2023 SKKU-KAFE International Conference on Finance and Economics

Conference Date.
October 25-27, 2023

Conference Venue.
Sungkyunkwan University, Seoul, Korea

Host.
Sungkyunkwan University
Korean Association of Financial Engineering

성균관대학교 SUNGKYUNKWAN UNIVERSITY(SKKU)   BrainKorea 21 FOUR   SKKU ICAN4.0   성균관대학교경제연구소 Sungkyun Institute of Economic Research   KAFE 한국금융공학회 The Korean Association of Financial Engineering

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성균관대학교 SUNGKYUNKWAN UNIVERSITY(SKKU)   KAFE 한국금융공학회 The Korean Association of Financial Engineering

Date: October 25-27

Location: Humanities and Social Sciences Campus, Sungkyunkwan University, 25-2, Sungkyunkwan-Ro, Jongno-Gu, Seoul, Korea
서울특별시 종로구 성균관로 25-2 성균관대학교 인문사회과학캠퍼스

Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Welcome Message

On October 25-27, 2023, Sungkyunkwan University (SKKU) and the Korean Association of Financial Engineering (KAFE) will co-host the 2023 SKKU-KAFE International Conference on Finance and Economics. It promises to be a gathering of brilliant minds–both passionate researchers and dedicated professionals from around the world–who will address important issues. As the president of KAFE and the head of Sungkyun Institute of Economic Research (SIER), it is my pleasure and great honor to invite you to attend this esteemed academic conference.

Our conference serves as a unique platform for interdisciplinary collaborations, where experts from diverse fields come together to share their insights, discoveries, and ideas. This, in turn, promotes further advances. Indeed, the significance of such collaborations cannot be overstated. It is often through the interaction of researchers from diverse disciplines that significant breakthroughs occur, new perspectives emerge, and transformative discoveries are made.

We have an exciting lineup of keynote speeches, paper presentations, and panel discussions. We will delve into a wide array of topics, ranging from traditional finance and economics to the disruptive forces of technology and innovation. Our agenda is thoughtfully designed to address key issues such as Artificial Intelligence, Big Data, Cryptocurrency, Digital Transformation, Energy Economics, ESG, Financial Innovation, Machine Learning, and Sustainable Finance. This event provides a wonderful opportunity to engage in spirited discussions, challenge existing paradigms, and explore novel approaches to the most pressing issues in our respective fields.

Our keynote speakers are Christo Auret (Editor-in-Chief, *Investment Analysts Journal*), Jonathan Batten (Editor-in-Chief, *Journal of International Financial Markets, Institutions & Money*; Co-editor, *Finance Research Letters*), Bart Frijns (Editor-in-Chief, *Journal of Futures Markets*), Ali Kutan (Editor-in-Chief, *Borsa Istanbul Review*; Co-editor, *Economic Systems*), Rose Liao (Editor-in-Chief, *Emerging Markets Review*), and Peter Szilagyi (Editor-in-Chief, *Journal of Multinational Financial Management*), all of whom serve as editor-in-chief of highly reputable and high-ranking SSCI journals.

Our invited speakers are Jaerim Choi (Professor, Yonsei University), Jianfeng Hu (Professor, Singapore Management University; CIO, Heritage Capital Management), Hyeng Keun Koo (Professor Emeritus, Ajou University), Woochan Kim (Professor, Korea University Business School), Jongsub Lee (Professor, Seoul National University), Xingguo Luo (Deputy Head, Zhejiang University), Arman Sahovic (APAC Head, Refinitiv, London Stock Exchange Group), Taihei Sone (Economist, Bank of Japan), Ken Umeno (Professor, Kyoto University), Robert Vivian (Professor, University of Witwatersrand), Robert Webb (Paul Tudor Jones II Eminent Research Professor, UVA McIntire School of Commerce), Jeffrey Wong (Professor, Macquarie University), Yuji Yamada (President, Japanese Association of Financial Econometrics and Engineering), and Adam Zaremba (Professor, Montpellier Business School – Grande école).

We gratefully acknowledge the generous financial support and other contributions to the conference from our co-sponsors. These include: the Korea Exchange (KRX); Korea Housing Finance Corporation; Korea Asset Management Corporation; Korea Securities Depository; KB Securities; Samsung Asset Management; Shinhan Securities; BNK Securities; S&P Global among others. We sincerely appreciate our co-host divisions, SKKU Department of Economics BrainKorea21 Four Program (Dean: Sunghyun Henry Kim) and SKKU ICT Challenge and Advanced Network of HRD Team (Chair: Eunil Park). We especially thank our long-standing academic partner, the Japanese Association of Financial Econometrics and Engineering (JAFEE) for their strong support and participation. We sincerely appreciate the steadfast support and relentless participation of our KAFE members and SKKU Global Finance Research Center (GFRC) fellows. Without their support, this series of SKKU-KAFE conferences would not have achieved its current high status.

I look forward to welcoming you to the 2023 SKKU-KAFE International Conference on Finance and Economics.

Doojin Ryu, Ph.D.
President, Korean Association of Financial Engineering
Head, Sungkyun Institute of Economic Research

Program

◆► Day 1 (October 25, Wed.)

Time	Session	Location
09:00 ~ 10:40	Session 1. Frontiers in Financial Research	Zoom Link
10:50 ~ 12:30	Session 2. Finance and Economics	Zoom Link
12:40 ~ 14:40	Session 3. Global Financial Markets	Zoom Link
15:00 ~ 18:00	Session 4. Special Session: Editors' Perspectives	Zoom Link

◆► Day 2 (October 26, Thu.)

Time	Session	Location
09:00 ~ 11:50	Session 5. Distinguished International Scholar Special Lecture	International Hall 9B217
13:00 ~ 14:40	Session 6. Top Financial Research	International Hall 9B217
13:00 ~ 14:30	Session 7. Financial Engineering	International Hall 9B215
12:30 ~ 14:30	Session 8. Tutorial Session	International Hall 9B208
14:50 ~ 16:20	Session 9. Quantitative Finance	International Hall 9B217
14:40 ~ 16:30	Session 10. In-depth Discussions	International Hall 9B215
14:40 ~ 16:00	Session 11. Financial Econometrics	International Hall 9B208
16:30 ~ 18:00	Session 12. BrainKorea21 Four Seminar	International Hall 9B217
16:40 ~ 18:10	Session 13. Financial Markets	International Hall 9B215
16:10 ~ 18:10	Session 14. Young Scholars Consortium	International Hall 9B208

◆► Day 3 (October 27, Fri.)

Time	Session	Location
09:00 ~ 11:00	Session 15. Special Lectures on Financial Derivatives	Global R&E Lounge International Hall 5F

- Korea Standard Time (KST)
- US Eastern Daylight Time (EDT)
- US Central Daylight Time (CDT)
- China Standard Time (CST)
- Japan Standard Time (JST)
- Australian Eastern Daylight Time (AEDT)
- New Zealand Daylight Time (NZDT)
- Central European Summer Time (CEST)
- Eastern European Summer Time (EEST)
- Turkey Time (TRT)
- South African Standard Time (SAST)

Main: International Hall 9B217
Sub1: International Hall 9B215
Sub2: International Hall 9B208

Session 1: Frontiers in Financial Research

Korea Standard Time (KST)	09:00~10:40, Oct. 25	US Eastern Daylight Time (EDT)	20:00~21:40, Oct. 24
US Central Daylight Time (CDT)	19:00~20:40, Oct. 24	China Standard Time (CST)	08:00~09:40, Oct. 25
Japan Standard Time (JST)	09:00~10:40, Oct. 25		

Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Chair: Kiseop Lee (Purdue Univ.)

A linear-rational Wishart term structure model with jumps
Komi Edem Dawui (World Bank, USA; Université Paris 1 Panthéon -Sorbonne)*
Jose Da Fonseca (Auckland University of Technology)
Yannick Malevergne (Université Paris 1 Panthéon - Sorbonne, France)

Predicting the S&P 500 index at the opening bell by using information in the after-market period
Jikhan Jeong (Missouri Univ. of Science and Technology, USA)

Attention-based reading, highlighting, and forecasting of the limit order book
Jiwon Jung (Purdue Univ., USA)*,   Kiseop Lee (Purdue Univ.)

A numerical scheme of barrier options
Yuri Imamura (Kanazawa Univ., Japan)

Bank stocks, expected returns, and anomalies
Huan Yang (Sichuan Normal Univ., China)*,   Jun Cai (City Univ. of Hong Kong)
Lin Huang (Southwestern Univ. of Finance and Economics, China),   Alan J. Marcus (Boston College, USA)

Session 2: Finance and Economics

KST 10:50~12:30, Oct. 25		CST 9:50~11:30, Oct. 25	
NZDT 14:50~16:30, Oct. 25		AEDT 12:50~14:30, Oct. 25	

Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Chair: Maria Kim (Univ. of Wollongong)

The effects of option incentive compensation on corporate innovation: The case of China
Rui Cheng (Taiyuan Univ. of Tech., China)*,   Hyeongjun Kim (Yeungnam Univ.)

CEO compensation gaps between gender and risk-averse tendency
Sungchang Kevin Kang (Massey Univ., New Zealand)

How marketing strategies shape price competition
Daehong Min (Korea Information Society Development Institute)*
Hakki Lee (Korea Information Society Development Institute),   Heechun Kim (December & Company Inc.)

Credit ratings in sovereign bond markets
Juyoung Yang (Korea Development Institute)

CEO facial masculinity and carbon risk: Evidence from state climate adaptation plans
Maria Kim (Univ. of Wollongong, Australia)*,   Trang Vu (Univ. of Wollongong)
Sandy Suardi (Univ. of Wollongong)

Session 3: Global Financial Markets

KST 12:40-14:40, Oct. 25		CST 11:40-13:40, Oct. 25
AEDT 14:40-16:40, Oct. 25		EEST 6:40-8:40, Oct. 25

Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Chair: Jinyoung Yu (Xi'an Jiaotong−Liverpool Univ.)

Need for liquidity: Liquidity provision by high-frequency traders and day traders
Jinyoung Yu (Xi'an Jiaotong-Liverpool Univ., China)

Illiquidity premia during COVID-19: Evidence from the Hong Kong options market
Chuxin Ye (Zhejiang Univ., China)*,   Xingguo Luo (Zhejiang Univ.),   Weiqi Shen (Zhejiang Univ.)

ESG reputation risks and value relevance of board capital: Evidence from financial markets
Jeffrey Wong (Macquarie Univ., Australia)*,   Qin Zhang (Macquarie Univ.)

Is there intraday momentum in the Chinese commodity futures and option markets?
Xingguo Luo (Zhejiang Univ., China)

Signaling or collusion effects? The information bridge between banks and SMEs in China
Kainan Li (Zhejiang Univ., China)*,   Xingguo Luo (Zhejiang Univ.),   Liuyong yang (Zhejiang Univ.)

Reputation capital and corporate decoupling: An empirical study of the Russian invasion of Ukraine
Kam-Ming Wan (Hanken School of Economics, Finland)*,   Siu Kai Choy (King's College London, UK)
Tat-Kei Lai (IESEG School of Management, France)

Session 4: Special Session: Editors' Perspectives

KST 15:00-18:00, Oct. 25		CEST 8:00-11:00, Oct. 25
TRT 9:00-12:00, Oct. 25		SAST 8:00-11:00, Oct. 25

Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Chair: Doojin Ryu (Sungkyunkwan Univ.)

Institutional investors and the use of debt in multinational firms
Peter Szilagyi (EDHEC Business School, France)
- Editor-in-Chief, *Journal of Multinational Financial Management (SSCI)*

Predicting returns with machine learning across horizons, firm sizes, and time
Adam Zaremba (Montpellier Business School, France)* - Editor-in-Chief, *Modern Finance*
Nusret Cakici (Fordham University, USA),   Christian Fieberg (City University of Applied Sciences, Germany)
Daniel Metko (University of Bremen, Germany)

Paychecks with a purpose: Exploring the link between CEO compensation and corporate sustainability
Bart Frijns (Open Univ. of the Netherlands) - Editor-in-Chief, *Journal of Futures Markets (SSCI)*

How to publish your paper in top-tier SSCI journals
Ali Kutan (Southern Illinois Univ. Edwardsville, USA) - Editor-in-Chief, *Borsa Istanbul Review (SSCI)*

Assessment of the efficient market hypothesis
Christo Auret (Univ. of Witwatersrand, Johannesburg)* - Editor-in-Chief, *Investment Analysts Journal (SSCI)*
Robert Vivian (Univ. of Witwatersrand)

Do multinationals walk the talk? Evidence from global supply chains and workforce policies
Rose Liao (Rutgers Univ., USA) - Editor-in-Chief, *Emerging Markets Review (SSCI)*

Session 5: Distinguished International Scholar Special Lecture

🇰🇷 KST 9:00-11:50 (170 min.), Oct. 26   International Hall 9B217 [국제관 지하 2층 Main]

Chair: Doojin Ryu (Sungkyunkwan Univ.)

Derivative instruments, insider trading, and manipulation: Part I
Jonathan Batten (Royal Melbourne Institute of Technology, Australia)

Information spillover and corporate policies: The case of listed options
Jianfeng Hu (Singapore Management Univ.)

Seizing the Green Economy: Taxonomies in APAC and beyond
Arman Sahovic (Refinitiv & London Stock Exchange Group, UK)

Session 6: Top Financial Research

🇰🇷 KST 13:00-14:40 (100 min.), Oct. 26   International Hall 9B217 [국제관 지하 2층 Main]

Chair: Soo Young Song (Chung−Ang Univ.)

The effect of mandatory bid rule on private benefits of control
Woochan Kim (Korea Univ.)*
Bushik Kim (Korea Univ.)
Yongjoon Lee (Korea Univ.)

ESG lending
Jongsub Lee (Seoul National Univ.)*
Sehoon Kim (Univ. of Florida, USA)
Nitish Kumar (Univ. of Florida)
Junho Oh (Hankuk Univ. of Foreign Studies)

Risk shocks, asset liquidity, and unemployment
Timothy Kam (Australian National Univ.)*
Ayushi Bajaj (Monash Univ., Australia)

Internal information asymmetry, external reporting, and insider trading: Theory and evidence
Chang-Mo Kang (Hanyang Univ.)*
Donghyun Kim (Chung-Ang Univ.)
Youngdeok Lim (Univ. of New South Wales, Australia)

Session 7: Financial Engineering

🇰🇷 KST 13:00-14:30 (90 min.), Oct. 26   International Hall 9B215 [국제관 지하 2층 Sub1]

Chair: Yeongsuk Cho (Mokpo National Univ.)

An interpretation of interdependence of market fluctuation estimation framework via omnifarious bivariate distance functions
Insu Choi (KAIST)*
Woo Chang Kim (KAIST)

The roles of various types of related party transactions in IPO firms' pricing and market returns
Sunghwan Kim (Kyungpook National Univ.)*
Jin Tan (Shenzhen INSIT Information Technology, China)
Henry X. Wang (Univ. of Missouri-Columbia, USA)

Inventory investment, firm value, and growth: Evidence from Korea
Woo Sung Kim (Silla Univ.)*
Halil Kiymaz (Rollins College, USA)

When falling stars hit the zero lower bound
Seunghyun Kim (Korea Univ.)*
Kyuho Kang (Korea Univ.)

The effectiveness of the countercyclical capital buffer for financial institutions in Korea
Yeongsuk Cho (Mokpo National Univ.)*
Taejin Jo (Mokpo National Univ.)

Session 8: Tutorial Session

🇰🇷 KST 12:30-14:30 (120 min.), Oct. 26   International Hall 9B208 [국제관 지하 2층 Sub2]

Chair: Ki Beom Binh (Myongji Univ.) [in Korean]

Stock returns, investor sentiment, and stock price synchronicity
Karam Kim (Korea Asset Pricing)
Discussant: Prof. Hankil Kang (Dankook Univ.)

Predictive ability of foreign risk aversion for the stock market's return and volatility
Jinwhan Kim (KAIST College of Business)*
Hoon Cho (KAIST College of Business)
Discussant: Prof. Sung Y. Park (Chung-Ang Univ.)

Decentralization in finance and financial inclusion
Jaemin Son (Sungkyunkwan Univ.)
Discussant: Prof. Byung Hwa Lim (SKK Business School)

A machine learning approach: The case of the Korean stock market
Yeonchan Kang (Inha Univ.)
Discussant: Prof. Yongjae Lee (UNIST)

Session 9: Quantitative Finance

KST 14:50-16:20 (90 min.), Oct. 26   International Hall 9B217 [국제관 지하 2층 Main]

Chair: Hyeng Keun Koo (Ajou Univ.)

Network connectedness across financial assets of Korea during COVID-19 pandemic: A Bayesian network approach
Wonho Song (Chung-Ang Univ.)*
Ha Kyung Chung (North Carolina State Univ., USA)

LLMs analyzing analysts: Do BERT and GPT extract more value from financial analyst reports?
Yongjae Lee (UNIST)

Portfolio strategy with scaling power laws: Universal super generalized central limit theorem and its implications to finance and economics
Ken Umeno (Kyoto Univ., Japan)

Anticipatory preference with sustainability constraint
Hyeng Keun Koo (Ajou Univ.)

Session 10: In−depth Discussions

KST 14:40-16:30 (110 min.), Oct. 26   International Hall 9B215 [국제관 지하 2층 Sub1]

Chair: Keebong Park (Hankuk Univ. of Foreign Studies) [in Korean]

Explanatory power of controlled ESG risk factors
Jeongseok Bang (Sungkyunkwan Univ.)
Discussant: *Prof. Jongsub Lee (Seoul National Univ.)*

The effect of the ESG on dividend policy in Korea
Doowon Ryu (Kookmin Univ.)
Discussant: *Prof. Chang-Mo Kang (Hanyang Univ.)*

Climate risk and financial stability
Seoyun Choi (Sungkyun Institute of Economic Research)
Discussant: *Dr. Hakkyum Kim (Korea Exchange)*

Investor sentiment and mispricing
Heejin Yang (Dongguk University WISE)
Discussant: *Prof. Jaeram Lee (Gachon Univ.)*

Session 11: Financial Econometrics

KST 14:40-16:00 (80 min.), Oct. 26   International Hall 9B208 [국제관 지하 2층 Sub2]

Chair: Sang Gyung Jun (Hanyang Univ.)

Valuation and in-depth analysis of multifactor swing quanto options for mitigating electricity price-volume risk
Yuji Yamada (Univ. of Tsukuba, Japan)*, Takuji Matsumoto (Kanazawa Univ., Japan)

Forecasting stock returns with conditional quantile level dependence
Sung Y. Park (Chung-Ang Univ.)*, Stanley I.M. Ko (Tohoku Univ., Japan)

Neutralization of the bias in the integrated variance of financial returns induced by microstructure friction
Sebastien Pierre (Cardiff University, UK)*, Jing Chen (Cardiff Univ.)
Jonathan Thompson (Cardiff Univ.)

Regulatory reforms and price heterogeneity in an OTC derivative market
Taihei Sone (Bank of Japan)*, Daisuke Miyakawa (Waseda Univ., Japan)
Takemasa Oda (Bank of Japan)

Session 12: BrainKorea21 Four Seminar

KST 16:30-18:00 (90 min.), Oct. 26   International Hall 9B217 [국제관 지하 2층 Main]

Chair: Dukgyoo Kim (Sungkyunkwan Univ.)

The cleanup of US manufacturing through pollution offshoring
Jaerim Choi (Yonsei Univ.)*, Jay Hyun (HEC Montreal, Canada), Gueyon Kim (Univ. of California, Santa Cruz),
Ziho Park (National Taiwan Univ.)

Session 13: Financial Markets

KST 16:40-18:10 (90 min.), Oct. 26   International Hall 9B215 [국제관 지하 2층 Sub1]

Chair: Seongju Moon (Gyeongsang National Univ.)

How does stock liquidity affect default risk?
Eujin Kang (Seoul National Univ.)

Regime-switching macro risks in the term structure of interest rates
Sun Ho Lee (Korea Univ.)*, Kyu Ho Kang (Korea Univ.)

Effect of sustainability policies on investments in emerging markets
Sarvar Teshaboev (Namangan Engineering Construction Institute, Uzbekistan)

The impact of financial reform policies on enterprises
Yichen Liu (Jiujiang Univ., China)

Following the leader? Size-dependent herding in the US equity fund market
Youngmin Kim (Kangwon National Univ.)*, Sei-Wan Kim (Ewha Womans Univ.)

Day 2 (October 26, Thu.)

Session 14: Young Scholars Consortium

KST 16:10-18:10 (120 min.), Oct. 26   International Hall 9B208 [국제관 지하2층 Sub2]

Chair: Ji Yeol Jimmy Oh (SKK Business School)

Asymmetric relationship between news sentiment and stock market indices: Differences between U.S. and Korean markets

Geul Lee (Korea Housing Finance Corporation)
Discussant: Wonho Song (Chung-Ang Univ.)

Military alliance, geopolitical risks, and international energy trade

Sunjin Kim (Korea Energy Economics Institute)*
Songyi Paik (Univ. of Minnesota, USA)
Discussant: Prof. Hyoung-Goo Kang (Hanyang Univ.)

Decomposing the options order imbalance: Arbitrage and informed trades

Jaeram Lee (Gachon Univ.)*
Heejin Yang (Dongguk University WISE)
Jinyoung Yu (Xi'an Jiaotong-Liverpool Univ., China)
Discussant: Prof. Da-Hea Kim (SKK Business School)

Dynamic legislative cosponsorship network formation model

Chang Geun Song (Seongnam Research Institute)*
Discussant: Prof. Young-Chul Kim (Sogang Univ.)

A dynamic model of governmental venture capital

Hyun Joong Kim (Univ. of Southern Denmark)
Discussant: Prof. Haerang Park (Korea Univ. -Sejong Campus)

Day 3 (October 27, Fri.)

Session 15: Special Lectures on Financial Derivatives

KST 9:00-11:00, Oct. 27   EDT 20:00-22:00, Oct. 26
Global R&E Lounge, International Hall 5F [국제관 5층 글로벌 R&E 라운지]
Zoom Link: https://us02web.zoom.us/j/5216726975?pwd=ckZrdFhOUUhReGRjRjZuNC8vWndsUT09

Chair: Doojin Ryu (Sungkyunkwan Univ.)

Yesterday's tomorrows: Past visions of future financial markets

Robert Webb (Univ. of Virginia, USA)

Derivative instruments, insider trading, and manipulation: Part II

Jonathan Batten (Royal Melbourne Institute of Technology, Australia)

Program Chair

Doojin Ryu (Sungkyunkwan University)

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Session 01
Frontiers in Financial Research

A linear-rational Wishart term structure model with jumps

José Da Fonseca*   Komi Edem Dawui†   Yannick Malevergne‡

September 17, 2023

Abstract

This study proposes a linear-rational multi-curve model based on the Wishart process with jumps. The jump component allows the model to replicate the skew observed in the cap/floor market as well as the non trivial correlation between the curves. The linear-rational property implies that pricing a swaption or a cap/floor is of equal numerical complexity. Thanks to the affine property of the Wishart process with jumps, we derive an explicit formula that relates the swaption/cap/floor market volatility and the model parameters. Further to this, we derive two approximate pricing formulas for interest rate derivatives that are fast to evaluate and that can be applied to liquid products, such as swaption/cap/floor, or more exotic ones, like constant maturity swap derivatives. We illustrate the model's ability to generate skewed smiles as observed in the EUR-Euribor cap/floor market and the numerical accuracy of the different option pricing formula approximations.

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Predicting the S&P 500 Index at the Opening Bell by Using Information in the After-Market Period

Jikhan Jeong[1]

ABSTRACT

This paper shows how to predict relative change in the daily Standard and Poor's 500 stock market index (S&P500) between the opening price at 9:30 a.m. EST on day t and the closing price at 4:00 p.m. on day t-1 by using news data from the New York Times (NYTs) and financial indicators during the after-market period (defined as between 4:00 p.m. on day t-1 and 9:30 a.m. on day t). The findings of this study can be useful for investors and policymakers to anticipate market movements early on. If there is a predicted rise in the S&P500 at the opening bell, investors' expectations for the beginning hours of market trading will be positive. If a sharp decline in the S&P500 is expected at the market opening, investors and policymakers can prepare for potential market risk (e.g., high price volatility). In particular, if there is a single-day severe decline in the S&P 500 compared to that of the closing price on the prior day, a market-wide circuit breaker is triggered to stop the entire stock market trading for a certain period of time. Even though the occurrence of circuit breakers is rare in the US, the market-wide circuit breakers happened four times in March 2020 due to the COVID-19 pandemic. Three of the events happened during the beginning hour of market trading. However, there are a limited number of studies about the circuit breaker events during the market opening due to the lack of sufficient data and others. The prediction experiment shows that the deep learning model using a combination of context-based word embedding using news and financial indicators outperforms all other models in F1 score, precision, and accuracy; however, the logit model outperforms all other models in recall. Therefore, investors should consider suitable prediction models based on their purpose of predictions.

KEYWORDS

Stork market, S&P500 index, AI application for economics, prediction

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Attention-Based Reading, Highlighting, and Forecasting of the Limit Order Book

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2. Kiseop Lee: Professor, Department of Statistics, Purdue University, E-mail: kiseop@purdue.edu

Abstract

Managing high-frequency market data has been a challenging task in finance. A limit order book is a collection of orders that a trader intends to place, either to buy or sell at a certain price. Traditional approaches often fall short in forecasting future limit orders because of their high frequency and volume. In this study, we propose a modified attention algorithm to analyze the movement patterns in a limit order book. The enormous amount of data with millisecond time stamps are efficiently examined and processed using an attention module, which highlights important aspects of limit orders. We demonstrate that our modified attention algorithm improves the forecasting accuracy of limit orders.

A Numerical Scheme of Barrier Options

Yuri Imamura

the School of Mathematics and Physics, Kanazawa University

In the talk, we are interested in the risk of covering some portion of the price of the option at a default time. The risk, which we call timing risk, is a risk of uncertain dividend, especially of its payment time. Credit derivatives typically are exposed to the risk. We will discuss how it could be hedged by a static position of European path-independent options, generalizing P. Carr and J. Picron (1999) where they applied the semi-static hedging formula of barrier options to hedge a payment at a stopping time in a Black-Scholes environment. We will give an exact hedging formula in a general diffusion setting.

The semi-static hedge, by which we mean a hedge of knock-out/knock-i n options by simply holding plain vanilla options, has been widely known and extensively studied since the paper by J. Bowie and P. Carr (1994). We recall the strategy of semi-static hedge. Let X be a diffusion process and τ be the first exit time of X out of a domain $D \subset \mathbf{R}^d$. We want to hedge the knock-out option by holding two plain options. Suppose that its pay-off is given by $F(X_T)1_{\{\tau > T\}}$, where F is, for the moment, a bounded measurable function on $\mathbf{R}^d$. The hedge strategy we will be working on is as follows: long position of the option whose pay-off is $F(X_T)1_{\{X_T \in D\}}$, and the short position of the one with $\hat{F}$, where $\hat{F}$ is a measurable function on $\mathbf{R}^d$ such that $\hat{F} = 0$ on D. Then,

- If X never exit D, then the hedge works apparently.

