

The Impact of the Military-Industrial Complex on the Emerging Russian Development Strategy

YEVGENY KUZNETSOV

This article was motivated by my first-hand experience with defense industry downsizing in Russia in 1992 through early 1994 and by discussions with Russian defense industry managers. I have arrived at four conclusions, each of which somewhat contradicts conventional wisdom:

1. There is a significant heterogeneity in productivity levels and technological levels of capital stock among defense enterprises.

2. The entrepreneurial potential of defense enterprise managers is just as diverse as the physical capital stock. Many of them are brilliant Schumpeterian entrepreneurs even under the unfavorable conditions of institutional vacuum and monetary austerity that followed price liberalization in Russia. Others, however, are unable to adjust to the realities of the nascent market and should be replaced.

3. In restructuring ventures, access to capital and inputs takes place not via formal economic institutions but through personal networks, which were traditionally very strong and still are functional in the military complex. Trust replaces institutions assessing the risk of financing.

4. In cases where defense diversification has been reasonably successful, it was not always achieved through export promotion. Import substitution seems (temporarily?) an equally viable strategy.

In this article I will argue that while the belief that Russian firms will be able to directly convert specific facilities and the labor force to commercial production is a chimera, the outlook for the gradual transformation of certain segments of the Russian defense complex is not necessarily bleak. The main objective of this article is to locate causes of the analytically puzzling tremendous heterogeneity of the Russian defense sector adjustment in 1992 and 1993, extensively documented elsewhere¹ in the recent history of the Soviet military industry.

There are two contrasting views on the development potential of the defense complex of the former Soviet Union. The first, which we may call "the only hope" view, portrays a cluster of the best physical and human capital, conversion of which, combined with a proper investment push, could provide a foundation for long-term Russian economic growth (Kostin 1992). The contrasting "omnipotent villain" hypothesis asserts that in spite of its tremendous resource drain from the now-defunct Soviet economy, it has hardly any comparative advantages, either static or dynamic, in the world market of civilian products. I will argue that both views miss the point. Given the arbitrary price structure of Soviet industry, one can easily find "sound" statistical evidence for any of point of view. The central question raised by this controversy is what welfare gains can we get from the

Yevgeny Kuznetsov is with the Peace Studies Program at Cornell University, and the Institute of Economic Forecasting at the Russian Academy of Sciences. He wrote this article for the Consensus Project at Harvard University. Research was partially supported by an SSRC-MacArthur Fellowship in International Peace and Security.

military-industrial complex after so many years of resource drain, the magnitude of which is still unknown. The successor states of the Soviet Union are plunging into a long period of (hopefully creative) destruction and industrial downsizing that will be accompanied by selective growth. In this economy-wide restructuring, the defense industry's identity will be lost, so that its technological processes will be more often shut down rather than converted. Thus, an explicitly evolutionary perspective becomes appropriate.

Hirschman (1958, 1979) notes that "development depends not so much on finding optimal combinations for given resources and factors of production as on calling forth and enlisting for development purposes resources and abilities that are hidden, scattered, or badly utilized." How can one incorporate the technological knowledge, managerial routines, and human capital that are "hidden, scattered, or badly utilized" in the increasingly idle military sector? The question "what are the initial structural, organizational, and technological conditions, as inherited from the years of military-led growth, of Russian² market-oriented development?" will be the major focus of this article.

As J. Frieden (1991) convincingly underscores once again apropos of the Latin American example, there is no direct connection between a country's initial conditions and the actual economic performance. To deduce the latter solely from the former is grossly misleading. Patterns of behavior by interest groups, the government, and other domestic and foreign economic actors are equally relevant. These factors affecting Russian economic demilitarization will be treated only marginally.³ I will instead present evidence illustrating the tremendous technological and managerial heterogeneity of the defense sector of the former Soviet Union and will provide some clues on how to incorporate this diversity into the development strategy of the Russian Federation. I will argue that Soviet military-led development, albeit disastrously inefficient, had some specific growth incentives that, properly understood and perhaps transformed, may be employed (and will be employed, given the inevitable continuity of managerial culture) in defense industry downsizing.

An attempt to derive far-reaching conclusions about the emerging Russian development strategy from just three months experience with defense downsizing in 1992 (or for that matter, the conversion endeavors of 1989-1991) will clearly leave me "open to the twin charges of over-generalization and oversimplification" (Hirschman 1958). To avoid at least some of those I will devote the body of this article to what is now economic history: the Soviet defense build-up of the 1960-80s, which will allow me to show how the defense sector heterogeneity emerged and was reproduced.

The article is structured in the following way. Section one describes the motivating example of successful defense enterprise diversification. I also explain why the Soviet defense industrial sector displayed apparent evidence of duality (non-homogeneity) and why this duality should be retained in the course of demilitarization. Section two describes the basic stylized facts of the Soviet version of military-led growth. In section three I outline the factors responsible for the non-homogeneity of the defense sector. Section four elaborates the dual-dual framework of the transformation of the Russian defense sector. In the final section, some tentative conclusions are drawn.

