# The Emerald Handbook of Blockchain for Business

Maximizing the potential of any technology to create value requires both vision and execution. Knowledge is a key to success in both. This book delivers in-depth coverage of both public and permissioned (business focus) types of Blockchains. The authors' exploration of the advantages/limitations, risks/rewards, and futures/realities is a door opener to the potential awaiting anyone serious about understanding or using blockchain technologies to impact the world.

- Francis D. Poeta, Serial Entrepreneur, CTO, IBM

The Emerald Handbook of Blockchain for Business is a mustown book for anyone interested in blockchain. It offers readers an in-depth journey starting from the origins of blockchain technology and cryptoassets, to the evolution of the technology into multiple industries including global finance, real estate, healthcare, and more. It also discusses innovative, cutting-edge developments in this ecosystem, including token economics, interoperability, and blockchain's impact on other emerging technologies.

> - Ron Quaranta, Chairman of the Board, Wall Street Blockchain Alliance

The Emerald Handbook of Blockchain for Business sheds light on blockchain with 22 chapters deploying an easy-to-understand style. The book starts with fundamental concepts and extends to intricate cases. It blends the know-how and experience of academics and practitioners into the blockchain domain. This book is a candidate to be a worldwide handbook of blockchain for academics, students, practitioners, entrepreneurs, business people, consultants, researchers, policymakers, and all technology-lovers.

- Professor Ibrahim E. Sancak, PhD, ZWIRN-Research Center, Ostfalia University of Applied Sciences, Germany, Founding (E) Director, Market Oversight and Enforcement Division, Capital Markets Board of Turkey

In this book, the team of experts delivers a balanced introduction to the world of blockchain and its diverse applications. The authors first explain the theoretical fundamentals of blockchains and the different components and then cover a spectrum of industry and business applications of this transformational technology. With the wide topic coverage, this book presents a comprehensive must-read primer for anyone interested in the study of blockchain.

- Petr Novotny, PhD, Research Staff Member & Master Inventor, IBM Research This page intentionally left blank

# The Emerald Handbook of Blockchain for Business

### **EDITED BY**

### H. KENT BAKER

American University, Washington, DC, US

### EHSAN NIKBAKHT

Hofstra University, NY

### SEAN STEIN SMITH

City University of New York, NY



Emerald Publishing Limited Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2021

Copyright © 2021 by Emerald Publishing Limited

#### Reprints and permissions service

Contact: permissions@emeraldinsight.com

No part of this book may be reproduced, stored in a retrieval system, transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the publisher or a licence permitting restricted copying issued in the UK by The Copyright Licensing Agency and in the USA by The Copyright Clearance Center. Any opinions expressed in the chapters are those of the authors. Whilst Emerald makes every effort to ensure the quality and accuracy of its content, Emerald makes no representation implied or otherwise, as to the chapters' suitability and application and disclaims any warranties, express or implied, to their use.

#### **British Library Cataloguing in Publication Data**

A catalogue record for this book is available from the British Library

ISBN: 978-1-83982-199-8 (Print) ISBN: 978-1-83982-198-1 (Online) ISBN: 978-1-83982-200-1 (Epub)



ISOQAR certified Management System, awarded to Emerald for adherence to Environmental standard ISO 14001:2004.





# **Table of Contents**

List of Figures	xi
List of Tables	xiii
Acknowledgments	xv
About the Editors	xvii
About the Contributors	xix
List of Contributors and Institutions	xxvii
Part I Blockchain: History and Background  Chapter 1 Blockchain: An Overview  H. Kent Baker, Ehsan Nikbakht and Sean Stein Smith	3
Chapter 2 History of Blockchain  Joseph "Joey" Ryan and Sean Stein Smith	15
Chapter 3 Review of Blockchain and Emerging Applications Timothy Grief and Ehsan Nikbakht	31
Chapter 4 Technical Aspects of Blockchain  Hak I Kim	49

