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Japan and China: The Next Fifty Years

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By Vaclav Smil

Major trends that are gradually changing the fortunes of nations and reshaping world history are not easy to identify. There are three key reasons for this. First, many important trends unfold so insidiously that they are recognized only ex post once the developments reach a breaking point and a long-term trend ends in a stunning discontinuity. Second, we cannot foresee which trends will become so embedded as to be seemingly immune to external forces and which ones will suddenly veer away from predictable lines. Third, what follows afterward is often equally unpredictable: the beginning of a new long-lasting trend or a prolonged oscillation, a further intensification or an irreversible weakening.

The history of Asia's two largest economies illustrates that nations are commonly subject to such changing trends. Shortly after Mao Zedong's death, Deng Xiaoping, his old revisionist comrade, launched the modern world's most far-reaching national reversal as he began transmuting the country, stranded for two generations in the role of an autarkic underperformer capable of providing little more than basic subsistence to its people, into a global manufacturing superpower that has become closely integrated into a new global economy. By the early 1990s Japan, the most dynamic large economy of the 1960s, 1970s, and 1980s, suddenly lost its seemingly unstoppable momentum (many experts had predicted it would become the world's leading economy even before the year 2000) and despite repeated assurances of a new turnaround (offered not only by many Japanese politicians but also by foreign economists), it has spent 15 years in retreat and stagnation.

This look at some key trends that will affect Japan's and China's future during the coming two generations tries to minimize the inherent uncertainties of any prospective exercises by making no forecasts. Instead, I merely single out what could be key regionally and globally important trends that will shape the fortunes of the world's second and third largest economy.

Japan's decline

Japan's rise, more phenomenal than Europe's recovery after World War II, lasted less than two generations, between 1955 when the country finally surpassed its prewar GDP and the late 1980s when it was widely seen as an unbeatable economic Titan. At that time its dynamism and enviable economic performance (even more remarkable given its near-total dependence on imported energy and hence the impacts to which it was subjected by the two OPEC-driven oil price shocks of 1973-74 and 1979-80) earned it widespread admiration and generated apprehension and outright fear regarding its future reach. This apparently unstoppable rise was not derailed even by the Plaza Accord of September 22, 1985 by the then G-5 that eventually led to near halving of the ¥/$ exchange rate (from 254 by the end of 1984 to 134 by the end of 1986) and led to a spree of foreign acquisitions by Japanese companies and record buying by the country's art collectors (Funabashi 1988).

The value of the Yen spiraled following the Plaza Accord

As Japan's high-quality exports kept rising, Ezra Vogel (Harvard's leading expert on Japan) published a new edition (1985) of his seemingly prescient bestseller (it first appeared in 1979), Japan as Number One. Japan's expansive trend actually defied the revaluation of yen and accelerated during the next four years: the Nikkei index stood at just over 13,000 by the end of 1985 and it peaked at nearly 39,000 in December 1989. But right afterwards Japan's bubble economy burst in spectacular fashion (Wood 1992; Baumgartner 1995). History has no other example of a country whose standing switched so rapidly from that of a globally admired technical and manufacturing superpower to that of a deeply ailing, has-been economy.

Critics of Japan's obvious bubble during the 1980s, became new prophets as just about everything began to unravel. By the end of 1990, as the Nikkei index fell to less than 24,000, many experts still foresaw an imminent recovery; but by 1995 the index's annual average was just below 20,000 and, although official forecasts continued to reassure about imminent recovery, it fell to less than 8,600 in 2002. Subsequently it rose to 11,400 by the end of 2004 and by the beginning of 2006 it was at 16,300, still nearly 60% below its record level; at the same time, the Dow Jones, at nearly 10,900, was less than 10% below its January 14, 2000 peak of 11,722.

Because so much of Japan's inflated stock market was propped by a real estate price bubble, its burst had a deviation-amplifying effect on the market. By 1995 the index of urban land prices in Japan's six largest cities fell to half of its peak 1990 level, and then it continued to decline: by 2005 it was just 25% of its top 'bubble' value (JREI 2006). More importantly, Japan, long the paragon of high value-added manufacturing, has been losing jobs first to other East Asian countries and then, even more rapidly, to China. In 1989 Japan derived more than 27% of its GDP from manufacturing, by 2005 that share fell below 20% (Statistics Bureau 2005). Complaints about the hollowing-out of the economy, heard strongly in the United States for the first time because of the country's huge trade deficits with Japan during the 1980s, became common in Japan. And every passing year has failed to arrest, much less reverse, Japan's profound and long-lasting retreat from its aspirations to become the world's leading technical innovator and from its ascent to the top of the global economic ladder (Yoda 2000; Callen 2003).

