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Economics And Finance*
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MARISA HERMAN

**Stochastic Methods in
Asset Pricing** MIT Press
Use of information is basic
to economic theory in two
ways. As a basis for
optimization, it is central
to all normative
hypotheses used in eco

nomics, but in decision-
making situations it has
stochastic and evolution
ary aspects that are more
dynamic and hence more
fundamental. This book
provides an illustrative
survey of the use of
information in econom ics
and other decision
sciences. Since this area
is one of the most active
fields of research in

modern times, it is not
possible to be definitive
on all aspects of the
issues involved. However
questions that appear to
be most important in this
author's view are
emphasized in many
cases, without drawing
any definite conclusions.
It is hoped that these
questions would provoke
new interest for those

beginning researchers in the field who are currently most active. Various classifications of information structures and their relevance for optimal decision-making in a stochastic environment are analyzed in some detail.

Specifically the following areas are illustrated in its analytic aspects: 1.

Stochastic optimization in linear economic models, 2. Stochastic models in dynamic economics with problems of time-inconsistency, causality and estimation, 3. Optimal

output-inventory decisions in stochastic markets, 4. Minimax policies in portfolio theory, 5. Methods of stochastic control and differential games, and 6. Adaptive information structures in decision models in economics and the theory of economic policy.

Essentials of Stochastic Processes Springer

This book brings together the latest findings in the area of stochastic analysis and statistics. The individual chapters cover a wide range of topics

from limit theorems, Markov processes, nonparametric methods, actuarial science, population dynamics, and many others. The volume is dedicated to Valentin Konakov, head of the International Laboratory of Stochastic Analysis and its Applications on the occasion of his 70th birthday. Contributions were prepared by the participants of the international conference of the international conference "Modern problems of stochastic analysis and statistics",

held at the Higher School of Economics in Moscow from May 29 - June 2, 2016. It offers a valuable reference resource for researchers and graduate students interested in modern stochastics.

Reconstructing Macroeconomics Elsevier
Stochastic volatility is the main concept used in the fields of financial economics and mathematical finance to deal with time-varying volatility in financial markets. This work brings together some of the main papers that have

influenced this field, and shows that the development of this subject has been highly multidisciplinary. *Stochastic Processes* Springer Science & Business Media
Stochastic Orders in Reliability and Risk Management is composed of 19 contributions on the theory of stochastic orders, stochastic comparison of order statistics, stochastic orders in reliability and risk analysis, and applications. These review/exploratory

chapters present recent and current research on stochastic orders reported at the International Workshop on Stochastic Orders in Reliability and Risk Management, or SORR2011, which took place in the City Hotel, Xiamen, China, from June 27 to June 29, 2011. The conference's talks and invited contributions also represent the celebration of Professor Moshe Shaked, who has made comprehensive, fundamental contributions to the theory of stochastic orders and its applications

in reliability, queueing modeling, operations research, economics and risk analysis. This volume is in honor of Professor Moshe Shaked. The work presented in this volume represents active research on stochastic orders and multivariate dependence, and exemplifies close collaborations between scholars working in different fields. The Xiamen Workshop and this volume seek to revive the community workshop tradition on stochastic orders and dependence

and strengthen research collaboration, while honoring the work of a distinguished scholar. Brownian Motion Springer This textbook gives a comprehensive introduction to stochastic processes and calculus in the fields of finance and economics, more specifically mathematical finance and time series econometrics. Over the past decades stochastic calculus and processes have gained great importance, because they play a decisive role in the modeling of financial

markets and as a basis for modern time series econometrics. Mathematical theory is applied to solve stochastic differential equations and to derive limiting results for statistical inference on nonstationary processes. This introduction is elementary and rigorous at the same time. On the one hand it gives a basic and illustrative presentation of the relevant topics without using many technical derivations. On the other hand many of the procedures are presented

at a technically advanced level: for a thorough understanding, they are to be proven. In order to meet both requirements jointly, the present book is equipped with a lot of challenging problems at the end of each chapter as well as with the corresponding detailed solutions. Thus the virtual text - augmented with more than 60 basic examples and 40 illustrative figures - is rather easy to read while a part of the technical arguments is transferred to the exercise problems