# Part II Types of Blockchain and Related Issues

Chapter 5 Public Blockchains and Applications  Hugo Benedetti	67
Chapter 6 Private and Hybrid Blockchains and Applications Gina Pieters and Sean Stein Smith	83
Chapter 7 Consensus Mechanisms and Related Issues  Deniz Appelbaum	99
Chapter 8 Token Economies  Alim Khamisa	121
Chapter 9 Proposed Modifications to Spur Consumer Adoption of Blockchain  Katherine McKechnie, Alexandra M. Dunn and Sayan Sarkar	141
Part III The Frontier of Blockchain Technology	
Chapter 10 Blockchain: Speed, Efficiency, Decreased Costs, and Technical Challenges  Amanda Wilkie and Sean Stein Smith	157
Chapter 11 The Importance of Interoperability, Decentralization, and Choice  Kirk Phillips	171
Chapter 12 Convergence with Artificial Intelligence and Other Related Concepts  Lian Duan	189
Chapter 13 Risk Management and Transference Issues in Blockchain Technologies  Joseph Brunsman	207
Chapter 14 Legal and Regulatory Issues in the Temporary Regime J. Scott Colesanti	223

241

Part IV Blockchain Applications in Business	
Chapter 16 Considerations for Blockchain Adoption and Integration Michael Nizich and Michael Campisi	259
Chapter 17 Blockchain Applications in Finance Steven Cosares, Kristin Kalish, Thomas Maciura and Andrew C. Spieler	275
Chapter 18 Blockchain Applications in Healthcare Alevtina Dubovitskaya	293
Chapter 19 Blockchain Applications in Real Estate Joshua Harris and Ehsan Nikbakht	311
Chapter 20 Blockchain Applications in Supply Chain Kaushik Sengupta	325
Chapter 21 Crypto Accounting Valuation, Reporting, and Disclosure Sean Stein Smith	341
Chapter 22 Auditing and Examining Blockchain Information  John "Jack" Castonguay	359
A Glossary of Blockchain Terms	373
Discussion Questions and Answers (Chapters 2-22)	383
Index	417

Chapter 15 Regulatory Ambiguity and Its Impact on Blockchain

Shehan Chandrasekera

This page intentionally left blank

# **List of Figures**

Figure 4.1.	An Example of a Blockchain Process.	51
Figure 4.2.	Architecture of a Blockchain Network.	52
Figure 4.3.	Structure of a Block.	53
Figure 4.4.	Types of Block.	54
Figure 4.5.	Block Hashing (I).	56
Figure 4.6.	Block Hashing (II).	56
Figure 4.7.	Merkle Hash Tree and Root.	57
Figure 4.8.	Merkle Hash Tree and Root in Blockchain.	58
Figure 4.9.	Operational Process of Blockchain.	61
Figure 6.1.	The Layer–component–process Configuration of a Distributed Ledger Technology (DLT) System.	84
Figure 6.2.	The Layer Hierarchy of a Distributed Ledger Technology (DLT) System.	90
Figure 7.1.	Complete Block Input.	105
Figure 7.2.	Hash Results of the "0000" Nonce.	105
Figure 7.3.	Hash Results of the "0023" Nonce.	106
Figure 7.4.	First Block.	106
Figure 7.5.	Hash Value from the Nonce of "0018."	107
Figure 7.6.	Blocks One and Two in the Blockchain.	107
Figure 7.7.	Hash Calculation of #2X with the Nonce of "0013."	108
Figure 8.1.	Evolution of the Web.	124
Figure 8.2.	Web 3.0 Stack.	125
Figure 8.3.	Taxonomy of Crypto Assets.	127
Figure 17.1.	Overview of the Post-trade Process for Foreign	
	Currency.	285

# xii List of Figures

Figure 18.1.	Blockchain-based Approach for Data Exchange in	
	the Primary Care Settings.	297
Figure 18.2.	MiPasa Ecosystem and Its Functionality.	301
Figure 19.1.	Anatomy of a Real Estate Deal.	312
Figure 20.1.	A Blockchain-enabled Supply Chain.	328

