The Next 50 Years: Unfolding Trends

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FUNDAMENTAL CHANGES in human affairs come both as unpredictable discontinuities and as gradually unfolding trends. Discontinuities are more common than is generally realized, and technical developments offer some of the best examples of these underappreciated shifts. Incremental engineering progress (improvements in efficiency and reliability, reduction of unit costs) and gradual diffusion of new techniques (usually following fairly predictable logistic curves, no matter whether the innovations are mass-produced consumer items or advanced industrial processes) are very much in evidence, but they are punctuated by surprising, sometimes stunning, discontinuities.

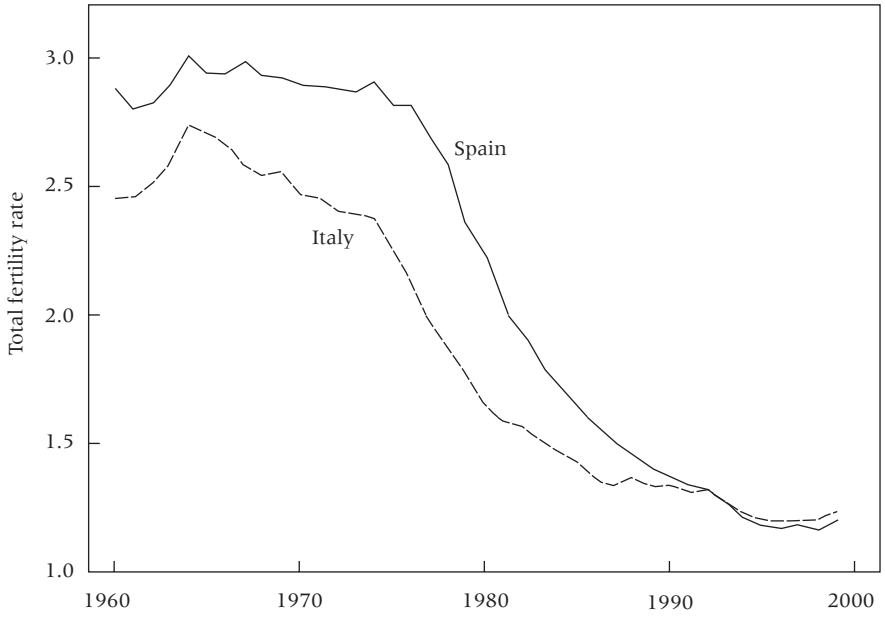
The modern history of flight is an apt illustration of these inherent unpredictabilities (Smil 2006). In 1955 it did not require extraordinary imagination to see that intercontinental jet travel would become a large-scale enterprise. But no one could have predicted (just a year after the third fatal crash of the pioneering British Comet and the consequent grounding of the first program of commercial jet flight) that by 1970 there would be a plane capable of carrying more than 400 people. The Boeing 747 was a result of Juan Trippe's vision and William Allen's daring, not an inevitable outcome of a technical trend. And more surprises followed, including a counterintuitively massive increase in the total volume of commercial flying: between 1972 and 1981 two rounds of large oil price increases more than quintupled (in real terms) the price of crude oil (from which all of the aviation kerosene is refined), yet worldwide passenger traffic expanded relentlessly and its volume was 60 times higher by century's end than it was in 1955 (ICAO 2001).

Some political discontinuities of the past 50 years have been even more stunning. Nineteen fifty-five was just six years after the Communist victory in China's protracted civil war, only two years after China's troops made it impossible for the West to win the Korean War and forced a standoff along the 38th parallel, and three years before the beginning of the worst famine in history (Smil 1999). At that time, China, the legitimacy of its regime

unrecognized by the United States government, was an impoverished, subsistence agrarian economy, glad to receive a few crumbs of wasteful Stalinist industrial plant, and its per capita gross domestic product was less than 4 percent of the US average. Yet by 2005 China, still very much controlled by the Communist party, had become a new workshop for the world, an indispensable supplier of goods ranging from pliers to cell phones, and it is now underwriting America's excessive spending through its record purchases of US Treasury bills. How could anyone have anticipated all of these developments in 1955, or for that matter in September 1976 right after Mao's death, or even as recently as 1989 after the Tian'anmen killings?

Demographic discontinuities can be as abrupt in relative terms as major technical and political shifts. Declines in fertility (even leaving aside China's forced trend) have been particularly surprising. Two generations ago Europe's Catholic South had total fertility rates close to or even above 3.0, but by century's end Spain and Italy shared the continent's record lows with Czechs, Hungarians, and Bulgarians (Billari and Kohler 2002; Rydell 2003). And in Spain's case most of this decline took place in just a single decade, between the late 1970s and the late 1980s (see Figure 1). In Canada a similar phenomenon was seen not only in Catholic Quebec (whose fertility during the mid-1920s was nearly 60 percent higher than in Ontario but

FIGURE 1 Steep decline in the total fertility rate in Italy (mostly during the 1970s) and Spain (mostly during the 1980s)



SOURCE: Based on a figure in Billari and Kohler (2002).

four decades later was 4 percent lower) but also among francophones outside the province: their fertility fell from nearly 5.0 during the late 1950s to below 1.6 by the mid-1990s (Rao 1974; O'Keefe 2001).

Unpredictability does not prevent us from identifying those discontinuities whose magnitude and impact would be so large that they could alter global history and from trying, as I did in a previous essay in this journal, to assess their probabilities and relative risks (Smil 2005a). The conclusions of that exercise indicate that we should not be overly concerned either about the possibility of globally destructive impacts of extraterrestrial bodies or about a recurrence of supervolcanoes and resulting massive tsunami, but there is a relatively high (at least 20 percent) probability of a new transformational megawar taking place during the next 50 years, and a major influenza pandemic is inevitable. Unfortunately, our ignorance does not allow us to relegate this new pandemic to the category of disasters with precedents (10,000,000 deaths globally) or to elevate it to an unprecedented level of global mortality (100,000,000 casualties).

Examination of the most likely outcomes of major trends that are gradually changing the fortunes of nations and reshaping world history is no easier than appraising the probabilities of the most dangerous catastrophic discontinuities. There are three key reasons for this counterintuitive reality. First, despite the plentiful evidence attesting to their existence, many important trends are not explicitly identified as they unfold and 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 any external forces and which ones will suddenly veer away from predictable lines (be they linear, temporarily exponential, or logistic). 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.

Recent history offers no better example of the first reason than the demise of the Soviet Union. In retrospect it is clear that during the second half of the twentieth century the Soviet regime was falling steadily behind in its self-proclaimed race with the United States. And yet the West—aroused by Nikita Khrushchev's famous threat ("we will bury you"), awed by a tiny Sputnik, and willing to believe in a huge missile gap—operated for two generations on the premise of a growing Soviet capability. In reality, any Soviet domestic and foreign gains were outweighed by internal and external failures and losses, and improvements in the country's economic and technical abilities were not enough to prevent its average standard of living, and its military capability, from falling further and further behind those of its great rival.[1] Illustrative of the second reason, the eventual commercialization of nuclear fusion has been set for decades at an ever-receding 30-

year horizon. The third challenge can be perfectly illustrated by rising concerns about the end of the oil era.[2]

The history of the world's four largest economies illustrates that complex systems are commonly subject to such changing trends. I have already noted the amazingly speedy transformation of the Soviet Union from a feared superpower with ever-increasing military budgets to a group of states that have been experiencing a falling quality of life and immense social challenges. As for China, less than four years 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 Stalinist 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 mid-1990s Japan, the most dynamic large economy of the 1960s, 1970s, and 1980s, had suddenly lost its seemingly unstoppable momentum (that led many experts to predict it would become the world's leading economy by the beginning of the twenty-first century); and despite repeated assurances of a new turnaround (offered, perhaps self-servingly, not only by many Japanese politicians but also by foreign economists), it has spent 15 years in retreat and stagnation. US economic and strategic fortunes seemed rather bleak during most of the 1980s, but during the 1990s—in the aftermath of the Soviet collapse and the first Gulf War and amid the unfolding (albeit illusory) New Economy—the United States had recovered in a number of remarkable ways. But this bounce was short-lived and has been followed by worrisome fiscal and structural reversals that have been accompanied by unprecedented strategic, military, and political challenges.

In contrast to my appraisal of discontinuities, which had to be topical, I will undertake this assessment of globally important shifting trends by looking at long-term trends that affect the major protagonists on the world scene. I will argue that two key, self-evident trends, China's rise and America's retreat, will continue during the coming generation; that neither Europe nor Japan can regain its former dynamism; but that Russia, despite its many problems, may reemerge as a much more influential power than it is today. All of these changes of fortune will be closely bound to what appear to be fundamentally irreversible population trends; such changes, more than any specific ideology, will be also critical in determining the influence of Islam on world history over the next 50 years. These trends will translate into a new order of global power. Who is on top matters in many ways, and the next two generations will, almost assuredly, see an epochal shift—the end of the pattern that has dominated history since World War II.

But all of these trends unfold on the irreplaceable stage of the Earth's biosphere, whose considerable resilience, elaborate integrity, and amazing

complexity are seriously endangered by human actions whose consequences can now result in undesirable change on global scale. Consequently, anthropogenic alterations of the biosphere may change the global environment to such an extent that it would weaken the biophysical foundation of modern civilization and imperil its very continuation, a change against which military capability, economic productivity, or orthodox religiosity would afford no protection.

Europe's place

A number of recent publications are euphoric about Europe's future trajectory. The Director of Foreign Policy at the Centre for European Reform predicts, astonishingly, that Europe will economically dominate the twenty-first century (Leonard 2004). The former London bureau chief of the *Washington Post* puts a slightly different label on the same conclusion, maintaining that the rise of the United States of Europe will end American supremacy (Reid 2004). And Jeremy Rifkin (2004), who has written (with gusto unfortunately unmatched by deeper understanding) on such disparate topics as the nature of entropy and the perils of genetically modified crops, is awed by the continent's high economic productivity, by the grand visions of its leaders, by their risk-sensitive policies and reassuring secularism, and by the omnipresent leisure and high quality of life provided by caring social democracies. Such delusionary writings make one wonder whether the authors ever perused the continent's statistical yearbooks, read the letters to editors in more than one language, checked public opinion polls, or walked through the postindustrial wastelands and ghettoes of Birmingham, Rotterdam, or Milan.

