Viewpoints From Abroad

The U.S. and Japan: Renaissance and Cooperation

By Frank Press

Only the naive would be surprised at the trade frictions between Japan and the United States. Both countries believe in high technology as a pillar of their economic futures. Both are intensely competitive. Both face economic stresses. Both are competing for virtually the same markets, including the world's largest technological market—the United States itself.

Vast differences offset these commonalities. Where U.S. businesses are reflexively suspicious of governmental involvement, Japanese businesses and government are more cooperative. Where U.S. banks and companies remain separate, in Japan they act in concert. Where U.S. companies generally demur at sharing trade secrets with their governments, Japanese companies feel it advantageous to inform their government of their progress and problems.

One can go on. However, a recounting of national differences matters less than how they will shape national futures. Technological competition will, if anything, intensify. And if the present frictions remain untended, then the future looks very bleak indeed. The costs to both nations—and to the world's welfare—will be enormous.

Two ways to reduce those frictions between the United States and Japan are by (1) better understanding of each other's national styles and (2) by enhanced interaction in scientific and technological enterprises. This article addresses both ways. It first discusses deep changes now under way in the U.S. affecting its future technological capacities. It concludes by suggesting mechanisms and areas for improved scientific and technological cooperation between the U.S. and Japan.

U.S. Perceptions

First, as background, I should outline the prevailing U.S. perception of Japanese trading practices. Briefly, U.S. industry and government see an iterative pattern: the use of a protected home market to nurse embryonic industries to maturity; a subsequent export drive by these industries, marked by extremely aggressive pricing; and, once a wedge is in, a drive for a commanding market position. The heart of the matter is a dilution of normal market risks through governmental involvement, effectively raising the risks to international competitors, combined with various strategems, public and private, that effectively shut out or reduce the entry of foreign businesses into Japan.

The U.S. has seen this pattern in automobiles, consumer electronics, and semiconductors. Many Americans are concerned that the same pattern will persist for supercomputers, robotics, commercial aircraft, and other advanced products. These practices are not necessarily venal. And one needs to own up that in many instances Japanese industry made a better product, better anticipated future markets, and applied superior production technologies and quality controls.

However, it would be deceptive to underplay the depth of anger within the U.S. at what is commonly regarded as a Japanese policy of targeting and systematically picking off U.S. industries, using practices which are inimical to our own. Japan's tactics have become a major political issue in the U.S.: a host of reciprocity or "domestic content" bills have been introduced in the U.S. Congress; one presidential contender has made Japan's

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policies part of his agenda; various studies—notably that of the Commerce Department done for the Cabinet Council on Commerce and Trade—have indicted Japan for effectively closing its markets to U.S. high technology industries. There is little disagreement within the U.S. in the comment in the recent MITI publication, *Economic Security of Japan 1982,* that "Japan must realize that its worn-out claim that its market is no less open to foreign competition than those of other industrial nations has failed to impress its trading partners."[1]

Renaissance

That said, what is the U.S. response? It is simplistic—and a disservice to both countries—to measure the response only through legislative language, presidential pronouncements, or governmental studies. That view ignores the peculiar structure and dynamics of the American technological enterprise; it ignores the roots of American technological strength.

It is incredibly hard, even for Americans, to understand that in the very absence of formal state planning in the U.S.—that we don't have a MITI, the French programmes, or the "concerted actions" of West Germany—reposes an enormous strength. We now see that strength waxing: in the increased expenditures by U.S. industry on their research and development; revived concerns with the teaching of science and mathematics in our secondary schools; real growth in the federal budget for basic research; the explosive growth, particularly in the past four years, of the venture capital market; the increased attention to antitrust and other U.S. policies affecting high technology industry; the formation of new industrial combines, such as the Microelectronics and Computer Technology Corporation; and multiplying links between universities and companies.

Such forces will, I believe, enormously strengthen the U.S. technological enterprise, inaugurating what amounts to an entrepreneurial renaissance. That strengthening is enabled by the very "untidyness" of the American system, one that is highly flexible, highly leveraged in its adjustability.

I. Changing Technological Elements

I would like to, briefly, describe these changes further, since they pertain directly to my first theme: the necessity for mutual understanding to deal with and reduce frictions between the U.S. and Japan.

I can be more specific on the present resurgence by examining the components of technological capacity. Briefly, advanced technology emerges out of research, development, manufacturing and production, and distribution. These various stages—taking different forms and importance depending on the industry—interact dynamically. Blending these components—growing, as the *Economist* put it, "inventive acorns into commercial oak trees"—requires sensitivity to market needs, bold strategy seconded by ample capital, a readiness to adopt and quickly emplace good ideas, and a relentless pursuit of both incremental and quantum improvements.

