

Ramaprasad Bhar  
and  
Shigeyuki Hamori

# Hidden Markov Models

Applications to Financial  
Economics

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Advanced Studies in  
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# Hidden Markov Models Applications To Financial Economics

**Xuefeng Zhou**



## **Hidden Markov Models Applications To Financial Economics:**

**Hidden Markov Models** Ramaprasad Bhar, Shigeyuki Hamori, 2006-04-18 Markov chains have increasingly become a useful way of capturing stochastic nature of many economic and financial variables. Although the hidden Markov processes have been widely employed for some time in many engineering applications e.g. speech recognition, its effectiveness has now been recognized in areas of social science research as well. The main aim of Hidden Markov Models Applications to Financial Economics is to make such techniques available to more researchers in financial economics. As such we only cover the necessary theoretical aspects in each chapter while focusing on real life applications using contemporary data mainly from OECD group of countries. The underlying assumption here is that the researchers in financial economics would be familiar with such application although empirical techniques would be more traditional econometrics. Keeping the application level in a more familiar level we focus on the methodology based on hidden Markov processes. This will we believe help the reader to develop more in depth understanding of the modeling issues thereby benefiting their future research. *Applications of State Space Models in Finance* Sascha Mergner, 2009 State space models play a key role in the estimation of time varying sensitivities in financial markets. The objective of this book is to analyze the relative merits of modern time series techniques such as Markov regime switching and the Kalman filter to model structural changes in the context of widely used concepts in finance. The presented material will be useful for financial economists and practitioners who are interested in taking time variation in the relationship between financial assets and key economic factors explicitly into account. The empirical part illustrates the application of the various methods under consideration. As a distinctive feature it includes a comprehensive analysis of the ability of time varying coefficient models to estimate and predict the conditional nature of systematic risks for European industry portfolios. *ARCH Models for Financial Applications* Evdokia Xekalaki, Stavros Degiannakis, 2010-03-18 Autoregressive Conditional Heteroskedastic ARCH processes are used in finance to model asset price volatility over time. This book introduces both the theory and applications of ARCH models and provides the basic theoretical and empirical background before proceeding to more advanced issues and applications. The Authors provide coverage of the recent developments in ARCH modelling which can be implemented using econometric software model construction fitting and forecasting and model evaluation and selection. Key Features Presents a comprehensive overview of both the theory and the practical applications of ARCH an increasingly popular financial modelling technique Assumes no prior knowledge of ARCH models the basics such as model construction are introduced before proceeding to more complex applications such as value at risk option pricing and model evaluation Uses empirical examples to demonstrate how the recent developments in ARCH can be implemented Provides step by step instructive examples using econometric software such as Econometric Views and the GARCH module for the Ox software package used in Estimating and Forecasting ARCH Models Accompanied by a CD ROM containing links to the software as well as the datasets used in the examples Aimed at readers wishing to gain an

aptitude in the applications of financial econometric modelling with a focus on practical implementation via applications to real data and via examples worked with econometrics packages

**Assistive Technologies: Concepts, Methodologies, Tools, and Applications** Management Association, Information Resources, 2013-08-31 Individuals with disabilities often have difficulty accomplishing tasks living independently and utilizing information technologies simple aspects of daily life taken for granted by non disabled individuals Assistive Technologies Concepts Methodologies Tools and Applications presents a comprehensive collection of research developments and knowledge on technologies that enable disabled individuals to function effectively and accomplish otherwise impossible tasks These volumes serve as a crucial reference source for experts in fields as diverse as healthcare information science education engineering and human computer interaction with applications bridging multiple disciplines

*Data Analysis and Related Applications, Volume 5* Yiannis Dimotikalis, Christos H. Skiadas, 2025-09-30 This book is a collective work by several leading scientists analysts engineers mathematicians and statisticians who have been working at the forefront of data analysis and related applications arising from data science operations research engineering machine learning or statistics Data Analysis and Related Applications 5 represents a cross section of current concerns and research interests in the above scientific areas The collected material has been divided into appropriate sections to provide the reader with both theoretical and applied information on data analysis methods models and techniques along with appropriate applications

