Other Countries' Money

BY Richard Florida

AT A NEW RESEARCH complex in Palo Alto, Calif., scientists, engineers, and software developers create technologies for the knowledge-based work environment of the 21st century. At another laboratory in Kendall Square in Cambridge, Mass.--practically across the street from MIT--computer scientists, artificial intelligence experts, and software developers pioneer advanced computing and information systems. Inside a striking new facility in Princeton, N.J., Nobel Prize-winning scientists conduct basic research at the frontiers of information technology. We've all heard that U.S. companies and government agencies are slicing their R&D budgets, so what accounts for these investments? The answer: foreign-owned corporations, pouring money into the U.S. R&D enterprise in an effort to develop products for the huge U.S. market, gain access to cutting-edge scientists and engineers, and take advantage of the world's most creative and productive R&D climate.

Foreign investment in U.S.-based R&D shot up from $700 million in 1987 to more than $17 billion in 1995 (the last year for which figures are available). The latter amount represented more than 15 percent of all funding for industrial R&D in America that year, according to a survey by the U.S. Department of Commerce. Foreign companies employ more than 100,000 Americans in R&D activities at hundreds of research laboratories and manufacturing facilities.

The growing presence of foreign companies conducting research and development in the U.S. reflects a fundamental trend: the globalization of innovation. Multinational enterprises have long operated international networks of manufacturing plants. But over the past decade, these multinationals have added a new dimension to their activities--an increasing capacity for R&D and innovation in various locations outside their home countries.

The relatively new phenomenon of foreign-owned, U.S.-based R&D has provoked controversy. Proponents believe foreign-owned laboratories contribute to the U.S. science and technology base, and that the government should encourage their development. Critics argue that the facilities are merely skeleton research operations designed to monitor the American research scene--even pirate ideas developed here.

To sort out this debate, I directed a study at Carnegie Mellon University. We surveyed all of the foreign-owned laboratories in the United States to gain insight into the thorny issues surrounding why foreign companies are investing in America, what foreign labs actually do, and how they contribute to the American system of innovation. As part of the project we interviewed executives of leading technology corporations in the United States, Europe, and Japan. Our research leads to the conclusion that foreign-owned labs do more good than harm.

INNOVATION GOES GLOBAL

Part of the controversy over R&D bankrolled by overseas firms stems from its startlingly rapid growth. Until recently, most companies conducted virtually all of their R&D at home. The past decade, however, has seen an explosion of international R&D activities by large multinational firms.

U.S.-based enterprises invest nearly $15 billion per year in off-shore R&D, roughly 10 percent of their total R&D budgets, :according to the Department of Commerce study. In the European Community, foreign investment in R&D has increased by more than 50 percent over the past decade, now accounting for 7 percent of European R&D. IBM has long operated a network of European labs, including a Zurich facility responsible for breakthroughs in superconductivity. Japanese companies operate an extensive and growing network of more than 200 overseas laboratories.

In Japan, U.S. and European companies are establishing a growing number of personal computer and consumer electronics laboratories. Again, IBM is an important player, having operated a major research center, the IBM Japan Tokyo Research Center Laboratory, for some time. Hewlett Packard, DEC, Intel, Microsoft, Motorola, Texas Instruments, Intel, and Apple also operate research labs in Japan.

Foreign-owned laboratories are a response in part to the rapid and thoroughgoing globalization of markets--in particular the fact that goods are increasingly produced where they are sold. Off-shore factories of multinational enterprises produce $6 trillion worth of goods and services annually, far exceeding the $500 billion generated by international trade, according to the United Nations Division on Transnational Corporations and Investment.

These offshore investments contribute to corporate innovation by allowing companies to get close to their customers. At Nissan's automotive design studio in San Diego, for example, engineers drive the streets asking motorists what they do and don't like about their cars. Just such an on-the-road encounter with a frustrated minivan user led Nissan to design a track system for Ford's Quest minivan so that motorists can slide seats back and forth inside the vehicle when cargo space is needed, rather than having to remove the bulky seats altogether.

The drive to get close to the customer has been compounded by pressure from local governments, which have in many cases demanded that companies setting up factories in their countries also conduct R&D there. This pressure wouldn't mean much, however, if the countries overseas weren't capable of conducting research. But European countries, Japan, and the newly industrializing nations of Asia have made substantial investments in science and technology as part of their quest for economic growth. As a result, chief technology officers in Europe, Japan, and North America expect to rely much more heavily on technology originating from external sources in the near future, according to a recent survey by Edward Roberts of MIT's Sloan School of Management. Indeed, Joel Birnbaum, senior vice president for R&D and director of Hewlett Packard Laboratories,

says his company no longer thinks of R&D along American, or even national, lines, but instead as a global system.

