Algorithmic Collusion Problems And Counter Measures

A comprehensive and rigorous introduction for graduate students and researchers, with applications in sequential decision-making problems. Alternative assets such as fine art, wine, or diamonds have become popular investment vehicles in the aftermath of the global financial crisis. Correlation with classical financial markets is typically low, such that diversification benefits arise for portfolio allocation and risk management. Cryptocurrencies share many alternative asset features, but are hampered by high volatility, sluggish commercial acceptance, and regulatory uncertainties. This collection of papers addresses alternative assets and cryptocurrencies from economic, financial, statistical, and technical points of view. It gives an overview of their current state and explores their properties and prospects using innovative approaches and methodologies.

FISCAM presents a methodology for performing info. system (IS) control audits of governmental entities in accordance with professional standards. FISCAM is designed to be used on financial and performance audits and attestation engagements. The methodology in the FISCAM incorp. the following: (1) A top-down, risk-based approach that considers materiality and significance in

determining audit procedures; (2) Evaluation of entitywide controls and their effect on audit risk; (3) Evaluation of general controls and their pervasive impact on bus. process controls; (4) Evaluation of security mgmt. at all levels; (5) Control hierarchy to evaluate IS control weaknesses; (6) Groupings of control categories consistent with the nature of the risk. Illus.

This book provides a comprehensive introduction to modern auction theory and its important new applications. It is written by a leading economic theorist whose suggestions guided the creation of the new spectrum auction designs. Aimed at graduate students and professionals in economics, the book gives the most up-to-date treatments of both traditional theories of 'optimal auctions' and newer theories of multi-unit auctions and package auctions, and shows by example how these theories are used. The analysis explores the limitations of prominent older designs, such as the Vickrey auction design, and evaluates the practical responses to those limitations. It explores the tension between the traditional theory of auctions with a fixed set of bidders, in which the seller seeks to squeeze as much revenue as possible from the fixed set, and the theory of auctions with endogenous entry, in which bidder profits must be respected to encourage participation.

The most important book on antitrust ever written. It shows how antitrust suits

adversely affect the consumer by encouraging a costly form of protection for inefficient and uncompetitive small businesses.

Exact algorithms for dealing with geometric objects are complicated, hard to implement in practice, and slow. Over the last 20 years a theory of geometric approximation algorithms has emerged. These algorithms tend to be simple, fast, and more robust than their exact counterparts. This book is the first to cover geometric approximation algorithms in detail. In addition, more traditional computational geometry techniques that are widely used in developing such algorithms, like sampling, linear programming, etc., are also surveyed. Other topics covered include approximate nearest-neighbor search, shape approximation, coresets, dimension reduction, and embeddings. The topics covered are relatively independent and are supplemented by exercises. Close to 200 color figures are included in the text to illustrate proofs and ideas.

This edited collection explores transparency as a key regulatory strategy in European business law. It examines the rationales, limitations and further perspectives on transparency that have emerged in various areas of European law including corporate law, capital markets law and accounting law, as well as other areas of law relevant for European (listed) stock corporations. This book presents a clear and accurate picture of the recent reforms in the European

transparency regime. In doing so it endorses a multi-dimensional notion of transparency, highlighting the need for careful consideration and contextualisation of the transparency phenomenon. In addition, the book considers relevant enforcement mechanisms and discusses the implications of disparate enforcement concepts in European law from both the private and public law perspectives. Written by a team of distinguished contributors, the collection offers a comprehensive analysis of the European transparency regime by discussing the fundamentals of transparency, the role of disclosure in European business law, and related enforcement questions.

Computer science and economics have engaged in a lively interaction over the past fifteen years, resulting in the new field of algorithmic game theory. Many problems that are central to modern computer science, ranging from resource allocation in large networks to online advertising, involve interactions between multiple self-interested parties. Economics and game theory offer a host of useful models and definitions to reason about such problems. The flow of ideas also travels in the other direction, and concepts from computer science are increasingly important in economics. This book grew out of the author's Stanford University course on algorithmic game theory, and aims to give students and other newcomers a quick and accessible introduction to many of the most

important concepts in the field. The book also includes case studies on online advertising, wireless spectrum auctions, kidney exchange, and network management.