1. A Motivating Example and Suggested Theoretical Framework

Almost every military-related enterprise in Russia faces a virtual collapse of defense-related demand because of the program of fiscal adjustment started on 2 January 1992. Some of them still do surprisingly well, however. For example, the total output of an electronic components plant in Viborg employing more than 4000 workers, was 85 percent military-related in mid-1991. By the end of February 1992 this shrank to 30 percent, and by November 1993 to 5 percent. In the course of two years, employment has been cut by a factor of two. Success is based on aggressive export promotion. Rapid growth of exports in turn becomes possible because of a very undervalued ruble and the exploitation of innovative civilian research and development (R&D) available elsewhere in the Russian defense-industrial complex. Thus, the company offers very cheaply various intermediate products for Finnish, German, and French machine-making firms. Each of these products contains some innovative component. It is noteworthy that the enterprise in question has itself offered credit to support its partner's R&D, which it will incorporate into its own products later. Thus, the firm has to perform functions of Schumpeterian supply-inducing finance, assess the risk, and share the profit. There is a clear understanding among the top management of the enterprises that this strategy of export dependence is very sensitive to the exchange rate. Once its value falls close to equilibrium, the company will have to diversify into domestic civilian business, with extensive long-term activities such as production of capital stock for nascent small private farming. Profit from export revenues that is not going on credit to foreign R&D or to support home-based R&D is allocated for investment in agricultural machinery. The managers envision the enterprise as a highly diversified business group in which the electronic components division will not necessarily play a substantial role.

We have outlined through this example the first two steps of unbalanced strategy: downsizing and growth on a microlevel. This strategy is inherently imbalance-generating. For example, successful transfer of human capital to export manufacturing is based on a number of conditions, such as a very favorable exchange rate and the large size of the market, which may disappear as one advances in a specific export market. Successful macrostabilization will entail rapid appreciation of exchange of local currency, reducing revenues in local currency and creating cash flow problems. Initial success thus contains the seeds of possible failure. But failure is by no means predetermined, as these disequilibria create pressure to seek new business opportunities (in our case, retreat into a specific sector of the internal market), the exploitation of which results in a new "act of discovery." A process of self-propelling growth sequences is launched where downsizing generates growth, growth generates imbalance, and vice versa.

Growth and adjustment also generate problems and imbalances in an enterprise's capital structure and between demand and supply for labor. In our example, the manager alleviates these imbalances through the standard method of a market economy: choice of an appropriate product mix. One might be tempted to applaud this ability to quickly learn market technique. The point, however, is that many defense industry managers in the high-tech sector of the Soviet economy have been inadvertently learning the basics of this technique for quite some time, even before perestroika.

The procurement cycle of a modern high-tech weapons system creates a formidable number of technological challenges, especially in an economy

with a weak high-technology base. On an enterprise level, intensive work under a high-tech weapons system is normally accompanied by underinvestment in factors of production—specialized capital stock and human capital. Investment in human capital includes not only training costs but also housing construction and maintenance of the social infrastructure. Sequential unfolding of the disequilibrium stage of growth (created by uncertainties in large-scale R&D projects) and an equilibrating stage where attention is shifted toward redeployment of factors of production to capital stock and human capital maintenance characterized the R&D cycle in many Soviet high-tech enterprises. This pattern is even more pronounced at the macrolevel. The transfer of the resources of military industry to large-scale weapons projects, which followed every step of the arms race, caused a serious deterioration in the country's investment balance as well as the situation in the consumer market. Corrective (balancing) measures became necessary, and one could have expected a subsequent influx of investment into civilian industry. However, for the reasons outlined in Kuznetsov and Shirokov (1989), it was again the defense sector that was (mainly because of technical complementarity between relevant civilian and defense production) displaying comparative advantages in accommodating pent-up civilian consumer and investment demand. What could be a better illustration of the "mobilized" or militarized nature of the Soviet economy: the defense sector not only created imbalances and distortions, it also was responsible for repairing them!⁴

Paradoxically, the unbalance-balance sequencing of the growth of the Soviet military industrial complex seems to confirm Albert Hirschman's (1958, 1979) vision of development as the sequential unfolding of the unbalancing (inducing, entrepreneurial) and redistributive (induced, balancing) functions of growth. We are prepared now to propose two hypotheses that will be explored in the rest of this article.

The first is that, since the Soviet defense complex performed a variety of both disequilibrating and balancing functions, it is not a unitary actor. It is fragmented and segmented, its segments being responsible for the specific function of Soviet growth.

The second hypothesis is, since the carriers of both balancing and unbalancing functions are defense enterprise managers, those of them who had to face the particularly challenging problem of combining these two functions might be good entrepreneurs. Indeed, we will argue that the strain of correcting numerous imbalances was a good incentive to be entrepreneurial (capable of getting things done) in the high-tech sector of the former Soviet defense industry.

Investigation of the heterogeneity of the defense complex will help us identify what it can offer to the emerging Russian development strategy. The next two sections will focus on the causes, outcomes, and mechanics of this heterogeneity.

2. Military-Led Indigenous High-Technology Development of the Mid-1960s through Mid-1970s

Numerous studies of the Soviet technological and industrial structure have come to the conclusion that it is segmented and highly heterogeneous (Iarcenko 1981; Glaziev 1990). At the extreme, some authors describe the Soviet economy as dual, one sector of which is modern industry rests on microprocessor technology, the other of which is outdated. Glaziev (1990)

provides evidence of a strong dichotomy between the two sectors. This dichotomy rests primarily on two pieces of evidence. First, the microprocessor-based sector and the old sector based on "chemical" and "metallurgical" long waves are expanding simultaneously. There is no or at most a very slow substitution of traditional production forms by microprocessor manufacturing processes, which has been very evident in the rest of the world. Second, the intersectoral transfers of factors of production are weak. In other words, this economy with a feeble modern sector is locked into a low-level equilibrium trap that impedes its structural transformation. This is not, however, the well-known defense/civilian industry dichotomy, but rather a duality based on a modern version of long wave theory (Dosi 1984; Perez 1985). How did the defense build-up contribute to the creation and reproduction of this industrial duality?

