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A CHANCE FOR ECONOMIC REVIVAL?

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Number 16

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The Background: Russia's Two Spheres of Comparative Advantage

The Soviet Union was famous for its economic contradictions. On the one hand, its creaky industrial sector was incapable of producing shoes that fit, or TVs that did not start fires. Distortions of the planned economy, manifested first and foremost in the misallocation and shortages of material resources and poor incentives for the work force and management, resulted in backward technology and poor quality of output, especially in the consumption goods sector. Thus, the comparative advantage that Russia enjoys, based on its abundant natural resources, exhibited a strong tendency to decline as one went from resource extraction and first-stage processing to deeper processing and manufacturing. Estimates conducted by specialists from the Russian Academy of Sciences indicated that Russian manufacturing industries might have actually been producing negative value added when calculated at proper market prices. That is, Russian manufacturing was, on average, destroying rather than creating value when processing Russian resources.

On the other hand, Russia's formidable science establishment made the country a leader in technologies ranging from metallurgy to computer software. In the climate of pessimism engendered by the Yeltsin Administration's erratic efforts to introduce free-market capitalism, commentators and investors have largely ignored this fact. It is extremely important, however, to remember that the concentration of resources by command methods paved the way for fairly good results in certain select branches of the Russian economy. This applies, in particular, to space technologies, aircraft building, precision instruments, development of new materials, and similar technologies. The former Soviet Union had also achieved a reasonably high level of development, even by international standards, in the spheres of transportation and infrastructure, mass education, and fundamental research to support these sectors. This development was based, in particular, on an extensive network of research institutes and experimental laboratories, and the coordination of their activities on a national level.

The high quality of human capital needed for the success of these research efforts was attained, first, by guaranteeing the labor force a high level of general education, and, second, by creating a special system of non-market incentives for the country's intellectual elite. In the beginning of the 1990s, less than three percent of workers had not graduated from medium high

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1 Based on a personal interview with Dr. Dmitri Lvov, Secretary of the Economics Department of the Russian Academy of Sciences conducted by one of the authors.
school, while about 20 percent of the work force had higher education. The Russian Federation had 200 university and college students per 10,000 of population, which is comparable to most developed nations. The part of the former Soviet Union that now comprises the Russian Federation employed more than 1.2 million research workers in 1985 and more than 3 million people, if technical and service personnel are included. This elite work force maintained both high intellectual standards and a much higher standard of living guaranteed by the state until the very collapse of the planned economy. It is especially true that those research centers and production facilities specializing in nuclear and space technologies as well as in the development and production of arms were set up as self-sufficient communities, almost totally isolated from the rest of the country. In addition to high social status and many fringe benefits, their staff also enjoyed salaries several times higher than those of the rest of the work force. These privileges, while taking a heavy toll on other branches of the Soviet economy, did at least partly compensate for the lack of market incentives in the elite sectors of the economy.

What all this amounts to is that, after the breakup of the Soviet Union, Russia basically had two spheres of comparative advantage which it could use for the purpose of integrating itself successfully into the world economy. The first such sphere was represented by the resource extraction sector, or, more generally, industries with a very low share of value added in the total value of output. The second comprised those industries with a very high share of value added that were not dependent on the general state of technology or manufacturing but rather on the quality of human capital. This is another extremely important sphere of latent comparative advantage for Russia.

Coincidentally, many of these sectors are also those that have been the focus of attention in developed nations for the past decade, as they comprise the core part of the modern high-tech "new economy," including a rapidly growing information technology sector. If properly cultivated, Russia's science and technology sector could commercialize its products that have potential markets worldwide and become a leading force for the revival of the overall economy. High technology and information have the potential to replace energy, minerals, and arms as "cash crops" in becoming the principal export sectors of the Russian economy, with many positive spin-offs to other sectors. The principal research institutes, including those of the Russian Academy of Sciences and those of the Russian atomic, military, and space programs, could play major roles in this development. They could provide the people, facilities, and ideas
for commercializing Russia's leading role in a variety of high-tech areas, such as supercomputers, computer software, pattern recognition, advanced communications, lasers, plasma fusion, and biotechnology. Some Western firms and governments have already used the products of these technologies or collaborated with these Russian institutes in their further research and development. Such knowledge areas, rather than the old "smokestack" industries or mineral extraction, represent the best potential sources of growth for Russia.