In 1900 Europe (excluding Russia)[3] had nearly 20 percent of the world's population and accounted for roughly 40 percent of the global economic product; 100 years later it had less than 9 percent of all people and produced less than 25 percent of the global output (Maddison 2001). By 2050 its population share will slip to about 6 percent of the global total, and, depending above all on growth in the gross domestic product of China and India, its share of global economic product may be as low as 10 percent: these are hardly trends leading toward global dominance. In addition, as is plainly clear to even a casual observer of European affairs, the continent has no coherent foreign policy or effective military capability, and the European Union's key member states do not see eye to eye even on a major issue such as bloated agricultural subsidies that now swallow about 40 percent of the EU's annual budget.[4]

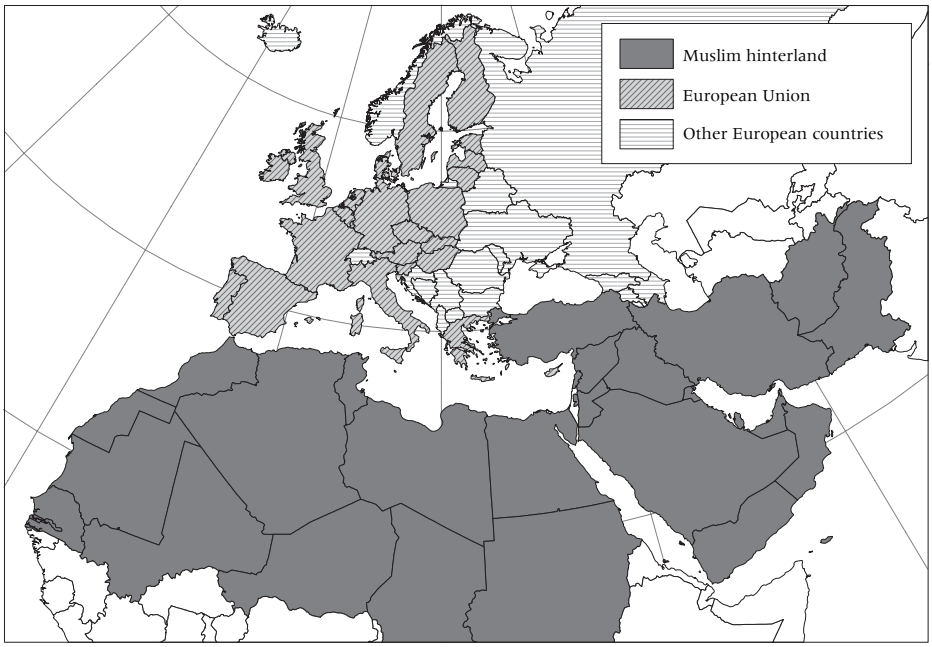
As for the EU's risk-sensitive policies, they allowed the member states to watch the slaughter of tens of thousands and the displacement of millions in the Balkan wars of the 1990s; only the US interventions, on behalf of Muslim Bosnians and Kosovars, prevented more deaths. The grand vi-

sions of professional politicians have been rejected in a referendum even by the European Union's pivotal founding nation. Labor productivity and leisure have been bought at the price of mass unemployment, roughly twice the US rate for the entire work force and in some parts of the continent more than 25 percent for people younger than 24 years. Peaks exceed 50 percent in three regions in Italy, two in France, and one in Poland (Eurostat 2005). And many managers, as well as ordinary citizens, would use the term bureaucratic paralysis instead of caring social democracy.

In any case, overgenerous welfare programs will soon start colliding with shrinking and aging populations, leading to a reduced taxation base, higher pension payments, and rising pensioner/worker ratios. All affluent countries will experience these shifts, but Europe's already high pensioner/worker ratios (Britain being the only exception among the continent's largest economies) mean that old-age dependency ratios will typically double by 2050 (Bongaarts 2004). These realities are at the core of Europe's population dilemma, perhaps the single most important factor that will shape its economic and political futures. As Demeny has noted, the process of moving toward a smaller and older population could be contemplated with equanimity only if Europe were an island—but instead "it has neighbors that follow their own peculiar demographic logic" (Demeny 2003: 4). This neighborhood—Demeny calls it the European Union's southern hinterland—includes 29 states (when counting Palestine and Western Sahara) between India's western border and the Atlantic Ocean, all exclusively or predominantly Muslim (see Figure 2).

By 2050 the European Union's current 25 nations are projected to have 449 million people (after losing some 10 million from the present level, notwithstanding an assumed net immigration of more than 35 million persons between 2005 and 2050), half of them older than 50 years, while the population of its southern hinterland is projected to reach about 1.25 billion. Immigration from this hinterland is already the greatest influx of people the continent has seen in more than a thousand years. During the previous incursion, intruders ranging from Ostrogoths to Vikings and from Bulgars to Magyars destroyed the antique order and reshaped Europe's population. So far, the modern migration has been notable not for its absolute magnitude but for three special characteristics. First, as is true for immigrants in general, the migrants from these states are much younger than the recipient populations, a difference that is accentuated by Europe's rapid aging. The migrants' birth rate is appreciably higher than the continent's mean. Second, the immigrants are disproportionately concentrated in segregated neighborhoods in large cities. This is seen in the data on religion: Rotterdam is nearly 50 percent Muslim; London's Muslim population has surpassed one million; and Berlin has nearly 250,000 Muslims. Third, significant shares of these immigrants show little or no sign of second-generation assimilation into their host societies.

FIGURE 2 Europe's Muslim hinterland. Total populations in 2005 and United Nations (2005) medium forecasts for the year 2050 are as follows: European Union (25 members) 459 and 449 million; other European countries (excluding Russia) 130 and 110 million; the Muslim hinterland 640 and 1240 million. Consequently, the population ratio of Muslim hinterland/EU 25 will rise from 1.39 in 2005 to 2.76 by 2050.



A tragically emblematic illustration of this last reality is that three of the four suicide bombers responsible for the 7 July 2005 attacks in London were British-born Pakistani Muslims. And while Christianity has become irrelevant to most Europeans, Islam is very relevant to millions of these immigrants. The lack of assimilation results from resistance on both sides. On one side is Europe's traditional ostracism (well illustrated by the perennial marginalization of the Rom) and the explicit policy of most European governments not to press for assimilation (under the banner of multiculturalism). On the other side, and perhaps more importantly, there is active resistance by an increasing share of immigrants whose demands for transferring their norms into host countries range from segregated schooling and veiling of females to the recognition of *sharia* law.

What would happen if this influx of largely Muslim immigrants were to be increased to a level that would prevent declines in Europe's working-age population? In many European countries, including Germany and Italy, these new Muslim immigrants and their descendants would then add up to more than a third of the total population by 2050 (United Nations 2000).

Given the continent's record, such an influx would doom any chances for effective assimilation. The only way to avoid both massive Muslim immigration and the collapse of European welfare states would be to raise the retirement age—now as low as 56 (females) and 58 years (males) in Italy and 60 years in France—to 75 years and to create impenetrable borders. The second action is impossible; the first one is (as yet) politically unthinkable, but, even if it were gradually adopted, mass immigration, legal and illegal, is unavoidable: the demographic push from the southern hinterland and the European Union's economic pull produce an irresistible force.

Two dominant scenarios implied by this reality are mutually exclusive: either gradual integration that leads to full participation of Muslims (now more than 15 million but eventually many tens of millions) in European societies or a continuing incompatibility of the two traditions that, through demographic imperatives, will lead to an eventual triumph of Islam, if not continent-wide then at least in the three largest Mediterranean states, Spain, Italy, and France. I do not think that a great hybridization, akin to the Islamo–Christian syncretism that prevailed during the earliest period of the Ottoman state (Lowry 2003), is at all likely. The continent's Christians are now too nominal and too uninterested in matters of faith (indeed quite appalled by what they see as a primitive US religiosity) to be partners in creating such a spiritual mélange. More importantly, for too many Muslims any dialogue with nonbelievers is heretical.

Other fundamental problems beyond Europe's economic underperformance and its demography will prevent the region from becoming an old-new global leader. Europe cannot act as a cohesive force as long as its internal divisions and disagreements remain as acute as they are today. Yet the ruinous agricultural subsidies, national electorates alienated from remote bureaucracies, Brussels's rule by directive, and formulation of common foreign policy and military strategy are, in the long run, secondary matters compared with the issue of the Union's enlargement. Even an arbitrary exclusion of Russia from Europe's aspirations leaves the challenges of dealing with the Balkans, Ukraine, and, foremost of all, Turkey. The European Union's gradual expansion has created pressures for serial enlargement that have now reached the boundaries of easy consensus.

The EU's conflicting attitudes toward Turkey—an eager (or at least welcoming, if always economically based) embrace and a fearful (culturally based) rejection—capture the complexity and consequences of that challenge. Turkey's exclusion would signal, on many levels, unwillingness to come to terms with the realities of the southern hinterland. But if a Muslim Turkey (where even the prime minister's wife will not appear without *hijab*) is admitted, why not its neighboring ancient Christian kingdoms of Georgia and Armenia? And, indeed, why not Iraq, one of the three largest successor states of the Ottoman Empire, a country whose territory used to be a province of the *Imperium Romanum* (Mesopotamia)?[5] No matter how far the ex-

pansion goes, what lies ahead is highly uncertain except for one obvious conclusion: an entity so preoccupied with its own constitution (and I do not mean a legal document: there the *vox populi* has spoken), so unclear about its eventual reach and mission, and so imperiled in terms of its population foundations cannot be a candidate for global leadership.

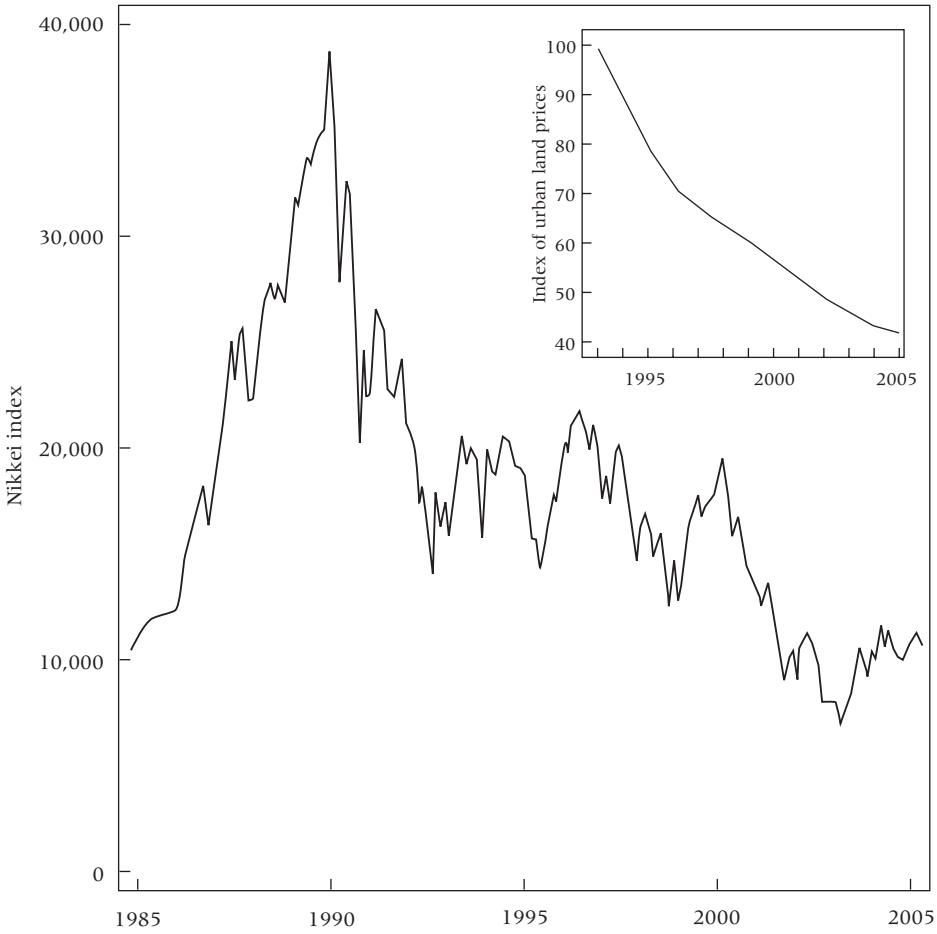
Japan's decline

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 gross domestic product and the late 1980s when it was seen as an economic Titan. At that time its admirable 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. The Plaza Accord of 22 September 1985 by the then G-5 eventually saw a near halving of the yen/dollar 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 collectors (Funabashi 1988). Moreover, Japan's high-quality exports kept rising and Ezra Vogel (Harvard's leading expert on Japan) published a new edition (1985) of his seemingly prescient bestseller (it first appeared in 1979) that characterized Japan as Number One.