These massive outflows of research and development funding often involve international business alliances. To develop the competitive technologies the market demands, companies engage in joint ventures with customers, suppliers--even rivals from other countries. For example, when Nissan realized it needed bigger projects to help support its large-scale R&D facilities, the company formed an alliance with Ford to build the Nissan Quest/Ford Villager minivan. Ford made the product Nissan designed. IBM and Toshiba not only worked together to develop the fiat-panel displays of the IBM Thinkpad, they also jointly manufacture them. IBM, Toshiba, and Siemens are collaborating at IBM's North American facilities to develop next generation semiconductor memory chips. Off-shore labs facilitate these partnerships by allowing companies to have scientists and technical people on the ground who can engage in such collaborations, and by acting as satellite connections to sources of ideas and technology wherever they are.

THE AMERICAN ATTRACTION

Yet if the export of research dollars is a global phenomenon, the largest share of it pours into the United States. The magnet that draws this funding is talent: Companies open labs in the United States to gain access to world-class researchers. This explains the proximity of many labs to major research universities, which they regard as a key source of commercial innovation. The NEC Research Institute, for example, was able to recruit renowned computer scientists partly because it is adjacent to Princeton University. When Canon established a research center for work on optical character recognition, image compression, and network systems, the company chose Palo Alto to be close to Stanford University and Xerox's famed Palo Alto Research Center. Mitsubishi Electric Research Laboratory, which conducts R&D on a range of information technology including computer vision, is next door to MIT.

Building your new R&D facility across the street from a famous university isn't the only way to gain access. A number of foreign companies have formed agreements with leading U.S universities and research institutes to reach their talent. Ciba-Geigy, for example, sponsors research at the University of San Diego, and the Swiss company Sandoz Pharma funds basic science at the Scripps Research Institute in San Diego. Shiseido, the Japanese cosmetics company, invested $90 million in the Harvard Medical School for skin research.

In the automotive industry, foreign laboratories gear their work to supporting U.S. manufacturing plants and customizing products for the American market. Nissan Design International's close ties to the U.S. market enabled them to realize that Nissan could attract American car buyers by adding a stylish body to a pickup truck platform. The result: the Pathfinder, which launched the sport utility craze and transformed the entire automotive market.

While the funding for these labs comes from abroad, the style of work in them is very much indigenous. Offshore companies generally recognize that to recruit and retain American researchers requires adoption of an American style of management. In this respect, these labs differ markedly from foreign-owned manufacturing facilities. Japanese companies that run U.S. factories, for example, typically seek to transfer and transplant to their U.S. facilities manufacturing practices honed at home.

As a result, foreign laboratories in America are organized much like leading research centers of American universities. These labs encourage scientific and technical staff to work autonomously and publish widely. They sponsor visiting scholars and host seminars and symposia--practices that are unfamiliar in Japanese corporate labs. Says the manager of one foreign lab: "Everyone comes in and talks with us, and individual researchers can invite their peers for discussion." One senior R&D manager I interviewed produced a company memorandum stating the mission as building a laboratory where scientists "do their basic research, regardless of whether or not it produces a salable product, or any product at all."

By setting themselves up this way, companies can attract top-notch scientific and technical talent and build important connections to leading scientists and researchers at other institutions. Scientific labor markets differ from other labor markets in that they are driven to a large degree by reputation and prestige. This is why universities with leading scientists and departments are able to recruit the top new researchers and graduate students. These lessons are not lost on foreign corporations, which organize themselves like American R&D centers and universities to attract the top scientists, who in turn attract other scientists, bolstering the overall reputation of the organization.

Mitsubishi's Electric Research Laboratories, for example, organized its Cambridge Research Center so that computer scientists, artificial intelligence experts, and software developers can explore how people work with computers and modern technology. Founding president Tohei Nitta and his counterpart Lazlo Belady started the lab in part to learn about the ability of American organizations to spur innovation. "We can be much more creative over here," Nitta says, largely because of the synergies between the lab's scientists and the rich university community of Cambridge.

Having labs in the United States also makes it easier to recruit top people back home and in other nations around the world. Michiyuki Uenohara, an executive director of NEC and founder of NEC Research Institute in Princeton, N.J., says the biggest dividend of operating the lab was that it increased the company's ability to attract the best Japanese scientific and technical talent by showcasing the organization's award-winning scientists.

WHAT FOREIGN LABS CONTRIBUTE

But if being in the United States is clearly good for the companies that build their research facilities here, is it good for the host country as well? That question is more difficult to answer.

Critics of foreign investment in U.S. R&D see a threat to American technological leadership by giving international companies easy access to U.S. technology. According to this "technonationalist" point of view, foreign R&D facilities are skeleton operations designed to monitor and pirate American ideas. Thus, this view holds, foreign investment in R&D in the United States should be restricted. Influential exponents of this view include Clyde V. Prestowitz, formerly of the Reagan administration's Department of Commerce and now president of the Economic Strategy Institute in Washington.

