

14 If US Consumption Declines Will the Global Economy Collapse?¹

Neva Goodwin

We are at a moment in history when it is necessary to move as quickly as possible away from dependence on fossil fuels as energy sources—especially coal and petroleum. While there are other pressures, such as peak oil and the pollution and environmental degradation associated with fossil fuel use, it is the threat of global climate change that makes this move so urgent.

Some other contemporary human systems, aside from energy, are also not sustainable. These include many aspects of use of natural resources (soil, water, biota), as well as the economic-cultural system employed to keep raising output and consumption—the activities generally used to define economic growth. This system was seen as so essential that Alan Greenspan felt it necessary to lower interest rates nearly to zero in order to sustain the consumption bubble of the 1990s and the early twenty-first century. Consumers were encouraged to borrow money on the basis of inflated house values, so as to be able to spend beyond their incomes.

It became evident that the consumption bubble was unsustainable when it turned out that the value of many capital assets was to a considerable extent fictional. These capital assets included home values as well as many far less tangible “values” (derivatives and other sorts of bundled, etiolated or overleveraged assets) that were bought and sold on stock exchanges.

Standard economics texts say that the basic economic questions are *what to produce, how, and for whom*. Industrial economies are structured so that firm survival depends on profits, while profitability is only loosely related to social and environmental needs. It is most profitable to sell to those who already have a lot, because those are the people with the most purchasing power; as inequality grows, so does the lop-sidedness of the answer to the *for whom* question.² Profitability also ignores externalized costs, so that the answers to the *how* question have resulted in huge environmental destruction, as well as socially destructive forces. As for *what* is produced: growing labour productivity, followed by ever-expanding output, creates enormous economic and cultural pressure to sell, and to buy, unnecessary things.

The motivation for firms to sell what they produce has become a—perhaps *the*—great driver of modern culture. Corporations determine most of what reaches us through the media. They create the work settings in which most of us will live for approximately half our waking hours for at least half of the years of our lives. Increasingly they control government, including lawmakers, and the agencies that are supposed to control corporate activity. And we exist in a situation where there is considerable dissonance between the goals of firms *versus* the health of society and its members.

Mass consumerism seems, on the face of it, fairer than a society that is top-heavy with elite consumption. Neither variant is sustainable in the forms we know today. Given the kinds of things that are desired in wealthy contemporary societies, and given the way these things are produced, transported, used and disposed of, it is physically impossible for all of the world's people to emulate the lifestyles held up as desirable in the fifty or so wealthiest countries. Severe food and water shortages would most likely be the first disasters to arrive, followed shortly by disease and massive armed conflicts, within and among countries, desperate to hold or get vanishing natural resources. We cannot continue, let alone extend, the consumption and lifestyle patterns of the richest 15 per cent of the world's peoples. How do we ramp down without falling into the precipice we want to avoid?

Some aspects of the existing global economic situation make it especially difficult to envision a reasonable path to overall reduction, fairer distribution and more sustainable composition of production and consumption. They include the following:

Global trade: wages and prices, demand and supply, have been globalized.³ Reduced demand in the high-import countries (especially the US) leaves producers elsewhere with shrunken markets to sell into.

Global capitalism: a system that cannot, in its current form, give primacy to needs over wants; it has no way to recognize populations (infants and children, elderly, disabled) who lack market power to fulfill their needs. There is nothing in what George Soros calls the “fundamentalist” version of market ideology that encourages business people to place social or ecological sustainability on a par with, let alone ahead of, individual gain.

Global financial system: a huge proportion of the money flowing through the system is financial wealth, often only distantly related to real things. As recently discovered, while financial wealth is commonly imagined to represent claims on real things, some of the real things never existed (e.g., what were assumed to be viable mortgages were not viable), and some are simultaneously claimed by a number of owners, beyond any real value (e.g., highly leveraged assets).

Global inequality and wealth concentration: some five hundred corporations control a large proportion of the world's financial wealth, which is being used in almost every nation to influence public debate and policy-making on the issues outlined earlier. At the same time, the price of grain faced by the world's poor is elevated by the feed-grain demands of the wealthy of the world, whose diets often include meat twice a day.