Japan's expansive trend actually accelerated during the next four years: the Nikkei index was at just over 13,000 by the end of 1985 and it peaked at nearly 39,000 in December 1989 (see Figure 3). But Japan's bubble economy burst in spectacular fashion (Wood 1992; Baumgartner 1995). Critics of Japan's obvious bubble, ridiculed during the 1980s, became new prophets as the economy 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, by 2002, less than 8,600. It rose only to about 11,400 by the end of 2004. During the first half of 2005 the Nikkei remained about 70 percent below its record level while the Dow Jones, at around 10,500, was only about 10 percent below its 14 January 2000 peak of 11,722.98.

Because so much of Japan's inflated stock market was propped up by a real estate price bubble, its burst had a deviation-amplifying effect on the market. Between March 1993 and 2004 the index of urban land prices fell by 65 percent (see Figure 3). More importantly, Japan, previously 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 percent of its gross domestic product from manufacturing; by 2005 that share fell below 20 percent (Statistics Bureau 2005).

FIGURE 3 Rise and fall of the Nikkei stock market index, 1985–2005 and, in the insert, average decline in real estate prices in Japan's six largest cities, 1993–2005



SOURCES: Nikkei index plotted from data at Nikkei Net Interactive «http://www.nni.nikkei.co.jp/»; real estate values are from Japan's Statistical Yearbook (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 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) and dismal statistical indicators (multiplied unemployment, a rising suicide rate). 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 just hanging out in strange clothes and hairdos, can be seen as a sign both of Japan's national decline and of its continuing personal affluence.[6]

Prospects are discouraging. Despite the prolonged economic shock, the country still has not made the adjustments to its peculiar banking, management, and decisionmaking 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 perennial danger of North Korea. Perhaps most fundamentally, the economic retreat has lasted so long that it is about to merge with the population retreat.

By 2010 (perhaps as early as 2007) Japan's population will begin a relentless slide that will bring it from 128 million in 2005 to just over 110 million by 2050—unless the unthinkable (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) takes place. Japan will become the most aged of all aging high-income societies. The country's median age will reach 50 years by 2025, and while in 2005 one out of four of its people was 60 years or older, by 2050 the share will be two out of five and more than one out of seven will be 80 years or older, creating the world's first geriatric society (United Nations 2005).

The Muslim world

Islam's guiding text does not provide any clear message about the duties of resistance and aggression.[7] The second *sura* of *al-qur'ān* admonishes the faithful "to fight for the sake of Allah those that fight against you but do not attack them first. Allah does not love the aggressors," but this explicit nonaggression command is predicated on an undefined first attack. Who is to decide?

Individuals clearly do so all the time, but, actually, nobody is allowed to. To quote a cleric who has done more for the resurrection of modern assertive Islam than any other Muslim leader of the twentieth century,

> Islam does not allow anybody to interpret the Qur'an according to his personal opinion or private judgment.... As far as the Qur'an is concerned our hands are tied. Nobody is allowed to attribute his opinion to the Qur'an and claim that the Qur'an says so. (Khomeini 1991: 2)

We now know that if the decision to fight back is taken, one mode of modern retaliation is the sacrificial fusion of murder and suicide. "The suicide bomber's thumb pressing the detonator simultaneously clocks him into paradise" (Andriolo 2002: 741), and rational arguments are powerless against this delusion. No less importantly, arguments have no place in dealing with *al-qur'ān*: because it is God's revealed word, it is either accepted in its entirety by the faithful or rejected by unbelievers. Doubting parts of it amounts to rejection, as does any adaptation of the text to modern needs: the challenge is not how to reconcile the revelation with modernity but how to adapt life in modern society to the revealed teaching. What then remains for an interfaith dialogue that so many Westerners call for?

So far, the overall risk arising from terrorist attacks in the West has been on par with less common natural disasters and orders of magnitude below such common man-made risks as driving or falling on stairs (Smil 2005a). This can, of course, change, either by launching seemingly endless waves of suicidal murderers or with the deployment of effective weapons of mass destruction that would raise such attacks above the level of tolerable (and familiar) risks: the unknown (and unknowable) probability of these events is the most frightening aspect of this new world.

Even so, there are at least three much more fundamental challenges posed by the Muslim world. First, the lack of secular sources of state legitimacy that leads to default reliance on traditional religious sources (significant everywhere, dominant in many countries) and emergence of archaic despotic authorities (Shahrur 2005). Saudi Arabia and Iran (and, of course, Afghanistan under the Taliban) are the extreme examples. But its persistence is evident even in Turkey eight decades after Kemal Atatürk secularized the country in 1924.

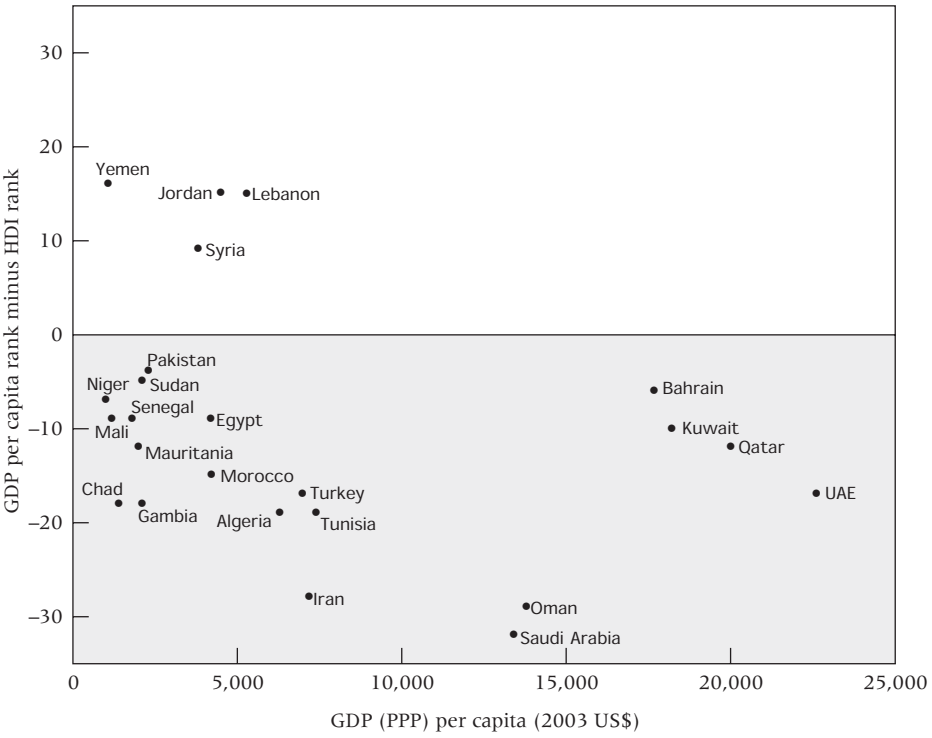
Second is the existence of *sharia*, whose precepts deal not only with personal and familial affairs but also with crime, commerce, finance, and education and thus preempt adoption of many laws that form foundations of modern states. *Sharia*'s reach is not weakening under the pressure of modernity: just the opposite is true, evidenced by the demands to make it a law of the land for Muslim minorities in some Western countries or in multiethnic northern Nigeria.

Third, and perhaps most disconcerting, is the modernization deficit that is so clearly reflected in the parlous state of science in the Muslim world. In the year 2002 researchers in Muslim countries, whose populations add up to more than 12 percent of the world's total, authored only 2 percent of all scientific publications, and 60 percent of this minuscule share came from a single country, Euro-aspiring Turkey (Kagitçibasi 2003). No Muslim country ranked among the 20 countries with the highest overall scientific output (a group that contains such small and resource-poor Western states as Belgium, Denmark, and Israel), and the same is true for health-related publications

(Paraje, Sadana, and Karam 2005). This gap is particularly telling: even the richest Muslim countries have basic health indicators below the level indicated by their per capita GDP—and in 20 out of 24 Muslim countries of Europe's southern hinterland the difference between their GDP per capita rank and their Human Development Index rank is negative (Figure 4).

Scientific advances have been the mainspring of modern economic growth, and their paucity throughout the Muslim world hampers progress in coping with the aspirations of expanding populations in general and of assertive young males in particular. By 2050 populations of Muslim societies that have been historically most prone to various forms of fundamentalism (*wahhabi*, militant *shi'a*) and anti-Western sentiments (embracing Pakistan,

FIGURE 4 Perhaps the most impressive way to convey the modernization deficit of Muslim countries in Europe's southern hinterland is to plot their per capita GDP (in purchasing power parity terms) against the difference between their global per capita GDP rank and their Human Development Index (HDI). All but four of 24 countries for which the latest data are available have negative scores[a]: their relatively high GDP levels should have brought higher quality of life to their citizens.



[a]HDI indicates that of the five countries with missing information, only Palestine would have a positive ranking, while Afghanistan, Iraq, Libya, and Western Sahara would join the negative group, raising the total of underperforming Muslim countries to 24 out of 29.
SOURCE: Plotted from data in United Nations Development Programme (2005).

Afghanistan, Iran, Saudi Arabia, and Yemen) will be, at nearly 700 million, 75 percent larger than those of declining Europe. Even more importantly, by 2025 nearly every seventh person in that region will be a male in his late teens or 20s (in Europe it will be every 16th person). Because the relative abundance of young males appears to be associated with episodes of coalitional aggression—analyses of demographic and war casualty data show that the variable consistently accounts for more than one-third of the variance in severity of conflicts (Mesquida and Wiener 1996, 1999)—this fact alone will be a major source of internal tension, instability, and violence.