Die Monopolkommission empfiehlt in ihrem XXII. Hauptgutachten "Wettbewerb 2018", die gesetzlichen Rahmenbedingungen an den digitalen Wandel anzupassen. Die Digitalisierung schreitet in vielen Bereichen der Wirtschaft voran. Preise werden zunehmend auf Grundlage von Algorithmen gesetzt. Streaming-Dienste und Videoportale schieben sich in der Zuschauergunst nach vorne und ersetzen das klassische Fernsehen. Bei der Arzneimittelversorgung ergänzt der Online-Handel zunehmend die Leistungen der niedergelassenen Apotheken. Den daraus resultierenden Strukturwandel gilt es zum Wohle der Verbraucher zu gestalten, mit fairen Regeln für die hergebrachten und die neuen Anbieter. Weiterhin befasst sich die Monopolkommission mit der Konzentration und Verflechtung von Großunternehmen sowie der Entwicklung von Marktmachtindikatoren. Auf der Grundlage einer Analyse der nationalen und europäischen Kartellamtspraxis werden Handlungsempfehlungen an den Gesetzgeber und die Kartellbehörden gemacht.

Los incesantes y veloces avances sociales y tecnológicos a los que nos enfrentamos actualmente están suponiendo un cambio en los patrones de

consumo de nuestra sociedad. En el ámbito del arrendamiento de viviendas con fines turísticos, tales avances tecnológicos han propiciado su expansión gracias al desarrollo de plataformas digitales que difunden, facilitan y simplifican el proceso de contratación. A ello deben sumarse las transformaciones sociales fruto del auge de la economía colaborativa y que influyen significativamente en un segmento importante de turistas que prefieren las viviendas vacacionales al alojamiento tradicional (hotelero o extrahotelero).El proceso expansivo de esta modalidad alojativa, ha supuesto su inclusión en las agendas legislativas. Esta circunstancia plantea, de entrada, el interrogante de si el arrendamiento con fines turístico debe ser considerado una modalidad de la economía colaborativa o si, por el contrario, estamos ante una actividad económica más. Por otra parte, la perspectiva regulatoria plantea además una serie de problemas en torno a la cuestión competencial, pues se produce una disociación entre aquellas materias susceptibles de regulación por el legislador nacional y aquellas otras que deben ser acometidas por el legislador autonómico. Precisamente, y desde el año 2013, el panorama normativo autonómico presenta un mosaico de regulaciones de variado carácter, si bien en líneas generales todas convergen en restringir la actividad de arrendamiento de viviendas de uso turístico. Una tendencia que ha terminado calando en la reciente modificación de las Leyes de Arrendamiento

Urbano y de Propiedad Horizontal operada por el Real Decreto-ley 21/2018, de 14 de diciembre, de medidas urgentes en materia de vivienda y alquiler. A todo ello se suman las ordenanzas municipales, cada vez más restrictivas con la explotación de esta modalidad turística.Este cúmulo de circunstancias ha propiciado el nacimiento de esta obra en la que ofrecemos una visión interdisciplinar y transversal del fenómeno de las viviendas vacacionales o con fines turísticos, y en la que trataremos de dar respuesta a las numerosas incógnitas que plantea.

From the man who coined the term "net neutrality" and who has made significant contributions to our understanding of antitrust policy and wireless communications, comes a call for tighter antitrust enforcement and an end to corporate bigness.

Throughout the world, the rule against price fixing is competition law's most important and least controversial prohibition. Yet there is far less consensus than meets the eye on what constitutes price fixing, and prevalent understandings conflict with the teachings of oligopoly theory that supposedly underlie modern competition policy. Competition Policy and Price Fixing provides the needed analytical foundation. It offers a fresh, in-depth exploration of competition law's horizontal agreement requirement, presents a systematic analysis of how best to

address the problem of coordinated oligopolistic price elevation, and compares the resulting direct approach to the orthodox prohibition. In doing so, Louis Kaplow elaborates the relevant benefits and costs of potential solutions, investigates how coordinated price elevation is best detected in light of the error costs associated with different types of proof, and examines appropriate sanctions. Existing literature devotes remarkably little attention to these key subjects and instead concerns itself with limiting penalties to certain sorts of interfirm communications. Challenging conventional wisdom, Kaplow shows how this circumscribed view is less well grounded in the statutes, principles, and precedents of competition law than is a more direct, functional proscription. More important, by comparison to the communications-based prohibition, he explains how the direct approach targets situations that involve both greater social harm and less risk of chilling desirable behavior--and is also easier to apply. Depuis quelques années, on observe des avancées majeures dans le domaine de l'intelligence artificielle et des robots, en raison des progrès techniques indéniables et des traitements de données sans cesse plus performants (en lien avec le phénomène big data). Parmi les réalisations concrètes les plus marquantes, on pointe les véhicules autonomes, les drones militaires ou les logiciels susceptibles d'aider les médecins, les juges, ou les avocats dans leurs