- On the event $\{\tau < T\}$, at time τ the hedger liquidates the portfolio. The cost is

$$e^{-r(T-\tau)}E[(F(X_T)1_{\{X_T \in D\}} - \hat{F}(X_T))|\mathcal{F}_\tau].$$

If the latter was also zero, we could say that the static hedge works perfectly but otherwise the latter could be understood as the error of the static hedge. the *hedge error* evaluated at $t (< \tau)$ is

$$e^{-r(T-t)}E[E[1_{\{\tau < T\}}(F(X_T) - \hat{F}(X_T))|\mathcal{F}_\tau]|\mathcal{F}_t] := E[E[1_{\{\tau < T\}}\pi(F)(X_T)|\mathcal{F}_\tau]|\mathcal{F}_t],$$

where $\pi(F)(x) := F(x)1_{\{x \in D\}} - \hat{F}(x)$.

In this talk, we first generalize the Car-Picron formula. A sufficient condition that a (generalized) timing risk is decomposed into an integral of knock-in options under a multi-dimensional diffusion market model. We then proceed to understand the hedging error of the semi-static hedge to be a timing risk. We construct a Carr-Picron type semi-static hedges. but hopefully it is much smaller. The second order error can be understood as a timing risk in our sense. Then we can apply this process repeatedly to construct higher order semi-static hedges, which is actually a "parametrix". Finally we will give some specific examples of the Asymptotic static hedging of timing risk, and it's error estimate.

This is a joint work with Jiro Akahori (Ritsumeikan University) and Flavia Barsotti (University of Amsterdam).

Bank Stocks, Expected Returns, and Anomalies

Huan Yang, Jun Cai, Lin Huang, and Alan J. Marcus*

Abstract

We construct three sets of expected return proxies for individual bank stocks: (i) characteristic-based proxies; (ii) standard risk factor-based proxies; (iii) risk-factor-based proxies in which betas depend on firm characteristics. We test these models of expected return by evaluating the extent to which each benchmark can eliminate patterns of abnormal returns, in particular, in extreme decile portfolios. Over the full sample period, characteristic-based proxies better eliminate abnormal returns. But during either extreme credit market or extreme business-cycle conditions, risk-factor-based models better explain returns. The more effective benchmark for expected returns, therefore, is conditional on the state of the macroeconomy.

Keywords: bank stocks, expected return proxies, credit market conditions, business cycles

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Session 02
Finance and Economics

The effects of option incentive compensation on corporate innovation: The case of China

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Highlights

- Option incentives stimulate corporate innovation inputs and outputs.
- Innovations driven by option incentives promote invention patents rather than utility model patents.
- High-tech firms benefit more from option incentives for their innovations.

Abstract

This study aims to examine the impact of option incentives on corporate innovations in the representative emerging and transition economy. By utilizing the Chinese dataset, we find a noteworthy positive impact of option incentives on two dimensions of innovation: inputs and outputs. These positive effects remain valid after controlling for potential endogeneity problems using difference-in-differences with propensity score matching. Option incentives have a more pronounced effect in high-tech firms but underperform in non-high-tech firms. Therefore, it is necessary to consider the different characteristics and needs of firms when developing their incentive policies. Our results provide useful insights for corporate managers and policymakers in developing option incentive programs to promote innovations in emerging economies.

Gender gaps in CEO compensation and risk aversion

Sungchang Kevin Kang[a] and Doojin Ryu[b,]*

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https://sites.google.com/view/doojin/home/research

Highlight

• Female CEOs have a positive association with risk management during the financial crisis.

• Female CEOs receive higher compensation than male CEOs after the financial crisis by being offered higher incentives.

• Our findings counteract the perception that women receive lower compensation than men owing to risk aversion.

Abstract

Previous studies use a resource-based argument to suggest that female chief executive officers (CEOs) may receive compensation benefits owing to their relative scarcity. However, they do not find a significant gender gap in CEO compensation. Recent studies also suggest that female CEOs have a significantly positive association with risk management during the 2007–2008 financial crisis. Hence, we consider the possibility that the gender gap in CEO pay may have become significant because the demand for female CEOs is outpacing the supply. Based on Standard and Poor's 500 dataset, we confirm that female CEOs receive significantly higher compensation than male CEOs do because they are offered significantly higher incentives, suggesting that female CEOs receive higher compensation than male CEOs do because they are a relative minority. We examine whether female CEOs exhibit risk aversion regarding incentive-based compensation, and find no significant differences by gender. Rather, the relationship between female CEOs and incentives is positive and significant. This finding helps to counteract the perception that women receive lower compensation than men owing to risk aversion.

How Marketing Strategies Shape Price Competition[*]

Hee Chun Kim[†]   Hakki Lee[‡]   Daehong Min[§]

Abstract

We study firms' marketing behavior in a differentiated goods market. There are two firms that only differ in their marginal costs. Consumers are uncertain about the quality of each firm's product. Before price competition, each firm chooses a marketing strategy that reveals the quality of its product. Then two firms compete in price. We show that each firm's unique dominant strategy is to reveal the true quality. At the unique equilibrium, three possible forms of competition arise depending on the marketing outcomes, (i) no firm enters the market, (ii) one firm becomes a monopolist, and (iii) both firms enter and compete. Compared to when there is no marketing, consumers have an informational gain but can face a monopolist in the market. Price competition is more likely to occur as consumers ex ante believe that the products are more likely to be of high quality.

Keywords: Information Design; Informative Advertisement

Credit Ratings in Sovereign Bond Markets

Juyoung Yang

How does credit market segmentation affect the default risk of developing countries? This paper explores the impact of market segmentation resulting from sovereign credit ratings on default risk and emphasizes its disciplinary role in shaping borrowing behavior.

Empirical analysis suggests that downgrades from investment-grade to junk ratings are associated with a 30-basis-point increase in spreads. To account for this, I develop a quantitative sovereign default model that incorporates credit ratings and a segmented market structure derived from ratings. I calibrate the segmentation parameter to match the observed spread movements during downgrades and find that the higher spread implies a 200-basis-point higher discount rate on junk bonds compared to comparable non-junk bonds.

In the model, when a country accumulates debt beyond a threshold, it triggers downgrades, resulting in sovereign bonds being priced by more impatient lenders, leading to higher interest rates. Consequently, the government borrows less, reducing default risk and raising the overall bond price schedule.

While the segmentation makes the country worse off in the steady-state debt level, it can benefit the government in low-debt states by mitigating overborrowing friction associated with long-maturity structures, resulting in welfare gains. An analysis of an optimal rating rule suggests that a looser rating rule diminishes these welfare gains.

CEO Facial Masculinity and Carbon Risk: Evidence from State Climate Adaptation Plans

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Maria H. Kim

Sandy Suardi

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Abstract

We exploit the staggered finalisations of State Climate Adaptation Plans (SCAPs) in the United States as a plausible exogenous rise in the perceived climate regulatory risks of local firms. Especially, we investigate whether and to what extent masculine-faced CEO influences corporate carbon emissions post-SCAP finalisation, given that facial masculinity is linked to complex masculine behaviours in males (including aggression, achievement drive, competitiveness, egocentricity, risk-taking, deception and maintenance of social status). We find that firms led by more masculine-faced CEOs reduce their carbon emissions after the finalisation of SCAP. By contrast, firms with less masculine-faced CEOs have no change in total carbon emissions post-SCAP finalisation. Our channel analysis unveils that more masculine-faced CEO-led firms emit less carbon through increasing investment in R&D. Our findings further suggest that the impact of CEO facial masculinity on corporate carbon emissions is more pronounced in firms with low environmental performance, high CEO ownership and being subject to higher SCAP uncertainty. Overall, our study provides novel evidence of the role of masculine-faced CEOs in improving corporate carbon performance when facing increased climate regulatory risks.

Keywords: Climate Regulatory Risks; SCAP Finalisation; Facial Masculinity; Carbon Risk

Session 03
Global Financial Markets

Need for liquidity: Liquidity provision by HFT and day trader

Jinyoung Yu

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Abstract

This study examines whether high-frequency traders (HFT) and day traders (DT) contribute to liquidity provision following liquidity shocks. The type of each trader is identified based on data-driven criteria. Liquidity shocks, identified as drastic falls in market liquidity in five-second intervals, occur most frequently shortly after the market opening, and a shock appears to last less than 10 seconds on average. Similarly, I find that trading volumes of both HFTs and DTs are the highest near the market opening; however, the relative increase in maker positions is only observed for HFTs. The results imply that maker positions of HFTs are associated with liquidity improvement on a longer horizon and that DTs tend to be more speculative. Finally, whereas HFTs generally gain positive profits when trading against DTs, they experience losses against DTs during intervals with liquidity shocks.

Illiquidity Premia during COVID-19: Evidence from the Hong Kong Options Market

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[b] Department of Economics, Sungkyunkwan University, Seoul, Korea
[c] School of Economics, Zhejiang University, Hangzhou, China.

Abstract

This study examines whether illiquidity premia exist in the Hong Kong stock options market. By employing intraday trading data, we confirm significant illiquidity premia during the COVID-19 pandemic. Positive and significant illiquidity premia exist across options with different maturity and options with long-term maturity have the largest illiquidity premium. To further investigate the impact of the pandemic, we define two waves in the post-pandemic period. We find that extremely high illiquidity premia temporarily exist in the first wave, in which the pandemic affects calls more than puts. This is attributed to the evaporated liquidity of calls during this period. To compensate for the limited liquidity, call options provide investors with more illiquidity premia.

Is there Intraday Momentum in the Chinese Commodity Futures and Option Markets?

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ABSTRACT

Using high-frequency data of the Chinese commodity futures and its option from 2017 to 2022, we test the intraday momentum effect. We find that there are strong intraday reverse effects in both commodity futures and option markets with both overnight and first half-hour interval and rest of day interval are significant. Further, we investigate cross forecasting ability and show that futures market has predictive power for option market while only put option market can predict futures market. We use vega heding to explain this nonlinear effect.

KEYWORDS: Chinese commodity futures; Futures option; Momentum

ESG Reputation Risks and Value Relevance of Board Capital:
Evidence from Financial Markets

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Abstract

This paper examines the value relevance of board capital in the event of increased corporate reputation risks (CRR) from negative media coverage of environmental, social, and governance (ESG) issues. Results provide new insights by demonstrating that investors value gender diversity and international directors but are indifferent to directors' independence and board size when reassessing firm valuation from ESG reputational risks. Specifically, boards with at least 19% female board composition and the presence of some international directors seem to alleviate the shareholders' negative stock market reaction. Overall, these findings suggest that investors favour directors' human and social capital rather than independence or board size in this situation; as they may be more helpful in navigating ESG reputational crisis through a wider range of skillsets, broader networks, and international resources.

JEL classification: G12, G14, G30, G32; G34
Keywords: ESG; reputation risks; board capital; diversity

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Signaling or collusion effects? The information bridge between banks and SMEs in China

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Highlight
- A guaranteed loan's interest rate decision-making from a bank is followed by the government guarantee institutions, known as the "signaling effect".
- Government guarantee institutions affect banks' risk judgment of borrowing firms through the information bridge channel.
- "Signaling effect" works better in guarantee institutions that have a longer duration.

Abstract
The difficulty of SME financing is a global problem. A government guarantee system could alleviate the asymmetric information between banks and SMEs, driving financial resources to them. A unique dataset from Zhejiang provincial guarantee group has been used in this article to verify the information bridge function of the government guarantee system. We show that, firstly, the "signaling effect" dominates in the relationship between banks and government guarantee institutions. Banks trust the government to guarantee institutions' risk judgment of the borrowing firms. As a result, a guaranteed loan's interest rate decision from a bank is followed by the government guarantee institutions. Secondly, by doing the mechanism test, we found that guarantee institutions affect banks' decisions through the information bridge function. Further, this article shows that the guarantee institutions with high cash holding play a stronger role in the signaling effect, and it works better in guarantee institutions with a lower degree of relevance to state-owned capital.

Reputation capital and corporate decoupling:
An empirical study of the Russian invasion of Ukraine[1]

Siu Kai Choy[2]   Tat-kei Lai[3]   Kam-Ming Wan[4]

September 23, 2023

ABSTRACT

Numerous companies are under pressure from stakeholders to decouple from Russia in 2022. This paper uses the Russian invasion incident to examine the stock market reaction to 413 decoupling announcements. We find that the average five-day cumulative abnormal return around decoupling announcements is –1.52%. However, the loss is smaller for high-ESG firms than for low-ESG firms, and even if high-ESG firms are deemed to have more agency concerns. The loss is also smaller for firms with major Russian relationships and located in countries with stronger social norms. Overall, our results are more consistent with the reputation capital view of ESG.

Session 04
Special Session:
Editors' Perspectives

Institutional Investors and the Use of Debt in Multinational Corporations

Jonathan A. Batten[1], Karren Lee-Hwei Khaw[2], Peter G. Szilagyi[3] and Martin Young[4]

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Abstract

Multinational corporations (MNCs) should strategically seek more debt than domestic firms. However, previous studies find no conclusive evidence that MNCs would systematically differ in their debt choices from domestic firms. Deviations from MNCs' optimal debt strategy can potentially be explained by managerial agency problems magnified by internationalization. Indeed, Gyimah et al. (2021) show that MNCs with stronger internal governance are shown to have more debt and more long-term debt. However, internal coordination and external monitoring problems are still increased by MNCs' business complexity, which can in turn amplify both managerial agency problems and the agency problems of debt. This paper investigates how the debt choices of MNCs are affected by the presence of institutional investors as an agency control mechanism. We separate institutional investors into pressure-resistant and pressure-sensitive, with the former shown to have greater independence and stronger monitoring incentives by the previous literature. Using a sample of US-incorporate firms for the period 2004-2021, we find that MNCs have higher institutional ownership than do domestic firms. All else equal, MNCs use less debt, less long-term debt and less senior and secured debt than domestics firms, and more so the more foreign sales they have. Institutional ownership reduces all types of debt except convertible debt, consistent with efforts to address the agency problems of debt (Batten et al., 2021). However, as foreign sales increase, more pressure-resistant institutional ownership leads to more debt, more long-term debt and more secured debt, consistent with efforts to mitigate managerial agency problems. The impact of pressure-sensitive institutional ownership is insignificant in all model specifications. We conclude that pressure-resistant institutional investors are an important agency control mechanism in MNCs, helping them to make more optimal debt choices.

Predicting Returns with Machine Learning Across Horizons, Firms Size, and Time

Nusret Cakici[†], Christian Fieberg[‡], Daniel Metko[§], Adam Zaremba[δ]*

Abstract

Researchers and practitioners hope that machine learning strategies will deliver better performance than traditional methods. But do they? This study documents that stock return predictability with machine learning depends critically on three dimensions: forecast horizon, firm size, and time. It works well for short-term returns, small firms, and early historical data; however, it disappoints in opposite cases. Consequently, annual return forecasts have failed to produce substantial economic gains within most of the U.S. market in the last two decades. These findings challenge the practical utility of predicting returns with machine learning models.

Keywords: machine learning, return predictability, the cross-section of stock returns, asset pricing, firm size, equity anomalies, long-short portfolios, long-run returns

JEL Codes: C52, G10, G12, G15

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[δ] Adam Zaremba, 1) Montpellier Business School, 2300, avenue des Moulins, 34185 Montpellier cedex 4, France, email: a.zaremba@montpellier-bs.com; 2) Department of Investment and Capital Markets, Institute of Finance, Poznan University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, email: adam.zaremba@ue.poznan.pl; 3) Department of Finance and Tax, Faculty of Commerce, University of Cape Town, South Africa.

Pay-checks with a Purpose: Exploring the Link between CEO Compensation and Corporate Sustainability

Bart Frijns

Open Univ. of the Netherlands

Abstract

This paper examines how the CEO's compensation structure influences corporate sustainability behavior. Research shows that including CSR metrics in the compensation package does not have the desired effect. In our data we find the same results. Therefore this study investigates which compensation characteristics do improve substantial sustainability strategies. By differentiating between the cash and equity components of CEO compensation, we investigate their effects on symbolic and substantial sustainability behavior. Due to information asymmetry and opaqueness on the investors' side, symbolic corporate sustainability behavior is valued by the market, whereas substantial sustainable investments are not necessarily recognized as value-enhancing. This may discourage CEOs to invest in improving the firm's environmental outcomes. We pursue an empirical approach and find that equity compensation positively relates to the overall Refinitiv ESG rating. At the granular level, it also relates positively to environmental intentions, social intentions and social outcomes. Typically, such sustainability initiatives have short-term horizons and are relatively inexpensive. Cash incentives positively relate to environmental outcomes. The latter concerns long-term cost-intensive sustainability investments. These results indicate that although equity compensation is mostly known for its positive effect on the long-term view of CEOs, this assumption does not hold for sustainable investments.

How to publish your paper in top tier SSCI journals

Ali M. Kutan

Southern Illinois University Edwardsville, USA

Abstract

This presentation provides guidelines for undergraduate and graduate students for writing research papers and for young scholars for preparing manuscripts for submission to peer-review top SSCI journals. It also shares information to improve research papers and deal with revision requests. It is highly recommended for undegraduate and graduate students, new Ph.Ds, and young scholars. It is also useful for those interested in promotion or recognition in their field by publishing in top tier international journals.

Assessment of the efficient market hypothesis

Christo Auret

University of Witwatersrand

Robert Vivian

University of Witwatersrand

Abstract

This study assesses the efficient market hypothesis testing the differenced and return data characteristics of five world indices, seven listed shares in South Africa, five commodities and three foreign exchange rates. Our study shows different results which are dependent on the frequency of data. We chose to run Variance Ratio tests and Hurst Exponent tests for the twenty timeseries, analysing daily weekly and monthly frequencies for both differenced and return data over a 20-year period from 1 Sep 2003 to 31 Aug 2023. In 36% of variables tested we find they do not exhibit a random walk outcome under daily data, 21% under weekly data and 17% under monthly data. The absence of random walk outcome implies predictability which is inconsistent with the Efficient Market Hypothesis since abnormal profits can be made using trading strategies. The absence of random walk outcomes in some of the variables teste, implies that the price series itself demonstrate long memory and persistence. This is confirmed one hundred percent when the two tests are applied to resulting price series themselves. All of the price series shows they are not random walk and in the case of the Hurst Exponent test, all of them are trending. Accordingly, one cannot discount the existence of long memory and persistence.

Do Multinationals Walk the Talk? Evidence from Global Supply Chains and Workforce Policies[*]

Xiaoxue Hu[a], Dongxu Li[a], Rose C Liao[b], Angie Low[c], Carrie Pan[d]

Abstract

This paper examines whether firms switch to different suppliers (supplier countries) when their suppliers are located in countries that experience changes in social policies. Using staggered regulatory changes in a host country's Social policy strictness as an exogenous shock, we find that firms *increase* their imports from countries that increased social policy strictness. We show that employee-oriented firms, those from democrat states, and with more consumer exposure are more likely to initiate quick changes. Our results suggest that companies walk the talk under consumer demand.

Session 05
Distinguished International Scholar Special Lecture

Derivative instruments, insider trading and manipulation

Jonathan A. Batten
Royal Melbourne Institute of Technology, Australia

2023 SKKU-KAFE International
Conference on Finance and Economics
October 25-27, 2023
Sungkyunkwan University, Seoul, Korea

Part I:
Overview of derivatives, market manipulation and simple strategies using derivatives

- Overview
- Summary of ways to prevent market abuse
- Overview of derivative markets
- Market manipulation-definitions and examples
- Simple trading strategies that have been used for market manipulation
  - Commodity markets: The Silver Fix
  - Interest rate markets: LIBOR
- Concluding comments and lessons for markets

Overview

- Financial derivatives serve to manage risk and enhance market efficiency.
- They can be used to leverage insider trading and market manipulation.
- These 2 presentations explore how sophisticated investors misuse derivatives.
- Examples from recent scandals and investigations highlight their potential
  - Part I: Overview of derivatives, market manipulation (commodities and interest rates) and simple strategies
  - Part II: Insider strategic trading strategies and techniques (stock and foreign exchange markets)
- Strong regulatory oversight (firm, industry and national level) and market transparency are essential to prevent misuse and promote fair trading practices.

Regulatory Overview

Regulatory agencies focus on three key activities:

(i) **disclosure duties**, which reduce an economic agents search costs and the gathering of information

(ii) **restrictions on fraud and price and market manipulation**, which also lower the costs associated with verifying information

(iii) **restrictions on insider trading** that would otherwise undermine the investment that is made in information gathering

We now focus on insider trading and market manipulation to shed insights into key aspects of market behaviour and failure

Summary of ways to prevent market abuse

- Detailed processes for prompt information disclosure.
- Access to real-time trading data- currently a costly exercise for researchers.
- Protect whistleblowers from retaliation.
- Use technology for real-time market surveillance (Regtech), typically real time and using AI
- Strengthen oversight and investigation of suspicious activities- currently regulators require reporting of unusual trading.
- Encourage fair information disclosure (simultaneous disclosure) policies.
- Enforce strict clearly defined rules against insider trading.

Summary of ways to prevent market abuse

- The future is using AI to monitor trading to prevent manipulation by sophisticated traders using complex strategies.
- Educate investors about market risks.
- Promote international cooperation in regulation (regulatory arbitrage).
- Explore blockchain technology for transparent record-keeping making it harder to manipulate financial data.
- Offer rewards for whistleblowers (this remains a contentious issue).
- Ensure independence and accountability of auditors and ratings agencies to reduce conflicts of interest and biased reporting..
- Continuously update regulations to adapt to changing market conditions.
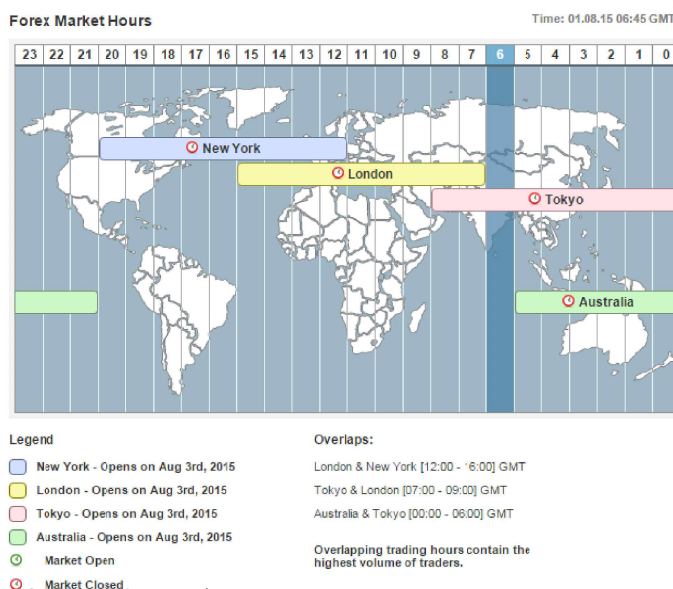

- Their model correctly identifies 90% of all suspected illegal transactions in the validation sample.
- Their detection model outperforms the ARMA(1,1) model of Park and Lee (2010) as well as three state-of-the-art anomaly detection techniques that detect insider trading.
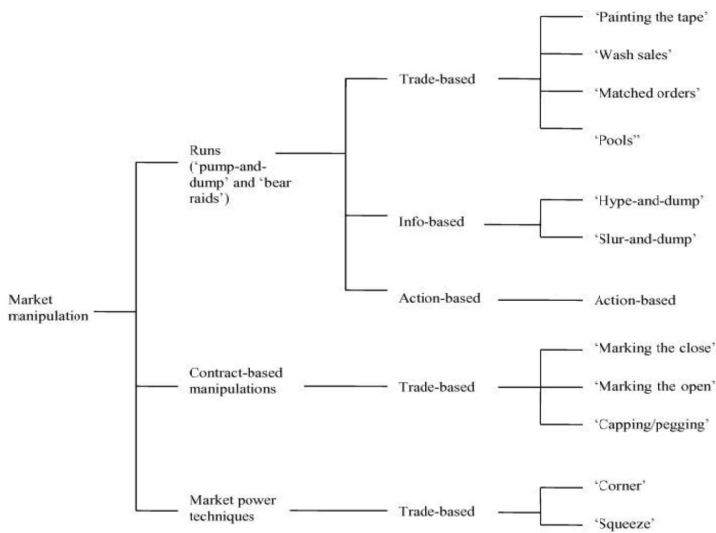
Stylized facts of the derivatives markets

- Need to consider how cash and non-cash-based Foreign Exchange (FX), interest rate, stock and other securities and products trade to understand manipulation timing, its consequences and how profits are optimised
- Need to consider where trading takes place and when
  - Most FX and interest rate trading occurs in London and New York, with Hong Kong, Singapore and Tokyo regional hubs and Paris, Frankfurt and Zurich in the EU.
  - Increasing turnover in the Gulf and China
  - USD main currency of use
- Stock markets in New York, China and the EU dominate but Chicago remains a futures trading hub
- Mostly 24 hour with volatility and liquidity changing across trading day

Stylized facts of the derivatives markets

- Information shocks arise from local idiosyncratic news as well as spillovers from other countries (e.g., US and China macro news)
- Evident in foreign exchange markets which trade a currency pair e.g., USD-KWN
- Asia-Pacific markets open as US markets close
- This results in variations in liquidity and volatility spikes

Forex Market Hours   Time: 01.08.15 06:45 GMT

| 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

New York
London
Tokyo
Australia

Legend
- New York - Opens on Aug 3rd, 2015
- London - Opens on Aug 3rd, 2015
- Tokyo - Opens on Aug 3rd, 2015
- Australia - Opens on Aug 3rd, 2015
- Market Open
- Market Closed

Overlaps:
- London & New York [12:00 - '6:00] GMT
- Tokyo & London [07:00 - 09:00] GMT
- Australia & Tokyo [00:00 - 06:00] GMT

Overlapping trading hours contain the highest volume of traders.

Market manipulation: Context

- When fraudsters manipulate the market through **matched orders**, they enter trades to buy or sell securities with the knowledge that a matching order on the opposite side has been or will be entered.
- **Action-based** when a manipulator's actions affect the perceived value of the stock to his or her advantage

Source: Putnins, 2012: Taxonomy of Manipulation

Market manipulation: Context
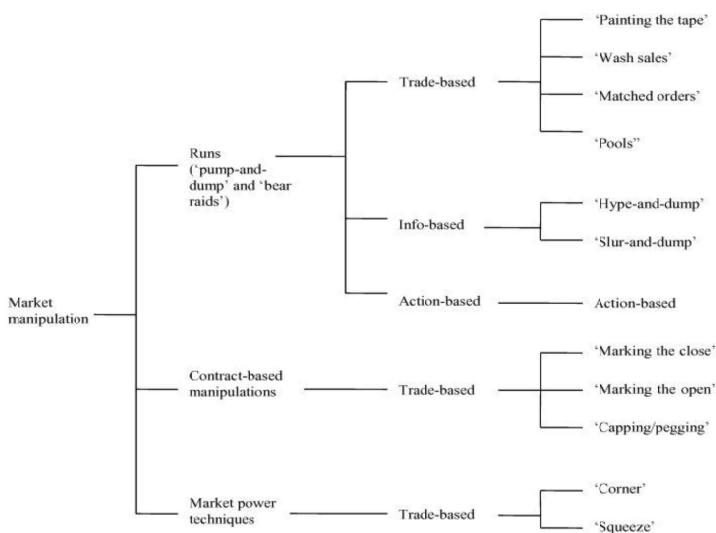
- The most famous alleged manipulations are the stock **pools** of the 1920s, through which groups of investors actively traded in a specified stock.
- Stock pools consisted of agreements, often written, among a group of traders to delegate authority to a single manager to trade in a specific stock for a specific period of time and then to share in the resulting profits or losses.
- These stock pools are the main reason for the current antimanipulation laws in the United States
- Authors fail to find evidence that the pools caused abnormal performance during the market crash and Great Depression.
- https://doi.org/10.1016/j.jfineco.2004.10.005

Source: Putnins, 2012: Taxonomy of Manipulation

Types of market manipulation

Painting the Tape:
- Traders artificially inflate the trading volume and price of a security by repeatedly buying and selling the same shares among themselves
- This creates the appearance of heightened interest and activity in the security.