The combination of these trends guarantees decades of worrisome domestic social and political convulsions, and, consequently, the Muslim world will present a considerable global security challenge even if it does not harbor radical movements engaged in external terrorism. Global repercussions of this internal instability will be compounded by the fact that five Persian Gulf countries (Saudi Arabia, Iran, Iraq, Kuwait, and United Arab Emirates) control about 65 percent of the world's remaining reserves of inexpensive liquid oil (BP 2005). By 2030 these countries will likely be extracting relatively more oil—about 40 percent of global production compared to roughly 33 percent today. And neither of the two dominant producers, Saudi Arabia and Iran, is likely to be able to maintain its present political regime.

Russia's course

The reemergence of Russia as a power to reckon with is another possibility to consider. This suggestion may seem far-fetched given the demise of the Soviet Empire, the subsequent weakening of economies of all of its successor states, the challenge from Islam not only along Russia's Caucasian (Chechnya, Dagestan) and Asian (Uzbekistan, Kazakhstan, Tajikistan, Kirgizstan) periphery but also inside the country (it has relatively large resident Muslim nationalities, nearly 15 percent of its population), widespread social ills, the parlous health of Russian males, and a rapid decline of the country's population according to the United Nations (2005) from 143 million in 2005 to about 110 million by 2050.

These objections to national revival are valid today, but not all of them are likely to persist for the next two generations. Counting Russia out would be a case of historical amnesia: there is nothing new about Russia leaving the great power game, and there would be nothing new about its vigorous reentry. The country was out of the contest for great power status in 1805 as Napoleon was installing his relatives as rulers of Europe. But less than a decade later, as Czar Alexander I rode on his thoroughbred through defeated Paris, followed by thousands of his Russian, Bashkir, Cossack, and Tartar troops, the country was very much an arbiter of a new Europe (Podmazo 2003). Russia was sidelined again in 1905, convulsed by its first bloody revolution, but 15 years later a victorious revolutionary regime re-

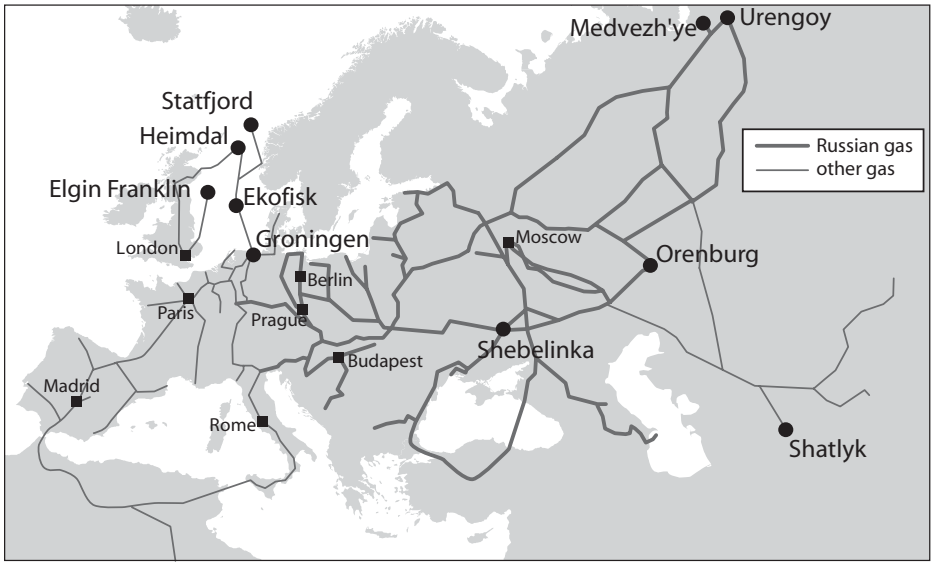
gained control over most of the former Czarist territory and inaugurated seven decades of Communist rule. As the first waves of revolutionary fervor subsided, Russia turned inward and by 1935, with Stalin plotting murderous purges of his comrades, his army, and millions of peasants, the country's international role seemed once again marginalized. Fourteen years later it was not only a victorious superpower with troops stationed from Korea to Berlin but also the second nuclear power with a successfully tested fission bomb. This last episode of Russia's militant role on the global stage lasted nearly 50 years, between 1945 and 1991, cost the West many trillions of dollars in armaments and dubious alliances, prolonged many violent proxy conflicts in far-flung places from Angola to Afghanistan, and brought the world to the brink of thermonuclear war (Freedman 2001). Moreover, it also contributed massively to environmental degradation with hundreds of highly contaminated nuclear weapons sites in both the United States and the countries of the former Soviet Union.

Russia's current weaknesses may yet keep it sidelined during the next half century, but its strengths may help to restore its great power status. Russia has always had many highly creative scientists and engineers whose fundamental contributions are practically unknown to the Western public. How many people watching a scanner toting up their groceries know that Russian physicists, together with their US colleagues, pioneered masers and lasers (Nobels to Basov and Prokhorov in 1964 and to Alferov in 2000). How many people seeing the images of stealth planes know that this class of aircraft began with Piotr Iakovlevich Ufimtsev's (1962) equations for predicting the reflections of electromagnetic waves from surfaces? And Russian surgeons have pioneered such remarkably unorthodox methods as extending leg bones shortened by bone deficiencies, deformities, and fractures (Gavril Abramovich Ilizarov) and treating nearsightedness by radial keratotomy (Svyatoslav Nikolaevich Fyodorov).

Russia is an unmatched treasure house of energy resources, with the world's second largest coal reserves, second largest potential for hydroelectricity generation, seventh largest crude oil reserves, and by far the world's largest natural gas reserves (BP 2005; International Energy Agency 2002; Merenkov 1999). Russia's reserves of natural gas amount to about 27 percent of the global total, nearly as much as the combined reserves of the number two and three countries (Iran and Qatar) and almost ten times as large as those of the United States. Natural gas is the fuel that will increasingly take the place of crude oil: with the exception of flying, everything done with liquid fuels can be done with gas, and natural gas generates about 30 percent fewer greenhouse gases per unit of liberated energy than oil, a highly desirable attribute in a world concerned about global warming.

Russia already pumps its gas through the world's largest and longest pipelines from Western Siberia to Italy and Germany (see Figure 5), and even larger projects will eventually be completed to carry it eastward to

FIGURE 5 The world's longest (and largest-diameter) natural gas pipelines transport fuel from western Siberia to western Europe. The next stages of Russia's global energy importance will include natural gas and crude oil pipelines for exports to Japan and China and eventually also massive liquefied natural gas exports to the United States.



SOURCE: Compiled from regional maps published in a variety of oil and gas journals.

Japan and China and, by using advanced designs of large liquefied natural gas tankers, around the world (Smil 2003). If one postulates a Russian economy reenergized by Siberian gas and oil (more of the latter remains to be discovered once the best Western geophysical methods are deployed, and a barrel of it might sell for a multiple of today's prices 25 years from now) and a Russian military rearmed by a new generation of weapons (as in the United States, the requisite R&D was drastically scaled down but not abandoned), the country may be ready to reassert its global influence.

If Russia's resurgence fails to materialize, however, there is an already firmly established trend that gathers speed and breadth with every year and that alone is powerful enough to dwarf the West's economic and military power during the first quarter of the twenty-first century: China's quest for a superpower status.

China's rise

Many historians would say that to speak of China's return would be a more accurate description than its rise. For centuries the country was the preindustrial world's largest economy, and there is little doubt that under Qian Long (1736–95), the longest reigning of all Qing dynasty emperors, it

was, on average, also more prosperous 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.[8] Half a century later superior British arms inflicted the first Western defeat on China, and soon afterward the ancient empire was fatally weakened by the protracted Taiping rebellion, one of the key transformational megawars of the past two centuries (Smil 2005a). 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 the violence and suffering: collectivization campaigns and anti-intellectual drives of the 1950s were followed by the world's worst, and overwhelmingly Mao-engineered, famine, which claimed at least 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 (1966–76), which ended only with Mao's death. By the end of 1979 Deng Xiaoping had begun to steer the country in a 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 allowing virtually any means that promote the age-old quest for wealth and prosperity. A quarter millennium after the beginning of its painful fall, China is finally reclaiming its place at the center of the world: ReOrient, in Gunder Frank's (1998) apt label.

Rapid rates of economic growth (though not as rapid as indicated by the country's notoriously unreliable statistics), an unprecedented stream of foreign investment (surpassing the aggregate invested annually in all other low-income modernizing nations), a seemingly endless supply of inexpensive and disciplined labor (furnished by the largest and most rapid urbanization in history), the precipitous creation of a huge domestic market for ever more costly consumer items (even as the income disparities between the coastal and interior provinces keep widening), and the readiness to innovate (not only by learning from foreign advances but also through widespread infringement of intellectual property rights and massive commercial and industrial espionage) are widely seen as interlocking components of a trend that will make China the world's largest economy.

Some 200 million workers have been deployed in China's manufactories since 1980. The unprecedented conquest of global markets has helped to decimate America's (and soon will also Europe's) manufacturing in sectors ranging from bedroom furniture to shoes, and from small tools to textiles, producing more than 90 percent of Wal-Mart's merchandise and contributing more than $160 billion (almost exactly 25 percent of the total) to the US trade deficit in 2004. What a remarkable symbiosis: a Communist government guaranteeing a docile non-union workforce that labors without rights