In all this, basic research has a tenuous relation to, say, manufacturing; and its contributions tend to be long term, although in some areas—notably, biotechnologies, such as monoclonal antibodies—the relation is direct and short. Development differs grossly from manufacturing, the difference between making one item versus many at competitive cost and quality. Distribution is a wholly different culture, demanding direct dealings with the consumer.

The U.S. is transforming itself in each of these parts. For example, there is, after a long fallow period, real funding growth proposed for basic research. The inadequate state of academic instrumentation is finally getting some concrete help.

Research

That support is amplified by the continuing flexibility of academic research—its ability to exploit new insights rapidly, the opportunities provided young investigators, and a very powerful system for separating the excellent from the shoddy. Neither Japan nor any other country has that unique combination of teaching and research that makes American universities—the "home of science"—such wellsprings of new knowledge.

Development and Manufacture

The links between reseach and development are multiplying through new conduits between universities and companies. Some cognizant fields include combustion technology, robotics, microelectronics, and plant biology. These new relations will be seedbeds of technological innovation; for example, the multiple university-industry links formed in plant biology are already being translated into new research questions and commercially-promising achievements, such as the recent success in relocating plant genes from one species to another and then having them express their coded information.

Similar currents are flowing through what is a clear weakness in U.S. technological capacities: manufacturing technology. The problems in engineering schools are now recognized and corrective measures being applied. Several companies, such as IBM, are funding curricula for production technology in engineering schools.

Resources

These revivals in the components of technological innovation are seconded by an emphasis on the requisite resources, both human and financial capital. We are moving to correct what amounts to a 10-year underinvestment in education. Just as Sputnik triggered a learning renaissance, so the heat of international competition seems to be triggering a second one.

Further, there is improved cooperation between labor and management to meet the current economic stresses and to deal with the intensifying global competition. Such cooperation frees up resources, enhancing productivity and improving the climate for investment.

The U.S. venture capital market is booming. That market, like the incomparable strength of academic research, is unique to the U.S. Obviously, venture capital has an explosive effect on start-ups of new companies with innovative ideas; less obviously, many of these companies are eventually absorbed by larger companies, grow large themselves, or force large companies to move into new areas. The net effect is innovative catalysis.

As to impact, the General Accounting Office, serving the U.S. Congress, recently estimated[2] that 1,322 companies founded with venture capital in the 1970s will, by 1989, annually, yield $88.8 billion in sales, $1.7 billion in corporate income taxes and $5.0 billion in personal income taxes, $13.6 billion in export sales, and employ 1.9 million people.

In any case, a relative simple change in 1978 in tax laws—a lower rate of taxation on capital gains—had an explosive effect on the amount of venture capital available. The industry remains small, with a capitalization of about $5.8 billion at the end of 1981[3]. However, the money pool for the venture funds is growing. U.S. pension funds alone may attain $1 trillion in value by the year 2000.

Government and Technological Change

A final factor in energizing American technological capacities is that the government is coming to recognize the unique properties of advanced technology industry. These properties include its criticality to national security—to the U.S. and its allies; the very rapid rate of obsolescence of its products, forcing extraordinary investments to avoid technological backwaters; and the urgency of developing sufficient markets and economies of scale to return the cash flow needed for reinvestment. Thus, in the semiconductor industry, a company typically spends up to 10% to 12% of sales in research and development and an additional 15% to 25% on new plant and equipment.

These realities of technological survival are penetrating the government. They are seconded by an awareness that the government does not have adequate personnel tutored in the actualities of manufacture; that, in short, the government's broad technological competence does not as yet match that of MITI.

A Middle Policy

Finally, the U.S. appears to be revising its views on its own role in advancing high technology. Such views include a conscious abandonment of the laissez-faire approach, in which the governmental role was (at least in principle, although the reality, arguably, was something else) absent and only the "invisible hand" of the market prevailed. However, while questioning the validity (or realism) of a laissez-faire approach, the government is also denying a directed industrial policy—the government "picking winners." There is little, if any, faith by private industry that the government has either the competence or even the duty to do that.

A middle course is emerging, in which the U.S. government surveys, and corrects, its policies affecting high technology; intensifies its support for resources which it can uniquely contribute, such as academic research; and adjusts its micro- and macroeconomic policies to account for the unique financial pressures in technological innovation.