activités professionnelles. Au-delà des questions éthiques ou philosophiques qu'elle pose, cette robotisation de la vie constitue un véritable défi pour le droit, en ce sens que les règles actuellement en vigueur peuvent se révéler inadaptées ou insuffisantes pour encadrer cette nouvelle réalité. Cet ouvrage a pour objet d'analyser, de manière transversale, les principales questions posées par l'intelligence artificielle et les robots, en matière de protection de la vie privée, de propriété intellectuelle, de droit des obligations (contractuelles ou extra-contractuelles) ou de droit de la concurrence, avant d'adopter une approche sectorielle, avec l'examen des enjeux posés par la robotisation de la justice, de la finance, des services publics ou des transports (drones et véhicules autonomes).

'Disruptive innovation', 'the fourth industrial revolution', 'one of the ten ideas that will change the world'; the collaborative/sharing economy is shaking existing norms. It poses unprecedented challenges in terms of both material policies and governance in almost all aspects of EU law. This book explores the application – or indeed inadequacy – of existing EU rules in the context of the collaborative economy. It analyses the novelties introduced by the collaborative economy and discusses the specific regulatory needs and instruments employed therein, most notably self-regulation. Further, it aims to elucidate the legal status of the parties

involved (traders, consumers, prosumers) in these multi-sided economies, and their respective roles in the provision of services, especially with regard to liability issues. Moreover, it delves into a sector-specific examination of the relevant EU rules, especially on data protection, competition, consumer protection and labour law, and comments on the uncertainties and lacunae produced therein. It concludes with the acute question of whether fresh EU regulation would be necessary to avoid fragmentation or, on the contrary, if such regulation would create unnecessary burdens and stifle innovation. Taking a broad perspective and pragmatic view, the book provides a comprehensive overview of the collaborative economy in the context of the EU legal landscape.

The New York Times bestseller about a noted tech venture capitalist, early mentor to Mark Zuckerberg, and Facebook investor, who wakes up to the serious damage Facebook is doing to our society - and sets out to try to stop it. If you had told Roger McNamee even three years ago that he would soon be devoting himself to stopping Facebook from destroying our democracy, he would have howled with laughter. He had mentored many tech leaders in his illustrious career as an investor, but few things had made him prouder, or been better for his fund's bottom line, than his early service to Mark Zuckerberg. Still a large shareholder in Facebook, he had every good reason to stay on the bright side. Until he simply

couldn't. ZUCKED is McNamee's intimate reckoning with the catastrophic failure of the head of one of the world's most powerful companies to face up to the damage he is doing. It's a story that begins with a series of rude awakenings. First there is the author's dawning realization that the platform is being manipulated by some very bad actors. Then there is the even more unsettling realization that Zuckerberg and Sheryl Sandberg are unable or unwilling to share his concerns, polite as they may be to his face. And then comes the election of Donald Trump, and the emergence of one horrific piece of news after another about the malign ends to which the Facebook platform has been put. To McNamee's shock, even still Facebook's leaders duck and dissemble, viewing the matter as a public relations problem. Now thoroughly alienated, McNamee digs into the issue, and fortuitously meets up with some fellow travelers who share his concern, and help him sharpen its focus. Soon he and a dream team of Silicon Valley technologists are charging into the fray, to raise consciousness about the existential threat of Facebook, and the persuasion architecture of the attention economy more broadly -- to our public health and to our political order. Zucked is both an enthralling personal narrative and a masterful explication of the forces that have conspired to place us all on the horns of this dilemma. This is the story of a company and its leadership, but it's also a larger tale of a business

sector unmoored from normal constraints, just at a moment of political and cultural crisis, the worst possible time to be given new tools for summoning the darker angels of our nature and whipping them into a frenzy. Like Jimmy Stewart in Rear Window, Roger McNamee happened to be in the right place to witness a crime, and it took him some time to make sense of what he was seeing and what we ought to do about it. The result of that effort is a wise, hard-hitting, and urgently necessary account that crystallizes the issue definitively for the rest of us.

