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Boeing's Big Bet On American Creativity -- And Why It's A Loser

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In this space last week I highlighted Boeing's program to transfer much of its most advanced technology to Japan, and suggested the company is committing the industrial equivalent of assisted suicide (with the Tokyo industry ministry gamely playing the role of Dr. Kevorkian). Among the more perceptive reader comments was that of a puzzled friend in Ireland. She wrote: "The question for me is why Boeing shares continue to soar when plant and personnel continue to decline." It is a timely question, as Boeing shares hit a new all-time high of 142.80 on Friday. They have now risen seven-fold since 1990, and are on a trailing price/earnings ratio of 25, and a prospective one of 19.

A lot of things have served to keep Boeing shares pushing ever higher, not least announcements last month that the dividend is being raised more than 50 percent AND the company is allocating a further $10 billion to buying back its own shares. In their faith in the "systems integrator" model (in which Boeing outsources more and more manufacturing and gives away the associated technology), both the Boeing board and Wall Street seem to think that the company's secret weapon a special American knack for technological creativity that will keep one jump ahead forever. All this, even as the Japanese seem to be gearing up to launch directly competitive products within a decade.

Unfortunately for the American national interest, the creativity argument is misconceived. Here is a link to an article I wrote in 2007 entitled "America's Creativity Conceit," and below is a slightly edited version of that article. The case I made then is even more relevant today.

TOKYO—Almost everything the Apple computer company sells these days comes with this memorable statement of origin: "Designed by Apple in California, Assembled in China." The implication is obvious: a few brilliantly creative, latte-quaffing, hybrid-driving Americans did the real work, while low-skilled Chinese assembly workers, laboring in serf-like conditions and earning a few dollars a day, meekly did the rest.

Certainly that is how it looks to American globalists. Citing Apple's iPod at a Virginia trade conference some time ago, former U.S. Treasury Secretary John Snow commented, "China gets to do what they do well: low-value manufacturing. America gets to do what we do well: return

on intellectual capital. It's good for both of us, but I would rather be on our end of that." The "Designed in California" message has been presented in similarly triumphalist terms by the Cato Institute's chief trade commentator Daniel Griswold.

Such talk panders to one of the most consequential illusions of contemporary American economic thought: the idea that by dint of its unique creativity alone, the United States can count on remaining the world economy's top dog in perpetuity. Widely shared by intellectuals on both sides of the U.S. political divide, this assumption goes a long way toward explaining the electorate's relative apathy in the face of the collapse of America's erstwhile world-beating manufacturing sector.

Yet the idea that Americans enjoy some sort of special lock on creativity is obvious nonsense. As the Harvard-educated Japan historian Ivan P. Hall points out, it is just "smug ethnocentric American complacency—little more than whistling in the dark."

Of course no one disputes the fact that America's past record of inventiveness has been extraordinary. Probably close to one-third of all the major inventions of the last 100 years have been American.
The question is where this enormous burst of creativity came from. Most Americans assume it sprang from a supposedly uniquely creative American culture—a culture that is thus considered an inexhaustible source of economic out-performance going forward.

The truth is more prosaic and—for anyone concerned about the sustainability of American economic leadership— quite chastening. What really made the difference was that, thanks to factors that were to prove all too transitory, 20th-century Americans had greater opportunities for invention. Because they were richer, far more of them studied advanced engineering and science. Moreover, taking the century as a whole, America's huge corporations greatly outspent foreign rivals in research and development.

The problem is that other nations are now not only catching up but in some cases drawing ahead. America's vulnerability has been succinctly summed up in a study by the technology-policy analysts Pat Choate and Edward Miller. In a report to the U.S.-China Economic and Security Review Commission in 2005, they commented, "The United States' economy is so large and powerful, and its scientific and technological leadership has long been so overwhelming that the nation could ignore potential technology-based flaws, traps, and dangers. But that era is quickly ending."

Before considering the outlook in detail, let's first dispose of the misconception that America's "culture of freedom" is a crucial advantage in innovation. Clearly culture in the broadest sense has some relevance. Absent a certain basic level of freedom, creativity does not flourish. But the bar is set quite low. While a nation as brutally authoritarian as today's Burma may not excel in innovation, many quite straitjacketed nations down through history have made major scientific and technological breakthroughs.