# **List of Tables**

Table 3.1.	Differences between Public and Private Blockchains.	35
Table 7.1.	Illustration of Different Input Lengths and Their Fixed Output Hashes.	102
Table 7.2.	Difference in Hashes When Changing Only the Case of the First Letter.	103
Table 7.3.	User IDs.	104
Table 7.4.	Transaction #1 Input.	104
Table 8.1.	ERC-20 Token Standard.	130
Table 14.1.	Summary of the Four <i>Howey</i> Test Elements.	225
Table 14.2.	Example of SEC Cases Against Crypto-defendants.	227
Table 14.3.	SEC No Action Letter Issued to a Coin Issuer ("TurnKey Letter").	234
Table 15.1.	Calculating Capital Gains and Losses.	243
Table 15.2.	How Nine Major US Cryptocurrency Exchanges Deal with Third-party Information Reporting.	248
Table 16.1.	Blockchain Solutions and Providers.	263
Table 22.1.	Management's Assertions and Audit Evidence	361

This page intentionally left blank

# **Acknowledgments**

When you're editing, you want to be the perfect appreciator, not another writer.

-Joseph Kanon

The path leading to publishing a book is long and sometimes bumpy with some unexpected detours along the way. For example, a global pandemic occurred during this project. To get to the end of our journey required the contributions of many people along the way. As editors, we are mindful of the important role that each plays. Although all the roles differ, each contributed meaningfully to completing this book. We greatly appreciate everyone's contributions, but particularly want to recognize the following individuals.

The chapter authors are at the heart of an edited book. Writing is hard work. We gratefully acknowledge the countless hours they invested in writing and revising their chapters thereby sharing their knowledge and experience about blockchain. As editors, our role was not to change their ideas, but to help craft and polish them to bring out their brilliance. We thank the highly talented staff at Emerald Publishing, especially Charlotte Maiorana, Senior Editor for Business, Economics, and Finance. We also recognize the support provided by our respective institutions: Kogod School of Business at American University, Frank G. Zarb School of Business at Hofstra University, and Lehman College at City University of New York. Finally, we are grateful for our families, who were largely silent partners in this process. We dedicate this book to Linda and Rory Baker; Parvin, Auzin, and Daniel Nikbakht; Frederick Smith and Kathleen Stein Smith as well as Patrick and Frederick Stein Smith.

This page intentionally left blank

## **About the Editors**

H. Kent Baker, CFA, CMA, is University Professor of Finance in the Kogod School of Business at American University. Professor Baker is an award-winning author/editor of 38 books including Debt Markets and Investments, Investment Traps Exposed: Navigating Investor Mistakes and Behavioral Biases, Financial Behavior: Players, Services, Products, and Markets; Investor Behavior: The Psychology of Financial Planning and Investing, and Survey Research in Corporate Finance. He is also the editor of two book series: Financial Markets and Investments (Oxford University Press) and the H. Kent Baker Investments Series (Emerald Publishing). As one of the most prolific finance academics, he has published more than 190 refereed academic journal articles and 125 practitioneroriented articles appearing in such outlets as the Journal of Finance, Journal of Financial and Quantitative Analysis, Financial Management, Journal of Corporate Finance, Financial Analysts Journal, Journal of Portfolio Management, and Harvard Business Review. He has consulting and training experience with more than 100 organizations and has conducted more than 800 training programs in North America and Europe. Professor Baker holds a BSBA from Georgetown University; an MEd, MBA, and DBA from the University of Maryland; and an MA, MS, and two PhDs from American University.