Technonationalism rests on the notion that federal policymakers can tilt the rules of innovation to benefit American companies over foreign competitors, or develop rules and regulations that reward "good" U.S. companies (those that invest in the United States) over "bad" ones (those that invest abroad). "Technoglobalists" counter that while such policy proposals are well-intentioned and seek to protect American investments, they are completely out of touch with the reality of a global system of innovation. According to this point of view, investments by foreign corporations in U.S. R&D strengthen American science and technology, especially when government and private sponsorship of U.S. research is being cut back. Any attempt to restrict foreign laboratories would therefore cut off a valuable source of R&D investment.

To sort out this issue, we must examine what exactly foreign-owned laboratories produce. Plenty, according to the Carnegie Mellon survey. These labs churn out patents at rates that exceed those of U.S. industrial R&D. Foreign labs in America generated 7.3 patents per $10 million in R&D spending, compared with 4.7 patents per $10 million of company-financed industrial R&D for the U.S. as a whole. In evaluating these figures, keep in mind that foreign labs tend to be engaged in a company's most patent-intensive activities. The U.S. rate of patents is lower in part because it is based on all industrial R&D, including work such as manufacturing engineering, which often leads to improvements in process technology rather than new products.

Foreign laboratories also add considerably to the stock of new scientific and technical knowledge by reporting their findings in scientific and technical journals. They publish an average of 10 journal articles per 100 scientists and engineers per year, better than the rate for industrial R&D by U.S.-owned companies. Moreover, these labs share their findings with scientists and researchers from other institutions by sponsoring seminars and workshops. One senior American researcher working in a foreign-owned laboratory says the facility is "the most open industrial laboratory I've ever worked in."

MAKING FOREIGN R&D INVESTMENT WORK FOR US

Policy-makers have long worked from the assumption that nations have self-contained and isolated science and technology systems. The basic idea is that governments should compensate for market failures by supporting risky, long-run basic research that will generate new technology and products. Such advances will help the government provide for national security, environmental protection, and the health of its citizens, as well as lead ultimately to economic growth.

This system worked well enough, so long as innovation systems were contained within national borders. As science and technology have become global enterprises, however, the underpinnings of this policy must be questioned. The question becomes whether U.S. taxpayers should support science and technology activities that can, and will, benefit foreign-owned companies.

This is a tough question. But the answer, in my view, is a resounding yes. Foreign companies are investing considerable resources in American innovation, providing employment for large numbers of scientists and engineers and generating innovations and scientific discoveries that contribute to America's science and technology infrastructure. Thus it stands to reason that government policy should encourage foreign investment in U.S. research and technology, not restrict it. There are three key steps to begin with.

First, U.S. business leaders and policy-makers should support efforts by the Organization for Economic Cooperation and Development and others to establish a global framework for science and technology investments. A vehicle for this exists in the form of the Multilateral Investment Agreement--an international trade treaty. This agreement begins to eliminate limitations on foreign investment in R&D, such as those that restrict foreign participation in domestically funded technology programs, and is thus a step toward creating a global playing field.

Second, U.S. science and technology funding agencies should promote foreign collaboration in science and technology.

Third, the United States should work with large investors in science, including Japanese and European companies, to develop joint funding and review programs for scientific and technological initiatives. Such international cooperation could help to eliminate the redundancies of today's system, in which many individual countries fund similar scientific work.

Furthermore, any policy measures that attempt to give U.S. companies an edge over foreign ones will inevitably provoke some sort of backlash as other nations respond in kind. The result would be a vicious downward spiral, in which all countries begin to impose tighter and tighter restrictions on one another. U.S. firms, which have a greater global presence than their overseas counterparts, would have the most to lose from such a trend. The best option for the United States is to embrace the new age of global innovation, and seek to attract R&D investment from all corners of the world.

Embracing the new realities of the global age of innovation is the only realistic path open. The United States has little choice but to take the lead in helping to establish a truly global environment for innovation. Our nation should lead, not only because we are the world's largest economy and the world's leading source of science and technology, but because we have the most to gain from a truly open and global system of innovation.
R&D Investment by Country (millions)

A	B
Korea	$372
Sweden	$807
Netherlands	$838
Canada	$1,396
France	$1,644
Japan	$1,867
U.K.	$2,479
Switzerland	$3,088
Germany	$3,976
Others	$1,199

Source: U.S. Department of Commerce

GRAPH: Foreign Investments in U.S. R&D

GRAPH: What Foreign Money Produces

GRAPH: R&D Investment by Sector