**Nonparametric Bayesian Learning for Collaborative Robot Multimodal Introspection** Xuefeng Zhou, 2020-01-01 This open access book focuses on robot introspection which has a direct impact on physical human robot interaction and long term autonomy and which can benefit from autonomous anomaly monitoring and diagnosis as well as anomaly recovery strategies In robotics the ability to reason solve their own anomalies and proactively enrich owned knowledge is a direct way to improve autonomous behaviors To this end the authors start by considering the underlying pattern of multimodal observation during robot manipulation which can effectively be modeled as a parametric hidden Markov model HMM They then adopt a nonparametric Bayesian approach in defining a prior using the hierarchical Dirichlet process HDP on the standard HMM parameters known as the Hierarchical Dirichlet Process Hidden Markov Model HDP HMM The HDP HMM can examine an HMM with an unbounded number of possible states and allows flexibility in the complexity of the learned model and the development of reliable and scalable variational inference methods This book is a valuable reference resource for researchers and designers in the field of robot learning and multimodal perception as well as for senior undergraduate and graduate university students

*Handbook of Discrete and Combinatorial Mathematics* Kenneth H. Rosen, 2017-10-19 Handbook of Discrete and Combinatorial Mathematics provides a comprehensive reference volume for mathematicians computer scientists engineers as well as students and reference librarians The material is presented so that key information can be located and used quickly and easily Each chapter includes a glossary Individual topics are covered in sections and subsections within chapters each of

which is organized into clearly identifiable parts definitions facts and examples Examples are provided to illustrate some of the key definitions facts and algorithms Some curious and entertaining facts and puzzles are also included Readers will also find an extensive collection of biographies This second edition is a major revision It includes extensive additions and updates Since the first edition appeared in 1999 many new discoveries have been made and new areas have grown in importance which are covered in this edition

**Estimation and Control for Networked Systems with Packet Losses without Acknowledgement** Hong Lin,Hongye Su,Peng Shi,Zhan Shu,Zheng-Guang Wu,2016-09-21 This book discusses recent advances in the estimation and control of networked systems with unacknowledged packet losses systems usually known as user datagram protocol like It presents both the optimal and sub optimal solutions in the form of algorithms which are designed to be implemented easily by computer routines It also provides MATLAB routines for the key algorithms It shows how these methods and algorithms can solve estimation and control problems effectively and identifies potential research directions and ideas to help readers grasp the field more easily The novel auxiliary estimator method which is able to deal with estimators that consist of exponentially increasing terms is developed to analyze the stability and convergence of the optimal estimator The book also explores the structure and solvability of the optimal control i e linear quadratic Gaussian control It develops various sub optimal but efficient solutions for estimation and control for industrial and practical applications and analyzes their stability and performance This is a valuable resource for researchers studying networked control systems especially those related to non TCP like networks The practicality of the ideas included makes it useful for engineers working with networked control

**The Measurement of Economic Relationships** Peter Tryfos,2013-03-09 Astranger in academia cannot but be impressed by the apparent uniformity and precision of the methodology currently applied to the measurement of economic relationships In scores of journal articles and other studies a theoretical argument is typically presented to justify the position that a certain variable is related to certain other possibly causal variables Regression or a related method is applied to a set of observations on these variables and the conclusion often emerges that the causal variables are indeed significant at a certain level thereby lending support to the theoretical argument an argument presumably formulated independently of the observations A variable may be declared significant and few doubt that this does not mean important at say the 0.05 level but not the 0.01 The effects of the variables are calculated to many significant digits and are often accompanied by intervals and forecasts of not quite obvious meaning but certainly of reassuring confidence The uniformity is also evident in the many mathematically advanced text books of statistics and econometrics and in their less rigorous introductory versions for students in economics or business It is reflected in the tools of the profession computer programs from the generaiones addressed to the incidental researcher to the dedicated and sophisticated programs used by the experts display the same terms and implement the same methodology In short there appears no visible alternative to the established methodol ogy and no sign of reservat ions concerning its validity