Ehsan Nikbakht, CFA, FRM, PRM, is C.V. Starr Distinguished Professor of Finance in the Frank G. Zarb School of Business at Hofstra University. His latest research focused on volatility transmission across different markets. Among his recent publications are blockchain and distributed financial data (*Managerial Finance* 2019), the external monitoring of private firms (*Global Finance Journal* 2017), and the international perspective of spillover effects on REITs (*International Journal of Business* 2016.) His book *Foreign Loans and Economic Performance* received a Stessin Prize for outstanding scholarly publication. Professor Nikbakht has delivered numerous educational presentations at major financial institutions including Bank of America, Goldman Sachs, Morgan Stanley, S&P, PNC, Royal Bank of Canada, Merrill Lynch, Legg Mason, State Street, and Deutsche Bank. He received an MBA from the Iran Center for Management Studies and a DBA in finance from George Washington University.

**Sean Stein Smith**, CPA, CMA, CGMA, CFE, is an Assistant Professor of Business and Economics in Lehman College at City University of New York. He serves on the Advisory Board of the Wall Street Blockchain Alliance, where he chairs the Accounting Work Group. Professor Smith has published numerous

#### xviii About the Editors

articles and several books focusing on the intersection of accounting, financial services, and emerging technologies. He also is the chairperson of the NJCPA's Emerging Technologies Interest Group (#NJCPATech). Professor Smith is on the Advisory Board of Gilded, a TechStars '19 company and AICPA-CPA.com Startup Accelerator participant. He was a Visiting Research Fellow at the American Institute of Economic Research in 2019 continuing his research on blockchain, crypto assets, and financial services. He is a frequent guest on television, radio, and other multimedia discussing emerging technologies and financial services. Professor Smith received a B.S, M.S, and MBA from Fairleigh Dickinson University and a DBA from Capella University.

## **About the Contributors**

Deniz Appelbaum is an Assistant Professor in the Department of Accounting and Finance at the Feliciano School of Business, Montclair State University. She enriches her academic pursuits with a practical view, after 20 years of experience in operations, credit, and business development in the corporate world. Professor Appelbaum emphasizes using data analytics and appropriate software tools in the classroom to prepare students for the technically advanced modern business environment. Her research focuses on blockchain, analytics, big data, and automation in financial auditing and fraud detection. Professor Appelbaum has published in such journals as Accounting Horizons, Journal of Emerging Technologies in Accounting, and Auditing: Journal of Practice and Theory. Professor Appelbaum received both an MBA and PhD from Rutgers, the State University of New Jersey.

**Hugo Benedetti** is an Assistant Professor and the Academic Director of the Master in Finance and Investments program at ESE Business School, Universidad de los Andes (Chile). Professor Benedetti's research focuses on entrepreneurial finance, venture capital, and FinTech, particularly blockchain technology and blockchain-enabled assets. His research has been featured in *The Economist, Bloomberg, The Wall Street Journal*, and NASDAQ, as well as in several crypto-industry publications. Professor Benedetti frequently delivers workshops in entrepreneurial finance, venture capital, and FinTech to incubators, angel investor networks, and venture capital funds. He has advised and mentored several FinTech and blockchain projects. Before joining academia, he co-founded a financial advisory boutique and held leadership roles in corporate finance, financial advisory, and venture capital at world-class firms. Professor Benedetti is a Fulbright scholar and received a PhD in finance from Boston College.

Joseph Brunsman is Vice President of Chesapeake Professional Liability Brokers where he focuses on providing unique cyber insurance solutions to businesses across the country. He has published in numerous national magazines on the intersection of cyber insurance and cybersecurity law. Mr Brunsman has a B.S. in Systems Engineering from the United States Naval Academy and an M.S.L. in cybersecurity law from the University of Maryland.

Michael Campisi is a former Graduate Assistant at the NYIT Entrepreneurship and Technology Innovation Center. Under the direction of Professor Nizich, his areas of research included software engineering, robotics, Internet-of-Things

device development, networking, and data science. Mr Campisi worked for several years in the investment management industry. He received a B.S. in business management and an M.S. in financial engineering and risk analytics from Rensselaer Polytechnic Institute and an M.S. in computer science from NYIT.

