Preface and introduction: overview of why this book matters

Frank Whelon Wayman, Paul R. Williamson, Solomon W. Polachek, and Bruce Bueno de Mesquita

> All public policy presupposes a forecast. (Alan Greenspan[1])
> Life can only be understood backwards, but . . . must be lived forwards. (Søren Kierkegaard[2])

In public policy, as in personal life, we protect ourselves as best we can by making informed choices – let us call the best ones rational choices – between (indeed, among) the options that seem to be available to us. It is one's hope that the choice we make will be for the best, but . . . . If our choice does have some effect, as we hope, then it alters the world, and hence moves us from the present into the future. And we do not know the future; it is the undiscovered country in whose shadow we live. This critical switch to a future frame of reference is especially so about many of our most important choices, such as choices about what to do about the big global problems with long turnaround times, like environmental degradation and nuclear proliferation.

Our best choice requires us to make, then, either explicitly or intuitively, a pair of contingent forecasts, namely: one about how things will be better, in our future, if we take our preferred choice; and the other about how things will turn out worse if we take the alternative, inferior choice before us. It is in this sense that "All public policy presupposes a forecast" – a remark that Alan Greenspan made even before he was Chairman of the Federal Reserve. However, all we have to go on in making such contingent forecasts is any data (or evidence or pattern) that we have detected from how things have been in the past. In that sense, Kierkegaard is right in saying that life must be lived forwards but can only be understood backwards. This book, *Predicting the Future in Science, Economics, and Politics*, is about that reasoning process by which we attempt to understand future contingent forecasts, and how we attempt to guide our decisions by evidence necessarily based on – but hopefully elevated by our reasoning above – past experience. As Richard Alexander said during his preparation

of Chapter 4, we humans are the future-seeking organism (Alexander 2005).

The global biospheric system of Earth, emphasized in our book, is the physical, biological, and social context in which, and only in which, humans have evolved to live. It is affected by (nominally distinct) physical, biological, and social processes, and, we contend, can only be understood from an ecological perspective covering, and integrating, the whole range of the sciences. Such a perspective might add empirical content to the term "general systems theory." The limits and possibilities of scientific prediction and explanation of this system's properties are in fact a large part of the context of our book.

To examine this inclusive system, we consider both the relatively continuous variables which have tended to grow incrementally in our lifetimes, such as atmospheric carbon dioxide (CO_2) or the world's human population, and other variables that are more discontinuous, with a history of surprising onsets, such as earthquakes, war, and genocide. Although *Predicting the Future* contains forecasts of surprising phenomena such as nuclear weapons proliferation (Chapter 8) and international armed conflict (in Chapters 9 and 13), our main focus is not the explicit forecast, but rather the method of doing this correctly. (For greater attention to the forecast issue, see Cooper and Layard 2002.)

While it would be useful to be able to predict the future of certain global conditions, such as global warming, nuclear proliferation, and warfare, it would also be useful to know the limitations in the ability to make such predictions. To balance these abilities to predict but also to recognize the limits of forecasts, we must reckon with behavior of complex systems including chaos theory, so our book has contributions from well-known specialists in these areas. Another methodological theme we develop is that, to predict the future, we will need the means to study change over time; this involves incorporating dynamics in addition to comparative statics from one period to the next. There is a broader scope of material that is relevant to this subject of global forecasting and prediction than has been previously considered, and this book touches on several of these elements that we think are relevant, but how exactly they are to be put together remains to be determined (a set of choices and possibilities being examined especially in Chapters 2 and 18).

RATIONALE FOR PUBLICATION, IN THE CONTEXT OF THE LITERATURE OF OUR TIME

Recent bestsellers indicate a trending interest among both authors and readers, a quest for understanding *What the Future Holds* (Cooper and Layard 2002). We have written a book that fills an important gap in the new shelf of books on predicting the future. One reason for the surge in interest in this topic (namely, anticipating the future) may well be that, more than in previous generations, we live in a "revolutionary" epoch (Gore 2013: xv). In this fairly plausible view, held by Al Gore and others, changes in the past have simply not been "as powerful or as pregnant with the fraternal twins – peril and opportunity – as the ones that are beginning to unfold" (Gore 2013: xv). Gore presents six dimensions of change which he believes are unprecedented, especially in their powerful interaction effects with each other, such as the shifting balance between the power of human technology and of the Earth's ecological systems, new biotechnology, and unsustainable growth in human population and pollution flows (Gore 2013: xiv−xv). A second reason for the new interest in predicting the future is that, despite the novel conditions we face, computer modeling and related tools have allowed predictions to become more accurate. An everyday example of this improved predictive accuracy is provided by five-day weather forecasts. The accuracy extends to other areas such as the social sciences. We find some of the recent bestsellers cover the story of accurate forecasts of stock markets and presidential elections. A third reason for the new interest in prediction is that this improved predictive accuracy is not accidental, but stems from better scientific tools (such as computer models) that merit our attention. And yet our understanding of what tools are good, and how the tools can be used together in a synergistic way, certainly needs improvement. We believe our book can help with this.