Protectionist Impulses

In short, the U.S. system is now proving that it is homeostatic; that it responds to stresses; and the response, while slow, is gathering strength. The U.S. now has the will to reassert itself in international competition. The menace in that is the potential of catastrophe, if the protectionist impulses floating through the country take concrete form.

We have, unless *both* sides move to reconcile their differences, the makings of a Greek tragedy, in which nations suffer a fate which they mutually agreed to avoid. The United States and Japan are allied in their belief in free trade and the essentiality of high technology to their national futures. And both countries know that international competition need not be a zero-sum game, that many countries can win; that technological advances can enrich many nations.

The United States, thus, shares the assertions in the Economic Security report, of the need to maintain and strengthen the free trade system. But I share the fear, also expressed in that report, that "a drift toward protectionism, if left unchecked, threatens to interrupt free trade."

II. Toward Cooperation

As I wrote at the beginning, enhanced understanding is essential for dealing with foreseeable difficulties. A second step is through active efforts by both sides to intensify their scientific and technological cooperation.

Such cooperation clearly is desirable. The Economic Security report put it well in its proposal for "undertaking the development of front-line technologies as a motive power in revitalizing the world economy."[4] Achieving such cooperation is another matter. However, there are gathering forces which, I believe, should make it more attractive for both countries to join in investigating natural scientific phenomena of common interest and also generic technologies that are the overtures to commercial technologies.

These forces include: (1) the rising research costs, as science become more expensive, outpacing the inflation rate; (2) the increasing multidisciplinary nature of many research fields—for example, surface science or neurobiology; and (3) the enormous complexity, and the consequent costs of developing, of new technologies, from nuclear fusion reactors to supercomputers. While the costs of fusion reactors remain as problematical as the technology, we know that the development costs for the present generation of supercomputers was about $100 million. Further, as Sir Julian Ridsdale, chairman of the British-Japan Parliamentary Group, pointed out in a previous issue of this Journal, "the costs of [nuclear fission] reactors are becoming so large that no one country can sustain such a huge investment programme."

Of course, we already have cooperative arrangements, formal and informal, between the two countries. Japanese students populate U.S. universities; there are some 100 Japanese researchers at the U.S. National Institutes of Health. And one can be reasonably confident that scientific cooperation will be durable, given freedom to travel, the funds, and open communication. The two countries need to work hard to assure that those conditions prevail.

Technological cooperation may be more difficult. And both countries need to search for and test mechanisms for realistic, two-way, and relatively unfettered cooperation in technological fields. These certainly include nuclear fusion and advanced fission reactors, new particle accelerators, and perhaps the next generation of supercomputers, including Japan's very ambitious "fifth-generation" project. Indeed, as Richard Dolen reported recently in the *ONR Far East Scientific Bulletin*, the organizers of the fifth-generation project have asked for cooperation from other countries. However, Dolen went on to ask the pertinent question of how "this will be managed in the face of the problems of obtaining or withholding too much information?"[5]

Certainly, achieving a level of cooperation that both sides agree is fair is difficult. There is the matter of how open the exchange actually is. There is the fact that at some level technological cooperation impinges directly on commercialization, forcing one side or another to choose between openness and competitive advantage. It will be a challenge to find workable ground rules for arbitrating such difficulties and answering such questions.

However, a real effort is needed to defray the very real frictions that now exist between the two countries and to enable them to fully share in realizing the common vision which they have in the centrality of technological advances to national and world welfare.

As a corollary, the increasing level of coproduction between the United States and Japan benefits both countries and enhances the atmosphere for better understanding of each other's problems. We are likely to see coproduction intensify, as development and manufacturing costs rise, as the two countries attain differing levels of strength in particular elements of a technology (as illustrated by the multiple sourcing of computer components), as the imperatives for large markets become greater, and as the financial risks become ever more prohibitive. Such coproduction pressures will severely test artificial barriers to international trade erected by governments. ●

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[1] Ministry of International Trade and Industry, *Economic Security of Japan 1982*, (BI-49), p. 15

[2] U.S. General Accounting Office, *Government-Industry Cooperation Can Enhance the Venture Capital Process*, August 12, 1982 (GAO/AEMD-82-35), p. 12

[3] Ibid, p. 5

[4] Ministry of International Trade and Industry, *op cit*, p. 23

[5] Richard Dolen, "Japan's Fifth Generation Computer Project," *ONR Far East Scientific Bulletin*, Vol. 7, No. 3 (July-September 1982), p. 92

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