John "Jack" Castonguay, CPA, is an Assistant Professor of Accounting at the Frank G. Zarb School of Business, Hofstra University. He also serves as the Vice President of Strategic Content Development for Knowfully Learning Group. Previously, he worked for PricewaterhouseCoopers. His research interests include emerging technologies in accounting and auditing, audit quality, corporate governance, and sustainability. Professor Castonguay holds a BBA in accounting and an MSA from James Madison University and a PhD in accounting from the University of Tennessee in Knoxville.

Shehan Chandrasekera, CPA, is one of the few CPAs in the United States who is recognized as a real-world operator and a conceptual subject matter expert on cryptocurrency taxation. He is the Head of Tax Strategy at CoinTracker, a Forbes Tax Contributor, and a CPE instructor. Mr Chandrasekera has received various awards including the 2019 CPA Practice Advisor 40 under 40 honoree and Outstanding Young CPA of the Year. He is also among 21 accountants mentioned on *Accounting Today* who is helping to shape accounting in 2020 and beyond. Mr Chandrasekera has done speaking engagements with many organizations including Google, Coinbase, Lyft, AICPA, American Bar Association, and State CPA Societies. Mr Chandrasekera graduated from William Paterson University with B.S. in accounting with honors.

J. Scott Colesanti, a Professor at the Hofstra University School of Law, has taught Securities Regulation since 2000. Between 1988 and 1999, Professor Colesanti served as an investigative attorney for the New York Stock Exchange Division of Enforcement, rising to be that department's youngest Trial Counsel in 1993. He subsequently served in the Exchange's Office of the General Counsel, and as an industry arbitrator for over 10 years. As compliance counsel to a national broker dealer, he acted as regulatory liaison to over 20 states. Professor Colesanti has taught abroad on four occasions, each time comparing American fraud prohibitions with those of the European Union. He has published over 20 articles on the identification, prevention, and discipline of securities fraud. Professor Colesanti received a J.D. from Fordham Law School and an LL.M. from New York University.

Steven Cosares is a Professor of Mathematics and Computer Science at CUNY's LaGuardia Community College. His interests in the applications of quantitative modeling and optimization brought him to the topic of decision support systems in finance. Over the last decade, he has provided management consulting support and has published articles on the topic. His work has appeared in scholarly journals including *Operations Research*, *Journal of Wealth Management*, and *Interfaces*. Professor Cosares received undergraduate degrees in applied mathematics and computer science from SUNY Stony Brook and a PhD in operations research from the University of California, Berkeley.

Lian Duan is an Associate Professor in the Department of Information Systems and Business Analytics at Hofstra University. His research interests include correlation analysis, health informatics, and social networks. Professor Duan has published in such outlets as *IEEE Transactions on Knowledge and Data Engineering*, ACM Transactions on Knowledge Discovery from Data, Annals of Operations Research, SIGKDD Conference on Knowledge Discovery and Data Mining, and IEEE International Conference on Data Mining, Information Systems. He received a PhD in management sciences from the University of Iowa and a PhD in computer sciences from the Chinese Academy of Sciences.

Alevtina Dubovitskaya is a Docent in Lucerne University of Applied Science and Arts, Switzerland. She is also a consultant at Swisscom, where her work ranges from clients advisory to the design and implementation of blockchain-based solutions compliant with the laws and regulations. She has experience in such areas as designing protocols for privacy-preserving data aggregation and sharing in healthcare and developing the systems using blockchain technologies with a focus on accountable and trusted interactions and reputation management in dynamic distributed (multi-agent) systems. Her research interests are distributed data management in the context of blockchain, cryptographic solutions for providing security and privacy, and design of blockchain-based applications compliant with the laws and regulations. She received the best paper award on the application of blockchain technology in healthcare at the Swiss eHealth Summit 2017, a Doctoral Fellowship from the EDIC program at the Swiss Federal Institute of Technology (EPFL) in Lausanne, and a Russian Government Prize Fellowship. She received a PhD at EPFL, Switzerland.

