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Japan as a Technological Superpower

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In talking about Japan as a technological superpower, one can devote most of one's time to demonstrating this fact, enumerating ad nauseam Japan's accomplishments in technology-based industrial sectors. I would like to begin by taking Japan's technological strength as a given (the Japanese economy is, after all, the second largest in the world, as is its spending on R&D and on defense), and move on to two larger issues. First, I want to explain why, at least in my view, Japan is a technological superpower. And, second, I would like to explore the consequences of that technological power and how these are likely to be exercised by Japan in the post-Cold War world.

The story begins, I believe, with ideas about power and national security themselves. Control of technology has long been a matter of national security for Japan. Japan is not unique in this regard. Its history parallels (and repeatedly has drawn lessons from) the experience of some European powers, in particular the cases of 15th century Venice and 17th century Netherlands. These cases suggested to Japan that, under propitious circumstances, state strength can be generated through trade. For modern-day Japan they suggested possibilities for a global division of labor between merchant states and peacekeepers. Thus, despite Japan's capability to generate substantial military power, there is no broad-based call today in Japan for it to convert its economic strength into military power and assume leadership in that area. The defense budget is way up, but equipment procurement is down.

For years many Japanese intellectuals have proposed a Japanese strategy of pursuing a division of labor in international society. Naohiro Amaya, the late MITI theoretician, likened the role of Japan to that of a merchant in the Tokugawa era. "For a merchant to prosper in samurai society," he wrote, "it was necessary to have superb information-gathering ability, planning ability, intuition, diplomatic skill, and at times the ability to be a sycophant."

Japanese ideas have also diverged from those with which they are often associated. For example, in 1936 Hermann Goering stated that "guns will make us powerful; butter will only make us fat." That is one vision of national security and national power. Japan has now proven him wrong altogether: butter is as likely as guns to make a nation strong in the international arena. The Japanese lesson is simple: they have subordinated defense

production and yet emerged as one of the most technologically sophisticated nations in the world.

However, at a time when a nation's defense skills will more than ever depend on the strength of its commercial economy, the Japanese are well situated to have both butter and guns-should they make the requisite political decision. At the present time, the Japanese defense industry is quite small. Japanese defense production comprises barely one half of one percent of total Japanese industrial production. Barred since 1976 by cabinet policy from export markets, Japanese arms sales are no larger than those of the nation's sushi shops.

But despite limited production of final systems and large-scale weapons platforms, Japanese firms have emerged as world leaders in the design and manufacture of materials, components, and sub-systems used in defense systems at home and abroad. Indeed, the most rapid growth in postwar Japan was in sectors closely linked to the materials and technologies that enhance the battlefield capabilities of modern weapons: data processing, telecommunications, optoelectronics, and lightweight materials. To take just two examples: by making integrated circuits in large volumes for consumer electronics and graphite fiber in large volumes for tennis rackets and golf clubs, Japanese manufacturers were able to accumulate experience and "spin on" their knowledge to military aerospace applications. Having responded to the escalating demands of rapidly changing civilian markets for these and other products, they find themselves able to meet military specifications of performance, reliability, and quality-often at a lower cost than their competitors.

Contrary to much contemporary mythology, I would argue that Japan did not achieve its current global technological status by ignoring the arms industry in the postwar period. Arms production attracted considerable attention from economic planners and businessmen in the early 1950s. Had different political decisions been made and had the original postwar trajectory been sustained, Japan's "economic participation in the Cold War" might have looked very much like Britain's or France's-i.e., Japan might have continued to build weapons for the export market. Instead, after a critical domestic debate, and with considerable pressure exerted by the U.S., Japan decided that it would not, after all, become the "Far Eastern arsenal of the free world," as some in 1950s Japan wanted it to become. Today, with the end of the Cold War, the rape incident in Okinawa, and renewed controversy about the U.S.-Japan Security Treaty, this debate may be revisited.

Whether or not a new Japanese security stance emerges, however, the country's policies rest on a coherent set of beliefs that I call the 'three-note chord' of Japanese security and technology ideology. It comprises three fundamental ideas about the relationship of technology to national security that found a military expression during the first half of Japan's industrialization drive, and a commercial one in the second half.