and their solutions. Stationary Stochastic Processes for Scientists and Engineers Elsevier Quantitative Sociodynamics presents a general strategy for interdisciplinary model building and its application to a quantitative description of behavioural changes based on social interaction processes. Originally, the crucial methods for the modeling of complex systems (stochastic methods and nonlinear dynamics) were developed in physics but

they have very often proved their explanatory power in chemistry, biology, economics and the social sciences. Quantitative Sociodynamics provides a unified and comprehensive overview of the different stochastic methods, their interrelations and properties. In addition, it introduces the most important concepts from nonlinear dynamics (synergetics, chaos theory). The applicability of these fascinating concepts to social

phenomena is carefully discussed. By incorporating decision-theoretical approaches a very fundamental dynamic model is obtained which seems to open new perspectives in the social sciences. It includes many established models as special cases, e.g. the logistic equation, the gravity model, some diffusion models, the evolutionary game theory and the social field theory, but it also implies numerous new results. Examples concerning opinion formation,

migration, social field theory; the self-organization of behavioural conventions as well as the behaviour of customers and voters are presented and illustrated by computer simulations. Quantitative Sociodynamics is relevant both for social scientists and natural scientists who are interested in the application of stochastic and synergetics concepts to interdisciplinary topics. **A Practitioner's Guide to Stochastic Frontier Analysis Using Stata**
Cambridge University

Press
This book presents the main applied aspects of stochastic optimization in economic models. Stochastic processes and control theory are used under optimization to illustrate the various economic implications of optimal decision rules. Unlike econometrics which deals with estimation, this book emphasizes the decision-theoretic basis of uncertainty specified by the stochastic point of view. Methods of applied stochastic control using

stochastic processes have now reached an exciting phase, where several disciplines like systems engineering, operations research and natural resources interact along with the conventional fields such as mathematical economics, finance and control systems. Our objective is to present a critical overview of this broad terrain from a multidisciplinary viewpoint. In this attempt we have at times stressed viewpoints other than the purely economic one. We believe that the

economist would find it most profitable to learn from the other disciplines where stochastic optimization has been successfully applied. It is in this spirit that we have discussed in some detail the following major areas: A. Portfolio models in finance, B. Differential games under uncertainty, c. Self-tuning regulators, D. Models of renewable resources under uncertainty, and ix x PREFACE E. Nonparametric methods of efficiency measurement. Stochastic

processes are now increasingly used in economic models to understand the various adaptive behavior implicit in the formulation of expectation and its application in decision rules which are optimum in some sense. Stochastic Orders and Applications Springer Science & Business Media Stochastic calculus provides a powerful description of a specific class of stochastic processes in physics and finance. However, many econophysicists struggle

to understand it. This book presents the subject simply and systematically, giving graduate students and practitioners a better understanding and enabling them to apply the methods in practice. The book develops Ito calculus and Fokker-Planck equations as parallel approaches to stochastic processes, using those methods in a unified way. The focus is on nonstationary processes, and statistical ensembles are emphasized in time series analysis. Stochastic

calculus is developed using general martingales. Scaling and fat tails are presented via diffusive models. Fractional Brownian motion is thoroughly analyzed and contrasted with Ito processes. The Chapman-Kolmogorov and Fokker-Planck equations are shown in theory and by example to be more general than a Markov process. The book also presents new ideas in financial economics and a critical survey of econometrics. *Stochastic Processes*

American Mathematical Soc.
In Part I, the fundamentals of financial thinking and elementary mathematical methods of finance are presented. The method of presentation is simple enough to bridge the elements of financial arithmetic and complex models of financial math developed in the later parts. It covers characteristics of cash flows, yield curves, and valuation of securities. Part II is devoted to the allocation of funds and risk management: classics

(Markowitz theory of portfolio), capital asset pricing model, arbitrage pricing theory, asset & liability management, value at risk. The method explanation takes into account the computational aspects. Part III explains modeling aspects of multistage stochastic programming on a relatively accessible level. It includes a survey of existing software, links to parametric, multiobjective and dynamic programming, and to probability and statistics. It focuses on

scenario-based problems with the problems of scenario generation and output analysis discussed in detail and illustrated within a case study. *Introduction to Stochastic Models* North Holland Stochastic processes occur everywhere in the sciences, economics and engineering, and they need to be understood by (applied) mathematicians, engineers and scientists alike. This book gives a gentle introduction to Brownian motion and stochastic processes, in general. Brownian motion

plays a special role, since it shaped the whole subject, displays most random phenomena while being still easy to treat, and is used in many real-life models. In this new edition, much material is added, and there are new chapters on "Wiener Chaos and Iterated Itô Integrals" and "Brownian Local Times".

