia</i>	72%	84%
<i>Ukraine</i>	17%	9%
<i>Belarus</i>	3%	1%
<i>Others</i>	8%	6%

Table 6.
The share of Russia in the total number of enterprises of the four key defense industrial branches

Source: "Voenno-Promyslenny Kompleks: Razmeshchenie na Territorii SNG [The Military Industrial Complex: Location on the CIS territory]," *Konversiya-weekly RICA*, 23 December 1992.

	<i>Russia</i>	<i>Other republics</i>
Ministry for Defense Industry	88%	12%
Ministry for General Machine-building	81%	19%
Ministry for Aircraft Industry	90%	10%
Ministry for Shipbuilding	72%	28% (incl. 22% in Ukraine)

Table 7.
Regional distribution of the minimal consumption budget (rubles per month)

Source: *Ekonomicheskaya konyunktura Rossiyskoy Federacii [The Economic Situation of Russian Federation]*, publication of the Working Centre of Economic Reforms by the Government of the Russian Federation.

<i>Region</i>	<i>January 1992</i>	<i>December 1992</i>	<i>September 1993</i>	<i>October 1993</i>
Russia (average)	509	4 755	20 029	20 751
Northern	463	5 625	24 813	25 175
North-West	627	5 303	20 213	20 608
Central	545	5 081	20 511	21 214
Volgo-Vyatskiy	483	4 141	18 685	18 827
Central Black Earth	483	3 741	15 977	16 051
Trans-Volga	422	3 602	15 596	16 964
Northern Caucasus	469	4 120	17 915	18 768
Ural	504	4 803	19 478	20 131
West Siberia	430	4 649	19 657	20 146
East Siberia	495	4 828	22 014	22 245
Far East	563	6 578	33 941	36 531
Ratio of Differentiation	1.48	1.83	2.18	2.28

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