

Investment Science Luenberger

Everything you need to get a grip on the complex world of derivatives. Written by the internationally respected academic/finance professional author team of Sebastien Bossu and Philippe Henrotte, *An Introduction to Equity Derivatives* is the fully updated and expanded second edition of the popular *Finance and Derivatives*. It covers all of the fundamentals of quantitative finance clearly and concisely without going into unnecessary technical detail. Designed for both new practitioners and students, it requires no prior background in finance and features twelve chapters of gradually increasing difficulty, beginning with basic principles of interest rate and discounting, and ending with advanced concepts in derivatives, volatility trading, and exotic products. Each chapter includes numerous illustrations and exercises accompanied by the relevant financial theory. Topics covered include present value, arbitrage pricing, portfolio theory, derivatives pricing, delta-hedging, the Black-Scholes model, and more. An excellent resource for finance professionals and investors looking to acquire an understanding of financial derivatives theory and practice. Completely revised and updated with new chapters, including coverage of cutting-edge concepts in volatility trading and exotic products. An accompanying website is available which contains additional resources.

including powerpoint slides and spreadsheets. Visit www.introeqd.com for details.

Operations Research (OR) began as an interdisciplinary activity to solve complex military problems during World War II. Utilizing principles from mathematics, engineering, business, computer science, economics, and statistics, OR has developed into a full fledged academic discipline with practical application in business, industry, government and military. Currently regarded as a body of established mathematical models and methods essential to solving complicated management issues, OR provides quantitative analysis of problems from which managers can make objective decisions. Operations Research and Management Science (OR/MS) methodologies continue to flourish in numerous decision making fields. Featuring a mix of international authors, Operations Research and Management Science Handbook combines OR/MS models, methods, and applications into one comprehensive, yet concise volume. The first resource to reach for when confronting OR/MS difficulties, this text – Provides a single source guide in OR/MS Bridges theory and practice Covers all topics relevant to OR/MS Offers a quick reference guide for students, researchers and practitioners Contains unified and up-to-date coverage designed and edited with non-experts in mind Discusses software availability for all OR/MS

techniques Includes contributions from a mix of domestic and international experts The 26 chapters in the handbook are divided into two parts. Part I contains 14 chapters that cover the fundamental OR/MS models and methods. Each chapter gives an overview of a particular OR/MS model, its solution methods and illustrates successful applications. Part II of the handbook contains 11 chapters discussing the OR/MS applications in specific areas. They include airlines, e-commerce, energy systems, finance, military, production systems, project management, quality control, reliability, supply chain management and water resources. Part II ends with a chapter on the future of OR/MS applications.

The easy way to get started in investing The most stressful investment for any new investor is the first one. All About Investing helps remove that stress, by providing inexperienced investors with techniques for establishing realistic investment goals, buying the proper assets to meet those goals, and constructing a safe and suitable portfolio of long-term investments.

Engineers must make decisions regarding the distribution of expensive resources in a manner that will be economically beneficial. This problem can be realistically formulated and logically analyzed with optimization theory. This book shows engineers how to use optimization theory to solve complex problems. Unifies the large field of optimization with

a few geometric principles. Covers functional analysis with a minimum of mathematics. Contains problems that relate to the applications in the book. Professional text/reference on mathematical finance. Portfolio construction is fundamental to the investment management process. In the 1950s, Harry Markowitz demonstrated the benefits of efficient diversification by formulating a mathematical program for generating the "efficient frontier" to summarize optimal trade-offs between expected return and risk. The Markowitz framework continues to be used as a basis for both practical portfolio construction and emerging research in financial economics. Such concepts as the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT), for example, provide the foundation for setting benchmarks, for predicting returns and risk, and for performance measurement. This volume showcases original essays by some of today's most prominent academics and practitioners in the field on the contemporary application of Markowitz techniques. Covering a wide spectrum of topics, including portfolio selection, data mining tests, and multi-factor risk models, the book presents a comprehensive approach to portfolio construction tools, models, frameworks, and analyses, with both practical and theoretical implications.

A comprehensive text and reference, first published in 2002, on the theory of financial engineering with

numerous algorithms for pricing, risk management, and portfolio management.