*Hidden*

*Markov Models in Finance* Rogemar S. Mamon, Robert J Elliott, 2007-04-26 A number of methodologies have been employed to provide decision making solutions to a whole assortment of financial problems in today's globalized markets Hidden Markov Models in Finance by Mamon and Elliott will be the first systematic application of these methods to some special kinds of financial problems namely pricing options and variance swaps valuation of life insurance policies interest rate theory credit risk modeling risk management analysis of future demand and inventory level testing foreign exchange rate hypothesis and early warning systems for currency crises This book provides researchers and practitioners with analyses that allow them to sort through the random noise of financial markets i.e. turbulence volatility emotion chaotic events etc and analyze the fundamental components of economic markets Hence Hidden Markov Models in Finance provides decision makers with a clear accurate picture of core financial components by filtering out the random noise in financial markets Indian Economy: Empirical Analysis On Monetary And Financial Issues In India Shigeyuki Hamori, Takeshi Inoue, 2014-09-05 India's financial sector has undergone significant changes following the start of the economic liberalization in the early 1990s In addition to providing important information on monetary and financial issues in India this book also provides examples to analyze a developing economy by using macro financial data The book also focuses on three main topics that is monetary policy financial markets and finance poverty nexus and provides new insights into these issues by applying some recently developed quantitative techniques The World Scientific Handbook Of Futures Markets Anastasios G Malliaris, William T Ziemba, 2015-08-06 The World Scientific Handbook of Futures Markets serves as a definitive source for comprehensive and accessible information in futures markets The emphasis is on the unique characteristics of futures markets that make them worthy of a special volume In our judgment futures markets are currently undergoing remarkable changes as trading is shifting from open outcry to electronic and as the traditional functions of hedging and speculation are extended to include futures as an alternative investment vehicle in traditional portfolios The unique feature of this volume is the selection of five classic papers that lay the foundations of the futures markets and the invitation to the leading academics who do work in the area to write critical surveys in a dozen important topics **The European Sovereign Debt Crisis and Its Impacts on Financial Markets** Go Tamakoshi, Shigeyuki Hamori, 2015-02-11 The global financial crisis saw many Eurozone countries bearing excessive public debt This led the government bond yields of some peripheral countries to rise sharply resulting in the outbreak of the European sovereign debt crisis The debt crisis is characterized by its immediate spread from Greece the country of origin to its neighbouring countries and the connection between the Eurozone banking sector and the public sector debt Addressing these interesting features this book sheds light on the impacts of the crisis on various financial markets in Europe This book is among the first to conduct a thorough empirical analysis of the European sovereign debt crisis It analyses using advanced econometric methodologies why the crisis escalated so prominently having significant impacts on a wide range of financial markets and was not just limited to government bond markets The book also allows one

to understand the consequences and the overall impact of such a debt crisis enabling investors and policymakers to formulate diversification strategies and create suitable regulatory frameworks

**Income Elasticity and Economic Development** M. Ohidul Haque, 2005-10-24 Income Elasticity and Economic Development Methods and Applications is mainly concerned with methods of estimating income elasticity This field is connected with economic development that can be achieved by reducing income inequality This is highly relevant in today's world where the gap between rich and poor is widening with the growth of economic development Income Elasticity and Economic Development Methods and Applications provides a good example in showing how to calculate income elasticity using a number of methods from widely available grouped data Some of the techniques presented here can be used in a wide range of policy areas in all developed developing and under developed countries Policy analysts economists business analysts and market researchers will find this book very useful

*Modeling Simulation and Optimization* Shkelzen Cakaj, 2010-04-01 Parametric representation of shapes mechanical components modeling with 3D visualization techniques using object oriented programming the well known golden ratio application on vertical and horizontal displacement investigations of the ground surface spatial modeling and simulating of dynamic continuous fluid flow process simulation model for waste water treatment an interaction of tilt and illumination conditions at flight simulation and errors in taxiing performance plant layout optimal plot plan atmospheric modeling for weather prediction a stochastic search method that explores the solutions for hill climbing process cellular automata simulations thyristor switching characteristics simulation and simulation framework toward bandwidth quantization and measurement are all topics with appropriate results from different research backgrounds focused on tolerance analysis and optimal control provided in this book