- Bernhardt and Davies find that the equally weighted index return on the last trading day of a quarter is significantly higher than both the return on the first trading day of a quarter and the average return on other trading days; and further that these return differences rise with the percentage of total equity that is held by mutual funds.
- This strong empirical evidence indicates that the incentives of fund managers to distort investments are so high at the end of a quarter that their behavior significantly alters aggregate market outcomes.

Types of market manipulation: Painting the tape process

1. Identify a period of low liquidity such as during the last few minutes before the daily closing price is determined.

2. Accumulate a substantial long or short position in the targeted futures contract, depending on whether they want to push the closing price higher or lower.

3. Engage in a series of coordinated trading to raise or lower the closing price to create illusion of increased demand and price appreciation or depreciation.

4. This activity should be detectable as a spike in trading volume or volatility

Types of market manipulation:
Painting the tape process

1. If the closing price is determined based on the last trade or a volume-weighted average price during a specific period, the manipulated trading activity can significantly influence the closing price.

2. Many trading systems rely on the closing price as an indicator of market sentiment and so maybe misled into thinking there is a strong trend in the futures contract, either upward or downward, based on the manipulated data.

3. Once the closing price is established, the manipulators can should profit from their positions, by clearing them at the closing period (perhaps through client orders etc. or offsetting trades.

Types of market manipulation

Pump and Dump:

• In this scheme, manipulators disseminate false or misleading information to drive up the price of a security.

• Once the price has risen significantly, they sell their shares, leaving other investors with losses.

Short and Distort:

• This is the reverse of the "pump and dump." Manipulators take a short position in a security and then spread negative, false information to drive down the price.

• After the price has fallen, they cover their short positions at a profit.

Types of market manipulation: Pump and Dump

"One telltale sign of a pump-and-dump scheme is copy-and-pasted messages by groups of social-media and discussion-group posters with similar screen names, who will often disappear at the culmination of their scheme with their anonymity intact".

"The way they work is they create a token, and they want to take it as high as they can, so they go onto social media and talk about the things they are doing, they share memes and get people onto their channel," Carlton said.

"They first list some place like CoinGecko, then CoinMarketCap, and each listing expands them to a broader audience."

Types of market manipulation: Spoofing

Spoofing and Layering:

- Traders place a large number of orders to buy or sell a security with the intent to cancel them before execution.

- This creates a false impression of supply or demand and can trick other traders into making decisions based on the fake orders.

Gold, Silver Manipulation: CFTC Fines Deutsche, USB, HSBC For Spoofing Markets

Neils Christensen
Tuesday January 30, 2018 09:59

Kitco News   Share this article:

(Kitco News) - Three major European banks have been fined by the Commodity Futures Trading Commission for "spoofing" and manipulating gold and silver markets.
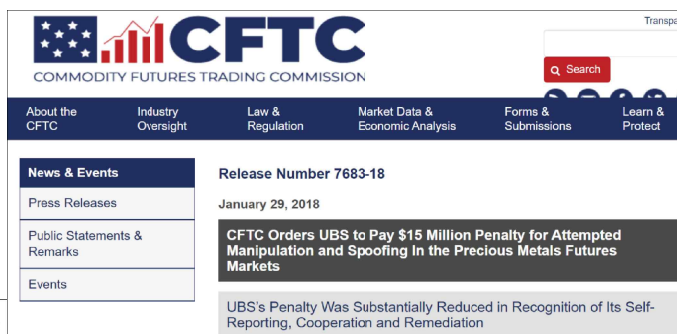
The Order finds that from January 2008 through at least December 2013, UBS, by and through the acts of certain precious metals traders on the spot desk (Traders), attempted to manipulate the price of precious metals futures contracts by utilizing a variety of manual spoofing techniques with respect to precious metals futures contracts traded on the Commodity Exchange, Inc. (COMEX), including gold and silver, and by trading in a manner to trigger customer stop-loss orders."

Types of market manipulation: Liquidity pools

- Liquidity pool refers to an area in the market where there is a high potential of finding a lot of money, making it an attractive location for traders.

- Liquidity can be found above old highs and old lows in the form of buy side and sell side liquidity

- These may also be linked to historic technical trading signals.

- Smart money strategically pushes the price to sweep liquidity pools and fill their orders, ensuring they always have an advantage in the market.

- "Smart money can push the price down and grab liquidity, buying at a lower and cheaper price."

- Tesla historic chart with 200 and 50-day moving average
- Set stop loss at P<50MA. Buy when P>50MA
- Set buy order at 200-day MA.

Types of market manipulation: Spoofing to Trigger Stop Loss
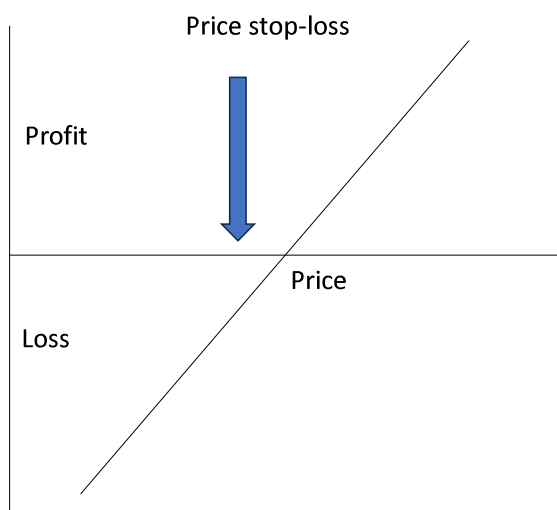
- Assume market price is 100 (for a spot or futures contract)
- Customer has a large long (buy) asset position at 100 with a stop loss at market.
- If price falls to 90 (i.e., if market trades at 90, then stop loss is activated)
- Bank is short (reverse position to customer). They sold at 110.
- They "spoof the market" to suggest to market they are heavy sellers
- They do so by placing buy-sell quotes below market
- Market prices trade at 90 and customer stop-loss is activated
- Customer sells to bank at 90 (receive +90-100 for a 10$ loss).
- Bank buys at 90 and sells at 110 for a 20$ profit

Types of market manipulation

Wash Trading (also round-trip trading):

• Traders simultaneously buy and sell the same security without any change in beneficial ownership

• Creates false trading activity and inflates volume.

• May be driven by tax strategy

Churning:

• Brokers excessively trade in a client's account to generate commissions for themselves, rather than serving the client's best interests.

Types of market manipulation

Front Running (Broker-Dealer Version):

• A broker-dealer executes a trade on a security for its own account ahead of a large client order, profiting from the expected price movement caused by the client's order.

• is illegal and a breach of the broker's fiduciary duty to the client.

Scenario
1. Assume a broker has a client (hedge fund) with a substantial position in a particular stock.
2. The broker learns that the client intends to place a large order to sell the stock.
3. This information is not yet known to the broader market. The broker needs to takes a short position in the stock.
4. To better leverage the private information the broker buys put options (which benefit from a declining stock price) or short-sells the stock ahead of the client's sell order.
5. When the client's sell order is executed, the stock price falls as anticipated and the broker buys back in the market or sells the put.
6. Note that there is still risk that the overall market may move (eg macro shock) and offset the idiosyncratic news of the stock.

Types of market manipulation:
Silver, then and now

Marking the Close: Silver and LIBOR Fixing-Examples Next

- Traders manipulate the closing price of a security by executing many trades at or near the market close, impacting the official closing price to benefit their positions.

Cornering the Market:

- A market manipulator accumulates a dominant position in a security or commodity to control its supply, influencing prices (you need cash to buy).
- This is particularly common in less liquid markets.

The billionaire Hunt brothers, William Herbert (left) and Nelson Bunker are sworn in before a House subcommittee investigating the collapse of the silver market. (UPI)

- The Silver Crisis of the late 1970s, resulted in a $150 million lawsuit against the Hunt Brothers, "While manipulation forces prices away from their fundamental value, speculation does not". http://dx.doi.org/10.2139/ssrn.4029866
- During the Hunt brothers' accumulation of the silver, prices of silver bullion rose from $11 an ounce in September 1979 to $49.45 an ounce in January 1980

Market manipulation: The silver fix summary

Hunt Brothers price spike far left

2011 spike and subsequent allegations of manipulation

The silver fix was a daily benchmarking process in the silver market, where a panel of banks determined the daily silver price, providing a reference for silver transactions globally.

- https://casetext.com/case/in-re-london-silver-fixing-ltd

Market manipulation: The silver fix summary

- The silver fix was a daily benchmarking process in the silver market, where a panel of banks determined the daily silver price, providing a reference for silver transactions globally.

- Key banks faced allegations of manipulation, where some panel banks were accused of colluding to influence the benchmark price for their benefit.

- Manipulation tactics included "spoofing," where traders placed large orders to deceive other market participants and then cancelled them, and collusion among some banks to control silver prices.

- Regulatory bodies, including the CFTC (Commodity Futures Trading Commission) and the FCA (Financial Conduct Authority), conducted investigations into these allegations, leading to settlements and fines against some banks.

- https://casetext.com/case/in-re-london-silver-fixing-ltd

Market manipulation: The silver fix summary

Report on Large Short Trader Activity in the Silver Futures Market

Commodity Futures Trading Commission
Division of Market Oversight
Washington, DC
May 13, 2008

"There is no evidence of manipulation in the silver futures market".
• Silver cash and futures prices have risen dramatically between 2005 and 2007, with silver outperforming the gold, platinum and palladium markets, suggesting that silver futures prices are not depressed relative to other metals prices.
• NYMEX silver futures prices tend to track closely the price of physical silver.
• Concentration levels for the top four short futures traders in the silver futures market are comparable to those observed in the gold and copper futures markets, and generally are lower than the levels seen in the platinum and palladium futures markets.

Rigging the silver fix:
January 1, 2007, through December 31, 2013

UNITED STATES DISTRICT COURT FOR THE
SOUTHERN DISTRICT OF NEW YORK

IN RE LONDON SILVER FIXING, LTD.
ANTITRUST LITIGATION

14-MD-02573-VEC
14-MC-02573-VEC

This Document Relates to:

The Honorable Valerie E. Caproni

ALL ACTIONS

[PROPOSED] THIRD CONSOLIDATED AMENDED CLASS ACTION COMPLAINT

"The first indication that competitive market forces break down around the start of the Silver Fix is the consistent and abnormally large drop in silver prices that begins before the start of the Fixing Members' daily conference call"

REUTERS

World   Business   Markets   Breakingviews   Video

BUSINESS NEWS   MAY 14, 2014 / 11:22 PM / UPDATED 9 YEARS AGO

What is the London silver fix?

By Reuters Staff   5 MIN READ

(Reuters) - The 117-year-old global benchmark price for spot silver, known as the silver fix, is to be scrapped from August.

The fix is set every day at noon by three banks, who get together over the telephone to work out the price at which their customers are willing to buy and sell the metal.

That benchmark is then published in the market as a standard that can be used by producers, consumers and traders in setting their contracts,

Rigging the silver fix:
January 1, 2007, through December 31, 2013

UNITED STATES DISTRICT COURT FOR THE
SOUTHERN DISTRICT OF NEW YORK

IN RE LONDON SILVER FIXING, LTD.
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Trade Reporting Weekly Turnover
Total value in US dollar (billions). The data represents the 12 week moving average value of trades for the period ending 29 September 2023.

Au
Gold $325.65 bn

Ag
Silver $42.94 bn

Pt
Platinum $7.27 bn

Pd
Palladium $3.77 bn

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Market Standards   Membership   Good Delivery   Responsible Sourcing   Prices & Data   News & Events

LBMA
International prices for gold, silver, platinum and palladium.

〽 Chart   ▤ Table | Prices Explained   Non-Publication dates for Prices

Silver ⌄   **USD $**   GBP £   EUR €

1970   1975   1980   1985   1990   1995   2000   2005   2010   2015   2020

1m 3m 6m YTD 1y All
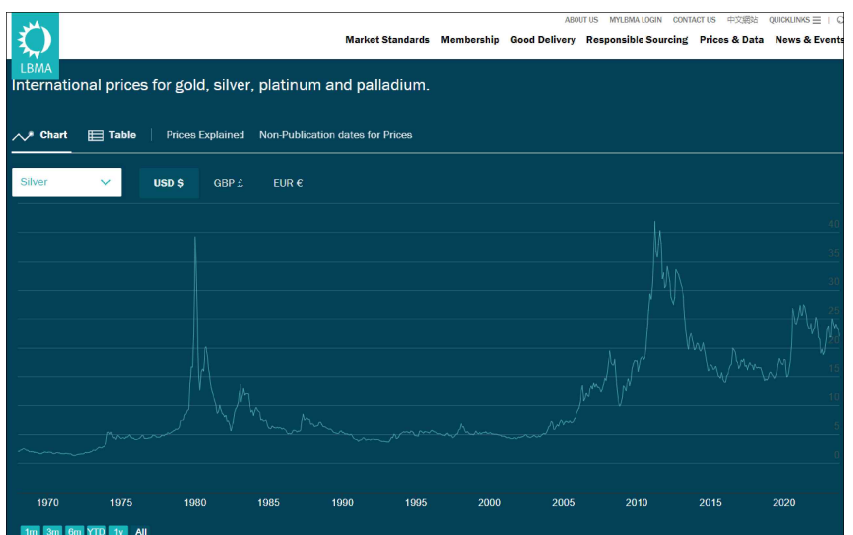
Rigging the silver fix: January 1, 2007, through December 31, 2013
Notional value of commodity futures trading worldwide
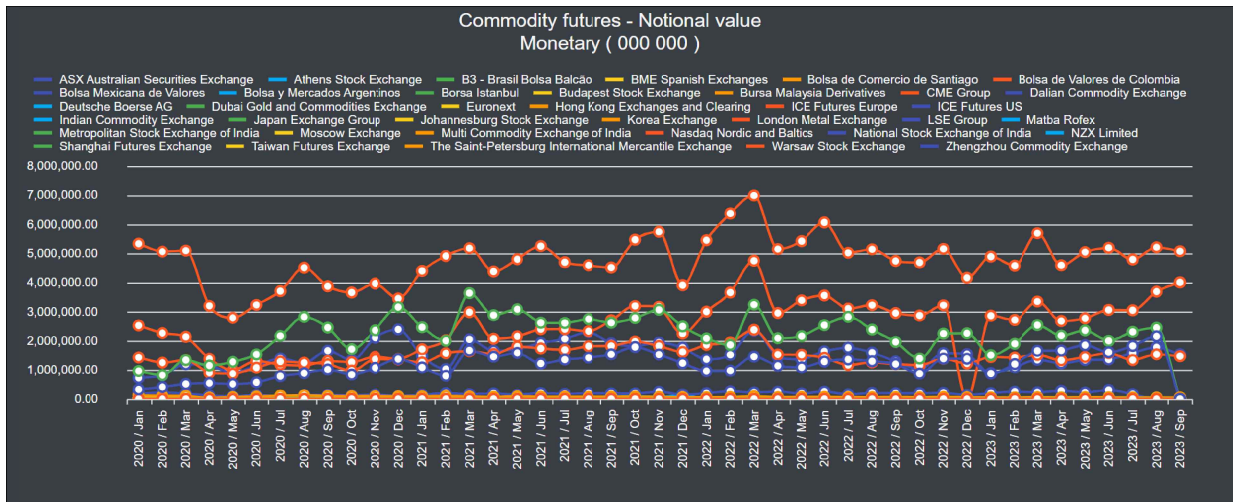
CME remains number 1, but rising markets in Shanghai and Zhengzhou

Rigging the silver fix: Evidence
January 1, 2007, through December 31, 2013
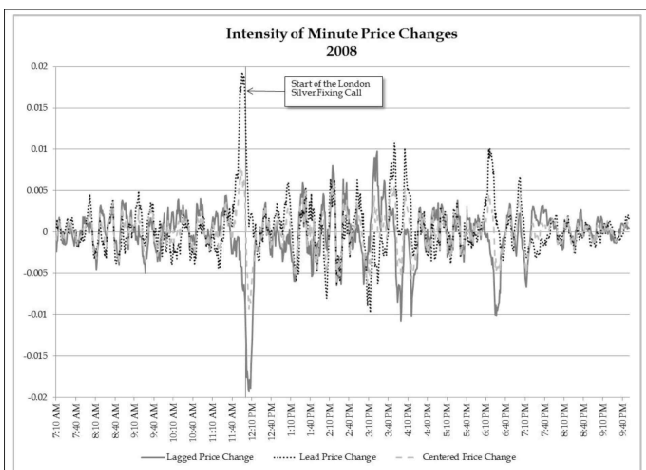
This plot examines the pricing dynamics in the silver spot market by comparing the magnitude of the change in silver prices across every minute of the day between 7:00 A.M. and 10:00 P.M. London time during 2008

The plot shows a large price spike around 12:00 P.M. London time, coincident with the start of the Silver Fix.

This large price change is a distinct break from silver market dynamics observed both before and after the Silver Fix.

(such as when US markets open)

Rigging the silver fix: Evidence
January 1, 2007, through December 31, 2013

- Figure 2 displays the cumulative unadjusted returns of COMEX silver futures contracts between January 1, 2007 and December 31, 2013.

- Cumulative unadjusted returns, which measure the change in value of a long position, represent the price level of COMEX silver futures contracts throughout the day.

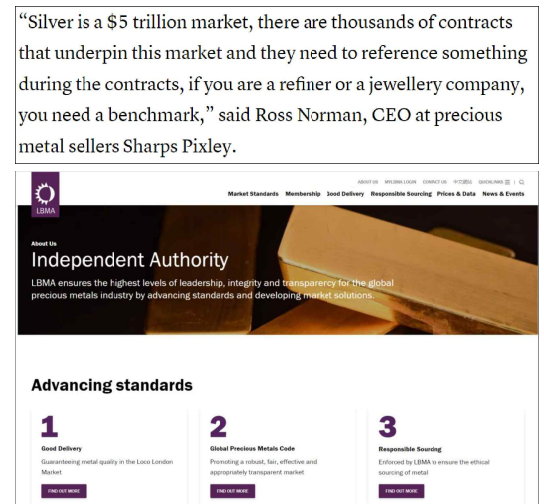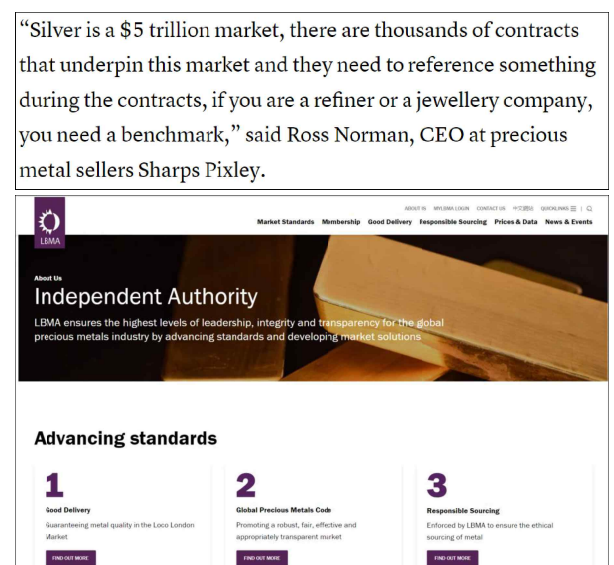- A decrease in cumulative unadjusted returns indicates a decrease in the prices of COMEX silver futures contracts.

- Figure 2 shows that COMEX silver futures cumulative unadjusted returns begin to decrease just before the start of the Silver Fix.

- This 10-basis point drop in COMEX silver futures prices, which is by far the largest of the day, causes silver prices to reach their nadir just after the Silver Fix starts, in many cases before the Fix price is released to the market

Rigging the silver fix: Evidence
January 1, 2007, through December 31, 2013

- Deutsche and UBS consistently submit price quotes that are lower than prevailing market prices.

- For example, beginning at 11:59:44 A.M., Deutsche Bank submits a quote substantially lower than the last quote submitted by BNP Paribas, which starts a reversion in the spot market price trend.

- UBS follows suit, lowering its next price quote to $18.65

- The Plaintiffs identified more than 850 days during the Class Period where the Defendants' spot market activity caused silver market price trends to reverse direction.

Market manipulation:
The silver fix changes made

- Transition to Electronic Auctions: The traditional method of determining the silver fix through a daily conference call among a few panel banks was replaced with electronic auctions, increasing transparency and reducing the potential for collusion.
- Increased Participation: The number of participants involved in setting the benchmark was expanded to include a broader range of market participants, reducing the influence of a select few banks.
- Price Calculation Methodology: The calculation methodology for the silver fix was revised to make it more robust and resistant to manipulation.
  - This involved using a volume-weighted average price over a specified time period to determine the benchmark price.

"Silver is a $5 trillion market, there are thousands of contracts that underpin this market and they need to reference something during the contracts, if you are a refiner or a jewellery company, you need a benchmark," said Ross Norman, CEO at precious metal sellers Sharps Pixley.

Market manipulation:
The silver fix changes made

- Enhanced Oversight and Regulation: Regulatory bodies like the FCA and the CFTC increased oversight and implemented stricter regulations to prevent market manipulation, including regular monitoring and reporting requirements.
- Transparency and Disclosure: Greater transparency in the benchmark-setting process and more extensive disclosure of the banks involved and the methodology used to determine the benchmark were introduced to increase market confidence.

"Silver is a $5 trillion market, there are thousands of contracts that underpin this market and they need to reference something during the contracts, if you are a refiner or a jewellery company, you need a benchmark," said Ross Norman, CEO at precious metal sellers Sharps Pixley.

Market manipulation:
The silver fix changes made

The LBMA Gold and Silver Price benchmarks are the global benchmark prices for unallocated gold and silver delivered in London, and are administered by ICE Benchmark Administration Limited. A licence is required from IBA in order to obtain and use real-time or historical LBMA Gold and Silver Price data, including for pricing and valuation activities and in transactions and financial products. Please contact iba@theice.com for details on how to obtain the requisite licence and where to access the data. Please see IBA's website for further information.

The LBMA Platinum and Palladium Price is administered independently by the London Metal Exchange (LME). LME licences its data for a wide variety of purposes, including distribution and the creation of derived products. Particular uses of the LBMA Platinum and Palladium prices require a usage licence. For information on licensing arrangements relating to these prices, please refer to the LME website.

Recent studies:

Show that short term price of precious metals futures can be predicted by algorithmic technical oscillators and therefore we recommend integrating such systems into portfolios management of other risky assets such as stocks, currencies, and other commodities.

Intraday Trading of Precious Metals Futures Using Algorithmic Systems

Cohen Gil https://doi.org/10.1016/j.chaos.2021.111676

Manipulation in interest rate markets
Turnover by currency in interest rate markets (OTC)

2022		Swaps					
	All products	Forward rate agreements	Total	Of which: overnight index swaps	Of which: other interest rate swaps	Total options	
Total, "net-net" basis	5,225,827	496,456	4,490,930	2,317,186	2,173,743	234,563	
By currency							
US dollar	2,275,610	26,100	2,182,683	1,067,609	1,115,074	66,827	
Euro	1,752,980	420,703	1,266,852	675,010	591,842	65,425	
Pound (sterling)	350,180	1	340,580	307,014	33,567	9,598	
Australian dollar	279,315	1,660	276,624	132,220	144,405	1,030	
Yen	116,895		48,596	34,828	13,768	68,298	
Canadian dollar	60,151	37	59,694	16,635	43,059	421	
New Zealand dollar	47,965	435	47,492	23,833	23,659	39	
Won	47,769	16	32,386	1,168	31,218	15,367	
Czech koruna	31,859	8,634	22,413		22,413	811	
Renminbi	29,544		29,485	967	28,518	59	

Highlights

- USD and Euro
- Surprising role for AUD, CAD, NZD and Rand =commodity currencies
- Limited role for RMB
- Options small relative to swaps
- Arbitrage in interest rate swaps and FRA (Forward Rate Agreement) involves taking advantage of price differences or yield differentials between these financial instruments in various markets (like futures) to make a risk-free profit.