Alexandra M. Dunn is an Assistant Professor of Management at the University of Mary Washington. Her current research interests include organizational support, organizational socialization, and employee job attitudes. Her work appears in such journals as the *Journal of Business and Psychology, Human Relations, Human Performance*, and *Journal of Occupational and Organizational Psychology*. She has presented her work at various conferences including the Academy of Management, Southern Management Association, and Society for Industrial Organizational Psychology. Professor Dunn received a B.A. in psychology from Elon University and an M.A. in industrial organizational psychology and PhD in organizational science from the University of North Carolina at Charlotte.

**Timothy Grief** is a Trade Analyst at BroadRiver Asset Management, L.P., where he executes first-level pricing, portfolio analysis, and investment flow support. He also works on longer-term projects alongside the technology and modeling teams. Formerly, he was an Analyst at Mitsubishi UFJ Trust and Banking, where he created and distributed internal management reports, risk reports, and client reports for Securities Lending. He also processed and managed securities lending agreements. Mr Grief was a Research Assistant in the Finance Department of the Frank G. Zarb School of Business at Hofstra University and served as an Equity Research Analyst for the Student Managed Investment Fund. He received a BBA degree in finance with high honors from Hofstra University.

Joshua Harris, CAIA, CRE, CCIM, is the Vice President of Strategy for Skanska USA Commercial Development, a leading developer of high-rise office, multifamily, and mixed-use projects in urban cores nationwide. His primary areas of expertise include real estate development, market research, and financial/project consulting. He is also an Adjunct Assistant Professor of Real Estate in the Peter J. Tobin College of Business at St. John's University. Before joining Skanska, he was the Academic Director and Clinical Assistant Professor of Real Estate at New York University's Schack Institute of Real Estate and the Director of the Dr P. Phillips Institute for Research and Education in Real Estate at the University of Central Florida. He received a PhD in finance from the University of Central Florida.

Kristin Kalish is an Independent Financial Consultant. Ms Kalish currently directs an entrepreneurship accelerator program, located at both Yale University and Georgetown University, for high school students globally. Her prior experience includes internships in private wealth management and in commodity analysis at a Chinese investment firm. Ms Kalish graduated summa cum laude from Hofstra University, earning a BBA with double majors in finance and management. She also holds a BS in economics from Dongbei University of Finance and Economics. She is currently a Level I candidate in the CFA program and pursuing an MS in finance.

Alim Khamisa, CPA, is an Adjunct Professor in the Blockchain Development Program at George Brown College. He is actively involved in curriculum development and also sits on the Program Advisory Committee. Professor Khamisa is passionate about Web 3.0 and decentralized finance (DeFi), and is a co-founder of the DeFi Toronto community meetup. He is an active member of the global blockchain community as an avid speaker, startup advisor, and angel investor. In his corporate innovation role at the Ontario Teachers' Pension Plan he focuses on applications of emerging technologies across asset management, capital markets, and finance more broadly. Professor Khamisa has a B.Sc. Honors from Carleton University and a Master of Business, Entrepreneurship and Technology (MBET) from the University of Waterloo.

Hak J. Kim is an Associate Professor in the Department of Information Systems and Business Analytics and a Co-director of Cybersecurity Innovation and Research Center at Hofstra University. Before beginning his academic career, he worked as a research engineer at SK Telecom, a world-class wireless network carrier. He has extensive research, teaching, and industry experience in the information technology field. Professor Kim is well-connected to the IT and security industry as well as several government agencies. He received a master's degree in engineering (telecommunications) from University of Colorado at Boulder and a PhD in information systems from the University of Pittsburgh.

**Thomas Maciura** is an Independent Financial Consultant. He has worked with various investment research and advisory service firms providing research and analysis across industries and assets classes. Formerly, Mr Maciura acted as a senior research analyst at Hofstra University's student-managed investment fund,

where he provided recommendations to the board of directors and represented the fund at events including NASDAQ Trade Talks. He held internship positions at The Bank of New York Mellon and JPMorgan Chase & Co., working within product and strategy. Mr Maciura holds a BBA in management with a minor in finance from the Frank G. Zarb School of Business at Hofstra University.