Stochastic Modeling in Economics and Finance

Springer Science & Business Media

A comprehensive overview of the theory of stochastic processes and

its connections to asset pricing, accompanied by some concrete applications. This book presents a self-contained, comprehensive, and yet concise and condensed overview of the theory and methods of probability, integration, stochastic processes, optimal control, and their connections to the principles of asset pricing. The book is broader in scope than other introductory-level graduate texts on the subject, requires fewer prerequisites, and covers

the relevant material at greater depth, mainly without rigorous technical proofs. The book brings to an introductory level certain concepts and topics that are usually found in advanced research monographs on stochastic processes and asset pricing, and it attempts to establish greater clarity on the connections between these two fields. The book begins with measure-theoretic probability and integration, and then develops the classical tools of stochastic

calculus, including stochastic calculus with jumps and Lévy processes. For asset pricing, the book begins with a brief overview of risk preferences and general equilibrium in incomplete finite endowment economies, followed by the classical asset pricing setup in continuous time. The goal is to present a coherent single overview. For example, the text introduces discrete-time martingales as a consequence of market equilibrium considerations

and connects them to the stochastic discount factors before offering a general definition. It covers concrete option pricing models (including stochastic volatility, exchange options, and the exercise of American options), Merton's investment-consumption problem, and several other applications. The book includes more than 450 exercises (with detailed hints). Appendixes cover analysis and topology and computer code related to the practical applications

discussed in the text.

State-Space Models

Springer Science & Business Media

In this book, the authors reconceptualize existing macroeconomics by treating equilibria as statistical distributions, not as fixed points.

The Economics of Inaction

CRC Press

State-space models as an important mathematical tool has been widely used in many different fields.

This edited collection explores recent theoretical developments of the models and their

applications in economics and finance. The book includes nonlinear and non-Gaussian time series models, regime-switching and hidden Markov models, continuous- or discrete-time state processes, and models of equally-spaced or irregularly-spaced (discrete or continuous) observations. The contributed chapters are divided into four parts. The first part is on Particle Filtering and Parameter Learning in Nonlinear State-Space Models. The second part focuses on

the application of Linear State-Space Models in Macroeconomics and Finance. The third part deals with Hidden Markov Models, Regime Switching and Mathematical Finance and the fourth part is on Nonlinear State-Space Models for High Frequency Financial Data. The book will appeal to graduate students and researchers studying state-space modeling in economics, statistics, and mathematics, as well as to finance professionals. Information and Efficiency in Economic Decision

Springer Science & Business Media
 From the Preface The first edition of this book was written mainly for audiences with physical science and engineering backgrounds. Nevertheless, it reached some readers with economic and management science training. Analytical training of graduate students in economics and management sciences had progressed much in the last 20 years, and many new research results and optimization

algorithms have also become available. My own interest in the meantime has shifted to the analysis of dynamics and optimization problems of economic and management science origin. With these developments and changes, I decided to rewrite much of the first edition to make it more accessible to graduate students and professionals in social sciences. I have also incorporated some new analytic tools that I deem useful in analyzing the

dynamic and stochastic problems which confront these readers. I hope that my efforts successfully bring intertemporal optimization problems closer to economics professionals. New topics introduced into this second edition appear mostly in Chapters 2, 4, 5, 6, and 8. Martingales and martingale differences are introduced early in Chapter 2. Some limit theorems and asymptotic properties of linear state space models driven by martingale differences are presented. Because many

