
Global Catastrophes and Trends

The Next 50 Years

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Preface

What to Expect

Some lifelong endeavors, many old (and later resurrected) skills, and a great deal of new work have gone into this book. As a scientist, I have been always interested in global environmental change, and in natural catastrophes and anthropogenic risks (particularly in the failures of modern techniques) and the quantification of their probabilities. My study of unfolding national trends has been made easier by my personal experiences and fondness for languages. As a European who emigrated first to the United States and then to Canada and who has frequently visited Asia, I have decades of direct experience with most of the societies whose fortunes will shape the global future of the twenty-first century.

Although my dominant research interests have shifted during the past 40 years, I have always followed European, Russian, and Middle Eastern affairs. For two decades I have studied China's energy use and environment, with frequent visits to the country, usually combined with stays in Japan. During my undergraduate days at the Faculty of Natural Sciences at the Carolinum University in Prague in the early 1960s, I developed a distaste for rigid compartmentalization of knowledge. Ever since that time I have tried to understand complex environmental and engineered systems as they interact with social and economic forces; hence my keen interest in history, demography, and economics. Many of my publications could be assigned to these categories. My interest in risk assessment and patterns of technical innovation began shortly after emigration from Europe to the United States in 1969; Robert Ayres and Chauncey Starr were my intellectual guides.

Given this background, my intent is to present as wide-ranging and interdisciplinary a perspective on the next 50 years as practicable in a book that amounts to less than 100,000 words. The book's principal aims need more than a single sentence to summarize. Above all, this is not a book of forecasts: I do not make a single claim that by a certain date a particular event will take place or a given trend will

peak or end. Nor is this a volume of scenarios: I do not offer imaginative fables describing alternative worlds of 2050. This book is simply a multifaceted attempt to identify major factors that will shape the global future and to evaluate their probabilities and potential impacts.

This work is based on recognizing a simple dichotomy—fundamental shifts in human affairs come mostly in two guises, as low-probability events that could (in an instant) “change everything,” and as persistent, gradually unfolding trends that have no less far-reaching impacts in the long term. A close, critical, interdisciplinary look at both these factors can be beneficial in reminding us—as individuals and as polities—to pay adequate attention to the consequences of unpredictable (or poorly predictable) catastrophic events and to the clearly discernible outcomes of worrisome long-term trends.

Better understanding and heightened awareness should help us lessen the impact of unpredictable events, even prevent some whose timing could not be known but whose coming might have been anticipated. (9/11, the September 11, 2001, destruction of the World Trade Center’s Twin Towers by terrorists, which came after the World Trade Center bombing on February 26, 1993, and after the publication of al-Qaeda’s training manuals during the trial of Umar Abdul Rahman in 1995, is an obvious instance.) They should also improve our efforts at moderating or reversing deleterious trends at a stage when changes are tolerable and sacrifices reasonable, before such trends bring unavoidable economic collapse, protracted social turmoil, heightened risks of widespread violent conflicts, or a global environment altered to a greater degree than at any time since the emergence of our species.

Consequently, in chapter 2, I begin by identifying key fatal discontinuities—sudden catastrophic events that can change the course of world history. These events include rare but recurrent natural phenomena, such as the Earth’s encounters with extraterrestrial bodies, volcanic mega-eruptions, and viral pandemics, as well as destructive human actions, such as major wars and terrorist attacks. I evaluate these phenomena in order to provide the best current understanding and, where possible, to quantify the probabilities of their occurrence during the first half of the twenty-first century.

Chapter 3, devoted to principal trends of global importance, examines key resource, demographic, economic, political, strategic, and social shifts. First is a fundamental universal trend that will affect the global history of the next two generations: a complex energy transition from a world powered largely by the combus-

tion of fossil fuels to an as-yet-uncertain mix of new resources and conversions. Few other factors will be as important in determining the economic and social fortunes of both affluent and poor countries as the tempo and eventual success or failure of this unfolding energy transition.

Second, I look at other gradual shifts by focusing on the principal actors on the world stage today: Europe, Japan, Russia, China, the United States, and the Muslim world. Global civilization has a relatively small number of leading actors (equivalent to keystone species in ecosystems) whose aspirations, commitments (or lack thereof), internal changes, and external postures disproportionately affect the future and fortunes of all.

Three examples illustrate the point of disproportionate influence. (1) although the demographic trends in Hungary and Japan appear to be similarly bleak, Japan's rapidly aging population is a matter of global consequence because the country is still the world's third largest economy and a principal technical innovator. (2) Continuation of the chronic and legendary mismanagement of the Italian economy will have only a marginal effect on global investment and trade, but the very foundations of the world's economy could be entirely remade if the United States does not soon end its economic excesses. (3) During the past generation Hindu extremists and Serbian nationalists have instigated acts of violence that have caused many casualties, but the global import of their violence and hate speech is minimal compared to the rise of the unyieldingly militant, terrorizing version of Islam whose threats extend to all inhabited continents.