# Manipulation in interest rate markets
Turnover by location of interest rate markets (OTC)

2022			View: Value		Level: Level 4	
			Swaps			
	All products	Forward rate agreements	Total	Of which: overnight index swaps	Of which: other interest rate swaps	Total options
⌄ Total, "net-net" basis	5,225,827	496,456	4,490,930	2,317,186	2,173,743	234,563
› By currency						
› By counterparty						
⌄ By country						
United Kingdom	2,626,080	361,595	2,101,318	1,231,902	869,416	163,166
United States	1,689,144	8,555	1,628,896	788,450	840,446	51,694
Hong Kong SAR	321,106	14,140	305,147	159,370	145,777	1,724
Germany	272,952	55,763	212,885	60,455	152,430	4,303
France	203,931	64,699	131,605	37,920	93,685	7,483
Singapore	155,974	187	132,920	54,134	78,786	21,316
Australia	112,725	158	112,237	51,295	60,942	330
Canada	72,165	1,065	70,189	15,965	54,224	910
Japan	50,736	185	48,496	26,894	21,602	2,055
Netherlands	38,247	8,142	29,615	5,258	24,356	490

Highlights

- London, followed by NY are the main centres for trading interest rate derivatives
- Especially OTC options
- Same for FX products

Notional value of interest rate futures trading worldwide
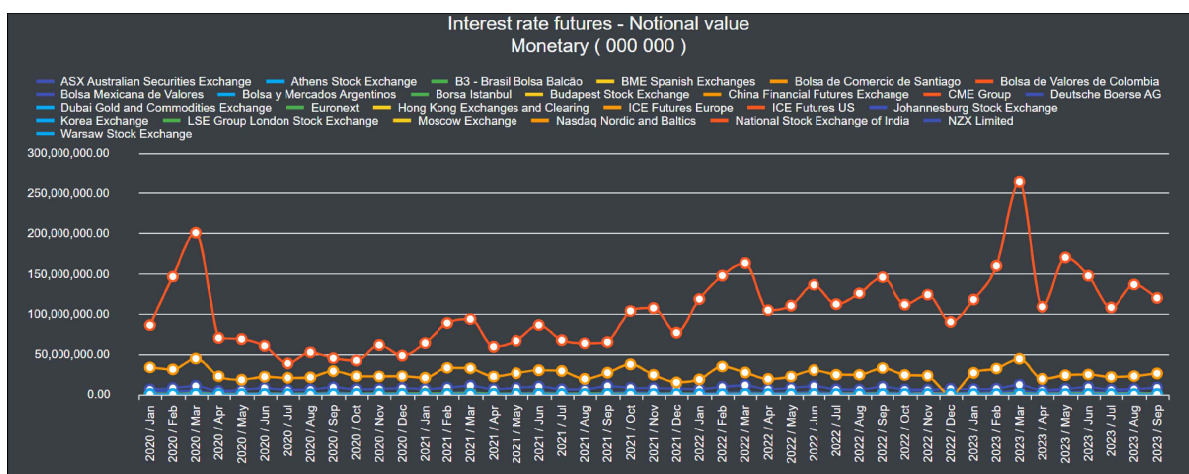
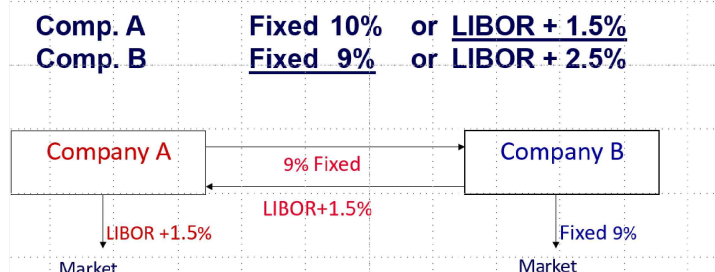CME Group (Chicago) and Deutsche Boerse AG

Interest rate futures trading worldwide

PRODUCT	MONTH	OPTIONS	CHART	LAST	CHANGE	PRIOR SETTLE	OPEN	HIGH	LOW	VOLUME
30 Day Federal Funds Futures	MAR 2024 ZQH4	OPT	ı̇ı̇l	94.615	+0.03 (+0.03%)	94.585	94.59	94.615	94.585	8,940
One-Month SOFR Futures	MAR 2024 SR1H4	OPT	ı̇ı̇l	94.61	+0.03 (+0.03%)	94.58	94.58	94.615	94.58	3,408
Three-Month SOFR Futures	MAR 2024 SR3H4	OPT	ı̇ı̇l	94.675	+0.05 (+0.05%)	94.625	94.64	94.68	94.63	394,214
U.S. T-Bil Futures	DEC 2023 TBF3Z3		ı̇ı̇l	94.615	+0.025 (+0.03%)	94.59	94.605	94.615	94.605	17
ESTR Futures	JUN 2024 ESRM4		ı̇ı̇l	96.35	+0.06 (+0.06%)	96.29	96.315	96.35	96.315	2,074

- CME short term interest rate products
- Secured Overnight Financing Rate (SOFR) futures and options are the primary liquidity pool for hedging USD short-term interest rates, trading on average over 3 million contracts each day.
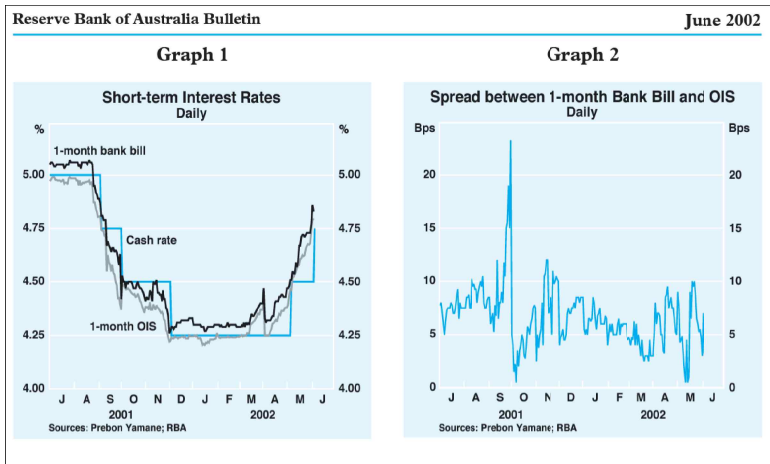
Interest rate swaps

To construct a swap, each company will borrow in the market where it has a comparative advantage and then **swap interest payments** so that they effectively pay the interest on each other's loan:

Comp. A   Fixed 10%   or <u>LIBOR + 1.5%</u>
Comp. B   <u>Fixed 9%</u>   or LIBOR + 2.5%

Company A → 9% Fixed → Company B
Company B ← LIBOR+1.5% ← Company A

Company A — LIBOR +1.5% — Market
Company B — Fixed 9% — Market

- An agreement between two parties to exchange interest payments
- It will occur when each party has a comparative advantage in one market but would prefer to borrow in another market
- The exchange of cash flows is separate from the actual loans
- Only the net difference between the interest payment changes hands (potential credit risk)
- There is no exchange of principal

Overnight Index Swaps (OIS)

Reserve Bank of Australia Bulletin — June 2002

Graph 1 — Short-term Interest Rates (Daily) — 1-month bank bill, Cash rate, 1-month OIS — Sources: Prebon Yamane; RBA

Graph 2 — Spread between 1-month Bank Bill and OIS (Daily) — Sources: Prebon Yamane; RBA

Assume, for example, that on the day before a central bank meeting:

- the current cash rate is 4.5percent;
- the 30-day overnight indexed swap rate (i.e., the fixed rate) is 4.75percent;
- the 60-day overnight indexed swap rate is 4.875percent.

The 30-day swap rate of 4.75percent suggests that market participants are, on balance, expecting the overnight cash rate over the next 30days to average that rate.

Since monetary policy is typically reviewed only at Board meetings, we can deduce that markets expect the Bank to raise the cash rate by 0.25percent at the next day's Board meeting.

An overnight indexed swap is an interest rate swap over some given term, e.g. 10Y, where the periodic fixed payments are tied to a given fixed rate while the periodic floating payments are tied to a floating rate calculated from a daily compounded overnight rate over the floating coupon period.

Manipulating LIBOR

- LIBOR, the London Interbank Offered Rate, is a widely used benchmark interest rate that serves as a reference for various financial products and contracts (Swaps, FRAs, LIBOR futures), particularly in the international financial markets.

- LIBOR is written into standard derivative and loan documentation (i.e., International Swaps and Derivatives Association ("ISDA"), the Loan Market Association ("LMA") and the Loan Syndication and Trading Association ("LSTA")).

- Determined by a daily survey of banks and reflects the average interest rate at which major banks based in London are willing to lend to one another in the interbank market for various maturity periods and various currencies.

- A panel of major banks, typically 16 for each currency, submit their estimated borrowing costs to a designated administrator.

- The highest and lowest submissions are excluded, and the remaining submissions are averaged to calculate the daily LIBOR rate.

	(USD million)	2014	2014
Bank of America	455	0.02%	0.24%
Barclays	3,132	0.15%	5.00%
Citigroup	2,485	0.13%	1.52%
Credit Suisse	85.3	0.01%	0.21%
Deutsche Bank	3,676	0.18%	8.73%
HSBC	872	0.03%	0.48%
JP Morgan	2,117	0.08%	0.90%
Lloyds Banking Group	370	0.03%	0.44%
RBS	2,456.7	0.15%	6.27%
Société Générale	1,354	0.09%	3.96%
UBS	2,858	0.27%	4.47%

LIBOR and FOREX Fine Settlements as a Percentage of Total Assets and Market Capitalization Bank Name Total Settlement % in Total Assets % in Market Cap.

Manipulating LIBOR

TABLE 1: ICE-LIBOR Contributing Banks

BANK/CCY	USD	GBP	EUR	CHF	JPY
Bank of America N.A. (London Branch)	X				
Bank of Tokyo-Mitsubishi UFJ Ltd	X	X	X	X	X
Barclays Bank plc	X	X	X	X	X
BNP Paribas SA, London Branch		X			
Citibank N.A. (London Branch)	X	X	X	X	
Cooperatieve Rabobank U.A.	X	X	X		
Crédit Agricole Corporate & Investment Bank	X	X			X
Credit Suisse AG (London Branch)	X		X	X	
Deutsche Bank AG (London Branch)	X	X	X	X	X
HSBC Bank plc	X	X	X	X	X
JPMorgan Chase Bank, N.A. London Branch	X	X	X	X	X
Lloyds TSB Bank plc	X	X	X	X	X
Mizuho Bank, Ltd		X	X		X
Royal Bank of Canada	X	X	X		
Santander UK Plc		X	X		
Société Générale (London Branch)	X	X	X	X	X
Sumitomo Mitsui Banking Corporation Europe Limited	X				X
The Norinchukin Bank	X				X
The Royal Bank of Scotland plc	X	X	X	X	X
UBS AG	X	X	X	X	X

- Historically, the London based banking sector trade organization, the British Bankers Association (BBA) managed the LIBOR setting process.
- LIBOR rates are quoted for various major currencies, including the U.S. dollar (USD), Euro (EUR), British pound (GBP), Japanese yen (JPY), and Swiss franc (CHF), among others.
- The BBA has over "200 member banks headquartered in over 50 countries with operations in 180 jurisdictions worldwide.
- Eighty per cent of global systemically important banks are members of the BBA

Manipulating LIBOR

TABLE 2: Data Vendors Permissioned to Release ICE-LIBOR

DATA VENDOR	WEB SITE	ICE LIBOR
Bloomberg	http://www.bloomberg.com/	X
Class Editori S.p.A.	http://www.classeditori.it	
FastMarkets	http://www.fastmarkets.com/	
Interactive Data	http://www.interactivedata.com/	X
Proquote	http://www.proquote.com/	X
Quick	http://www.quick.co.jp/	X
SIX Financial Information	http://www.six-financial-information.com/	X
SunGard	http://www.sungard.com/marketmap	X
SuperDerivatives	https://www.superderivatives.com/	X
Thomson Reuters	http://www.thomsonreuters.com/	X
vwd Vereinigte Wirtschaftsdienste	http://www.vwd.com/	X

Source: https://www.theice.com/iba/libor

- To access LIBOR prices you need to subscribe to a data service
- The world leaders are Thompson-Reuters and Bloomberg
- LIBOR rates are published for several different maturities, ranging from overnight to one year.
- The most common maturities are three-month and six-month LIBOR (align with 3X6 FRAs and near month futures contracts).

Manipulating LIBOR: Impacts

Figure 1: Outstanding of Total International Securities Issued Worldwide (US$ Trillion)
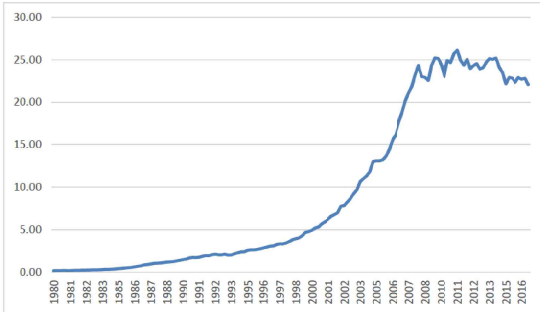
Appendix 1: Wheatley Report Estimates of LIBOR Usage

Table C.1: Use of LIBOR in Financial Contracts

Instrument/Application	Estimated value of contracts with LIBOR as benchmark
Syndicated Loans	~$10 trillion[a]
Floating Rate Notes	~$3 trillion[b]
Interest Rate Swaps	$165[c] – $230 trillion[d]
Exchange-traded Interest Rate Futures and Options	$30 trillion[d]
Forward Rate Agreements	$25[d] – $30 trillion[e]
Total	~$300 trillion

Note: Assumption that 50 per cent of contracts reference LIBOR; this list is not exhaustive.

Sources: (a) Oliver Wyman; (b) Dealogic; (c) DTCC; (d) Bank for International Settlements; (e) Trioptima

Significant decline in the issuance of all international securities (both fixed rate and floating since 2008 (Data from BIS)

Manipulating LIBOR: Impacts

Figure 2: The Percentage of Floating Rate (LIBOR Sensitive) to Total Securities
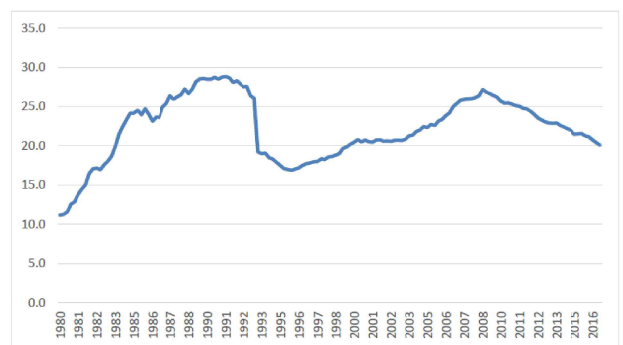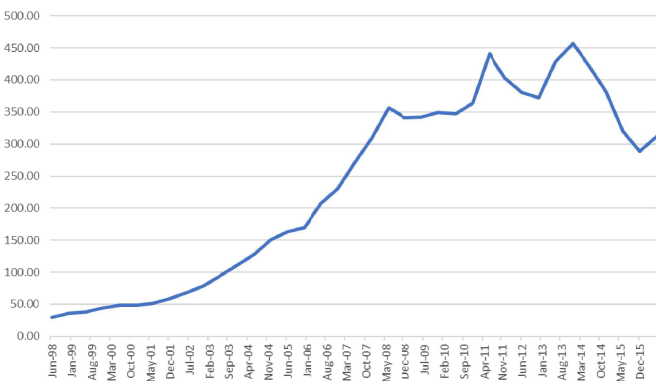
Source Bank for International Settlements 2016 (www.bis.org/statistics)

There was also been a significant decline in the outstandings of interest rate swaps.
(Figure is nominal values in US Trillion (Data from BIS))
Note the proportion of fixed to floating declined from historic highs pre GFC
This decline is at odds with the need example for balance sheet restructuring and preference for fixed rate in a low interest rate environment (Eg FIXED + IRS = floating)

Manipulating LIBOR: Impacts-Bank interest margins

Table 2: Summary Statistics

Panel A: Summary Statistics - Observation Level - All Countries

	Mean	Median	Standard Deviation	Minimum	Maximum	Observations	Banks	Countries
Bank Variables								
Net Interest Margin	2.76	2.36	1.91	-9.1	19.6	27,216	3,385	47
Return on Assets	0.52	0.29	1.06	-14.1	15.7	27,216	3,385	47
Interest Income Margin	4.89	4.28	3.25	-2.9	26.4	27,216	3,385	47
Interest Expense Margin	2.29	1.86	2.07	-6.5	15.7	27,216	3,385	47
Deposits over Liabilities	87.73	94.90	16.09	4.2	100.0	27,216	3,385	47
Equity over Assets	8.68	7.21	6.13	0.0	53.7	27,216	3,385	47
Securities over Assets	20.20	19.35	14.73	0.0	96.6	27,216	3,385	47
Country Variables								
3-Month Sovereign Yield	1.94	0.76	2.16	0.0	20.6	27,216	3,385	47
Spread: 10yr - 3mo Yield	1.65	1.43	1.11	-1.2	12.7	27,216	3,385	47
GDP Growth	1.50	1.69	3.35	-8.9	15.2	27,216	3,385	47

- Sample 3,385 banks from 47 countries for 2005-2013
- Claessens, Stijn, Nicholas Coleman, and Michael Donnelly (2017). "Low-For-Long" Interest Rates and Banks' Interest Margins and Profitability: Cross-Country Evidence. International Finance Discussion Papers 1197. Board of Governors of the Federal Reserve System

Manipulating LIBOR: Impacts-Bank interest margins
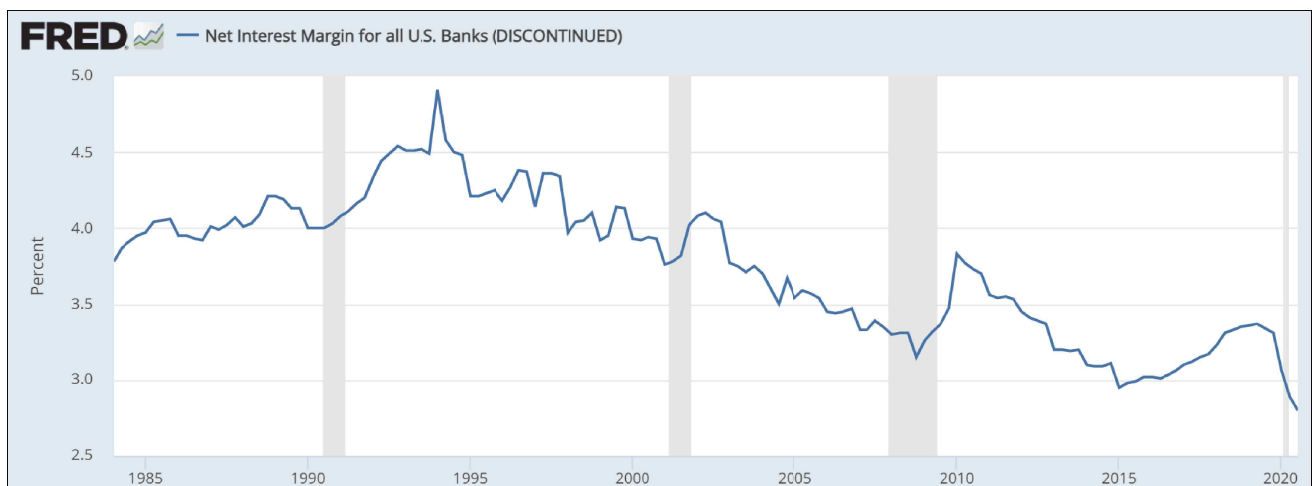
- Interestingly interest rate margins rose due the post GFC period but declined thereafter.
- The rigging accusations occurred in a setting of declining interest margins and pressure on bank profits

Manipulating LIBOR: Impacts on yield spreads

- Increases in LIBOR relative to other market rates mean that banks are becoming more wary of lending to each other, indicating that financial market stresses are rising.

- Conversely, reductions in LIBOR indicate that financial market participants are relatively more stable.

- For example, one commonly stress indicator that utilizes LIBOR is the "TED spread."

- The TED spread is equal to the difference between the rate on 90-day U.S. Treasures (T), which market participants view as risk free, and the 90-day Eurodollar LIBOR rate (ED), which factors in market risk.
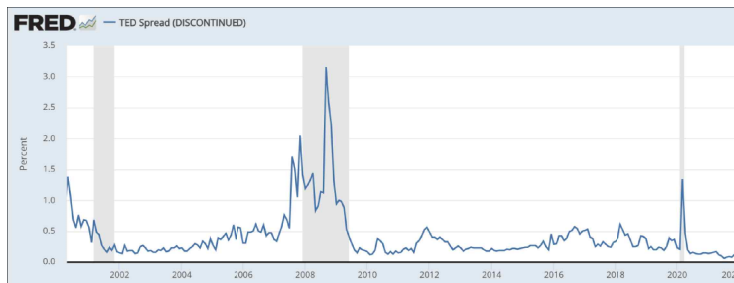
Many market observers closely followed the TED spread as it spiked to historic highs during the financial crisis of 2008.

Conclusions

- In response to the controversy and concerns about the sustainability of LIBOR, global financial authorities have initiated a transition from LIBOR to alternative reference rates, particularly the Secured Overnight Financing Rate (SOFR) in the United States and the Sterling Overnight Index Average (SONIA) in the United Kingdom.

- These alternative reference rates are designed to be based on more observable and transaction-based data, reducing the susceptibility to manipulation and improving the integrity of benchmark interest rates.

- The transition away from LIBOR is a significant process with implications for many financial contracts and requires careful planning and coordination in financial markets.

Key lessons for markets

- Limitations of industry-based market surveillance

- Role played by individual incentives in shaping unethical behavior

- Role played by organizational culture in shaping unethical behavior

- Failure of top-down regulatory apparatus in preventing unethical behavior

- Failure of regulatory surveillance systems in identifying illegal activity and a reliance on whistleblowers (granted immunity)

Information Spillover and Corporate Policies: the Case of Listed Options

Jianfeng Hu
with Gennaro Bernile, Guangzhong Li, and Roni Michaely

September, 2023

My Research Agenda of Options Markets

- Market frictions challenge classical options pricing models. My research begins with the most important friction – asymmetric information, and progresses as the following three steps:

  - Investors motivated by private information prefer options' market features such as high leverage and no short-sale constraints, making options trading informative about future states (Hu, 2014)

  - Such informed trading can change the information environment by making the stock price more efficient – a feedback effect from derivatives to the underlying market (Hu, 2018)

  - The impact on information environment can further affect corporate decisions – spillover and real effects (this paper)

Overview

- We examine causal effects of option listing on corporate financial and investment policies by exploiting exogenous regulatory listing requirements

- Consistent with option listings reducing information asymmetry and/or improved external monitoring, these events lead to significant changes:

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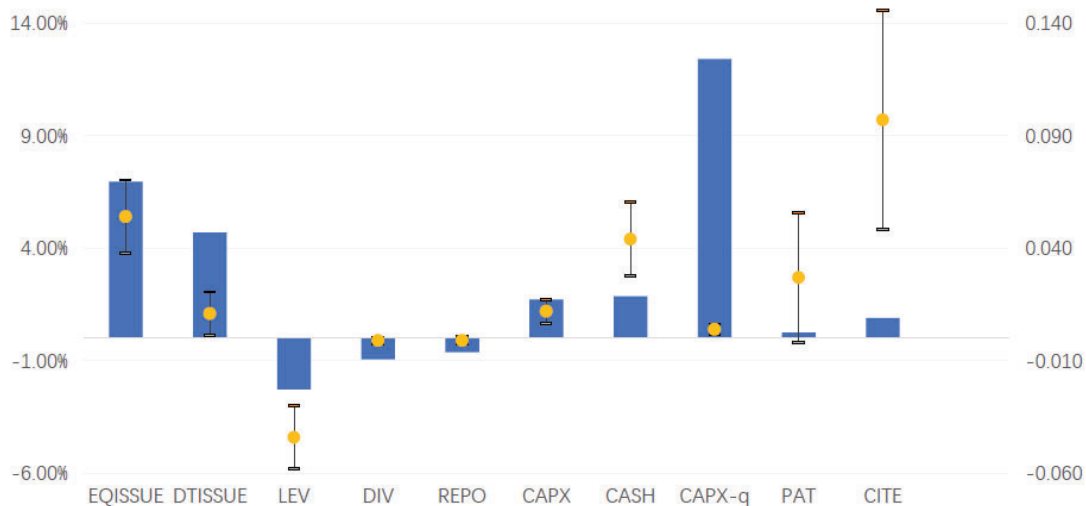
Why Is This Important?

- Options, as one of the most important financial innovations, can affect not just the underlying capital markets, but also market participants that do not trade options. This effect is significant for welfare analysis of derivatives and financial innovations.

- The real effects we discover in this study cover a wide range of corporate policies; and they are all consistent with how reduced information asymmetry affects firm behavior.

  - Options volume is associated with investment-q Roll, Schwartz, and Subrahmanyam (2009) ; and firm innovation Blanco and Wehereim (2017)

- The identification strategy uncovers causal effect of options introductions.

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Information Asymmetry and Corporate Behavior

- **Info asymmetry between firms and investors affects corporate policies**
  - Via adverse selection costs, especially for equity
  - Via agency costs

- A positive information shock (option listing) is expected to make the firm
  - access external capital markets with lower costs
  - manage its capital structure to achieve lower financial leverage (equity is more sensitive to asym info)
  - maintain lower repurchase and dividend payout
  - invest more, both in physical assets and risky innovation activities
  - build a larger cash reserve for future investment
  - invest more efficiently

Identification

- We exploit SEC's regulation regarding option listing as an exogenous variation. Background:
  - Option listing is initiated by options exchanges not firms
  - Exchanges comply to the SEC's rules regarding minimum stock price, volume, public float
  - Meeting or missing the requirements can exogenously affect the likelihood of option listing
- An instrumental variable (eligibility) for actual options availability
  - Relevance: first stage in 2SLS
  - Exclusion: two natural experiments
    - Opening of Chicago Board Options Exchange in 1973
    - A major rule revision in 2003
- The effect is most cleanly identified in firms near the threshold, where the characteristics are similar – regression discontinuity design (Main approach)

Sample and Data

- *Compustat-CRSP-OptionMetrics, 1996-2016*
  - *OP = 1 if a stock has options traded on at least half of trading days in a year*
  - *MEET = 1 if a stock meets all the listing requirements in a year*
    - *Stock price>$7.5 before 2003 and >$3 after 2003*
    - *Public float>7 million*
    - *Trading volume in previous 12 m>2.4 million shares*
  - *Exclude utilities and financials*
  - *RDD Sample includes those with at least one policy variable in [0.4,1.6] relative to the cutoff*

Time-series Firm Distribution

Number of Firms
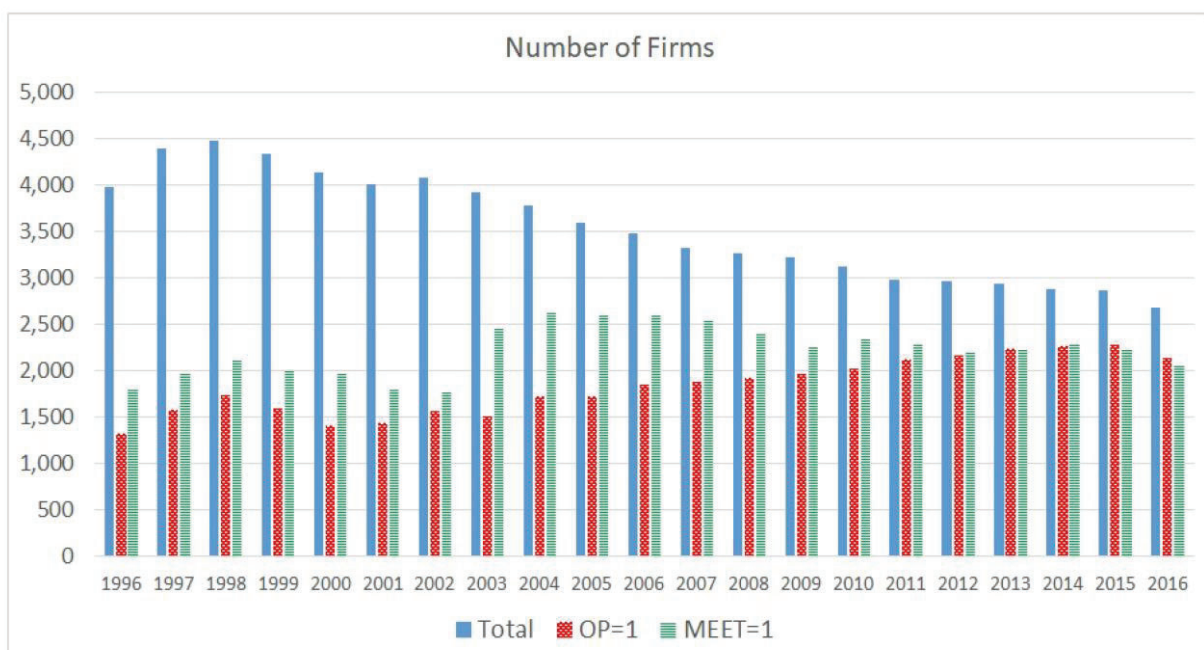
Control Variables

- **Ln(Assets)** – natural log of book asset

- **M/B** – Ratio of (Book AT – Book EQ + Mkt EQ) to Book AT

- **Tangibility** – Ratio of PPE to Asset

- **ROA** – Net Income to Book AT

- **FCF** – EBITDA to Book AT

- All baseline models include **firm** and **year fixed effects**

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First Stage

	RDD Sample(1996-2019)			Full Sample (1996-2019)		
	(1)	(2)	(3)	(4)	(5)	(6)
	OP	OP	OP	OP	OP	OP
$Meet_{it}$	0.118**	0.094**	0.093**	0.210**	0.143**	0.142**
	(12.90)	(11.18)	(11.08)	(20.72)	(15.66)	(15.48)
$Float_{it}$		0.000	0.000		-0.001*	-0.001*
		(0.05)	(0.03)		(-2.47)	(-2.43)
$Price_{it}$		0.004+	0.004+		0.011**	0.011**
		(1.92)	(1.84)		(7.85)	(7.76)
$Volume_{it}$		0.002**	0.002**		0.001**	0.001**
		(7.42)	(7.46)		(11.40)	(11.48)
$ASSET_{it-1}$		0.092**	0.089**		0.097**	0.094**
		(11.13)	(11.16)		(18.79)	(18.58)
$TANG_{it-1}$		0.014			0.006	
		(0.33)			(0.22)	
MB_{it-1}		0.005*	0.005*		0.008**	0.008**
		(2.09)	(2.08)		(5.21)	(5.18)
ROA_{it-1}		-0.038+			-0.052**	
		(-1.81)			(-4.77)	
FCF_{it-1}			-0.008			-0.008
			(-0.55)			(-0.93)
Age_{it-1}		0.030*	0.030*		0.031**	0.031**
		(2.48)	(2.54)		(5.84)	(5.82)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F statistic		423.397	480.373		1228.397	1227.475
N	15,028	15,028	15,028	37,994	37,994	37,994
R-square	0.116	0.187	0.186	0.163	0.261	0.260

