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**THE DEFENCE SECTOR IN THE ECONOMY OF A DECLINING
SUPERPOWER: SOVIET UNION AND RUSSIA, 1965-2000**

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COUNTRY SURVEY

**The Defence Sector in the Economy of a Declining Superpower:
Soviet Union and Russia, 1965-2000**

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Abstract

The Soviet Union was able to develop a large military-industrial complex and become the world's second superpower despite the small size of its malfunctioning planned economy because defence was given high priority status and special planning, rationing and administrative mechanism were used to ensure attainment of national security objectives. However, in the period 1976-85 the effectiveness of priority protection diminished and defence institutions experienced more of the problems typical of the shortage economic system. The heavy defence burden also created growing difficulties for the civilian economy. The attempts by the Gorbachev government to reform the defence sector and improve defence-economic relationships during perestroika (1985-91) uniformly failed. For most of the transition period, the Russian military-industrial complex has been adversely affected by its low priority status, drastic cuts in defence spending, instability of the hybrid politico-economic system, and negative growth of the economy. The armed forces and defence industry have been reduced in size and their outputs of military services and equipment have fallen to low levels. Nevertheless, the Russian armed forces still have over one million troops, significant stocks of sophisticated conventional weapons, and a large nuclear arsenal. Since mid-1999 the priority of the defence sector has been raised significantly, defence spending has increased, and the new government of President Putin has adopted ambitious plans to revive Russian military power by 2010. Economic factors will be of crucial importance in determining the success of this effort.

Key Words

Soviet Union, USSR, Russia, defence economics, defence sector, military-industrial complex, defence expenditure, defence budget, defence burden, arms race, armed forces, logistics, defence industry, military RDT&E, arms trade, national security, conversion, disarmament, economic systems, defence planning.

1. Introduction

Governments of the nation with Russia at its core (Tsarist Russia, Soviet Union, Russian Federation) have been committed, over the past century, to achieving a strong defence capability due to geopolitics, ideologies, historical experiences, and foreign military threats. However, the Russian economy always has been backward relative to those of leading industrialised countries (Davis 1999). A key challenge for Russian leaders therefore has been to develop economic institutions and policies that could mobilise the nation's limited resources to support a powerful military-industrial complex. The Stalinist command economic system proved to be especially effective in generating military power. The USSR industrialised rapidly in the 1930s, triumphed over Germany in World War II, and achieved strategic parity with the USA during the Cold War. It reached the apogee of its upward trajectory as a world power in the mid-1970s. Over the next decade, the USSR's military capabilities increased, but its economic growth decelerated and the gaps between Soviet and Western technologies widened (Davis 1990b). Reforms during 1985-91 failed to arrest this decline and the USSR fragmented after a terminal systemic crisis. Since 1992 the Russian state has attempted to construct a new politico-economic system and to reform a scaled-down defence sector to make it more effective and efficient.

This country survey addresses several questions about the Soviet and Russian defence sectors.¹

How did the relatively small Soviet economy support a superpower military-industrial complex? What factors determined the allocation of resources to defence? Why did the relationship between the defence sector and the Soviet economic system become dysfunctional in the 1980s? How have systemic changes associated with the Russian transition process, economic decline and reform programmes influenced the military-industrial complex? What are the prospects for the revival of Russia as a significant military power in the 21st century?

2. The Defence Sector in the Soviet and Russian Economic Systems

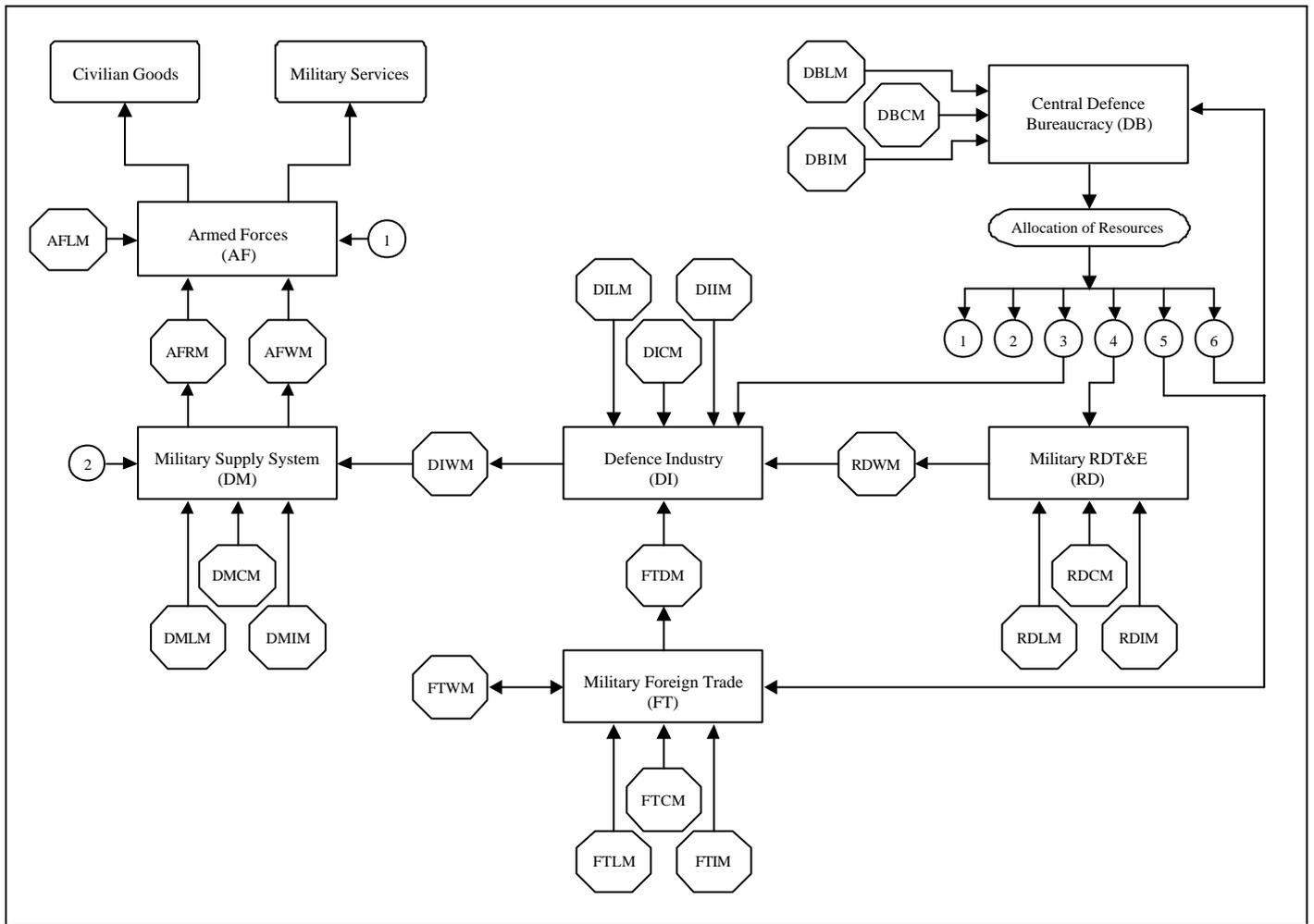
The Soviet and Russian defence sectors are defined in accordance with the national accounting

procedure of identifying an economic output (in this case, military services) and then assigning to the branch the institutions engaged in producing it: armed forces, military supply (logistics) network, defence industry, military RDT&E, military foreign trade and central defence bureaucracy (Davis 1990a). The transactions of defence institutions with each other and civilian organisations are carried out in the markets identified in Figure 1.² The armed forces produce potential and actual military services.³ The military supply network purchases goods from civilian and defence institutions and supplies them to the armed forces through retail and wholesale markets (AFRM and AFWM). Military and civilian commodities are produced by the defence industry and are sold in domestic and foreign markets, as are the designs and prototypes of the military RDT&E system. The military foreign trade institution legally exports and imports commodities and illegally obtains foreign military technology through espionage programmes. The central defence bureaucracy controls the defence sector production process. The vertical organizations of these defence institutions in the USSR and Russia are examined in sections 3.a and 5.a.

In both the Soviet and transition period the allocation of resources to the defence sector and the decision-making and behaviour of defence institutions have been heavily influenced by state priorities, the characteristics of the economic systems, the geography of the defence sectors, and military alliances (Warsaw Pact and Commonwealth of Independent States (CIS)).⁴ These factors are discussed in sections 3.a-c and 5.a-c.

Soviet and Russian national security (NS) is generated by a complex process that has external and internal dimensions: $NS = f(ENS, INS)$ (Davis 1992a). Changes in ENS and INS are caused by interactions of external and internal final threats (EFT, IFT) and the external and internal military services (EMS, IMS) produced by the armed forces: $ENS = f(EFT, EMS)$ and $INS = f(IFT, IMS)$. Initial threats are lowered to final ones by diplomatic, espionage,

Figure 1: Institutions and Markets in the Soviet/Russian Defence Sector



Notes: The defence sector markets, represented by the octagons, show the main flows of goods and services into or out of the defence sector and between the six defence institutions, represented by the rectangles. They do not show payments for supplies or the return flows of tax or profits from institutions to the state. The allocation of resources by the Central Defence Bureaucracy using plans and budgets is represented by the oval and six circles.

AFLM	Armed forces labour market	RDLM	Military R&D labour market
AFRM	Armed forces retail market	RDCM	Military R&D capital market
AFWM	Armed forces military commodity market	RDIM	Military R&D intermediate goods market
DMLM	Military supply labour market	FTDM	Military foreign trade domestic market
DMCM	Military supply capital market	FTLM	Military foreign trade labour market
DMIM	Military supply intermediate goods market	FTCM	Military foreign trade capital market
DIWM	Defence industry military commodity market	FTIM	Military foreign trade intermediate goods market
DILM	Defence industry labour market	FTWM	Military foreign trade world market
DICM	Defence industry capital market	DBLM	Central defence bureaucracy labour market
DIIM	Defence industry intermediate goods market	DBCM	Central defence bureaucracy capital market
RDWM	Military R&D military technology market	DBIM	Central defence bureaucracy intermediate goods market

Source: Prepared by the author on the basis of figures in Davis (1990a, 1992a).

propaganda, and arms control institutions. Governments develop strategies to ensure that national security status achieves a target level: $NS \geq NT$. These involve allocating resources to threat reduction and military programmes.