**Financial Linkages, Remittances, and Resource Dependence in East Asia** Takuji E. T. Al KINKYO, 2016-01-06 The purpose of this book is to empirically analyse the multifaceted nature of financial linkages in East Asia and to discuss the key policy challenges faced by the region's economies Although the emphasis is placed on East Asia some of the chapters cover a broader area of countries depending on the aim of the study Particular areas of focus in these studies include the evolution of cross border financial linkages in East Asia long run economic consequences of remittance inflows and natural resource dependence and policy priorities for the financial integration and management of resource rich economies

*Introduction of the Euro and the Monetary Policy of the European Central Bank* Shigeyuki Hamori, Naoko Hamori, 2010 The Euro area is an extremely unique and important currency area for two reasons First it is the single largest currency area to be created in an industrialized region In a sense the Euro area is important as a test case for those contemplating the establishment of new currency areas in East Asia North America or other industrialized regions Second it was established by sovereign states working as peers who despite various challenges peacefully and autonomously decided to create a single currency area In other words the Euro area is very different from other currency areas created by countries formerly in colonial relationships with each other Therefore for

regions emerging from a developing status and forming a currency area the Euro area could serve as a model case Marking the 10th anniversary of the creation of the European Central Bank ECB and the Euro this invaluable book analyzes the monetary policy of the ECB the guardian of the Euro by using recently developed econometric methods The analysis performed in this book marks a substantial contribution toward understanding the significance of the Euro area as well as the future of the Euro from an international perspective Handbook of Research Methods and Applications in Empirical Finance Adrian R. Bell,Chris Brooks,Marcel Prokopczuk,2013-01-01 This impressive Handbook presents the quantitative techniques that are commonly employed in empirical finance research together with real world state of the art research examples Written by international experts in their field the unique approach describes a question or issue in finance and then demonstrates the methodologies that may be used to solve it All of the techniques described are used to address real problems rather than being presented for their own sake and the areas of application have been carefully selected so that a broad range of methodological approaches can be covered The Handbook is aimed primarily at doctoral researchers and academics who are engaged in conducting original empirical research in finance In addition the book will be useful to researchers in the financial markets and also advanced Masters level students who are writing dissertations **Textbook Of Bioinformatics, A: Information-theoretic Perspectives Of Bioengineering And Biological Complexes** Perambur S Neelakanta,2020-08-24 This book on bioinformatics is designed as an introduction to the conventional details of genomics and proteomics as well as a practical comprehension text with an extended scope on the state of the art bioinformatic details pertinent to next generation sequencing translational clinical bioinformatics and vaccine design related viral informatics It includes four major sections i An introduction to bioinformatics with a focus on the fundamentals of information theory applied to biology microbiology with notes on bioinformatic resources data bases information networking and tools ii a collection of annotations on the analytics of biomolecular sequences with pertinent details presented on biomolecular informatics pairwise and multiple sequences viral sequence informatics next generation sequencing and translational clinical bioinformatics iii a novel section on cytogenetic and organelle bioinformatics explaining the entropy theoretics of cellular structures and the underlying informatics of syntenic correlations and iv a comprehensive presentation on phylogeny and species informatics The book is aimed at students faculty and researchers in biology health medical sciences veterinary agricultural sciences bioengineering biotechnology and genetic engineering It will be a useful companion for managerial personnel in the biotechnology and bioengineering industries as well as in health medical science Financial Globalization and Regionalism in East Asia Takuji Kinkyo,Yoichi Matsubayashi,Shigeyuki Hamori,2013-12-04 With increased resilience in the financial systems emerging Asian economies were less affected by the recent global financial crisis recovering more quickly from the crisis than major advanced economies Yet Asian financial systems remain underdeveloped More open and efficient financial systems continue to be a key priority for Asia s development strategy Emerging Asian economies need to



tackle the new challenges to macroeconomic and financial stability posed by financial globalisation This book identifies the key challenges to Asia's financial development in an era of rapid financial globalisation and discusses their policy implications for financial reforms and regional cooperation in East Asia Particular areas of focus include the impact of financial globalisation on economic stability and inequality in East Asian economies the progress of Asia's regional financial cooperation and lessons from the recent European economic crisis and the priority of financial reforms in individual Asian economies Combining advanced econometric methods and in depth case studies this book provides rigorous and contextual analyses of the most critical issues for Asia's financial development It offers a comprehensive and useful guide for students academics and policymakers interested in the current state and future prospects of Asian financial systems

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