The major claim of the theory of long waves is that the socioeconomic consequences of the diffusion of modern microprocessor technologies may be compared to that of industrialization.⁵ Informatization may be seen as a global process of the substitution of traditional smokestack industry by the R&D-intensive information sector, quite similar to the substitution of agriculture by industry. If so, Alexander Gerschenkron's (1962) basic question once again becomes relevant: which prerequisites are indispensable for high-tech industrialization, and if some of them are missing, what might be substituted for them?

Explosive diffusion of microprocessor technologies began in the developed world after the Oil Shock. At this very time, because of the changing technico-economic paradigm (Perez 1983—a set of prevailing organizational and production routines), a great number of new organizational forms emerged (venture capital, internal ventures). Unsuccessful organizations perished while other industries successfully entered upon, and carried out, their creative destruction. The existence of this Schumpeterian (Schumpeter 1961) competition, which created a variety of organizations bearing the risk, became the basic internal prerequisite of high-tech diffusion.

Since successful application of technology is obtained only through learning by doing, the transfer of technology within multinationals rather than trade of goods became the major vehicle of diffusion. Multinationals create new high-tech units by replicating their own successful experience, obtained through learning by doing and unavailable in an ordinary marketplace. The freedom of entry of multinationals into the national economy became the essential external prerequisite of the diffusion of post-industrial technologies.

Obviously, both of these prerequisites did exist before the Oil Shock, which provided one of the major impetuses of the microprocessor revolution. They were taken for granted. This is why Gerschenkron's question about the prerequisites of post-industrialization has never been asked. Since the end of the 1970s, the growth of Schumpeterian competition, the expansion of multinationals, and the diffusion of microcomputers and other high technologies have become self-reinforcing processes.

Planned economies, however, by definition were missing both prerequisites and had to find substitutes for them. The result was the growing duality of the Soviet economy as a substitution for these missing prerequisites. The essence of this substitution is the following. Long-term goals (strategic and security goals are among them) were assigned to the

relatively technologically advanced sector based both upon imported technology and indigenous R&D. The short-term goals of maintaining stable economic performance and achieving modest consumer satisfaction resulted in the creation of a technologically and organizationally separate "subsistence" sector.

To understand the evolution of industrial duality since the middle of the 1960s, one should address the long-term implications of both the profound change in Soviet economic management in the mid 1960s and the windfall oil revenues of the early 1970s to mid-1980s. The economic reform of the mid-1960s failed to produce a market environment, but it did change the production structure of planning. Each ministry was responsible for a certain output. As is well known, industrial monopoly is prone to strategic behavior. Soviet industrial monopolies were by no means an exception. The implications of the emergence of long-term strategic goals on the part of civilian industry were two-fold. On the one hand, by striving for independence each industrial monopoly tended to create its high-tech pocket of excellence, usually based on Western equipment. On the other hand, the bargaining power of defense industries was somewhat reduced. In certain cases the other civilian industrial monopolies obtained priority in input allocation. The most notable examples are the civil engineering industrial monopoly dealing with diversion of Siberian rivers to central Asia, and the oil and gas industrial monopoly. The share of the latter in total industrial development increased from 6.6 percent in 1969 to 28 percent in 1989 (Narkhoz 1990).

Deindustrialization induced by the expansion of primary exports is called the "Dutch Disease" (Wijnbergen 1984). The Soviet case of Dutch Disease differed from its classical exemplar: a decline in the industry of oil-exporting countries as the result of the oil boom. While the machine-building industry supplying the machinery for oil and gas extraction flourished, the semiconductor and electronic industry was concentrated in the defense sector and special "pockets of excellence" of civilian industry. The large-scale investment in defense electronics in the 1960s should have been followed by large-scale investment in civilian high technology. After some consideration, this idea was dropped (Kovalenko 1987). In the absence of both organizational competition and freedom of operation of multinationals, indigenous civilian high-tech development was considered to be too costly. The USSR was supposed to exploit its comparative advantages in primary product and buy civilian high technology in exchange. Oil revenues changed the relative price system, which resulted in permanent stagnation in the civilian high-tech sector. In this sense, the Soviet Union represents a special case of Dutch Disease.

The civilian high-tech sector, which is technologically and organizationally very similar to the defense high-tech sector, had two sources of growth—imported Western equipment on the one hand,⁶ and supply spillovers from the defense industry on the other hand. In the latter case, for reasons of economies of scale, the firms established in the defense sector subsequently expanded into the civilian sector. The typical Soviet defense-oriented firm is a highly diversified enterprise broadly comprising three units: a dual-use technology base (metalworking and generic machine-building), defense output, and civilian output units depending on it. All of consumer electronics is produced by defense firms. In 1988, before the announced conversion, more than 40 percent of the defense sector output

was civilian output. Because of technological complementarity and for some other reasons that will be discussed in section three, civilian “pockets of excellence” cooperated more closely with high-tech defense firms than with the rest of the economy. Thus, the formation of a vertically-integrated sector comprising selected civilian and defense enterprises was completed.

The most noticeable outcome of this stratification of the economy on a relatively advanced sector implementing long-term goals and on an outdated sector was the appearance of organizational competition that, however distantly, resembles classical Schumpeterian competition. This is a very important neo-Schumpeterian hypothesis; the organizational routines and search procedures (the terms coined by Nelson and Winter 1982) of the high-tech modern sector are to a certain extent different from those of their selection environment. The crux of the matter is that there is no physical creation and death of new organizations: the modern sector simply converts organizations and firms of the traditional sector to its specific needs (thus “borrowing” them from the traditional sector) and returns them when they are no longer needed. There is a competition to enter the modern sector.

