

Will Russian Scientists Go Rogue?
A Survey on the Threat and the Impact of Western Assistance
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The collapse of the Soviet Union sparked fears throughout the world that rogue nations and terrorist organizations would gain access to weapons of mass destruction (WMD). One specific concern has been “WMD brain drain.” Russians with knowledge about nuclear, chemical, and biological weapons could now depart to any country of their choice, including rogue nations seeking to produce WMD. Meanwhile, Russian science fell into a protracted crisis, with plummeting salaries, little funding for research, and few new recruits to science. These developments increased both the incentives and the opportunities for scientists to sell their knowledge to governments and terrorist organizations with hostile intentions toward the United States. Recognizing the threat of WMD brain drain from Russia, the United States, and other governments implemented a host of programs designed to reduce the risk. Despite, or perhaps partly because of, massive assistance from the West to prevent scientists with WMD knowledge from emigrating, the threat of Russian WMD brain drain has recently faded from view. Yet we have seen no evidence that these programs are effective and little systematic assessment of the current threat of WMD migration.

Our data from an unprecedented survey of 602 Russian physicists, biologists, and chemists suggest that the threat of WMD brain drain from Russia should still be at the forefront of our attention. Roughly 20 percent of Russian physicists, biologists, and chemists say they would consider working in rogue nations such as North Korea, Iran, Syria, or Iraq (still considered a rogue state at the time of the survey). At the same time, the data reveal that U.S. and Western nonproliferation assistance programs work. They significantly reduce the likelihood that Russian scientists would consider working in these countries. Moreover, Russian grants do not reduce scientists’ propensity to “go rogue”.

These survey findings have clear policy implications: the U.S. and its allies must continue to adequately fund nonproliferation assistance programs rather than hastily declare victory. The U.S. should remain engaged with former Soviet WMD scientists until they are willing and able to find support for their research from competitive, civilian-oriented, privately funded projects.

Otherwise, we run a great risk that WMD expertise will migrate from the former Soviet Union to countries or organizations that harbor hostile intentions toward the U.S. Assistance programs work to reduce the threat of WMD brain drain, but their task is not complete. Now is not the time to pull back.

Background

The Russian scientific establishment, once highly respected throughout the world, experienced a precipitous decline in its prospects and status since the demise of the Soviet Union in 1991. Between 1991 and 1994, federal funding for science declined by roughly 75 percent and has since remained at about that level. With few alternative sources of financing, Russia's scientific establishment was decimated. Salaries plunged, equipment and laboratories deteriorated, new supplies and journals were hard to come by, and electrical power and phone service were limited. Many scientists had to take second jobs to support themselves and their families. This dire situation led two prominent Russian scientists, in the mid-1990s, to declare "the common understanding is that science in Russia is now in a state of crisis. This, however, is an exceptionally rosy view of its condition....it would be more accurate to describe its current condition as comatose."

Under such conditions, it is hardly surprising that many scientists sought professional opportunities abroad or remained in Russia and entered other fields, such as business, leaving science altogether. According to some estimates, the number of scientific researchers declined by more than half, from 993,000 in 1990 to 417,000 in 1998. Most estimates suggest that the majority of scientists remained in Russia. However, the steady flow, or "brain drain," of scientists moving abroad caused great concern among Western nations. And, with the future of science looking bleak and few apparent prospects for non-defense related employment, the West was even more concerned about the possibility that those who remained in Russia and continued to live under harsh economic conditions could be tempted to sell their knowledge and move to rogue countries where the "benefits" could be better. And, after September 11, 2001, fears about possible collaboration between disgruntled Russian scientists and terrorists were even more pronounced.

Western Initiatives

Having recognized the proliferation threat posed by WMD scientists barely able to eke out a living, the United States and its allies responded with a number of programs aimed at keeping WMD scientists gainfully employed at home. These programs sought to turn participants' attention to civilian work, educate them about the market place, and instill a sense of entrepreneurship and an appreciation for international scientific norms. They award funds on a competitive basis to research projects that have commercial and civilian applications. They also promote institutional links – especially interactions between different types of organizations, such as institutes, firms and universities – rather than the hierarchical, state controlled system that typified Soviet science.