Global culture: images of the good life of the wealthy are spread throughout the world, creating dissatisfaction and desires among those who don't yet have it all, and habituation (without significantly increased well-being) among those who do.

Economists often say—and the rest of the world believes them—that the only alternative to economic growth is economic collapse. This chapter is written by an economist who believes that in a contest between finite nature and human expansion, humanity will inevitably be the loser. Therefore, we have no alternative but to find out how to climb back down from our excessive consumption patterns.

The place where many people both start and end their thinking on this subject is that, when US consumers reduce their consumption levels, many other parts of the world lose the demand they had counted on to support their exports. "Export-led growth" has been the mantra of World Bank economists and other economic advisors to poor (and some rich) countries for nearly half a century—and it was a trick that had previously been discovered several times by different countries (Chang 2007). This approach contains a fallacy of composition: obviously, not everyone can sell more than they buy. The US has for decades made this strategy possible for others by being the consumer of last resort.⁴ Since about 1980 the world became so used to this state of affairs that any alternative became frighteningly unimaginable. And the recent economic collapse has seemed to justify the fear: US purchasing declined, and many around the world have suffered.

The recent economic hardship may prove to be an early symptom of the collapse of the old paradigm. Along with the hardships we may see the opening of new possibilities, and an escape from the mindset described in the previous section.

Consider China—the country that seemed to epitomize dependence on the US appetite for imported goods. It has quietly begun to do what a minority of economists have urged since at least 1990: to create its own internal demand, so that Chinese factories will be able to sell into their own country, without being as dependent as they are now on foreign demand.⁵ When this is securely in place, China will no longer need to prop up its main trading partner by purchasing US government bonds.

The challenge for China, and the other major dollar hoarders, is to let the value of the dollar sink slowly enough not to cause another global crisis

(while also not losing all the value of their dollar holdings), yet to allow it to sink to a level that will reflect real international values (including, one would hope, the values of externalities).⁶ The likelihood of another round of global financial turmoil depends, more than anything else, on how skillfully the Asian powers can manage this transition.

We will simply assume two things: the dollar will decline against other currencies, creating sharp downward pressure on imports into the US; and US consumption will, sooner or later, shift in the direction of more sustainable patterns, including reduced long-distance trade. Given these assumptions, this section will move toward a list of ways in which developing countries may be able to benefit from such a changing world.

Human resources: a downsizing in US wealth relative to the rest of the world will reduce the draw that is summarized as “brain drain”. All of the looming crises of the twenty-first century—demographic shifts, resource shortages and climate change, and the disease, armed conflicts and forced migrations that are liable to accompany these—will require good thinkers, planners and leaders everywhere in the world.⁷ Developing countries will be much better off if their wisest and best-educated citizens have less reason to spend their lives abroad.

Technology: environmental realities create the necessity for massive technological innovation and progress. Among the most critical requirements for a bearable future is that the less-wealthy countries be given easy access to all of the best systems and ideas for leap-frogging the situation of the present overconsumers, in order to attain a positive fourth Industrial Revolution while there are still enough natural resources available to smooth this transition.

Pollution reduction: as the US and other wealthy countries adapt their systems of production, distribution, consumption and waste treatment to environmental realities, there will be reductions in pollution of all kinds, including many kinds of pollution that are having adverse effects throughout the world on human and ecological health. As one example, recession causes carbon emissions to decline in the US; this was seen in the 1991 and 2000 recessions, and has been even more pronounced in 2008.⁸

Realignment of trade: in the same way that China is finally awakening to the reality that its domestic market is potentially all the demand it needs for a flourishing economy, other regions may also find that they can conceive regional economic units that are large enough to greatly lessen dependence on more distant customers. The emergence of more localized trade systems will be easier under a regime of reduced potency of the US dollar and lessened US control of the WTO, World

Bank and IMF, and when smaller countries are no longer cowed by the threat of reduced US trade.