If the manager of a firm in the technologically advanced sector of the economy cannot produce up to expected standards (resulting in relatively high output quality and a substantial share of export output), how does it affect his career? The most likely outcome in Soviet industry would be his promotion to the post of one of the deputy ministers of the same or another industry to oversee the outdated (traditional) segment of the industry in question. This promotion would actually be considered a career setback. This example gives some idea of the intricacy of the labor market in the Soviet economy, where an appointment to the advanced sector even in a formally inferior position might be preferred to employment in the traditional sector.

According to this view, rapidly declining USSR high-technology, and especially defense industry, performance should be attributed not to the erosion of the priority protection of the modern sector, but rather to its growing inflexibility. Now this sector is the one with entry but without exit. Having once entered the modern sector, an individual or institution stays in it forever, regardless of subsequent performance. This was not the case in the 1960s. At that time a rapidly growing high-tech sector did perform selection functions (Kuznetsov and Shirokov 1989).

What accounts for the change between the 1960s and the 1980s? Hirschman’s (1970) conceptual distinction between aggressive (capital-stretching) monopoly and “lazy” (which exhibits quality deterioration in its adjustment behavior) monopoly, however vague it may seem, provides useful insights. The central concept of all of Hirschman’s writings is that of unbalanced growth that, by producing specific incentives and strains, creates entrepreneurship. In an economy where price-mediated competition is not strong (as in both developing and planned economies), “voice”—“any attempt at all to change, rather than to escape from, an objectionable state of affairs” (Hirschman 1970, 30)—develops as a substitute for exit. Limited competition is able to suppress “voice” and thus bolster a monopoly by unburdening it of its more troublesome customers. One way for a “lazy” monopolist to rid himself of the voice of these customers is to extend to them alone especially high-quality service and in this way buy “freedom to deteriorate” (Hirschman 1970).

The Soviet economy provides an unusual example of an economy where the distinction between “lazy” (quality-deteriorating) monopoly and

monopoly providing quality with high costs was institutionalized. The customers with powerful voice—the military, military industries, and producers geared specifically to Western markets—maintained the highly diversified military-industrial complex and special pockets of excellence within the civilian sector (Kuznetsov and Morgunov 1989), while the remainder of the economy—its traditional sector—was left to deteriorate.

Since the beginning of the 1970s, the voice mechanism has begun to lose its former effectiveness. Nepotism and widespread corruption resulted in a more feeble voice for engineers and chief designers as far as military industries were concerned (Korotkevich and Shchekochikhin 1991). Capital-stretching “aggressive” monopolies increasingly turned into “lazy” monopolies. Following Hirschman, one might hypothesize that in an economy with very limited competition, economic development degenerates into a transformation from manufacturing industry dominated by “lazy” monopoly to one with capital-stretching monopoly or, at best, oligopoly. This is, of course, a transition from one evil to another, but in some unfortunate countries like Argentina and the Soviet Union, even this transformation has stalled.

Such an evolutionary view, emphasizing the importance of organizational diversity and learning by doing, at least partly explains the failure of current conversion. However, many of the successful market organizational forms and new organizational structures—cooperatives and joint ventures—are in the military-industrial complex. The point is that for many defense enterprises it is not yet the time for learning by doing, or more precisely, for the adoption of profitable civilian technologies. Current conversion came as an unexpected organizational shock, which did not allow time to make a search for new organizational and production routines. In this case, before beginning to learn by doing there should be a rather long embryonic phase of learning to learn (Stiglitz 1988)—i.e., adoption of technologies not for their current or prospective profitability but for the benefits that will accrue in the adoption of future technologies. This learning to learn is at least partly responsible for apparent allocative inefficiencies that do not exploit comparative defense industry advantages, such as converting space rocket production to washing machine manufacturing.

Three conclusions are important from this review of military-led high-tech industrialization in the USSR:

- Diversification of the defense industries into the civilian sphere was, from their point of view, rational not only because of economies of scale but also because of the possibility of transferring the revenues and inputs from civilian to defense manufacturing. Being the only producer of certain types of capital or intermediate goods, defense producers exerted power over the whole economy. In other words, priority protection was not necessarily the result of the high priority of defense per se, but rather a response to the predominant bargaining power acquired in a monopoly position in a civilian market. Another somewhat unusual rationale was using civilian production as a screening device for investment allocations to determine losers and winners in defense procurement.

- The dynamism, albeit very insufficient, of Soviet high-tech industrialization was based on a system of creating the winners and losers in investment allocations and defense procurement. More specifically, a winner is typically an enterprise that has succeeded in high-investment or defense-procurement allocation in an embryonic “internal capital market” within

ministries-conglomerates. Losers are typically those who receive either less prestigious defense contracts or traditional (non-high-tech) investments, or no investment at all. This is the mechanics of reproduction of technological duality (Glaziev 1990) or capital heterogeneity (Iaremenko 1981).

• In the second half of the 1970s, and especially in the 1980s, even this very remote surrogate for Schumpeterian competition was breaking down. Growing institutional rigidity is the major cause of the Soviet growth slowdown in the second half of the 1970s and 1980s. In the next section, we will take a closer look at the defense industry implications of capital heterogeneity.

3. Technological and Institutional Heterogeneity of the Defense Sector

The Soviet defense industry seemed to be technologically and organizationally homogeneous. It enjoyed priority protection in the course of plan implementation. The *voenpred* [military control] system enforced the quality of the military output. The secrecy level, however, differed from industry to industry and from firm to firm. Considering the long-term performance of the Soviet defense industry rather than the short-term, the question arises how the overall tendencies to generate technological duality and non-homogeneity discussed above are manifested in the defense complex.