excellent books are available on martingales and their limit theorems, derivations and proofs are mostly sketchy, and readers are referred to these sources. The results in Chapter 2 are applied in Chapters 5, 6, and 8, among other places. The notion of dynamic aggregation and its relation to cointegration and error-correction models are developed in Chapter 4. Some recursive parameter estimation schemes and their statistical properties are included in Chapters 5

and 6. Here again, books devoted entirely to these topics are available in the literature, and much had to be omitted to keep the second edition to a manageable size. In an appendix to Chapter 7, a potentially very powerful tool in proving convergence of adaptive schemes is outlined. Rational expectations models and their solution methods are developed in Chapter 8 because of their wide-spread interest to economists. A very important class of problems in sequential

decision problems revolves around questions of approximating nonlinear dynamics or more generally complex situations with a sequence of less complex ones. Chapter 9 does not begin to do justice to this class of problems but is included as being suggestive of works to be done. When I first started contemplating the revision of the first edition, I benefited from a list of excellent suggestions from Rick van der Ploeg, though I did not necessarily incorporate all

of his suggestions. Conversations with Thomas Sargent and Victor Solo were useful in organizing the material into the form of the second edition. I also benefited from discussions with Hashem Pesaran and correspondences with L. Broze in finalizing Chapter 8. Some material in this book was used as lecture notes in a graduate course in the Department of Economics, University of California, Los Angeles, the winter quarter of 1987. I thank the

participants in the course for many useful comments. Key Features * This major revision of the First Edition addresses optimization problems stated in stochastic difference equations, which often contain uncertain or randomly varying parameters * Presents a set of concepts and techniques useful in analyzing or controlling stochastic dynamic processes, with possible incompletely specified characteristics * It discusses basic system properties such as: *

Stability and observability
 * Dynamic programming formulations of optimal and adaptive control problems * Parameter estimation schemes and their convergence behavior * Solution methods for rational expectations models using martingale differences

Optimization of Stochastic Systems

Springer Science & Business Media
 A bibliography on stochastic orderings. Was there a real need for it? In a time of reference

databases as the MathSci or the Science Citation Index or the Social Science Citation Index the answer seems to be negative. The reason we think that this bibliography might be of some use stems from the frustration that we, as workers in the field, have often experienced by finding similar results being discovered and proved over and over in different journals of different disciplines with different levels of mathematical sophistication and accuracy

and most of the times without cross references. Of course it would be very unfair to blame an economist, say, for not knowing a result in mathematical physics, or vice versa, especially when the problems and the languages are so far apart that it is often difficult to recognize the analogies even after further scrutiny. We hope that collecting the references on this topic, regardless of the area of application, will be of some help, at least to pinpoint the problem. We

use the term stochastic ordering in a broad sense to denote any ordering relation on a space of probability measures. Questions that can be related to the idea of stochastic orderings are as old as probability itself. Think for instance of the problem of comparing two gambles in order to decide which one is more favorable.

Stochastic Economics

Princeton University Press
A Practitioner's Guide to
Stochastic Frontier
Analysis Using Stata
provides practitioners in

academia and industry with a step-by-step guide on how to conduct efficiency analysis using the stochastic frontier approach. The authors explain in detail how to estimate production, cost, and profit efficiency and introduce the basic theory of each model in an accessible way, using empirical examples that demonstrate the interpretation and application of models. This book also provides computer code, allowing users to apply the models in their own work, and

incorporates the most recent stochastic frontier models developed in academic literature. Such recent developments include models of heteroscedasticity and exogenous determinants of inefficiency, scaling models, panel models with time-varying inefficiency, growth models, and panel models that separate firm effects and persistent and transient inefficiency. Immensely helpful to applied researchers, this book bridges the chasm between theory and

practice, expanding the range of applications in which production frontier analysis may be implemented.

