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Dynamic Programming In Economics

Transforming an infinite horizon problem into a Dynamic Programming one Solving a Simple Finite Horizon Dynamic Programming Problem Introduction to LQG dynamic programming for macroeconomics Applications of Dynamic Programming in Economics (1/5): The Cake Eating Problem I Nonlinear Control: Hamilton Jacobi Bellman (HJB) and Dynamic Programming Part 1: An Overview - Introduction to Dynamic Programming Dynamic Optimization Part 1: Preliminaries 4 Principle of Optimality - Dynamic Programming introduction Autonomous Problems and the Current Value Hamiltonian Optimal Control: Solving Continuous Time Optimization Problems Lecture 19 (Bellman Eq.) Dynamic Programming Explained (Practical Examples) Stochastic Dynamic Programming Lecture 2, Spring 2022: Stochastic DP, finite and infinite horizon. ASU LINMA2491: Stochastic Dual Dynamic Programming The Ramsey-Cass-Koopmans Model Part 1: Derivation Exploiting Symmetry in High-Dimensional Dynamic Programming Economic Dispatch full Matlab-code based dynamic programming Applications of Dynamic Programming in Economics: Deriving the Euler Equation Principle of Optimality - Dynamic Programming Economic Applications of Stochastic Dynamic Programming (2/3): Eating Cake with Thieves. Bellman Equation - Explained! Just physics student things #shorts #math #astrophysics Dynamic Optimization Part 3: Continuous Time Math-Econ-Dynamic Programming Part 1 Applications of Continuous Time Stochastic Dynamic Programming in Economics: Part 1/4

Elements of Dynamic Optimization
Exercises in Dynamic Macroeconomic Theory
Dynamic Programming of Economic Decisions
Economic Dynamics, second edition
Recursive Methods in Economic Dynamics
Dynamic Programming and Its Application in Economics and Finance
Dynamic Programming
Recursive Methods in Economic Dynamics
Optimization in Economic Theory
Dynamic Economics

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Dynamic Programming in Economics
Numerical Methods in Economics
Dynamic Programming Solutions for Economic Models Requiring Little Information about the Future

BRIANA STOUT

Elements of Dynamic Optimization Princeton University Press
Dynamic Programming in EconomicsSpringer Science & Business Media
Exercises in Dynamic Macroeconomic Theory Elsevier
The purpose of this paper is to discuss some variational problems arising from mathematical economics, and some of the methods that can be used to treat these questions both analytically and computationally. The discussion is limited to important and interesting classes of processes, allocation and smoothing processes, and to a discussion of the application of the theory of dynamic programming to those processes. (Author).
Dynamic Programming of Economic Decisions Oxford University Press
A rigorous and example-driven introduction to topics in economic dynamics, with an emphasis on mathematical and computational techniques for modeling dynamic systems. This text provides an introduction to the modern theory of economic dynamics, with emphasis on mathematical and computational techniques for modeling dynamic systems. Written to be both rigorous and engaging, the book shows how sound understanding of the underlying theory leads to effective algorithms for solving real world problems. The material makes extensive use of programming examples to illustrate ideas. These programs help bring to life the abstract concepts in the text. Background in computing and analysis is offered for readers without programming experience or upper-level mathematics. Topics covered in detail include nonlinear dynamic systems, finite-state Markov chains, stochastic dynamic programming, stochastic stability and computation of equilibria. The models are predominantly nonlinear, and the emphasis is on studying nonlinear systems in their original form, rather than by means of rudimentary approximation methods such as linearization. Much of the material is new to economics and improves on existing

techniques. For graduate students and those already working in the field, Economic Dynamics will serve as an essential resource.
Economic Dynamics, second edition Courier Corporation
This rigorous but brilliantly lucid book presents a self-contained treatment of modern economic dynamics. Stokey, Lucas, and Prescott develop the basic methods of recursive analysis and illustrate the many areas where they can usefully be applied.
Recursive Methods in Economic Dynamics Springer Science & Business Media
One of the fundamental economic problems is one of making the best use of limited resources. As a result, mathematical optimisation methods play a crucial role in economic theory. Covering the use of such methods in applied and policy contexts, this book deals not only with the main techniques (linear programming, nonlinear optimisation and dynamic programming), but also emphasizes the art of model-building and discusses fields such as optimisation over time.
Dynamic Programming and Its Application in Economics and Finance Princeton University Press
Humans interact with and are part of the mysterious processes of nature. Inevitably they have to discover how to manage the environment for their long-term survival and benefit. To do this successfully means learning something about the dynamics of natural processes, and then using the knowledge to work with the forces of nature for some desired outcome. These are intriguing and challenging tasks. This book describes a technique which has much to offer in attempting to achieve the latter task. A knowledge of dynamic programming is useful for anyone interested in the optimal management of agricultural and natural resources for two reasons. First, resource management problems are often problems of dynamic optimization. The dynamic programming approach offers insights into the economics of dynamic optimization which can be explained much more simply than can other approaches. Conditions for the optimal management of a resource can be derived using the logic of dynamic programming, taking as a starting point the usual economic definition of the value of a resource which is optimally managed through time. This is set out in Chapter I for a general resource problem with the minimum of mathematics. The results are related to the discrete maximum principle of control theory. In subsequent chapters dynamic programming arguments are used to derive optimality conditions for particular resources.
Dynamic Programming Springer
Since its initial publication, this text has defined courses in dynamic optimization taught to economics and management science students. The two-part treatment covers the calculus of variations and optimal control. 1998 edition.

