

# Roll the DICE Again: Economic Models of Global Warming

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# Roll the DICE Again: Economic Models of Global Warming

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## Preface

Dealing with complex scientific and economic issues has increasingly involved developing scientific and economic models that help analysts and decision makers understand likely future outcomes as well as the implications of alternative policies. The present study presents the details of a pair of integrated-assessment models of the economics of climate change. The models, called *RICE-99* (for the *Regional Dynamic Integrated* model of *Climate* and the *Economy*) and *DICE-99* (for the *Dynamic Integrated* model of *Climate* and the *Economy*) build upon earlier work by the author and collaborators, particularly the *DICE* and *RICE* models constructed in the early 1990s.

The purpose of this book is to lay out the logic and details of *RICE-99* and *DICE-99*. Like an anatomy class, this description tends to highlight the less sexy aspects of the subject. Rather, again like anatomy, the purpose is to lay out the internal structure of the models and the ways different segments are connected.

The book is organized into two parts. The first part describes *RICE-99* and its globally-aggregated companion, *DICE-99*. This part contains an introduction (chapter 1) and a brief description of *RICE-99* (chapter 2) that includes all the model equations. The details of the derivation of these equations and their parameterization are presented in chapters 3 and 4. Chapters one through four present *RICE-99*, leaving explicit discussion of *DICE-99* to Chapter 5. Chapter 6 explains how the models are solved. Part II presents the major results of *RICE-99* and applies it to the questions surrounding climate change. The Appendices at the end of this book provide a summary listing of the equations, a variable list, and the programs for the *RICE-99* and *DICE-99* models. The models and spreadsheets are also available on the

web.

Workers in this exciting field will recognize that this study builds on earlier work of the author and of many others in the field. Although the paper bears the name of two authors, the intellectual inspiration and contribution of many should be recognized. Among those who have contributed directly or indirectly, we would like to thank Jesse Ausubel, Howard Gruenspecht, Henry Jacoby, Dale Jorgenson, Charles Kolstad, Alan Manne, Robert Mendelsohn, Nebojsa Nakicenovic, John Reilly, Richard Richels, Thomas Schelling, Richard Schmalensee, Stephen Schneider, Leo Schrattenholzer, Robert Stavins, Ferenc Toth, Karl Turekian, Paul Waggoner, John Weyant, Zili Yang, and Gary Yohe. Megan McCarthy and Ben Gillen provided valuable research assistance. This research was supported by the National Science Foundation and the Department of Energy. None of these are responsible for the errors, opinions, or flights of fancy in this work.

Endnotes:

1. Nordhaus is A. Whitney Griswold Professor of Economics, Yale University and on the staff of the Cowles Foundation at Yale. Boyer is Associate in Research, Yale University. Version is web pref 102599.wpd