The essential guide to EU competition law for students in one volume; extracts from key cases, academic works, and legislation are paired with incisive critique and commentary from an expert author team. In this fast-paced subject area, the authors carefully highlight the most important cases, legislation, and developments to allow students to navigate the breadth of legislation and case law. With their clear explanations and commentary, the authors provide invaluable support to students as they approach this complex and highly technical area of law. Extracts provide opportunities for students to understand the law in practice, and to see its relevance to business. Indispensable for undergraduate and postgraduate students alike, this is the standalone guide to the competition law of the EU. Online resources: The text is accompanied by

online resources containing: -An additional chapter on State Aid -Web links -Updates in the law

"An entertaining romp that tells us where and why the tech industry, once America's darling, went wrong, and what it might do to recover its good graces." —Tim Wu, author of The Master Switch Buying groceries, tracking our health, finding a date: whatever we want to do, odds are that we can now do it online. But few of us realize just how many oversights, biases, and downright ethical nightmares are baked inside the tech products we use every day. It's time we change that. In Technically Wrong, Sara Wachter-Boettcher demystifies the tech industry, leaving those of us on the other side of the screen better prepared to make informed choices about the services we use—and to demand more from the companies behind them. A Wired Top Tech Book of the Year A Fast Company Best Business and Leadership Book of the Year

Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and

Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community detection. Learn how graph analytics vary from conventional statistical analysis Understand how classic graph algorithms work, and how they are applied Get guidance on which algorithms to use for different types of questions Explore algorithm examples with working code and sample datasets from Spark and Neo4j See how connected feature extraction can increase machine learning accuracy and precision Walk through creating an ML workflow for link prediction combining Neo4j and Spark

The rising reliance on testing in American education and for licensure and certification has been accompanied by an escalation in cheating on tests at all levels. Edited by two of the foremost experts on the subject, the Handbook of Quantitative Methods for Detecting Cheating on Tests offers a comprehensive compendium of increasingly sophisticated data forensics used to investigate whether or not cheating has occurred. Written for practitioners, testing professionals, and scholars in testing, measurement, and assessment, this volume builds on the claim that statistical evidence often requires less of an inferential leap to conclude that cheating has taken place than do other, more common sources of evidence. This handbook is organized into sections that roughly correspond to the kinds of threats to fair testing represented by different forms of cheating. In Section I, the editors outline the fundamentals and significance of cheating,

and they introduce the common datasets to which chapter authors' cheating detection methods were applied. Contributors describe, in Section II, methods for identifying cheating in terms of improbable similarity in test responses, preknowledge and compromised test content, and test tampering. Chapters in Section III concentrate on policy and practical implications of using quantitative detection methods. Synthesis across methodological chapters as well as an overall summary, conclusions, and next steps for the field are the key aspects of the final section.

This collection of essays represents the first in a series of two volumes that set out to reflect the state of the art of antitrust thinking in digital markets in jurisdictions around the world.The issues it tackles are many: the role of innovation, the conundrum of big data, the evolution of media markets, and the question of whether existing antitrust tools are sufficient to deal with the challenges of digital markets. Each author tackles the overarching themes from their unique national perspective. The resulting tapestry reflects the challenges and opportunities presented by the modern digital era, viewed through the lens of competition enforcement.

Virtual CompetitionHarvard University Press

Advances in artificial intelligence (AI) highlight the potential of this technology to affect productivity, growth, inequality, market power, innovation, and employment. This volume seeks to set the agenda for economic research on the impact of AI. It covers four broad themes: AI as a general purpose technology; the relationships between AI,

growth, jobs, and inequality; regulatory responses to changes brought on by AI; and the effects of AI on the way economic research is conducted. It explores the economic influence of machine learning, the branch of computational statistics that has driven much of the recent excitement around AI, as well as the economic impact of robotics and automation and the potential economic consequences of a still-hypothetical artificial general intelligence. The volume provides frameworks for understanding the economic impact of AI and identifies a number of open research questions. Contributors: Daron Acemoglu, Massachusetts Institute of Technology Philippe Aghion, Collège de France Ajay Agrawal, University of Toronto Susan Athey, Stanford University James Bessen, Boston University School of Law Erik Brynjolfsson, MIT Sloan School of Management Colin F. Camerer, California Institute of Technology Judith Chevalier, Yale School of Management Iain M. Cockburn, Boston University Tyler Cowen, George Mason University Jason Furman, Harvard Kennedy School Patrick Francois, University of British Columbia Alberto Galasso, University of Toronto Joshua Gans, University of Toronto Avi Goldfarb, University of Toronto Austan Goolsbee, University of Chicago Booth School of Business Rebecca Henderson, Harvard Business School Ginger Zhe Jin, University of Maryland Benjamin F. Jones, Northwestern University Charles I. Jones, Stanford University Daniel Kahneman, Princeton University Anton Korinek, Johns Hopkins University Mara Lederman, University of Toronto Hong Luo, Harvard Business School John McHale, National