**Katherine McKechnie** is a Student at the University of Mary Washington pursuing a degree in accounting. Her current interests are economics and financial technology.

Michael Nizich is the Director of the Entrepreneurship and Technology Innovation Center and an Adjunct Associate Professor of Computer Science at the New York Institute of Technology (NYIT). Professor Nizich has more than 25 years of professional experience in information technology delivering and implementing enterprise-scale information systems in such industries as aviation, education, law enforcement, biotechnology, and cybersecurity. He has held IT leadership positions in both private and publicly held companies as well as non-profit organizations. Professor Nizich has more than 12 years of college-level teaching experience. He received a B.S. in computer information systems from Dowling College, an M.S. in technology systems management from Stony Brook University, and a PhD in information science from Long Island University.

Kirk Phillips, CPA, CMA, CFE, CBP, is the Managing Director, Global Crypto Advisors and a Principal in Blockchain Catalytics. He is the author of *The Ultimate Bitcoin Business Guide* ™ among other publications. He is also a member of the AICPA Virtual Currency Task Force and the AICPA ISACA Blockchain Risk Working Group. Mr Phillips regularly speaks and educates CPAs and attorneys on blockchain and cryptocurrencies, has a boutique consulting practice in the space, and is one of the first Certified Bitcoin Professionals (CBP). He is the Philadelphia City Leader for BitAngels. Mr Phillips received a B.S. in business and an accounting certificate from Salisbury University.

Gina C. Pieters is an Assistant Instructional Professor in the Economics Department at the University of Chicago and a Research Fellow at the Cambridge Center for Alternative Finance at the University of Cambridge. She has published on various cryptocurrency topics including taxation issues in blockchain forks, impact of decentralized cryptocurrency on monetary policy, and a framework for analyzing digital ledger technology. Professor Pieters has also published on pricing differences across exchanges. She has been interviewed on various global media outlets including BBC and NPR. She is also active on Twitter under @ProfPieters. Professor Pieters received a B.A. in economics and a B.S. in physics from University of California, Santa Cruz, and an M.A. and PhD in economics from the University of Minnesota.

**Joseph "Joey" Ryan**, CPA, is the Co-Founder and CFO at Gilded, a TechStars '19 company and AICPA-CPA.com Startup Accelerator participant. He is a licensed CPA with 10 years of public accounting experience. Mr Ryan had stints at RSM US LLP, Ernst & Young (EY), and LaPorte APAC, where he performed

Accounting from Florida State University.

financial statement audits on a vast range of institutional businesses both privately held and publicly traded. In 2018, he co-founded Gilded to execute on the vision of the future of payments and accounting in the age of digital currency. Mr Ryan works with digital currency accounting industry leaders to define problems and opportunities that blockchain presents. He is a member of the Wall Street Blockchain Alliance's Accounting Working Group and holds a M.S. in

Sayan Sarkar is an Assistant Professor in Accounting at the University of Mary Washington. His current research interests include earnings management, corporate governance, corporate fraud, and ethics. His work appears in such journals as *Managerial Finance, Global Finance Journal, Advances in Accounting*, and *Journal of Behavioral and Experimental Finance*. He has presented his work at various conferences including the Financial Management Association, Midwest Finance Association, Eastern Finance Association, and American Accounting Association. Professor Sarkar received an M.A. in banking and finance from Sheffield Hallam University and an MBA and PhD from the University of Texas at El Paso.

Kaushik Sengupta is a Professor of Management and Entrepreneurship at the Frank G. Zarb School of Business, Hofstra University. Professor Sengupta's research focuses on digital supply chains, technology adoption in supply chains, healthcare operations, and cross-border issues in supply chains. His research has appeared in *Operations Research, International Journal of Production Research, Journal of Supply Chain Management*, and *Journal of Management and Education*. Professor Sengupta received an MBA from the Indian Institute of Management, Lucknow and an MS in business and PhD in operations management from Indiana University.