Thus, our book *Predicting the Future in Science, Economics, and Politics* provides an analytic framework for implementing the approaches advocated in two current *New York Times* bestsellers: Nate Silver's (2012) *The Signal and the Noise* and James Owen Weatherall's (2013) *The Physics of Wall Street*. Silver calls attention to accurate versus inaccurate forecasting and suggests strategies for accurate prediction, based in part on his own success. Weatherall, in one of his main examples, describes the methods used by our Chapter 5 author, the physicist Doyne Farmer, whose Prediction Company found weak signals in noisy data, and combined them to earn good rates of return for its investors. Weatherall advocates using hard science, including physics, and emphasizes that one physics-based hedge fund doubled other returns, while refusing to hire Wall Street insiders. We believe we provide the best of both Silver's and Weatherall's

approaches, insofar as we have made salient the idea of "consilience" which unifies knowledge to do these things. Silver's forecasts, on the 2012 election and baseball, rely mostly on large databases (such as many public opinion polls, weighted by Silver on the basis of their likely accuracy). On the other hand, Bueno de Mesquita's (2009) recent popular book – written by one of us – focuses more on short-term consequences of specific policies (for example, what is the effect of US foreign aid to Pakistan, in making Pakistan more helpful in the war on al-Qaida?). It uses game theory as its main method. As mentioned, we are interested in comparing and contrasting several useful methods, including Bueno de Mesquita's and Silver's, and figuring out how they all fit together best in an overall strategy for forecasting. Compared to Cooper and Layard (2002), we focus more on the menu of choice concerning methods for knowing the future, and the advantages and disadvantages of each; they focus more on specific forecasts. Our forecasts are stronger than theirs concerning political risks such as the future likelihood of nuclear weapons acquisition and warfare. Unlike Cooper and Layard, we have hedge fund managers from physics and economics who (in their Chapter 5 on "Using Predictions in an Uncertain World") discuss how to assess the value of future assets, and who had to successfully forecast such things each day in order to make money. Far better than most at explanation involving the unification of science, Wilson (1998, 2000) can only do so much in a given book. He had not, until teaming up with Alexander in this volume (contributing our Chapters 3 and 4, respectively), been able to strongly extend consilient efforts to include the realms of the macro-social sciences such as economics and political science, in whose domains so much of the future is driven.

In short, until now there has not been one comprehensive overview, in a book, of the integration of the sciences into a unified predictive tool, and our volume provides new insights into how one might be constructed, with contributions from leading scholars across many disciplines, and with applications to many problems in global forecasting about conditions affecting the human condition.

It seems a tragic truism that academic research tends to increased specialization as time goes by, whereas the important problems facing humans (such as climate change, the need to cooperate to protect the environment, threats from nuclear weapons) require a synthesis of understanding. For the good of the human condition, this trend should, if not reversed, at least be balanced with efforts to not just cumulate but synthesize understanding. Therefore, we have brought together a group of authors from various disciplines, to reflect on how to forecast the future. We believe the market is increasing, as it is being recognized that long-term trends (population growth, carbon dioxide emissions, nuclear

proliferation, war) need to be understood in order to adopt effective poli-
cies or even comprehend where we stand and what sort of future awaits us.
We believe our book is timely, given the several current *New York Times*
bestsellers alluded to above.

Predicting the Future consists of 18 original chapters by prominent
scholars developing new techniques to forecast global conditions for busi-
ness and world leaders. Each chapter is built around cause-and-effect
relationships based on empirical evidence that link together to create a
unified predictive model to project global economic and political condi-
tions, such as the ecological environment, war, nuclear proliferation, and
sustainable development. Both qualitative and quantitative approaches are
included. The quantitative range from complex systems studies to game
theory to number-crunching of past patterns to assess the likely range
of future developments (as, for example, whether stock prices anticipate
political turmoil). Original contributions come at the start from the two-
time Pulitzer Prize-winning Harvard Professor Edward O. Wilson (also
named one of *Time* magazine's 25 most influential Americans), and con-
tinue through to Bruce Bueno de Mesquita (named one of *Foreign Policy*'s
top 100 global thinkers, and the US cable TV History Channel's "Next
Nostradamus") at the end. Overall, this unusual collaborative endeavor of
high-level scholars from across the sciences offers a new view into predict-
ing the future.

NOTES

1. From James L. Rowe, "US Statistics," *Washington Post*, July 11, 1976, as quoted in
   Robert Behn and James Vaupel (1982) *Quick Analysis for Busy Decision Makers*, New
   York: Basic Books, p. 71.
2. From Søren Kierkegaard, *Journalen* JJ: 167 (1843), *Søren Kierkegaards Skrifter*, Søren
   Kierkegaard Research Center, Copenhagen, 1997–, Vol. 18, p. 306.

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    paper presented at the conference Illuminating the Shadow of the Future:
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