This third edition of the classic textbook in Optimization has been fully revised and updated. It comprehensively covers modern theoretical insights in this crucial computing area, and will be required reading for analysts and operations researchers in a variety of fields. The book connects the purely analytical character of an optimization problem, and the behavior of algorithms used to solve it. Now, the third edition has been completely updated with recent Optimization Methods. The book also has a new co-author, Yinyu Ye of California's Stanford University, who has written lots of extra material including some on Interior Point Methods.

This volume provides the definitive treatment of fortune's formula or the Kelly capital growth criterion as it is often called. The strategy is to maximize long run wealth of the investor by maximizing the period by period expected utility of wealth with a logarithmic utility function. Mathematical theorems show that only the log utility function maximizes asymptotic long run wealth and minimizes the expected time to arbitrary large goals. In general, the strategy is risky in the short term but as the number of bets increase, the Kelly bettor's wealth tends to be much larger than those with essentially different strategies. So most of the time, the Kelly bettor will have much more wealth than these other bettors but the Kelly strategy can lead to considerable losses a small percent of the time. There are ways to reduce this risk at the cost of lower expected final wealth using fractional Kelly strategies that blend the Kelly suggested wager with cash.

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The various classic reprinted papers and the new ones written specifically for this volume cover various aspects of the theory and practice of dynamic investing. Good and bad properties are discussed, as are fixed-mix and volatility induced growth strategies. The relationships with utility theory and the use of these ideas by great investors are featured. A comprehensive introduction to the tools, techniques and applications of convex optimization.

This book discusses scenarios for risk management and developing global investment strategies. What are the chances that various future events will occur over time and how should these events and probable occurrence influence investment decisions? Assessing all possible outcomes is fundamental to risk management, financial engineering and investment and hedge fund strategies. A careful consideration of future scenarios will lead to better investment decisions and avoid financial disasters. The book presents tools and case studies around the world for analyzing a wide variety of investment strategies, building scenarios to optimize returns.

Revised edition of the author's *The map and the territory: risk, human nature, and the future of forecasting*, published in 2013.

In spite of theoretical benefits, Markowitz mean-variance (MV) optimized portfolios often fail to meet practical investment goals of marketability, usability, and performance, prompting many investors to seek simpler alternatives. Financial experts Richard and Robert Michaud demonstrate that the limitations of MV optimization are not the result of conceptual flaws in Markowitz theory but unrealistic representation of investment information. What is missing is a realistic treatment of estimation error in the optimization and rebalancing process. The text provides a non-technical review of classical Markowitz optimization and traditional objections. The authors

demonstrate that in practice the single most important limitation of MV optimization is oversensitivity to estimation error. Portfolio optimization requires a modern statistical perspective. Efficient Asset Management, Second Edition uses Monte Carlo resampling to address information uncertainty and define Resampled Efficiency (RE) technology. RE optimized portfolios represent a new definition of portfolio optimality that is more investment intuitive, robust, and provably investment effective. RE rebalancing provides the first rigorous portfolio trading, monitoring, and asset importance rules, avoiding widespread ad hoc methods in current practice. The Second Edition resolves several open issues and misunderstandings that have emerged since the original edition. The new edition includes new proofs of effectiveness, substantial revisions of statistical estimation, extensive discussion of long-short optimization, and new tools for dealing with estimation error in applications and enhancing computational efficiency. RE optimization is shown to be a Bayesian-based generalization and enhancement of Markowitz's solution. RE technology corrects many current practices that may adversely impact the investment value of trillions of dollars under current asset management. RE optimization technology may also be useful in other financial optimizations and more generally in multivariate estimation contexts of information uncertainty with Bayesian linear constraints. Michaud and Michaud's new book includes numerous additional proposals to enhance investment value including Stein and Bayesian methods for improved input estimation, the use of portfolio priors, and an economic perspective for asset-liability optimization. Applications include investment policy, asset allocation, and equity portfolio optimization. A simple global asset allocation problem illustrates portfolio optimization techniques. A final chapter includes practical advice for avoiding simple portfolio

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design errors. With its important implications for investment practice, Efficient Asset Management 's highly intuitive yet rigorous approach to defining optimal portfolios will appeal to investment management executives, consultants, brokers, and anyone seeking to stay abreast of current investment technology. Through practical examples and illustrations, Michaud and Michaud update the practice of optimization for modern investment management.