Japan's stagnation has produced many unprecedented signs (such as the previously unthinkable sight of homeless men living in cardboard boxes in railway stations, parks and back streets) and dismal statistical indicators.

The unemployment rate, which mostly fluctuated between 2-2.5% during the 1980s rose to 5.5% by the end of 2001; the suicide rate, traditionally higher in Japan than in Europe or North America, increased from 16.4/100,000 in 1990 to 25.5/100,000 by 2003 (Statistics Bureau 2005). And even greater changes are about to unfold: in 2007 the first large cohort of elderly baby boomers will launch the country's mass retirement wave (typically at age 60); at the same time, increasing numbers of young people (already more than one million) have opted out of the labor market. This NEET generation (not in employment, education or training), which prefers hanging out in strange clothes and hairdos, can be seen as a sign both of Japan's national decline and its personal affluence.

Japan's new homeless

But some things have not changed: Japanese females still live longer than females elsewhere (their average life expectancy at birth surpassed 85 years in 2003, compared to 83 in France and 82 in Canada), and mean per capita GDP is (in terms of purchasing power parity) only marginally behind the French or Canadian level. And there have been new, welcome, gains: after two generations of very high savings people began spending more freely, be it on air conditioning, new bathrooms, fancier cars or flights to Thailand or Europe. To be sure, savings rate plummeted, but more Japanese enjoy life in greater comfort at home and more of them spend their vacations (still short even when compared to Americans) abroad: in 2005 more than 17 million Japanese tourists (nearly every seventh person) left the archipelago.

Prospects, however, are daunting. Despite the prolonged economic shock, the country still has not made sufficient adjustment to its peculiar banking, management, and decision-making systems that are generally considered to be preconditions of a new beginning (Carlile and Tilton 1998; Lincoln 2001; Grimond 2002; Tandon 2005). Prolonged recovery has become much harder because of a combination of economic and political factors: the relentless rise of China and its continued confrontational style of foreign policy, the increasingly precarious dependence on the grossly overextended United States, and the danger of an irrational North Korea. By 2005 there were many signs of a real turnaround and a key question seemed to be this: if Japan's rise during the 1980s was uncritically hyped by the country's admirers, are not the country's detractors now repeating the same mistake in reverse by degrading Japan to a category of a lasting underperformer?

Indeed, the editor of The Economist concluded that the country "is at last ready to surprise the world how well it does, not how badly" (Emmott 2005:3), and there has been no shortage of statistics to buttress optimism. By 2003 annual GDP growth rose once again to more than 2%, and many large companies became profitable again (some because of their links with, or manufacturing in, China, others thanks to growing worldwide demand for Japan's well-known brands of manufactures). By 2005 newly available jobs nearly matched the number of applicants (the ratio was below 0.5 in 1998). Moreover, in July 2006 seven years of deflation (as high as -0.9% of consumer price index in 2002) came to an end as the Bank of Japan raised its interest rate from 0 to 0.25% (the rate was 6% in 1990).

But there are at least three major reasons why I do not foresee Japan regaining a status comparable to its position during the 1980s. The first was perfectly captured in Donald Richie's perceptive Japan diaries in his entry for February 12, 1999. When Karel van Wolferen, who authored a book on the enigma of Japanese power (Wolferen 1990), remarked that the only way out of Japan's (at that time decade-long) dilemma is some kind of revolt that he could not imagine, Ritchie (2004:429) told him "that Nagisa Oshima had said that this occurred only three times in Japan's history; the Tempo Reforms, the beginning of Meiji, and in 1945. And each time the structure re-crystallized, and petrified." This may be dismissed as too deterministic, but any diligent student of history must be careful not to deny the existence of national peculiarities and predilections.

The second reason is that the signs of Japan's domestic renaissance have been accompanied by the country's worsening relations with its three western neighbors, by endless, and actually deepening, distrust and dislike whose manifestations range from mass demonstration in China's cities to South Korea's frequent and strident diplomatic protests to undisguised hostility by North Korea that provoked the government to contemplate openly the possibility of a preventive strike to take out North Korea's missiles. These seemingly intractable external factors are the main reason why, even if a widely discussed change of constitution were to remove the restrictions on Japan's military actions (Nippon Keidanren 2005), the country would remain no less dependent on its strategic ties with the US.