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Options Availability and Financial Policy (RDD)

	(1) EQISSUE	(2) DTISSUE	(3) LEV	(4) DIV	(5) REPO
OP_{it}	0.054**	0.011+	-0.044**	-0.001	-0.001
	(5.46)	(1.88)	(-5.19)	(-1.20)	(-1.05)
$ASSET_{it-1}$	-0.074**	-0.021**	0.066**	-0.003**	0.001*
	(-9.90)	(-5.76)	(11.37)	(-3.13)	(2.54)
$TANG_{it-1}$	0.127**	0.055**	0.247**	-0.002	-0.004**
	(6.19)	(3.42)	(9.19)	(-0.60)	(-2.75)
MB_{it-1}	0.022**	0.006**	0.015**	0.001*	0.000
	(5.25)	(2.84)	(4.56)	(2.49)	(-0.99)
ROA_{it-1}	-0.247**	-0.024	-0.099**	0.006	0.007
	(-8.23)	(-1.44)	(-4.22)	(1.31)	(1.46)
Age_{it-1}	0.001+	0.000	-0.002**	0.000	0.000
	(1.87)	(0.50)	(-3.92)	(-0.14)	(0.01)
$Float_{it}$	0.002*	0.001*	-0.001	0.000	0.000
	(2.29)	(2.05)	(-1.51)	(-0.73)	(-0.81)
$Price_{it}$	0.006**	0.003**	-0.005**	0.001**	0.000
	(5.88)	(3.92)	(-3.78)	(3.96)	(-0.56)
$Volume_{it}$	0.000	0.000	0.000+	0.000	0.000
	(1.46)	(0.08)	(1.67)	(1.57)	(1.41)

Options Availability and Financial Policy (Full Sample IV)

	(1) EQISSUE	(2) DTISSUE	(3) LEV	(4) DIV	(5) REPO
OP_{it}	0.046**	0.015**	-0.047**	-0.001+	-0.006**
	(8.24)	(4.73)	(-8.05)	(-1.95)	(-2.62)
$ASSET_{it-1}$	-0.040**	-0.015**	0.042**	0.000	0.002
	(-11.40)	(-8.12)	(10.85)	(-0.45)	(1.21)
$TANG_{it-1}$	0.071**	0.026**	0.229**	-0.001	-0.003
	(5.93)	(3.15)	(10.40)	(-0.52)	(-0.65)
MB_{it-1}	0.025**	0.005**	0.012**	0.002**	-0.001
	(10.80)	(4.09)	(5.43)	(6.47)	(-0.76)
ROA_{it-1}	-0.209**	-0.041**	-0.112**	0.004+	-0.022**
	(-13.37)	(-4.08)	(-7.46)	(1.68)	(-3.91)
Age_{it-1}	-0.000	-0.000+	-0.002**	0.000	-0.001**
	(-0.13)	(-1.67)	(-4.96)	(1.14)	(-5.30)
$Float_{it}$	0.000	0.001**	0.000	0.000	-0.001**
	(0.42)	(2.74)	(-0.21)	(-0.40)	(-4.66)
$Price_{it}$	0.001*	0.002**	-0.003**	0.001**	0.000+
	(2.21)	(6.95)	(-4.22)	(6.22)	(1.70)
$Volume_{it}$	0.000	0.000	0.000**	0.000	0.000**
	(-0.49)	(-0.09)	(3.91)	(-0.79)	(3.01)

Market Response to Corporate Financial Announcements

	(1) SEO CAR-1,1	(2) Repo CAR-1,1	(3) ΔDIV CAR-1,1
OP	1.006*	-1.143**	-0.320**
	(2.04)	(-5.53)	(-3.00)
MKTCAP	-0.008	-0.182*	-0.170*
	(-0.08)	(-2.05)	(-2.00)
MB	-0.063	0.067	0.203*
	(-0.30)	(0.31)	(2.30)
Ret_12M	-0.385+	-1.922**	0.559*
	(-1.74)	(-3.93)	(2.34)
SEO_Size	-4.497*		
	(-2.01)		
Repo_Size		0.015**	
		(5.97)	
ΔDIV			0.388**
			(4.03)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	928	2,601	5,042

Options Availability and Investment Policies (RDD)

	(1) CAPX	(2) CASH	(3) CAPX	(4) PAT	(5) CITE
OP_{it}	0.012**	0.044**	-0.009**	0.027	0.097**
	(3.78)	(4.44)	(-2.86)	(1.54)	(3.28)
$ASSET_{it-1}$	-0.012**	-0.094**	-0.008**	0.005	-0.016
	(-6.93)	(-12.87)	(-6.06)	(0.36)	(-0.96)
MB_{it-1}	0.005**	0.025**	0.003+	0.004	0.01
	(5.21)	(6.20)	(1.93)	(0.79)	(1.14)
FCF_{it-1}	0.025**	0.046+	0.020**	-0.101*	-0.035
	(4.08)	(1.93)	(3.15)	(-2.55)	(-0.65)
Age_{it-1}	0.000	-0.001	0.000	0.002	0.004+
	(1.19)	(-1.17)	(-0.44)	(1.46)	(1.94)
$Float_{it}$	0.000+	0.002+	0.000	0.000	-0.001
	(1.81)	(1.70)	(1.40)	(-0.11)	(-0.19)
$Price_{it}$	0.002**	0.009**	0.002**	0.001	-0.003
	(5.77)	(7.07)	(5.69)	(0.23)	(-1.21)
$Volume_{it}$	-0.000+	0.001**	0.0000	0.001*	0.000
	(-1.76)	(3.68)	(-0.41)	(2.49)	(0.27)
$OP_{it}*MB_{it-1}$			0.004**		
			(3.00)		

Options Availability and Investment Policies (Full Sample IV)

	(1) CAPX	(2) CASH	(3) CAPX	(4) PAT	(5) CITE
OP_{it}	0.018**	0.055**	-0.006**	0.010	0.040*
	(7.99)	(8.59)	(-5.22)	(0.87)	(2.25)
$ASSET_{it-1}$	-0.009**	-0.061**	-0.002**	0.045**	0.051**
	(-7.73)	(-15.86)	(-3.21)	(6.50)	(5.58)
MB_{it-1}	0.004**	0.027**	0.003**	0.010**	0.021**
	(6.56)	(10.73)	(4.88)	(3.25)	(4.25)
FCF_{it-1}	0.034**	0.085**	0.031**	-0.057**	-0.056*
	(8.05)	(5.59)	(7.24)	(-2.99)	(-1.98)
Age_{it-1}	0.000	-0.001**	0.000	-0.001	0.000
	(0.99)	(-2.82)	(-0.80)	(-0.64)	(-0.46)
$Float_{it}$	0.000**	0.000	0.000*	-0.002**	-0.002**
	(3.12)	(-0.19)	(2.19)	(-4.31)	(-3.33)
$Price_{it}$	0.001**	0.003**	0.001**	0.002	0.000
	(5.21)	(4.08)	(7.09)	(1.47)	(0.17)
$Volume_{it}$	-0.000**	0.000	0.000	0.001**	0.000*
	(-2.62)	(0.51)	(0.16)	(4.84)	(2.40)
$OP_{it}*MB_{it-1}$			0.003**		
			(6.14)		

Validity of IV

- We test relevance in the first stage of 2SLS

- For exclusion restriction, we investigate two natural experiments

  1. Opening of the first options exchange (CBOE) in 1973 makes the IV relevant

     - The IV should have no impact before 1973

  2. SEC revised the minimum stock price from $7.5 to $3 in 2003

     - Treated firms ($3--$7.5) vs control firms (<$3)

NE1. CBOE Opening

Panel A Before CBOE opening: 1961-1972

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EQISSUE	DTISSUE	LEV	DIV	REPO	CAPX	CASH	CAPX	PAT	CITE
$HMEET_{it}$	0.002	0.003	-0.007	-0.001	-0.005	0.005	0.002	0.006	0.043	-0.043
	(0.72)	(0.96)	(-1.38)	(-1.18)	(-0.96)	(1.02)	(0.53)	(0.77)	(1.20)	(-1.09)
$HMEET_{it} * MB_{it-1}$								-0.001		
								(-0.13)		

Panel B After CBOE opening: 1974-1985

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EQISSUE	DTISSUE	LEV	DIV	REPO	CAPX	CASH	CAPX	PAT	CITE
$HMEET_{it}$	0.009**	0.012**	-0.042**	-0.002**	-0.039**	0.010**	0.002	0.004	0.027	0.005
	(5.54)	(3.82)	(-8.97)	(-4.82)	(-3.79)	(3.94)	(0.60)	(0.63)	(1.44)	(0.16)
$HMEET_{it} * MB_{it-1}$								0.004		
								(1.10)		

- HMEET is based on the listing requirements in 1973 in Panel A, and on the contemporary requirements in Panel B. The results are OLS because actual treatment is not observable.

NE2. Price Rule Revision in 2003

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	EQISSUE	DTISSUE	LEV	DIV	REPO	CAPX	CASH	CAPX	PAT	CITE
$Treat*Post_{it}$	0.031**	0.008+	-0.039**	-0.001**	-0.092**	0.012**	0.042**	0.008*	0.005	0.018+
	(4.10)	(1.65)	(-5.69)	(-3.57)	(-4.59)	(5.73)	(5.67)	(2.46)	(0.40)	(1.67)
$Treat*Post_{it}*MB_{it-1}$								0.002		
								(1.60)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	16,525	16,525	16,525	16,525	16,525	16,525	16,525	16,525	16,525	16,525

- *Treat* =1 for firms that become eligible after the rule change
- *Post* =1 after the rule change
- Sample period is 1998-2008

Cross-sectional Variation

Panel A: Analyst following

	(1) EQISSUE	(2) DTISSUE	(3) LEV	(4) DIV	(5) REPO	(6) CAPX	(7) CASH	(8) CAPX	(9) PAT	(10) CITE
OP_{it}	0.047**	0.010*	-0.041**	-0.001	-0.012**	0.018**	0.052**	0.018**	0.013	0.052+
	(6.09)	(2.04)	(-5.15)	(-1.15)	(-3.55)	(5.69)	(5.83)	(4.58)	(0.76)	(1.80)
$OP_{it}*Analyst_{it}$	-0.016**	-0.001	0.006+	-0.001*	0.005**	-0.004**	-0.019**	-0.003+	-0.026**	-0.045**
	(-4.84)	(-1.02)	(1.81)	(1.96)	(3.12)	(-2.68)	(-4.90)	(-1.92)	(-3.13)	(-3.27)

- The interaction's coefficients are the opposite of OP's, suggesting weaker option listing effects in firms covered by more analysts (more transparent)
- Similar results from other asymmetry measures (PIN, institutional ownership, firm size, and firm age)

Intensive Margin Effects of Options

Panel A Fixed effects results

	(1) EQISSUE	(2) DTISSUE	(3) LEV	(4) DIV	(5) REPO	(6) CAPX	(7) CASH	(8) CAPX	(9) PAT	(10) CITE
$OPVOL_{it}$	0.007**	0.004**	-0.005**	-0.001**	-0.002**	0.003**	0.009**	0.003**	0.001	0.056**
	(8.68)	(7.36)	(-5.71)	(-3.42)	(-5.87)	(9.64)	(10.36)	(8.46)	(0.33)	(11.72)
$OPVOL_{it}*MB_{it-1}$								0.000		
								(0.99)		

Panel B IV estimation results

	(1) EQISSUE	(2) DTISSUE	(3) LEV	(4) DIV	(5) REPO	(6) CAPX	(7) CASH	(8) CAPX	(9) PAT	(10) CITE
$OPVOL_{it}$	0.007**	0.005**	-0.007**	-0.001**	-0.002**	0.003**	0.011**	0.003**	0.007+	0.066**
	(8.24)	(8.28)	(-6.24)	(-2.94)	(-5.61)	(8.58)	(10.58)	(8.39)	(1.74)	(11.86)
$OPVOL_{it}*MB_{it-1}$								0.001		
								(1.12)		

Robustness

- Alternative identification method: We conduct an event study on listing using propensity score matching method.

- Alternative measures of corporate policies:
  - Scaled by market value of assets instead of book value
  - R&D
  - Patent dummy, originality, and generality

- Alternative estimation methods:
  - Fixed effects
  - Alternative RDD bandwidths
  - Exclude stock splits and reverse splits

Lee Kong Chian
School of
Business

Options and Corporate Policies - Bernile, Hu, Li, Michaely

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SINGAPORE MANAGEMENT
UNIVERSITY

Conclusions

- Firms with *newly listed options*

  – Access more external capital

  – Rely more on equity

  – Invest more and produce more/better innovation

- On balance, option listings have real effects consistent with reduced asymmetric information and enhanced external monitoring due to more efficient market prices

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Options and Corporate Policies - Bernile, Hu, Li, Michaely

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Landscape of the Green Economy

Seizing the Green Economy in APAC

Arman Sahovic

APAC Head of Sustainable Finance and Investing Distribution

SUSTAINABLE GROWTH

LSEG

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1. Green Revenues Overview

SUSTAINABLE GROWTH

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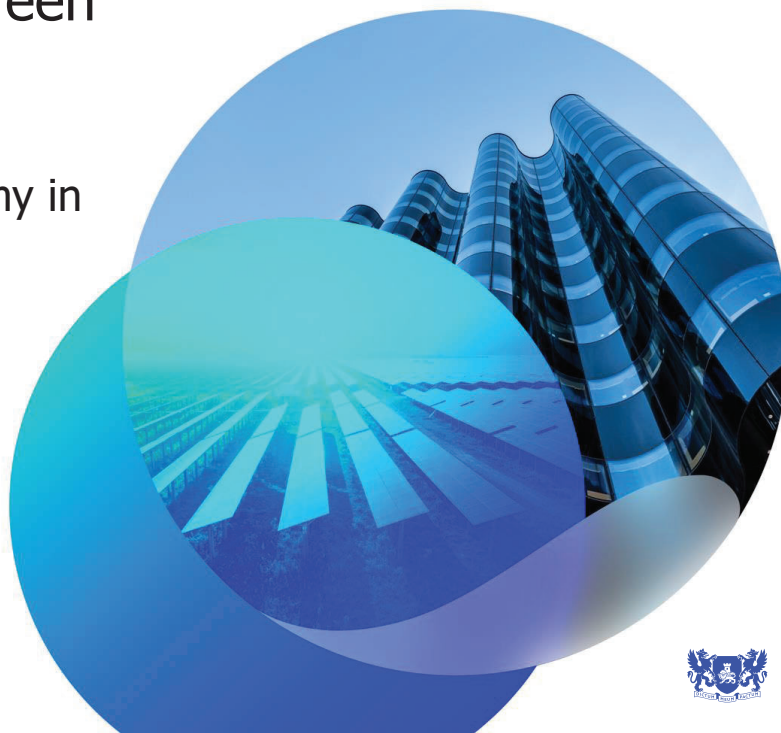
Green Revenues Overview

Key benefits

- A unique data solution enabling users to identify and quantify company exposure to the green economy.
- Based on a comprehensive Green Revenues Classification System (GRCS) and green tiering system
- Broad scope and high granularity create flexibility to support a variety of investment use cases and regulatory reporting needs (e.g. EU Taxonomy).

18,000+
Companies tracked for green revenues*

Approx 5,000 identified to have green revenues

2008 / 2016
Min and Max data available for 10+ years; Point estimate values from 2016

Green Revenues estimation process

Identify	Calculate	Engage	Measure
Identify companies with revenue exposure to green activities based on GRCS	Calculate potential Green Revenues ranges from disclosed data	Engage with all companies for additional disclosure	Measure Green Revenues using a tiered estimation approach

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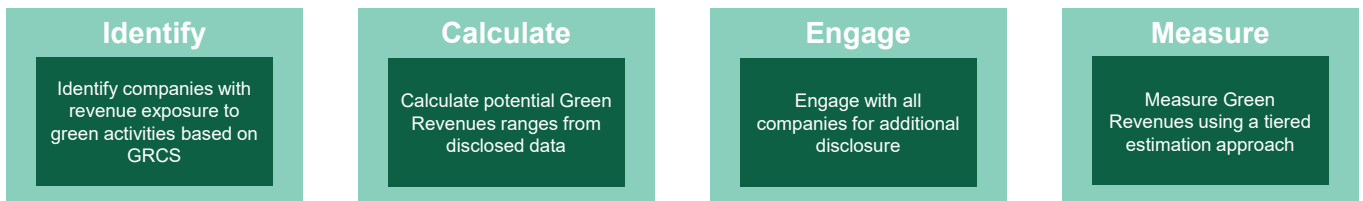
*across 48 developed and emerging markets, including FTSE Global All-Cap Index and Russell 3000 Index, and representing over 98% of the total global (equity) market capitalization.

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Green Revenues Classification System [GRCS]
A decade of evolution

2008: Environmental Markets Classification System

2013: Green Revenues Classification System

2015: Green Revenues Data Model

2020: Green Revenues 2.0

Green Sectors

Water Infrastructure and Technology
Energy Generation
Waste and Pollution Control
Energy Equipment
Transport Solutions
Energy Management and Efficiency
Green Revenues %
Transport Equipment
Environmental Resources
Food and Agriculture
Environmental Support Services

- **Multiple subsector allocation**
- **No minimum revenue threshold**
- **Governed by the FTSE Russell Green Industries Advisory Committee**

10 SECTORS	**64** SUBSECTORS	**133** MICRO SECTORS

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Green, Greener, Greenest
Assess company activities against seven environmental objectives and allocate micro sectors to green tiers based on overall impact

Impact in tiers		
Tier 1	**Tier 2**	**Tier 3**
Clear & significant	**Net positive**	**Limited**
Micro sector examples	**Micro sector examples**	**Micro sector examples**
— Solar	— Flood control	— Nuclear
— Recyclable products & Materials	— Cloud computing	— Bio fuels
— Waste management	— Smart city design & Engineering	— Key raw materials and minerals

Environmental objectives

1. Climate change mitigation
2. Climate change adaptation
3. Pollution prevention and control
4. Protection of healthy ecosystems
5. Sustainable use and protection of water and marine resources
6. Transition to a circular economy, waste prevention and recycling
7. Sustainable and efficient agriculture (additional objective compared to EU Taxonomy)

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Green Revenues estimation methodology
Address gaps in disclosure with a tiered estimation approach providing a more practical dataset

Disclosed
• Green Revenues percentage is calculated from detailed company disclosure
• No need for estimates modelling
• Average figure taken where a range exists but is less than 5%

Company-Specific Estimates	Sector-Specific Estimates
• A variety of revenue & non-revenue proxy data is used to reduce disclosure gaps	• Quant model applied to all remaining data gaps
• E.g. via the identification of number of electric vehicles produced	• Model extrapolates disclosed and company-specific data to calculate company revenue weighted average for the ICB subsector

Disclosed 27%

Company-specific estimate 73%

Notes: Proportion of GR-weighted investable market cap that is disclosed vs. estimated by FTSE Russell.

Source: FTSE Russell, January 2023.

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2. Green Economy Analysis

Green Economy by ICB Supersector

High green exposures in some sectors:
- Autos & Parts (35%)
- Utilities (29%)
- Construction & Materials (20%)

Top five sectors by market cap:
- Technology
- Industrial Goods and services
- Autos & Parts
- Utilities
- Construction & Materials
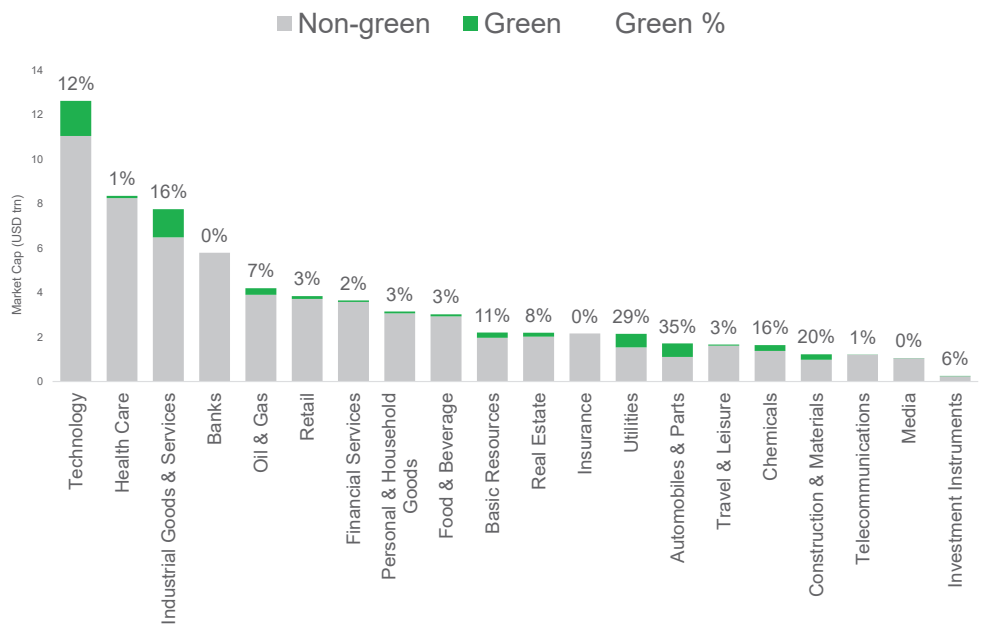
Notes: GR-weighted investable market cap; Green exposure calculated as the sum of GR-weighted investable market cap over the total market caps of all companies in each sector.
Source: FTSE Russell, January 2023.

A sizeable investment opportunity

The green economy is substantial and growing, representing **8% of the market capitalization** of global listed companies and an almost USD **$6 trillion investment opportunity**.
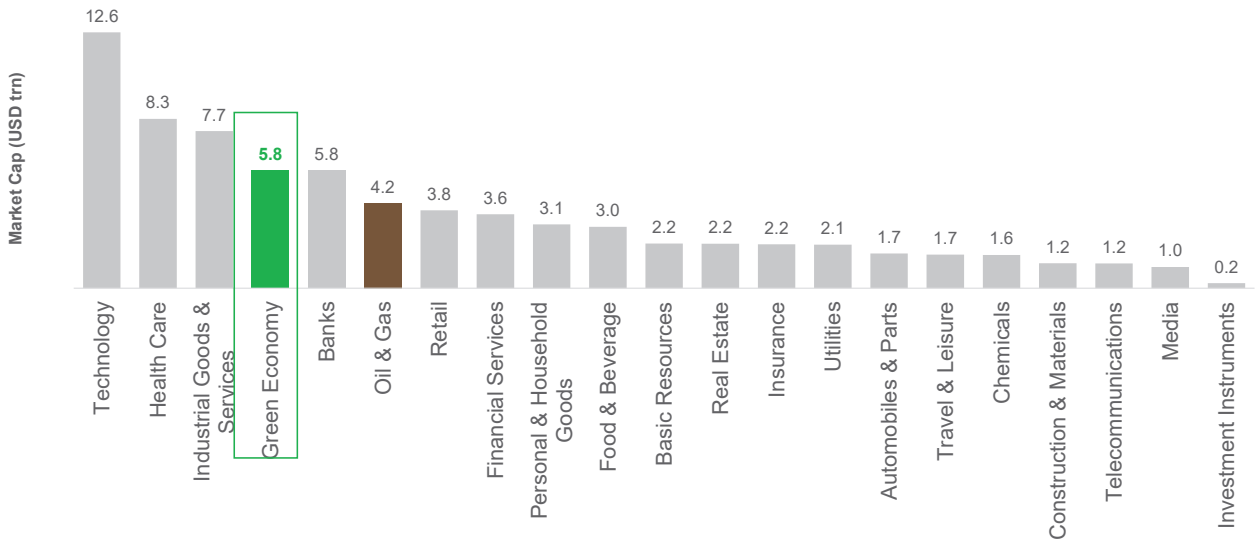
Bar chart — Market Cap (USD trn):

- Technology: 12.6
- Health Care: 8.3
- Industrial Goods & Services: 7.7
- Green Economy: 5.8
- Banks: 5.8
- Oil & Gas: 4.2
- Retail: 3.8
- Financial Services: 3.6
- Personal & Household Goods: 3.1
- Food & Beverage: 3.0
- Basic Resources: 2.2
- Real Estate: 2.2
- Insurance: 2.2
- Utilities: 2.1
- Automobiles & Parts: 1.7
- Travel & Leisure: 1.7
- Chemicals: 1.6
- Construction & Materials: 1.2
- Telecommunications: 1.2
- Media: 1.0
- Investment Instruments: 0.2

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Notes: GR-weighted investable Market Cap.
Source: FTSE Russell, January 2023.

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Substantial investment opportunity

Chart — Market cap (USD trn) bars and Green economy % line:

Year	Market cap (USD trn)	Green economy %
2009	1.4	4.5%
2010	1.6	4.5%
2011	1.4	4.2%
2012	1.6	4.0%
2013	2.0	4.4%
2014	2.1	4.4%
2015	2.2	4.6%
2016	2.6	5.0%
2017	3.3	5.3%
2018	3.0	5.9%
2019	4.1	6.4%
2020	6.3	8.1%
2021	8.1	9.2%
2022	5.8	8.3%
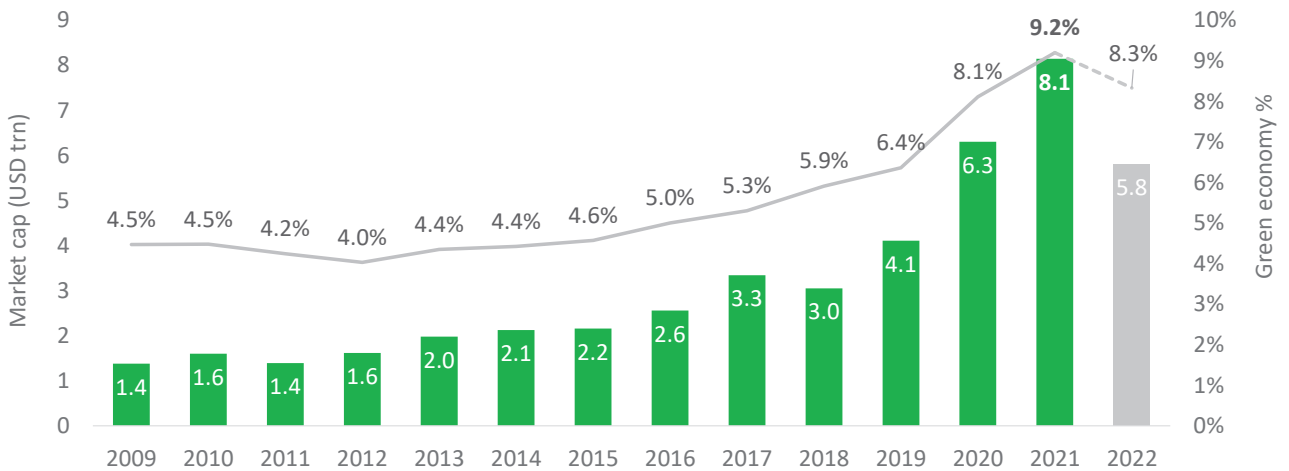
Notes: GR-weighted investable market cap. GR2.0 data, including disclosed information and estimates, for 2016 to 2020; Faded 2021 bar represents linear interpolation of 2020 GR data; Data for 2009 to 2015 is extrapolated using disclosed GR percentages and disclosed maximum and minimum ranges.