Recursive Methods in Economic Dynamics

Waveland Press
Advanced Textbooks in Economics, Volume 1: Variational Methods in Economics focuses on the application of variational methods in economics, including autonomous system, dynamic programming, and phase spaces and diagrams. The manuscript first elaborates on growth models in economics and calculus of variations. Discussions focus on connection with dynamic programming, variable end points-free boundaries, transversality at infinity, sensitivity analysis-end point changes, Weierstrass and

Legendre necessary conditions, and phase diagrams and phase spaces. The text then ponders on the constraints of classical theory, including unbounded intervals of integration, free boundary conditions, comparison functions, normality, and the problem of Bolza. The publication explains two-sector models of optimal economic growth, optimal control theory, and connections with the classical theory. Topics include capital good immobile between industries, constrained state variables, linear control problems, conversion of a control problem into a problem of Lagrange, and the conversion of a nonautonomous system into an autonomous system. The book is a valuable source of information for economists and researchers interested in the variational methods in economics.

Optimization in Economic Theory Cambridge University Press
Foundations of Dynamic Economic Analysis presents a modern and thorough exposition of the fundamental mathematical formalism used to study optimal control theory, i.e., continuous time dynamic economic processes, and to interpret dynamic economic behavior. The style of presentation, with its continual emphasis on the economic interpretation of mathematics and models, distinguishes it from several other excellent texts on the subject. This approach is aided dramatically by introducing the dynamic envelope theorem and the method of comparative dynamics early in the exposition. Accordingly, motivated and economically revealing proofs of the transversality conditions come about by use of the dynamic envelope theorem. Furthermore, such sequencing of the material naturally leads to the development of the primal-dual method of comparative dynamics and dynamic duality theory, two modern approaches used to tease out the empirical content of optimal control models. The stylistic approach ultimately draws attention to the empirical richness of optimal control theory, a feature missing in virtually all other textbooks of this type.

Dynamic Economics London : Department of Economics, University of Western Ontario
Optimal control theory is a technique being used increasingly by academic economists to study problems involving optimal decisions in a multi-period framework. This textbook is designed to make the difficult subject of optimal control theory easily accessible to economists while at the same time maintaining rigour. Economic intuitions are emphasized, and examples and problem sets covering a wide range of applications in economics are provided to assist in the learning process. Theorems are clearly stated and their proofs are carefully explained. The development of the text is gradual and fully integrated, beginning with simple formulations and progressing to advanced topics such as control parameters, jumps in state variables, and bounded state space. For greater economy and elegance, optimal control theory is introduced directly, without recourse to the calculus of variations. The connection with the latter and with dynamic programming is explained in a separate chapter. A second purpose of the book is to draw the parallel between optimal control theory and static optimization. Chapter 1 provides an extensive treatment of constrained and unconstrained maximization, with emphasis on economic insight and applications. Starting from basic concepts, it derives and explains important results, including the envelope theorem and the method of comparative statics. This chapter may be used for a

course in static optimization. The book is largely self-contained. No previous knowledge of differential equations is required.

