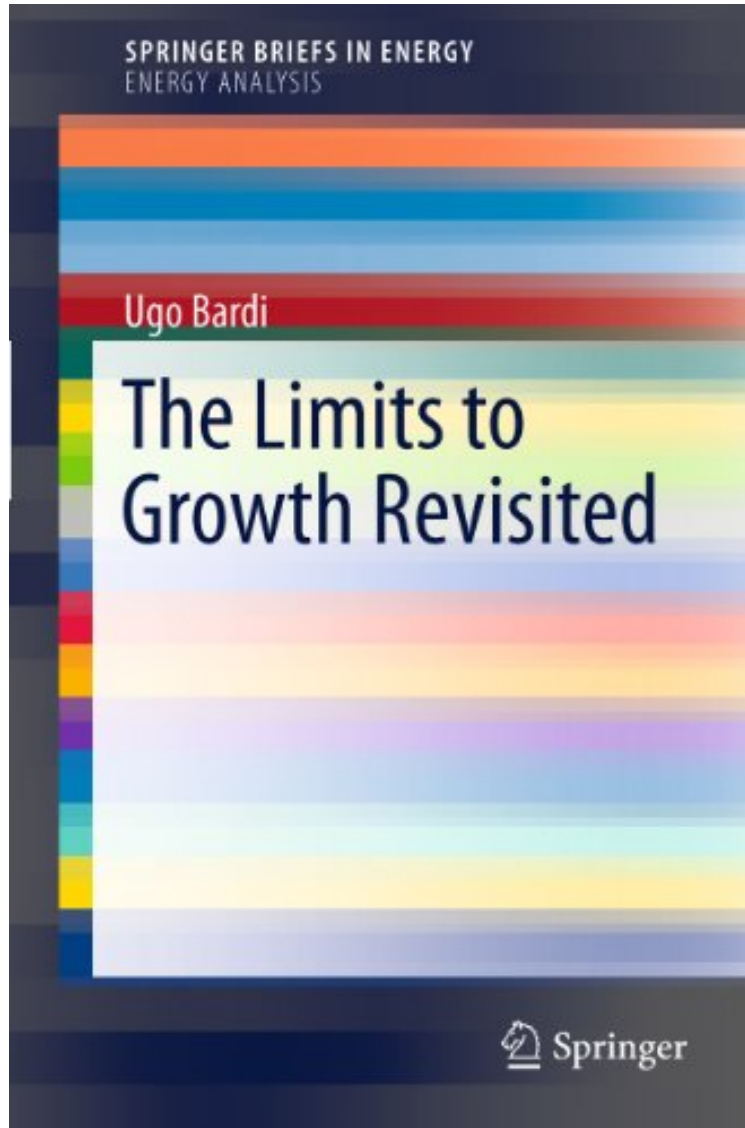


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Ugo Bardi

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Ugo Bardi : The Limits to Growth Revisited (SpringerBriefs in Energy) before purchasing it in order to gauge whether or not it would be worth my time, and all praised The Limits to Growth Revisited (SpringerBriefs in Energy):

20 of 21 people found the following review helpful. "Revisit" does not mean "Update"By Peter FawcettAs we approach the 40th anniversary of LTG this compact monograph (just over 100 pages) forms a valuable review, especially for readers who might not have seen the original or the subsequent updates in 1992 and 2004 or the Second Report to the Club of Rome (Mesarovic et al). Readers might well be encouraged to look out these and many other pertinent references given by the author, so as to fully appreciate the world modeling which LTG conveyed and why it evoked bitter controversy.As Ian Johnson puts it in the Foreword, " (the) book allows us to better understand the