But by far the most fundamental obstacle to Japan's reincarnation as a great power in the 21st century is the fact that the country's partial economic recovery came so late that it has merged with the onset of Japan's depopulation and with a globally unprecedented aging of its people. Two generations of decreasing total fertility rate –- from the post-WWII peak of 2.75 children per family in the early 1950s to only about 1.3 (well below the replacement level of 2.1) by the early 2000s –- have made it inevitable that Japan's total population will eventually begin to decline. Only a massive, Canadian- or Australian-style immigration that would admit at least half a million people every year, mostly from the Philippines, South Korea, and China, could prevent this trend –- but such a policy change is most unlikely, certainly in the near future. Consequently, the only uncertainty is the rapidity of the aging process: its many socio-economic consequences will be similar to those that will be affecting other countries (England 2002; McMorrow 2004; MacKellar et al. 2004).

The medium variant of the best Japanese projections of the early 2000s expected the peak population in 2006, at 127.74 million (NIPSSR 2002), but the preliminary count of the 2005 census (held on October 1) showed that the total population of 127.76 million was about 19,000 below the estimate for October 2004: apparently, Japan has already entered a long period of depopulation. If there were no dramatic changes in Japan's fertility (a most likely trend during the coming generation, but a much more uncertain proposition when looking 50 years ahead), the country's population would decline first slowly, to about 121 million by 2025, then more obviously to about 100 million people by the year 2050 (NIPSSR 2002). For comparison, the latest United Nations (2005) forecast sees only a marginal decline by 2025 (nearly 125 million) and about a total decline to 112 million by 2050. But these differences matter much less than what the absolutes hide: it is virtually certain that by the middle of this century Japan will become the most aged of all aging high-income societies.

Using the medium variant of the latest Japanese projections (NIPSSR 2002), the

country's median age will reach 50 years by 2025 and while in 2005 one out of five people was 65 years or older (the highest share worldwide), by 2025 the share will be nearly 30% and it will reach 35% by 2050. Japan's age-sex population structure would assume a cudgel-like profile, in contrast to today's barrel-like shape and the classical pyramid of the early 1950s. The share of adults of economically active age will drop from 66% in 2005 to 53% by 2050 when, astonishingly, about one out of seven people will be 80 years or older. This would mean that there would be more highly aged people (80+) than children (0-14, their 2050 share is projected to be less than 11%), creating the world's first truly geriatric society (United Nations 2005).

Implications of the depopulation and the aging trend would be far reaching and some are difficult to imagine: there has never been a society, much less a major nation, where octogenarians outnumbered children. The absolute drop would push Japan from being the world's tenth most populous nation in 2005 (after Nigeria and ahead of Mexico) to the 13th rank by 2025 and to the 17th place by 2050, behind Vietnam and ahead of Turkey (United Nations 2004). And because most Japanese companies still set the minimum mandatory retirement age at 60, there will be a wave of retirees between 2010 and 2020 as the high-fertility cohort of the 1950s quits working. A new law passed in 2004 will raise the minimum mandatory retirement age to 65 by 2013, and while many (if not most) people will want to work past 60, none of these adjustments will provide more workers for occupations that require more demanding physical exertions and that will be in greater demand as both Japan's infrastructure and its population age rapidly.

Reconstruction of crumbling highways (think of air hammers, concrete pouring and laying down reinforcing steel bars), repair of buildings damaged by earthquakes or the care of bedridden patients cannot be done by octogenarians. Japan's robotization has often been offered as a partial solution of the aging challenge: instead of importing foreign labor Japan leads the world in using industrial robots. By 2005 the country had about 356,000 robots, more than 40% of the worldwide total and nearly 90% of the combined stock of these machines installed in Europe and North America (IFR 2005). The country's many makers of robots include such leading producers as FANUC, Fujitsu, Kawasaki, Mitsubishi, Muratec, Panasonic and Yaskawa.

But the actual gap between Japan and the rest of industrialized world is not that large because Japanese statistics also include data on simple manipulators that are controlled by mechanical stops and these machines would not pass a stricter definition of industrial robots used in the US and the EU. Moreover, Joseph F. Engelberger (with George Devol, founder in 1956 of the world's first robot company, Unimation) has been very critical of the direction taken by Japan's leading robot researchers: "Nothing serious. Just stunts. There are dogs, dolls, faces that contort and are supposed to express emotion on a robot" (cited in Cameron 2005). Instead, he argues, as he has since the late 1980s (Engelberger 1989), for intensive development of household service robots to help the elderly and infirm, an advance that would particularly benefit the world's most geriatric nation.