Reassessing scale: realignment of trading relationships could be a step toward a broader movement to economies of smaller scale, away from long-distance-trade-based systems that require massive use of fossil fuel. The latter have historically been responsible for displacement of small farmers and conversion of forests to export-oriented agriculture. There are environmental advantages, as well as some advantages of financial and resource security, in moving to more local production and consumption, based on regional strengths and natural capital.

Response to local demand: the demand to which local producers respond will be generated relatively more from local consumers, instead of coming from the US. The composition of local demand will depend importantly on the relative weights of elite versus mass-consumption. This depends importantly on the distribution of wealth and income. In places with a relatively even distribution the demand for basic goods will be a larger component of demand than in situations of greater inequality, where there will be greater demand for luxury goods. A tilt toward basic goods is desirable from many points of view, including environmental sustainability and the greater well-being that results from their satisfaction than from accumulation of status goods (see Frank, this volume).

Reduced impact of US cultural/ideological exports: the American Dream is a dream of bigness and excess: big houses and cars, huge salaries for the corporate or media stars in a "winner-take-all society". It in some way relates to what may be called a monoculture mentality, in which it is assumed that single, big solutions may be found for all problems; examples are massive "slum clearance" as a way of achieving urban renewal, or single-species systems of agriculture and animal husbandry that require massive doses of antibiotics or pesticides to counteract the unnatural uniformity. Other US cultural or ideological exports have included the economic ideologies of free markets, growth and "only selfishness is rational". With the end of US superpower status it will be easier for other cultures to pick and choose what US models are worth importing, and which are not.

US consumption in competition with world needs: US consumers will face requirements to adjust not only the quantity but also the composition of what is consumed. If they feel less affluent they may begin to take seriously the growing stream of information about how to achieve better nutrition on less money. Any reduction in American consumption of grain-fed animals and poultry will put more grain onto

global markets, at least counteracting the upward pressure on grain prices from biofuels and from an increasingly import-hungry China. Another possible and desirable outcome is that the combination of rising resource prices with other (e.g., regulatory) pressures for conservation will result in reduced US demand for other increasingly scarce resources, such as fish, timber and fossil fuel—again making it easier for the rest of the world to meet their needs.

It may be hoped that within fifteen to twenty years the post-carbon era will be well established, moving toward a time (perhaps after 2050) when energy may become plentiful again. Until then it will continue to be critical to minimize the use of energy as well as of materials—especially water and toxic materials. Everywhere in the world this will advantage closed loop systems, green design and labour-intensive services. Such shifts will require tax incentives and the elimination of subsidies to industries that cannot adapt to these new realities, or to dinosaurs within essential industries—such as coal and petroleum within the energy industry, or mechanized, high-input monocultures within agriculture. It will also require many kinds of planning at every scale of social organization

Who will do that planning? If it is believed that it must be done at the highest government level, in the US it is necessary to look back as far as the Second World War to find examples of the sort of planning that is needed. We have seen a relatively clumsy effort at this approach in the erratic decisions made by the White House economic team in the twelve months following the fall of 2008: let this company go bankrupt, prop up that one with loans, strengthen one government agency, change the mandate of another, stimulate this sector, coax or coerce that—etcetera. Out of this rather messy, ad hoc effort one can discern, as a guiding principle or goal, the question: *what is best for the whole economy/society?* In some situations governments (at various levels) are in the best position to ask and answer such a question, but it is worth reviewing the other actors in society who might also take it on.

The economic actors to whom this role has been effectively given for the last half century are the large corporations, including banks and other financial entities. When people choose to let the market decide what to do, on the grounds that it is always more efficient, they are in fact leaving the decisions to the large corporations. Trust in these entities has been much reduced, as it has become clear that *what is best for the whole economy/society* is not their concern. If the corporation of the future is to have a say in the direction of the economy, it will need to be a significantly revised institution, operating by different rules, within a different corporate culture, both internal and external. There are good efforts under way to envision such new corporate organization.⁹ In response to the common belief that it is essential to leave as much as possible to “the market” because of the superior efficiency of this mode, it is important to remember that efficiency is not a virtue when it is

harnessed to the wrong goals, such as short-term profits at the expense of long-term contribution to a healthy society.