Investment Science is designed for the core theoretical finance course in quantitative investment and for those individuals interested in the current state of development in the field -- what the essential ideas are, how they are represented, how they are represented, how they can be used in actual investment practice, and where the field might be headed in the future. The coverage is similar to more intuitive texts but goes much farther in terms of mathematical content, featuring varying levels of mathematical sophistication throughout. The emphasis of the text is on the fundamental principles and how they can be mastered and transformed into solutions of important and interesting investment problems. End-of the chapter exercises are also included, and unlike most books in the field, Investment Science does not concentrate on institutional detail, but instead focuses on methodology.

Fresh, lively text serves as a modern introduction to the subject, with applications to the mechanics of systems with a finite number of degrees of freedom. Ideal for math and physics students.

Difference and differential equations; Linear algebra; Linear state equations; Linear systems with constant coefficients; Positive systems; Markov chains; Concepts of control; Analysis of nonlinear systems; Some important dynamic systems; Optimal control.

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Practical Financial Optimization is a comprehensive guide to optimization techniques in financial decision making. This book illuminates the relationship between theory and practice, providing the readers with solid foundational knowledge. Focuses on classical static mean-variance analysis and portfolio immunization, scenario-based models, multi-period dynamic portfolio optimization, and the relationships between classes of models Analyzes real world applications and implications for financial engineers Includes a list of models and a section on notations that includes a glossary of symbols and abbreviations

Securities Valuation: Applications of Financial Modeling is a clear, concise guide to securities valuation and the principles of financial theory. It describes state-of-the-art methods for valuing a broad range of securities: equity, equity and interest rate options, swaps and swaptions, treasuries, corporate bonds with and without credit risks, mortgage-backed securities, collateralized mortgage obligations, credit derivative swaps, and more. Thomas Ho and Sang Bin Lee use their combined fifty years of experience in academia, financial business, and public services to present students and general readers with twenty-six challenging cases. These cases describe the contexts in which financial models are used, the practical complications of these models, and ways to deal with their limitations. Each chapter begins with a problem in valuation, formulates models for it, and then provides the solutions. The assumptions, input data, and output solutions for each model are clearly stated. The model is illustrated by a numerical example rendered in Excel. A

companion website-www.thomasho.com-contains more than 130 Excel files of all the financial models from this book and its three companion volumes. Users can download the models, analyze them on their spreadsheets, and use them to do practice exercises

Securities Valuation: Applications of Financial Modeling is ideal for undergraduate and graduate courses in finance and mathematical finance as well as for professional training programs. It is part of a series on financial modeling by the authors that also includes The Oxford Guide to Financial Modeling. Future titles in the series will focus on financial modeling for options, futures, and derivatives and financial modeling for financial institutions.

With 'Investment Science', David G. Luenberger offers an introduction to the fundamentals of investment science, covering such topics as fixed-income securities, interest, portfolio growth, asset dynamics and derivative securities.

This is a lively textbook providing a solid introduction to financial option valuation for undergraduate students armed with a working knowledge of a first year calculus. Written in a series of short chapters, its self-contained treatment gives equal weight to applied mathematics, stochastics and computational algorithms. No prior background in probability, statistics or numerical analysis is required. Detailed derivations of both the basic asset price model and the Black–Scholes equation are provided along with a presentation of appropriate computational techniques including binomial, finite differences and in particular, variance reduction

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techniques for the Monte Carlo method. Each chapter comes complete with accompanying stand-alone MATLAB code listing to illustrate a key idea.

Furthermore, the author has made heavy use of figures and examples, and has included computations based on real stock market data.

By framing issues, identifying risks, eliciting stakeholder preferences, and suggesting alternative approaches, decision analysts can offer workable solutions in domains such as the environment, health and medicine, engineering and operations research, and public policy. This book reviews and extends the material typically presented in introductory texts. Not a single book covers the broad scope of decision analysis at this advanced level. It will be a valuable resource for academics and students in decision analysis as well as decision analysts and managers

David G. Luenberger's *Investment Science* has become the dominant seller in Master of Finance programs, Senior or Masters level engineering, economics and statistics programs, as well as the programs in Financial Engineering. The author gives thorough yet highly accessible mathematical coverage of the fundamental topics of introductory investments: fixed-income securities, modern portfolio theory and capital asset pricing theory, derivatives (futures, options, and swaps), and innovations in optimal portfolio growth and valuation of multi period risky investments. Throughout the text, Luenberger uses mathematics to present essential ideas about investments and their applications in business practice. The new edition is updated to include the

significant advances in financial theory and practice. The text now includes two new chapters on Risk Measurement and Credit Risk and the expanded use of so-called real options, the characterization of volatility changes, and methods for incorporating such behavior in valuation. New exercise material and modifications to reflect the most recent financial changes have been made to nearly all chapters in this second edition.