The first belief is in **autonomy**, which has been Japan's strategic goal over the entire course of its industrialization. Since the mid-nineteenth century, Japanese security planners have had to navigate between the scylla of technological backwardness and the charybdis of foreign dependence. The desire for autonomy has led to a consistent belief that national

security is enhanced by the domestic design and production of capital equipment, as well as of weapons. There is rarely an industrial policy document that fails to justify its goals without reference to the development of 'autonomous technology' (*jishu gijutsu*) or 'indigenization' (*kokusanka*).

In accordance with the desire for autonomy, it is not uncommon for each subsequent generation of Japanese products-whether aircraft, machine tools, nuclear power plants, or chemicals-to depend less than its predecessor on foreign technology. As one MITI official put it, "First import; then produce it ourselves" (*Ichigo yunyu, nigo kokusanka*). Since licensing has been the middle road toward the desired goal of pure (jun) technological autonomy, Japan provides us with the interesting paradox of 'autonomy through licensing.'

The second belief is in **diffusion**, by which I mean that Japanese often regard technology a quasi-public good to be developed and distributed through elaborate networks of producers and bureaucracies. Participants in the process believe that proprietary technology can be distinguished from generic information and that each contributes significantly to Japanese security. As a consequence, Japan has built an extensive network of 'technology highways'-an infrastructure comprising at least as many lanes, but with perhaps fewer roadblocks, as its U.S. counterpart. I am referring here to the movement of personnel within large, highly diversified firms; to organizations within these firms dedicated to the internal transfer of knowledge; and to interfirm relations, both vertically between firms and among firms at different points on the value-added chain.

Institutions such as research consortia enable competitors to achieve common technical goals before they start competing with each other in the market. Japanese firms cooperate in consortia at every level of the development cycle, including basic research, systems development, and even manufacturing. While the form and function of these consortia vary-and while competition among the participating firms never disappears and is often extremely vigorous-collaboration persists as a highly valued norm in Japan, while it is denigrated (even forbidden) as 'collusion' elsewhere.

To continue the highway metaphor, the Japanese system also facilitates extensive inbound, but much less outbound, technology 'traffic' from abroad. Thus it is able to exploit the opportunities other countries have created to promote technology exchanges. Partly as a result, Japanese technology highways much more effectively acquire and diffuse global and domestic technologies than similar systems in other countries-certainly including those in the U.S.

The third Japanese belief is in **nurturing**. In Japanese thinking, autonomy and diffusion are incomplete without a parallel effort to support and sustain the producers that benefit from these processes. There are many threats to the sustenance of long-term manufacturing capabilities, including market shifts and technological revolutions. Firms and the government vigilantly monitor the economy to mitigate the worst effects of each. There is also the threat of "excessive competition" (*kato kyoso*)-the fratricidal competition among firms that results in bankruptcies and unemployment, but which is oxymoronic in Western terms. In the Japanese view, the social dislocations of "excessive competition" are as great

as or greater than the economic costs of excessive concentration in the neo-classical model. Thus, firms and sectors are nurtured or protected by the government. The dense local, regional, national, political and industrial networks that shape how firms are vertically organized in Japan does not facilitate the 'cut and run' strategies typical in the U.S. Rather, Japanese primary contractors and subcontractors share market pain during downturns and grow in unison during economic upturns.

Since 1989, Japan has had to cope with its most protracted recession of the postwar period. The threat of deindustrialization due to a strong yen that encourages manufacturing overseas and the attraction of global markets-popularly referred to as 'hollowing out'-has never been far from public concern. Yet the overvalued yen drew much less investment away from Japan than Western analysts expected. Between 1990 and 1995 the overall manufacturing sector in Japan posted a net gain in jobs, whereas the United States, despite its cheap dollar, lost 12% of its manufacturing base during the same period. This suggests that Japanese strategists place a different value on manufacturing and are therefore willing to pay a higher cost to maintain it.

Japan brings more than a century of experience to licensing foreign technology and "international cooperation" to a global market that is only slowly learning that single firms in single countries can no longer build complex systems (or even all the necessary components) on their own. The Japanese do not consider technological autonomy and "international cooperation" incompatible. Indeed, to the contrary, a central purpose of "international cooperation" is to enhance the Japanese technology base which, in turn, strengthens the Japanese position in international projects and enhances the ability to demand a higher value-added role.