3. The High Priority Defence Sector in the Soviet Shortage Economy: 1965-85

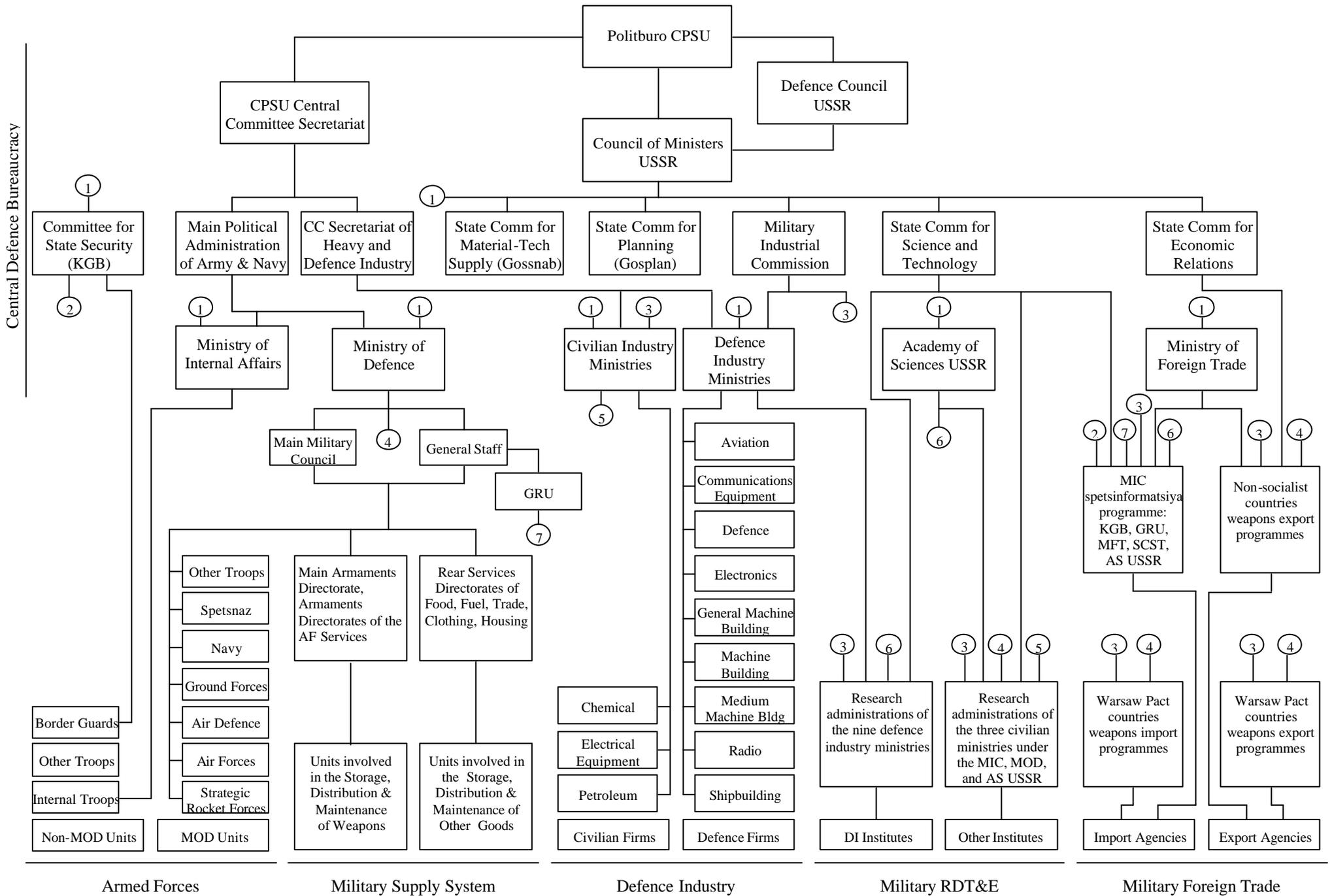
a. Organisation of the Soviet Defence Sector

The Soviet defence sector was organised in a manner that facilitated the build-up of military power in an authoritarian political system and a command economy.⁵ Its organisation in terms of the six institutions and the vertical relationships of their components is described in Figure 2. Their horizontal links are illustrated in Figure 1 and discussed in Davis (1990a).

The USSR's traumatic experiences in World War II, nationalistic attitudes, and Marxist-Leninist ideology caused the Brezhnev-generation elite to perceive amplified foreign threats and to adopt an ambitious national security strategy that demanded large-scale production of threat reduction and military services. The central defence bureaucracy approved Soviet military doctrine, which provided guidance concerning the probability and nature of a future war, and the preparations necessary to fight it successfully. Economic developments in the defence sector were governed by general plans and special long-term weapons programmes.

The Soviet government distributed defence assets across the country to accomplish national security objectives irrespective of costs. Conventional forces were organised to fight in three Theatres of Military Operations (Western, Southern, Far Eastern) and were divided between 16 military districts within the USSR, four Groups of Soviet Forces Abroad, and four fleets. In 1991 the 1,400 ICBMs in the USSR were based in the Russian Federation (1,066), Ukraine (176), Kazakhstan (104), and Belarus (54). Defence industry and military RDT&E establishments were predominantly located in Slavic republics. Certain regions, such as Moscow and Perm, had heavy

concentrations of defence industry and secret “closed cities” existed that were devoted to military



Source: Prepared by author on the basis of figures in CIA (1986) and DOD (1988) and information from Soviet/Russian sources (e.g. Ivkin 1999) and interviews.

production and RDT&E (Gaddy 1996).

The Soviet Union dominated the Warsaw Pact and used it to maintain control over the armed forces of East European countries and to obtain resources from their defence industries and military RDT&E (Rice 1984, Crane 1987). Since the East Europeans contributed 18 % of Warsaw Pact troops and 10 % of its expenditure, despite possessing 30 % of its population, they could be viewed as “free riders”. However, since they did not wish to be alliance members, this spending could as well be viewed as a Soviet tax.

b. High Priority Status of the Soviet Defence Sector

The priority system was a key determinant of Soviet success in mobilizing resources to support a large military-industrial complex. During 1965-88 the defence sector had a high priority status (Table 1) (Ericson 1988, Davis 1990a). The Soviet leaders’ preference ordering appeared to be a non-marginalist, lexicographic one, with defence needs being satisfied fully before those of less important branches. The defence sector had generous wage rates and in-kind benefits. During plan implementation, the Military-Industrial Commission (MIC) made energetic efforts to ensure that defence goals were achieved. Military inspectors (voenpredy) in factories were supposed to safeguard quality standards. Defence institutions had relatively “soft” budget constraints and usually obtained planned supplies despite the chronic instability and deficits in the civilian economy.⁶ All defence institutions were allowed to maintain large input inventories. However, the effectiveness of priority protection diminished in the “era of stagnation” (1976-85), with the result that problems increased in the defence sector (Davis 1992a).

Table 1: Priority Status of Defence Institutions in the Soviet and Russian Economies		
Priority Indicator	Soviet Command Economy	Russian Transition Economy
During Plan/Budget Formulation		
Defence in Leadership's Objective Function	High Weight/Lexicographic Ordering	Low Weight/ Trade-Offs between Defence and other Objectives
Responsiveness to Problems	Highly Responsive	Unresponsive
Wage Rates	Relatively High	Relatively Low
Adequacy of Financial Norms in Budgets	Generous	Stingy
During Plan/Budget Implementation		
Outputs	Commitment to Overfulfilment of Plans	No State Plans, Minimal Help in Maintaining Output
Budget Constraints	Soft	Relatively Soft
Supply Plans	Commitment to Fulfilment of Plans	Tolerance of Disruptions
Investment Plans	Ambitious and Commitment to Fulfilment of Plans	Little Investment and Indifference to Fulfilment
Inventories of Inputs	Large Input Inventories	Depleting Input Inventories
Reserve Production Capacity	Large Mobilization Capacity	Diminishing Mobilization Capacity
Shortage Intensity	Low	High
Sources: Davis (1990a, 1992a) for the Soviet command economy and research of the author in the 1990s for the Russian transition economy.		

c. Defence Institutions in the Soviet Shortage Economy

The microeconomic features of Soviet defence institutions, summarised in Table 2, were determined jointly by their relative priority ranking and the influences of the shortage economy.⁷

Defence industry was more powerful than either the armed forces or military R & D (Almquist 1990), so it had the best conditions. Defence industry enterprises functioned in sellers' markets in

Table 2: Behavioural Characteristics of the Defence Institutions in the Soviet and Russian Economies		
Characteristics	Soviet Command Economy	Russian Transitional Economy
Output Side of Defence Institutions		
Market for Outputs	Sellers' Market, Defence Industry Dominant	Gradual Shift to Buyers' Market
Attitude Toward the Quantity of Output	Quantity Drive	Inertia Initially Maintains Quantity Drive, but then a Shift to Revenue Maximization
Attitude Toward the Quality of Output	Neglect of Quality	Greater Awareness of Quality Issues but Insufficient Investment to Upgrade Quality of Products
Stocks of Finished Goods	Minimal Output Stocks	Growth of Unsaleable Stocks of Outputs
Production within Defence Institutions		
Managerial Attitude Toward Risk	Risk Aversion of Managers	Uncertainties of Transition Period Reinforce Risk Aversion of Many Managers
Technological Innovation	Sluggish Technological Innovation	Negligible Technological Innovation
Technological Level	Low Technological Level	Technological Gaps between Russia and the Developed Countries Increase
Stability of Production	Forced Substitution and Production Bottlenecks	Less Pressure for Storming, but Intensification of Production Bottlenecks
Inventories of Inputs	Hoarding of Inputs/Large Inventories	Managers Violate Mobilization Rules and Sell Inventories of Valuable Inputs
Mobilization Capacity	Large Mobilization Capacity	Legal and Illegal Reduction of Mobilization Capacity
Input Side of Defence Institutions		
Budget Constraint	Soft Budget Constraint	Shift to Relatively Hard Budget Constraint
Investment Behaviour	Investment Hunger	Drive to Investment Conversion and Weapons Export Projects using Subsidised Credits
Conditions in the Market for Inputs	Less Intense Shortages of Inputs than in Civilian Economy	Acute Shortages of Inputs
<p>Sources: The behavioural categories are derived from concepts of the shortage economy presented in Kornai (1992) and Davis and Charemza (1989). The assessments of the behaviour of Soviet and Russian defence institutions are based on Davis (1990a, 1992a) and Russian material published in the 1990s.</p>		

DIWM (see Figure 1).⁸ They often attempted to satisfy the demands of the military by fulfilling output plans in volume terms (the “quantity drive”).⁹ The voenpredy system was less effective than claimed in

controlling quality because both enterprise managers and inspectors wanted goods to be accepted so that sales and military deployment targets could be reached.

During 1975-85 the inter-actions between the defence sector and the civilian economy became more intense and problematic. Supplies of defence firms came from 3,500 civilian factories, most of which operated without high priority protection (CIA 1986). As shortages intensified in the civilian sphere, supply plans of defence firms often were under-fulfilled, which led to bottlenecks in production, forced substitution of inputs and “storming” to achieve targets.¹⁰ Difficulties in the civilian economy, in turn, were exacerbated by its buffer status and the siphoning of scarce, high-quality resources away from it to the military-industrial complex.

Numerous successes were achieved in weapons development in the USSR (e.g. atomic and hydrogen bombs, sophisticated tanks, advanced fighter aircraft). But the disruptions associated with technological innovation in a shortage economy could cause under-fulfilment of production plans and, thereby, the loss of bonuses and difficulties in managerial careers. Most defence industry managers were risk averse and in favour of continuing production of established weapons systems with relatively simple designs (CIA 1986, Almquist 1990). The USSR defence industry lagged behind the West in most production technologies.

d. Soviet Defence Expenditure and Burden

The Soviet Union allocated substantial resources to the defence sector on the basis of plans expressed in quantity terms, but these flows were not fully measured by monetary indicators (Noren 1995, Cooper 1998). Prices of defence commodities were set administratively, usually at low levels.¹¹ The government did not maintain a comprehensive defence budget, even in secret. Published defence spending bore little relationship to actual resource allocation. It rose slowly from 13 billion current rubles in 1965 to 20 billion rubles in 1988. The coverage of the state defence budget was widened in 1989

and the published budget figure jumped to 75 billion rubles, but this still was a significant underestimate.