We will now proceed to take a brief look at what has happened to the human capital intensive sector in Russia during the years of transition. In addition, we will discuss the factors hindering the development of this sector and the possible policy measures that could revive it as a potential source of recovery for the Russian economy.

The Plight of the Human Capital Intensive Sector under Transition

To date, post-Soviet Russia's only seriously exploited assets have been its natural resources. Russia is the storehouse of the world for many energy resources and minerals, and its potential in this area has been commercialized into natural resource extraction that provides the basis for most of its exports. Gas and oil, in particular, are not only the bases for Russia's largest exports, but also for its largest firms – Gazprom, the world's largest producer of natural gas, and Lukoil, a major international oil producer. Russia currently accounts for about a third of world production of natural gas and about 9 percent of world production of oil. In addition, it accounts for over 12 percent of world production of platinum, over 5 percent of world production of gold, and almost 5 percent of world production of copper. In 1997 almost half of its exports were in fuels and energy, with another fifth in metals, so over two-thirds of its exports were based on mining and extraction of its natural resources. It is also this sector of the Russian economy that has attracted the most attention from domestic and international investors during the years that followed the collapse of the Soviet Union.

By contrast, the picture in the other area of Russian comparative advantage, that of the human capital intensive sector, has been very bleak after the demise of the planned economy. To begin with, the government abruptly cut off its expenditures for maintaining not only the research potential of Russia but also for its system of education in general. According to estimates derived by the authors based on official statistical data, public expenditure on
education has declined 55 percent in real terms over the years of transition, while the growth in private expenditure could not nearly compensate for this cut in public funding.

Public expenditure on fundamental science has declined even more sharply. Total expenses for R&D as a percentage of Russia's GDP shrank from 2 percent in 1990 to 0.7-0.8 percent in the mid-1990s, while the share of public spending from the federal budget in the total expenses declined to less than 50 percent (Nauka v Rossii v tsifrakh, M., 1996, p. 102; Finansovye Izvestiya, May 5, 1998). Additionally, there is a large gap between assigned budget allocations for research institutions and the actual funds made available to them. In the mid-1990s, less than 40 percent of the initial budget allotments actually came through while the initial allotments themselves were, in fact, inadequate to support the institutions to begin with (Nezavisimaya Gazeta, July 17, 1996). This drew many members of the country's intellectual elite into a state of total despair. In late 1996, Dr. Nechai, Director of the Federal Nuclear Center in Snezhinsk, a top-secret city responsible for the construction and production of thermonuclear weapons, killed himself because he could no longer tolerate a situation in which he persistently lacked minimum necessary funding. It was reported that over the six months preceding his suicide, he was able to pay each of his 50,000 staff members – academics and engineers of highest quality in a facility comparable to the Los Alamos National Laboratory in the United States – only 50 dollars. The facility did not even have the money to replace fire extinguishers that were beyond their expiration dates, while its electricity and heating supplies were periodically cut off due to nonpayment.

This anecdotal evidence finds additional support in objective data. Comparing real wage dynamics across industries, we can see that the relative size of incomes of employees engaged in research-related spheres has fallen far below the average. As a result of drastic cuts in official real salaries in these spheres, incomes of a very large proportion of those employed in research and education activities have decreased to subsistence level or less (I. Ushkalov and I. Malaha, 1999, pp. 50-51). For example, comparing real wages across industries, in October 1997 the share of personnel receiving wages below the official poverty line stood at 31.6 percent for the research sector and 49 percent for the education sector, while it was 17.5 percent for the industrial sector as a whole. Clearly, what used to be the elite sector of the Soviet economy has by now become a complete pariah.
Reflecting the growing dissatisfaction with the state of things in the human capital intensive sector, and also taking advantage of newly obtained freedoms, the outflow of human capital from Russia has totaled at least 1 million people over the past 10 years. Officially registered cases of emigration between 1990-1996 on a yearly basis varied between 90,000 and 110,000 people (Naseleniye Rossii, 1996, p. 88). There is no official data on this brain drain, but, according to Russian companies that provide services to people who want to emigrate, the flow of emigrants in the latter half of the 1990s was about 100,000 per year (Ekspert, 2000, No.1-2, p.73).