Using real-world examples and clear case studies, the authors provide investors and managers with an innovative method for assessing a company's non-financial assets, allowing them to assess opportunities whose financial rewards are less than certain.

This second edition provides a rigorous yet accessible graduate-level introduction to financial economics. Since students often find the link between financial economics and equilibrium theory hard to grasp, less attention is given to purely financial topics, such as valuation of derivatives, and more emphasis is placed on making the connection with equilibrium theory explicit and clear. This book also provides a detailed study of two-date models because almost all of the key ideas in financial economics can be developed in the two-date setting. Substantial discussions and examples are included to make the ideas readily understandable. Several chapters in this new edition have been reordered and revised to deal with portfolio restrictions sequentially and more clearly, and an extended discussion on portfolio choice and optimal allocation of risk is available. The most important additions are new chapters on infinite-time security markets, exploring, among other topics, the

possibility of price bubbles.

From cell phones to Web portals, advances in information and communications technology have thrust society into an information age that is far-reaching, fast-moving, increasingly complex, and yet essential to modern life. Now, renowned scholar and author David Luenberger has produced *Information Science*, a text that distills and explains the most important concepts and insights at the core of this ongoing revolution. The book represents the material used in a widely acclaimed course offered at Stanford University. Drawing concepts from each of the constituent subfields that collectively comprise information science, Luenberger builds his book around the five "E's" of information: Entropy, Economics, Encryption, Extraction, and Emission. Each area directly impacts modern information products, services, and technology--everything from word processors to digital cash, database systems to decision making, marketing strategy to spread spectrum communication. To study these principles is to learn how English text, music, and pictures can be compressed, how it is possible to construct a digital signature that cannot simply be copied, how beautiful photographs can be sent from distant planets with a tiny battery, how communication networks expand, and how producers of information products can make a profit under difficult market conditions. The book contains vivid examples,

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illustrations, exercises, and points of historic interest, all of which bring to life the analytic methods presented: Presents a unified approach to the field of information science Emphasizes basic principles Includes a wide range of examples and applications Helps students develop important new skills Suggests exercises with solutions in an instructor's manual

Self-contained coverage of topics ranging from elementary theory of waves and vibrations in strings to three-dimensional theory of waves in thick plates. Over 100 problems.

Investment Science Oxford University Press, USA

This book emphasizes the applications of statistics and probability to finance. The basics of these subjects are reviewed and more advanced topics in statistics, such as regression, ARMA and GARCH models, the bootstrap, and nonparametric regression using splines, are introduced as needed. The book covers the classical methods of finance and it introduces the newer area of behavioral finance. Applications and use of MATLAB and SAS software are stressed. The book will serve as a text in courses aimed at advanced undergraduates and masters students. Those in the finance industry can use it for self-study.

Many professionals and students in engineering, science, business, and other application fields need to develop Windows-based and web-enabled

information systems to store and use data for decision support, without help from professional programmers. However, few books are available to train professionals and students who are not professional programmers to develop these information systems. *Developing Windows-Based and Web-Enabled Information Systems* fills this gap, providing a self-contained, easy-to-understand, and well-illustrated text that explores current concepts, methods, and software tools for developing Windows-based and web-enabled information systems. Written in an easily accessible style, the book details current concepts, methods, and software tools for Windows-based and web-enabled information systems that store and use data. It is self-contained with easy-to-understand small examples to walk through concepts and implementation details along with large-scale case studies. The book describes data modeling methods including entity–relationship modeling, relational modeling and normalization, and object-oriented data modeling, to develop data models of a database. The author covers how to use software tools in the Microsoft application development environment, including Microsoft Access, MySQL, SQL, Visual Studio, Visual Basic, VBA, HTML, and XML, to implement databases and develop Windows-based and web-enabled applications with the database, graphical user interface, and program components. The book takes

you through the entire process of developing a computer and network application for an information system, highlighting concepts and operation details. In each chapter, small data examples are used to manually walk through concepts and operational details. These features and more give you the conceptual understanding and practical skill required, even if you don't have a computer science background, to develop Windows-based or web-enabled applications for your specialized information system.