University of Ireland Paul R. Milgrom, Stanford University Matthew Mitchell, University of Toronto Alexander Oettl, Georgia Institute of Technology Andrea Prat, Columbia Business School Manav Raj, New York University Pascual Restrepo, Boston University Daniel Rock, MIT Sloan School of Management Jeffrey D. Sachs, Columbia University Robert Seamans, New York University Scott Stern, MIT Sloan School of Management Betsey Stevenson, University of Michigan Joseph E. Stiglitz. Columbia University Chad Syverson, University of Chicago Booth School of Business Matt Taddy, University of Chicago Booth School of Business Steven Tadelis, University of California, Berkeley Manuel Trajtenberg, Tel Aviv University Daniel Trefler, University of Toronto Catherine Tucker, MIT Sloan School of Management Hal Varian, University of California, Berkeley The problem of privacy-preserving data analysis has a long history spanning multiple disciplines. As electronic data about individuals becomes increasingly detailed, and as technology enables ever more powerful collection and curation of these data, the need increases for a robust, meaningful, and mathematically rigorous definition of privacy, together with a computationally rich class of algorithms that satisfy this definition. Differential Privacy is such a definition. The Algorithmic Foundations of Differential Privacy starts out by motivating and discussing the meaning of differential privacy, and proceeds to explore the fundamental techniques for achieving differential privacy, and the application of these techniques in creative combinations, using the query-release problem as an ongoing example. A key point is that, by rethinking the computational

goal, one can often obtain far better results than would be achieved by methodically replacing each step of a non-private computation with a differentially private implementation. Despite some powerful computational results, there are still fundamental limitations. Virtually all the algorithms discussed herein maintain differential privacy against adversaries of arbitrary computational power -- certain algorithms are computationally intensive, others are efficient. Computational complexity for the adversary and the algorithm are both discussed. The monograph then turns from fundamentals to applications other than query-release, discussing differentially private methods for mechanism design and machine learning. The vast majority of the literature on differentially private algorithms considers a single, static, database that is subject to many analyses. Differential privacy in other models, including distributed databases and computations on data streams, is discussed. The Algorithmic Foundations of Differential Privacy is meant as a thorough introduction to the problems and techniques of differential privacy, and is an invaluable reference for anyone with an interest in the topic.

The digital economy is gradually gaining traction through a variety of recent technological developments, including the introduction of the Internet of things, artificial intelligence and markets for data. This innovative book contains contributions from leading competition law scholars who map out and investigate the anti-competitive effects that are developing in the digital economy.

The Future of Copyright in the Age of Artificial Intelligence offers an extensive analysis of intellectual property and authorship theories and explores the possible impact artificial intelligence (AI) might have on those theories. The author makes compelling arguments via the exploration of authorship, ownership and artificial intelligence. We live in a highly connected world with multiple self-interested agents interacting and myriad opportunities for conflict and cooperation. The goal of game theory is to understand these opportunities. This book presents a rigorous introduction to the mathematics of game theory without losing sight of the joy of the subject. This is done by focusing on theoretical highlights (e.g., at least six Nobel Prize winning results are developed from scratch) and by presenting exciting connections of game theory to other fields such as computer science (algorithmic game theory), economics (auctions and matching markets), social choice (voting theory), biology (signaling and evolutionary stability), and learning theory. Both classical topics, such as zero-sum games, and modern topics, such as sponsored search auctions, are covered. Along the way, beautiful mathematical tools used in game theory are introduced, including convexity, fixed-point theorems, and probabilistic arguments. The book is appropriate for a first course in game theory at either the undergraduate or graduate level, whether in mathematics, economics, computer science, or statistics. The importance of game-theoretic thinking transcends the academic setting—for every action we take, we must consider not only its direct effects, but also how it influences the incentives of others.