For a start, none of the most inventive cultures of antiquity—China, Mesopotamia, or Egypt—counted as a civil liberties Utopia. Nearer our own time, Nazi Germany, fascist-era Japan, and

the old Soviet Union all displayed considerable inventiveness. The Japanese, for instance, developed such path-breaking innovations as the Mitsubishi Zero, which proved the most lethal fighter plane in the air in the early days of World War II.
Clearly the lesson of history is that if America's maximalist concept of individual freedom is a factor at all, it is hardly decisive. All the evidence is that something else is much more important: money.

By and large the wealthier a society is, the more inventive it tends to be. Just ask any of the thousands of brilliant Western European scientists and engineers who—in a phenomenon known as the brain drain—emigrated to the United States in the 1950s and the subsequent decades. They were not seeking freedom—they had that already. Rather, they wanted to work with the most advanced equipment and the largest research budgets.

The logic is surely indisputable: rich nations get to the technological frontier first and have more resources to throw into the fray. Certainly any wider look at world history suggests a remarkable correlation: few societies have shown much inventiveness before they first established the economic wherewithal to equip their thinkers with the most advanced materials, machines, and knowledge.

Where relative economic laggards have sometimes punched above their weight—say, Japan in the 1930s or the Soviet Union in the 1950s—the explanation has been that government leaders have gone out of their way to provide teams of hand-picked scientists and engineers with massive support.

Such exceptions apart, the pattern of national affluence leading to technological leadership has been abundantly apparent throughout history. Thus it was that three centuries before Christ, the Chinese invented the magnetic compass. Contemporary Northern European hunter-gatherers could never have made such a breakthrough. They may have been equally brilliant, and they no doubt enjoyed greater liberty, but they simply lacked the advanced materials and knowledge already available to the much more affluent Chinese.

Similar factors explain the extraordinary inventiveness of the Muslim world during Europe's Dark Ages. The Arabs, after all, were then one of the world's richest peoples, and their craftsmen routinely worked with the rarest and most advanced materials. The Arabs' familiarity with glass-making techniques, for instance, helps explain why it was the Muslim polymath Abbas Ibn Firnas who in the 9th century invented eyeglasses.

Similarly, when economic leadership passed to Renaissance Europe, so did the baton of inventiveness. Again, ready access to advanced equipment and materials was a key factor. For instance, without plentiful supplies of mercury, the 17th-century Italian physicist Evangelista Torricelli could hardly have invented the barometer.
It is hardly news that the United States has been in relative economic decline since the 1960s. What is less obvious—but seems equally indisputable to anyone who has studied the evidence—is that America has been losing relative position in inventiveness almost as fast. The correlation is not an accident. As other nations have prospered, they have not only spent more on educating scientists and engineers, but have put more of them to work at the technological cutting edge.

For several years, Japan, for instance, has bested the United States in the proportion both of its workforce and its gross domestic product that it devotes to research and development. Japan, moreover, excels in the quality of its R & D. Whereas much of what for statistical purposes counts as R & D in the United States lately consists merely of such lightweight activities as website building and software customization, the Japanese focus their technological efforts much more tightly on building solid competitive advantage in export industries.

Meanwhile, the Europeans have been leaping ahead in Big Science. The trend is expected to be highlighted next year with the opening of Europe's $5-billion Large Hadron Collider. Located on the Swiss-French border, it will be by far the world's largest energy particle accelerator. A proposed American response, the International Linear Collider, will be heavily funded by Japan—so heavily indeed that it may well be located on Japanese soil.

In retrospect, we can see that America's era of greatest relative inventiveness was in the 1930s through the 1960s. In the 1930s alone, American inventions included nylon, the helicopter, the electron microscope, the automated teller machine, and the plain paper copier. Then in the 1940s came the bazooka, the atomic bomb, the microwave oven, and the transistor. The 1950s brought the nuclear reactor, industrial diamonds, the computer hard drive, the integrated circuit, the video cassette recorder, and the communications satellite, followed in the 1960s by the laser, the computer mouse, and light-emitting diodes.

Of course, the flow of significant American breakthroughs hardly stopped in 1970. But American leadership has become increasingly attenuated. Although Americans played a key role in developing both personal computers and cell phones, for instance, these innovations were rather predictable refinements of earlier devices. For the most part, the main technical task was miniaturization—a task that was from the start shared with other nations, most notably the Japanese. In the case of cell phones, the Japanese contribution—unbeknownst to the American press—has been particularly impressive. According to research by Deutsche Bank, as of 2000, of the 36 suppliers worldwide who then made one or more of the key components in cell phones, 29 were Japanese. Only one was American.