This textbook aims to fill the gap between those that offer a theoretical treatment without many applications and those that present and apply formulas without appropriately deriving them. The balance achieved will give readers a fundamental understanding of key financial ideas and tools that form the basis for building realistic models, including those that may become proprietary. Numerous carefully chosen examples and exercises reinforce the student's conceptual understanding and facility with applications. The exercises are divided into conceptual, application-based, and theoretical problems, which probe the material deeper. The book is aimed toward advanced undergraduates and first-year graduate students who are new to finance or want a more rigorous treatment of the mathematical models used within. While no background in finance is assumed, prerequisite math

courses include multivariable calculus, probability, and linear algebra. The authors introduce additional mathematical tools as needed. The entire textbook is appropriate for a single year-long course on introductory mathematical finance. The self-contained design of the text allows for instructor flexibility in topics courses and those focusing on financial derivatives. Moreover, the text is useful for mathematicians, physicists, and engineers who want to learn finance via an approach that builds their financial intuition and is explicit about model building, as well as business school students who want a treatment of finance that is deeper but not overly theoretical.

Too often, finance courses stop short of making a connection between textbook finance and the problems of real-world business. "Financial Modeling" bridges this gap between theory and practice by providing a nuts-and-bolts guide to solving common financial problems with spreadsheets. The CD-ROM contains Excel* worksheets and solutions to end-of-chapter exercises. 634 illustrations.

This book presents a carefully selected group of methods for unconstrained and bound constrained optimization problems and analyzes them in depth both theoretically and algorithmically. It focuses on clarity in algorithmic description and analysis rather than generality, and while it provides pointers to the

literature for the most general theoretical results and robust software, the author thinks it is more important that readers have a complete understanding of special cases that convey essential ideas. A companion to Kelley's book, *Iterative Methods for Linear and Nonlinear Equations* (SIAM, 1995), this book contains many exercises and examples and can be used as a text, a tutorial for self-study, or a reference. *Iterative Methods for Optimization* does more than cover traditional gradient-based optimization: it is the first book to treat sampling methods, including the Hooke-Jeeves, implicit filtering, MDS, and Nelder-Mead schemes in a unified way, and also the first book to make connections between sampling methods and the traditional gradient-methods. Each of the main algorithms in the text is described in pseudocode, and a collection of MATLAB codes is available. Thus, readers can experiment with the algorithms in an easy way as well as implement them in other languages.

An updated look at how corporate restructuring really works Stuart Gilson is one of the leading corporate restructuring experts in the United States, teaching thousands of students and consulting with numerous companies. Now, in the second edition of this bestselling book, Gilson returns to present new insight into corporate restructuring. Through real-world case studies that involve some of the most

prominent restructurings of the last ten years, and highlighting the increased role of hedge funds in distressed investing, you'll develop a better sense of the restructuring process and how it can truly create value. In addition to "classic" buyout and structuring case studies, this second edition includes coverage of Delphi, General Motors, the Finova Group and Warren Buffett, Kmart and Sears, Adelphia Communications, Seagate Technology, Dupont-Conoco, and even the Eurotunnel debt restructuring. Covers corporate bankruptcy reorganization, debt workouts, "vulture" investing, equity spin-offs, asset divestitures, and much more Addresses the effect of employee layoffs and corporate downsizing Examines how companies allocate value and when a corporation should "pull the trigger" From hedge funds to financial fraud to subprime busts, this second edition offers a rare look at some of the most innovative and controversial restructurings ever. This book presents high-quality original contributions on positive systems, including those with positivity in compartmental switched systems, Markovian jump systems, Boolean networks, interval observer design, fault detection, and delay systems. It comprises a selection of the best papers from POSTA 2018, the 6th International Conference on Positive Systems, which was held in Hangzhou, China, in August 2018. The POSTA conference series represents a targeted response to the growing

need for research that reports on and critically discusses a wide range of topics concerning the theory and applications of positive systems. The book offers valuable insights for researchers in applied mathematics, control theory and their applications.