The Soviet defense consumer (the Ministry of Defense and the Military Industrial Commission of the Council of Ministers), is very restricted in its choice of the producer of a selected weapons system. The bargaining power of the defense consumer is substantially greater than that of its civilian counterpart, but again it is basically short-term bargaining power based on the ability to impose a punishment if the quality of the weapons is below a certain specified level.

Western Coordinating Committee for Multilateral Export Controls (COCOM) restrictions on the export of sensitive technology and the virtual absence of other experts in high technology except those in high-tech defense-related design bureaus made these design bureaus monopolists with very great bargaining power. The technocratic intellectuals working there resemble Galbraith's notion of a technostructure,⁷ whose specific interests differ both from the goals of the Ministry of Defense and the defense producer. In some cases, this technostructure may pursue research projects unrelated to defense objectives. The process is simple: give the project a military title, use this title as a cover to obtain the necessary resources, and then pursue your own research interest.⁸

It is the disequilibrium characterized by the mismatch of defense supply and demand that contributes further to the defense industry's diversity and creation of a wide range of management routines. The planner's priority, organizational routines, differ substantially in the disequilibrium sector (where there is a permanent substantial gap between defense consumer demand and actual supply) and the equilibrium sector (where there is no such gap). In the first-priority disequilibrium sector there is relatively balanced financing in both product and process development, since it is technological processes that are the major bottleneck in advancing product development. Conversely, in the second-priority sector, military R&D is concentrated on product development to the total neglect of manufacturing technology.⁹ That is why the technological level of this "traditional" sector of the defense industry, basically dealing with conventional weapons, is on

average stunningly low. The standard manufacturing technology of the "traditional" defense sector is just as obsolete as that of the traditional civilian sector (Isaev 1989). In fact, it might be even lower, since unlike the civilian economy, the access of the defense sector to foreign equipment is jeopardized because of COCOM restrictions.

Under these circumstances, the sector with relatively outdated manufacturing processes tries to achieve military effectiveness by simplifying weapons design (Soviet conventional weapons were famous for their simplicity), while the high-tech sector pursues a level of technology as the first priority. Operational capability is achieved through a sufficiently high technology level.

There has been a long-running debate on the comparative importance of military effectiveness vs. level of technology in Soviet weapons design (Perry 1973, 37-38; D. Holloway 1977, 411-413). The proposed sectoral breakdown provides the conceptual distinction: the disequilibrium sector emphasizes the level of technology (since presumably all the possibilities for making up the lag in technology by indigenous design have already been utilized); the equilibrium sector emphasizes weapons design. In other words, the whole defense sector strives for simplicity in weapons design in the technologically inadequate environment (i.e., lacking a solid civilian technology base). The equilibrium sector, specializing in relatively technologically undemanding tasks, proceeds far enough in this direction and meets the performance requirements of draining resources extensively from the civilian economy. In the implementation of technologically advanced tasks, the possibility of substituting inadequate technology by product design to obtain the necessary technology either from abroad or from the civilian sector is reduced. So the technological level becomes the primary goal of the defense plant in question.¹⁰

This distinction between the disequilibrium (high-tech) and equilibrium (traditional) sectors is for expository purposes only. There is no strong dichotomy between the two sectors. Rather, a spectrum of enterprises exists, with some production units in the middle. Defense industry heterogeneity was manifested in the transfer of resources between high-tech and traditional sectors.

4. The Dual-Dual Economic Policy of Demilitarization

Let us summarize the argument so far. I have argued that the Soviet military-industrial complex has always performed two functions. Its primary function was to supply the military with advanced weaponry. Like any high-tech activity, it was sometimes prone to failure. It also created regional and sectoral imbalances in the economy. The balancing function—provision of less advanced but readily available (traditional) weaponry, provision of consumer durables and social services, and correction of sectoral imbalances—was often performed by the military-industrial complex, too. The "unbalancing" function was performed by the technologically advanced sector of the military-industrial complex (aggressive or dynamic monopolies), while the "balancing" one was undertaken by the traditional sector ("lazy" monopolies).

In a well-functioning market economy such redistribution (balancing) functions as correction of regional imbalances and income inequality are performed by the government. The capital market corrects sectoral imbalances. However, the sheer magnitude of defense downsizing implies a

high probability of both market (profit-oriented activity) and government failure. Thus, a viable and nonviolent strategy of downsizing should combine two patterns of business behavior: an unbalancing risk-taking entrepreneurial one and a somewhat inefficient pattern of professional management with a paternalistic attitude toward the employees. Fortunately, the solution to this problem is contained in the recent economic history of the Soviet military sector. The cases of successful downsizing reveal an intricate interplay of these two patterns of behavior. The following is an example.

The major problem of conversion of manufacturing processes in the short run is the lack of profitable production opportunities. In a rapidly disintegrating economy this problem is crucial. The major goal of production cooperatives created by defense manufacturers is to establish the whole technological chain, embracing the slack industrial capacities of one defense-oriented enterprise, the unused inputs from another, excess labor from a third, etc. This semi-market behavior might entail the formation of efficient civilian manufacturing processes converted from defense processes. Such cooperatives, however, are heavily dependent upon the mother company defense-oriented plant that instituted them. That is why one would consider it a profit-maximizing internal venture rather than an independent economic agent.