controversy following the release of LTG (in 1972) and at the same time gain insights into dynamic modeling and some of the key arguments debated."About half of the content is devoted to the modeling, half to the controversies.A brief review of background - Malthus, the Classical Economists, Vernadsky, Hubbert, Carson, Ehrlich - leads to the dynamic systems modeling work of Forrester and his subsequent cooperation with the Club of Rome, a moderate/liberal group of industrial and academic leaders motivated by equity issues, so as to develop terrestrial resource quantification models. The author gives a useful overview of the challenges of modeling/simulation for complex systems and constructively compares LTG with more recent work. He notes the essentially heuristic goal of such modeling - often misunderstood - and the importance of understanding validation and "robustness" (convergence?) of these dynamic simulations.The controversies are shown to have arisen from distinctions between i) resource limits of planet Earth as against the powers of human ingenuity and ii) growth in material throughput as against growth in economic activity: i.e. physical measures vs. econometrics (especially in a context of deficit spending). The author's reappraisal of two decades of acrimonious criticism (by both scientists and economists) seems to be balanced and fair, leading to the sorry conclusion of ".... the definitive separation of two worlds: that of economists and that of system scientists On the whole, the debate had died out not because a conclusion had been reached but because it had not generated meaningful (scientific) results".The challenge of homeostasis remains - ".... a steady state at a level of industrial and agricultural production, as well as of population, comparable to the present one." The author notes that this "..... was possible for the three dates for which the simulations were performed (1972, 1992, 2004) but it became increasingly difficult. At the larger population and increased depletion level of today (2011) it may no longer be possible to stabilize the system at the present level".The book implicitly asks - what now? In chapters 8 and 9 prospects for resource enhancement and technological progress are reviewed. The author suggests that "..... world modeling was largely abandonedwe are facing the future without having planned for it" but notes the significance of newer focus groups such as the Association for the Study of Peak Oil and, of course, the Intergovernmental Panel on Climate Change. Supercomputing, especially the UK-Japan Earth Simulator Project, has been devoted to climate modeling and the author notes the European plan to adapt and extend this Simulator to full world-system capacity.The book is somewhat marred by numerous typo- and linguistic errors - rather surprising for this publishing house - and also a degree of repetition which might have been edited out of a brief text. Some diagrams are inadequately captioned, especially the quintessential Figure 2.1 reproduced from LTG - what do all those B's, D's and S's represent? Figure 6.4 also is not adequately explained.But I found the book very worthwhile.27 of 28 people found the following review helpful. A Wakeup Call to Economists and ScientistsBy Dick_BurkhartAs a mathematician I regard the Limits-to-Growth studies as by far the best mathematical economics ever done. It should be the foundational work for the study of macro economics. The fact that most economists either ignore or actually reject this remarkable work is a damning indictment of the state of mainstream economics.Ugo Bardi not only gives an intuitive explanation of the methodology of the "systems dynamics" developed by Jay Forrester and elaborated by Dennis and Donella Meadows, but also lays out the sordid history of misrepresentation and political / ideological attacks against this methodology. This is one of the key reasons that the field of economics has performed so poorly in recent decades. The situation is so bad that today geologists with a good knowledge of world oil resources and markets routinely forecast long term global economic trends far better than any Noble prize winner in economics.The top economists have blinded themselves by a narrow ideology centered around private markets and production using simplistic models and outmoded concepts, ignoring the foundational role of natural resources and the environment, not to mention what the social sciences, philosophy, and religion have to teach about what should be the ultimate goal of economics: "sustainable well-being". Physicists like Professor Bardi are far better equipped to understand economics from a global perspective than economists themselves, who are poorly trained in science and advanced mathematics.Broad minded economists have recently formed the World Economics Association in an attempt to piece together an economic discipline better matched to the real world, yet only a few, such as Steve Keen from Australia, are grappling with the non-linear nature of economics using systems dynamics, let alone chaos theory or the kind of massive computation done by climate modelers, melding a variety of models with a variety of data and producing a range of scenarios.The Limits-to-Growth model aggregates all economic variables into just five: Resources, Pollution, Population, Industrial Output, and Food. Then it uses basic scientific principles to develop non-linear differential equations (feedback loops) among these variables with a minimal number of parameters, which may be varied to account for unknown future developments, such as new technology or global governance on the positive side, or break down of governance or industrial systems on the negative side. Different values of these parameters lead to different scenarios for the world economy over the course of the 21st century. All the scenarios, except the most optimistic, lead to some form of substantial global economic collapse. The "business-as-usual" scenario suggests that this collapse could come as early as the 2020 to 2030 time frame.Others, such as John Michael Greer, expect that this collapse will come in waves, with each partial collapse freeing up enough resources to allow a partial recovery until declining overall resources and ecosystem destruction force yet another round of deeper collapse and partial recovery, which Greer calls "catabolic collapse". Current events suggest that the financial meltdown of 2008 was the first small wave of collapse and that the partial recovery will soon max out. The lack of growth to pay off debt is already being felt