The assessments of states and the Muslim world in chapter 3 consider factors ranging from demographic trends and immigration to technical innovation and macroeconomic performance. For each of these specific surveys I provide historical background (often contradictory) evidence regarding the strength and durability of the unfolding trends, and the likelihood of particular future developments (these trends, unlike recurrent natural catastrophes, are not subject to meaningful quantification because they are contingent on so many events).

The third part of chapter 3 addresses two aspects of who is on top. The first is a strategic, collectivist matter of ever-shifting global primacy (a more accurate term than dominance), a multifaceted and hard-to-evaluate quest for power, influence, and advantage. The second concerns individual fortunes in life, a worrisome and apparently global trend of growing economic and social inequalities that results, to a large extent, from vigorous (and seemingly interminable) globalization of resource use, production, and consumption.

Although most of the events that will mold the future can be categorized either as sudden catastrophic events or as unfolding trends, environmental change warrants separate treatment because it is such an inimitable amalgam of shocking discontinuities (especially given that sudden environmental change is measured on a different time scale) and gradual trends, and because these two classes of phenomena are intertwined in multiple (and still poorly understood) feedbacks. In chapter 4, I review the best available evidence regarding the magnitude and tempo of environmental changes that have the potential to affect the course of planetary civilization seriously during the coming two generations. This assessment includes not only the still insufficiently appreciated complexities of global warming but also brief looks at other profound environmental changes, such as a multifaceted assault on the global water cycle, a massive human alteration of the global nitrogen cycle, and a trend of increasing resistance of common pathogenic bacteria to antibiotics.

I close the book by offering in chapter 5 a rational framework for assessing potential risks and evaluating unfolding trends. Quantification of risks offers a useful basis for rational perception and effective preparation for threats ranging from recurrent natural catastrophes to technical failures and terrorist attacks. Our understanding of unfolding trends and any attempts to change them in desirable directions benefit from setting them in appropriate historical context, not mistaking short-lived phenomena for long-term processes, and stressing the unpredictable nature of complex, interwoven social, economic, political, strategic, and environmental developments. These realities preclude meaningful long-range forecasting, but they do not prevent us from acting as responsible risk minimizers.

In sum, do not expect any grand forecasts or prescriptions, any deliberate support for euphoric or catastrophic views of the future, any sermons or ideologically slanted arguments. Instead, expect eclectic inquiries, reliance on long-term historical perspectives, reminders that limited understanding and inherent uncertainties are our constant companions in appraising the risks of globally fatal discontinuities and the strength and ultimate outcomes of unfolding trends.

Complex realities often produce contradictory evidence and seemingly incompatible arguments. For example, the assessment of the future of the United States is more pessimistic in the chapter on national trends than in the book's concluding discussion. This is understandable. While it is hard to escape a rather gloomy feeling after a systematic, cumulative look at a series of trends (economic, demographic, social, strategic) whose only common denominator appears to be their wrong direction, the overall assessment of the country's prospects brightens considerably when

its recent failings and misfortunes are seen alongside its great residual strengths and historically tested capacity for reinvention and restructuring, and are then compared with the weaknesses, handicaps and rigidities of other major actors: only the youngest readers of this book will be able to judge the eventual outcomes.

My intent is to illuminate, not to prescribe; to question and to convince readers of the fundamental openness of contingent futures. The framework chosen to accomplish this is a wide-ranging, historically based interdisciplinary appraisal of sudden discontinuities and unfolding trends, of the contest for global primacy, and of underlying energy needs and worrisome environmental changes. All of this is neither soothing nor grimly satisfying, but I believe that such a realistic, searching, amalgamative, mosaic-building approach is superior to grand prescriptions, and it offers the best way to power our imagination, to mobilize our creativity, and to deploy our considerable capacity for adapting to new, unforeseen and unforeseeable circumstances.

Finally, two technical notes and a paragraph of thanks. Being able to get insights unfiltered by translations has been a very useful asset for me in understanding the histories and appraising the fortunes of different societies. Besides reading in all principal European languages (Russian and Italian are my favorites), I have studied both *putonghua* (Chinese) and *nihongo* (Japanese), and I also spent five years working on literary Arabic and the Egyptian dialect. That is why I prefer to use consistent and linguistically accurate transcriptions in this book. For readers' convenience, exceptions were made for terms that are now commonly used in English-language publications: al-Qaeda (*al-qā'ida*) and the Koran (*al-qur'ān*). And, as in all of my books, all statistics are in metric units used with appropriate SI prefixes, listed in appendix A.

My thanks, above all, to Paul Demeny for asking me for an unorthodox contribution to his journal and hence unwittingly launching this book: the two papers about the next 50 years published in *Population and Development Review* (Smil 2005a; 2005b) became its core. Thanks also to Clay Morgan for giving me the latitude to do my seventh MIT Press book; to John Katzenberger, Granger Morgan, Peter Nolan, Simon Upton, Daniel Vining, and an anonymous reviewer for reading the entire text or parts of the typescript and offering their criticism and suggestions; and, once again, to Douglas Fast for creating a fine set of illustrations.