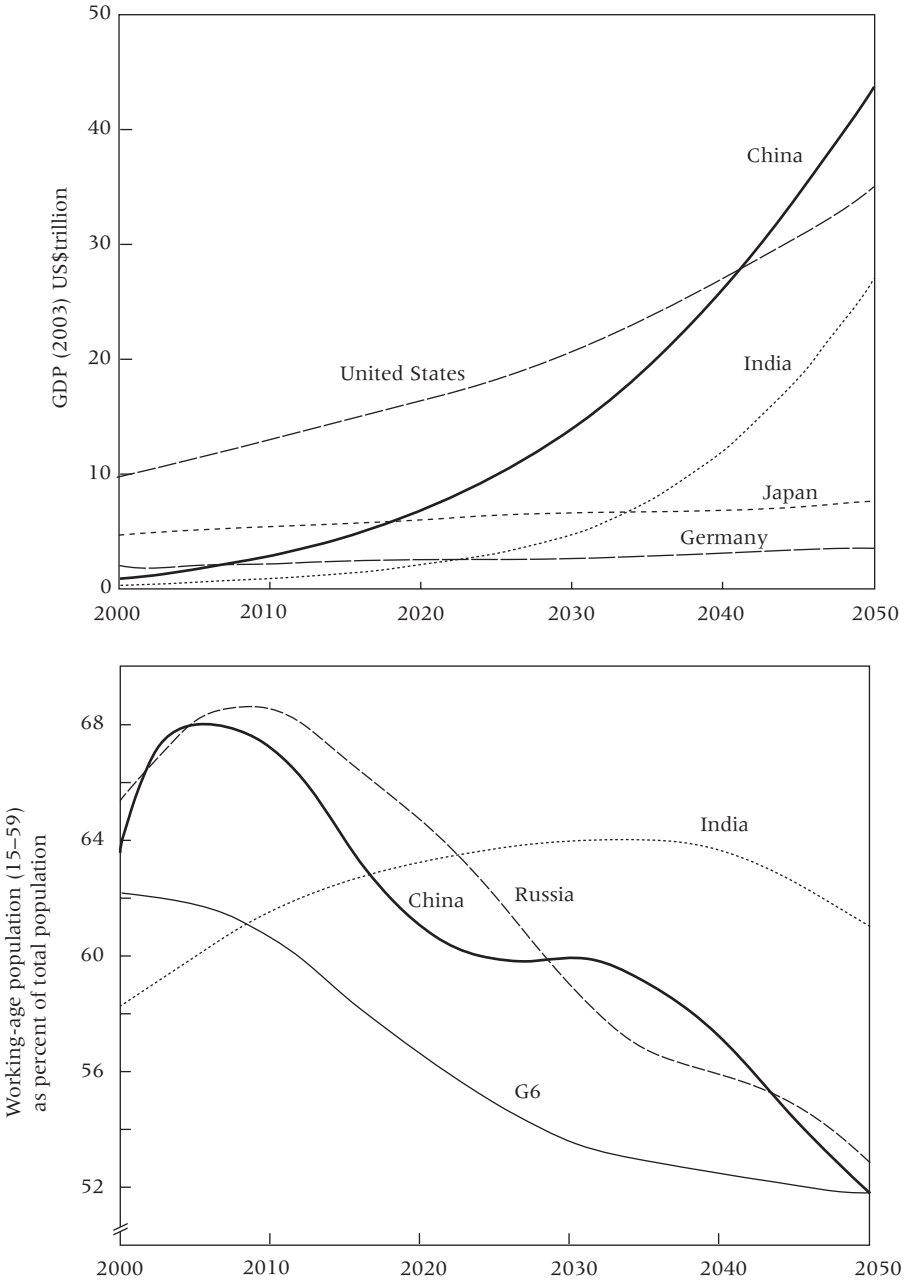
in Western-financed factories so that multinational companies can expand their profits, increase Western trade deficits, and shrink non-Asian manufacturing. More of the same is to come, and before this wave is naturally exhausted China's manufacturing may dominate the global market of common consumer items as crushingly as it now dominates Wal-Mart's selection.

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) gross domestic product growth rate would make the country the world's largest economy some time 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 to surpass the US level by 2041 (see Figure 6).[9] 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, 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 a welcome trend (they keep Western inflation rates low!), and many CEOs speak favorably about America's strategic partnership with China. 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 United States spends today, and this will make it a real superpower impervious to any US threat or pressure. This may be wishful thinking.[10] On the other hand, and unlike the situation during the decades of the Cold War when the United States was in no way economically dependent on Russia, China is already propping up the dissipating US economy by supplying it with essential goods and buying up the country's ballooning debt. Some observers thus foresee a time when China will be America's strategic adversary and the Sino–US military contest in the Pacific will be a defining development of the twenty-first century (Kaplan 2005).

Both the mercantile and the adversarial arguments have validity. 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 no resurgence of US manufacturing (many of its sectors are simply defunct). And anticipations of China's continued intensified military spending are based on a high rate of defensive and offensive build-up that has been underway for years and on increasingly bellicose state-

FIGURE 6 China's rapid GDP growth will make it the world's largest economy (perhaps as early as during the 2020s), but rapid aging of its population will soon present it with challenges even more difficult than those facing the affluent countries.



NOTE: G6 countries are France, Germany, Italy, Japan, United Kingdom, and United States.
SOURCES: Growth curves plotted from data in Wilson and Purushothaman (2003); demographic data from United Nations (2005).

ments of some Chinese policymakers. But a multitude of internal and external weaknesses will militate against China's becoming a superpower during the next two generations. All large, populous countries face many limits and challenges, but in China's case they are uncommonly numerous. Their mere recital would fill many pages, so I note just a few key items.

China's twisted demographic foundation, the result of a traditionally excessive preference for sons aggravated by the state's penetrating interference, has left the country with perhaps the world's most unnatural sex ratio at birth. This reality will disrupt China's social fabric in several worrisome ways: it condemns tens of millions of 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 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: in 2005 about 11 percent of China's population was 60 years and older, compared to some 17 percent in the United States, but by 2030 the two shares will be equal and by 2050 China will have proportionately more people over age 60 (about 31 percent) than will the United States (about 26 percent). The proportion of persons of working age within the total population, currently about 68 percent, will fall to 53 percent by mid-century, equalling the corresponding figure for the G6 countries (see Figure 6). This burden will be aggravated by the fact that some three-quarters of all Chinese have no pension plans, leaving tens of millions of adults from single-child families responsible for two parents and four grandparents. And as Yang (2005) notes, the aging process will be felt already during the next 15 years as the number of entry-level, low-skilled workers will keep shrinking, making it more difficult to recruit labor from rural areas at depressed wages.

Economic reforms have employed tens of millions of Chinese, but they have also been responsible for one of the world's fastest increases in 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 whose numbers cannot be accurately counted (Solinger 2004). And tens of millions of peasants are 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).

Degradation of China's environment has been exceptional for both its extent and its intensity (Smil 2004; World Bank 1997). Particulate matter and sulfur dioxide smog generated by the combustion of coal have spread as the country more than doubled its burning of coal since 1980; and to this increase has been added photochemical smog generated by road traffic, power

plants, and refineries. Reforestation campaigns have produced impressive increases of land under forest, but these are largely monocultures (poplars, pines) made up of spindly trees, while the remaining mature forests continue to disappear, aggravating the country's traditionally excessive soil erosion and silting of its water reservoirs. But among the multitude of China's environmental ills none is as acute as the northern shortage of water.

China has 20 percent of the world's population but only 7 percent of freshwater resources, and the provinces north of the Yangzi, with some 40 percent of the country's population and a similar share of its GDP, have available only about 20 percent of the southern average.[11] In addition, 90 percent of water sources in urban areas are polluted and water tables have been sinking in some parts of Hebei and Shandong by several meters per year. Economic losses attributable to China's environmental degradation have been conservatively quantified to be equal every year to 6–8 percent of the country's GDP, or almost as much as the annual growth in GDP (Smil 1996; World Bank 1997).

Finally, China—despite (or perhaps because of) its ancient culture, and in sharp contrast to the United States—has little soft-power appeal to become a superpower of expressions, fashions, and ideas. Its language can be mastered only with great difficulty, and very few foreigners (and fewer and fewer Chinese) are equally at ease with the classical idiom and spoken contemporary dialects. Its music is not eagerly downloaded by millions of teenagers around the world (and how many of your acquaintances like to sit through a complete performance of a Beijing opera?), its sartorial innovations are not instantly copied by all those who wish to be hip, outsiders cannot name a single Chinese celebrity, and who wants to move, given a chance, to Wuhan or Shenyang?

In the realm of ideas, there is (to choose a single iconic example) no Chinese Steve Jobs, 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 turgid text of the country's Communist constitution would be ever read and admired as widely as is that hope-inspiring 1787 American document.[12] Anyone familiar with contemporary China knows how eagerly the Chinese themselves—teenagers, aspiring yuppies, managers—are imitating America.

But even a problem-ridden China, a self-absorbed Europe, a faltering Russia, and nonconfrontational Islam would be no guarantees of America's continued primacy.

America's retreat

No matter which of the preceding national trends will fail or prevail, a process is already in motion whose likely intensification will change the world

more than any other concurrent development. The gradual unraveling of America's global dominance—despite the tiresomely repeated phrase about the sole remaining superpower, and the continuing willingness of foreigners to buy the country's debt and to hold its currency (still the global standard)—has been underway for some time. In the first years of the twenty-first century many components of this process have become much more discernible.

Signs of imperial overstretch, a classic marker of an ebbing capacity to dominate, have been noted by historians and political commentators (Nye 2002; Cohen 2005). The title of Wallerstein's (2002) article—"The eagle has crash landed"—is perhaps the best summation of these analyses. *Pax Americana* is over: the limits of American military power have been demonstrated by the jihadist attack of 2001 and, even more so, by the costly (both in human and financial terms) aftermath of the Iraq war and a long list of other strategic challenges, including the inability to deal with potentially catastrophic North Korean defiance, a resolute Iranian threat, or China's arms build-up. The only question that remains concerns the modalities of the ending. Will it be a controlled, and possibly drawn-out, fadeout or a precipitous fall?

Other notable components of US decline range from demographic to technical concerns. Huntington (2004) worries about a relatively rapid hispanization of the country and argues that this immigration is fundamentally different from previous (transoceanic) waves because it draws on a large pool of poorer, less-well-educated migrants who come from a culturally resilient community and hence may not be amenable to America's traditionally swift acculturation. This is, of course, an arguable premise but even if it were only partially true the political and economic consequences of such a change would be far reaching.

Perhaps the most prominent current economic concern is the country's rising budget deficit and deteriorating current account deficit. Gross federal debt doubled between 1990 and 2005 (US Department of Treasury 2005a). By 2005 the current account deficit approached 6 percent of GDP, and it has been absorbing some two-thirds of the aggregate worldwide current account surplus, both levels unprecedented in history. This deficit and the net foreign capital inflows have reversed the country's net international investment position, which was positive (in market value terms) from the end of World War I until 1988 (US Bureau of the Census 1975; Mann 2002). By 1995 it had deteriorated to about –$300 billion and by the end of 2004 it stood at more than –$2.5 trillion, equal to about 22 percent of the country's GDP in that year (Bureau of Economic Analysis 2005).

Some critics see these deficits ending in a crisis, both inevitable and severe. Fallows (2005) used the term. Obstfeld and Rogoff (2004) concluded that after taking into account the global equilibrium consequences of an unwinding of this deficit, the potential collapse of the dollar becomes considerably larger than indicated by their previous estimates. And yet others

see this deficit as a sign of economic strength. Dooley, Folkers-Landau, and Garber (2004) believe that a large current account deficit is an integral and sustainable feature of a successful international monetary system. Ferguson (2005) and Bernanke (2005) concluded that the deficit is primarily driven not by America's extravagance but by the slump in foreign domestic demand, which has created excessive savings, and the resulting large current account surpluses in Asia, Latin America, and the Middle East have been invested in the United States.

But Summers (2004: 8) asks a penetrating question: "How long should the world's greatest debtor remain the world's largest borrower?" and suggests the term "balance of financial terror" to describe "a situation where we rely on the costs to others of not financing our current account deficit as assurance that financing will continue."[13] Are these the fiscal foundations of a superpower? As of April 2005 the two largest holders of US Treasury securities were China with $230 billion (after tripling its holdings since the end of 2001) and Japan with $685 billion (US Department of Treasury 2005b). Hence one can think of China as financing the Department of Defense bill for forces and operations in Iraq and Afghanistan for nearly three years, and of Japan as covering the US budget deficit for almost two years. This arrangement surely cannot last for decades, and an America eventually forced to live within its means will have to be a very different place.

