Recognizing that robust decision making is vital in risk management, this book provides concepts and algorithms for computing the best decision in view of the worst-case scenario. The main tool used is minimax, which ensures robust policies with guaranteed optimal performance that will improve further if the worst case is not realized. The applications considered are drawn from finance, but the design and algorithms presented are equally applicable to problems of economic policy, engineering design, and other areas of decision making.

Critically, worst-case design addresses not only Armageddon-type uncertainty. Indeed, the determination of the worst case becomes nontrivial when faced with numerous--possibly infinite--and reasonably likely rival scenarios. Optimality does not depend on any single scenario but on all the scenarios under consideration. Worst-case optimal decisions provide guaranteed optimal performance for systems operating within the specified scenario range indicating the uncertainty. The noninferiority of minimax solutions—which also offer the possibility of multiple maxima—ensures this optimality.

Worst-case design is not intended to necessarily replace expected value optimization when the underlying uncertainty is stochastic. However, wise decision making requires the justification of policies based on expected value optimization in view of the worst-case scenario. Conversely, the cost of the assured performance provided by robust worst-case decision making needs to be evaluated relative to optimal expected values.

Written for postgraduate students and researchers engaged in optimization, engineering design, economics, and finance, this book will also be invaluable to practitioners in risk management.


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Reviews:

"This book will be very helpful to those interested in uncertainty and robust decisions. I recommend it warmly to all practitioners and researchers in economics, environment, engineering design, finance and operations research."--P.M. Pardalos, Journal of Economics
"This is minimax made practical, while maintaining theoretical rigor, computational feasibility, and good problem formulation. . . . The book is very comprehensive, and in many places quite detailed. However, it is easy to find a path through the material suited to one's purpose, ranging from a quick overview of this powerful approach to a detailed study of it and the relevant background material. It is an excellent example of how the results of an extensive research program can be translated into a book that is accessible and which is likely to have significant impact in both the optimization and finance communities."--David G. Luenberger, Journal of Economic Dynamics & Control

“. . .a very solid, cohesive treatment of worst-case avoidance applied to financial risk management, combining theoretically sound methods in satisfyingly practical ways. Anyone with an interest in real-world financial risk management would be making an error—perhaps not of LTCM-sized magnitude, but large nevertheless—by not having it on her bookshelf.”—Robert J. Tetlow, Computational Economics