Investment and Exit Decisions at the Plant Level

Springer Science & Business Media
From household appliances to applications in robotics, engineered systems involving complex dynamics can only be as effective as the algorithms that control them. While Dynamic Programming (DP) has provided researchers with a way to optimally solve decision and control problems involving complex dynamic systems, its practical value was limited by algorithms that lacked the capacity to scale up to realistic problems. However, in recent years, dramatic developments in Reinforcement Learning (RL), the model-free counterpart of DP, changed our understanding of what is possible. Those developments led to the creation of reliable methods that can be applied even when a mathematical model of the system is unavailable, allowing researchers to solve challenging control problems in engineering, as well as in a variety of other disciplines, including economics, medicine, and artificial intelligence. Reinforcement Learning and Dynamic Programming Using Function Approximators provides a comprehensive and unparalleled exploration of the field of RL and DP. With a focus on continuous-variable problems, this seminal text details essential developments that have substantially altered the field over the past decade. In its pages, pioneering experts provide a concise introduction to classical RL and DP, followed by an extensive presentation of the state-of-the-art and novel methods in RL and DP with approximation. Combining algorithm development with theoretical guarantees, they elaborate on their work with illustrative examples and insightful comparisons. Three individual chapters are dedicated to representative algorithms from each of the major classes of techniques: value iteration, policy iteration, and policy search. The features and performance of these algorithms are highlighted in extensive experimental studies on a range of control applications. The recent development of applications involving complex systems has led to a surge of interest in RL and DP methods and the subsequent need for a quality resource on the subject. For graduate students and others new to the field, this book offers a thorough introduction to both the basics and emerging methods. And for those researchers and practitioners working in the fields of optimal and adaptive control, machine learning, artificial intelligence, and operations research, this resource offers a combination of practical algorithms, theoretical analysis, and comprehensive examples that they will be able to adapt and apply to their own work. Access the authors' website at www.dcsc.tudelft.nl/rlbook/ for additional material, including computer code used in the studies and information concerning new developments.

Estimation of Dynamic Programming Models with Censored Dependent Variables Cambridge University Press
This book is a companion volume to Dynamic Macroeconomic Theory by Thomas J. Sargent. It provides scrimmages in dynamic macroeconomic theory--precisely the kind of drills that people will need in order to learn the techniques of dynamic programming and its applications to economics. By doing these exercises, the reader can acquire the ability to put the theory to work in a variety of new situations, build technical skill, gain experience in

fruitful ways of setting up problems, and learn to distinguish cases in which problems are well posed from cases in which they are not.The basic framework provided by variants of a dynamic general equilibrium model is used to analyze problems in macroeconomics and monetary economics. An equilibrium model provides a mapping from parameters of preferences, technologies, endowments, and "rules of the game" to a probability model for time series. The rigor of the logical connections between theory and observations that the mapping provides is an attractive feature of dynamic equilibrium, or "rational expectations," models. This book gives repeated and varied practice in constructing and interpreting this mapping.

Dynamic Economics Dynamic Programming in Economics
This work provides a unified and simple treatment of dynamic economics using dynamic optimization as the main theme, and the method of Lagrange multipliers to solve dynamic economic problems. The author presents the optimization framework for dynamic economics in order that readers can understand the approach and use it as they see fit. Instead of using dynamic programming, the author chooses instead to use the method of Lagrange multipliers in the analysis of dynamic optimization because it is easier and more efficient than dynamic programming, and allows readers to understand the substance of dynamic economics better. The author treats a number of topics in economics, including economic growth, macroeconomics, microeconomics, finance and dynamic games. The book also teaches by examples, using concepts to solve simple problems; it then moves to general propositions.

Introduction to Methods of Optimization MIT Press
The second edition of a rigorous and example-driven introduction to topics in economic dynamics that emphasizes techniques for modeling dynamic systems. This text provides an introduction to the modern theory of economic dynamics, with emphasis on mathematical and computational techniques for modeling dynamic systems. Written to be both rigorous and engaging, the book shows how sound understanding of the underlying theory leads to effective algorithms for solving real-world problems. The material makes extensive use of programming examples to illustrate ideas, bringing to life the abstract concepts in the text. Key topics include algorithms and scientific computing, simulation, Markov models, and dynamic programming. Part I introduces fundamentals and part II covers more advanced material. This second edition has been thoroughly updated, drawing on recent research in the field. New for the second edition: “Programming-language agnostic” presentation using pseudocode. New chapter 1 covering conceptual issues concerning Markov chains such as ergodicity and stability. New focus in chapter 2 on algorithms and techniques for program design and high-performance computing. New focus on household problems rather than optimal growth in material on dynamic programming. Solutions to many exercises, code, and other resources available on a supplementary website.

Dynamic Programming MIT Press
Multistage decision problems are numerically challenging. Typically the work to solve such problems is an exponential function with respect to both the number of stages and the number of decision parameters. The problems have been researched extensively and a wide variety of methods to solve

them have been proposed. Inevitably all methods are limited in the size of problem they can solve. The purpose of our work is to develop a new more efficient algorithm and one that can run on parallel architectures, thereby extending significantly the size of problems that are tractable. We present a numerical dynamic programming algorithm that has three components: optimization, approximation, and integration. A key feature of the approximation methods we use is to preserve mathematical features such as convexity and differentiability, which enables us to use powerful optimization methods. To illustrate the efficiency of the new method we present extensive results on optimal growth models and dynamic portfolio problems, using our implementation of the algorithm on the Condor Master-Worker system.