There are many more concerns. Foremost among them is the country's declining technical capability, marked by deep losses of manufacturing. Underperforming education leads to well-documented dismal scores in math and science: for example, the latest international assessment of mathematical skills in 29 OECD countries puts America's 15-year-old students only above those of Portugal, Italy, Greece, Turkey, and Mexico (OECD 2003). Despite the decades-long war on drugs, their street prices have remained low and stable (or even falling), their distribution is more widespread (particularly that of highly addictive methamphetamine), and their purity (especially that of heroin) and potency (that of marijuana) are at unprecedented levels (US DEA 2003). Troubled health care and pension systems may be headed toward bankruptcy, yet endless congressional debates cannot offer effective solutions (Kotlikoff and Burns 2004; Béland 2005; Derickson 2005). And a visible deterioration of the country's physical fitness makes the United States the most obese, and perhaps most physically unfit, nation in Western history.[14]

All of these symptoms have been discussed at length in America's vibrant electronic and print media: scathing self-examination and self-criticism show no signs of decline. I will comment on only two conjoined high-profile changes: the foreign trade deficit and the associated retreat from global leadership in manufacturing and technical innovation. After decades of trade deficits the United States began to run a surplus on its foreign trade in 1896

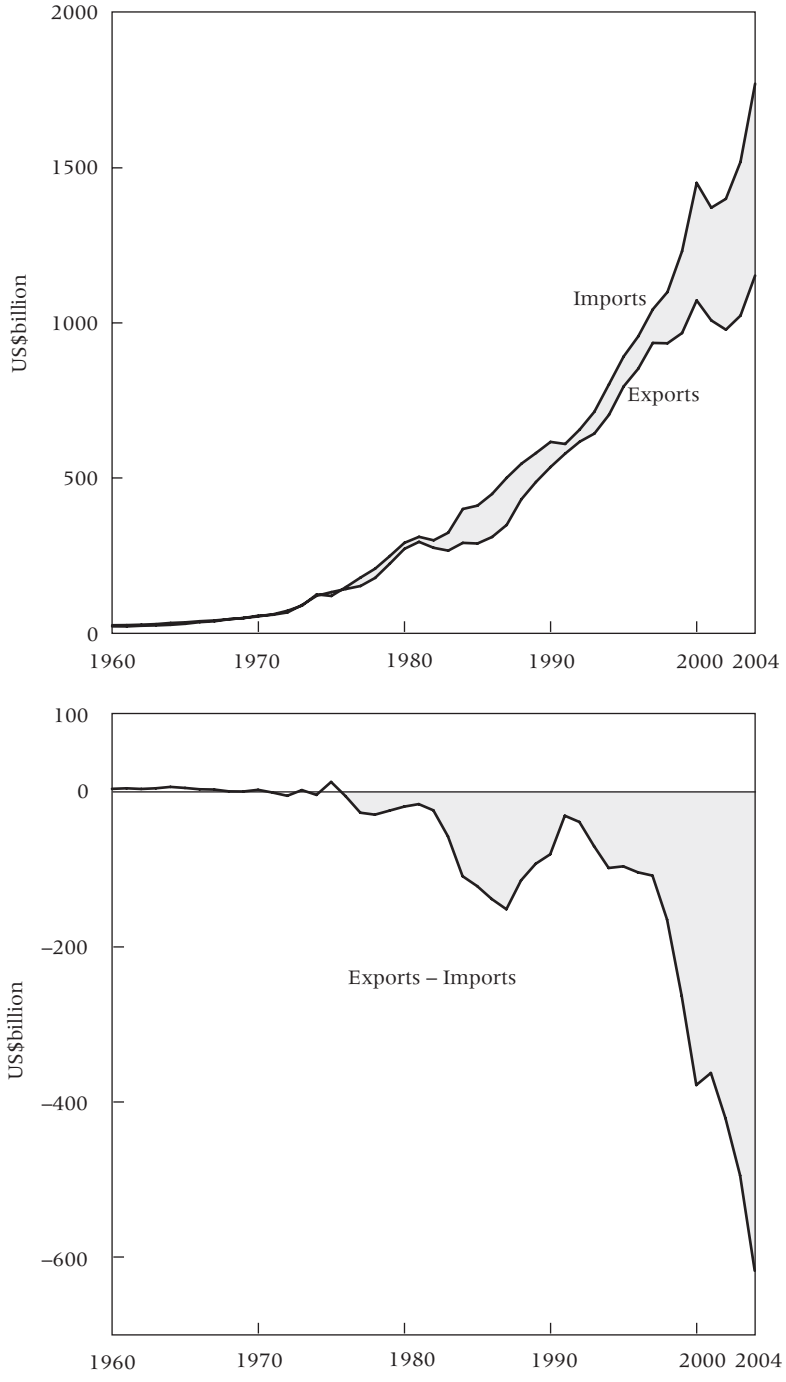
and maintained it, through economic cycles and wars, for the next 75 years. Between 1974 and the late 1990s a fluctuating sequence of deficits has been followed by a free fall: the 1997 deficit more than doubled in just two years and the record 1999 deficit nearly doubled by 2003 and then grew by another 25 percent in 2004, exceeding the 1996 level by a factor of six (see Figure 7).

This transformation has not been merely a matter of high and sustained consumer spending or, as some economists maintain, a benign unfolding of a new global system. While the most recent increases are unsustainable (continuation of the 2000–04 growth would have the country importing every year more than its current GDP in less than 25 years), this long-term trend has converted the United States into a country of permanent trade deficits and resulting structural deficiencies and strategic vulnerabilities. While a resolute administration in Washington can drastically cut, even eliminate, its budget deficit, the elimination of US trade deficits has become highly unlikely. To begin with, the United States has become ever more dependent on imports of basic industrial supplies and materials: in 2004 it bought twice as much as it sold, with crude oil accounting for nearly a third of that bill (US Census Bureau 2005).

This in itself tells us little about the overall trade balance: Japan imports virtually all of these basic supplies and materials but then turns most of them into value-added products. But the United States has a huge deficit in manufactured goods, mostly because its imports of automobiles (and parts and engines) are roughly 2.6 times larger than car and engine exports. In addition, the country now has deficits in 18 out of 32 major categories of capital goods (led by computers and their accessories) and in 27 out of 30 categories of consumer goods where the only small surpluses come from toiletries and cosmetics, books, and records, tapes, and disks (US Census Bureau 2005).

All affluent countries have seen a relative decline of manufacturing, but in the United States the pace of decline has accelerated: the sector employed about 30 percent of the US labor force during World War II but by the century's end the share was just 14 percent. Many economists, unconcerned about this decline, repeat the mantra of new jobs in services providing greater prosperity. But this ignores both the large embedded trade deficits and increasing strategic vulnerability of a country that has already lost entire manufacturing sectors. Virtually every kind of mundane manufacturing, from apparel to toys, has nearly vanished, accounting for an embedded deficit on the order of $200–250 billion a year. Automobiles, the largest manufacturing sector, have been in an apparently unstoppable slide as the adjustments made by the country's leading automakers are never enough to prevent further losses of market share: in 1970 American companies produced 85 percent of all vehicles sold domestically; in 1998 the

FIGURE 7 Foreign trade balance of the United States, 1960–2004



SOURCE: Plotted from data in US Census Bureau (2005).

share was still at 70 percent but by 2005 it fell below 60 percent and it may drop below 50 percent by 2010. This projected trend would add another $100–150 billion of chronically embedded deficit a year.

Dominance in high-quality steel production, still the cornerstone of modern economies, is a thing of the past in the United States. In 2004 US Steel was the world's seventh largest steel company, outranked not only by Europeans and Japanese but by giants whose names are largely unknown: Lakshmi Mittal's company, South Korea's POSCO, and Shanghai Baosteel (International Iron and Steel Institute 2005). And the country has been losing the leadership of one of its last great high-tech manufacturing assets, its aerospace industry. The United States wrested it from Europe during the 1930s with such iconic designs as the DC-3 and Boeing 314, strengthened it during World War II with superior fighters and bombers, and extended it after the war with remarkable military designs and passenger jets, particularly the Boeing 737, the most successful commercial jet in history, and the revolutionary Boeing 747. By the mid-1970s the US aviation industry dominated the jetliner market, and its military planes were at least a generation ahead of other countries' designs (Hallion 2004).

The subsequent decline of the US aerospace industry forced the commission examining its future to conclude that the country had come dangerously close to squandering the unique advantage bequeathed to it by prior generations (Walker and Peters 2002). By 2000, only five major airplane makers remained in the United States, the labor force declined by nearly half during the 1990s, Boeing was steadily yielding to Airbus in the global market (between 2003 and 2005 Boeing sold fewer than 900 planes compared to about 970 for Airbus), most top military planes had been flying for more than a quarter century, and American rocket engines were outclassed by refurbished Russian designs. In 2003 Airbus began intensive work on the A-380 superjumbo (Airbus 2004). Boeing went ahead with a smaller but super-efficient 7E7 (787, Dream Liner) but only after it subcontracted much of the construction to foreign manufacturers (Boeing 2004). By 2004 the US surplus in trading civilian aircraft, engines, and parts was only about $25 billion, equal to annual imports of toys, games, and sporting goods.

Rapid reduction of the country's traditionally large surplus in trading agricultural commodities is the most recent, and perhaps most surprising component of the US decline. The export/import ratio of the value of this trade was 1.8 as recently as 1995; by 2000 it was down to 1.3; and in 2004 it sank below 1.2, with the surplus falling below $10 billion a year (US Department of Agriculture 2005). As a result the net export gain from America's huge agricultural sector was not even enough to pay for the imports of fish and shellfish in that year. And when the accounting is done in terms of a larger, and actually a more meaningful category that subsumes all traded crops, animal products, processed foods, and beverages, the United States

already had a substantial trade deficit in 2004, and it is now quite likely that the country will become a permanent net food importer.[15]

There is no way the much-touted trade in services can ever make up for the massive deficits in traded goods. Such trade has been declining since 1997 and its recent net balance has been about $50 billion a year, less than the imports of pharmaceuticals. Salvation will not come from movies or computer games: since those products are increasingly pirated (a trick not easily done with a Boeing 747), they will contribute even less revenue in the future. Short of a steep devaluation of the dollar and a precipitous decline in the standard of living, it is hard to imagine how these dismal trends can be reversed and how the United States can balance its trade, particularly in light of the rising cost of its energy imports. How long will the Japanese, Chinese, and other creditors (including the Caribbean banking centers, working with a great deal of recycled drug trade monies, and now the fourth largest holder of US Treasury securities) be willing to maintain the superpower on credit at a high cost to themselves?