China's rise

Historians of dynastic China would say that resurgence would be more accurate than describing the recent decades as the country's rise. Over much of the last two millennia China was the preindustrial world's largest economy: Maddison's (2001) estimates credit it with some three-quarters of the global economic product at 0 CE, two-thirds by the year 1000, and still nearly 60% as recently as 1820. And there is little doubt that under Qianlong (1736-1795), the longest reigning of all Qing

dynasty emperors, it was, on average, more prosperous in per capita terms than England or France (Pomeranz 2001). That was surely the emperor's perception as he tersely dismissed the British offer to trade and ordered George III to "tremblingly obey" his warnings. Half a century later superior British arms inflicted the first Western defeat on China, and soon afterwards the empire was fatally weakened by the protracted Taiping rebellion, one of the transformational mega wars of the past two centuries (Smil 2005). The empire staggered on until 1911; its dissolution was followed by four decades of internal and external conflicts.

The establishment of Maoist China in 1949 did not end violence and suffering: collectivization campaigns and anti-intellectual drives of the 1950s were followed by the world's worst, and overwhelmingly Mao-engineered, famine that arguable claimed some 30 million lives between 1959 and 1961 (Ashton et al. 1984; Chang and Halliday 2005). Then came the decade of the incongruously named Cultural Revolution (1966-1976). By the end of 1979 Deng Xiaoping had begun to steer the country in an entirely new direction of economic pragmatism and reintegration with the world economy. This process, contrary to all expectations, only intensified after the 1989 Tian'anmen killings as the ruling party kept its priorities clear: maintain firm political control by buying people's acquiescence (if not approval) by satisfying the age-old quest for peace and prosperity. A quarter millennium after the beginning of its painful fall, China is finally reclaiming what its leaders feel is its rightful place at the center of the world: ReOrient, in Gunder Frank's (1998) apt label.

China's rapid economic growth (though not as rapid as indicated by the country's notoriously unreliable statistics) have been the result of several interlocking factors. For more than two decades the country has received an unprecedented stream of foreign investment, recently about an order of magnitude greater than India 2005. Although China's population growth rate has been very low because of the official (unevenly, but still effectively implemented) one-child policy, the total rose from 999 million in 1980 to nearly 1,316 million by 2005 (the addition larger than the total population of the US in 2005): the country thus has a large supply of inexpensive and disciplined labor that has been moving en masse from poor interior to precipitously expanding coastal cities and their peripheries, in the largest and most rapid urbanization in history.

China has followed the Japanese and South Korean example by promoting export-oriented, labor-intensive manufacturing, but the rapid economic growth also created a new huge domestic market for ever more costly consumer items (even as the income disparities between the coastal and interior province keep widening). Finally, China has shown the readiness to innovate, unfortunately not only by learning from foreign advances and setting up some well-supported research facilities, but also through widespread infringement of intellectual property rights and massive commercial and industrial espionage.

Some 200 million workers have been deployed in China's new industries since 1980. The conquest of global markets has helped to decimate America's and Europe's manufacturing in sectors raging from bedroom furniture to shoes, and from small tools to textiles, producing more than 90% of Wal-Mart's merchandise and contributing just over $200 billion (or about 26% of the total) to the US trade deficit in 2005 (USCB 2006). What a remarkable symbiosis: a Communist government guaranteeing a docile non-union workforce that labors without rights and often in military camp-like conditions in Western-financed factories so the multinational companies can expand their profits, increase Western trade deficits, and shrink non-Asian manufacturing. More of the same is to come,

and before this wave is exhausted the country's manufacturing may dominate the global market of common consumer items as thoroughly as it now dominates Wal-Mart's selection.

China's new industries

This economic surge has attracted a great deal of attention, much of it awed by the country's achievements (Démurger 2000; Fishman 2005; Shenkar 2005; Sull and Wang 2005). Continuation of China's high (though gradually moderating) GDP growth rate would make the country the world's largest economy sometime between 2025 and 2040. Wilson and Purushothaman (2003) project China's GDP (in exchange-rated terms) to surpass that of Germany by 2007 and that of Japan in 2016 and reaching the US level by 2041. But in per capita terms China would still be far behind the United States. By 2040 the two countries will have, respectively, about 1,430 and 380 million people, so identical GDPs would leave China's per capita level at roughly a fourth of the US rate. A projected per capita GDP rate of about $19,000 (in 2003 monies) a year would make China as rich as today's Greece.

What will China do with this new power? During most of the 1990s China's external actions were seen as overwhelmingly mercantile as the country appeared to be preoccupied with employing its huge surplus rural labor force and as its exports came from traditional labor-intensive categories in mature manufacturing sectors. But since the late 1990s China has become aggressive in a global quest for raw materials in general and for oil in particular (Zweig and Bi 2005). Chinese are ready to deal with Australian liquefied natural gas traders, Tehran's mullahs, or the Sudanese instigators of Darfur atrocities who control large untapped reserves of crude oil. Many commentators see the flood of China's manufactured products as an entirely welcome trend (they keep Western inflation rates low!), and many CEOs speak favorably about America's strategic partnership with China.