Desperate to find satisfactory conversion technologies, constrained by numerous restrictions imposed by planners, unable even to disclose its own identity because of secrecy limitations, those defense industry managers who are shrewd and far-sighted enough would establish a cover company. This company is seemingly independent (and thus free from the usual behavioral constraints), but in fact performs functions that are vital for the mother company during conversion. The major objective of the cover firm is, of course, production of civilian goods on the basis of unutilized capacities of the mother firm. Thus something very important for genuine market transition is emerging: organizational competition between a large-scale firm and its own internal venture—a market cooperative. If the “market” organization turned out to be more efficient in the search for new civilian production routines, the wages of its employees would be higher, and one might expect the transfer of labor from the state-controlled part of the large plant to the market-oriented (internal venture) part. As long as the internal venture produces civilian output utilizing the slack capacities of the defense firm that otherwise would have been idle, and the output of the internal venture counts for the conversion effort of the defense firm, its manager supports such resource transfer. In evolutionary terms, the internal venture performs the Schumpeterian creative destruction of the state-controlled part of the large plant. Significant wage differentials in state-controlled and market sectors of the enterprise in question provide the labor transfer incentive.

The objection may be raised that in the current Russian economic environment the establishment of cooperatives is quite often a stealthy form of asset-stripping in which a group of managers takes the potentially profitable shops of a plant, the rest of which are left to be supported by state subsidies.¹¹ However, this is not an argument against the transfer of resources from established state to start-up private enterprise, but rather an argument for the acceleration of privatization, which would enable the authorities to regulate such transfer.

Let us examine this situation in the context of development economics. The large-scale defense-oriented plant in question has a segmented local labor market. Because of the temporary lack of efficient opportunities for conversion and civilian diversification, the marginal product of labor in this stagnant section of the firm is zero. Its marginal benefits, however, are greater than zero: hidden unemployment is sustained by financial transfers from a profitable "cooperative." The manager of the firm performs the function of the government: he levies a tax on the profit of "cash cows" to provide retraining for redundant personnel. Everyone can be in a position of hidden unemployment: to work in a "cash cow" is a matter of luck rather than merit. Thus, these financial transfers are not only tolerated but even encouraged as long as hidden labor redundancy shows a tendency to diminish.

I would argue that given the entrenched business routines of the Russian managers it makes sense to stimulate a similar duality on the macro level. Schumpeterian-type competition involving high profit and frequent bankruptcies will inevitably be combined with a less dynamic sector of large diversified businesses, which would perform the balancing functions (like providing some sort of a safety net for its workers) in very much the same way it had done before the price liberalization of 1992. We will not change the business routines of defense industry managers overnight, and even if we could, we should not. These business routines contain numerous "hidden rationalities." The call for a dual strategy of demilitarization (an aggressive profit-motivated private sector vs. a large-scale mixed economy with deliberate creation of some "slack") stems from the need to employ these entrepreneurial resources, which would have been badly utilized otherwise. In other words, the dominance of the military-industrial sector in the Soviet economy created a specific managerial culture, which, being a far cry from the bureaucratic culture (as the preceding section argues), is the most suitable in the context of development based on large diversified business groups. Learning is the hallmark of such development; "fast growth is an unexpected consequence of government intervention, high productivity is an unexpected effect of fast growth, and competition is an unexpected outcome of monopoly" (Amsden 1989, 153). Having described the impact of the military-industrial complex on the institutional prerequisites of Russian economic development, let us turn to discussion of the more conventional initial conditions: technological endowment and human capital stock.

The defense sector duality suggested in the previous section sheds some light on both the competitive position of the military firm's civilian output and the scope of required restructuring. The high-tech (priority) segment of the defense industry does have dynamic comparative advantages in the civilian world market. They are geared to "technology gap" goods (medical equipment, for example), where international trade is costly because of numerous non-tariff barriers. The cluster of capital goods that are less sophisticated (intermediate inputs for machine tools, for example) face a more competitive market, but by the same token their equilibrium price is very sensitive to the exchange rate. Because of potentially high productivity of the primary resource sector, the equilibrium exchange rate of the Russian currency is bound to be rather high; that is, unfavorable to high value-added exports. A broad policy of state-administered export subsidies will be required to promote high-tech exports produced with formerly military-related industrial capabilities. Alternatively, the high-tech sector of the

defense industry can be geared to import substitution in agricultural equipment and oil-related capital goods. As the example in section one indicated, on the micro level there will be an intricate succession of export-promoting and import-substituting growth phases.

For the low priority (obsolete) segment of the defense industry, the prospects are bleak. It can hardly contribute anything positive in terms of managerial culture. The enterprise manager in this case is indeed a bureaucrat—a “lazy” monopolist (Hirschman 1970) as we described him earlier. Capital stock is obsolete and labor requires substantial retraining. However, if one takes into account that such plants are usually concentrated in a very small area, and in the region in question (Ural, for example) there are many inefficient civilian machine-building plants that are obsolete and close to bankruptcy, too, the efficient solution is much easier to find. The first two steps, which should be taken simultaneously, are the following. The first is retraining the workers for future employment on new civilian capital equipment—mini-plants of ferrous metallurgy. The second is the creation of a network of small mini-plants of ferrous metallurgy that would work on regional scrap. The rolled metal of these mini-plants would facilitate the formation of highly specialized machine-building firms housed on the premises of the former large-scale plants and capable of providing employment for its workers.¹² In this case, the reemployment of the defense firm workers is a by-product of the wider regional problem, which has no particular reference to the defense industry per se. There is no standard recipe, of course; one must find solutions in every particular case. It is clear, however, that government or government-mediated capital assistance is required to finance such ventures. The combination of the two somewhat contrasting business mentalities emerging in the process of demilitarization with the sectoral division of the defense industry results in the dual-dual policy of the Russian demilitarization and development.

