POTENTIAL AREAS OF CONGRESSIONAL INTEREST

U.S. interest in promoting the flow of scientific and technical information from Japan to the United States is growing. Up to now, most of the flow has been the other way. For example, in 1988 there were roughly 7,000 Japanese scientists and engineers working in U.S. government and university facilities. The number of Americans working in Japanese labs was probably no more than 500.[1]

Several factors led to this lack of balance. First, U.S. engineers and scientists have not been particularly eager to work in Japan. Not many speak Japanese and until quite recently, few were interested in learning it. Moreover, very few American companies or institutions have wanted to send technical people to Japanese laboratories for extended stays; nor do they especially reward people with experience in Japan. Even now, despite the growing interest in closer interchanges with Japan the traditional reluctance to go outside one's own country--even one's own company--for technical knowledge remains strong in American 'industry (the "not-invented-here" syndrome). For those engineers and scientists who do want temporary assignments in Japan, high living costs and the difficulty of finding jobs for spouses remain big obstacles.

The nature of Japanese institutions also deters U.S. researchers from doing work there. Most R&D in Japan--including some of the best--takes place in private industry, and since a good deal of this work is proprietary, acceptance of outsiders in corporate labs can be difficult. In government and university labs, the quality of basic research has been uneven, very good in some fields but less so in others; furthermore, foreign researchers' access to government labs was rather limited until recently. In the United States, university and government labs have the reputation for consistently high quality work. Positions there interest foreign researchers, and foreigners are generally welcome. Japanese scientists win many of these positions on merit, often drawing stipends from the U.S. government.

Since 1962, the United States and Japan have had bilateral exchange programs in the field of science and technology. The U. S.-Japan Cooperative Science Program, established by executive agreement that year, has supported hundreds of joint seminars and short-term cooperative research projects ever since. In the past year or so, emphasis in these bilateral exchanges has shifted to longer term projects and more research by American scientists and engineers in Japan. Anew agreement signed in 1988 reflects this changed emphasis.[3]

One goal of the U.S. negotiators in the new agreement was "equitable contributions and comparable access to each Government research and development systems."[4] Accordingly, Prime Minister Takeshita arranged for a gift of $4.8 million to enable U.S. inves-

1 E. Lachica, "U.S. Japase Negotiators Deadlocked on Tapping Each Others' Technology," Wall Street Journal, Jan. 22, 1988, cited in U.S. Congress, Office of Technology Assessment, Commercializing High Temperature Superconductivity, OTA-ITE-388 (Washington, DC: U.S. Government Printing Office, 1988), p. 116.

2 For example, 327 Japanese did research at the National Institutes of Health in 1986437, copared to 72 West Germans and 68 French. Stipends for five out of six Japanese were paid by the NIH, at a cost of $6.8 million; fewer than half of the Germans and two-thirds of the French got NIH stipends. See Marjorie Sun, "Strains in U.S.-Japan Exchanges," Science, July 31, 1987.

3 The Agreement Between the United States of America and Japan on Cooperation in Research and Development in Science and Technology, first signed in 1980 and revised in 1988.

4 Letter from the Honorable George P. Shultz, Secretary of State of the United States of America, to His Excellency, Sousuke Uno, Minister for Foreign Affairs of Japan, June 20, 1988; letter from MiUno to Mr. Shultz, June 20, 1988.

tigators to do research in Japan.[5] In addition, the Japanese government established two new award programs to bring as many as 100 young post-doctoral or master-degree American scientists and engineers to Japan each year, for cooperative research projects lasting 6 to 24 months. Placements will be mainly in university and government laboratories, some of which rank as world leaders; for example, the Institute for High Energy Physics at Tsukuba The awards pay for airfare to Japan, travel in Japan, a stipend, housing and family allowances, medical insurance, and Japanese language instruction.

The National Science Foundation coordinates the Japanese-sponsored programs on the U.S. side and nominates some of the candidates. In its Japan Initiative, which got underway in 1988, NSF offers more awards of the same kind. It provides funds (mostly drawn from the Japanese gift) for U.S. scientists and engineers to work in Japanese corporate labs, as well as government and university facilities, for 6 to 18 months. NSF has arranged with the Japanese Ministry of International Trade and Industry (MITI) to offer U.S. applicants up to 30 research spots per year in the 16 laboratories directed by MITI's Agency of Industrial Science and Technology. MITI has also agreed to place up to three U.S. researchers per year in Japan's fifth generation computer project.

NSF's Japan Initiative also provides tuition, fees, and a stipend for researchers to undertake intensive studies in the Japanese language. The program is primarily for graduate or post-doctoral scientists and engineers, but is also open to senior researchers, including people in industry. Altogether, NSF set aside $800,000 for its Japan Initiative in fiscal year 1988 and $725,000 in FY 1989.

A spokesman for NSF said in late winter 1989 that the Japanese language programs, first announced in April 1988, were now oversubscribed; they are "flooded with applicants." Also, NSF is supporting programs at four universities to improve the teaching of Japanese. The NSF official expected that at least one of the programs for U.S. research in Japan would be fully booked (with 50 U.S. researchers) by May 1989, about a year after it was announced. This program offers posts in university labs under the authority of the Ministry of Education, Science, and Culture, and is administered by the Japan Society for the Promotion of Science; the Society has been NSF's opposite number in the Japan-U.S. Cooperative Science Program since it was established 27 years ago. The other Japanese-sponsored program is administered by the Science and Technology Agency (STA), a new partner for NSF; this one was moving along more slowly. And, surprisingly to NSF, only one applicant so far had asked for a posting to a Japanese corporate lab.