Source: FTSE Russell, January 2023.

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Size based on revenue
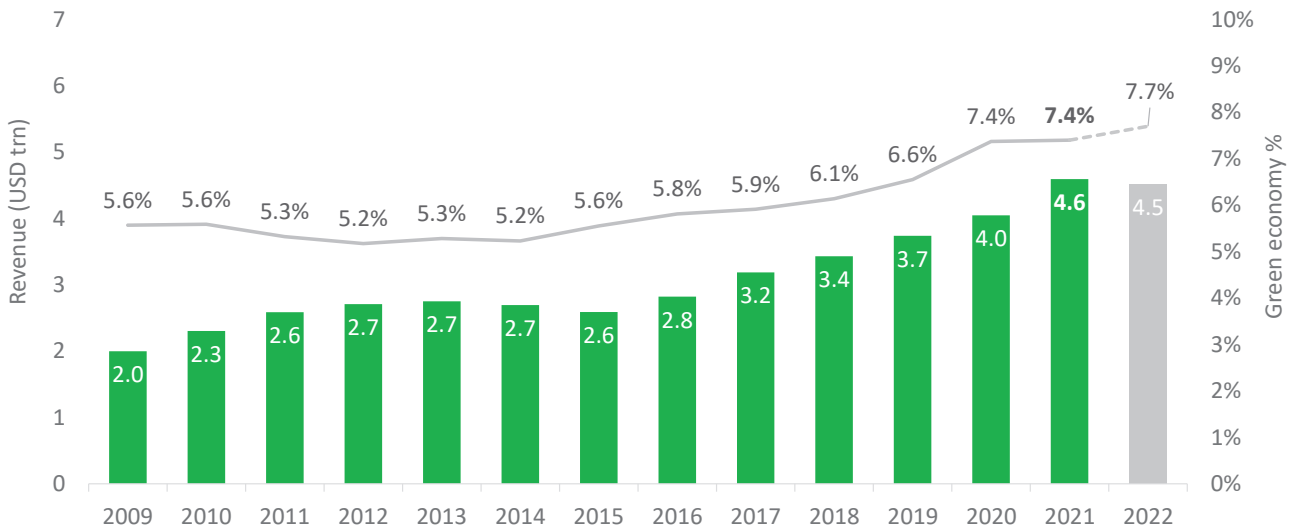
Notes: GR-weighted revenue. GR2.0 data, including disclosed information and estimates, for 2016 to 2021. Data for 2009 to 2015 is extrapolated using disclosed GR percentages and disclosed maximum and minimum ranges. 2021 uses the latest available full year revenue figures for each GR company.

Source: FTSE Russell, January 2023.

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Outperformance of green industries

Performance of FTSE Environmental Opportunities All Share vs Global All Cap and Oil & Gas

Notes: Index represents Total USD return, based to 02/01/2008, running until 03/01/2023; Companies included in the Environmental Opportunities All Share Index have at least 20% green revenue. Past performance is not a guarantee of future performance. Source: FTSE Russell, January 2023.

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Green economy by green sectors, size and tiers

Green Economy by Green Sector

- Energy Management & Efficiency
- Transport Equipment
- Energy Equipment
- Energy Generation
- Environmental Resources
- Waste & Pollution Control
- Transport Solutions
- Water Infrastructure & Technologies
- Food & Agriculture
- Environmental Support & Services

Green Economy by Size

- Large cap
- Mid cap
- Small cap
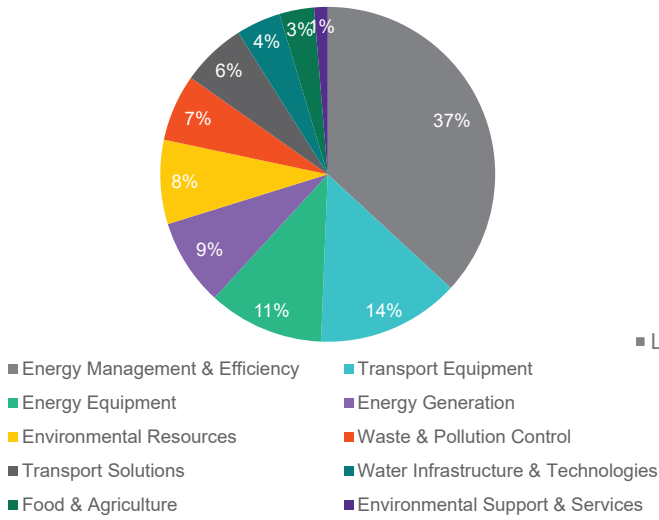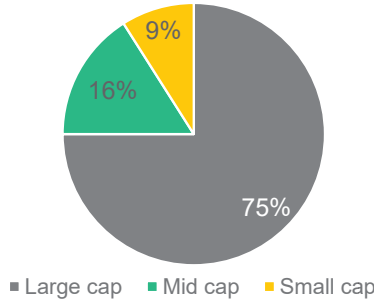
Green Economy by Green Tier
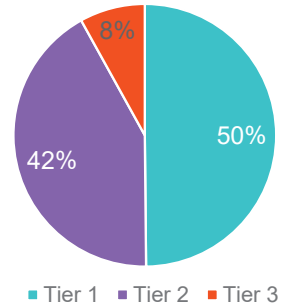
- Tier 1
- Tier 2
- Tier 3

Tier 1 = clear and significant environmental impacts

Tier 2 = substantial net positive environmental impacts

Tier 3 = limited environmental impacts

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Notes: GR-weighted investable market cap.
Source: FTSE Russell, January 2023.

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Geography of the green economy

Green Economy by Country/Market

% share of countries among global green investable market cap

- United States
- China
- Taiwan
- Canada
- Japan
- Germany
- France
- Switzerland
- United Kingdom
- South Africa
- Other
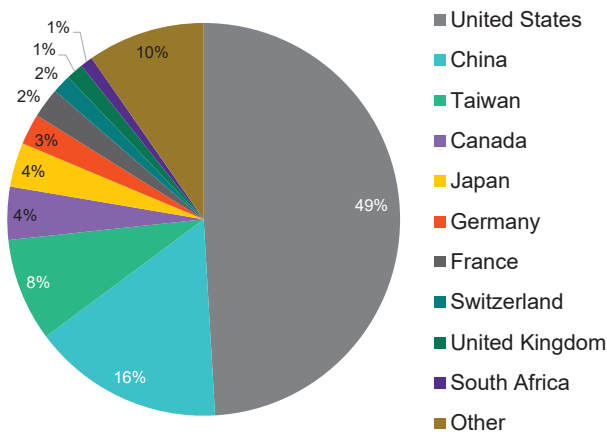
Green Exposure

% of green investable market cap among total investable market cap of each country/market
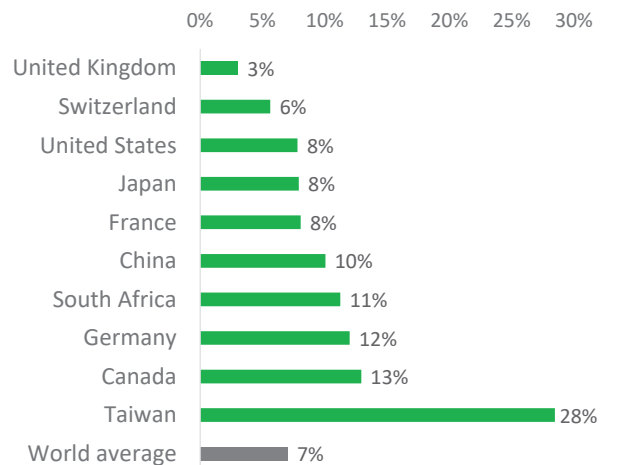
Country	Green Exposure
United Kingdom	3%
Switzerland	6%
United States	8%
Japan	8%
France	8%
China	10%
South Africa	11%
Germany	12%
Canada	13%
Taiwan	28%
World average	7%

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Notes: GR-weighted investable market cap; Green exposure calculated as the sum of GR-weighted investable market cap over the total market caps of all companies in each sector.
Source: FTSE Russell, January 2023.

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Information and Resources

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Research paper

September 2022

Index Insights
Sustainable Investment | Green Economy

FTSE Russell

Green equity exposure in a 1.5°C scenario

Applying climate investment trajectories with green revenues

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Session 06
Top Financial Research

The Effect of Mandatory Bid Rule on Private Benefits of Control

August 2023

Bushik Kim   Ph.D. Candidate, Korea University Business School

Woochan Kim[*]   Professor, Korea University Business School

Yongjoon Lee   Master Student, Korea University Business School

Abstract

This study explores whether adopting mandatory bid rule mitigates private benefits of control during instances of control transfer. Employing a difference-in-differences approach, our findings align with the theory suggesting that the mandatory bid rule encourages acquirers to reduce the private benefits of control. The deals above the threshold exhibit significantly lower private benefits of control after the rule's adoption, while those below the threshold show negligible changes post-adoption. In tandem, we observe a similar trend with control premiums.

We also find evidence that our results are not merely driven by selection bias, which would occur if acquirers seeking high private benefits predominantly acquired shares below the threshold and acquirers pursuing low private benefits mainly acquired shares above the threshold. Above all, the increase in private benefits of control after adopting the mandatory bid rule for deals below the threshold is substantially smaller in magnitude compared to the decrease in private benefits of control for deals above the threshold. Additionally, the deal-fraction analysis of Lee, Kim, and Kim (2023) reveals that the fraction of deals above the threshold does not drop significantly after adopting the mandatory bid rule.

Our results also provide an important implication for the ongoing debate regarding whether the mandatory bid rule increases acquisition costs. Should the rule lower private benefits of control (and the control premium), as shown in this study, it is unlikely that the acquisition cost will rise, thereby not impeding acquisition activities.

Keywords: Mandatory Bid Rule, Equal Opportunity Rule, Private Benefits of Control, Control Premium, Self-limitation Mechanism

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ESG Lending

Sehoon Kim
Nitish Kumar
Jongsub Lee
Junho Oh

Risk Shocks, Asset Liquidity and Unemployment

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Abstract. Asset returns typically reflect a risk and liquidity premium, the size of which depends on the state of the economy. This in turn affects unemployment as firms respond to interest rates. However, there is also feedback from unemployment to the performance of firms. In this paper, we model demand and supply of liquid assets under under time-varying risk shocks. Households adjust their portfolios depending on their liquidity needs, and supply of liquid assets is affected by firms' entry decision. An increase in aggregate risk shocks raises interest rates thereby fewer firms enter, and if accompanied by a fall in productivity, unemployment rises by even more.

Internal Information Asymmetry, External Reporting, and Insider Trading: Theory and Evidence

Chang-Mo Kang[t]   Donghyun Kim[;j]   Youngdeok Lim[§]

Abstract

We examine how enhanced external reporting mandates influence insider trading in firms where internal information sharing is determined endogenously. We analyze costly audit games where headquarters executives (HQEXs) audit internal reports from *privately informed* divisional managers (DMs) and subsequently release public reporting under external auditing. It turns out that, when insiders have incentives to report optimistically, enhancing HQEXs' reporting mandates can *promote* DMs' informed share purchases. We find supporting evidence from estimating difference-in-differences models that exploit a regulatory shock on the HQEXs' segment reporting obligations, namely, the adoption of Financial Accounting Standards No. 131. Our study provides novel policy implications.

Session 07
Financial Engineering

An Interpretation of Interdependence of Market Fluctuation Estimation Framework via Omnifarious Bivariate Distance Functions

Insu Choi, Woo Chang Kim*

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Abstract

Understanding and predicting market fluctuations remains a formidable task in the dynamic global financial market. This research presents a potentially innovative estimation framework, seeking to interpret the complex interdependence of market fluctuations through various bivariate distance functions. The study humbly explores the multi-faceted nature of market interdependence, attempting to decipher patterns and correlations that might assist in estimating market shifts, all while recognizing the significant role of market interdependence in financial stability and investment decision-making. The framework, utilizing diverse bivariate distance functions, aspires to shed light on the complex relationships among various financial entities and variables, hoping to facilitate a more precise and comprehensive estimation of market fluctuations. The proposed methodology aims to improve the accuracy of predictive analytics in volatile markets and provide some insights into the symbiotic relationships therein. Preliminary evaluations using carefully curated datasets suggest that the proposed framework might offer improved estimates of ETF price fluctuations, showing potential enhancements over traditional methodologies.

The roles of various types of related party transactions in IPO firms' pricing and market returns

Sunghwan Kim [*]
Jin Tan [**]
Henry X. Wang [***]

(Abstract)

Based on expectations from theoretical models and empirical studies regarding related-party transactions (RPTs) concerning two puzzles (underpricing in the IPO market and long-term winners' curse), this study provides some evidence of overpricing of IPO firms both in the IPO markets and in the secondary markets. The results support those of prior studies regarding two puzzles in general. However, our findings regarding the effects of RPTs on stock returns are mostly non-linear and U-shaped, contradictory to those of prior studies reporting either simple linear effects empirically, or inverse U-shaped non-linear effects theoretically.

Keywords: non-linear effect, overpricing, related party transaction, IPO; winners' curse, China

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Inventory Investment, Firm Value, and Growth: Evidence from Korea

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Abstract

We investigate the relationship between inventory investment and firm value in growth firms. Using a sample of non-financial Korean firms between 2010 and 2018, we find that firms with higher inventory holdings are more likely to have higher firm values, consistent with the signaling hypothesis related to information asymmetry. Next, we find that the inventory of growth firms is higher than that of non-growth firms, suggesting that growth firms are inclined to engage in inventory activities to enhance firm value. Furthermore, we find that the relationship between inventory and firm value is more pronounced for firms with high growth opportunities than those with low growth opportunities. In addition, we see mixed results for the role of inventory during financial crises, indicating that inventory might have played a role in mitigating liquidity risk for high-growth firms during the financial crisis.

When Falling Stars Hit the Zero Lower Bound[*]

Seunghyun Kim

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Kyu Ho Kang

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August 2023

Abstract

Recently, Bauer and Rudebusch (2020) have shown that incorporating macroeconomic trends (falling stars) into Gaussian affine term structure models helps correct the bias in term premium estimates. Given that the dynamics of short term yields change drastically during persistent zero lower bound (ZLB) periods, term premium dynamics are also highly likely to be subject to regime shifts when the ZLB is binding. To investigate whether accounting for the ZLB is absolutely necessary for term premium estimation, we propose and estimate a new arbitrage-free affine term structure model with falling stars and regime shifts between ZLB and non-ZLB states. Our proposed model nests a model with falling stars. According to our model comparison, the model with both falling stars and regime shifts outperforms the model with falling stars only during the ZLB. Most importantly, we find that the model with falling stars only substantially underestimates term premium volatility during the ZLB periods. This is due to the underestimation of the effect of the factor representing the yield spread, which plays an important role in determining the term premium, when the compression of yields during the ZLB is unaccounted for. We thus demonstrate that falling stars and the ZLB are both key features of the U.S. yield curve that must be incorporated for the estimation of the term premium. (JEL Classification: C11, C32, C52, E31)

Keywords: Regime switching, term premium, no-arbitrage condition, Bayesian estimation

The Effectiveness of the Countercyclical Capital Buffer(CCyB) for Financial Institutions in Korea

Yeongsuk Cho (Mokpo National Univ.) [1]

Taejin Jo (Mokpo National Univ.) [2]

Banks, aiming to enhance profitability, possess a financial characteristic of investing in relatively long-term loans and securities. Consequently, during sharp economic fluctuations, banks experience increased uncertainty regarding financial stability. Particularly, in financial crises, systemic risks affecting the entire financial sector tend to recur. To mitigate such risks, Basel III introduced the Countercyclical Capital Buffer (CCyB), a measure aimed at alleviating uncertainties related to banks' economic responsiveness. While in Korean banks maintained sound solvency even during the COVID-19 pandemic, the financial uncertainty has heightened since 2022 due to steep increases in interest rates and exchange rates.

This study seeks to analyze the impact of CCyB accumulation in domestic banks through regression analysis. Specifically, it examines the influence of the size of capital exceeding the minimum regulatory capital (the capital ratio of banks exceeding the minimum required at a specific point) on loan fluctuations, thus assessing the extent of the impact of CCyB imposition. The research data covers 14 domestic banks (commercial banks, specialized banks, regional banks) from December 2013, when Basel III began to be applied, to March 2023 on a quarterly basis, utilizing data from the Financial Supervisory Service statistical system.

The results indicate that the successful operation of the Countercyclical Capital Buffer (CCyB) system by financial authority is crucial in proactively detecting excessive credit expansion and systemic risks. Therefore, financial authority needs to systematically manage the fluctuations in the level of CCyB accumulation, considering systemic risks and their impact on the increase or decrease in loan portfolios.

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Session 08
Tutorial Session

Stock return, investor sentiment, and stock price synchronicity

Karam Kim

Korea Asset Pricing

Abstract

This study examines whether stock price synchronicity affects the relation between investor sentiment and stock returns. The effect of investor sentiment on stock returns is negative. When the stock price synchronicity increases, the sentiment effect on stock returns is more significant and negative. It implies that the sentiment effect is greater if stock prices co-move with the market.

Predictive ability of foreign risk aversion for the stock market's return and volatility

Jinhwan Kim[a,*], Hoon Cho[a], Doojin Ryu[b]

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[b] Department of Economics, Sungkyunkwan University, 25-2, Sungkyunkwan-ro, Jongno-gu, Seoul, Korea

Abstract

This study examines the effect of foreign risk aversion on emerging stock markets. We show that global risk aversion has a major impact on the investment activities of foreign investors. This implies that global risk aversion has a forecasting ability for emerging market return and volatility. We show that a global risk aversion predicts the emerging market return and volatility at least as well as the domestic predictor does through the in- and out-of-sample tests. U.S. risk aversion predicts the short and middle horizon of Korea's stock market return. It also effectively predicts the short horizon of the realized and implied volatility of Korea's stock market.

Decentralized Finance, financial inclusion, and financial stability

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ORCiD

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Abstract

We analyze how the decentralized financial system, called Protocol for Loanable Funds (PLF) competes with the existing financial system. One of the main differences between PLF and the traditional bank is the purpose each has. Traditional banks pursue profit maximization, while PLF just liquidates loan demand in line with deposit supply. We suggest the condition for optimal PLF's blockchain consensus design that can improve social welfare, reflecting the blockchain trilemma.

A machine learning approach: The case of Korean stock market

Yeonchan Kang[a]

[a]Department of Industrial Engineering, Inha University, Incheon, Republic of Korea

Abstract

We analyze the Korean stock market with various firm characteristics and macroeconomic variables through a machine learning approach. Our dataset encompasses 82 firm characteristics and 10 macroeconomic indicators from 2005 to 2022. Importantly, within macroeconomic variables, we incorporate sentiment indicators, such as the news sentiment index and economic sentiment index as provided by the Bank of Korea, to elucidate the influence of sentiment dynamics Consistent with findings from the U.S. stock market and other markets, both neural network models and gradient-boosting tree-based models demonstrate superior predictive accuracy for stock returns in the Korean stock market. Furthermore, our analysis identifies the priority of momentum as the most influential predictor for the Korean market.

Keywords: Korean stock market, Large dataset, Machine learning, Model selection
JEL classification codes: JEL C45, C52, C55, C58, G17

Session 09
Quantitative Finance

Network connectedness across financial assets of Korea during COVID-19 pandemic: A Bayesian network approach

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Abstract

This study conducts an empirical analysis of how the various financial assets in South Korea (stock, bond, exchange rates, Bitcoin, Koribor, gold, and oil) react during the COVID-19 pandemic period using the Bayesian network approach. We consider various asset types together, especially providing the results graphically. Our empirical results are as follows. First, the Bayesian networks are useful for analyzing causal relationships among multiple assets. Second, post-period network structure results show more direct effects on other financial assets compared to the pre-period. The exchange rate markets, including USD-KRW, are dominantly associated with other variables, and the Bond and Stock markets are the most endogenous variables. Third, Intensity measures which is based on t-values are more reliable than Count measures and have the advantage of considering the direction and strength of the network together. We apply estimated network connectedness index to predict various macroeconomic variables.

Keywords: COVID-19, financial markets, Bayesian network, network connectivity, asset returns
JEL codes: C45; F30; G15;

LLMs Analyzing the Analysts: Do BERT and GPT Extract More Value from Financial Analyst Reports?

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ABSTRACT

This paper examines the use of Large Language Models (LLMs), specifically BERT-based models and GPT-3.5, in the sentiment analysis of Korean financial analyst reports. Due to the specialized language in these reports, traditional natural language processing techniques often prove insufficient, making LLMs a better alternative. These models are capable of understanding the complexity and subtlety of the language, allowing for a more nuanced interpretation of the data. We focus our study on the extraction of sentiment scores from these reports, using them to construct and test investment strategies. Given that Korean analyst reports present unique linguistic challenges and a significant 'buy' recommendation bias, we employ LLMs fine-tuned for the Korean language and Korean financial texts. The aim of this study is to investigate and compare the effectiveness of LLMs in enhancing the sentiment analysis of financial reports, and subsequently utilize the sentiment scores to construct and test investment strategies, thereby evaluating these models' potential in extracting valuable insights from the reports.

*These authors contributed equally.
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1 INTRODUCTION

Over the last few decades, the sheer volume of unstructured data available to financial market participants surged, presenting challenges related to the processing and potential oversight of critical information. The application of Natural Language Processing (NLP) has offered new avenues for data analysis in various domains, including finance. Building upon these NLP foundations, numerous studies have adopted advanced deep learning NLP techniques and Large Language Models (LLMs) to analyze the sentiment-rich data sourced from news and social media. These sentiment scores have subsequently been utilized in various downstream tasks such as price forecasting, risk prediction, and portfolio optimization [3, 4, 19, 24, 32, 33]. However, due to the often high noise-to-signal ratio associated with these sources, critical information related to a corporation's fundamentals can frequently become obfuscated [7, 25, 27]. Within this context, the value of analyst reports as a data source becomes apparent.

According to Jegadeesh et al. [15], analyst reports, underpinned by insights from experienced analysts, serve as valuable resources in financial decision-making, particularly in investments [13, 14, 16]. Compared to news articles or social media posts, these reports have significantly less noise and often contain more refined information about individual stocks. While news articles and social media posts can be useful for understanding overall market sentiment or investor attention, they often fall short in providing detailed, fundamental insights about specific companies. On the other hand, analyst reports are the result of thorough analysis conducted by industry experts, making them a reliable source of information.

Fractal portfolio strategies: Does scale preference of investors matter?

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Abstract

The mean-DCCA portfolio is known to consider the assets' nonlinearity and scaling properties by embedding the fractal correlation into the mean-variance criterion, with specific strategies under the assumption that the scale preference of investors is constant. We examine whether accounting for changes in investors' scale preference in response to market conditions improves portfolio performance. A portfolio with preference on short-scales is effective under market uncertainty, while long-scale preference strategy is effective under a steady market. Our results support the Fractal Market Hypothesis and reveal the potential effect of investor heterogeneity on portfolio risk reduction.

Keywords: portfolio selection; fractal correlation; DCCA analysis; multi-scale properties

1. Introduction

Modern portfolio theory, which determines the allocation of investments in financial assets, requires controlling and minimizing risk to achieve diversification. In the traditional mean-variance analysis, the investor's decision-making is characterized by expected returns and variances, and the optimal combination of assets should be iden-

Anticipatory preference with sustainability constraint

Hyeng Keun Koo[1]

[1]Ajou University

Abstract

We propose a social preference with sustainability constraint. We take a Rawlsian perspective and impose a minimum welfare constraint for all future generations. Our preference is represented by a social utility function which has the future minimum welfare level as a component. Thus, our preference is a anticipatory preference. We provide an optimal consumption and investment policies with such a preference.

Session 10
In-depth Discussion Session

Explanatory power of controlled ESG risk factors

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Abstract

Previous literature has discussed whether ESG (Environmental, Social, and Governance) is a new risk factor that explains the cross-section of expected returns in stock markets. We analyze the portfolios which are constructed based on ESG scores considering a firm's concern about its image. As a result, ESG portfolios controlled by the image concern, a proxy as advertising spending, show a significant negative alpha. We also find that the controlled ESG factor has marginal explanatory power under well-known factor models and even new factors that explain the recent stock market well. It suggests that ESG, which is controlled by corporate interest in their image, not just ESG, influences investor decision-making in the stock market.

The Effect of the ESG on Dividend Policy in Korea

Doowon Ryu*

Abstract

This study examines the impact of ESG on dividend (payout) policy in Korea. Using a sample of Korean non-financial firms listed on the KOSPI over the period from 2004 to 2017, we find the following results. First, high ESG firms tend to pay more dividends than low ESG firms. Second, the dividend payout of high ESG firms is partly more stable. Third, high ESG firms are more likely to pay dividends than low ESG firms. Overall, these results suggest that ESG has a positive impact on the dividend policy of Korean firms.

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Climate Change and Financial Markets

Seo Yun Choi[1]

Abstract

In this paper, we explore the impact of climate risk on the financial industry that supports economic growth and the importance of developed countries' responses to climate change. We document three critical mechanisms of climate impact on the economy and estimate the negative effect of climate change on the default risk of financial markets, using carbon emissions and greenhouse gas emissions data from a sample of 158 countries sourced from the World Bank database. Our results find that carbon and greenhouse gas emissions exacerbate the financial system's stability. Additionally, this effect is more pronounced in advanced countries and countries with higher social Indices. The findings show that the negative effect of climate change is strengthened in countries with members who have better perceptions of trust and compliance with the law of society or where the government has better abilities to formulate and implement sound policies and regulations. In particular, we identify that the negative impact is even more significant in countries with a higher financial development index. Thus, we conclude that major countries with well-organized systems can mitigate climate change risks worldwide. We emphasize the crucial role of developed countries in swiftly and extensively contributing to moderating climate change and implementing policies to limit climate risk.

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Investor sentiment and mispricing

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Abstract

This paper analyses the role of investor sentiment in explaining the futures mispricing mechanism by analyzing data from the KOSPI200 futures market, which is a highly liquid and actively traded derivatives market. After controlling various variables potentially affecting price dynamics and mispricing mechanisms, we find that the positive association between investor sentiment and futures mispricing is highly significant. Also, we attribute the cause of observed mispricing to market volatility, short sale restrictions, and market reform. Our findings imply the importance of including investor sentiment in the futures pricing mechanism.

Keywords: Arbitrage; Index futures; Intraday data; Investor sentiment; Mispricing
JEL classifications: G13, G14, G15

Session 11
Financial Econometrics

Valuation and in-depth analysis of multifactor swing quanto options for mitigating electricity price-volume risk[*]

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1

Outline

New multivariate derivatives with an early exercise feature called swing quanto options.

Hedge effect against revenue fluctuation in the electricity market.