What other groups might we consider to take responsibility for the question *what is best for the whole economy/society*? A partial answer, especially important until or unless radical reform can make corporations responsive to this goal, looks to the so-called universal investors. These are investors who are so large that they cannot afford *not* to be invested in virtually the entire economy. Including most notably pension funds and insurance companies, these also happen to be organizations that have a strong stake in the future: their missions require them to generate earnings that will at least not decline for a long time. These two facts mean that universal investors have strong reasons to object if any company's actions are polluting the social or ecological environment on which the viability of all commercial enterprises depends.¹⁰

The diffuse and diverse world of non-profit organizations includes some that already play important watchdog roles, monitoring the environmental and other impacts of corporations, reporting on the honesty and responsibility of government or international agencies, etc. There is a role of "ombudsman for future generations" that has been discussed at various times, but too rarely put in place or given the broad resources and powers it would require.

Another aspect of the American ideology may be designated "corporate and consumer culture". The two pieces of this are mirror images of each other. Corporate culture, until now, has tended increasingly in the direction of accepting the tenet of economic theory that only selfishness is rational. That translates into managers enriching themselves at the expense of all stakeholders, increasingly including the stockholders, who are the owners of the company. The mirror image is the consumerist culture, as whipped up by the corporate need to sell ever more products. A culture of consumerism is one in which individual identity, self-respect and social position are strongly tied to the purchase of marketed goods; spending money is seen as a pleasurable and desirable end in itself; and there is encouragement for the belief that the purchase and use of high-end goods, in particular, will bring happiness.

To stand up to these pernicious cultural beliefs and assumptions different forces need to be brought into play. One is the force of morality. Religions, parents, schools and ethically oriented organizations can and do offer a variety of alternative moral beliefs to "only selfishness is rational". To be sure, at any time and place in human history it would be possible to find sociopaths guiding their lives exclusively by this cynical belief, and there have probably been societies other than our own wherein it became dominant; but the survival of the human species has required many contrary impulses to be built into our genetic as well as our cultural makeup.¹¹

If we are to look towards such a cultural shift, we must also consider aggregation issues: many people are prevented from taking action by the

fear that “I’ll look like a sucker if I make sacrifices and no one else does.” In addressing the onrushing global crises assumed in this chapter there are, fortunately, people of conviction who act for the greater good even when they seem to be stepping out alone. The critical question is what cultural, cognitive and spiritual support can assist others to join in.

The word *sacrifice* was used in the preceding paragraph. Without previously using that word, this chapter has asked the question of how the global economy could survive reduced consumption by the currently high-consuming populations. The question of how those populations would feel about reducing their consumption has not been addressed here—although the economic crisis of 2008–2009 (2010? and . . .?) has forced significant reductions. An important point here is that, if a whole society sets out to consume less it is possible that much can be done without feeling like cut-to-the-bone sacrifice. There is some encouragement in the young field that calls itself hedonic psychology (other people know it as happiness studies), which has established strong evidence for a set of propositions¹² that to some may sound like simple common sense, but that are directly opposed to basic assumptions in standard economics:

- Individual increases in material wealth do not raise the happiness of the whole society; indeed, evidence from Japan and the US, where the standard of living has risen greatly since the 1950s, shows no increase—if anything a decline—in the happiness of the population as a whole.
- Wealth very much beyond basic needs, when it belongs to and is spent on behalf of individuals, operates within a zero-sum game wherein success by a few creates, among the rest, hopeless wishes for emulation and overall well-being is not increased. By contrast, wealth that belongs to, and is spent on behalf of, a whole society can be used to promote public goods such as environmental protection and restoration, to protect the well-being of future generations. More equal societies are better able to cope with emergencies; moreover, if a cultural norm of equality promotes the more use of resources for public goods, less for private status consumption, they will be happier.
- Human well-being—the ultimate purpose of any economy—is not only tied to what people *have*, but also to how they feel about it and what they do with it. Leisure to enjoy the riches that advanced economies have accumulated in the last centuries is becoming one of the most significant scarce resources; for many, well-being will be better served by more *time* than by more *products*. This gives credibility to a scenario in which some systems of production and consumption could be modified to produce less output (thereby mitigating climate change) but more well-being.