One such program, the International Science and Technology Centers (ISTC), a Moscow-based multilateral organization involving the United States, Russia, the

European Union, Japan, Norway, and the Republic of Korea, has disbursed over 600 million dollars in grants to more than 50,000 scientists in the Commonwealth of Independent States since 1993. The U.S. Department of Energy (DOE) oversees two programs aimed at reducing the possible diversion of WMD expertise to terrorists and proliferators: the Initiatives for Proliferation Prevention (IPP) creates links between U.S. industry and former Soviet weapons scientists who propose applied research projects that have commercial potential, and the Nuclear Cities Initiative (NCI) aims to reduce the size of Russia's closed nuclear cities by helping weapons experts make the transition to civilian employment. Another major government-financed program is the European Commission's International Association for the Promotion of Cooperation with Scientists from the Commonwealth of Independent State and the Former Soviet Union (INTAS). These government programs have been supplemented by privately funded efforts, such as three initiatives of George Soros: the International Science Foundation (1993 to 1996), International Soros Science Education Program (ISSEP), and the Civilian Research and Development Foundation (CRDF), established in 1995.

Until now, information about the value of Western (and Russian) grant programs has been primarily anecdotal. In Russia, most scientists and government officials appear to value these programs. For instance, the deputy director of the Institute of Nuclear Physics, Gennady Kulipanov, said that almost 80 percent of its resources were devoted to research during the Soviet period and 20 percent was spent on applying the results of that research to industry. Western (and Russian) grants have enabled them to devote "four-fifths of their time to produce industrial equipment that is sold in China, Japan, South Korea, and even in the U.S., earning them more than USD 20 million a year." Vladimir Fortov, former head of the Russian Foundation for Basic Research—a Russian institution that provides grants for basic research—declared in 1995 that "approximately 50 percent of Russian basic science is being financed today from foreign sources such as the Soros Foundation, the International Science and Technology Center, INTAS, and others." Yet, others in Russia are more doubtful about the value of Western grant programs, claiming they amount to spy organizations for the West and are plundering Russia's intellectual treasures.

Data

The original purpose of our survey was to evaluate the effectiveness of the ISTC's program in Russia. We hired a highly respected Russian survey research firm, ROMIR, to conduct the actual survey. We prepared a questionnaire in consultation with a wide range of experts on Russian science in the research community and the government. We also drew on a focus group study we had conducted with Russian scientists in fall 2001. ROMIR staff translated the questionnaire, pre-tested it twice, and conducted an interviewer training session which we observed.

Fieldwork began on November 2, 2002, and ended on January 23, 2003. Generally fieldwork went smoothly, with one exception: the survey had to be cut short abruptly in one institute, when the institute leadership became suspicious and ordered the interviewers to leave. The institute's remaining sample volume was reallocated to other institutes of similar profile. A total of 602 interviews were completed in 20 institutes,