Place on top

Nearly all of the trends I have discussed so far are susceptible to sudden shifts that may lead to national and international crises, but the magnitude and importance of the transactions involved and the complexity of the interrelated financial, political, and strategic calculations provide a significant degree of buffering that makes gradual moves more likely.[16] In either case, America's global leadership is in its twilight phase, approaching the latest of the infrequent power shifts on this scale. Since the beginning of the early modern era this leading role has been played by a single state only twice: by Spain between 1492 and 1588 (from the conquest of Granada and the Atlantic crossing to the defeat of the Armada) and (on a much grander scale) by Britain between 1814 and 1914 (from Waterloo to the trenches of World War I). During the seventeenth and eighteenth centuries there was no clear hegemon. Powerful Qing China (particularly under Emperor Kangxi, 1661–1722) dominated in the East and pulled in the bulk of the world's silver, while the West experienced a prolonged competition between waning Spain and expanding France and England.

As with every change of global leadership, America's retreat will be widely felt. For some four generations the country has been the world's dominant agent of change, an unselfish savior, a reluctant arbiter, and a brash trendsetter. At the same time, it has never been averse to *realpolitik* as attested by détente with the Soviet Union, support of dictatorial regimes in Latin America, Africa, the Middle East, and Asia, and rapprochement with Communist China. But in its fundamentals, and very often in its execution, America's foreign policy has been imbued with moral (and moralistic) con-

victions about the duty to act as a global promoter of freedom, a call to action that unites John F. Kennedy and George W. Bush.

The call would be very different indeed if it were to come from the mullahs speaking for a resurgent Islam, from the *énarques* running a United States of Europe, from the councils of a rejuvenated Russian military, or from confident politbureau strategists in Beijing. But the probability of any of these calls is not very high. By 2050 the Muslim world of some 2 billion people will almost certainly wield more influence than today, but its heterogeneity (going beyond the more than 1,300-year-old *sunni–shi'a* rift), its internal troubles (oil production in some countries will be in steep decline, economic progress will be very uneven), and its many selfish national interests will prevent its coalescing into a new cohesive caliphate.[17] Only wishful thinking can conjure the transmutation that would be required to remake aging Europe into a new consensual hegemon, and a resurgent (but still depopulating) Russia could not fill the multifaceted superpower niche.

China will become the world's largest economy (in absolute terms), but its further rise will be checked by a multitude of internal limits and external complications, while India with 1.5 billion people by midcentury will be striving to become China's equal. And chances are that there will be a profoundly altered United States: economically weaker and technically less competent, with an impotent currency, rampant corruption, and distant memories of superpower glory.

Who is on top matters—be it as a savior, a hegemon, a pace-setter, a model, an irresistible attractor, or a brutal enforcer. The United States may have appeared as each of these to different nations at different times, but its retreat from such (admired or denounced) roles will not create a more stable world, particularly if there is no clearly dominant power or no grand alliance. The demise of American global dominance would not bring any exquisitely multilateral balance of power.

The absence of a globally influential power in a world dominated by forces of globalization would be akin to the retreat of Roman power that stood behind the centuries of coherent civilization extending from Mauritania to Mesopotamia: a chaotic, long-lasting fragmentation that would be inimical to economic progress and greatly exacerbate many of today's worrisome social and environmental trends. About 2 billion people already live in countries that are in danger of collapse, and there are no convincing signs that the number of failing and nearly failed states will diminish in the future (Foreign Policy/Fund for Peace 2005). A century ago a failure, or chronic dysfunction, of a smallish (and particularly a landlocked) state would have been a relatively inconsequential matter in global terms. In today's interconnected world such developments command universal attention and prompt costly military and humanitarian intervention: prominent recent examples include Afghani-

stan, Bosnia and Herzegovina, Congo, Iraq, Liberia, Sierra Leone, Somalia, and Sudan. Were a number of such state failures to take place simultaneously in a world without any dominant power, who would step in to defuse the most threatening ones? As Niall Ferguson has warned, "Be careful what you wish for. The alternative to unipolarity would not be multipolarity at all. It would be apolarity—a global vacuum of power. And far more dangerous forces than rival great powers would benefit from such a not-so-new world disorder" (Ferguson 2004: 39).

Many Western strategic planners, forced to make contingency plans for a massive launch of thermonuclear weapons, wished for the end of the Cold War and yearned for a world without superpower confrontation. They got their wish sooner than any think tank could have imagined—and now they look wistfully back at the world of an identifiable and rational enemy: the Soviet politburo had no wish to immolate their own country by launching the first strike. Today's young European leftists may get their wish of a severely hobbled and introverted America even before they need glasses to read their copies of *The New Statesman*, *Il Manifesto*, or *Junge Welt* (and by 2050 the youngest among them may see a complete demise of American power), but how much will they then enjoy the ambience of Eurabia[18] or the *fatwas* defining their permissible reading?

Envoi

I wish I could close with a crisp recapitulation that would tame the disparate trends noted in this essay by a clever taxonomy and that would offer a probabilistic assessment of their intensity and likely duration. Indeed, I favor quantitative appraisals and that is why I offered such a guide in the first of these twin essays when I calculated and compared the probabilities of major global natural catastrophes and anthropogenic risks during the next 50 years (see Smil 2005a, particularly Figure 6). A similarly rigorous ranking of the unfolding trends is impossible: it would be largely a matter of guesswork, not a set of calculations that can be based (as are the appraisals of catastrophic probabilities) on the frequency of past events. In this sense discontinuities are more amenable to quantification than are the intensities and durations of gradually unfolding trends.

Any meaningful taxonomy (or even just a simple ranking) is undercut by two incessant processes: by changing intensities of even the most embedded trends; and by shifting significance and concerns that result not only from complex interactions among closely allied processes but also from often stunning impacts of previously underestimated or ignored trends. An unexpected temporary upturn of the US economic fortunes during the 1990s is a perfect example in the first category: it could not alter the fundamental trend of the country's declining weight in the global economy (from about

40 percent in 1950 to about 20 percent in 2005), but (especially as it coincided with an equally unexpected retreat of Japan's economy and the unraveling of the post-Soviet states) it briefly interrupted and even temporarily (if only marginally, by about 1 percent) reversed that slide.

Examples in the second category abound since the key drivers of major trends keep shifting. Radical Islam was not on anybody's list of factors threatening the United States during the 1980s (indeed, during that decade the movement was coopted by Washington's strategists, via the Saudi–Afghan connection, to fight the Soviet Empire), and even after the first World Trade Center attack in 1993 US policymakers showed stunning reluctance to tackle *al-q¯a'ida*. But after 9/11 the asymmetric threat of terrorism has infected all of these policymakers' major actions and reactions, be they the setting of interest rates or lamenting the response to Hurricane Katrina: a bearded, bespectacled, French-speaking Egyptian physician turned global terrorist is now, arguably, as great a driver of the US secular decline as is the excessive, deficit-raising consumption of Wal-Mart-bound masses or the education system whose average graduates rank in their problem-solving skills as poorly as they do in literacy and mathematics.[19] How can we systematically compare or quantify these disparate and ever-shifting drivers?

Trends may seem obvious but they have a multitude of drivers whose importance shifts constantly, and the resulting mix is beyond anybody's grasp. And so when contemplating the great American retreat, it is useful to recall that historians have identified scores of causes of the decline of the Roman Empire (Rollins 1983; Tainter 1989), and only a naïve mind would rank German tribes ahead of debased currency or the imperial overstretch ahead of ostentatious consumption in that typology of causes of fall. This is also the reason why even large corporations and large nations may be fully aware of many unfolding trends but are rarely able to shape them to their long-term advantage. In the West, our wealth, the extent of our scientific knowledge, and major areas of our lives where we have successfully asserted our control over the environment mislead us into believing that we are (or ought to be) more in charge of history than we can ever be. Hence I have been deliberately agnostic and open-ended in this survey: my intent is to raise, illuminate, and probe what I believe to be the key trends without engaging in any counterproductive (and inherently merely cosmetic) rankings or classifications.

But perhaps this preoccupation with the unpredictability and irrationality of human behavior is misguided. Perhaps I should have written about trends whose continuation and intensification could seriously undermine the functioning of modern civilization regardless of orthodoxies, politbureaus, or financial deficits. The possibility of a relatively rapid global warming has been the most widely discussed natural-cum-anthropogenic trend of this kind. The dimensions and consequences of this threat are well un-

derstood (Houghton et al. 2001); what is missing is any certainty about the future pace of the process and its intensity. Some recent analyses by leading biogeochemists question even the best available consensus.

Andreae, Jones, and Cox (2005) have concluded that extensive past and present-day atmospheric cooling by anthropogenic aerosols has counteracted the unfolding rise of tropospheric temperatures to such an extent that lower aerosol emissions in the future (part of the quest for cleaner air) will allow global warming to proceed at or even above the upper extreme range projected by the Intergovernmental Panel on Climate Change (Houghton et al. 2001). This alarming scenario would imply an average global temperature rise of as much as 7.9° to 9.6°C by 2100, a rapid shift of a magnitude that would be enormously destabilizing, if not catastrophic.[20] We will likely not know with any assurance how bad such warming might get until it gets so bad that it will be too late to take any effective remedial action.

And there are many other, much less noted, natural-cum-anthropogenic trends that are not pleasant to contemplate. Widely publicized concerns about the loss of biodiversity evoke images of massive tropical deforestation and the demise of charismatic megafauna (tigers, pandas, whales). But both Europe and North America have seen a gradual decline of economically much more important charismatic pollinators, both the domesticated honeybees and wild insects. Pollination by bees is an irreplaceable ecosystemic service responsible for as much as 30 percent of all food consumed in North America, from almonds and apples to pears and pumpkins.

Pollinators are also needed to produce a full yield of seed for such key feed crops as alfalfa and red clover (Proctor, Yeo, and Lack 1996). Spreading infestations of varroa mites and tracheal mites are very difficult to control, and they either kill bees outright or introduce lethal viruses into their bodies. Introduced African bees, which began their northward expansion in Brazil in 1956, have been destroying native wild colonies in the Americas, and indiscriminate use of pesticides has been the most detrimental human factor in roughly halving the North American honeybee count during the second half of the twentieth century (Watanabe 1994; Kremen, Williams, and Thorp 2002).

Viruses, whose mutations can cause unprecedented pandemics whose probability I assessed in the companion essay (Smil 2005a), are not the only constantly and rapidly mutating organisms; bacteria, their more complex allies, are nearly as adept at defeating our controls. They, too, add to a growing list of emerging infections (Morens, Folkers, and Fauci 2004), and mutations of well-known species already present an even greater danger. In most modern hospitals only one or two antibiotics stand between patients and the rampant spread of antibiotic-resistant microbes. Vancomycin has become the drug of last resort after many bacteria acquired resistance to penicillins, erythromycin, neomycin, chloramphenicol, tetracycline, and beta-lactams.

Ominously, the first vancomycin-resistant enterococci appeared in 1987 in Europe and in the United States two years later, and staphylococci have also acquired the resistance (Cohen 2000).