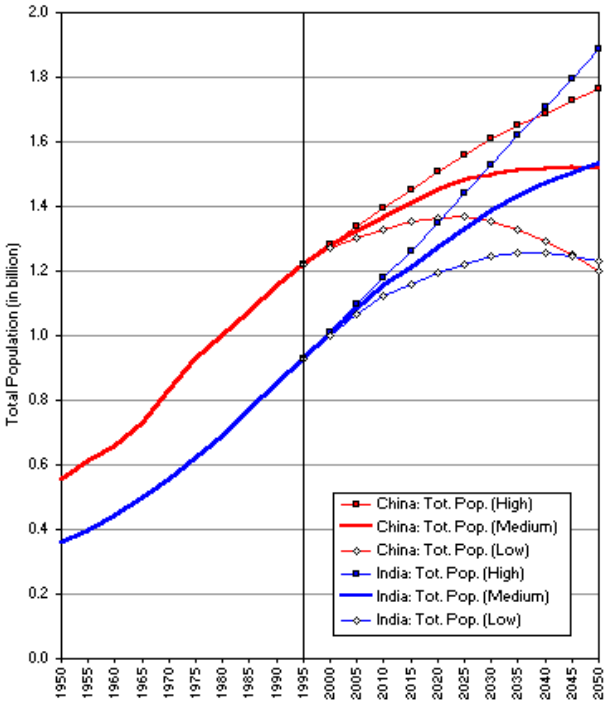
China's National Overseas Oil Company

But some Chinese strategists and policymakers think differently. Their arithmetic is made clear by the following calculation that I have heard most frankly expressed by a senior Chinese governmental advisor on strategic affairs: by the year 2020 China's continuing high economic growth rates will allow it to spend on its military as much as the US spends today, and this will make it a real superpower impervious to any US threat or pressure. This may be wishful thinking. All of these calculations depend on the conversion rates used to compare Chinese and US GDPs and on continued high growth rates. Official exchange

rates pegged China's GDP in the year 2005 at only about 15% of the US total, whereas the adjustment for purchasing power parity puts it already at about 60%.

Wilson and Purushothaman (2003) projected China's 2020 (exchange-rated) GDP at 6.5 times the 2000 level, or about $7.1 trillion (in 2003 $) compared to $16.5 trillion for the US, and they also estimated that the value of Chinese currency could double in ten year's time if growth continued and the exchange rate were allowed to float. This adjustment would lift China's 2020 real GDP close to $15 trillion, near the US level at that time. With a higher share of it going to the military China could indeed match US defense spending by 2020! The Pentagon estimates that by the year 2025 Chinese defense spending will be as high as $200 billion (US Department of Defense 2004). Again, multiplied by two this gives a level above the US FY 2004 defense budget.

Moreover, in contrast to the decades of the Cold War when the United States was in no way economically dependent on Russia, China is helping to prop up the dissipating US economy by supplying it with essential goods at cut-rate prices and, with Japan, by buying up the lion's share of the country's ballooning debt. Not everybody sees this a threat: there are two opposing ways of extrapolating these developments, one seeing China's peaceful rise (Zheng 2005; Zhu 2005), the other one not just an unpeaceful expansion (literally: Mearsheimer 2006) but the inevitability of China becoming America's strategic adversary and the Sino-US military contest in the Pacific being a defining development of the 21st century (Kaplan 2005). Both the mercantile and the adversarial arguments have a great deal of validity.



Chinese and Indian population projections

For example, a complete ban on China's imports would bring a surge of products from other Asian exporters (mostly from South Korea, Taiwan, Vietnam, Indonesia and Thailand) but hardly any resurgence of US manufacturing (many of its sectors are simply defunct and others not competitive). And anticipations of China's high military spending are based on continued high rates of defensive and offensive build-up that has been underway for years and on increasingly bellicose statements of some policy makers. But both the mercantile acceptance of internationally integrated China and the adversarial approach to China's intentions toward and beyond Taiwan ignore a multitude of internal and external weaknesses that militate against the country's becoming a superpower (in all senses of that loaded term) during the next two generations.

All large, populous countries face limits and challenges, but in China's case these are uncommonly numerous, and ignoring them is to repeat the mistakes made before 1990 when

the West judged the long-term prospects of the USSR (as a formidable superpower) or Japan (as a virtually guaranteed global economic leader). I will note just the key items in four major categories concerning China's population, economic progress, environmental degradation and the power of ideas. These trends, rather than the endlessly discussed possible outcomes of China-Taiwan dispute (Bush 2005; Tucker 2005), will determine the reach and the limits of China's rise during the first half of the 21st century.