5. Conclusion

The failure of the Soviet conversion of 1989-1991 was correctly attributed by many observers to a lack of market incentives. We should not, however, fall into the trap of letting the market alone take care of defense downsizing. Market institutions will develop gradually and thus market failure—or more correctly, market inadequacy—will be on the agenda for years to come. It would be altogether ahistorical, however, to believe that government intervention can always successfully correct market inadequacy. A theory of economic behavior in the presence of both government and market failures still needs to be elaborated.

The reading of Soviet economic history from the mid-1960s till the mid-1980s presented in sections two and three of this article provides an example of “muddling through” in the presence of both types of failures. Government was captured by various “lazy” monopolies and was unable to implement its own development plans. Market incentives were non-existent, or at best suppressed. Relying on various insights of Albert Hirschman—whose central preoccupation is, from my point of view, precisely where the incentives of economic behavior lie in the presence of both market and government or hierarchy failure—I tried to show how things were done when neither market nor hierarchies were well developed. From this perspective, a great deal of continuity and path-dependency between the pre-1992 Soviet economy and the nascent Russian market environment is to be expected. Institutional

vacuum indicated by both market and government failure is the unavoidable context of Russian defense industry downsizing. It will not be costless to adjust both the managerial and technological routines of the military-industrial complex to emerging Russian market conditions, but as this article has indicated, the long-term outlook is not entirely bleak.

Chances for success will be higher if we abandon the view that the Russian military-industrial complex was a unitary actor and try to comprehend the "hidden rationalities" in the behavior of its economic agents. The tremendous institutional, technological, and economic heterogeneity of the defense sector that have been discussed in this article facilitate the challenge of identifying everything viable and capable of evolution on which the newly emerging Russian development strategy can rely. It is important to understand that the heterogeneity I was discussing is manifested in virtually every military-industrial enterprise, which is one of the reasons for the profound organizational turmoil: certain units of a formerly single enterprise succeed and form an independent firm, others create associations, etc. That is why, while I wholeheartedly agree with the major thrust of the conclusion of Ethan Kapstein and Marshall Goldman's article in this issue, that efforts directed to conversion at the level of the enterprise tend to fail, the whole notion of "enterprise" is not quite operational in the current Russian institutional environment.

There is little doubt that one of the outcomes of the dramatic reduction of the procurement budget in 1992 and onward will be de-industrialization rather than reallocation of resources to civilian manufacturing. Still, if the Russian government is able to pursue appropriate macro and industrial policies, certain poles of growth based on the human capital of the defense enterprises are bound to emerge.

Notes

1. See Kuznetsov (1994) for the relevant stylized facts.

2. According to J. Cooper (1992), in 1995, 72.5 percent of industrial personnel of the military industrial complex were employed mainly in Russia. For that matter, of all the USSR successor states, we will focus mainly on Russia.

3. The reader may consult Kuznetsov (1992), which addresses these issues and complements the current analysis.

4. In 1991, the defense complex produced all of the Russian output of television sets, sewing machines, cameras, and video-cassette recorders; 94 percent of all computers; 98 percent of tape recorders; 98 percent of refrigerators; and 94 percent of aluminum rolled metal (Golovachev 1992).

5. That is because not only the new dynamic sector is being created, which drains labor from the traditional branches of the economy; the manufacturing process of the traditional branches also changes dramatically (and indeed, a substantial proportion of demand for electronics comes from metallurgy, the chemical industry, etc.). This profound technological change creates new prevailing organizational forms and changes drastically the motivations and skills of labor. The technological duality (Glaziev 1990) or segmentation (Iaremenko 1981) of the Soviet economy is a process but not a product segmentation. Metallurgical or chemical plants belong to the modern sector along with semiconductor industries if their manufacturing processes are modern, i.e., based on a recent advancement of the microprocessor industry.

6. In the 1980s the ratio of imported Western equipment in the overall capital stock is close to 80 percent in the chemical industry, 70 percent in the pulp and timber industry, and 50 percent in the food processing industry. *Vneshnyaya Torgovlya SSSR, 1981-1989*.

7. While J. Galbraith's (1967) claim of the takeover of corporate decision-making by an overlapping bureaucracy of experts called the "technostructure" is more wishful thinking than a conclusion based on sound empirical evidence for the American economy, it is relevant to Soviet decisionmaking in high-tech industry. The large-scale enterprise of modern Western society exists in a highly competitive environment. This environment entails the erosion of the technostructure. In the Soviet Union that is clearly not the case.

8. The projects pursued by the Soviet defense industrial technical elite were sometimes ridiculous in their goals. An example is the project of construction of an engine which allegedly would be able to exceed the velocity of light (Kuznetsov and Shirokov 1989).

9. This is also the typical situation in the United States. According to Reppy (1990), the U.S. Department of Defense program for manufacturing technology (Mantech) has a budget of only about 0.1 percent of the defense R&D budget.

10. Thus, once again it is the manufacturing technology that distinguishes the disequilibrium sector, not the output it produces. What gives the Soviet advanced high-tech sector the highest priority is a technology gap with Western adversaries that is considered to be critical.

11. I am indebted to P. Flaherty for making this point.

12. A more precise elaboration of this case and further discussion of conversion in the context of the structural change in the civilian economy may be found in Kuznetsov (1990a, b).