By far the greatest concerns on this score are about drug-resistant *Streptococcus pneumoniae* and *Staphylococcus aureus*: antibiotic resistance is now present not only in humans and domestic animals but also in wild animals that have never been exposed to those drugs (Gilliver et al. 1999). Despite all our genomic hubris, bacteria have a great advantage: some 3.5 billion years of evolution have endowed them with superior mutation and survival capacities. Moreover, this diffusion of highly drug-resistant bacteria is taking place at a time when most major pharmaceutical companies have largely withdrawn from any R&D devoted to antibiotics. And so we simply do not know how close we are, or might come, to a world that resembles the pre-penicillin era of bacterial infections with unpredictable and massively fatal outcomes. In that world every annual influenza epidemic may bring an order of magnitude as many deaths due to bacterial pneumonia, and tuberculosis and typhoid fever may become very difficult to treat, or even (once again) untreatable.

Of course, readers are free to dismiss of all of this and retreat to those never-ending economic dreams of rising growth curves or to stunning technical visions of a world where magnetically levitated trains speed past vertical cities, where computers are embedded in your skin, and where minifusion reactors work in your basement. But if you take a long look back and then try to discern what may come, if you ponder the reiteration of catastrophe throughout history and think about human irrationality, hatred, and drive for power and dominance, and about the fate of aerosols, bees, and bacteria, then you might conclude that, despite so many atrocities, failures, and fears, the past 50 years were an exceptionally stable and an unusually benign period in human history and that the probabilities of less benign events will greatly increase during the next 50 years.

Notes

1 I became convinced about the inevitability of the demise of the Soviet Union in Prague during the spring of 1963 when, as yet another sign of glacially progressing de-Stalinization, *Time*, *Newsweek*, and *The Atlantic Monthly* became available in the open periodicals section of Carolinum University's library and access to technical publications became virtually unlimited. As I compared this sudden flood of facts, figures, and images with the crumbling society around me, I could draw only one conclusion: contrary to Khrushchev's boasts, the gap between East and West was widening and the Communist regimes would never catch up. But I, like others, could not imagine the collapse coming within a single generation, and I thought (bitterly, being on the wrong side of the Iron Curtain) that the empire would endure into a new century.

2 Ever since the late 1940s, nuclear physicists have been promising that the commercialization of electricity generation produced by heat released from the fusion of the lightest elements would take place within 30–40

years. Skeptics should be forgiven for concluding that it will not happen before 2050. As for crude oil, it is not at all clear whether we are now facing more unpredictable price fluctuations that will eventually be moderated by a transition to natural gas and renewable sources—or the beginning of the end of oil as the most important energy source of modern civilization. The latter could be seen as fairly catastrophic (absent an equally flexible and affordable alternative for passenger cars) or as a tremendous opportunity for innovation since accelerated transition to natural gas and renewable conversions would improve both the world's economic fortunes and its environmental quality. These complex matters are addressed in detail in Smil (2003).

3 Russia's exclusion here is merely a matter of comparative statistical convenience. Arguments about Russia's place in (or outside of) Europe have been going on for centuries, but I have never understood either the Western reluctance or the Russian hesitancy to place the country unequivocally in Europe. Of course, the country has its unmistakable Asian overlay (there must be a transition zone in such a large land mass), but its history, music, literature, engineering, and science make it quintessentially European.

4 In 2004 Denmark became the first country whose citizens can find out how these enormous subsidies are distributed. Large sums went to corporate food processors, board members of an agricultural center, four out of 18 ministers (or their spouses), the Danish Royal family, rich estate owners, state prisons, and, a particularly favored group, potato starch producers (Mulvad and Hansen 2004).

5 And (*nihil novum sub sole*) a country whose territory was bitterly contested, particularly during the long reign of Flavius Julius Constantius (337–361 CE), by a Western power. Gibbon (1776–78) has memorable descriptions of Mespotamian wars, particularly of the engagements at Singara and Nisibis.

6 Japanese females still live longer than females elsewhere (their average life expectancy at birth now surpasses 85 years, compared to 83 in France and 80 in the United States); mean per capita income (in terms of purchasing power parity) is slightly ahead of France or Germany; and after two generations of high savings people are now spending more freely.

7 To simplify, this lack of clarity epitomizes the contrast between militant and compassionate Islam. A single juxtaposition of a quote from *al-qur'ān* and a *hadith* (traditions relating to the actions and sayings of Muhammad) illustrates the duality. The third *sura* (*al-imān*), *ayat* (verse) 151 puts it unequivocally: "We will put terror into the hearts of the unbelievers.… Hell shall be their home.…" But the *sunan* of Abu Dakd (*hadith* 4923) states with equal clarity: "If you show mercy to those who are on Earth, he who is in Heaven will show mercy to you."

8 This document is remarkable not only for its revelation of the utterly self-centered mindset of the rulers of the Qing China but also for its new relevance. A complete translation of the letter is available online at «http://acc6.its.brooklyn.cuny.edu/~phalsall/texts/qianlong.html».

9 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 level. A projected per capita GDP of about $19,000 (in 2003 prices) a year would make China as rich as today's Greece.

10 All of these calculations depend on the conversion rates used to compare Chinese and US GDPs. Official exchange rates pegged China's GDP in 2004 at only about 14 percent of the US total, whereas the adjustment for purchasing power parity puts it at about 61 percent. Wilson and Purushothaman (2003) projected China's 2020 (exchange-rated) GDP at 6.5 times its 2000 level, or about $7.1 trillion (in 2003 prices) compared to $16.5 trillion for the US, and they also estimated that the value of Chinese currency could double in ten years' 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 GDP going to the military, China could indeed match US defense spending by 2020. The Pentagon estimates that by 2025 Chinese defense spending will be as high as $200 billion (US Department of De-

fense 2004). Again, multiplied by two this gives a level above the US FY2004 defense budget.

11 In 2000 China's nationwide mean per capita freshwater availability was about 2,000 m^3/year, and around 2030 (when China's population peaks at close to 1,450 million) this will fall to less than 1,800 m^3/capita (and in the northern provinces to less than a quarter of that). In contrast, global availability in the year 2000 averaged about 7,000 m^3/capita, the US rate was nearly 9,000 m^3/capita, and the Russian rate was close to 30,000 m^3/capita (World Resources Institute 2000).

12 Here 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 tell us how admirably capitalist the new China is might reread the article a few times. For the full text of this quintessentially Stalinist document, see the official website of the Chinese government at «http://english.people.com.cn/constitution/constitution.html».

13 The countries that finance the US current account deficit will not do so indefinitely. Even now, as Summers (2004: 9) stresses, "A great deal of money is being invested at what is almost certainly a very low rate of return. To repeat, the interest earned in dollar terms on U.S. short-term securities is negative." In addition, the investor countries with fixed exchange rate regimes (notably China: a 2 percent revaluation of its currency in July 2005 was a laughably inadequate adjustment) are losing domestic monetary control. Summers also notes that a similar kind of behavior lay behind Japan's excesses of the 1980s since "much of the speculative bubble…that had such a catastrophic long-run impact on the Japanese economy was driven by liquidity produced by a desire to avoid excessive yen appreciation." A house of cards comes to mind.

14 Consequently, in comparison with other major industrialized countries, the United States looks good only when contrasted with Russia and Ukraine, whose high rates of alcoholism and poor nutritional choices result in much-abridged life expectancies. Comprehensive information about the American obesity epidemic is available at a website maintained by the Centers for Disease Control and Prevention (2005). Recent attempts to portray obesity as a fairly innocuous condition and grossly overweight people as victims are ludicrous: links between obesity and higher morbidity are too well established and the current rate of American obesity is largely a matter of choice, not of any somatic inevitability. In 1991 only four of 45 surveyed US states had obesity prevalence rates between 15 and 19 percent, and none was over 20 percent. But by the year 2001 the nationwide mean was 20.9 percent with 29 states having rates between 20 and 24 percent (Mokdad et al. 2003).

15 This is an inexplicably unreported shift whose eventual public and policy impact cannot be underestimated. After borrowing from China and Japan to support its dependence on crude oil, the United States will be borrowing just to feed itself! Autarky in food is an impractical and unattainable goal for many small nations—but were the United States to become a permanent net food importer, who would be left to do any net exporting?

16 Large and powerful empires take time to unravel. The Roman experience, even when limited to the Western Empire, is unlikely ever to be repeated: Gibbon (1776–88) plotted the span of the decline and fall (180–476 CE) at nearly 300 years. The British Empire, with a peak in 1902 (the end of the Second Boer War) and the end with the 1947 quitting of India (the rest, including violent Malay and Kenyan conflicts, was just wrapping up the retreat), took only 45 years to unravel. The Soviet retreat took almost exactly the same amount of time, from the World War II victory in 1945 to Yeltsin's disbanding of the union in 1991. Arguments about the onset of the US decline (1964, 1968, 1975, 2001) and its most likely duration could be the topic of an interesting conference or a fascinating book.

17 But the US National Intelligence Council (2004) chose a new caliphate—"a global movement fueled by radical religious identity politics [that] could constitute a challenge to Western norms and values as the foundation of the global system"—as one of its four likely scenarios for the year 2020. Others are Davos

World (robust economic growth led by China and India), *Pax Americana* (continuing US predominance), and Cycle of Fear (concerns about proliferation of weapons leading to large-scale intrusive security measures of an Orwellian world). See the Documents section of *PDR*, March 2005, pp. 190–196.

18 Ana Palacio, former Minister of Foreign Affairs of Spain, remarked in conversation with Olivier Guitta in April 2005: "If we build a European identity just to be a counterweight to the US, then Europe may end up being Eurabia." See Guitta (2005).

19 The only major Arabic biography of Ayman al-Zawāhiri was published by Muntasir Zayyāt in Cairo in 2002, and its retitled English translation came out two years later (Zayyāt 2004). PISA (OECD 2003) rankings put the US 23rd out of 29 countries on all of these counts.

20 The average global increase of close to 10°C in less than 100 years would be by far the highest temperature shift since the emergence of genus *Homo*; and its concatenated climatic, ecosystemic, economic, and political consequences would dwarf any other global challenge. Our species would surely survive—but not many of our current national and international arrangements.

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The Next 50 Years: Unfolding Trends

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Change in modern societies comes both because of sudden, and often catastrophic, events and because of the gradual unfolding of fundamental demographic, social, economic, strategic, and environmental trends. A previous essay by the author assessed the probabilities over the coming five decades of the most important natural and anthropogenic catastrophes with possible global impacts. This essay surveys key socioeconomic trends of the next 50 years. While the ranking and comparative assessments of the importance, intensity, and durability of these trends may be elusive, their historic background, complexity, linkages, and likely consequences can be illuminated by focusing on the long-term futures of six major global actors, the United States, the European Union, the Muslim world, Japan, Russia, and China. This appraisal suggests a likelihood of a world without a dominant power (or a grand alliance) and subject to a potentially worrisome fragmentation.

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