It dropped to 69 billion rubles in 1990 and then rose in 1991 in nominal terms due to accelerating inflation (see Table 3 and Figure 3).¹²

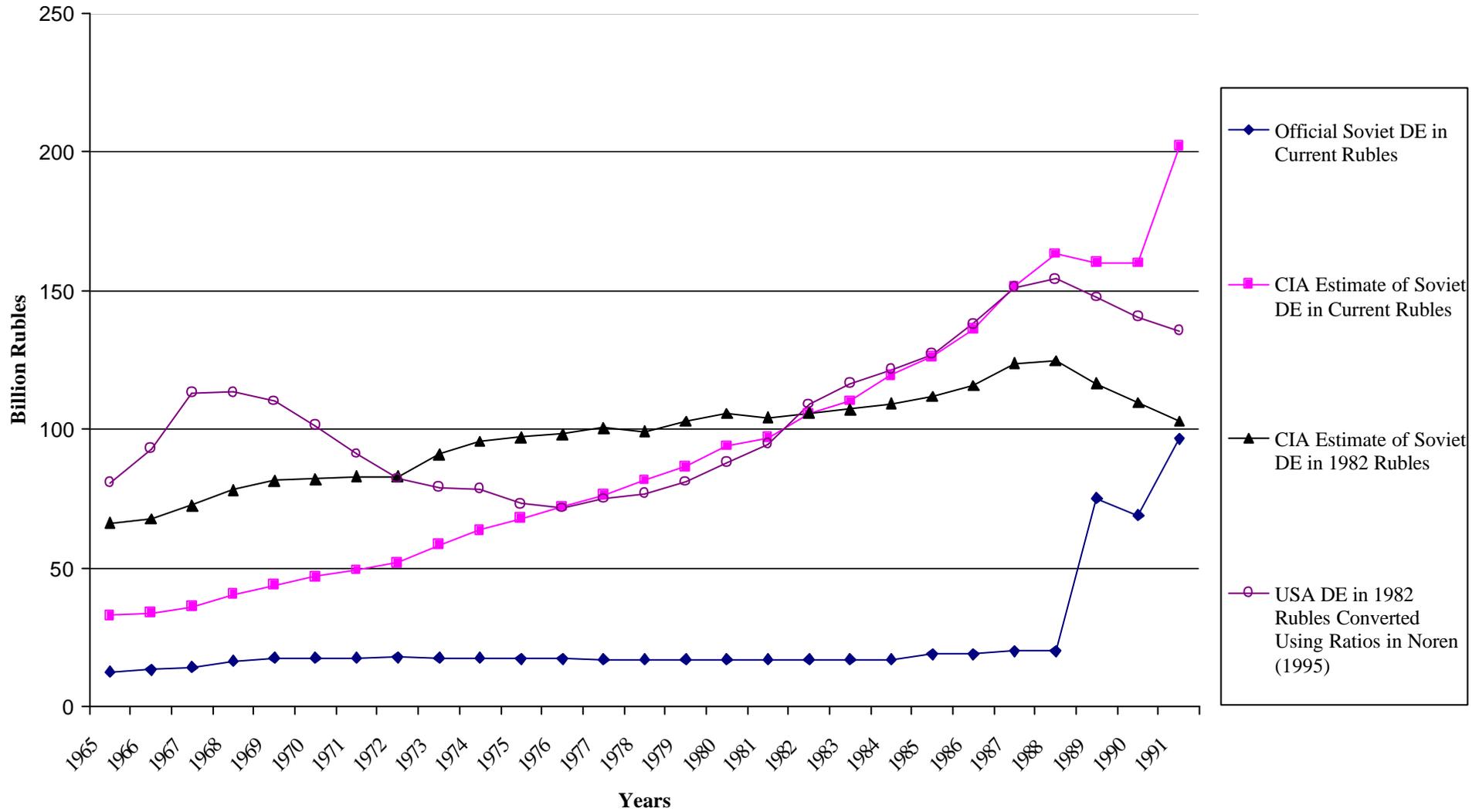
Indicator		1965	1970	1975	1980	1985	1988	1989	1990	1991
Defence Expenditure										
Soviet DE (Official)	Billion Current Rubles	12.8	17.8	17.4	17.1	19.1	20.2	75.2	69.1	96.6
Soviet DE (CIA)	Billion Current Rubles	33.0	46.9	68.0	94.0	126.2	163.3	160.1	160.0	202.0
Soviet DE (CIA)	Billion 1982 Rubles	66.3	82.2	97.3	105.7	111.9	124.8	116.5	109.7	103.0
Procurement (CIA)	Billion 1982 Rubles	32.8	41.5	47.8	49.1	47.9	52.7	46.9	42.5	39.9
Construction (CIA)	Billion 1982 Rubles	5.7	4.4	4.8	5.9	5.7	6.1	5.9	6.0	5.6
Personnel (CIA)	Billion 1982 Rubles	8.6	10.1	11.3	12.0	12.4	12.6	12.3	11.6	10.9
O & M (CIA)	Billion 1982 Rubles	9.3	12.8	16.1	18.1	21.0	24.0	22.0	21.6	20.2
RDT&E (CIA)	Billion 1982 Rubles	8.9	12.1	16.1	19.3	23.7	28.2	28.2	26.8	25.1
Soviet DE (CIA)	Billion 1988 \$	190	222	255	270	284	297	286	264	226
USA DE (CIA)	Billion 1988 \$	220	260	192	211	283	299	296	286	252
USA DE (Conversion)	Billion 1982 Rubles	80.9	101.4	73.2	88.1	127.2	154.1	147.5	140.6	135.5
Defence Burden										
DE/GDP Current R	%	NA	12.2	13.6	14.7	15.9	17.8	15.6	NA	NA
DE/GDP Constant Rubles	%	16.0	15.4	15.5	15.3	14.9	15.5	14.3	13.8	14.0
Sources and Notes: 1965-90 Official Soviet from statistical yearbooks. CIA estimates from Noren (1995), Firth and Noren (1998) and declassified CIA material. 1991 Official Soviet from IISS <u>Military Balance 1991-1992</u> . Numbers in CIA series are estimated from information published by IISS and ACDA and in Davis (1992b). The series of USA DE in 1982 rubles was calculated by multiplying the Soviet DE in 1982 rubles by a ratio of USA to Soviet DE in rubles in Noren (1995).										

Foreign analysts used a variety of techniques to estimate Soviet expenditure on defence: reconstruction of the state budget, input-output tables, and national income accounts to identify hidden spending; calculation of residuals, especially in machine-building and metal-working and in exports of machinery; and the “building block method” developed by the CIA (CIA 1987; Firth and Noren 1998). This work was impeded by tight Soviet censorship of military-related information, misleading reporting of budgets, absence of market-determined prices, and hidden state subsidies. In retrospect, the CIA’s estimations appear to be the most plausible. Its method involved acquisition of intelligence about stocks, activities and resource flows in quantitative terms and then the multiplication of these quantity measures

by estimated ruble and dollar prices

to generate values. CIA studies indicate that current ruble spending rose from 33 billion rubles in

Figure 3: Soviet Defence Expenditure, 1965-91



1965 to a peak of 163 billion rubles in 1988, and then declined to 160 billion rubles in 1990. It increased again in 1991 due to inflation (Table 3 and Figure 3). Real defence expenditure rose from 66 billion 1982 rubles in 1965 to a high point of 125 billion rubles in 1988 and then dropped to 103 billion rubles in 1991. The composition of defence expenditure changed (Table 3). For example, the share of procurement fell from 49 % in 1965 to 43 % in 1990.

Many classified and public studies attempted to identify the determinants of Soviet defence spending.¹³ Estimated standard demand equations (discussed in Sandler and Hartley 1995, Chapter 3) that took into account Soviet GDP, prices, spending of allies (“spillin”) and threats could not have illuminated Soviet spending decisions. This was because the USSR gave defence an unusually high priority, prices and alliance expenditure were not relevant, data on the dependent variable (Soviet defence expenditure) either were misleading (official Soviet) or were classified (CIA), and threats were multi-dimensional and difficult to measure objectively. Arms race models also were not successful in explaining trends, due to the factors mentioned above and the fluctuating relationship between Soviet and USA defence spending, with the latter being the best measure of the behaviour of the main Soviet rival in the race (see Table 3 and Figure 3).

Analysis by the author suggests that the allocation of resources to defence by the Soviet leadership was determined by incremental change from the achieved level (reflecting inertia in the state bureaucracy and in large weapons programmes), the endemic “quantity drive” of the shortage economy, the priority of defence, and resource availability. To the extent that the leaders were concerned with expenditures, it would be with current ruble magnitudes rather than with CIA estimates expressed in constant rubles. An appropriate formulation of this would be that current period defence expenditure (DE_t) is a function of the previous year’s expenditure (DE_{t-1}) and an adjustment reflecting priority status (α) and annual growth of GDP (g_t): $DE_t = DE_{t-1} (1 + \alpha g_t)$.¹⁴ If growth is positive ($g_t > 0$), then $2 > \alpha$

> 0 and $\alpha > 1$ implies high priority (DE growth $> g$) and $\alpha < 1$ indicates low priority (DE growth $< g$). If growth is negative, then defence spending declines less rapidly with high priority ($\alpha < 1$) and more rapidly with low priority ($\alpha > 1$). In the USSR, DE in current rubles grew faster than GDP during 1965-88, which indicates that $\alpha > 1.0$.¹⁵ This trend therefore is consistent with the hypothesis that defence had a high priority status. In the case of constant rubles (1982), DE growth was lower than that of GDP, which reflected the CIA evaluation that inflation in the defence sector was greater than it was in the civilian economy. This indicates that $\alpha < 1.0$.

The official Soviet defence expenditure series generates a low defence burden (DE/GDP) in the 2.3 – 2.5 % range for the period 1965-88. The more plausible reported spending after that (and retrospectively for earlier years) generates higher burdens: 8.0 % in 1989 and 6.9 % in 1990. In contrast, the CIA estimated that the Soviet defence burden in current prices rose from 12.2 % in 1970 to a peak of 17.8 % in 1988, while in constant 1982 prices it increased from 15.4 % in 1970 to 15.7 % in 1987. The Soviet defence burden in 1985 was substantially higher than those of Japan (1 %), Warsaw Pact East European states (2 - 4 %), West Germany (3 %), and the U.S.A. (6 %). The normal CIA expenditure series excluded various security-related activities (e.g. hardening of sites, cost of empire). Inclusion of these extra expenses raises the security burden by a maximum of 3 % in 1980 (Firth and Noren 1998). The CIA has been criticized for over-stating the magnitude of the USSR GDP (e.g. 53 % of USA GDP in 1985). If a lower estimate is accepted (say 30 % of USA GDP), then unchanged defence expenditure would produce a higher defence burden (about 28 %).

e. Developments in Soviet Defence Institutions, 1965 - 85

The armed forces expanded from 4.5 million in 1965 to 5.9 million in 1985 (Table 4). Each year 50,000 new officers were commissioned and two million enlisted men were drafted. The educational standard of personnel rose, but quality-related problems intensified, such as alcoholism and slack

discipline. The numbers of deployed weapons increased significantly over 1970-85: tanks from 38,000 to 52,600 and helicopters from 800 to 4,300. The quality of weapons improved. The strategic rocket forces introduced MIRVed missiles and the road-mobile SS-25. The production of potential and actual military services increased markedly. The number of strategic missile warheads rose from 882 in 1965 to 9,997 in 1985, their destructive power (equivalent megatons) grew by 40 %, and ICBMs became more accurate. The armed forces produced numerous services for civilians (e.g. educational, medical) and much of the civilian infrastructure was built by construction, pipeline, and railway troops. However, by the 1980s NATO armies had superiority in most deployed military technologies. Resource constraints restricted the training of Soviet troops, thereby undermining their combat readiness.

The military supply network provided weapons and other commodities to the armed forces and sold consumer goods to the civilian population through voentorg retail outlets, military bookstores, and military state farms (Despres 1996). It was closely linked to markets, operated on a commercial basis, and experienced the problems of the customer in the shortage economy. The scale of economic crime in the military supply network increased.