A large part of this emigration was comprised of educated people who formed the core of Russian research institutes and its intellectual potential. Many of these specialists, who used to be the intellectual elite of the Soviet Union, have already settled down in the United States, Canada, Israel, Germany and other countries. Israel alone received more than 13,000 scientists from the former USSR during the last decade on a permanent basis (The Moscow Times, Aug. 7, 1999, p. 10).

Still more visible is the outflow of researchers and other intellectuals who leave Russia on a temporary basis to perform wage-contracted research or train specialists in selected spheres on the basis of long-term or medium-term contracts. Among highly educated specialists and professional scholars, the number of such "temporary emigrants" exceeds the number of officially recorded cases of emigration by several fold (I. Ushkalov. I. Malaha, 1999, p. 71). Losses resulting from emigration have been especially great for the leading research centers and universities. Moscow State University, which used to be regarded as the showcase of the Soviet system of higher education, is reported to have lost from 10 to 20 percent of its best scholars (Vek 1996, No. 51).

The demise of state-owned research institutes and the absence of privately sponsored ones have forced many of the remaining researchers to change their sphere of activity. According to some surveys, 10 percent or less of those who had to leave research institutes and laboratories during the years of transition to a market economy have been able to find jobs in large private firms or banks. The rest found their new jobs in small businesses or in government structures, where their human capital cannot be efficiently used and is itself subject to gradual depreciation. A survey conducted by the Laboratory of Analysis and Forecasting of Migration Processes of the Institute of Economic Forecasting of the Russian Academy of Sciences found that, on average, 7
percent of researchers employed in secret military research institutes and laboratories resigned from their positions each year during the 1990s. Out of this number, 1 out of 7 emigrated, mostly to Israel or Germany and sometimes to the United States, while the remaining 6 had changed their jobs without leaving Russia (Expert No. 12, 2000).

One more thing becomes clear when looking at the official employment statistics. During 1993-98, large- and medium-size enterprises, which are the only ones counted in the official data, have sharply reduced their hiring of new workers in most industries, including those that had traditionally employed a high proportion of people with higher education. Paradoxically, the sharpest declines in new hiring were recorded in fundamental science and related sectors, and in those sectors linked to information technologies. Moreover, the number of people resigning from their jobs in these sectors has consistently outpaced those newly hired. As a result, the number of personnel engaged in research and research-related activity, which had reached its peak in the mid-1980s, declined almost by half by 1998.

Of course, it is possible to advance the argument that research institutes and laboratories had employed grossly too many people during the Soviet era, and this argument is certainly valid in many cases. However, we hasten to point out here that the decline in the absolute number of researchers in recent years has by no means been accompanied by an increase in efficiency for the remaining personnel. What this means is that many researchers only formally retain their jobs at institutes and research centers, while their main source of income and economic activity resides elsewhere. The relative wages data already cited prove this beyond any doubt. We can also cite evidence to support this conclusion from the official data.

Factors Hindering Human Capital Based Development

We thus seem to be facing a paradoxical situation here: while Russian and international businesses have been sharp enough to seize upon the opportunity of export profits provided by the resource extraction sector, they seem to have largely overlooked its potential for knowledge-intensive research and development. Reflecting this, Russia's long-term potential as a leader in information technology and other advanced technologies has also been largely overlooked by international investors, scholars, and advisors. They have focused too much attention on Russia's current problems and on the further development or revival of such traditional sectors as mining, heavy industry, and the arms industry.
In fact, very little paradox is involved, given the current state of affairs in this sector. The reality of the transition economy and the government policies introduced so far have been so unfriendly to the other side of the Russian latent comparative advantage that no actual development could be forthcoming regardless of its potential.