Andrew C. Spieler, CFA, CAIA, FRM, is the Robert F. Dall Distinguished Professor of Business in the Frank G. Zarb School of Business at Hofstra University. He has published in *Real Estate Economics, Journal of Real Estate Finance and Economics, Journal of Real Estate Portfolio Management, Global Finance Journal, Journal of Applied Finance*, and other journals. He served as Chair of the Derivatives Committee at the New York Society of Securities Analysts. Professor Spieler also serves as Co-Director of the annual real estate conference sponsored by the Wilbur F. Breslin Center for Real Estate Studies. Professor Spieler is the founder of Advanced Quantitative Consulting, LLC. He received a BA in math and a BS in economics from Binghamton University (SUNY), an MS in finance from Indiana University, and an MBA and PhD in finance from Binghamton University (SUNY).

**Amanda Wilkie** is a consultant at Boomer Consulting, Inc., the accounting profession's premier consulting company assisting hundreds of the highest performing CPA firms in five areas critical to a firm's success: leadership, talent, technology, process, and growth. She is also a strategic thought leader, a soughtafter speaker, and a recognized leader who teaches others to lead. She has over 20 years of experience in technology and strategic leadership roles in multiple top 50

accounting firms. Her passion for emerging technologies and their impact on the accounting profession made her an early student of all things blockchain, and for the last several years, she has been a showcased educator on the subject. She has a B.S. in computer science from High Point University and an MBA from Shorter University along with Project Management, Lean Six Sigma, and Blockchain Solution Architect certifications.

This page intentionally left blank

### **List of Contributors and Institutions**

Deniz Appelbaum Feliciano School of Business, Montclair State

University

H. Kent Baker Kogod School of Business, American University

Hugo Benedetti ESE Business School, Universidad de los Andes

(Chile)

Joseph Brunsman Chesapeake Professional Liability Brokers, Inc

Michael Campisi New York Institute of Technology

John "Jack"

Castonguay Frank G. Zarb School of Business

Shehan Chandrasekera CoinTracker

J. Scott Colesanti Maurice A. Deane School of Law, Hofstra

University

Steven Cosares CUNY – LaGuardia Community College
Lian Duan Department of Information Systems and

Business Analytics, Hofstra University

Alevtina Dubovitskaya Lucerne University of Applied Sciences and Arts

Alexandra M. Dunn College of Business, University of Mary

Washington

Timothy Grief BroadRiver Asset Management, L.P.

Joshua Harris Skanska USA Commercial Development and

Peter J. Tobin College of Business, St. John's University, Peter J. Tobin College of Business

Kristin Kalish Independent Financial Consultant

Alim Khamisa Blockchain Development Program, George

Brown College, Innovation and Emerging Technology Leader, Ontario Teachers' Pension

Plan

Hak J. Kim Zarb School of Business, Hofstra University

### xxviii List of Contributors and Institutions

Thomas Maciura Independent Financial Consultant

Katherine McKechnie College of Business, University of Mary

Washington

Ehsan Nikbakht Frank G. Zarb School of Business, Hofstra

University

Michael Nizich College of Engineering and Computing Sciences,

New York Institute of Technology

Kirk Phillips Global Crypto Advisors

Gina Pieters Assistant Instructional Professor in the

Economics Department at the University of Chicago, and a Research Fellow at the Cambridge Center for Alternative Finance at

the University of Cambridge

Joseph "Joey" Ryan Gilded

Sayan Sarkar College of Business, University of Mary

Washington

Kaushik Sengupta Frank G. Zarb School of Business, Hofstra

University

Sean Stein Smith Lehman College, City University of New York

Andrew C. Spieler Frank G. Zarb School of Business, Hofstra

University

Amanda Wilkie Boomer Consulting, Inc