The Soviet defence industry possessed 1,100 enterprises under twelve ministries that were subordinate to the MIC.¹⁶ In the mid-1980s its labour force (about 10 % of the national total) consisted of 7.2 million manufacturing and social sector workers in the MIC system and 2.8 million in the civilian economy (Gaddy 1996). Of these, 4.1 million were involved in military production. The defence industry produced large and increasing volumes of weapons, reflecting the “quantity drive” (see Table 4). During 1976-85 Soviet factories churned out 28,300 tanks and 14,900 military aircraft, even though many of the models were outmoded by Western standards.

Defence firms also manufactured a wide array of civilian goods (e.g. televisions, refrigerators and calculators) that accounted for 40 % of total MIC production by 1985 (Cooper

Table 4: Developments in the Soviet Defence Sector, 1965-91

Indicator	Units	1965	1970	1975	1980	1985	1990	1991
Armed Forces Manpower								
Total Armed Forces	Thousands	4464	4835	5595	5923	5900	4958	4563
Strategic Rocket Forces	Thousands	323	350	350	385	300	260	164
Ground Forces	Thousands	1616	1750	1825	1825	1995	1473	1400
Air Forces	Thousands	305	330	440	550	570	420	420
Air Defence Forces	Thousands	462	500	500	520	635	500	475
Navy	Thousands	439	475	500	433	480	410	450
Command/Support	Thousands	831	900	1150	1300	705	925	650
Railroad/Construction	Thousands	277	300	400	450	615	490	424
KGB (incl Border Guards)	Thousands	120	130	200	200	250	230	230
MVD Security Troops	Thousands	92	100	230	260	350	250	350
Armed Forces Military Equipment								
Tanks	Number		38000	42000	50000	52600	41700	54400
Total Artillery, Mortars, MLR	Number		21000	26100	29900	50200	64200	64200
SAM Launchers: Strategic	Number		9800	9500	10000	9600	8650	8650
Total AIFV/APC	Number		30000	38000	62000	70000	86000	86000
GF Helicopters	Number		800	1550	2000	4300	4500	4500
AF Fighter/Attack Aircraft	Number		2850	3550	5000	5900	4335	4905
Medium Range Bombers	Number		895	825	518	500	390	410
Major Surface Combatants	Number		221	236	289	289	227	218
Tactical Submarines (SS/SSN)	Number		240	265	257	203	242	221
Strategic Bombers	Number	118	157	157	157	160	128	100
ICBMs	Number	281	1472	1469	1338	1371	1378	1006
ICBM Warheads	Number	281	1472	2169	5362	6813	6938	6106
SSB/SSBN	Number	25	44	73	85	78	60	55
SLBMs	Number	75	317	771	990	980	908	832
SLBM Warheads	Number	72	287	828	1558	2264	2900	2792
Total Warheads	Number	882	2327	3565	7488	9997	11252	10164
Defence Industry Production								
ICBMs	Number		300	200	250	100	125	
SLBMs	Number				200	100	65	
SAMs	Number				53000	53000		
Bombers	Number				30	50	40	30
Fighters/Fighter Bombers	Number		1000	1200	1300	650	575	250
Helicopters	Number				700	600	175	350
Tanks	Number		4500	2500	3100	3000	1300	850
Armoured Vehicles	Number	3500	8000		6500	3500	4400	3000
SP Artillery	Number				900	1000	400	300
Submarines	Number				13	8	12	6
Major Combatant Ships	Number				11	8	8	3
Military Exports								
Total Arms Exports	\$ millions	700	2400	4000	17000	17300	14200	6600
Share of World Arms Exports	%		27.9	31.3	39.3	34.2	37.1	25.9
Non-Socialist Arms Exports	\$ millions	300	995	2790	6980	7500	9410	4300
Sources: ACDA, Collins (1978), Gaddy (1996), NRDC (1997), IISS, SIPRI.								

1986, CIA 1986, Almquist 1990). The quality of these commodities was higher than equivalents produced by Soviet civilian enterprises, but lower than foreign ones sold in world markets.

The military RDT&E network contained 900 research institutes and design bureaus. Over one-third of total RDT&E expenditures in the USSR were devoted to military programmes. The military RDT&E network was able to close technological gaps with the West in areas such as aerodynamics, directed energy, and explosives (DOD 1988). Overall, though, it was unable to keep pace with the accelerating technological innovation in the NATO countries (Sapir 1991).

The foreign links of the Soviet military-industrial complex increased during 1965-85, as did its exports of weapons. It had elaborate defence cooperation programmes with Warsaw Pact nations and they were the main customers for Soviet weapons in the initial years of this period (Rice 1984). In the 1970s there was a substantial increase in military aid and arms exports to Third World nations as a result of socialist revolutions and the greater availability of hard-currency in OPEC countries. Total arms sales of the USSR increased from \$ 700 million (current dollars) in 1965 to a peak of \$ 21,900 million in 1987 (a four-fold increase in real terms) (Table 4). Exports to non-socialist countries rose from \$ 300 million (current) to a high of \$ 11,900 in 1989. The USSR exported growing quantities of sophisticated weapons systems (e.g. MiG 29 Fulcrum fighters) to non-socialist nations. During 1975-85 its deliveries included 15,000 tanks, 5,600 fighter aircraft, and 66 surface warships. However, the arms trade was less beneficial to the USSR than the official figures suggest, because over the period 1975-90 its customers paid only 56 % of the amount due in cash and barter commodities (Gaddy 1996).

The USSR acquired foreign military-related technologies through covert trade diversion and “special information” (spetsinformatsiya) programmes that were managed by the MIC and involved agencies such as the KGB (Directorate T) and the GRU (military intelligence) (CIA 1985, 1986). The

acquired Western technologies often had beneficial impacts on military R & D or defence industry production programmes. However, the inflow was not substantial enough to compensate for the technology-inhibiting features of the Soviet shortage economy.

f. Production of Military Power and National Security

During 1965-75 the national security status of the USSR improved because internal threats were kept under control, external threats (EFT) diminished (e.g. the USA cut its real defence spending by 30 % during 1969-76), and the production of military services (EMS) increased (Davis 1990b). However, after 1975 foreign countries became increasingly concerned about the USSR's interventions in the Third World (e.g. Afghanistan in 1979) and Eastern Europe and military build-up. The USA raised real defence spending (in 1988 dollars) from \$ 190 billion in 1975 to \$ 283 billion in 1985, which enabled it to upgrade its nuclear and conventional military capabilities. By the early 1980s, the advanced OECD economies had higher growth rates than the USSR. Although Soviet military power increased, the growing external threats meant that the USSR experienced a deterioration of its national security.

4. The Soviet Defence Sector During Perestroika, 1985-91: From Reform to Disarmament to Collapse

The regime of CPSU General Secretary Mikhail Gorbachev announced a national security strategy in early perestroika that was based on the conciliatory “new thinking” (novoe myshlenie) in international relations, set more modest security objectives, and placed greater emphasis on threat reduction through diplomacy and arms control (e.g. the 1987 Intermediate Nuclear Forces treaty) and less on military power. A new military doctrine downplayed offensive operations in favour of “reasonable sufficiency” (Hudson 1990). Defence reforms included rejuvenation of the national security elite and the transfer to the civilian economy of defence organisation models (e.g. the quality control organisation, Gospriemka, based on the voenpredy system). Defence industry firms gained greater

financial autonomy and became more market oriented.

Many “new thinking” concepts were, however, inconsistent with actual policies. The 12th Five Year Plan (1986-90) increased the allocation of resources to defence (Table 3). The armed forces grew on an “extensive” basis, defence industry produced more weapons, and arms exports rose to \$ 22 billion in 1988. Since NATO built-up its forces and the OECD economies grew more rapidly, Soviet national security continued to deteriorate.

After 1988 the Gorbachev regime tried to implement the new national security strategy. The USSR reduced the size of the armed forces (from 5.7 million in 1988 to 4.6 million in 1991), military output of defence industry, and defence spending. It signed the CFE and START treaties. But flaws in reform programmes increasingly undermined the economic system and resulted in intensified shortages and negative growth. Liberal foreign policies improved relations with the West, but facilitated successful anti-communist revolutions in 1989-90 in Eastern Europe, the reunification of Germany, and the abolition of the CMEA and Warsaw Pact.

These developments adversely affected all defence institutions. The power of the central defence bureaucracy diminished and military doctrine ceased to guide defence developments. The armed forces obtained few benefits from the hesitant attempts at military reform and their combat readiness declined. The defence industry experienced cuts in procurement (by 8 % in 1990 and 25 % in 1991), a collapse of arms exports, and declines in civilian purchases of its goods (Gaddy 1996). Priority protection mechanisms broke down, supplies from civilian firms became erratic, and imports from Eastern Europe ceased. The government’s ambitious conversion (konversiya) programme was unsuccessful (Cooper 1991). The output of military and civilian goods dropped at accelerating rates. Arms exports decreased to \$ 7 billion (current dollars) in 1991 (Table 4).

During late perestroika, Gorbachev’s policies reduced external political and military threats

(EFT), but Soviet economic performance fell increasingly below that of the West. Independence movements in the republics overcame the efforts of the central government to reduce internal threats (IFT) or to suppress them using military force (IMS). The output of Soviet military services (EMS) decreased. As a consequence of these trends, the national security status of the USSR plummeted to a level below the minimum necessary for the survival of the state.

In Autumn 1991 the Soviet defence industry and military RDT&E network were partitioned into new national systems by the successor states. The armed forces remained under central control while attempts were made to create an acceptable joint command under the CIS. But by Spring of 1992 the leading successor states had established independent armed forces on the foundations of military assets located on their territories (Allison 1993).