One of the most important problems is the absence of any coherent government policy that would at least help keep up the Russian human capital potential and prevent it from being squandered. The absence of an informed approach to what may prove to be Russia’s best chance for economic recovery is seen first and foremost in what has been happening to the government expenditure on fundamental research. Not only is the current size of these expenditures absolutely inadequate, but, even more significantly, those resources that are made available are provided in an extremely inefficient manner. Specifically, they are spread across thousands of institutes and research centers without any hope of providing adequate financing to any one of them. As a result, most of those institutes and centers have long ago ceased to conduct meaningful research. Furthermore, the government funding that is getting through is mostly dissipated in rent-seeking activities of the bureaucracy in managing research centers and facilities. As always in such cases, vested interests are created that benefit from the status quo while the research sector itself suffocates without adequate financing.

One would expect that at least some of the research that has immediate potential for commercialization could claim the attention of investors, both domestic and foreign. However, progress along these lines has encountered another very serious problem, namely the general insecurity of property rights in the Russian economy. Property rights and business contracts in Russia today are guaranteed and enforced not so much by public institutions, but rather by private protection teams and corrupt insider rings. Their judicial norms have little in common with economic reality, and, accordingly, they are treated with contempt not only by businesses, but even by the authorities themselves. Actual interactions among economic agents are based on unwritten rules of the economic game that are enforced by the threat of unorganized, but nevertheless quite effective reprisals against deviators by criminal elements. These rules that have arisen spontaneously largely determine the realm and the degree of competition in any industry. They also regulate relations within economic groupings, among them, and between private agents and the government. Formal judicial norms are implemented only to the extent that they do not contradict these informal rules.
As one of the authors has argued in more detail elsewhere (Braguinsky 1999), such an economic order is no impediment for private (or new "nomenklatura") businesses to export mineral resources from Russia. It is also no impediment to other kinds of projects that are profitable in the short run. However, it presents an insurmountable hurdle to starting new projects that require longer-term investment, even though the ultimate (discounted) value of such projects may be considerably higher. The reason, briefly, is that private protection is not secure enough in the long run, so the risk adjusted discount factor becomes so high as to make the projects privately unprofitable even though they may have a very high social value. The latter point is extremely important to stress, especially with later policy recommendations in mind. The problem is not simply the shortage of money for investment. Even today, Russian citizens residing in Russia – to say nothing of those who have emigrated – have billions of dollars invested in foreign bank accounts. They cannot and do not risk investing their money in long-term business projects in Russia because they do not feel that they will be adequately protected by the legal system.

It is no coincidence that many purely Russian firms that conduct projects in the "high tech" branches of the Russian economy prefer to base all of their non-production activities outside of Russia. A company may be registered in the Republic of Ireland, obtain money for investment in the United States, and have its own bank accounts in Luxembourg. A good example of this is the Russian business venture 'ParaGraph,’ a world leader in optical character reading technology. ParaGraph developed the first software for OCR of handwritten texts in the world. The company is now headquartered in the Bahamas and its marketing division is in California. Only its production base remains in Russia.

**A Changing Tide?**

The negative effects of the deficient institutional structure and the lack of government policies have not been limited to the knowledge intensive sector, of course. Even the resource extraction sector has declined in absolute terms since the start of the "transition to a market economy."

Generally speaking, Russia has experienced huge and unprecedented declines in output and living standards since the dissolution of the Soviet Union. The total volume of industrial output and real income, at least that reported officially, has dropped to almost half of their "pre-
transition” levels, while investment has plummeted by at least 80 percent. Capital outflow has reached an extremely high level (not to mention the human capital outflow referred to above), and the reliability of various technological systems has fallen dramatically, increasing the risk of local or even global technological and ecological disasters.