Algorithms permeate our lives in numerous ways, performing tasks that until recently could only be carried out by humans. Artificial Intelligence (AI) technologies, based on machine learning algorithms and big-data-powered systems, can perform sophisticated tasks such as driving cars, analyzing medical data, and evaluating and executing complex financial transactions - often without active human control or supervision. Algorithms also play an important role in determining retail pricing, online advertising, loan qualification, and airport security. In this work, Martin Ebers and Susana Navas bring together a group of scholars and practitioners from across Europe and the US to analyze how this shift from human actors to computers presents both practical and conceptual challenges for legal and regulatory systems. This book should be read by anyone interested in the intersection between computer science and law, how the law can better regulate algorithmic design, and the legal ramifications for citizens whose behavior is increasingly dictated by algorithms.

Artificial intelligence and related technologies are changing both the law and the legal profession. In particular, technological advances in fields ranging from machine learning to more advanced robots, including sensors, virtual realities, algorithms, bots, drones, self-driving cars, and more sophisticated "human-like" robots are creating new and previously unimagined challenges for regulators. These advances also give rise to new opportunities for legal professionals to make efficiency gains in the delivery of legal services. With the exponential growth of such technologies, radical disruption seems

likely to accelerate in the near future. This collection brings together a series of contributions by leading scholars in the newly emerging field of artificial intelligence, robotics, and the law. The aim of the book is to enrich legal debates on the social meaning and impact of this type of technology. The distinctive feature of the contributions presented in this edition is that they address the impact of these technological developments in a number of different fields of law and from the perspective of diverse jurisdictions. Moreover, the authors utilize insights from multiple related disciplines, in particular social theory and philosophy, in order to better understand and address the legal challenges created by AI. Therefore, the book will contribute to interdisciplinary debates on disruptive new AI technologies and the law.
A synthesis of theoretical and practical research on combinatorial auctions from the perspectives of economics, operations research, and computer science.
This book provides an introduction to the mathematical and algorithmic foundations of data science, including machine learning, high-dimensional geometry, and analysis of large networks. Topics include the counterintuitive nature of data in high dimensions, important linear algebraic techniques such as singular value decomposition, the theory of random walks and Markov chains, the fundamentals of and important algorithms for machine learning, algorithms and analysis for clustering, probabilistic models for large networks, representation learning including topic modelling and non-negative matrix factorization, wavelets and compressed sensing. Important probabilistic techniques are

developed including the law of large numbers, tail inequalities, analysis of random projections, generalization guarantees in machine learning, and moment methods for analysis of phase transitions in large random graphs. Additionally, important structural and complexity measures are discussed such as matrix norms and VC-dimension. This book is suitable for both undergraduate and graduate courses in the design and analysis of algorithms for data.

Algorithms are a fundamental building block of artificial intelligence - and, increasingly, society - but our legal institutions have largely failed to recognize or respond to this reality. The Cambridge Handbook of the Law of Algorithms, which features contributions from US, EU, and Asian legal scholars, discusses the specific challenges algorithms pose not only to current law, but also - as algorithms replace people as decision makers - to the foundations of society itself. The work includes wide coverage of the law as it relates to algorithms, with chapters analyzing how human biases have crept into algorithmic decision-making about who receives housing or credit, the length of sentences for defendants convicted of crimes, and many other decisions that impact constitutionally protected groups. Other issues covered in the work include the impact of algorithms on the law of free speech, intellectual property, and commercial and human rights law.

From the Nobel Prize-winning author of Thinking, Fast and Slow and the coauthor of Nudge, a revolutionary exploration of why people make bad judgments and how to

make better ones--"a tour de force" (New York Times). Imagine that two doctors in the same city give different diagnoses to identical patients—or that two judges in the same courthouse give markedly different sentences to people who have committed the same crime. Suppose that different interviewers at the same firm make different decisions about indistinguishable job applicants—or that when a company is handling customer complaints, the resolution depends on who happens to answer the phone. Now imagine that the same doctor, the same judge, the same interviewer, or the same customer service agent makes different decisions depending on whether it is morning or afternoon, or Monday rather than Wednesday. These are examples of noise: variability in judgments that should be identical. In Noise, Daniel Kahneman, Olivier Sibony, and Cass R. Sunstein show the detrimental effects of noise in many fields, including medicine, law, economic forecasting, forensic science, bail, child protection, strategy, performance reviews, and personnel selection. Wherever there is judgment, there is noise. Yet, most of the time, individuals and organizations alike are unaware of it. They neglect noise. With a few simple remedies, people can reduce both noise and bias, and so make far better decisions. Packed with original ideas, and offering the same kinds of research-based insights that made Thinking, Fast and Slow and Nudge groundbreaking New York Times bestsellers, Noise explains how and why humans are so susceptible to noise in judgment—and what we can do about it.