5. The Low Priority Defence Sector in the Russian Transitional Economy: 1992-2000

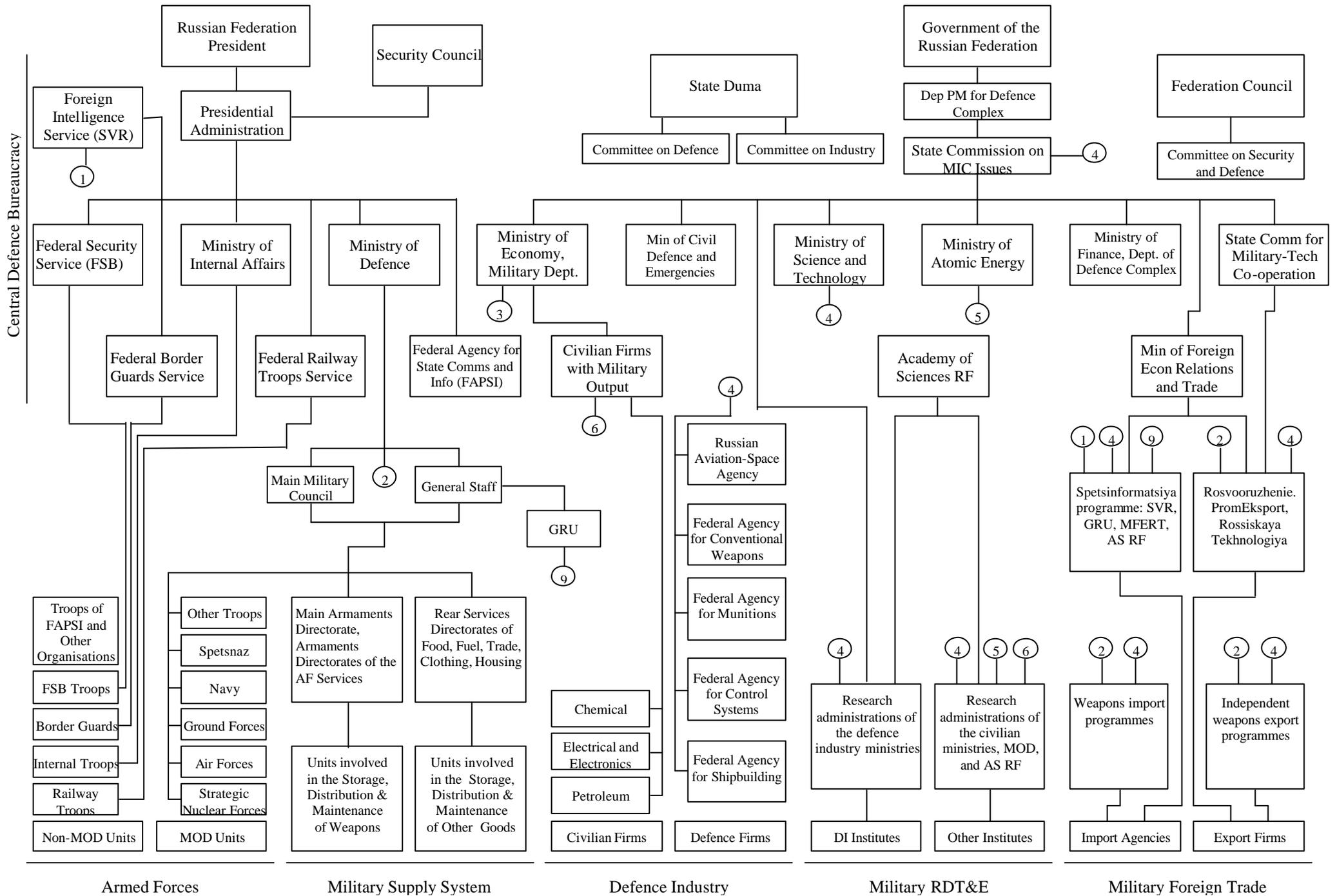
a. Organisation of the Russian Defence Sector

During 1992-2000 a hybrid politico-economic system has evolved in Russia that is an amalgam of old institutions (e.g. security services, Ministry of Defence) and processes (e.g. state direction, barter) and new ones (e.g. Presidential apparatus, oligarchs, privatization).¹⁷ This system has exerted a strong influence on the outcome of defence sector reforms.

The vertical organisation of the Russian military-industrial complex by main defence institution is shown in Figure 4. The central defence bureaucracy has been weak relative to its Soviet counterparts and has had diminished influence on resource allocation decisions.

In 1992-93 Russia's national security strategy reflected the beliefs of liberal reformers in the government that the country was not confronted by serious threats, the military-industrial complex was an obstacle to reform, and armed force was a factor of diminishing importance in international affairs. It therefore emphasised threat reduction and economic revival, and substantially lowered the priority of

defence and military expenditure. During 1994-2000 a centrist consensus has evolved that Russia is facing serious threats externally (e.g. NATO expansion) and internally (e.g. Islamic separatism in the Caucasus) and that military power plays



Sources: Russian reference books, Moscow telephone book, newspaper articles (e.g. Sokut 1999), and interviews by author.

a vital role in resolving conflicts (e.g. NATO's bombing campaign in Yugoslavia) (Zolotarev 1998, Zyuganov 1998, Kontsepsiya 2000). The centrist strategy calls for suppression of internal threats, containment of external threats by diplomacy, strategic deterrence and arms control, and the re-building of economic strength and military power. The latter goal is to be achieved through military reform and modernisation of the defence industry and military RDT&E.

The Russian government has issued new versions of military doctrine in 1993 and 2000 (Allison 1993, Korbut 1999a, Voennaya 2000). It produced a long term (10-15 years) Federal Programme of Reconstruction and Conversion of the Defence Complex that was supposed to govern the development of weapons and military equipment (Sokut 1999, Korotchenko and Mukhin 1999). This programme is based upon a strategy of concentrating scarce resources in the highest priority weapons projects and of guaranteeing sales to defence firms. The General Staff prepared a forecast of financial developments in the defence sector out to 2010 (Prognoz 1999). But these documents have had only weak influence on developments in the defence sector due to the many unpredictable political changes and the malfunctioning of the economy (Kulikov 1999).

Following the fragmentation of the USSR, Russia gained control of military resources on its territory and in the Groups of Forces Abroad, all nuclear weapons, and most military assets in the other successor states. However, Belarus and Ukraine appropriated personnel, facilities and equipment located on their territory (Allison 1993, 1996). The Russian armed forces have been reorganised into nine military districts (IISS 1999). Russia inherited most of Soviet defence industry (72 %) and military RDT&E facilities (84 %).

Former Warsaw Pact allies in Eastern Europe have gravitated toward, or have become members of, NATO. Russian leaders tried to create a new military alliance based on the CIS (Allison 1993). But most successor states preferred to maintain loose CIS military links.

b. Low Priority Status of the Russian Defence Sector

Despite the evolution of the national security strategy, the Russian government continued to give the defence sector a low priority status throughout the 1990s (Table 1). In conceptual terms, there was a transformation of the elite's welfare function from a lexicographic preference ordering, with defence as the most highly valued output, to a marginalist one with a low weight attached to defence and acceptance of trade-offs between military and civilian outputs. Resource allocations became unresponsive to the problems in the defence sector. The wage rates and benefits of defence employees deteriorated. The government became indifferent to the attainment of output targets by defence institutions, did not safeguard their supplies, and imposed increasingly hard budget constraints.

However, in 2000 the Putin administration criticized the neglect of the military-industrial complex and announced an upgrading of the priority of defence. This has been reflected in the new national security concept, the announcement of increases in defence spending in 2000-01, and the adoption of ambitious plans for the revival of the defence complex (Kontsepsiya 2000, Sokut and Korotchenko 2000).

c. Defence Institutions in the Russian Transitional Economy

Developments in the Russian defence sector have been strongly affected by the evolving, hybrid economic system, which has features of the old shortage economy and a capitalist one. Hierarchical relationships in the defence sector have become less important with the abolition of the MIC and Gosplan, but subordinate units have remained dependent upon their superiors for budget allocations, tax breaks, subsidies, and cheap credits. The defence sector markets shown in Figure 1 have been transformed into more normal ones, in which prices are influenced, if only imperfectly, by demand and supply. Many defence institutions have been privatised and commercialised. The main economic reform

policies (stabilization, privatization, price and foreign trade liberalization) have had mainly negative impacts on the military-industrial complex. The poor performance of the economy over the past decade (e.g. negative growth, high inflation, falling investment) has adversely affected the defence sector. For example, the financial crisis of 1998 undermined a renewed effort by the government to advance military reform and defence industry re-organisation (Arbatov 1999, Kulikov 1999).

The behavioural characteristics of defence institutions have changed, as summarised in Table 2. Power in the markets for civilian goods of defence industry has shifted in favour of buyers, but sellers' markets typical of a shortage economy have remained for many military goods. Firms have become more aware of the need to raise the quality of their products, but adverse circumstances have forced many of them to maintain quantity drives. Technological innovation has been impeded by inadequate investment and the risk aversion of managers in an uncertain environment. Contrary to expectations, the intensity of shortages in the defence sector during transition has been higher than it was in the Soviet period. Inventories of inputs and mobilisation capacity have been reduced. Hardening budget constraints have made institutions more sensitive to prices.

d. Russian Defence Expenditures and Burden

Russian defence spending was radically reduced in the 1990s. Due to high inflation, this is not reflected in total defence spending in re-denominated post-1998 current rubles, which rose from 1,282 million rubles in 1992 to 191,482 million rubles in 1999 (Table 5). But the index of defence spending in constant rubles dropped from 100.0 in 1992 to a low of 39.9 in 1998. Real defence expenditure in dollars declined in a similar manner. The IISS (1999) series shows it falling from \$ 146 billion (\$ 1997) in 1992 to \$ 55 billion in 1998, or by 62 %. According to SIPRI (1999), it decreased by 76 %, from \$ 48 billion (\$ 1995) in 1992 to \$ 11 billion in 1998.

Table 5: Russian Defence Expenditure, 1992-99

Indicator		1992	1993	1994	1995	1996	1997	1998	1999
Defence Expenditure Rubles									
Authorised Defence Budget	Mln Current	901	8327	40626	59379	80185	83200	92765	109558
Defence Budget Outlay	Mln Current	855	7213	28500	49600	63891	79692	68004	129380
Outlay Share of Authorised	%	94.9	86.6	70.2	83.5	79.7	95.8	73.3	118.9
Other Outlay on Defence	Mln Current	427	3607	14250	25237	31011	38551	32897	62102
Total Defence Expenditure	Mln Current	1282	10819	42750	74837	94902	118243	100901	191482
GDP	Mln Current	19006	171510	610745	1540500	2145700	2521900	2684500	4476100
Real GDP Index	1992 = 100	100.0	91.3	79.7	76.4	73.8	74.5	71.1	73.4
Real DE Index	1992 = 100	100.0	86.0	83.3	55.4	48.7	52.1	39.9	46.8
Defence Expenditure Dollars									
IISS Defence Expend \$	Bln \$ 1997	146.0	114.0	101.0	86.0	73.0	64.0	55.0	66.0
IISS DE \$ 1997 Index	1992 = 100	100.0	78.1	69.2	58.9	50.0	43.8	37.7	45.2
SIPRI Defence Expend \$	Bln \$ 1995	47.5	41.9	40.5	25.7	23.4	24.9	11.2	15.0
SIPRI \$ 1995 Index	1992 = 100	100.0	88.2	85.3	54.1	49.3	52.4	23.6	31.6
Shares of Defence Budget									
Personnel + O & M	%	55.4	50.0	54.4	53.7	51.3	46.4	54.5	51.9
Procurement	%	20.5	18.3	20.8	17.3	16.5	20.1	20.8	19.4
Military R & D	%	8.3	7.2	6.0	8.3	8.1	11.1	13.2	11.4
Infrastructure	%	13.5	16.5	11.8	10.3	9.5	4.8	4.0	2.9
Pensions	%	5.0	5.5	4.9	8.2	12.3	13.3	13.5	10.9
Nuclear, Other	%	2.3	2.6	2.2	2.2	2.3	4.3	7.5	3.4
Defence Burden									
Defence Share of Budget	%	16.0	16.6	20.9	21.3	18.4	19.7	16.4	18.0
Offical DE/GDP	%	4.5	4.8	6.6	3.7	3.8	3.1	2.1	2.6
IMF DE/GDP	%	4.7	4.4	4.6	2.9	3.6	3.3	2.5	2.8
IISS DE/GDP	%	10.8	8.9	8.3	7.4	6.5	5.8	5.2	5.5
SIPRI DE/GDP	%	5.5	5.3	5.8	3.7	3.7	3.8	3.2	3.7
Author's Estimate DE/GDP	%	6.7	6.3	7.0	4.9	4.4	4.7	3.8	4.3

Notes: The ruble expenditures for 1992-97 have been converted to post-1998 rubles (1 new ruble - 1000 old rubles). State budget DE included military pensions for all years. Other Budget Outlay for 1999 estimated to be .48 of Defence Budget Outlay. Real DE Index calculated from Real GDP Index and Author's Defence Burden series. The latter was calculated by dividing Total DE by GDP. Cell entries for IISS, IMF and SIPRI for 1999 in the sections on DE Dollars, Shares of Defence Budget and Defence Burden are the author's estimates.

Sources: IISS Military Balance, SIPRI Yearbook, Russian statistical yearbooks and newspaper articles (e.g. Lyuboshits and Tsybmal 1999), and conversations with Julian Cooper and Digby Waller.