Modern Problems of Stochastic Analysis and Statistics

Routledge
Stochastic processes are indispensable tools for development and research in signal and image processing, automatic control, oceanography, structural reliability, environmetrics, climatology, econometrics, and many other areas of science and engineering. Suitable for a

one-semester course, *Stationary Stochastic Processes for Scientists and Engineers* teaches students how to use these processes efficiently. Carefully balancing mathematical rigor and ease of exposition, the book provides students with a sufficient understanding of the theory and a practical appreciation of how it is used in real-life situations. Special emphasis is on the interpretation of various statistical models and concepts as well as the types of questions

statistical analysis can answer. The text first introduces numerous examples from signal processing, economics, and general natural sciences and technology. It then covers the estimation of mean value and covariance functions, properties of stationary Poisson processes, Fourier analysis of the covariance function (spectral analysis), and the Gaussian distribution. The book also focuses on input-output relations in linear filters, describes discrete-time auto-

regressive and moving average processes, and explains how to solve linear stochastic differential equations. It concludes with frequency analysis and estimation of spectral densities. With a focus on model building and interpreting the statistical concepts, this classroom-tested book conveys a broad understanding of the mechanisms that generate stationary stochastic processes. By combining theory and applications, the text gives students a well-

rounded introduction to these processes. To enable hands-on practice, MATLAB® code is available online.

Stochastic Calculus and Differential Equations for Physics and Finance

Butterworth-Heinemann
The theory of controlled processes is one of the most recent mathematical theories to show very important applications in modern engineering, particularly for constructing automatic control systems, as well as for problems of economic

control. However, actual systems subject to control do not admit a strictly deterministic analysis in view of random factors of various kinds which influence their behavior. Such factors include, for example, random noise occurring in the electrical system, variations in the supply and demand of commodities, fluctuations in the labor force in economics, and random failures of components on an automated line. The theory of controlled processes takes the random nature of the

behavior of a system into account. In such cases it is natural, when choosing a control strategy, to proceed from the average expected result, taking note of all the possible variants of the behavior of a controlled system. An extensive literature is devoted to various economic and engineering systems of control (some of these works are listed in the Bibliography). is no text which adequately covers the general However, as of now there mathematical theory of controlled processes. The

authors of this monograph have attempted to fill this gap. In this volume the general theory of discrete-parameter (time) controlled processes (Chapter 1) and those with continuous-time (Chapter 2), as well as the theory of controlled stochastic differential equations (Chapter 3), are presented. *Mathematical Modeling in Economics and Finance: Probability, Stochastic Processes, and Differential Equations* Springer Building upon the

previous editions, this textbook is a first course in stochastic processes taken by undergraduate and graduate students (MS and PhD students from math, statistics, economics, computer science, engineering, and finance departments) who have had a course in probability theory. It covers Markov chains in discrete and continuous time, Poisson processes, renewal processes, martingales, and option pricing. One can only learn a subject by seeing it in action, so there are a

large number of examples and more than 300 carefully chosen exercises to deepen the reader's understanding. Drawing from teaching experience and student feedback, there are many new examples and problems with solutions that use TI-83 to eliminate the tedious details of solving linear equations by hand, and the collection of exercises is much improved, with many more biological examples. Originally included in previous editions, material too advanced for

this first course in stochastic processes has been eliminated while treatment of other topics useful for applications has been expanded. In addition, the ordering of topics has been improved; for example, the difficult subject of martingales is delayed until its usefulness can be applied in the treatment of mathematical finance.

Fundamentals of Pure and Applied Economics

Cambridge University Press

A 'stochastic' process is a 'random' or 'conjectural'

process, and this book is concerned with applied probability and statistics. Whilst maintaining the mathematical rigour this subject requires, it addresses topics of interest to engineers, such as problems in modelling, control, reliability maintenance, data analysis and engineering involvement with insurance. This book deals with the tools and techniques used in the stochastic process - estimation, optimisation and recursive logarithms - in a form accessible to

engineers and which can also be applied to Matlab. Amongst the themes covered in the chapters are mathematical expectation arising from increasing information patterns, the estimation of probability distribution, the treatment of distribution of real random phenomena (in engineering, economics,

biology and medicine etc), and expectation maximisation. The latter part of the book considers optimization algorithms, which can be used, for example, to help in the better utilization of resources, and stochastic approximation algorithms, which can provide prototype models in many practical applications. *

An engineering approach to applied probabilities and statistics * Presents examples related to practical engineering applications, such as reliability, randomness and use of resources* Readers with varying interests and mathematical backgrounds will find this book accessible

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