Observers are digital algorithms that combine sensor outputs with knowledge of the system to provide results superior to traditional structures, which rely wholly on sensors. Observers have been used in selected industries for years, but most books explain them with complex mathematics. Observers in Control Systems uses intuitive discussion, software experiments, and supporting analysis to explain the advantages and disadvantages of observers. If you are working in controls and want to improve your control systems, observers could be the technology you need and this book will give you a clear, thorough explanation of how they work and how to use them. Control systems and devices have become the most essential part of nearly all mechanical systems, machines, devices and manufacturing systems throughout the world. Increasingly the efficiency of production, the reliability of output and increased energy savings are a direct result of the quality and deployment of the control system. A modern and essential tool within the engineer's kit is the Observer which helps improve the performance and reduce the cost of

these systems. George Ellis is the author of the highly successful Control System Design Guide (Second Edition). Unlike most controls books, which are written by control theorists and academics, Ellis is a leading engineer, designer, author and lecturer working in industry directly with the users of industrial motion control systems. Observers in Control Systems is written for all professional engineers and is designed to be utilized without an in-depth background in control theory. This is a "real-world" book which will demonstrate how observers work and how they can improve your control system. It also shows how observers operate when conditions are not ideal and teaches the reader how to quickly tune an observer in a working system. Software Available online: A free updated and enhanced version of the author's popular Visual ModelQ allows the reader to practice the concepts with Visual ModelQ models on a PC. Based on a virtual laboratory, all key topics are demonstrated with more than twenty control system models. The models are written in Visual ModelQ ,and are available on the Internet to every reader with a PC. Teaches observers and Kalman filters from an intuitive perspective Explains how to reduce control system susceptibility to noise Shows how to design an adaptive controller based on estimating parameter variation using observers Shows how to improve a control system's ability to reject

disturbances Key topics are demonstrated with PC-based models of control systems. The models are written in both MatLab® and ModelQ; models are available free of charge

The essential introduction to the principles and applications of feedback systems—now fully revised and expanded This textbook covers the mathematics needed to model, analyze, and design feedback systems. Now more user-friendly than ever, this revised and expanded edition of Feedback Systems is a one-volume resource for students and researchers in mathematics and engineering. It has applications across a range of disciplines that utilize feedback in physical, biological, information, and economic systems. Karl Åström and Richard Murray use techniques from physics, computer science, and operations research to introduce control-oriented modeling. They begin with state space tools for analysis and design, including stability of solutions, Lyapunov functions, reachability, state feedback observability, and estimators. The matrix exponential plays a central role in the analysis of linear control systems, allowing a concise development of many of the key concepts for this class of models. Åström and Murray then develop and explain tools in the frequency domain, including transfer functions, Nyquist analysis, PID control, frequency domain design, and robustness. Features a new chapter on design principles and tools, illustrating the types of

problems that can be solved using feedback
Includes a new chapter on fundamental limits and new material on the Routh-Hurwitz criterion and root locus plots Provides exercises at the end of every chapter Comes with an electronic solutions manual An ideal textbook for undergraduate and graduate students Indispensable for researchers seeking a self-contained resource on control theory

This book describes patterns of behavior, which collectively allow universities to exchange knowledge more effectively with industry, accelerate innovation and eventually contribute to economic growth and development. These are based on the effective practices of MIT and other universities the authors have benchmarked, building on the practices that MIT has exported in its international institution building projects conducted since 2000. The authors provide guidance that is globally applicable, but must be locally adapted. The approach is first to describe the context in which universities act as engines of economic development, and then present a set of effective practices in four domains: education, research, innovation, and supporting practices. Each of these domains has six to nine practices, and each practice is presented in a similar template, with an abstract, a rationale and description, and one or two mini-case studies. Each domain is summarized by an integrative case study. Focuses on a globally adaptable set of effective practices, complemented

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by case studies, that can enhance universities' contribution to economic development, based on an integrated view of education, research and innovation; Presents effective practices and broader insights that come from real global experience, spelled out in templates and explained by cases; Includes tangible resources for university leaders, policy makers and funders on how to proceed.

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