China's twisted demographic foundation, the result of a preference for sons aggravated by state interference via the one-child policy, has left the country with one of the world's most unnatural sex ratios at birth. Normal ratio of males/females is 105, China's national mean is 110 and the rate is in excess of 115 in some provinces and more than 130 in some counties (Walker 2006). This reality will disrupt China's social fabric in several worrisome ways: it condemns tens of millions of poorer males to spouseless (and hence shorter) life; it has already led to waves of rural female abduction by criminal gangs and the large numbers of footloose young males, who are responsible for most of crime in any society, both petty and organized, could (an extreme view) even be a factor in foreign aggression (Hudson and den Boer 2003).

China's birth planning policy will also result in a rapid aging of the country's population (England 2005). In 2005 about 11% of China's population was 60 years and older, compared to some 17% in the United States, but by 2030 the levels will be comparable and by 2050 China will have more old people (about 30%) and higher a dependency ratio than will the United States. The proportion of persons of working age within the total population, currently about 68%, will fall to 53% by mid-century, equaling the corresponding figure for the G6 countries. This burden will be aggravated by the fact that some three-quarters of all Chinese have no pension plans, leaving tens of millions of young males responsible for two parents and four grandparents. And as Yang (2005) notes, the aging process will be already felt during the next 15 years as the number of entry-level, low-skilled workers will shrink, making it difficult to recruit migrant labor at depressed wages.

Economic reforms have employed tens of millions in new industries, transformed villages to large cities in less than a single generation, attracted enormous inflows of foreign investment, conquered global markets in many industrial categories and elicited worldwide admiration of Chinese economic progress. But they have also been responsible for one of the world's fastest increases of income inequality (Khan and Riskin 2001). They have brought poverty and marginalization and created a massive urban underclass of destitute migrants and unemployed city workers numbering the tens of millions (Solinger 2004) even as they created an elite enjoying obscene levels of private consumption and striving to maintain the marriage of convenience between the unchecked power of the ruling party and illicit wealth (Pei 2006; 2006a).

And tens of millions of peasants lead a precarious existence e subject to the arbitrary actions of party leaders, state officials, and ambitious businessmen, including violent (and uncompensated) expropriation of their land and punishing taxation (Chen and Wu 2004; Friedman, Pickowicz and Selden 2005). Poverty also keeps rural China unhealthy (Dong, Hoven and Rosenfield 2005), and corruption is severe and endemic (Manion 2004; Wedeman 2004; Ying 2004). Transparency International (2005) puts China in the same class as family-run Saudi Arabia, hardly a sign of a progressive society aspiring to global leadership.

Degradation of China's environment has been exceptional for both its extent and intensity. Pre-1949 China was massively deforested, suffering from heavy erosion and regional

shortages of water; Maoist policies exacerbated the problems and added enormous burdens of industrial air and water pollution even as its propaganda was brainwashing Western admirers with tales of exemplary environmental achievements. Given the willing naïveté and general ignorance of Chinese realities, these efforts were successful. I will never forget the disbelief and doubts with which my first survey of China's environment (Smil 1983) was met in the United States and in Europe: things could not possibly be that bad!

Eventually China opened up most of its territory to visitors, new Earth observation satellites provided more detailed coverage of many environmental phenomena and the results of China's pollution monitoring became publicly available: during the 1990s there could be no doubt that the country had few rivals in the extent and intensity of its air and water pollution and its chronic water shortages (Smil 1993; World Bank 1997). But when people began to ask how soon China would reach a clear environmental breaking point, I had to disappoint them: as Deng Xiaoping's reforms led China to quadruple its GDP within a generation, the country's environment in some respects improved and in others worsened. This dynamic situation makes it difficult to assess the net outcome of these contradictory trends.

The post-Mao leadership adopted a number of measures that reversed the most irrational Maoist policies, including the conversion of orchards, wetlands and slopelands to grainfields, and the ban on private woodfuel lots. Quality of afforestation efforts improved impressively, major cities acquired at least primary waste-water treatment, particulate air pollution from large stationary source was controlled by electrostatic precipitators and higher energy efficiency of modernized industries reduced the waste streams per unit of products. Three decades after Mao's death (in September 1976) China is greener, cleaner and more efficient –- but there is more to be worried about the state of its environment today than there was a generation ago. China's food production and energy demand are the two key reasons why.