All this shows that attempts thus far to rebuild the Russian economy based only on the first type of the comparative advantage it possesses, namely, the resource extraction industry, are not working. Further economic trauma in Russia could have serious consequences not only for Russia, but for the world as a whole. Social stability has so far been generally maintained, but it is not hard to detect some very alarming trends that go against the officially proclaimed aims of democratic development and the introduction of a modern civil society. Rebuilding those sectors of the Russian economy that are based on its human capital potential could prove to be a crucial factor in reversing this dangerous course.

If proper conditions for its development can be secured, knowledge-based development in general and information technology in particular could lead to the revival of the Russian economy and accelerate its integration into the world economy. Indeed, with proper internal policies and external support, we believe that Russia could become one of the fastest growing emerging markets in the world. This is important not only for Russia's economic fate. The West as a whole, not to mention private investors, could benefit enormously from the commercialization of its research and development capacities. No other sector in Russia, whether energy and mineral development, arms production, heavy industry, or others, has a comparable potential for production, employment, productivity growth, investment, exports, etc.

Despite the negative tendencies of recent years, a vast potential still exists in several key knowledge intensive industries and branches of the Russian economy. For example, there has been little, if any, emigration of specialists in nuclear physics and nuclear technologies or in missile and space technologies. This was partly due to strict controls over the emigration of such specialists, but also partly due to their own high moral values and self-perception of the uniqueness of their knowledge. The same applies to other military-related technologies, especially in aircraft construction and the development of high-precision weaponry. According to the study of the Laboratory of Analysis and Forecasting of Migration Processes of the Institute of Economic Forecasting of the Russian Academy of Sciences cited above, the desire to emigrate has greatly receded recently in top secret military-related cities. More than half of the population
of those cities expressed, in principle, their desire to work abroad in the early 1990s, but, by the end of the decade that number stood at less than 10 percent.

Although many research centers have been reduced to a state of almost total demise, some of them have managed to survive until the present, and several companies – Russian as well as foreign – have started to show some interest in their potential. This is particularly true of some software projects, nuclear physics and physics of extremely low temperatures, organic chemistry, pharmacology, modern optics, etc. As one example, the Minnesota Mining and Manufacturing (3-M) Company has 28 contracts for joint research with Russian institutions. Russia’s high level of human capital gives it the potential to move into the very forefront of many high technology areas very rapidly. Given the uncertainties of utilizing Russian expertise, a modest start clearly makes sense. Russia could start with the development of certain key projects that have high potential and a clear significant comparative advantage that could be developed. These projects could point up the benefit of a targeted approach and serve as demonstration projects or incubators for related technologies, that would in turn lead to further development of the knowledge sectors of the economy. Examples of these initial projects include technologies that have already been developed at Russian research institutes and that are now in pilot plant operation. One of these new technologies is a novel method for the incineration of industrial and municipal wastes that can, in effect, turn garbage into fuel. It eliminates solid wastes with no environmental damage and, at the same time, generates electric power. The technique used, that of superadiabatic combustion, has been perfected at the Institute of Chemical Physics of the Russian Academy of Sciences, and it has been put into pilot operation both in Russia and in Finland. Another example is a new technique developed by Russian mathematicians for earthquake prediction and the identification of mineral deposits using pattern recognition that has been put into practice in the International Institute for Earthquake Prediction Theory and Mathematical Geophysics in Moscow.

These are but two examples of many scientific developments that could have great commercial value on a worldwide basis. There are other promising lines of development where Russia has a technological lead, such as new technologies in producing petroleum products based on catalysis processes, the development of new composite materials, and biotechnology.
The Role of Russia in the Information Revolution

Human capital intensive industries that are currently attracting particular attention worldwide are those related to Information Technology (IT). Given its vast and underutilized human capital, including the world’s largest pool of scientists and engineers, and the strength of its scientific and technical institutes, Russia has an enormous potential role in IT and knowledge based development. Such a development could be a leading force not only for the revival of the Russian economy but also for its integration into the world economy. Now may be the time for Russia to take a very different course, focusing on high tech research and development, particularly in IT and related knowledge based industries, that would enable it to play a leading role in the information revolution. This commercialization of Russia's science and technology is a diamond waiting to be discovered.