Besides these NSF and Japanese programs, several universities and one trade association, the American Electronics Association (AEA), sponsor placement of U.S. engineers and scientists in Japan.[6] From the beginning of its program in 1984 till September 1988, AEA sponsored 41 fellows from 20 American graduate schools, placing them for 9 months' to a year's work in Japanese electronics companies. Interest in the program has risen each year; in 1988,55 applicants competed for 11 spots.

5 This was a one-time gift, not a yearly contribution.

6 The AEA's program is cofunded by NSF.

The EAGLE Consortium (Engineering Alliances for Global Education), composed of eleven universities,[7] is offering a new program in 1989. It plans to enroll 250 undergraduates and graduate students in a summer course of intensive Japanese language study, followed by a year of academic study and language maintenance, after which the students will be placed in Pacific rim branches of U.S. companies for 8 to 12 months. Some 40 companies have expressed interest in placing EAGLE Consortium students.

The government-sponsored programs described above were established by executive action. Congress has not enacted any law that explicitly encourages U.S. researchers to work in Japan, but did include in the Trade Act an admonition to U.S. negotiators to ensure that "access to research and development opportunities and facilities, and the flow of scientific and technological information, are, to the maximum extent practicable, equitable and reciprocal."[8] This is happening.

The NSF and Japanese programs to support U.S. researchers in Japan are not yet fully subscribed, but the reason may be that the programs are new, and individual applicants must make rather complicated arrangements with the Japanese institutions they want to work in. The AEA and MIT fellowships are older, and also make more of the placement arrangements for the fellows. Both programs started slowly but now have more applicants than positions. Congress might wish to monitor the progress of the government-sponsored programs, to determine whether, at some point, they ought to be expanded. If the number of qualified applicants continues to grow and an expansion is needed, one option might be to establish a Congressional U.S.-Japanese Fellowship Program, which would have the advantage of prestige due to the backing of Congress. Meanwhile, a useful government function, which NSF might undertake, would be to bring together in one place information on all the programs, public and private, that offer U.S. researchers the chance to work in Japan.

One area that might profit from increased congressional attention is Japanese language studies and translations of technical papers. The language barrier is obviously a major impediment to flows of technological knowledge from Japan to the United States, both through the exchange of people and through published literature.

Congress has passed legislation to encourage the flow of published information from Japan to this country. In the Japanese Technical Literature Act of 1986, it directed the Department of Commerce to keep abreast of new technical developments in Japan, translate technical documents on request (at the requester's expense), and publish lists of important documents translated from Japanese and a directory of translation services. The office that was set up to do these jobs is small, with a staff of two and a budget of less than half a million dollars, reprogrammed from other Department funds. In the beginning, the office arranged translations, but it does so no longer because the translations cost so much ($60 a page) and take so much time that there were few customers. According to the office staff, what people really need is abstracts of Japanese technical literature and forecasts of trends in technology.

Several possibilities are open if Congress wishes to do more to break through the lan-

[7] The University of California at Berkeley, **Cornell University, the Georgia Institute of** Technology, the Rose Hulman Institute *of* Technology, the University of Illinois, Lehigh University, North Carolina State University, the University of Texas at Austin, Texas A&M University, the State University of New York at Buffalo, and the University of Wisconsin.

[8] Public Law 100-418, Part II, Sec. 5171 (a).

guage barrier. One is to appropriate funds specifically for the Office of Japanese Technical Literature, enabling it to bring results of Japanese research and technology development to American users more effectively. Possibly, the Office could collaborate with private services that offer abstracts and evaluations of Japanese technical information and on demand, translations.[9] Such services are very expensive. And they are unfamiliar; even customers who could afford them may be unaware of their possible benefits. One role for the Office might be to provide partial or temporary subsidies for distributing these reports and services to NSF grantees or to industrial subscribers. Considering the national interest in encouraging the flow of technical information from Japan to the United States, this might bean appropriate role for government.

More fundamentally, Congress might wish to support the teaching of Japanese to more Americans. The NSF language courses for scientists and engineers are now getting an eager response, but the number of people involved is small--50 or so a year. The best way to broaden knowledge of Japanese among many Americans is to start language instruction early. Japanese school children get 10 years of instruction in English, from the elementary grades through high school. (Granted, the instruction is not very strong in conversational skills, yet many Japanese professionals can read English.) It is the rare American high school that offers any Japanese courses; most that do are in Hawaii, with a few more on the West Coast.

Congress has already demonstrated its concern for foreign language instruction in the public schools. The education act passed in 1988 contains a section that authorizes Federal grants of as much as $20 million a year, to contribute to the cost of model foreign language programs for children in public and private schools.[10] The program supports instruction in "critical foreign languages," as defined by the Secretary of Education. A logical first step to expand the teaching of Japanese to more Americans is for Congress to oversee the progress of this program and evaluate whether it gives adequate support to the study of Japanese.

In addition, Congress might wish to support programs to encourage Japanese language studies at the undergraduate level in colleges and universities. (The EAGLE consortium program which includes Japanese language studies, is open to undergraduates as well as graduates, but NSF's current Japanese language program is aimed at graduate engineers and scientists.) One possibility is to provide NSF fellowships for engineering undergraduates who want to study Japanese.

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9 An example is the Japan Technology Information and Evaluation Service (J-TIES), a private service that provides a monthly report of scientific and technical advances in Japan, as selected and evaluated by an advisory committee of University of Tokyo professors. Another example is the Japanese Technical Information Service.

10 Augus F. Hawkins-Robert T. Stafford Elementary and Secondary School Improvement Amendments of 1988, Public Law 100-297, Title II, Part B.