These Japanese beliefs and the practices that result from them have international consequences that go well beyond the economic rationality of different firms. If global power and national security increasingly depend on industrial capabilities, then states will lose their capacity to bargain in the world if they fail to link themselves effectively with foreign economies in ways that assure that state-of-the-art technologies flow reciprocally into their economies and are exploited. The question is, will Japan's trading partners and allies find this reciprocity easy to achieve? And this raises my second question at the outset of this piece: how will Japanese power be used?

If Japan is a technological superpower with particular ideas about the relationship of technology to security, how are these ideas likely to be expressed in foreign policy? Japan faces a difficult dilemma in the post-Cold War period. From a classical realist perspective, the U.S. has lost much of its strategic and economic motivation for maintaining its alliance system. With the collapse of the U.S.S.R. and the implosion of the Russian economy, the U.S.'s gross national product is now fifteen times greater than Russia's. As a result, Japanese calculations must take into account that its alliance with the U.S., which heretofore masked the differences between military and mercantile realism, will no longer do so.

Japan will continue to place greater emphasis on (and pay a greater price for) economic security. It may even be willing to assume short-term military risks in order to strengthen its long-term economic security. In assessing future risks Japan must define and balance various threats. In military realism, the primary threat to state security is from direct attack, but in mercantile economic realism the equivalent of military conquest is deindustrialization or dependency. Economics is viewed as a competitive endeavor in which the gains of one state may result in losses to others. In the most important case facing Japan, a mercantile strategy would call for bandwagoning with Chinese power, rather than balancing against it.

Japan has long been particularly sensitive to relative economic gains and the potential for dependency these entail. It has persistently acted as if its greatest vulnerabilities were economic and technological, and therefore its strategists have acted as if deindustrialization and dependence were greater threats than Chinese military expansion. For Japan, timely access to technology remains a matter of national security. We should expect, therefore, that economic liberalization and deregulation will continue to be lethargic, reactive, limited, and highly strategic. We should also expect that when forced to choose the Japanese will balance against economic rather than military threats. Let me illustrate this with the example of “CALS.”

In the late 1980s, the U.S. Department of Defense began a program to improve efficiency in weapons acquisition. The DOD, working with some of its major prime contractors, developed software for an electronic database of materiel: The Computer-aided Acquisition and Logistical Support System (CALS). According to press reports, the CALS system shortens development time and helps reduce inventory, thereby increasing efficiency. Contractors such as Boeing and General Motors began adapting this integrated product management system for commercial use. Yet, according to Japanese reports, “Japanese companies are afraid that CALS . . . will become the international standard . . . and if Japanese products do not meet the standard they will be kept out of the world market. It could also lead to the disintegration of the Japanese traditional ‘keiretsu’ business practices and to worldwide restructuring since cost/performance could be the driving force for the use of CALS” (Foreign Broadcast Information Service, “Japan Begins Promotion of CALS Development,” *Foreign Media Note*, 25 August 1995).

The two-fold threat that Japanese firms might be excluded from the marketplace and that traditional relationships might be disrupted by low-cost, direct procurement, has led MITI to budget more than \$6 million in 1996 (and \$17 million in 1997) to develop a Japanese CALS and to create an international CALS system that excludes U.S. and European firms. MITI has invited China, Indonesia, Malaysia, and the Philippines to participate in the development of pilot CALS systems in the areas of automobile, electronics, and textile manufacturing. MITI says it will invite the U.S. to participate “in the future.”

Thus the threat of unfettered market competition and dependency is still met by the strategic nurturing of domestic solutions. The Japanese demonstrate that, even in a “global economy,” nations are still very important. They foster a geographic collection of skills and resources, generally-but by no means exclusively-coextensive with their citizenry.

Japanese leaders know exactly who they represent and prefer consistently to trade with and depend upon co-nationals.

A more recent example of such practices is the outcome of last summer's efforts by the United States to force Japan to open its markets to American auto parts. This led to what we will surely look back on as a sea-change in Japan's willingness to recognize and use its power. The Clinton administration, confident that Japan would once again succumb to pressure, set a deadline by which 100% tariffs would be applied to imported Japanese luxury automobiles unless there were "measurable" changes in Japanese procurement of U.S. auto-parts. Before these sanctions were invoked, however, the United States backed off and accepted a Japanese pledge to accept additional imports, but from its own U.S.-based factories. Japan had learned to say "no" to the United States with impunity, and the United States may have learned that the "rules of engagement" with Japan are changing. Official U.S. policy that firms do not have nationality must strike the Japanese as utterly bizarre.