Change in what we produce and consume is one aspect of the necessary future; the other aspect will probably entail revision in how, and how much,

we work. The kinds of work that are most essential for human survival and well-being include: raising children; producing food; providing education to assist people to develop, exercise and explore their mental, physical and spiritual potentials; providing home environments that are pleasant, comfortable and sanitary, and that support self-actualization; supporting and maintaining physical and mental health in children and adults; providing care for those who are sick, old or otherwise unable to care for themselves; and maintaining, and where possible, restoring the health of the earth's ecosystems.

There are (at least) two striking characteristics of the foregoing list: women have been the predominant workers in most of the activities named here; and these activities have generally been among the least well-paid (or even unpaid) categories of work.

This outcome can be traced back through the history of the industrial revolutions that have given us the economies we know today. Two trends allowed mass-consumption to come into being and to grow as the force supporting ever-increasing production. One was the trend for the price of human labour to rise, relative to the prices of energy and raw materials—hence spreading purchasing power. The second was the trend for a growing proportion of the average household budget to be liberated from purchasing necessities, and made available for “extras”—starting with pottery dishes and machine-loomed fabrics; moving on to bicycles and oil lamps; through Keyfitz's “standard package” (Keyfitz 1998) of electric lighting, refrigerators, televisions and automobiles; to computer gadgets, cell phones, jet skis and US\$5,000 barbecue grills.

There was some tension between these two trends: while labour in general became better paid, labour associated with the provision of basic necessities had to remain cheap or free in order to allow the household budget to shift toward the exciting new products of the consumer society. This tension was resolved by populating the labour force committed to the essential work largely with those members of society with least economic power: minorities, migrants and women.

The increasing productivity that has so dramatically characterized the industrial revolutions was, it should be recalled, specifically the productivity of labour; in many cases the productivity of energy and materials, with their costs declining, was allowed to stagnate or decline. Much of this “progress” must be rethought, with economic production and expenditure better reflecting both the priority of the activities that most contribute to human well-being, and also the true costs of production, including all externalities. Overall *the requirements of both nature and society will force the economy to respond with significant shifts in relative prices*. While the transition to the post-carbon future is under way, energy prices will rise. The products of the natural world—the food, fuel, minerals, etcetera, whose prices, as “commodities”, plummeted throughout the twentieth century—will be revalued at levels representing the full, long-range cost of their extraction, processing and reinsertion into nature, or else their recycling within the

production process. Thus materials and, at least in the medium run, energy will be more expensive than they have been, relative to wages.

What does this mean about economic growth, in GDP terms? The same amount of money might flow through the economy, but it would represent less purchasing power, with respect to goods. The pressure of rising material and energy costs will induce energy- and materials-saving technological change—similar to the way the last two centuries of relatively rising labour costs induced labour-saving technological change.

Can technological change be energy and materials saving and at the same time continue to employ ever less labour? It is hard to imagine how this could be, in spite of two—now, apparently, three—recent “jobless recoveries” from recessions, and comments such as this: “There appears to be a new tendency to substitute against labor. It’s permanent, as long as there are alternatives like outsourcing and robotics.”¹³ The old tendency to substitute against labour is unrelated to outsourcing (where labour is still employed, just in a different location), and given the energy- and materials-intensity of robots, they will have to be many times more productive than human beings in order to compete.

Another critical question is: how can the “relative” prices of three major inputs—materials, energy and labour—rise simultaneously? This is only possible if there is a fourth input whose price is sinking in relation to the others—and which is significant enough so that the combination of the four prices does not simply produce inflation. Can this fourth input be technology? To consider this possibility we need to conceptually break down “technology” into two portions: that which requires the addition of significant quantities of materials and/or energy (as was the case, for example, with Green Revolution technology, or with robotics); and that which is information-intensive (“ii tech”; see Goodwin 1991). The latter can be embodied in human beings, in the form of knowledge and skills, as well as in material things, such as computer chips. Only a very significant rise in the proportion of ii tech among all productive inputs will make it possible for the prices of materials and energy to rise while the price of labour at least does not decline, relative to consumer goods.