Springer Science & Business Media

This comprehensive study of dynamic programming applied to numerical solution of optimization problems. It will interest aerodynamic, control, and industrial engineers, numerical analysts, and computer specialists, applied mathematicians, economists, and operations and systems analysts. Originally published in 1962. The Princeton Legacy Library uses the latest print-on-demand technology to again make available previously out-of-print books from the distinguished backlist of Princeton University Press. These editions preserve the original texts of these important books while presenting them in durable paperback and hardcover editions. The goal of the Princeton Legacy Library is to vastly increase access to the rich scholarly heritage found in the thousands of books published by Princeton University Press since its founding in 1905.

Optimisation in Economic Analysis

Oxford University Press, USA

Dynamic Programming is the analysis of multistage decision in the sequential mode. It is now widely recognized as a tool of great versatility and power, and is applied to an increasing extent in all phases of economic analysis, operations research, technology, and also in mathematical theory itself. In economics and operations research its impact may someday rival that of linear programming. The importance of this field is made apparent through a growing number of publications. Foremost among these is the pioneering work of Bellman. It was he who originated the basic ideas, formulated the principle of optimality, recognized its power, coined the terminology, and developed many of the present applications. Since then mathe maticians, statisticians, operations researchers, and economists have come in, laying more rigorous foundations [KARLIN, BLACKWELL], and developing in depth such application as to the control of stochastic processes [HoWARD, JEWELL]. The field of inventory control has almost split off as an independent branch of Dynamic Programming on which a great deal of effort has been expended [ARRoW, KARLIN, SCARF], [WIDTIN] , [WAGNER]. Dynamic Programming is also playing an in creasing role in modem mathematical control theory [BELLMAN, Adap tive Control Processes (1961)]. Some of the most exciting work is going on in adaptive programming which is closely related to sequential statistical analysis, particularly in its Bayesian form. In this monograph the reader is introduced to the basic ideas of Dynamic Programming.

Economic Dynamics Springer Science & Business Media
Dynamic Programming in Economics is an outgrowth of a course intended for students in the first year PhD program and for researchers in Macroeconomics Dynamics. It can be used by students and researchers in Mathematics as well as in Economics. The purpose of Dynamic Programming in Economics is twofold: (a) to provide a rigorous, but not too complicated, treatment of optimal growth models in infinite discrete time horizon, (b) to train the reader to the use of optimal growth models and hence to help him to go further in his research. We are convinced that there is a place for a book which stays somewhere between the "minimum tool kit" and specialized monographs leading to the frontiers of research on optimal growth.
Dynamic Programming in Economics MIT Press
The tasks of macroeconomics are to interpret observations on economic aggregates in terms of the motivations and constraints of economic agents and to predict the consequences of alternative hypothetical ways of administering government economic policy. General equilibrium models form a convenient context for analyzing such alternative government policies. In the past ten years, the strengths of general equilibrium models and the corresponding deficiencies of Keynesian and monetarist models of the 1960s have induced macroeconomists to begin applying general equilibrium models. This book describes some general equilibrium models that are dynamic, that have been built to help interpret time-series of observations of economic aggregates and to predict the consequences of alternative government interventions. The first part of the book describes dynamic programming, search theory, and real dynamic capital pricing models. Among the applications are stochastic optimal growth models, matching models, arbitrage pricing theories, and theories of interest rates, stock prices, and options. The remaining parts of the book are devoted to issues in monetary theory; currency-in-utility-function models, cash-in-advance models, Townsend turnpike models, and overlapping generations models are all used to study a set of common issues. By putting these models to work on concrete problems in exercises offered throughout the text, Sargent provides insights into the strengths and weaknesses of these models of money. An appendix on functional analysis shows the unity that underlies the mathematics used in disparate areas of rational expectations economics. This book on dynamic equilibrium macroeconomics is suitable for graduate-level courses; a companion book, Exercises in Dynamic Macroeconomic Theory, provides answers to the exercises and is also available from Harvard University Press.
Numerical Methods in Economics Springer Science & Business Media
This work presents the optimization framework for dynamic economics and treats a number of topics in economics, including growth, macroeconomics, microeconomics, finance and dynamic games. The book also teaches by examples, using concepts to solve simple problems, moving on to general propositions.

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