References

- Amsden, Alice H. 1989. *Asia's Next Giant: South Korea and Late Industrialization*. New York: Oxford University Press.
- Cooper, Julian. 1992. "Defence Industry Conversion in the East: The Relevance of Western Experience." Paper prepared for 1992 NATO Economics Directorate Colloquium, "External Economic Relations of the Central and East European Countries." Brussels, 8-10 April 1992.
- Dosi, G. 1984. *Technical Change and Industrial Transformation*. New York: St. Martin's Press.
- Frieden, Jeffrey A. 1991. *Debt, Development, and Democracy: Modern Political Economy and Latin America, 1965-1985*. Princeton: Princeton University Press.
- Galbraith, John Kenneth. 1967. *The New Industrial State* Boston: Houghton Mifflin.
- Gerschenkron, A. 1962. *Economic Backwardness in Historical Perspective*. Cambridge, Massachusetts: Belknap.
- Glaziev, S. 1990. *Ekonomicheskaya Teoria Tekhnicheskogo Razvitiya* ["Economic Theory of Technological Development"]. Moscow: Nauka.
- Golovachev, V. 1992. "The Collapse of The Defense Complex May Cause the Crash of the Economy," *Ekonomika i Zhizn* 18, May 1992.
- Hill, C., S. Deitrick and A. Markusen 1990. *Converting the Military Industrial Economy* New Brunswick: Rutgers University. [unpublished manuscript].
- Hirschman, A. 1981. "The Social and Political Matrix of Inflation: Elaborations on the Latin American Experience," *Essays in Trespassing: Economics to Politics and Beyond*. Cambridge: Cambridge University Press.
- Hirschman, Albert O. 1979. "The Turn to Authoritarianism in Latin America and the Search for Its Economic Determinants," in David Collier, ed., *The New Authoritarianism in Latin America*. Princeton: Princeton University Press, 61-98.

- Hirschman, Albert O. 1970. *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*. Cambridge, Massachusetts: Harvard University Press.
- Hirschman, A.O. 1958. *The Strategy of Economic Development*. New Haven: Yale University Press.
- Holloway, D. 1977. "Military Technology," in *Technological Level of Soviet Industry*. New Haven: Yale University Press.
- Iaremenko, Yu. 1981. *Strukturnie Izmeneniia v Socialisticheskoi Ekonomike* ["Structural Changes in the Socialist Economy"]. Moscow: Myusl.
- Isaev. 1989. "Reformyi i Oboronnye Ostrastli" "Reform and the Defense Industries"], *Kommunist*, 5.
- Korotkevich, P. and Yu. Shchekochikhin. 1991. "VPK Bolshevikov," *Literaturnaya Gazeta*, 2 October 1991.
- Kostin G. 1992. "Oboronka bez mifof" ["Defense complex stripped off mythology"], *Sovetskaya Rossia*, 14 October 1992.
- Kovalenko, V. 1987. "EVM na puti k tret'emu tusacheletiu." ["Computer on the road to the year 2000." Roundtable discussion] *Socialisticheskaya Industriia*, 4 August.
- Kuznetsov, Ye. 1990a. "Dinamishkie modeli v issvedovanii processov tekhniko-economiceskoro razvitiya" ["Dynamic Models in the Analysis of Technological Development"], Ph.D. dissertation, Moscow.
- Kuznetsov, Ye. 1990b. "Konversya Neotloshnye zadashi i dolgosroshnye problemi." *Kommunist* 13. trans. in JPRS-UKO-90.
- Kuznetsov, Ye. 1993. "Defense Industry Downsizing in Short-run Crisis Management: The case of the former Soviet Union and its implications for the USA adjustment." in E. Kapstein, ed., *New Political Economy of Defense*. Congressional Quarterly Press, 1993, 159-85.
- Kuznetsov, Ye. 1994. "Economy-wide and Macro Implications of the Defence-related enterprises restructuring in Russia," *The World Bank Policy Research Paper*. Forthcoming.
- Kuznetsov, Ye. and O. Morgunov. 1989. "Mechanizmi Vosproizvodstva Raznokashevnykh Resursov" ["Mechanisms of Growth of Non-Homogeneous Economy"], *Izvestia Akademii Nauk SSSR senya Ekonomicheskaya*, 5.
- Kuznetsov, Ye. and F. Shirokov. 1989. "Naykoemkie Proizvodstva i Konversia Oboronnoi Promyshlennosti," *Kommunist* 10: 15-23. [English translation available: "Science Intensive Output and Defense Industry Conversion," JPRS-UKO-89-016, 21 September 1989: 8-13.]
- Nelson, R. and S. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge: Belknap Press.
- Perez, C. 1985. "Microelectronics" ["Microelectronics, Long Waves and World Structural Change: New Perspectives for Developing Countries," *World Development* 13, 441-63.
- Perez, C. 1983. "Structural Change and the Assimilation of New Technologies in the Economic and Social System," *Futures*, October.
- Perry, R. 1973. "Comparisons of Soviet and US Technology," Rand R-827-PR. Santa Monica: RAND.
- Reppy, J. 1990. "Military Research and Economic Performance," Manchester, U.K.: University of Manchester.
- Schumpeter, J. 1961. *The Theory of Economic Development*. New York: Oxford University Press.
- Stiglitz, J. E. 1988. "Economic Organization, Information, and Development," in *Handbook of Development Economics*. New York: North Holland. 94-160.
- Thorbecke, E. 1990. "Agriculture and Economic Development," *Social Research* 47, 2.
- van Wijnbergen, S. 1984. "The Dutch Disease: A Disease After All?" *Economic Journal* 94: 41-55.