The story has been similar in liquid crystal displays. Scientists from the United States, but also from Japan, Britain, and Switzerland, have all made significant contributions. Meanwhile, commercialization has been led by the Japanese. In a related development, the Japanese claim most of the credit for creating high-definition television, despite a much publicized if sadly unsustained intervention by Zenith and General Instrument in the early 1990s.
In terms of its influence on people's lives, the biggest American invention of recent decades has undoubtedly been the Internet. Yet here again, on close examination, the news for American technological optimists is less than reassuring. Yes, the Internet traces its origins to the U.S. Defense Department's ARPANET. But this dates back to the 1960s, a time when the U.S. government spent far more, in real terms, on stimulating pioneering scientific work than it can afford these days.

As for the practical application of the technologies underlying the ARPANET, it was left to a Briton working in a Swiss laboratory, Tim Berners-Lee, to come up with the World Wide Web. America's claim to have led the conquest of cyberspace has been further diluted by the crucial

role played by other nations in developing fiber optics (without which the Internet would not only be extremely slow but extremely expensive in communications costs). One of the most important early breakthroughs was made by the British-based Shanghai-born physicist Charles Kuen Kao. The Japanese, moreover, claim much of the credit for mastering the manufacturing processes to mass produce not only optical fibers but the laser diodes that transmit the necessary optical signals.

If America's declining technological prowess has been little publicized in the United States, the facts have long been obvious in international trade figures. In their 2005 report, Choate and Miller summed up the point in their definition of a China Sphere, a region encompassing not only mainland China but the wider Confucian world from Vietnam to Japan. As of 2004, the China Sphere already enjoyed a surplus in technological trade with the United States of $60 billion—a surplus that grows with each passing year.

Of course, the United States continues to enjoy a surplus in patent royalties and other intellectual property payments. But the flow is far thinner than Americans realize. As of 2004, America's intellectual property surplus with the rest of the world came to a mere $29 billion—a drop in the bucket compared to a current account deficit of $668 billion. As Choate points out, the United States could greatly increase the flow were it to make judicious improvements to its badly outdated patent system but even then the flow would go nowhere near eliminating America's now disastrously high trade deficits.

Meanwhile, the world's technological center of gravity inexorably shifts toward East Asia. Yet the East Asian technological challenge has yet to be taken seriously in the West. As Brian McVeigh, the author of an important book on Japanese higher education, points out, Western condescension is misplaced. Although East Asians were slow to enter the technology race, this reflected merely a legacy of isolationism that until relatively recent times had cut the region off from outside intellectual influences. The policy originated as a response to rising Western colonialism in the 17th century. Then, when the region began opening up, government leaders insisted that the first duty of leading scientists was not to win Nobel prizes but rather to build national economic muscle—and to do so mainly by overtaking the West in advanced manufacturing. Throughout the region, career incentives have been structured to ensure that the most brilliant scientists go into industry rather than universities or public research institutes. Those who follow this path rarely make headlines, let alone win Nobel prizes, but the policy has paid off in ever strengthening trade balances.

Again, Japan provides the most telling example. Japan's current account surplus in 2006—at $174 billion, up from a mere $56 billion in 1989—represented $1,368 per Japanese citizen. That was probably a record for any major nation and more than ten times China's per-capita performance of $135.

This brings us back to the untold story behind Apple's statement of origin. As is often the case in international economics these days, the real story is in what isnot said. Although Apple is correct in stating that its products are assembled in China, this sidesteps the real question: where are the components made? Whereas the assembly of the final product is not much of a technical test, the manufacture of the key components is something else—a challenge that only the most advanced

nations using the most highly trained workers working in the most expensively equipped factories can address.

In the iPod's case, one key component is crucial: a miniaturized hard drive that requires some of the world's most advanced precision machining. It is made by Toshiba of Tokyo, and it constitutes a disproportionately large share of the entire manufacturing cost. In terms of the iPod's employment implications, the real winner has not, of course, been California, where Apple's design department has created negligible employment opportunities. Nor has it been China, where assembly workers are paid a pittance. Rather, it has been in the highly capital-intensive manufacturing facilities of Japan, where factory workers enjoy some of the world's highest wages in world manufacturing. Even if the Japanese contribution is taken for granted by a handful of product designers in California, you can say this for it: it pays the bills. Just look at Japan's trade surpluses.