1. Pricing of multivariate swing options.

2. Introduction of quanto options and their application to hedge issues

3. Verification of hedge effectiveness using empirical data.

Introduction of Swing options

➢ Swing options (e.g., Lari-Lavassani et al. (2001), Dorr (2003), Meinshausen and Hambly (2004), Wilhelm and Winter (2006)):

- Option with a fixed number of swings (exercises) until maturity.

- Only one exercise at the same point in time.

- Extension of Bermudan options.

➢ Pricing method:

- Solve backward while comparing exercise value and continuation value, similar to American options.

- Exercise value is not equal to the payoff. When exercised, it reduces to the value of a swing option with one less exercise opportunity. If the remaining exercise opportunities become zero, it stops.

Pricing method

$0 = T_0 < T_1 < T_2 < \cdots < T_N = T$, L: Exercise opportunities

$Z_t^{(L)}$: Swing option value with L exercise opportunities

P_t: Swing option payoff

X_t: State variables (d_x-dimensional Markov process)

$n = N$: $Z_{T_N}^{(L)} = P_{T_N}$

$n = N - 1, N - 2, \ldots, 2, 1$:   Exercise value   Continuation value

$$Z_{T_n}^{(L)} = \max\left(P_{T_n} + Z_{T_n}^{(L-1)}, e^{-r(T_{n+1}-T_n)} \mathbb{E}\left[Z_{T_{n+1}}^{(L)} \middle| \mathcal{F}_{T_n} \right] \right)$$

$n = 0$: $Z_{T_0}^{(L)} = e^{-r(T_1 - T_0)} \mathbb{E}\left[Z_{T_1}^{(L)} \right]$

Least Squares Monte Carlo (LSMC) method

> $Z_t^{(L)}$: Swing option value with L exercise opportunities
>
> P_t: Swing option payoff
>
> X_t: State variables (d_x-dimensional Markov process)

➤ Continuation value function: $\mathbb{E}\left[Z_{T_{n+1}}^{(L)} \middle| \mathcal{F}_{T_n}\right] = \mathbb{E}\left[Z_{T_{n+1}}^{(L)} \middle| X_{T_n}\right] = \Phi_n^{(L)}(X_{T_n})$

> A measurable function minimizing $\mathbb{E}\left[\left|Z_{T_{n+1}}^{(L)} - \Phi_n^{(L)}(X_{T_n})\right|^2\right]$

- American option problems:

  Longstaff and Schwartz (2001): Polynomial basis functions.

  Lapeyre and Lelong (2021), Hoshisashi and Yamada (2023): Application of multilayer neural networks.

Least Squares Monte Carlo (LSMC) method

➤ Repeat 1)—4) for $L = 1,2,3, \dots, N$.

Step 1) Generate m sample paths for $X_{T_n}, n = 1, \dots, N$ with the given initial state X_{T_0}

Step 2) Set $n = N$ and apply the terminal condition $Z_{T_N}^{(L)} = P_{T_N}$ to compute the value of $Z_{T_N}^{(L)}$ for each sample path.

Step 3) For $n = N - 1, \dots, 2, 1$, Estimate the continuation value function $\Phi_n^{(L)}$ and calculate $Z_{T_n}^{(L)}$ in the following equation.

$$Z_{T_n}^{(L)} = \max\left(P_{T_n} + Z_{T_n}^{(L-1)}, e^{-r(T_{n+1}-T_n)}\Phi_n^{(L)}(X_{T_n})\right)$$

Step 4) Compute $Z_{T_0}^{(L)} = e^{-r\delta T_1}\mathbb{E}\left[Z_{T_1}^{(L)}\right]$.

Multivariate case and Application to the Electricity Market

➢ Past research: Single-variate case

Dorr (2003), Meinshausen and Hambly (2004), Thanawalla (2006),
Hirsch (2009), Endo (2020)
                Spline regression
     Electricity market

➢ This research: Multivariate extension with tensor product spline functions.

Tensor product spline functions: The basis function vector is defined by taking the tensor product of univariate spline function basis vectors (Wood (2017)).

Swing quanto options for hedging revenue volatility risks against price and volume fluctuations

Quanto options

Options provided by the product of a payoff of standard call or put and a stochastic multiplier.

➢ For example, when trading foreign stock options in domestic currency, the payoff varies with the exchange rate.

$$\text{Payoff} = \text{Foreign exchange rate} \times (\text{Stock price} - \text{Strike})^+$$

➢ In the electricity market, the procurement price is determined by the spot electricity price in the wholesale electricity market, and the trading volume fluctuates daily based on the electricity consumption of the end-users (simultaneous variation).

➢ On the other hand, the retail price remains fixed for a certain period.

$$\text{Loss} = \text{Trading volume} \times (\text{Spot electricity price} - \text{Fixed price})^+$$

New options for loss hedging

➢ Introduction of **new options for hedging losses** of retail electricity providers procuring electricity in the wholesale electricity market.

- Quanto options payoff: $\boxed{V_{T_n}\left(S_{T_n} - F_{T_0,T_n}\right)^+, n = 1, \dots, N}$

  T_0: Option contract date

  T_n: Option exercisable date $(n = 1, \dots, N)$

  S_t: Spot electricity price at day t [Yen/kWh]

  F_{T_0,T_n}: Forward price at day T_0 with maturity T_n [Yen/kWh]

  V_t: Area demand on day t [kWh]

- Assumption: **Risk neutral** in the real world, no risk premium

Hedging of losses using options

Losses of retail electricity providers

1 2 3 ... ... N

Derivative payoffs

Total cash flows ➡ **Mitigation**

European: Exercisable only at the predetermined L time point

American: Exercisable L times at any point

Swing: Exercise is limited to once at one time point (exercisable L times).

Under the risk-neutral probability measure, the sum of expected DCFs with the option value is equal, regardless of the presence or type of the option.

Initial option value = Sum of discounted cash flows (DCFs) of option payoffs

Problem to be addressed

- Losses of retail electricity providers:

$$cV_{T_n}\left(S_{T_n} - F_{T_0,T_n}\right)^+, n = 1, \ldots, N$$

c: Ratio of retail electricity provider's demand to area total

> Cases where perfect hedging is possible using European options across all maturities.

$$cV_{T_n}\left(S_{T_n} - F_{T_0,T_n}\right)^+ - cV_{T_n}\left(S_{T_n} - F_{T_0,T_n}\right)^+ = 0$$

- Comparison of hedging with a restricted number of exercisable times (European vs. Swing).

Under the risk-neutral probability measure, the sum of expected DCFs with the option value is equal, regardless of the presence or type of the option.

Two-dimensional model with two single-factor equations

> **Daily average values** of spot price and demand, S_t and V_t.

$$\ln S_t = h_1^S(Seasonal_t) + h_2^S(Period_t) + \beta_1^S Mon_t + \cdots + \beta_6^S Sat_t + \beta_7^S Holiday_t + \eta_t^S$$
$$\ln V_t = h_1^V(Seasonal_t) + h_2^V(Period_t) + \beta_1^V Mon_t + \cdots + \beta_6^V Sat_t + \beta_7^V Holiday_t + \eta_t^V$$

$Seasonal_t$: **Annual cycle dummy variables for seasonal trends** $(= 1, 2, \ldots, 365 \, or \, 366)$

$Period_t$: **Daily dummy variables for long-term trends** $(= 1, 2, 3, \ldots)$

$Mon_t, Tue_t, \ldots, Sat_t$: **Day-of-the-week dummy variables, e.g., $Mon_t = 1$ (Monday) or 0 (otherwise).**

$Holiday_t$: **Holiday dummy variables $(= 1$ for holidays or 0 otherwise)**

$$\boldsymbol{\eta}_t := [\eta_t^S, \eta_t^V]^\top \sim VAR(1): \boldsymbol{\eta}_t = A\boldsymbol{\eta}_{t-1} + \boldsymbol{c} + \boldsymbol{\varepsilon}_t$$

$X_t = [S_t, V_t]^\top$: State variables (Two dimensional Markov process)

Higher-dimensional models with multi-factor equations

➢ **Multi-factor extension** of spot price and area demand models

$S_{1,t}$: Spot electricity price morning average at day t [Yen/kWh]

$S_{2,t}$: Spot electricity price afternoon average at day t [Yen/kWh]

$V_{1,t}$: Area demand morning average at day t [kWh]

$V_{2,t}$: Area demand afternoon average at day t [kWh]

Daily averages: $\boxed{S_t = (S_{1,t} + S_{2,t})/2, \quad V_t = (V_{1,t} + V_{2,t})/2}$

• After decomposing into trend and residuals, we assume a
4-dimensional VAR(1) model for the residuals.

$\boxed{X_t = \left[S_{1,t}, V_{1,t}, S_{2,t}, V_{2,t}\right]^\top}$: State variables (Four dimensional Markov process)

Empirical simulation for Tokyo area

✓ **JEPX Spot electricity price**: 30 min electricity delivery in Tokyo
(https://www.jepx.jp/electricpower/market-data/spot/)

✓ **Demand index**: Total demand in Tokyo **(https://www.tepco.co.jp/forecast/)**

☐ Learning period: **April 1, 2016 — July 31, 2022**

☐ Simulation period: **August 1, 2022 — August 31, 2022**

(Four dimensional model of $\left[S_{1,t}, V_{1,t}, S_{2,t}, V_{2,t}\right]^\top$**)**

1. Set the contract date as July 31st. Generate 20,000 sample paths for August 1st to August 31st.

2. Calculate *L* swing quanto options exercisable *L* times from August 1st to August 31st, as well as *L* European options with *L* maturities from the longest.

3. Calculate the payoff on the sample path (for swing options, exercise occurs when the exercise value first equals the option value).

Generation of sample paths for the estimated four dimensional model

(a) $S_{1,t}$

(b) $V_{1,t}$

(c) $S_{2,t}$

(d) $V_{2,t}$
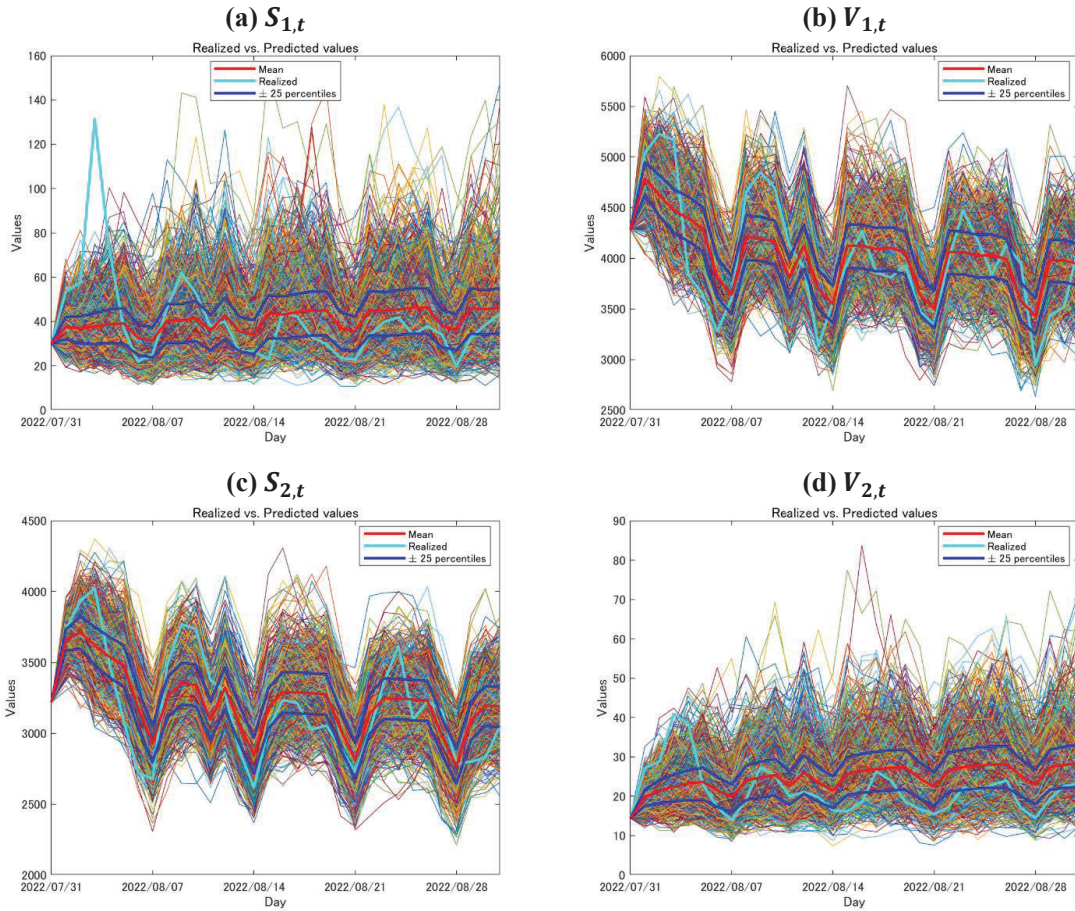
Number of exercise opportunities vs. option values

Values of Swing and European options for different number of exercise opportunities
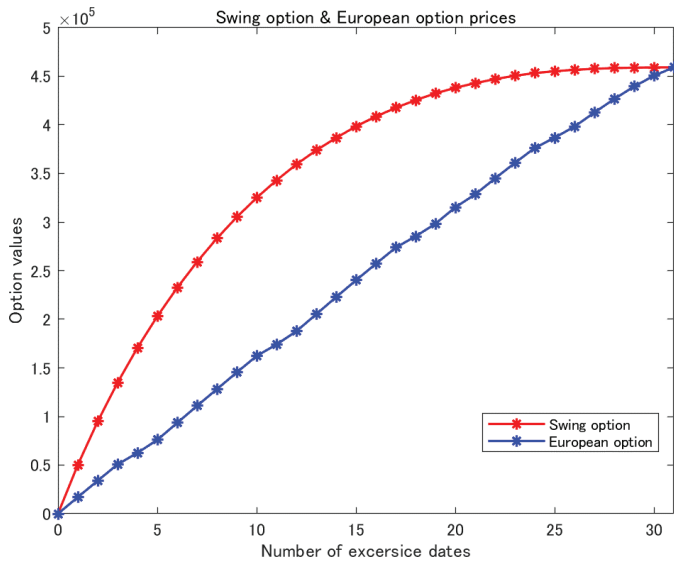
The average hedged loss DCFs for Swing options and European options
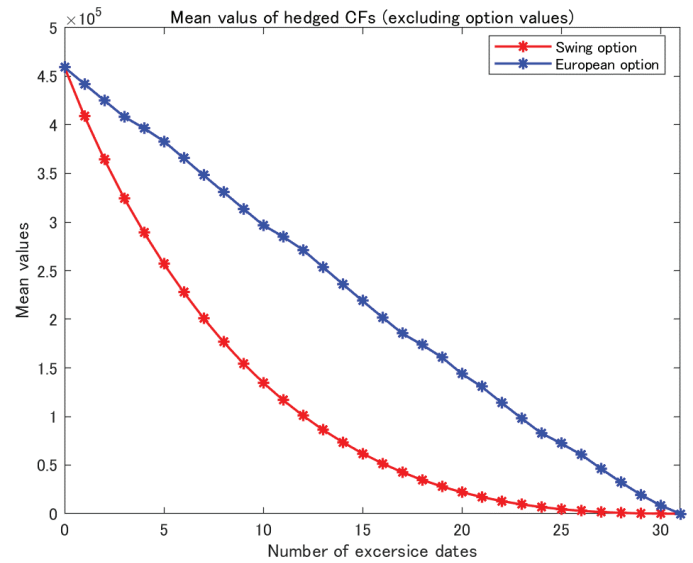
☐ Given the same number of exercise opportunities, Swing option value ≥ European option value.

☐ The sums of option values and the average hedged loss DCFs are equal.

Number of exercise opportunities vs. hedge effectiveness

<table>
<tr>
<td>Standard deviations of hedged loss DCFs for different number of exercise opportunities</td>
<td>95 percentiles of hedged loss DCFs for different number of exercise opportunities</td>
</tr>
</table>
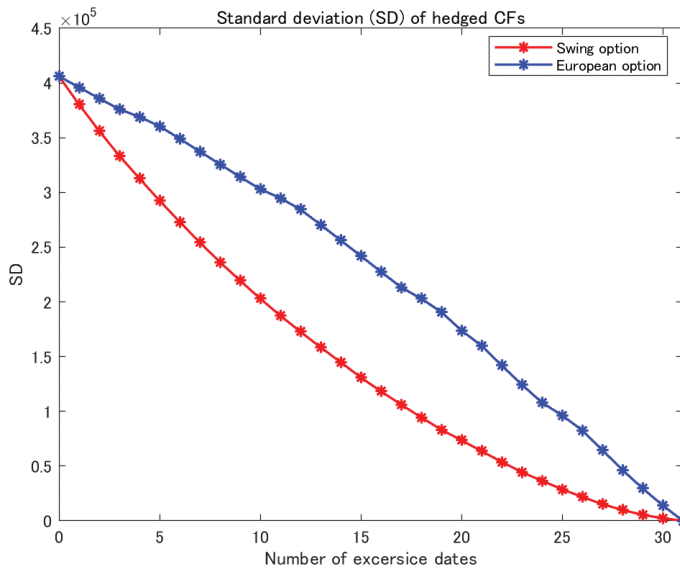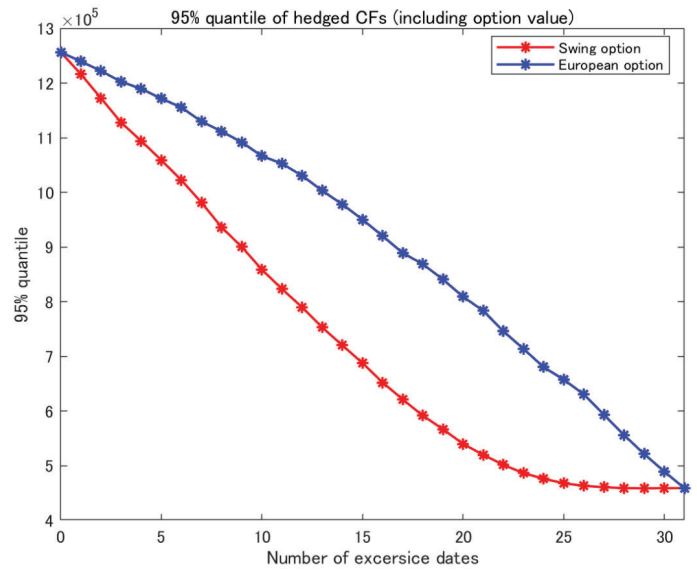
☐ Higher hedge effectiveness is always observed for swing options given the same number of exercise opportunities.

Hedge performance when the initial payments are set equal
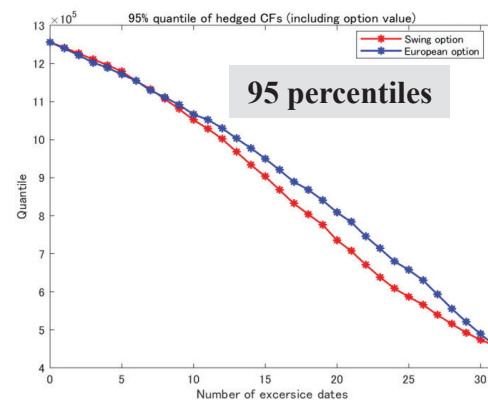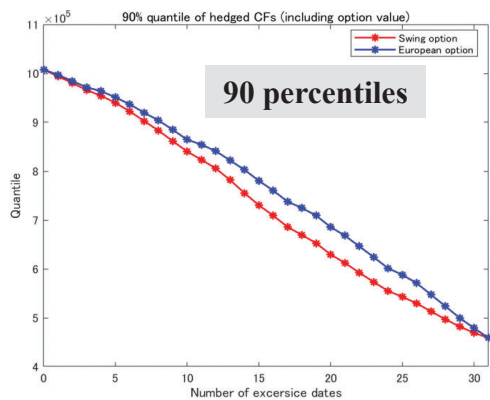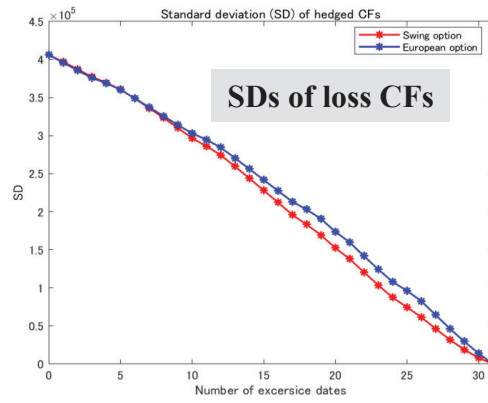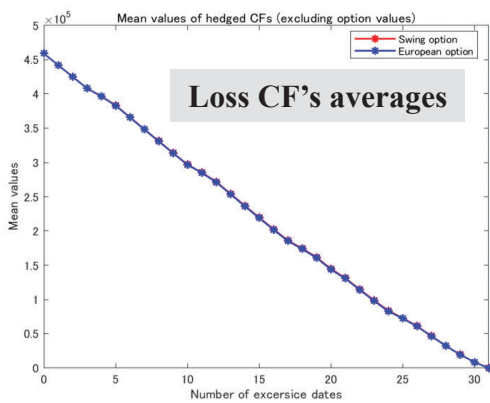
Loss CF's averages

SDs of loss CFs

90 percentiles

95 percentiles

☐ Even when adjusting the holding units of swing options to make the initial payment amounts the same, swing quanto options achieve higher risk reduction.

Conclusion

> New multivariate derivatives with an early exercise feature called swing quanto options.

☐ Pricing of multivariate swing quanto options

➢ Application of Least Squares Monte Carlo Method

➢ Estimation of continuation values via tensor product splines

☐ Hedging revenue fluctuation risk in the spot electricity market trading

➢ Hedge effectiveness through comparison with European options.

➢ Even when adjusting the holding units of swing options to make the initial payment amounts the same, swing quanto options achieve higher risk reduction.

Forecasting Stock Returns with Conditional Quantile-level Dependence

Stanley Iat-Meng Ko[*]   Sung Y. Park[†]

Abstract

This paper proposes a novel approach to time series forecasting of the equity premium. A new concept—optimal quantile forecasting—is introduced that is the closest estimated conditional quantile to the realized return. We discover an interesting autocorrelation structure of optimal forecasting quantile-level sequences in monthly and quarterly stock returns data. We show that our optimal quantile-level point forecast can be interpreted as a time varying risk adjustment to the conditional expected risk premium. A two-step forecasting approach is proposed such that the one-step-ahead optimal quantile level is first predicted and then the corresponding conditional quantile value is estimated as the forecast of the monthly and quarterly Standard and Poor (S&P) 500 excess return. Our empirical results demonstrate the superiority of our method for monthly and quarterly excess returns. We show the extraordinarily robust predictive power of our method in different sample periods, which is not found for other methods. Our method also performs well under the alternative absolute loss measure.

JEL classification: C10; C22; G12; G17.

Keywords: conditional density; equity premium predictions; optimal forecasting; quantile regression.

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Neutralization of the bias in the integrated variance of financial returns induced by microstructure friction

Sebastien Pierre

Cardiff University

Jing Chen

Cardiff University

Jonathan Thompson

Cardiff University

Abstract

Financial price series are widely regarded as following jump-diffusion processes, with jumps predominantly viewed as market corrections induced by the release of economic news. Financial price series are also governed by trading constraints, such as tick size and bid-offer spreads, which restrain price records to specific increments and arguably curb trading activity. These trading constraints are often referred to as microstructure friction in the literature. Various quantitative methodologies to detect jumps in financial data introduce test statistics which reflect the disparity between the realized and integrated variance of returns. It is evidenced that the noise induced by microstructure friction creates significant statistical biases in integrated variance estimates, potentially leading to erratic and unreliable jump detection rates. This research presents an alternative measure of integrated variance, which effectively neutralizes the effect of microstructure noise, and yields consistent jump detection results across a wide range of data sampling frequencies and asset liquidity profiles. Comprehensive jump detection tests on simulated and real financial data are produced to support this research.

Regulatory Reforms and Price Heterogeneity in an OTC Derivative Market

2023 KAFE-SKKU International Conference
on Finance and Economics
October 26th, 2023

Taihei Sone (Bank of Japan)
Takemasa Oda (Bank of Japan)
Daisuke Miyakawa (Waseda Uni.)