As a former global superpower, Russia has a double comparative advantage in IT. First, Russia has a large technological research infrastructure. For years, technological institutions and universities have produced advanced technology for the military. As the conversion of the defense industry to consumer applications and the infusion of western technology through joint telecommunications ventures permeate society, Russia could yet fulfill its technological potential. Second, there is a highly educated work force in Russia to support IT modernization. In order to utilize these advantages, institutions of higher learning must move from purely scientific research to market oriented efforts. As an example of this kind of technological development, India has evolved in the last decade from being on the sidelines in computer technology into a major center for computer software development. These days, when you call a technical support number, there is a good chance the expert on the other end of the line is sitting in front of a computer terminal in Bangalore. This is a precedent that could apply to Russia as well, which would be starting from a much more significant base of expertise than that of India.

The Russian market for IT related products and the demand for experts in this field have shown some visible signs of recovery in the past couple of years despite the generally depressed state of the economy. A few years ago, there was little demand for engineers and technical specialists, who either had to work for miserable salaries or change their profession. According to recent Russian media reports, however, the situation has greatly improved in recent years. *Kommersant Dengi* (February 9th, 2000) reports a notable increase in vacancies, especially in computer related areas, mass communications, and IT businesses. The firms in those industries
have been actively hiring new personnel and are also offering quite attractive salaries by Russian standards even in the aftermath of the August 1998 crisis. The salary offers vary from company to company, and they are better at foreign firms than at firms with only Russian capital. They range from 1,000 to 5,000 dollars a month, for example, for a manager of an IT project, which is a fairly high salary by Russian standards (Fukolova 2000). At the same time, ordinary programmers are still very cheap, with monthly salary ranging from 200 to 700 dollars a month (ibid).

Some Russian firms have launched quite successful businesses in the IT sphere. One of the leading companies in this industry in Russia currently is IBS (Information Business Systems), headed by Anatoly Karachinsky, its energetic, 40-year-old chairman. Projects successfully implemented by IBS in recent years include those undertaken for the Central Bank of Russia and several other government agencies; Russia’s largest savings bank; Gazprom, the world’s largest natural gas producer; Lukoil, the major oil producer, British Petroleum and others. IBS employs more than 400 people, and its turnover for 1999 is estimated at more than $50 million (Nefedov 2000). Major Russian commercial banks such as Menatep, Avtobank, and others, have likewise been actively making use of IT in their operations.

The business environment has also improved dramatically in recent years. In the early 1990s, most IT projects in large Russian businesses involved a kickback system, with the efficiency of the project a secondary issue at best. Kickback cases are now extremely rare, according to an IBS senior vice president. However, the IT industry in Russia is currently in its infancy stage at best. One thing that especially deserves notice is that all projects carried out by Russian IT firms are targeted at the domestic market rather than at export and foreign consumers. The list of projects carried out by IBS is illustrative of this fact: its clients are either Russian government agencies or big exporters of resources from Russia. This feature is characteristic not only of IT but of virtually all new businesses in Russia, with the exception of the resource extraction sector. What this means in macroeconomic terms is that the source of new income for the country as a whole basically continues to be the foreign demand for Russian resources, while the IT industry currently competes only for the demand generated by the proceeds from those exports.

One more problem of note is the lack of long-term financing that impedes the development of the human capital intensive industries in general. The computer programs
Some Policy Implications

Many of the policy measures needed to revive Russia’s human capital intensive sector and to promote its IT sector are also measures that are badly needed to promote Russia's overall economic development. These include the creation of market institutions and the formulation of responsible government policies (Braguinsky and Yavlinsky 2000). Additionally, there are specific measures aimed particularly at the IT and other knowledge intensive sectors that need to be taken to make use of the huge potential Russia has in this field.

Russia has many of the necessary ingredients for the commercialization of its technological developments. The human capital and part of its institutional infrastructure already exist. Russia also has potential entrepreneurs who could play a leading role in this direction. A new layer of business people who reject "robber baron" values and wish to establish modern creative businesses inside Russia, has emerged. The recent opening up of the country has already created the potential for transnational business operations, for which no borders exist between Russia and the West. So far, these operations have kept almost all of their financial resources abroad and have raised investment funds and paid taxes outside of Russia.