This is a stiff requirement. It may hold true in some industries, whose workers will be made so much more productive through ii tech that they will be able to command relatively high wages—on the standard economic assumption of a positive relationship between the wage and the marginal value of the worker’s output.¹⁴ However, it seems unlikely that this will maintain, for most workers, wages high enough to allow the average household consumption bundle to contain a quantity of goods that does not shrink in the foreseeable future. The net effect of the trends that are predictable on environmental grounds is, overall, incomes that have less purchasing power, at least in relation to goods with a relatively high content of materials and energy.

To add to this effect I would like to raise the—admittedly idealistic—possibility that a sane society might find ways of raising the relative

compensation for the kinds of work that are most essential for human survival and well-being. Three examples will suggest how this could, conceivably, come about.

The first is food production. Sustainably managed farms will replace some of the physical inputs of agribusiness (chemical weed and pest killers, heavy machinery) with human inputs of time, intelligence and smart technology. Food production will be more labour-intensive than the factory farms of the United States today, where less than 3 per cent of the labour force is enough to feed our entire population. The people who do such farmwork will require more education than has been assumed for farm labourers of the past. For educated people the choice of farming as a profession will compete with other possibilities; it will not be chosen if it is a back-breaking, no-time-off, low-paid activity. With food production requiring more workers than were needed in the American monoculture model, while these future farmworkers are relatively better paid, food will then become relatively more expensive, requiring Americans to pay somewhat (but, it turns out, not a great deal) more than the 13 per cent of household income that is normal in the US today (a proportion that is very low by the standards of the rest of the world).¹⁵

The second example is education. Education appears, among industries that now exist, to be the one where there is the most room for expanded employment. It can be a positive benefit at all stages of life—especially if the concept of education is expanded to include a greater component of arts, crafts, skills and even games, for those who do not enjoy the book-learning component that is now so heavily emphasized. It is both a means to other ends (e.g., income-enhancing skills) and also, importantly, an end in itself. While education can be enhanced by technology, such enhancements have not yet been successful in greatly reducing the need for labour inputs. It can function with a low ratio of materials and energy to labour.¹⁶ For this reason, if labour costs do stagnate or decline relative to other inputs, and given that education is a labour-intensive industry, we can at least anticipate that the trend toward rising education costs will be moderated.

The third example—raising children—may be the most difficult because this takes place for the most part in homes, where there is no market through which the primary caregivers—the parents—can be paid. Where there is a market for parent substitutes (babysitters, day-care providers), these have traditionally been regarded as unskilled workers and paid accordingly. The old assumption was that parents raised their children purely as an act of love, making a choice that would not have been affected if it had been subject to a price. This assumption has been staggering under the weight of some facts. First, women who achieve education, a means to earn income outside of their homes, and access to contraceptives, show a very strong preference for having fewer children. Second, the sharp drop in fertility that accompanies migration from rural to urban settings is best explained by the fact that children are an economic asset in farm families and an

economic liability in urban life. Indeed, the cost of raising children in urban settings is often cited as the reason for fertility declining below replacement rates in one industrialized nation after another.¹⁷ It is this last fact that may, in the end, force a rethinking of the economic costs and benefits of child raising. A possible approach would be a “basic income” policy that allocates funds to every household based on the number of people who are there to be taken care of, with much higher allocations for those who cannot take care of themselves: infants and infirm elderly would probably count for the most, followed by older children.

Some different lessons may be drawn out of these three examples. They suggest that, in a Fourth Revolution model society, more resources may go toward child raising and food production than is now the case. The relative cost of a unit of education (such as a year in college) may go down, but the total amount of educational activity in a society could greatly increase. The examples agree, however, in supporting the preceding argument, which sums up to an image of a society in which the service component of the average household market basket is increased, while the goods component is markedly reduced.