By 2025 the affluent Western nations will add some 25 million people to their 2005 total of 700 million. China will add –- according to the medium variant of the latest United Nations forecast (United Nations 2004) – about 125 million to its 2005 total of about 1,316 million. With 11% of global population, those Western nations had nearly a quarter of the world's farmland in 2005, averaging about 0.5 ha/capita. In contrast, China, with 20% of the world's population in the year 2005, had only 9% cent of the world's farmland, or just a little over 0.1 ha/capita.

The only two poor populous countries with less farmland per capita are Egypt and Bangladesh –- but nearly 300 million Chinese already live in provinces where the per capita availability of arable land is lower than in Bangladesh (Smil 2004). Moreover, as China is undergoing the biggest construction boom in history, conversion of farmland to industrial, residential and transportation uses, as well excessive soil erosion (unsustainable soil losses in excess of 15 t/ha a year now prevail in at least a third of China's fields), salinization and desertification, have been steadily reducing the country's arable land. Even without further acceleration of recent trends (a highly conservative assumption given the recent decision to build a network of freeways whose length will surpass that of the US Interstate system), the average per capita availability of farmland will be less than 0.08 ha/person by the year 2025.

Deng Xiaoping's agricultural reforms made China basically self-sufficient in food, and did so at a higher level than at any time in the country's long history (FAO 2006) but because of large regional disparities there are still several tens of millions of malnourished people. In order to eliminate this deficit, to produce

adequate food for the additional 125 million people, and to further improve the quality of overall nutrition, China will have to expand its food output by at least 20% by 2025. This will require an incremental food supply roughly equivalent to the total current food consumption in Brazil -- yet food production will have to come from a steadily diminishing area of farmland.

China will have to because the country will not have the Japanese (or South Korean) option: those two countries import most of their food in exchange for high value-added industrial products. China could certainly produce enough manufactures to buy most of its food –- but that amount of grain and meat is simply not available on the global market. In 2005 China produced about 430 million tons of grain, while the 2004 global exports of all cereals amounted to 275 million tons (FAO 2006). China could thus absorb the world's entire grain exports and still satisfy less than two-thirds of its demand. Meat comparisons show an even greater gap: in 2005 China's total meat output was put officially at 77 million tons (SSB 2006) but global exports totalled just 28 million tons: China could thus import all of the world's traded meat and cover only a bit more than a third of its annual demand. Even if the official meat production claim were exaggerated by 50%, the underlying reality would not change: China will be never able to rely on imports for most of its food consumption.

Cropping intensification is the only way to produce more food from less arable land, and irrigation is the key input. In absolute terms China already irrigates more land than anybody else, and in relative terms it ranks only behind Egypt and Israel, but its water supply is already very precarious. China has only 7% of the world's freshwater resources and the provinces north of the Yangzi, with some 40% of all population and a similar share of GDP, have only about 20% of the southern average, or just over 500 m3/capita. In 2000 China's nationwide mean per capita freshwater availability was about 2,000 m3/year, and around 2030 (when China's population peaks at close to 1,450 million) this will fall to less than 1,800 m3/capita (in the northern provinces barely half of that).

In contrast, global availability in the year 2000 averaged about 7,000 m3/capita, the US rate was nearly 9,000 m3/capita, and the Russian rate was close to 30,000 m3/capita (World Resources Institute 2000). Even if it were possible to use every drop of the northern stream runoff, per capita water supply would be less than a quarter of America's actual per capita water consumption. Actual per capita northern supply for all uses -- agriculture, industry, services and households -- amounts to little more than the Americans use just to flush their toilets and wash their clothes, dishes and cars. In addition, 90% of water sources in urban areas are polluted and in some northern provinces water tables have been sinking by several meters per year.

Such are the northern water shortages that the Yellow River, the region's principal source, has regularly ceased to flow long before it reaches the sea. This happened for the first time in history in 1972, and starting in 1985 the river dried up in some sections every year. In 1997 the stream did not reach the Bohai Bay for a record 226 days, and the dry bed extended more than 700 km from the river's mouth (Liu 1998). Massive (and costly, in both economic and environmental terms) South-North water transfer from the Yangzi to the Huanghe basin will not provide a lasting solution. The necessity to satisfy the rising urban demand and to secure water for growing industries (above all for expanding electricity generation) means that the North's already overused resources will be, even with the transfer, under more pressure during the next two decades.