However, the production processes and the psychology of these business people remain deeply rooted in Russia. Represented by offshore registered financial and investment firms, these businesses currently control most Russian exports and some key elements of its transport facilities. With appropriate technical assistance, contacts and access to global markets, capital access and financing mechanisms, a social capital approach to economic development, protection of shareholder rights, good accounting regulations, and the institutional structures needed for an entrepreneurial culture to develop. Russia could join the information revolution and jockey into position in the world economy. It would no longer be just a supplier of oil and gas, minerals, raw materials, and arms. At the same time, it would no longer be a nation dependent upon the support
of other nations and international public and private banks. Rather, Russia could become a knowledge-based economy exporting high technology products around the globe.

To achieve this, Russia requires financial technology, including access to domestic and international investment and working capital. It needs technical assistance to provide the basis for commercialization of the many products and services its research and development sector has produced in the past and continues to produce today. New approaches to financing such development are necessary to ensure that investments in these areas are secure and channeled into promising areas. Joint ventures with international firms and banks or through the European Union's TACIS program of technical assistance to the Commonwealth of Independent States, remain a possibility.

It is worth noting that many western and joint venture companies that show interest in IT related projects in Russia today have been set up by, or intend to use, the expertise of Russians who have emigrated to the West. India took this path. Many of its gifted and educated people who had emigrated to the United Kingdom and the United States, set up firms that employed human capital in India. Thus, although the so-called "brain drain” does have some negative short-term effects, it can also represent a powerful way to bring human and financial capital together with very beneficial long-term effects. The idea of restricting the exchange of human capital between Russia and the rest of the world should be definitely rejected as a measure that would inhibit the growth of the IT industry as a comparative advantage industry in Russia.

One path for the exploitation of Russian science is collaboration with Israel. Many of its successful high technology companies rely on Russian scientists and engineers. These companies might engage in strategic alliances with Russian firms and institutes that could be mutually beneficial. But, the main effort for successful exploitation of Russia’s comparative advantage in knowledge-based industries should come from the Russian authorities themselves. The current policy stance taken by the Russian leadership, however, actually hinders the development of technology and research that would benefit its economy.

The West can and should play a major role in establishing a normal market-based economic order in Russia, especially now when 90 percent of the Russian business and political elite have a vested interest in maintaining the status quo. Progress in market reform should be the main indicator when considering assistance to Russia from Western governments or international
agencies, rather than such formal criteria as what is happening to state monopolies or the size of the budget deficit. The same approach should be taken by large private businesses.

The West should likewise make it clear that the degree of its involvement will be directly linked to the readiness of the Russian government and Parliament to act in accord with the judicial measures that they themselves have adopted. Under current circumstances, government guarantees can be revoked at any time, as demonstrated in the events of August 1998, and taxes are paid not in accordance with the tax code but rather in accordance with idiosyncratic agreements with the authorities. As a result, it makes little sense to place emphasis on procuring government statements of intent and/or commitments to tax exemptions. It will also be necessary, of course, to press Russia to build the basic institutions of free markets, including protection of shareholder rights, accounting transparency, legal due process, and the like.

Another important aspect of developing IT industries as a potential comparative advantage sector for Russia would be to provide adequate information for those who would like to make use of this potential. The situation today is highly unusual. Many believe that Russia does have a large amount of research inherited from the former Soviet Union that can be commercialized. At the same time, however, it is extremely hard for an ordinary business person to get reliable information as to what kind of research is indeed available, who has property rights to it, and how it can actually be commercialized. Given this lack of information, the Russian government should assist in creating a database, or make sure that the information is made publicly available. Given that most research has been carried out and is still being carried out in military-related institutions, if the government does not take an active role, then any large-scale usage of such information will be rendered very difficult indeed.

Will any of this be easy? Hardly, but it would be tragic to waste Russia's unique potential in knowledge intensive industries.
References