In looking after its own interests, will Japan also provide the public goods typically supplied by hegemonic powers? Under the assumptions of military realism, great powers may provide public goods to their allies. States bent on maintaining their relative position against their primary military competitors may even tolerate a slippage in their own relative position vis-a-vis allies as long as there are absolute gains for their partners. Those absolute gains by alliance partners will, after all, improve the position of the alliance as a collectivity relative to that of their foes. Major alliance leaders-whether of military or economic alliances-are therefore likely to provide their partners with public goods, such as relatively open markets and free trade.

Japan does provide more Official Developmental Assistance (ODA) than any other state at the present time. It also invests more abroad than any other. Yet Japan enjoys trade surpluses with virtually every trading partner-rich and poor, industrial and agricultural, those with a budget surplus and those with a budget deficit. These statistics give a very literal meaning to the term "strategic trade."

Japan has a large and growing trade surplus with most of its Asian neighbors. With the four newly industrialized countries (NICs)-South Korea, Taiwan, Singapore, and Hong Kong-the surplus was a record \$63.9 billion in 1994, and climbed 20% in the first half of 1995. In 1995, Japan's trade surplus with the major economies of ASEAN (Indonesia, the Philippines, Thailand, and Malaysia) was nearly double that of 1994. Moreover, despite the lifting of many formal restrictions on foreign ownership during the 1970s, less than 0.1% of all investments in Japan from 1982 to 1992 came from foreign sources. This represents less than one-tenth the level found in the country with the next lowest ranking, Germany. Japan's pattern of technology transfer is similarly problematic from the perspective of providing public goods. Data from the Prime Minister's office show that Japanese firms remain very active acquirers of foreign-particularly U.S.-technology. There are very few countries with which Japan enjoys a technology trade surplus. It is interesting to note that those having a technology trade surplus with Japan are also those, such as China, Thailand, Indonesia, and the United Kingdom, where Japanese investment accounts for a large

portion of domestic manufacturing investment. Indeed, in the case of the United States, it is in those sectors where Japanese firms invest heavily-steel and automobiles-where Japanese-U.S. technology trade is in Japan's favor. Thus, we observe that for Japan technology, like trade, follows investment, and that technology is a strategic asset, not a commodity.

Contemporary Japan has emerged as a superpower even though its military production and its ability to deploy troops is, by American standards, insignificant. It has done so under a propitious (indeed, enabling) alliance with the U.S. and by developing institutions and technological capabilities that enhance Japanese national security. These institutions and capabilities are bound together by a technonational ideology that evolved from nineteenth-century mercantilism and survived twentieth century militarism. Indigenization, diffusion, and nurturing of technology define the core of Japanese technonationalism; they stand in sharp contrast to U.S. practice. In the United States, science and technology became stepchildren of the military; in Japan, they became godparents. The nineteenth-century architects of modern Japan rallied around the slogan "Rich nation; strong army"-a slogan that brought war and devastation. Yet the contribution of these modernizers to the new Japanese state was profound. They taught their successors that technological capabilities are central to national security, and they created political and economic institutions to foster national independence. After 1945, their successors reinvented national security through a program of commercial technonationalism-a program whose slogan might well be "Rich nation; strong technology."

Despite the continuities between prewar and postwar Japan, it is important to acknowledge that both ideology and strategy evolve, and each is shaped by the structure and national perception of world politics. Centuries of Japanese technonationalism reveal that the evolution of Japan's grand strategy and its provisions for national security are at best messy and uneven; the notion of 'strategy' suggests more coherence than one can actually observe.

Nonetheless, Japanese elites have responded to global challenges to their national security with what often seems like extraordinary sagacity and consistency. As mercantile realists, they have judged their opportunities and wielded their power in ways that have confounded conventional analysts of foreign policy. The historical junctures when Japan's development and strategy shifted-the early Meiji period, the first postwar decade-were exceptional moments in which dramatic global transformations meshed with evolving national values. Today there is another global transformation under way, and we must try to understand how Japan's ideology and strategy are being altered even as they are filtered through perceptions of threats based on national experience and memory. While important choices are being made today, only a historical perspective can fully explain why these choices are coherent and strategic for Japan.

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