In June 2019, the Committee on the Judiciary initiated a bipartisan investigation

into the state of competition online, spearheaded by the Subcommittee on Antitrust, Commercial and Administrative Law. As part of a top-to-bottom review of the market, the Subcommittee examined the dominance of Amazon, Apple, Facebook, and Google, and their business practices to determine how their poweraffects our economy and our democracy. Additionally, the Subcommittee performed a review of existing antitrust laws, competition policies, and current enforcement levels to assess whether they areadequate to address market power and anticompetitive conduct in digital markets. Over the course of our investigation, we collected extensive evidence from these companies aswell as from third parties-totaling nearly 1.3 million documents. We held seven hearings to review the effects of market power online-including on the free and diverse press, innovation, and privacy-and a final hearing to examine potential solutions to concerns identified during the investigation and to inform this Report's recommendations. A year after initiating the investigation, we received testimony from the Chief ExecutiveOfficers of the investigated companies: Jeff Bezos, Tim Cook, Mark Zuckerberg, and Sundar Pichai. For nearly six hours, we pressed for answers about their business practices, including about evidence concerning the extent to which they have exploited, entrenched, and expanded their power over digitalmarkets in anticompetitive and abusive ways. Their answers were often

evasive and non-responsive, raising fresh questions about whether they believe they are beyond the reach of democratic oversight. Although these four corporations differ in important ways, studying their business practices hasrevealed common problems

This book is the first detailed treatment of the approaches taken to enforce competition laws against cross-border cartels (CBCs) from the perspective of young and small competition authorities (more than 70% of the total number of authorities worldwide). No other legal or inter-disciplinary scholarship exists in the market that deals with the issue of a taxonomy of CBCs combined with young/small competition authorities' problems. The book looks at the extent of the harms caused by CBCs and issues associated with tackling them at a transnational level. It explains why past solutions to problems with cooperation have failed and proposes novel ideas on how to improve cooperation and coordination in certain types of CBC investigations (transnational and regional CBCs). The proposals are based on primary-source information and observations made by the author as part of his work in the UN, and interviews with leading enforcers from young, small, old and large jurisdictions. Young/small competition authorities, competition lawyers and economists, scholars and students within the fields of competition law and international law, and those interested in

international cooperation and coordination in the area of cartel enforcement in emerging markets will greatly benefit from this book. It is clearly structured and extensively referenced, providing a valuable guide to the topic.

The OECD Business and Finance Outlook is an annual publication that presents unique data and analysis on the trends, both positive and negative, that are shaping tomorrow's world of business, finance and investment.

Ariel Ezrachi and Maurice Stucke take a hard look at today's app-assisted paradise of digital shopping. The algorithms and data-crunching that make online purchasing so convenient are also changing the nature of the market by shifting power into the hands of the few, with risks to competition, our democratic ideals, and our overall well-being.

Our world is being revolutionized by data-driven methods: access to large amounts of data has generated new insights and opened exciting new opportunities in commerce, science, and computing applications. Processing the enormous quantities of data necessary for these advances requires large clusters, making distributed computing paradigms more crucial than ever. MapReduce is a programming model for expressing distributed computations on massive datasets and an execution framework for large-scale data processing on clusters of commodity servers. The programming model provides an easy-to-

understand abstraction for designing scalable algorithms, while the execution framework transparently handles many system-level details, ranging from scheduling to synchronization to fault tolerance. This book focuses on MapReduce algorithm design, with an emphasis on text processing algorithms common in natural language processing, information retrieval, and machine learning. We introduce the notion of MapReduce design patterns, which represent general reusable solutions to commonly occurring problems across a variety of problem domains. This book not only intends to help the reader "think in MapReduce", but also discusses limitations of the programming model as well. This volume is a printed version of a work that appears in the Synthesis Digital Library of Engineering and Computer Science. Synthesis Lectures provide concise, original presentations of important research and development topics, published quickly, in digital and print formats. For more information visit www.morganclaypool.com

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