In 1999 the defence budget was set at a relatively high level and then was revised upward on several occasions in response to improved economic circumstances (due to industrial recovery and unexpectedly high prices of energy exports), NATO actions (expansion and the bombing of Yugoslavia), and the intensifying war in Chechnya (Lyuboshits and Tsymbal 1999, Ulyukaev 1999). During the Autumn of 1999, Prime Minister Vladimir Putin ensured that defence was given a higher priority status and that a substantial share of the windfall budget funds were diverted to the military-industrial complex. As a result, actual total defence expenditure in 1999 exceeded planned by about 20 % and the index of real spending recovered to 46.8. IISS and SIPRI estimates of dollar spending are consistent with the ruble trend, in that they show significant increases as well. The approved budget for 2000 is 140.8 billion rubles (Ivanyuk 2000, Korbut 2000). Military RDT&E and procurement (state orders) are to allocated 62 billion rubles (Sokut and Korotchenko 2000).

Russian government reports on defence spending must be interpreted with caution because of exclusions, censorship, and misleading accounting practices (Korbut 2000). The official defence budget omits spending on internal and border troops, road construction and railway troops, civil defence troops, subsidies to the defence industry and closed military regions, and some military RDT&E (Cooper 1998, IISS 1999, Lyuboshits and Tsymbal 1999). These extra expenditures amount to 40 % of the defence budget. As in the past, the defence sector makes use of administrative prices, instead of market-determined ones, and a “heavy ruble” still exists. Many transactions are carried out on the basis of barter and therefore are difficult to value. There is wide-spread use of off-budget subsidies (e.g. relief from payment of gas and electricity bills and taxes). Accurate measurement of resource flows in the military-industrial complex probably would reveal higher amounts of defence spending than those presented in the ruble series in Table 5.

Dollar estimates of Russian defence spending are affected by the choices of exchange rates.

Discussions of relevant methodological issues and their implications can be found in IISS and SIPRI documents, but are beyond the scope of this article. Representatives of the Russian military-industrial complex usually prefer to use market exchange rates in comparative work because they generate low estimates of defence spending in dollars, which are helpful in making the case for more generous allocations. For example, Russian spending per soldier in 1996 calculated using defence budget expenditure and the annual exchange rate is \$ 8,900, well below USA expenditure per soldier of \$ 176,000. In contrast, spending per Russian soldier estimated using a purchasing power parity exchange rate amounts to \$ 48,235.

The specification and estimation of an explanatory model of Russian defence spending in the 1990s are challenging, if not impossible, tasks because of a number of factors: continuing but opaque changes in the underlying economic system; poor connections between macro policies and microeconomic processes; lack of reliable data on key variables (including the dependent variable, defence spending); fluctuating, if not erratic, national security decision making; and recurrent political and economic shocks (e.g. the initial shift toward a new politico-economic system, high inflation in 1992-93, unpredictable budget sequestrations, wars in Chechnya, abrupt changes in world oil prices, the financial crisis of 1998). The key explanatory factors of the Soviet period (inertia, priority, and GDP growth dynamics) have remained important, but have not determined developments in a consistent manner. Institutional inertia buffered some of the early shocks, such as the drastic reduction in procurement in 1992. For several years kept the military-industrial complex functioning in accordance with previous patterns and contributed to higher than planned resource allocations to defence. Despite the absence of state budget funding, firms continued to produce weapons and supply them to the military on credit, using inputs that were supplied to them on credit. However, after several years of deteriorating conditions, inertial forces began to generate self-reinforcing downward tendencies in the military-

industrial complex. With respect to the other factors, defence had a consistent low priority status during 1992-98 and economic growth was negative in most years (Table 5). One therefore would expect the growth of Russian defence expenditure to be lower than that of GDP ($\Delta DE_t < g_t$). However, defence spending growth was less negative than that of GDP in 1994 and more positive in 1997.

Due to the instability and shocks, the formula introduced in section 3.d, $DE_t = DE_{t-1} (1 + \alpha g_t)$, with stable values of α , does not generate estimates that track actual spending closely. For example, the IISS constant dollar series can be reproduced only by imposing different values for α for each year in the range 0.9 – 6.0. The econometric estimation of standard demand for defence equations would be problematic for the reasons mentioned above. Arms race models would be unhelpful in explaining resource allocation decision making in Russia because there is a low correlation between the dynamics of foreign threats and Russian defence spending.

There have been major changes in the distribution of defence expenditure by category. In 1992 the share devoted to personnel and O & M rose to 55 % (30 % in 1991), as the government tried to protect wages and operations, whereas the share of procurement dropped to 21 %, from 40 % in 1991. This distribution has remained stable throughout the decade. However, the Putin government plans to raise the procurement and R& D share back up to 40 % in 2000 (Korbut 1999b, 2000).

In its efforts to achieve macroeconomic stabilization, the Ministry of Finance regularly sequestered 20-30 % of approved defence budget funds during 1994-98. However, in 1999 the planned budget was over-fulfilled. The Ministry of Defence often has not paid the bills of suppliers. Its debts tripled during 1993-96 and by late 1999 the MOD owed the defence industry 26 billion rubles (Sokut 1999). In order to cope with the insufficiency of budget funds, many defence institutions have tried to earn revenue by selling goods and services to the civilian sector.

The defence burden on the Russian economy has diminished substantially. According to official

statistics, the defence share of GDP in current rubles declined from 4.5 % in 1992 to 2.1 % in 1998. IISS estimates the defence burden to be consistently higher, but decreasing from 10.8 % in 1992 to 5.2 % in 1998 (IISS 1999). It should be recognised, though, that the defence burden is not reduced by cutting military procurement if the unprofitable state-owned defence firms that lose orders are subsidised through non-military budget items in order to prevent their closure.

An important defence economic challenge for Russia has been financing the high-intensity wars in Chechnya. A Duma report, summarised in IISS (1996), estimated the annual cost of the 1994-96 war to be about 12 % of the defence budget per year. The 1999-2000 war has involved more troops (100,000) who are receiving extra combat pay (800-1000 rubles per day), large quantities of ground equipment (e.g. 300 tanks), higher intensity of combat operations (about 1000 air strikes per month), and substantial military construction (Korbut 1999b). The estimated additional cost of the war is 3 billion rubles per month (Korbut 2000). That implies that 12 billion rubles were spent over the period September – December 1999, which amounts to about 10 % of the 1999 budget or 0.3 % of GDP. An equivalent sum has been spent in the initial four months of 2000.

e. Developments in Russian Defence Institutions, 1992-2000

(1) Armed Forces

Although the General Staff has proposed many military reforms, most measures have not been supported by necessary funding, which has resulted in uncoordinated, piece-meal changes (Arbatov 1999, Kulikov 1999).¹⁸ The main accomplishments of reform have been the re-grouping of military forces withdrawn from abroad (730,000 troops and 45,000 major pieces of military hardware), re-creation of an air defence network, development of internal military districts into border ones, consolidation of branches (primarily the merger of the Air Forces and Air Defence Forces in 1998), establishment of some mobile forces, and improved organisation of strategic nuclear forces (Allison

1996). The authorised number of MOD military personnel was reduced to 1.7 million in 1999 from the 1992 level of 2.8 million, but actual manning was only 1.4 million (Table 6). There has been a proliferation of forces under other authorities (see Figure 4), and their numbers grew from 590,000 in 1992 to 625,000 in 1998 (36 % of the total).¹⁹ This has caused difficulties in command and control (evident in the wars in Chechnya), training, and defence budgeting.

Resources allocated to the armed forces to implement disarmament treaties (CFE, chemical and biological weapons conventions, START II) have been insufficient (Arbatov 1999). The START II strategic arms treaty will require the destruction of approximately one-half of Russia's ICBM force (675-780 launchers with 3775-3880 warheads), the procurement of 600-700 single-warhead Topol ICBMs, and the doubling of the number of SLBMs (Savelyev 2000). A Russian analyst has claimed that: "The full scale implementation of START II can do just as much to undermine Russia's economy and finances as did the arms race in the USSR."

The tightly constrained defence budgets have had adverse consequences for O & M, procurement and personnel. In 1995 ground forces aviation received only 30 % of the authorised quantity of fuel, which already was below its minimum requirement. Most military units have been unable to pay their electricity and gas bills, and at times have had their power disconnected. In the 1990s the Russian armed forces needed to replace military equipment that was becoming obsolete (e.g. the Mi-24 combat helicopter) or that had been seized by other Soviet successor states (e.g. re-fuelling helicopters, T-80 tanks). Despite this situation, real expenditure on procurement fell to about 7 % of its 1991 level by 1998 and acquisitions of weapons systems diminished to extremely low levels. Ground Forces Aviation needed about 40-50 new generation helicopters per year, primarily the Ka-50 (Black Shark), but it obtained only 7-10 per year.

Table 6: Developments in the Russian Defence Sector, 1992-98

Indicator	Units	1992	1993	1994	1995	1996	1997	1998
Armed Forces Manpower								
Total Armed Forces	Thousands	3310	2359	2094	1920	1722	1923	1735
Strategic Rocket Forces	Thousands	144	144	114	100	100	100	100
Ground Forces	Thousands	1400	1000	780	670	460	420	420
Air Forces	Thousands	300	170	170	130	145	130	210
Air Defence Forces	Thousands	356	230	205	200	175	170	0
Navy	Thousands	320	300	295	200	190	220	180
Command/Support	Thousands	200	165	150	220	200	200	200
Railroad/Construction	Thousands	200	130	100	100	100	100	100
FSB (incl Border Guards)	Thousands	220	100	100	120	120	254	288
MVD Security Troops	Thousands	170	120	180	180	232	329	237
Armed Forces Military Equipment								
Tanks	Number	29000	25000	19500	19000	16800	15500	15550
Total Artillery, Mortars, MLR	Number	25700	25700	21300	20650	18400	15700	15700
SAM Launchers: Strategic	Number	7000	7000	3500	2500	2350	2150	2150
Total AIFV/APC	Number	57000	51000	37000	33000	2770	28300	28300
GF Helicopters	Number	3200	3500	2600	2600	2450	2565	2300
AF Combat Aircraft	Number	3700	3600	2150	2150	1775	1855	1400
Medium Range Bombers	Number	320	300	220	130	125	125	125
Major Surface Combatants	Number	192	169	161	150	166	60	44
Tactical Submarines (SS/SSN)	Number	183	153	127	138	87	87	72
Strategic Bombers	Number	112	113	113	113	113	66	66
Bomber Warheads	Number	1392	1398	1398	1398	1398	817	817
ICBMs	Number	950	898	818	771	755	755	755
ICBM Warheads	Number	5725	5156	4314	3709	3589	3589	3589
SSB/SSBN	Number	40	31	27	26	26	26	26
SLBMs	Number	628	520	456	440	440	440	412
SLBM Warheads	Number	2492	2384	2320	2272	2272	2272	2128
Total Warheads	Number	9609	8938	8032	7379	7259	6678	6534
Defence Industry (DI) Production								
Total DI Output Index	1991 = 100	77.7	62.4	38.4	29.3	21.3	18.5	18.0
DI Military Output Index	1991 = 100	49.6	32.4	20.9	15.5	11.9	8.8	9.2
DI Civilian Output Index	1991 = 100	99.7	85.3	52.8	40.3	28.4	28.0	25.8
ICBMs + SLBMs	Number	55	35	25	10	10	10	15
Bombers	Number	20	10	2	2	1	0	0
Fighters/Fighter-Bombers	Number	150	100	50	20	25	35	40
Helicopters	Number	175	150	100	95	75	70	40
Tanks	Number	500	200	40	30	5	5	15
Armoured Vehicles	Number	700	300	380	400	250	350	250
SP Artillery	Number	200	100	85	15	20	10	10
Submarines	Number	6	4	4	3	2	2	2
Major Combatant Ships	Number	1	1	0	1	1	0	0
Military Exports								
Total Arms Exports	\$ Current millions	2500	3200	1500	3700	3300	2700	2800
Total Arms Exports (IISS)	\$ 1997 millions	2806	3390	2906	3687	3583	2500	2854
Share of World Arms Exports	%	5.4	7.2	6.8	7.9	7	4.5	5.1
Sources: ACDA, Gaddy (1996), IISS <u>Military Balance</u> , NRDC (1997), SIPRI <u>SIPRI Yearbook</u> , Russian statistical yearbooks, Russian newspaper articles.								