Future energy demand will impose a tremendous pollution burden on China. In 2005

China's consumption of primary commercial energy amounted to about nine per cent of the global total, again much less than the country's population share. In order to join the ranks of truly developed nations China's per capita energy consumption would have to be at least twice the current mean; in any case, there will be further substantial increases in emissions of particulates and sulfur and nitrogen dioxide and intensification of already endemic urban photochemical smog. In addition, China is already the world's second largest emitter of greenhouse gases, and its most appealing nonfossil alternative has its own environmental problems: accelerated development of hydropower -- exemplified by the highly controversial Sanxia megaproject -- has already caused extensive flooding of high-yielding farmland, mass population resettlements, and rapid reservoir silting (due to deforestation and slopeland cultivation).

One summary approach to the economic impact of China's environmental degradation is to monetize these burdens. Some of these quantifications can be done with a great deal of confidence, others are largely guesstimates and some (notably the eventual changes brought by global warming) must be left out. But even the partial quantifications add up to considerable impacts: economic losses attributable to China's environmental degradation have been conservatively quantified to equal 6-8% of the country's GDP, or almost to as much as the annual growth (Smil 1996; World Bank 1997).

Finally, there is an intangible but critically important power of ideas: no aspiring superpower can do without them. In this respect, China has yet to face its old deep internal wounds: it cannot be a credible exporter of ideas as long as it remains unwilling to address the terrible legacy of the ideas that guided it for nearly four decades. Official government policy still silences any probing discussions of the two greatest catastrophes that befell China after 1949, the world's largest, Mao-made, famine (1959-1961) and the Cultural Revolution (1966-1976). Postwar Germany has faced the horrors of the Third Reich and worked to atone for its transgressions. Russia began to face its terrible Stalinist past when Khrushchev opened the gates of the gulag and had the dictator's corpse removed from the Red Square mausoleum. But the portrait of arguably the 20th century greatest mass murderer still presides over Tian'anmen, hundreds of his statues still dot China's cities, and Maoism was never rejected by the ruling party. Such amnesia is hardly a solid foundation for offering a moral leadership.

As for Beijing's "socialist market economy with Chinese characteristics", it is only a label for the mixture of relatively free enterprise and continued party control. Although this rather unoriginal idea (with elements copied from Japan, Taiwan and Singapore) has many Western admirers ("Chinese did not make Gorbachev's mistake!") it is definitely not a recipe for economic development of poor nations. And as for offering a broader social and behavioral model, China -- despite (or perhaps because of) its ancient culture, and in a sharp contrast with the United States -- has little soft-power appeal an arbiter of fashions and popular infatuations.

Its language can be mastered only by long-term devotion, and even then there are very few foreigners (and fewer and fewer Chinese) who are equally at ease with the classical idiom and spoken contemporary dialects. Its contemporary popular music is not eagerly downloaded by millions of teenagers around the world. China's sartorial innovations are not instantly copied by all those who wish to be hip, Westerners, Muslims or Africans cannot name a single Chinese celebrity, and who wants to move, given a chance, to Wuhan or Shenyang? Or who would line up, if such an option were available, for the Chinese equivalent of the Green Card?

In the realm of pure ideas, there is (to choose a single iconic example) no Chinese Steven Jobs or Bill Gates, an entrepreneur epitomizing boldness, risk-taking, arrogance, prescience, creativity, and flexibility, a combination emblematic of what is best about America's innovative drive. And it is simply unimaginable that the country's turgid constitution would be ever read and admired as widely as is that hope-inspiring 1787 document. I assume you know its stirring opening. Here, for contrast, is the first article of China's 1982 constitution:

"The People's Republic of China is a socialist state under the people's democratic dictatorship led by the working class and based on the alliance of workers and peasants. The socialist system is the basic system of the People's Republic of China. Sabotage of the socialist system by any organization or individual is prohibited."

Those who telling us how admirably capitalist the new China is might re-read the article a few times. And anybody familiar with today's China knows how avidly the Chinese people themselves –- teenagers, aspiring yuppies, managers –- are imitating America even as some profess their nationalistic (and often not at all discrete) anti-American fervor.

* * *

There seem to be many reasons why neither Japan nor China can reach a real superpower status during the next two generations. Similarly, critical appraisals indicate that Russia (with its continuing governance problems, rapidly aging population and single-track economy dependent heavily on exports of energy) is unlikely to regain the position occupied by the USSR at the peak of its power –- and that the United States, despite the endlessly repeated mantra of being the only remaining superpower, is facing so many military, economic, social and political challenges that its already clearly discernible gradual retreat from global supremacy is more likely to accelerate than to reverse. This means the most likely outcome by 2050 is a multipolar world of a growing number of (mostly nuclear) powers including USA, European Union, Russia, China, Japan, India, Brazil, Pakistan and Iran. By the mid-century people may yet recall longingly the time when the two superpowers worked their great balancing act.

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