heavily in Europe and some form of default or inflation seems likely in the US within a few years as well, leading to a second wave of collapse. Yet you can do a lot even without the full limits-to-growth model. The reason oil geologists can forecast long term global trends better than economist is that one aggregate variable dominates all the others: energy. Thus Bardi demonstrates a simple prey - predator model (humans = predator, nature = prey) and shows how this simplifies to the famous Hubbert curve for the rise and fall of oil production (or of the 19th century whaling, or of British coal production, etc). Thus "peak oil" is now in the driver's seat, with peak energy and lots of other peaks not far behind. In some countries the revolutions have already begun (Arab Spring); in others new protests (UK riots, US "Occupy Wall Street") are but hints of what is to come. Meanwhile politicians and economists argue over how to jump start growth, instead of figuring out how to deal with the coming "de-growth". Bardi's short book is an easy-to-read wakeup call to the more scientifically minded, too many of whom have been seduced by a faith in technology that ignores the historical dynamics of the rise and fall of civilizations.³ of 3 people found the following review helpful. Too short
By A. Ali
It's difficult to know who the book is written for. Metaphorically speaking, it's trying to tersely describe an elephant to a blind man. I say "tersely" because the book is 104 pages (which makes it expensive at \$46). It's unlikely to hold the attention of laymen because of its frequent references to technical results; at the same time the nitty-gritty math and computer code isn't there to attract the attention of modelers and computer coders, who might like to create and test their own computer simulations. For myself, it's way too brief and I would have liked a monograph replete with math formulas, computer code, and models that was around four times the size of this 104-page booklet.

"The Limits to Growth" (Meadows, 1972) generated unprecedented controversy with its predictions of the eventual collapse of the world's economies. First hailed as a great advance in science, "The Limits to Growth" was subsequently rejected and demonized. However, with many national economies now at risk and global peak oil apparently a reality, the methods, scenarios, and predictions of "The Limits to Growth" are in great need of reappraisal. In *The Limits to Growth Revisited*, Ugo Bardi examines both the science and the polemics surrounding this work, and in particular the reactions of economists that marginalized its methods and conclusions for more than 30 years. "The Limits to Growth" was a milestone in attempts to model the future of our society, and it is vital today for both scientists and policy makers to understand its scientific basis, current relevance, and the social and political mechanisms that led to its rejection. Bardi also addresses the all-important question of whether the methods and approaches of "The Limits to Growth" can contribute to an understanding of what happened to the global economy in the Great Recession and where we are headed from there.

From the Back Cover
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Shows how "The Limits to Growth" is a subject more relevant today than when the book was first published
Demonstrates how scenario-building using system dynamics models or other methods is an essential tool in understanding possible futures
Examines the factors that may lead to the rejection of good science when the conclusions are unpleasant
Separates the reality that the future can never be predicted with certainty from the need to prepare for it
About the Author
Ugo Bardi is a member of the Department of Earth Sciences at the University of Florence, where he teaches physical chemistry. His research interests include mineral resources, renewable energy, and system dynamics applied to economics. He is a member of the Club of Rome, of the scientific committee of the Association for the Study of Peak Oil (ASPO), and Climalteranti, a group active in climate science. He is also founder and former president of the Italian chapter of ASPO and chief editor of *Frontiers in Energy Systems and Policy*. His articles have appeared on *The Oil Drum*, *Resilience* (formerly *The Energy Bulletin*, *Financial Sense*, and *Cassandra's Legacy*). His previous books include *The Limits to Growth Revisited*.
Ian Johnson is Vice President for Sustainable Development, World Bank