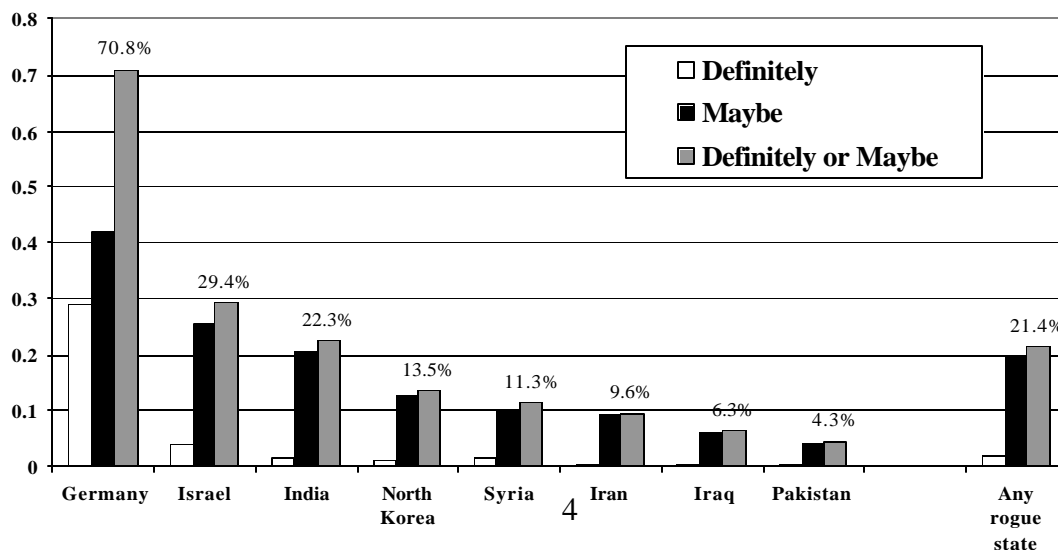
which were sampled on the basis of three criteria: they had to be focused on physical, chemical, or biological sciences; they had to have received at least some funding from the ISTC; and they had to be accessible to ROMIR in terms of permission and cost. To assess the ISTC, we had to over-sample recipients of ISTC funding, but we use post-sampling weights to correct for this in the results we present here. Among sampled scientists actually contacted, the refusal rate was 7.4 percent. After the completion of fieldwork, ROMIR office staff called back a randomly chosen 15 percent of the respondents to verify that the interview had taken place. All these interviews were verified.

Unfortunately, we were denied access to institutes directly overseen by the Ministry of Atomic Energy, which form the bulwark of the weapons complex. However, the institutes we did visit were an integral part of that complex: both weapons related and civilian research were conducted at these institutes in Soviet times. But the absence of institutes exclusively committed to defense research as represented in our study may limit the ability to generalize our findings. Nonetheless, our survey gives unprecedented empirical insight into the orientations of a wide swath of currently practicing Russian scientists. Our data can provide a benchmark for future studies of the same population and for comparisons with data on institutes that primarily conduct defense-related work.

Findings

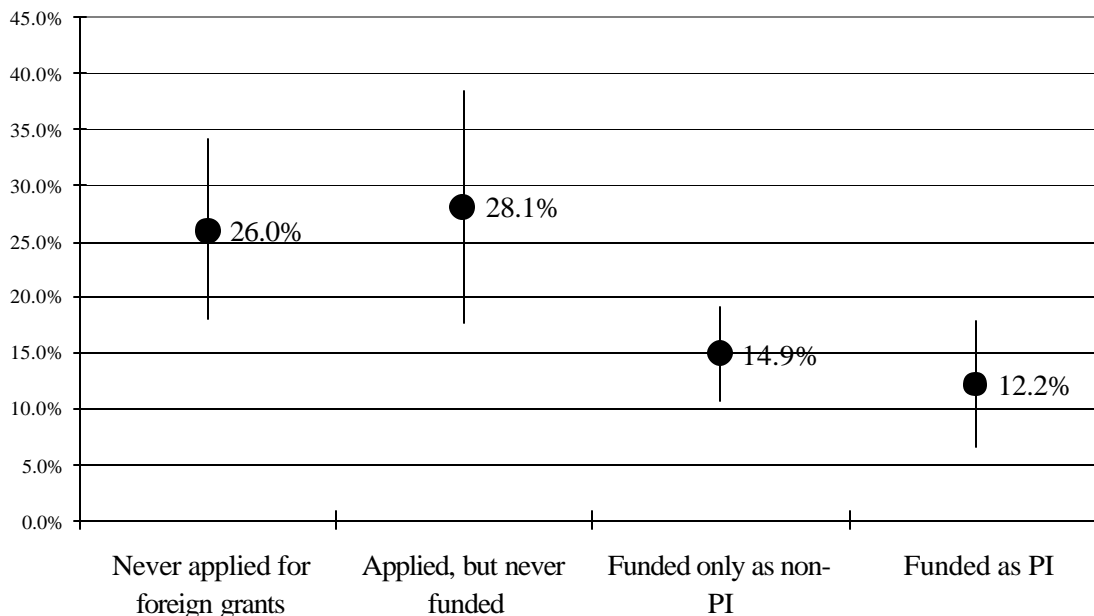
We asked respondents whether they would consider taking a job in each of eight foreign countries if the job required them to move there for at least one year (Figure 1). Combining the responses “definitely” and “depending on the work conditions”, we find overwhelming interest in taking a job in Germany (71 percent), and lower but still substantial interest in jobs in Israel (29 percent) and India (22 percent). Willingness to consider taking jobs in individual rogue countries is lower still, ranging from a high of 14 percent for North Korea to a low of 6 percent for Iraq. But if we combine the responses for North Korea, Syria, Iran, and Iraq, we arrive at a striking result: 21.4 percent of scientists in the specialties we consider are willing to consider taking a job in at least one rogue nation. Taking into account sampling variability (the 95 percent confidence interval or “margin of error”), the actual figure in the population surveyed probably lies somewhere between 18.1 percent and 24.3 percent.