While human ingenuity will continue to find ways to “do more with less” (to quote the twentieth-century visionary, Buckminster Fuller), the bottom line will be that everyone will need to accept lifestyles that require reduced throughput of materials, and also of energy, until the transition to the post-carbon era results in a great sufficiency of cheaply and sustainably available renewable energy. Given population aging, for the rest of this century it also seems likely that each active worker will be supplying goods and services for a larger number of non-workers than is now the case. Within the “goods” category, household consumption will revert to a higher proportion of necessities, more like the consumption baskets of a hundred years ago or more. Aspirations to live in the style of Americans at the beginning of the twenty-first century are off the table for virtually everyone—including Americans.

NOTES

1. The author is grateful to Kevin Gallagher, Jonathan Harris, Brian Roach and Tim Wise for very helpful comments and suggestions.
2. As of 2004 the richest 1 per cent of US households owned 33 per cent of all household wealth—up from 22 per cent eighteen years earlier (Kennickel 2007).
3. There are signs that the world is steadily approaching, though it has not yet reached, the once-ridiculed ideal of factor price equalization—a good thing when it means wages in poor countries rise toward those in the rich; not so popular when it is the reverse.
4. Between 1960 and 2008 US imports as a percentage of gross world product went from about 1.5 per cent to a little over 5 per cent (World Development Indicators database; US Bureau of Economic Analysis, International Economic Accounts).

5. Exports as a percentage of GDP for China grew from around 20 per cent in the early 1990s to 43 per cent in 2007, then dropped to 35 per cent in 2008 (World Development Indicators database). China's efforts to build up new markets for exports in developing countries are not incompatible with a continuing reduction in the country's export orientation.
6. It should be noted that this, like other "hopes" scattered throughout this chapter, is not something that is likely to occur spontaneously, e.g., through unregulated market forces. Imposition of a price on carbon, such as a cap and trade or carbon tax regime, will be necessary to internalize that particular externality.
7. See Homer-Dixon (2001) for a forceful argument for the need to maintain and increase human capital in response to the challenges of the twenty-first century; and the danger that these challenges could have the effect of reducing expenditures on education while encouraging the replacement of science with superstition—an effect that is already evident in significant portions of the US population.
8. US Department of Energy, Annual Energy Outlook 2009; <http://www.eia.doe.gov/oiaf/aeo/index.html> (accessed 9 November).
9. See, for example, <http://www.corporation2020.org/>.
10. Some religious groups, especially religious pension funds, have been leaders in this movement. One might expect that foundations and universities would take a similarly broad view of the impact of their endowments' management. This in fact has been slow to happen; however, such a movement now seems to be building. The author of this chapter is working with others to promote it in the US.
11. There is no longer much debate between "the selfish gene" and "group survival" among those who follow science. Both are understood to be relevant drivers of human, animal and even plant behaviour.
12. See, for example, Cobb, Halstead and Rowe (1995); Deaton (2008); Diener, Diener and Diener (1995); Diener and Oishi (2000); Frank (1999, and in this volume); Kahneman, Diener and Schwarz (1999); and Lane (1991, 2005).
13. Allan Sinai (*New York Times* 2009), chief global economist at the research firm Decision Economics.
14. This relation often appears less tight than that between the wage and the worker's ability to appropriate more of the profit than others who have helped to produce it: recent decades have provided numerous examples of top corporate managers receiving annual compensation such that, if it had been reduced to just one or a few millions, would have left enough in the profit kitty to double the incomes of all the non-managerial employees.
15. For an analysis of the impacts of rising food prices on poor consumers, and some factors that can mitigate these impacts, see Goodwin (1991).
16. By comparison, health care—an industry whose human importance rivals education—has become highly materials- and energy-intensive. It is possible, however, to imagine a movement toward a form of health care that has a much greater human component, along with massive inputs of information-intensive technology. This form is more likely to emerge in places where the emphasis shifts more toward health maintenance rather than remediation.
17. Germany, Italy and Japan are examples of countries whose population is already in actual decline, while many other wealthy nations are headed in that direction. Russia is not such an obvious case, as its population decline has coincided with both economic and psychological depression, rather than the situation of advanced commercialization of the first three. China, also, cannot be cited in support of this hypothesis, since in that country political dictat is the overriding reason for reduced fertility.

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