Wages of draftees, contract enlisted men, and officers have fallen in real terms and have been paid irregularly. The supply of food to the military has been erratic and insufficient, which has led to a rise in malnutrition among troops. There have been growing personnel problems (e.g. draft evasion, resignations of young officers, low morale) (Smirnov 1998). Training has suffered severely because of shortages of inputs, such as fuel. Russian pilots have been able to fly only about 20 hours per year (versus 300 hours per NATO pilot). Many flight simulators have broken down due to lack of spare parts. Live firing of weapons has been drastically reduced.

The armed forces have become more involved in providing goods and services to the civilian economy on a commercial basis. Ground forces units routinely hire out their soldiers as agricultural and construction labour. Military training facilities regularly host programmes for civilians. The marketisation of military-civilian links and the worsening circumstances of personnel have resulted in an upsurge in economic crime in the armed forces. Weapons and equipment have been stolen and sold in the black market.

Over the past eight years the production of most military services has fallen. An exception to this rule is that the production of actual combat services increased in the periods 1994-96 and 1999-2000 due to the wars in Chechnya. In the first war, it was evident that the quality and effectiveness of combat operations had declined from Soviet standards, partly due to resource constraints. The armed forces have planned the second war more carefully, have obtained greater resources to support it, and have carried out operations more effectively.

(2) Military Supply Network

The Russian military logistics system has been reduced in size and fragmented into units under the MOD and other authorities. Stingy norms have been used to calculate supply requirements and modest budget requests have been routinely slashed. For example, the Central Clothing Supply

Administration was awarded one-quarter of the funds it needed in 1996. Furthermore, approved funds have been sequestered. The MOD received only 78 % of its food budget in 1994. Funds allocated to purchase supplies have been diverted by MOD authorities to meet other budgetary commitments, especially paying overdue salaries.

The logistics system has encountered numerous difficulties with its suppliers and transportation. One firm declined a military order for tinned food because it was more profitable to sell unprocessed tin abroad. The indebtedness of the MOD supply system has grown and its credit rating has plummeted. Most civilian firms now demand pre-payment of deliveries to the MOD. The distribution of supplies, especially to troops in remote bases, has become problematic because the MOD cannot afford the high freight tariffs resulting from price liberalization.

Legal operations in the markets of the military supply network (Figure 1) have been facilitated by new legislation and impelled by financial pressures. The self-financing Central Clothing Administration earns income by providing repair services to the civilian population. The Central Military Rocket Propellant and Fuel Directorate offers its fuel storage and pumping facilities to civilian customers at market prices. But there have been movements away from the market as well, reflected in a striving for self-sufficiency and barter. In 1996 the military agriculture system (101 military state farms, 34 dairies, and 3,000 small-scale plots on military bases) supplied the armed forces with 8,000 tons of meat, 16,800 tons of milk, and 55 million eggs. There has been a growth of illegal economic activity. Large quantities of military equipment were sold by high-level supply officers during withdrawals from Eastern Europe. The trade, food and fuel directorates have been implicated in numerous cases of economic crime.

(3) Defence Industry

The 900 defence industry enterprises inherited by Russia have been controlled by different state

bodies during the 1990s (Sokut 1999). The current system is shown in Figure 4. Attempts have been made to develop new business structures that will be effective in a market economy. An important model has been the Financial Industrial Group, which unites defence firms, RDT&E facilities, and financial institutions. By 1998 there were 75 registered FIGs that encompassed 1,212 firms and 3.3 million employees.

At the start of transition, Russian defence firms were state owned, large and monopolistic. The average defence enterprise had 6,000 industrial employees (Gaddy 1996). The government has wanted these enterprises to become financially viable without subsidies, while remaining responsive to state orders. Early plans called for about 500 firms to remain as state entities, while the others were to be converted into joint-stock companies and privatized (Noren 1994, Gaddy 1996). However, privatization proceeded slowly, resulted in insider (managers and workers) control and weak corporate governance, and made a minor contribution to the restructuring of the defence industry in the 1990s. Despite the existence of numerous conversion programmes (14 federal and over 1,000 regional, branch or enterprise ones in 1992-94) little has been achieved, primarily due to lack of funds. Conversion projects received 18 % of the authorised state budget funding in 1995 and 33 % in 1996.

Russian defence industry has been afflicted by a precipitous drop in demand for its products. State orders for military equipment have been slashed and have become disconnected from a long-term armaments procurement programme, which has made planning impossible. Approved procurement budgets have been incompletely funded (e.g. 23 % in 1995). According to Sokut and Korotchenko (2000) only 20 % of state orders for military equipment were paid for out of budget funds in 1998. Civilian demand for both traditional products of defence firms (e.g. washing machines, televisions) and those generated by conversion has been weak because of competition from superior imports. Foreign orders for Russian arms have fallen as well.

Limited progress has been achieved in activating the defence industry markets shown in Figure 1 and in transforming the sellers' markets for military goods into buyers' markets. The armed forces have remained weak customers that have been dependent upon credit from their industrial suppliers. Sellers' markets for civilian producer durables also have survived in cases where major customers have been unprofitable firms, farms, or state budget institutions. In contrast, there are buyers' markets for consumer goods and for industrial commodities that can be sold to successful sectors of the economy, such as the energy industry. Limited advances have been made in demonopolising industry, reducing state regulation, and eliminating price controls.

The government has reduced explicit subsidies of defence firms, but has been unwilling to close even those declared insolvent. Enterprises have been given hidden subsidies (e.g. tolerance of non-payment of gas and electricity bills), subsidised credit from state-controlled banks, and tax relief. In consequence, soft budget constraints have been maintained.

Wholesale markets for inputs of the defence industry (DIWM and DICM in Figure 1) have developed and prices within them have been re-aligned (i.e. prices of energy have risen relative to those of manufactures). Although defence firms have been unable to pay for all inputs, most suppliers initially were willing to ship goods on credit (Noren 1994). However, enterprises able to earn hard currency have tended to cut off their supplies to defence firms or have demanded advance payment. Barter transactions remained important throughout the 1990s. The defence industry has required substantial capital inputs for maintenance and technological innovation. But investment declined by 59 % in 1992 and its growth remained negative during 1993-98. Supplies of construction services and machinery have dropped to low levels.

The defence industry labour market (DILM) has shifted from being privileged to deprived. Defence wages and in-kind benefits have declined relative to successful civilian branches and there have

been recurrent delays in payments. The defence industry labour force decreased from 4.8 million in 1992 to 2.3 million in 1998. Many skilled employees have moved into the private civilian sector.

The production conditions within defence enterprises are summarised in Table 3. Bottlenecks have remained a major problem. For example, in 1996 the Arsenyev Progress Aircraft Association had seven partially completed Ka-50 helicopters, but was unable to pay for the parts necessary to complete them. Average and marginal costs of production of military equipment and consumer durables have been rising as a result of the loss of economies of scale and the maintenance of high overhead expenses. Labour productivity has declined. On the positive side, defence enterprises have reduced their vast inventories of inputs.

Economic crime in the defence industry has grown. Workers routinely steal civilian products, small arms, and reserve stocks for sale in the black market. Larger scale programmes of theft of equipment, military technologies and supplies have been organised by corrupt managers. They also have undervalued the capital of joint stock companies to facilitate insider acquisition of shares during privatization.

Total defence industry output has declined sharply. Its index (1991 = 100) dropped to a low of 18 in 1998 (see Table 6). The worst affected branches have been electronics, communications equipment, and shipbuilding. The index of military output (1991=100) fell to 9.2 in 1998, which drove the military share of total output down to 21 %. The production of fighter aircraft and tanks dropped by 90 % (Table 6). The index of civilian production (1991=100) remained high through 1993 but then decreased to 25.8 in 1998. The output of non-food consumer durables, such as televisions and refrigerators, collapsed. But in 1999 total defence industry output increased by about 30 % and production recovered in all of its branches.

(4) Military Research and Development

Russia inherited a military RDT&E network of 800 design bureaus, scientific institutes and experimental factories that employed 900,000 scientific workers (Gaddy 1996) (Figure 4). Real spending on military R & D was cut by 30 % in 1992 and by 1996 its index (1992 = 100) had fallen to 47 (Table 6). It then rose in 1997, fell back in 1998 and slightly increased in 1999. Authorised funds have been sequestered and some of those allocated have been diverted to pay wages or to purchase supplies. The Tula Design Bureau of Instrument Building experienced a 91 % drop in state orders for its work during 1990-94 and then received only 50 % of the contracted funds. Some R & D institutes have obtained benefits from involvement in joint ventures with Western companies and in FIGs exporting weapons. But the majority have been unable to win research contracts in the depressed civilian economy. International programmes to support conversion have not compensated for the budget cuts.

Employment in military RDT&E has declined by about 10 % per annum, to 450,000 in 1998. Younger, well-qualified scientists have been leaving the military sector. Even military research institutions working on high priority projects, such as the Topol strategic missile, have experienced problems in obtaining supplies through MRDIM and MRDCM (Figure 1). Overall, the output of military RDT&E has fallen significantly, which has had and will have detrimental effects on the development of new weapons systems.

(5) Military Foreign Trade

After an early phase of liberalization of arms exports, control was re-centralised. The current organisation is shown in Figure 4. The most important bodies are the State Committee for Military-Technical Policy and Rossvooruzhenie. Some large firms have been given the right to engage directly in arms transactions, such as MiG MAPO.

Russian defence officials established high targets for the revenue from arms exports (\$ 5 - 10 billion per annum) and have hoped that it could finance military production, defence industry conversion,

and military R & D. But results have been disappointing due to declining world-wide demand for weapons, preferences of customers for technologically-superior Western products, and rising Russian prices. The value of Russia's weapons exports has fluctuated in the \$ 1.5 – 3.7 billion (current dollars) range (Table 6). By the mid-1990s the average annual quantities of weapons delivered to developing countries by Russia in the 1990s had fallen to less than one-sixth of those shipped by USSR during 1989-91 (e.g. 150 tanks versus 943) (ACDA 1995). The USSR/Russia share of Eastern Europe's arms imports declined from 95 % in 1990 to a negligible level by the mid-1990s. The Asia-Pacific region accounted for 43 % of Russian sales and the Middle East a low 24 %. China has been the largest customer.

The transfer of defence-related technology from the West to Russia, especially electronics, has increased due to the liberalisation of controls on exports by NATO and the abolition of CoCom. Illegal contributions have been made by Russia's spetsinformatsiya system, run by the GRU and the Foreign Intelligence Service (SVR).

f. Production of Military Power and National Security

Russian national security has been affected by both positive and negative forces (Zolotarev 1998, Zyuganov 1998, Kontseptsiya 2000). Since 1992 external military threats (EFT) have diminished and the Russian leadership has had less ambitious security objectives. But improvements in the military capabilities of NATO and the expansion of NATO eastward have increased threats. The economic power of Russia's potential adversaries (United States, China, Germany, Japan, Britain) has increased, while that of Russia has collapsed. There have been serious internal threats (IFT) to the viability of the Russian state, notably in Chechnya.