Figure 1. Propensity to migrate to various countries
(Source: Weighted Survey of Russian Scientists Data)



While the overall threat remains disturbingly high, we also find that participation in foreign grant programs reduces the propensity of Russian scientists to consider migrating to a rogue country (Figure 2). We classify our respondents into four categories: those who have never applied for foreign grants at all, those who applied but have not been funded, those who have been funded but only as non-Principal Investigators (PIs), and those who have been funded as PIs. Among those in the first two categories, 26.0 percent and 28.1 percent, respectively, would consider taking a job in a rogue country. The corresponding figures for those in the latter two categories are 14.9 percent and 12.2 percent. As can be gleaned from the 95 percent confidence intervals around these estimates, the differences between the two groups of non-funded scientists are not statistically significant, nor are the differences among the two groups of funded scientists. However, the differences between funded (whether as non-PI or PI) and non-funded (whether applied or not) are statistically significant. These results strongly suggest that the participation in foreign grant programs reduces propensity to “go rogue.” We verified these results by estimating a multivariate statistical model (logistic regression), where we assessed the effects of foreign grant status after controlling for age, gender, ethnicity, place of residence, scientific specialty, administrative position, and income. Based on our final model, scientists with mean values on all these variables have a 25.0 percent probability of saying they would consider “going rogue” if they have not received funding from foreign grants, versus an 11.3 percent probability if they have received funding.

**Figure 2. WMD Migration Propensity by Foreign Grant Status:
Estimates and Upper and Lower Confidence Bounds
(Source: Weighted Survey of Russian Scientists Data)**



What about Russian grants? Perhaps they also diminish Russian scientists' propensity to "go rogue." In fact, our data suggest that Russian grants do not affect WMD migration potential. Our point estimates suggest that 32.2 percent of those who never applied for Russian grants would consider taking a job in a rogue country, compared with 16.0 percent of those who applied but were not funded, 22.4 percent of those who were funded only as non-PIs, and 16.2 percent of those who were funded as PIs. However, the differences among all three latter categories are not significant: those who applied for Russian grants but did not receive them are no more or less likely to consider going rogue than those who received them as non-PIs or PIs. The multivariate results confirm this. The logical implication is that Russian scientists who have never applied for Russian grants differ from those who have applied with respect to WMD migration propensity, but actual participation in Russian grant programs has no impact.

Conclusion

Based on these findings, we conclude that WMD brain drain from Russia continues to represent an important threat to international security, as well as one that has faded from the headlines. Until now, we had no data for assessing whether foreign grant programs aimed at reducing that threat have any impact. Our data provide solid empirical evidence that these programs do indeed reduce the potential for WMD brain drain, but Russian grants have no effect. Therefore, foreign assistance programs should be maintained and even enhanced. They have had an impact, but their work remains incomplete. Moreover, other results suggest that initiatives directed at younger scientists are especially needed. Younger scientists do not feel as strong a sense of responsibility toward their profession or the State as their more senior counterparts and are more willing to cast aside their roots and move abroad, including working in a rogue nation.

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