Diplomatic, intelligence and arms control organisations producing threat reduction services (ETR and ITR) have been active, but not especially effective in accomplishing goals. The output of potential

strategic and conventional military services in Russia has declined in both quantitative and qualitative terms. On balance, the national security of Russia has deteriorated in the transition period and the country has continued to decline as a world power.

6. Conclusions and Prospects

The Soviet Union was able to develop a large military-industrial complex (Table 4) and achieve strategic parity with the U.S.A. while possessing a relatively small economy because the politico-economic system created special conditions in the high priority defence sector (Table 1). During 1965-91 resource allocation was determined by the “quantity drive” of defence institutions, their priority status, and the dynamics of Soviet growth (Table 3). However, the heavy defence burden combined with the adverse features of the shortage economy to generate microeconomic distortions (Table 2) and macroeconomic short-comings, such as decelerating growth. As problems in the civilian economy intensified in the “stagnation era” (1976-85), it became increasingly difficult to sustain the protection of defence institutions. The production of military services and the combat effectiveness of the armed forces declined. Defence-related technological gaps between the USSR and NATO countries widened. The reforms of the Gorbachev era were disruptive or ineffectual. External and internal threats increased, leading to a decline in the national security status of the USSR until it fragmented in 1991.

Political leaders in the Russian Federation expected that reforms of the economy and military-industrial complex could be carried out quickly and successfully. Elaborate programmes were adopted to govern restructuring of the armed forces, conversion of defence industry, and revitalization of military RDT&E. But the transition in Russia has been flawed and has produced a hybrid economic system with many of the worst features of both command and market economies (i.e. weak state, insecure property rights, rampant crime). The defence sector was given a progressively lower priority status and defence

expenditure was drastically reduced in an uncoordinated manner (Tables 1, 5). All defence institutions suffered from the worsening microeconomic conditions (Table 2). Their related markets (Figure 1) were activated, but remained distorted and inefficient. Shortages in the Russian defence sector have been more pervasive than they were in the Soviet economy.

In the armed forces there have been some achievements in restructuring and reform. The war in Chechnya during 1999-2000 has demonstrated that the military remains capable of fighting an intense, low-technology war. But negative trends have outweighed positive ones. Personnel problems have increased, the obsolescence of its weapons has accelerated, and combat readiness has fallen. The production of most military services has declined in volume and quality terms. The military supply network has become disorganised. Reforms of the defence industry and military RDT&E have failed and the outputs of these institutions have dropped precipitously. The defence industry has evolved from a high priority institution that dominated both its customers and suppliers into a neglected, bankrupt one. Technological gaps between Russia and NATO countries have widened. The national security status of Russia continued to deteriorate through 1999.

The prospects for the Russian defence sector over the initial decade of the 21st century are uncertain. The politico-economic system is opaque and malfunctioning. Most of the government's forward-looking documents concerning reforms of the armed forces, military doctrine, and weapons development have been divorced from economic realities.

In the most likely scenario of the future, the Russian state under President Putin gradually strengthens its control over the oligarchs, government bureaucracy and regions. The economy evolves into a more stable state-dominated, capitalist system, albeit with imperfect markets and pervasive corruption. Economic growth accelerates from a low base. The state raises the priority of the military-

industrial complex and defence spending grows faster than GDP (Prognoz 1999, Korotchenko and Mukhin 1999). The modernisation of the armed forces commences, based upon re-organisation, professionalisation and procurement of new weapons systems (Konsteptsiya 2000, Sokut 2000, Arbatov and Romashkin 2000). The Ministry of Defence gradually becomes a stronger buyer in the domestic market for arms, while defence industry enterprises lose their monopoly power and are forced to become more competitive. The size of the defence industry is stabilized, it becomes more focussed on military production, and it modernizes its manufacturing plant. Greater investment is made in military RDT&E, which results in an acceleration of technological innovation. But Russian-NATO technological gaps are not closed significantly. The Russian government maintains self-sufficiency in weapons production and military RDT&E. The value of Russian arms exports increases due to improved product quality, energetic marketing and favourable international political conditions.

In sum, it is probable that the economic and military power of Russia in the early 21st century will increase from current low levels. Although Russia will remain relatively backward technologically and weaker than the NATO alliance, by 2010 it should possess the most powerful national defence sector on the Eurasian landmass.

7. Bibliography

This is a selected bibliography that lists about one-third of the sources used in preparing this article. The full bibliography is included in the longer draft of this paper that is available at the author's website (<http://www.economics.ox.ac.uk/Faculty/Members/davis.htm>).

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8. Endnotes

- ¹ This article is a significantly reduced version of the original draft, which is available at the author's website (<http://www.economics.ox.ac.uk/Faculty/Members/davis.htm>).
2. Although exchanges in the Soviet economy were governed by the formal plans and linked rationing of central agencies, important horizontal economic relationships existed in markets, primarily because there were recurrent deviations from plans, supply imbalances and chronic shortages of inputs. These phenomena forced defence managers to engage in informal activity in the markets shown in Figure 1.
3. The objectives of potential military services are to deter attacks and intimidate possible hostile forces by threatening the use of pre-emptive or retaliatory military action. Actual military services consist of combat operations produced to attain established goals.
- ⁴ The features (decision making, methods of co-ordination, ownership pattern, system of incentives), economic policies, economic environment, and economic performance of the Soviet command and Russian transition economies are described in Davis (1999).
5. According to the Soviet defence economist Pozharov (1981, pp. 115-16): "In order for economic power to be converted into military strength, it is necessary to provide for the production of armaments, combat technology and other items of a military nature, the correct distribution and timely delivery of them to the troops, and the creation of all the conditions for their effective utilization. A special social organism serves these goals - the military economy. The scale and effectiveness of the military economy characterises the military-economic power of the state, that is, its actual capability to provide its armed forces and to support the necessary defensive capacity of the country."
6. In the judgement of CIA (1986): "The defense industries receive the highest quality raw materials and are given preferential access to the transportation and distribution networks for delivering materials...they also have access to the best machinery."
- ⁷ The shortage economy model is presented in Kornai (1992) and Davis and Charemza (1989). Its basic propositions are that the Soviet-type economy was characterized by quantity (non-price) control mechanisms, such as central planning and rationing, pervasive shortages in retail and wholesale markets and rational, habitual responses by consumers and producers to shortage phenomena. Budget constraints on firms were soft, so there were weak financial restrictions on their demand for inputs. Firms operated in sellers' markets and produced goods and services of low quality and obsolete technical standards. On the input side, institutions experienced chronic difficulties in obtaining supplies and tried to maintain large inventories to minimize production disruptions caused by shortages of planned inputs. Barter was widely used in informal trades between firms. Bilateral foreign trade between socialist countries was another form of barter.
8. The argument that a sellers' market existed for the defence industry's products conflicts with past conventional wisdom that the market for military goods was one of the few in the USSR in which the consumer (the armed forces) was in a strong position relative to the supplier (the defense industry) and that weapons designers dominated production establishments (Alexander 1979).
9. The "quantity drive" describes the striving of managers in a shortage economy to increase the volume of output in order to satisfy queuing customers and exacting superiors. CIA (1986) claims that "the

Soviets have traditionally emphasized numbers rather than sophisticated designs” and that they expanded weapons production through “extensive growth”. Almquist (1990) cites the criticism of the aircraft designer Antonov that performance in the defense industry was assessed using simple indicators of gross value of output, which encouraged managers to pay attention to the quantity of output rather than its quality.

10. CIA (1986, pg. 8) reported that: “Continued high levels of military procurement, coupled with unexpectedly slow growth in the output of the machine-building, energy, metallurgy and chemical sectors, almost certainly contributed to industrial bottlenecks in the late 1970s.” Almquist (1990) found that: “On the question of supply, the writings of the defense industry managers suggest that the Soviet defense industry may not enjoy the immunity to problems often assumed; it is certainly clear that the managers are not satisfied with whatever degree of special protection they may have. These managers complain just as much as their civilian counterparts about the vagaries of supply and unpredictability of supplier.”
11. The Ministry of Defence was able to purchase substantial quantities of goods and services with modest official budget allocations as a result of its “heavy ruble”. According to a 1991 Soviet estimate, a defence ruble could buy three to four times more machinery and equipment than a civilian ruble.
12. An official Soviet statement in 1987 reported that: “It is common knowledge that attempts to compare military budgets have not yet yielded any positive results because of crucial discrepancies in the structure of arms prices and in price setting mechanisms. The defence budget which we are publishing (20.2 billion rubles), for example, reflects what the USSR Ministry of Defence spends on personnel of the armed forces, material-technical provisions, military construction, pension funds and a number of other expenditures. Scientific research, design and testing work, and armaments and military technology purchases are accounted for in other articles of the USSR state budget.”
13. Noren (1995) provides a comprehensive survey of Western attempts to estimate Soviet defence expenditure. It is beyond the scope of this article to review the many publications on this topic or to attempt to model Soviet defence economic decision making.
14. It is assumed that the Soviet leadership could predict growth in the forthcoming year with accuracy, due to the inertia and known inter-connections in the economy, even if this was not reflected in the published annual and five-year economic plans.
15. The α coefficient is being estimated econometrically for the current and constant ruble cases and will be reported in the final published draft. At the time of preparation of this discussion paper current price data for several years was still missing.
16. The ministries under the Military Industrial Commission were (less obvious products shown in parentheses): aviation industry, communications equipment industry (electronic warfare equipment), chemical industry, defence industry (conventional armaments), electrical equipment industry, electronics industry, general machine building (rockets and space equipment), machine building (munitions), medium machine building (nuclear warheads), petroleum refining and petrochemical industry, radio industry (radar), and shipbuilding industry (CIA 1986). The defence industry also included the factories of the Ministry of Defence and military-related production units of predominantly civilian ministries.
17. The new politico-economic system in Russia has evolved from slowly from shortage system that

was analysed by Kornai (1992) and illustrated with his Figure 15.1. With respect to political power, the Presidential apparatus retains central control, especially in the security field, but there now are multiple political hierarchies and some strong regional governments. The state, broadly defined, remains of crucial importance, as does economic paternalism. There has been a shift from direct to indirect bureaucratic co-ordination. Money and prices are semi-active, whereas quantity processes and administrative interventions continue to be influential. Vertical relations are still of significance to enterprises because they determine the allocation of subsidies, credits, tax breaks and price controls. Sellers' markets and soft budget constraints are wide-spread. The hybrid features of the economic system and erratic economic policies have engendered distorted behaviour by firms, such as reliance on barter. Chronic, intense shortages afflict institutions dependent upon the state budget.

18. An example is the 1996 "Military Organisation and Development Plan for 1996-2000 and the Programme of Russian Federation Armed Forces up to 2005". Its objectives were: reorganisation of the high command to enhance its effectiveness; reduction in the number of branches of the armed forces to three (army, navy and air force); shifting from a draft to a volunteer army; democratisation; creation of new mobile forces; enhancement of military R & D; revision the relationship between the military and defence industry to make the latter, the supplier, more responsive to the demands of the former, its customer; and introduction of smart weapons in all military services.
19. Military units subordinated to other organisations included: Communication Troops, Civil Defence Troops, Tax Police, Foreign Intelligence Service Troops, Main Protection Directorate Troops, Troops of the Federal Administration for Special Construction, Ministry of Atomic Energy Guards, Troops of the Federal Specialised Administration for Construction in Eastern Regions, Troops of the Federal Highway Construction Directorate, and Railroad Troops.