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*Fixed-Floating IRS

- For the contracted notional amount

- Over the contracted maturity

Seller → Fixed (i.e., "swap rate", "price") → Buyer
Seller → Floating → Buyer

Segments: C2D   D2D   D2C   (+ C2C)

Customer ← Fixed ← Dealer ← Fixed ← Dealer ← Fixed ← Customer
Customer → Floating → Dealer → Floating → Dealer → Floating → Customer

1

1
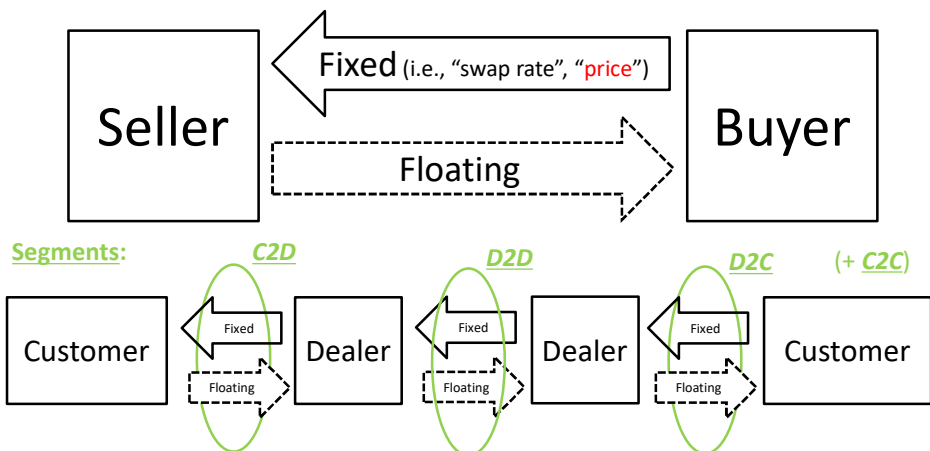
1

1. <u>Background</u>

☐ Global Financial Crisis ⇒ Regulatory reforms

Since 2012　　　　　　　Since 2016

■ CCP mandate & bilateral margining rules (IM/VM)

Basel III Capital Charge

aiming at…

⇒ "**<u>Insulation</u>**" of default shock propagation

⇒ "**<u>Transparent market</u>**" w/ homogeneous prices

2

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*<u>CCP mandate</u>
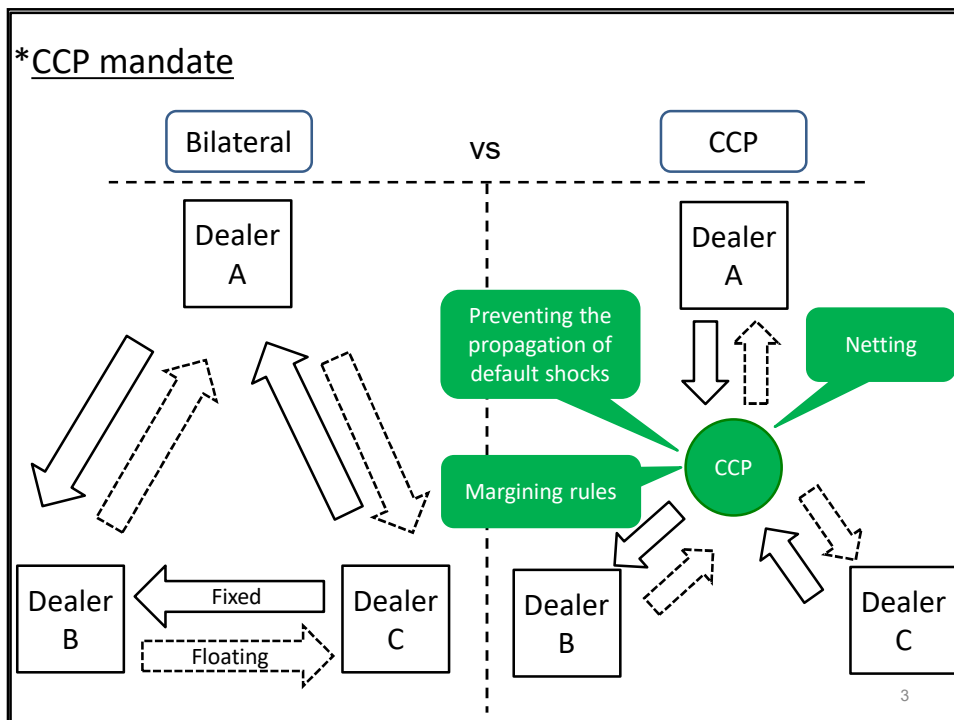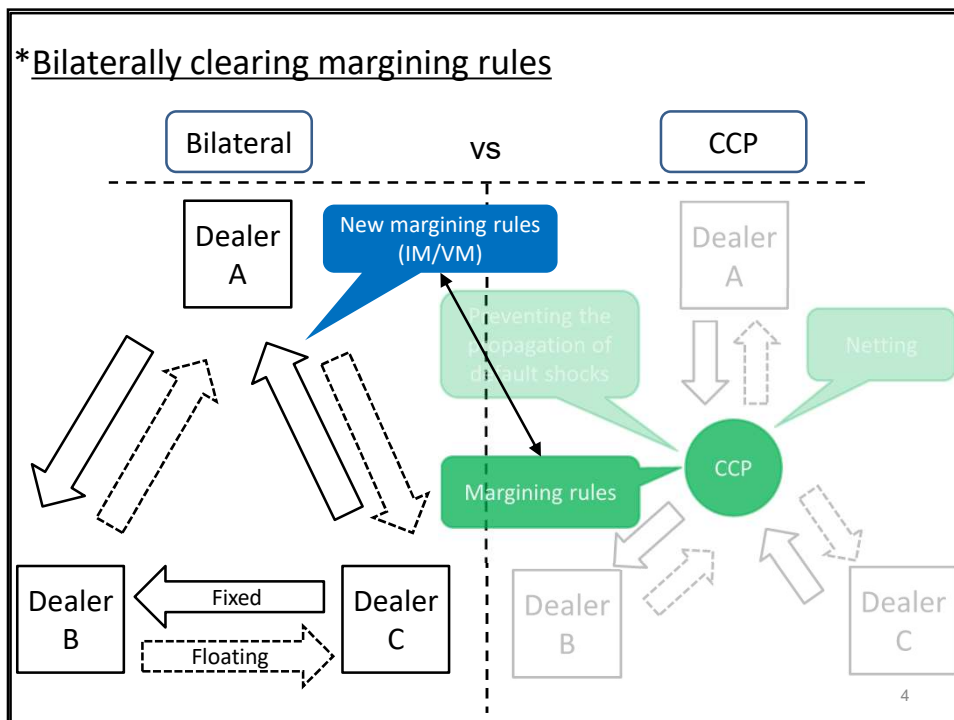
2. Heterogeneous price?

☐ *Cenedese et al. '20* find…

- CCP price < Bilateral price (*a.k.a.* OTC premium)

- *D* receive fixed from *C* > *C* receive fixed from *D*
  (D2C)   (C2D)

  Claim: Pass-through of regulatory costs from XVA under D's bargaining power!

3. Empirical Strategy

□ Transaction-level panel estimation (*Cenedese et al. '20*)

$$SwapReturn_{i,s,b,t}$$
$$= \alpha + \beta Non\text{-}CCP_{i,s,b,t} + X_{i,s,b,t}\gamma + FE_{s,b,t} + \varepsilon_{i,s,b,t}$$

"OTC premium"

where

$SwapReturn_{i,s,b,t}$: Difference between the transaction- level swap rate (i.e., fixed) and the mid-quote of the Bloomberg benchmark rate at the end of the previous business day

$Non\text{-}CCP_{i,s,b,t}$: Dummy for the case of not being cleared via CCP

$X_{i,s,b,t}$: Log-notional, maturity

$FE_{s,b,t}$: Date-FEs & Seller-Buyer-Month FEs

□ Sub-sample estimations

■ Replication of *Cenedese et al. '20*: (**D2D), D2C, C2D, (C2C)**

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*Summary statistics

This table reports summary statistics (by trade) of the main variables used in our analysis split by segment. CCP denotes trades cleared through a central counterparty, while Non-CCP denotes non-centrally cleared trades. Notional is the JPY amount (in ¥b) on which the exchanged interest payments are based. Maturity refers to the number of years between the effective and maturity date of the swap contract. The swap return is defined as the difference (in bps) between the transaction-level swap rate and the mid-quote of the Bloomberg benchmark rate at the end of the previous business day. The sample covers every JPY-denominated spot vanilla interest rate swap by Japan-based counterparties, which was reported to Financial Services Agency, The Japanese Government between April 1, 2013 and October 31, 2021.

	N	Mean	Std.dev.
Panel A: CCP			
Notional (bil yen)	424,129	10.51	22.54
Log-notional	424,129	22.22	1.26
Maturity (years)	424,129	10.35	7.02
Swap return (bps)	424,129	0.56	12.76
Panel B: Non-CCP			
Notional (bil yen)	178,909	7.42	18.88
Log-notional	178,909	21.30	1.89
Maturity (years)	178,909	8.00	5.35
Swap return (bps)	178,909	13.09	33.09
Panel C: All			
Notional (bil yen)	603,038	9.60	21.57
Log-notional	603,038	21.95	1.53
Maturity (years)	603,038	9.66	6.66
Swap return (bps)	603,038	4.28	21.73

9

5-i. Results: TIV for *D*

D / C
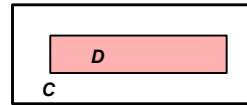
- ☐ Replication of *Cenedese et al '20*
  - ■ Dealer = *D* (= *RD + NRD*), Customer = *C* (= *RC + NRC*)
  - ■ Price heterogeneity
    - • OTC premium = 2-3bp << 10bp in *Cenedese et al. '20*

> D2D is not reported in *Cenedese et al. '20*

The table reports the results of trade-level panel regressions of the swap return on the Non-CCP dummy that equals one for Non-CCP trades and zero otherwise, and a number of other variables and controls. The swap return is defined as the difference (in bps) between the transaction-level swap rate and the mid-quote of the Bloomberg benchmark rate at the end of the previous business day. Column 1 shows the results of all (including D2D, D2C, C2D, and C2C) trades. Column 2 - 5 show the results of D2D, D2C, C2D, and C2C trades respectively. Here, Z2X trades represent trades where Z receives fixed rates while X pays them and D represents G16 dealers while C does otherwise. The sample covers every JPY-denominated spot vanilla interest rate swap reported to FSA between April 1, 2013 and October 31, 2021 All specifications include time, buyer ID, and seller ID fixed effects. We report t-statistics calculated using clustered standard errors (by quarter and pairs of buyer and seller ID) in parentheses. ∗∗∗, ∗∗, ∗, denote significance at 1%, 5%, and 10% confidence level, respectively.

	All	D2D	D2C	C2D	C2C
	(1)	(2)	(3)	(4)	(5)
Non-CCP dummy	1.527***	2.288**	2.575***	0.652*	0.127
	(0.373)	(0.889)	(0.718)	(0.364)	(0.421)
Log-notional	-0.906**	-0.379**	-0.303***	-0.158**	-2.773**
	(0.392)	(0.149)	(0.104)	(0.068)	(1.289)
Maturity	-0.094*	-0.014	-0.054***	-0.023	-0.260*
	(0.048)	(0.016)	(0.019)	(0.016)	(0.153)
Day, (Month × Buyer ID × Seller ID) FE	Yes	Yes	Yes	Yes	Yes
$\bar{R}^2$	0.61524	0.22916	0.38603	0.32623	0.72166
Obs	603,038	169,415	150,911	149,439	133,273

Heterogeneity (OTC premia)

Asymmetry

10

10

5-ii. Results: Experiment

D / C
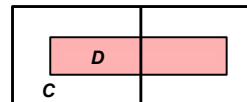
- ☐ Note: CCP-mandate does not largely matter

	All	D2C
	(1)	(3)
Non-CCP dummy	1.619***	2.577***
	(0.419)	(0.781)
Non-CCP dummy × CCP mandate dummy 1	0.945*	0.854
	(0.454)	(0.626)
Non-CCP dummy × CCP mandate dummy 2	0.674	1.297
	(0.536)	(0.825)
Non-CCP dummy × IM mandate dummy 1	-1.141*	-2.333**
	(0.578)	(0.860)
Non-CCP dummy × VM mandate dummy 1	10.110*	16.379***
	(5.220)	(0.878)
Non-CCP dummy × CCP mandate dummy 3	-0.897**	-0.023
	(0.418)	(0.431)
Non-CCP dummy × VM mandate dummy 2	-0.074	-1.353*
	(0.509)	(0.744)
Non-CCP dummy × IM mandate dummy 2	-5.067**	-4.482***
	(2.038)	(1.002)
Non-CCP dummy × IM mandate dummy 3	0.092	-0.420
	(1.391)	(2.034)
Non-CCP dummy × IM mandate dummy 4	-1.098	-1.558
	(0.711)	(1.109)
Non-CCP dummy × IM mandate dummy 5	-1.604***	1.313*
	(0.433)	(0.737)
Log-notional	-0.904**	-0.297***
	(0.392)	(0.104)
Maturity	-0.096*	-0.057***
	(0.048)	(0.019)
Day, (Month × Seller ID × Buyer ID) FE	Yes	Yes
$\bar{R}^2$	0.61535	0.38659
Obs	603,038	150,911

t
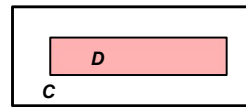
Not so much

Temporarily widen

Not so much

11

11

5-iii. Results: TV for *D*

❑ Before/after introducing margining rules

■ β of $Non\text{-}CCP_{i,s,b,t}$

• OTC premia>0 only for D2D & D2C before the introduction

The table reports the results of trade-level panel regressions of the swap return on the Non-CCP dummy that equals one for Non-CCP trades and zero otherwise, and a number of other variables and controls. The swap return is defined as the difference (in bps) between the transaction-level swap rate and the mid-quote of the Bloomberg benchmark rate at the end of the previous business day. Column 1 shows the results of regressions on the whole trades from FY2013 to FY2021. Column 2 shows the results of regressions on the trades from FY2013 to FY2016. Column 3 shows the results of regressions on the trades from FY2017 to FY2021. Here, Z2X trades represent trades where Z receives fixed rates while X pays them and D represents G16 dealers while C does otherwise. The sample covers every JPY-denominated spot vanilla interest rate swap reported to FSA between April 1, 2013 and October 31, 2021. All specifications include time, seller ID, and buyer ID fixed effects. We report clustered standard errors (by quarter and pairs of seller and buyer ID) in parentheses. $***$, $**$, $*$, denote significance at 1%, 5%, and 10% confidence level, respectively.

		Whole period (from FY2013 to FY2021)	from FY2013 to FY2016	from FY2017 to FY2021
		(1)	(2)	(3)
Non-CCP dummy of all trades		1.527***	1.953***	0.057
		(0.373)	(0.422)	(0.427)
	Non-CCP dummy of D2D trades	2.288**	4.234***	-0.161
		(0.889)	(1.234)	(0.436)
	Non-CCP dummy of D2C trades	2.575***	3.056***	0.395
		(0.718)	(0.840)	(0.569)
	Non-CCP dummy of C2D trades	0.652*	0.701	0.454
		(0.364)	(0.426)	(0.521)
	Non-CCP dummy of C2C trades	0.127	0.477	-1.430
		(0.421)	(0.345)	(1.136)

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5-iv. Results: Summary

❑ **Our question: Reforms ⇒ IRS price homogeneity?**

■ Over the course of the full introduction of regulatory reforms

A) We found price heterogeneity as reported in *Cenedese et al. '20*

B) Such price heterogeneity in *D2C* segment was widened right after the introduction of bilateral clearing margining rules

C) Yet, the new margining rules ⇒ homogeneous prices

⇒ The ultimate source of price heterogeneity seems to be "insufficient margin provision" in the case of bilateral clearing

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6. Concluding remarks

☐ The regulatory reforms contribute to transparent market

⇒ Q. What happens if interest rates go up (FVA & MVA)?

☐ **Ongoing & future research**

> Maehashi, Miyakawa, Sasamoto @ BOJ

- ■ Other OTC derivative markets (e.g., CDS, FX, Equity etc.)
  - • A measure of bargaining power (e.g., network centrality)
  - • Relative network metrics seem to have pricing implication
  - • $\eta_{selle\,,date}$, $\eta_{buyer,date}$, $\eta_{reference,date}$, $\eta_{s,r,month}$, $\eta_{b,r,month}$, $\eta_{s,b}$ etc.

- ■ Endogenous choice of CCP/Non-CCP (*Du et al. '19* for CDS)

- ■ Spillover (e.g., loan markets: *Araujo et al. '16*; *Arnold '17*)
- ■ Quantifying cost & benefit of regulatory reforms

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Thank you and comments are welcome!

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Appendix

0. This paper

- ❑ An OTC derivative market: Interest Rate Swap (IRS)

- ❑ Regulatory reforms

- ❑ Opaque MKT w/ "heterogeneous" price

(Q1. Status in Japan)

Q2. Reform vs. Price?

Q3. Source of market opacity?

Dealer A
Buyer
(Insured)

Fixed (**price**)

Floating

Dealer
B
Seller
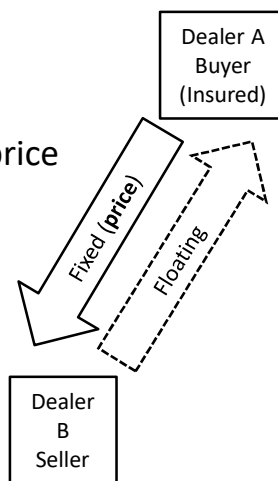
17

1. <u>Background</u>

❑ Over-the-counter (OTC) derivative markets

■ Interest rate, currency, credit, and more (e.g., climate)

❑ Interest Rate Swap (IRS) ∈ OTC derivatives

■ Global IRS market: Outstanding = 350 trillion USD

- JPY-denominated IRS: Outstanding = 35 trillion USD (★)

- FIs in Japan (w/ branches of foreign FIs) are involved in 50% of (★)
  → This is our data coverage (around 5% of the entire global market)

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7-vi. <u>Results: Discussion</u>

❑ Really due to the reforms?

■ Raw data of Swap return = Fixed rate received (t) – Mid quote (t-1)

19
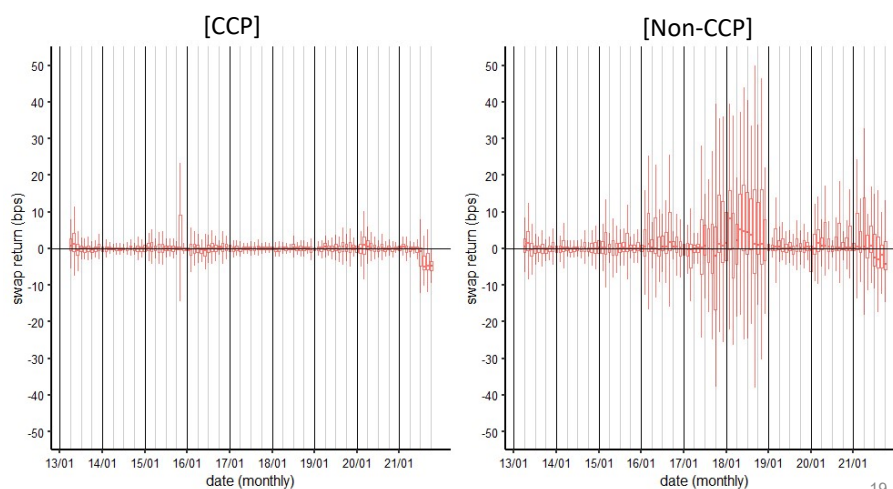
19

*Heterogeneity in *Cenedese et al. '20*

- Heterogeneity b/w CCP & non-CCP
- Asymmetry between *D2C* & *C2D*

No heterogeneity
OTC premia: A -B = 0

Asymmetry

Heterogeneity
"OTC premia": C -D > 0
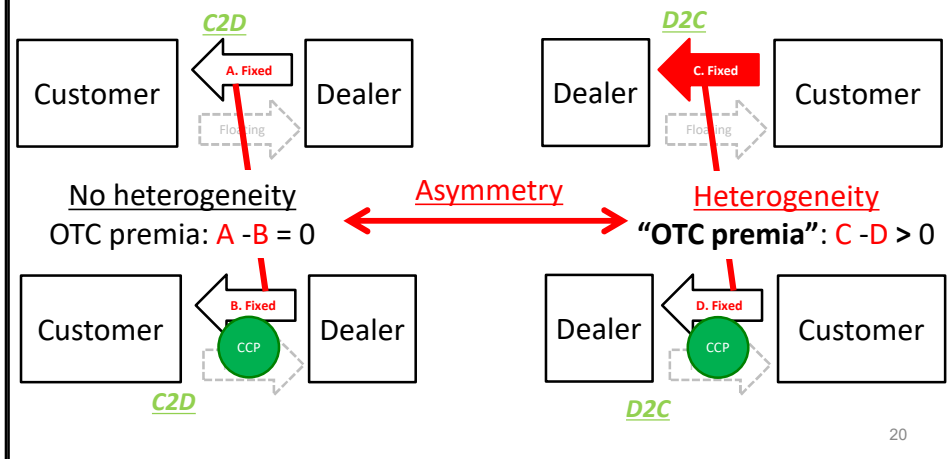
20

X. Policy Background

☐ Regulatory reforms after GFC

   i.   Mandatory use of central clearing party (CCP)

   ii.   Non-centrally cleared margining rules

      • Obliged to provide IM (initial margin) and VM (variation margin)

   iii.   Request for real-time reports of transaction details (i.e., data)

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*Regulatory reform (i) and (ii): Event logbook

★ = Average of the outstanding notional amounts of all OTC derivatives over the past particular period

(Unit: JPY)	CCP mandate	IM	VM
Nov. 2012	JSCC participants		
Dec. 2014	★>=1trn		
Dec. 2015	★>=0.3trn		
Sep. 2016	Applied to most of **D2D**	★>420trn	★>420trn
Dec. 2016	Insurance(★ >=0.3trn)		
Mar. 2017	Affecting CCP		No threshold
Sep. 2017		★>315trn	
Sep. 2018		★>210trn	
Sep. 2019		★>105trn	
Sep. 2021		★>7trn	
Sep. 2022		★>1.1trn	

Our entire data periods are under the CCP mandate

Bilateral margining rules are applied to wider parties

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22

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*Regulatory reform (i)

Non-CCP   vs   CCP

Dealer A

Dealer B   Fixed / Floating   Dealer C

Preventing the propagation of default shocks

Netting

Margining rules

CCP

Dealer A

Dealer B

Dealer C
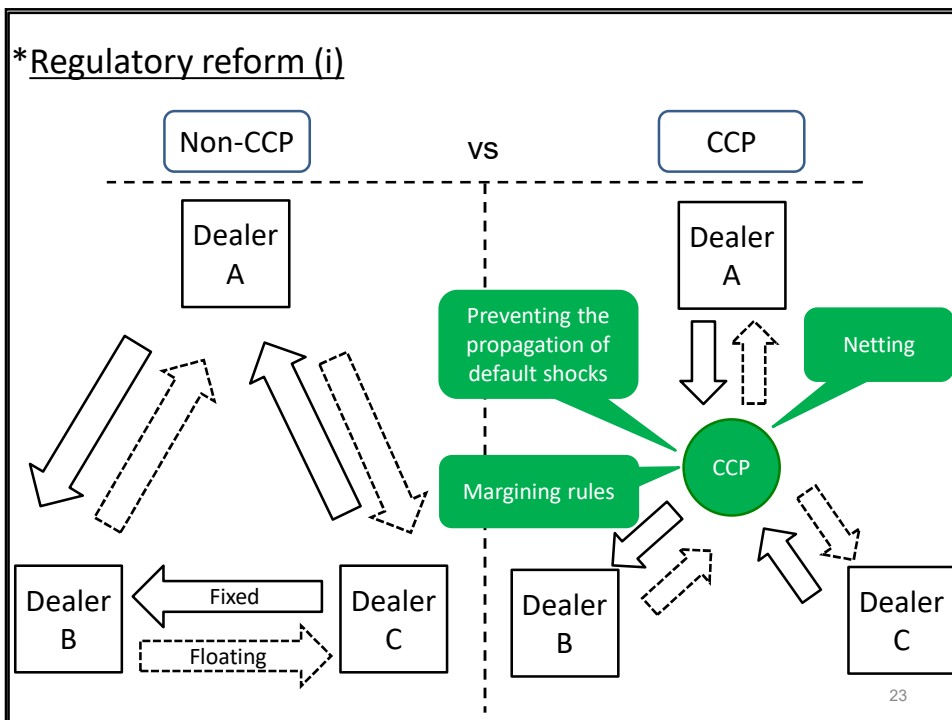
23

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X. Policy Background (cont'd)

☐ Regulatory reforms after GFC

    i.   Mandatory use of central clearing party (CCP)

    ii.   Non-centrally cleared margining rules

        • Obliged to provide IM (initial margin) and VM (variation margin)

    iii.   Request for real-time reports of transaction details (i.e., data)

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24

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*IM & VM

25
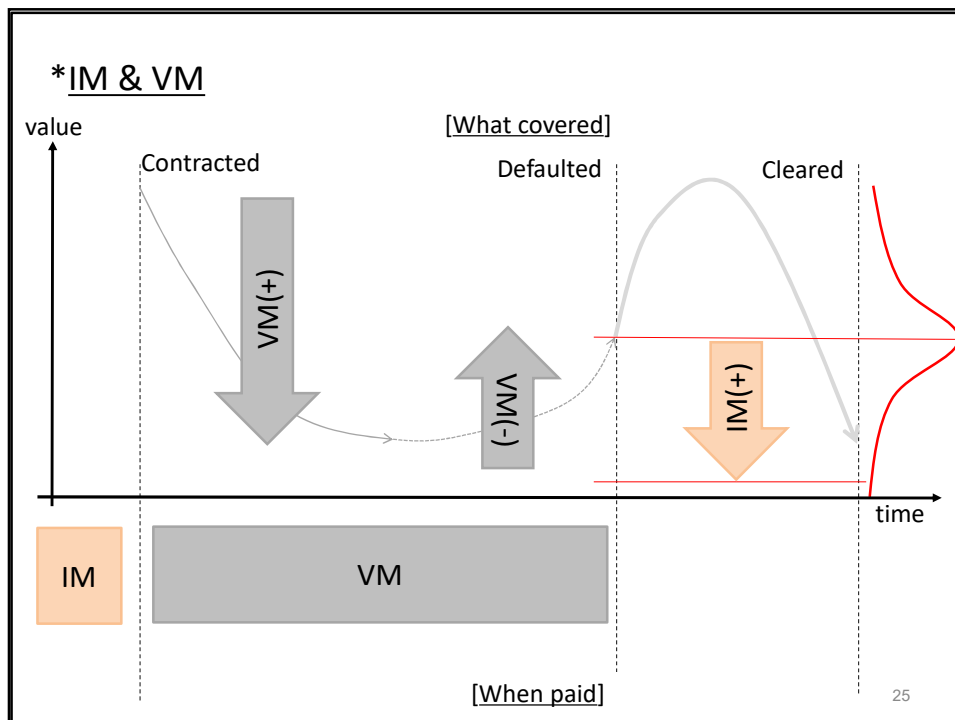
25

*Regulatory reform (i) and (ii): Event logbook

★ = Average of the outstanding notional amounts of all OTC derivatives over the past particular period

(Unit: JPY)	CCP mandate	IM	VM
Nov. 2012	JSCC participants only		
Dec. 2014	★>=1trn		
Dec. 2015	★>=0.3trn		
Sep. 2016		★>420trn	★>420trn
Dec. 2016	Insurance(★ >=0.3trn)		
Mar. 2017	Applied to all regulated parties in Japan		No threshold
Sep. 2017		★>315trn	
Sep. 2018		★>210trn	
Sep. 2019		★>105trn	Affecting Non-CCP
Sep. 2021		★>7trn	
Sep. 2022		★>1.1trn	

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*Regulatory reform (ii)
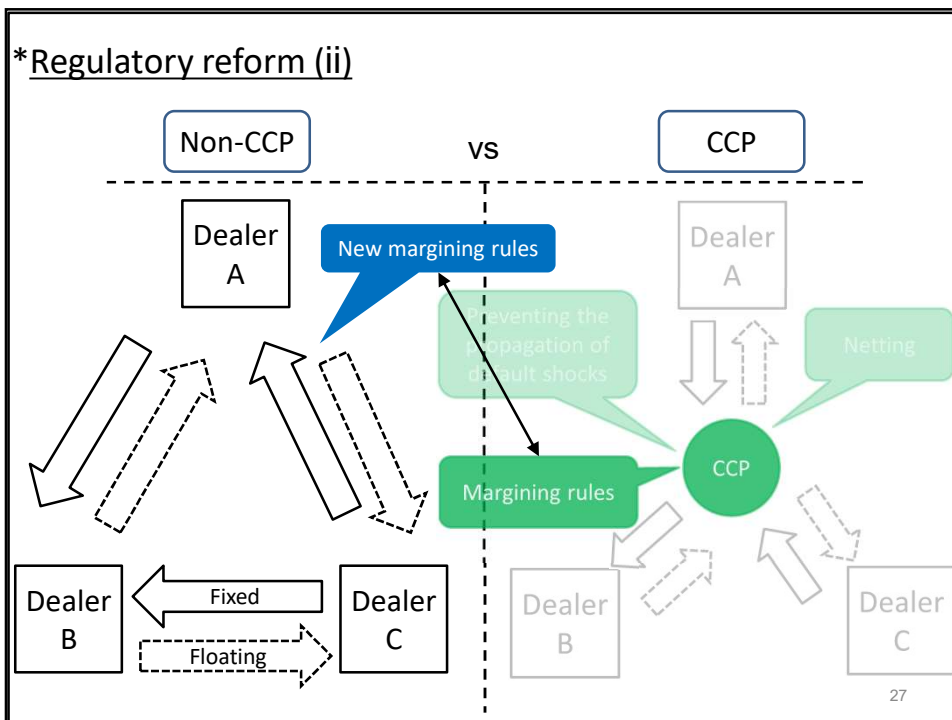
27

X. Policy Background (cont'd)

☐ Regulatory reforms after GFC

    i.   Mandatory use of central clearing party (CCP)

    ii.   Non-centrally cleared margining rules

        • Obliged to provide IM (initial margin) and VM (variation margin)

    iii.   Request for real-time reports of transaction details (i.e., data)

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*Data collection & analyses by financial authorities

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*Evolution of IRS outstanding

JPY Interest Rate Swap Outstanding （All Countries）

JPY Interest Rate Swap Outstanding (Japan Only)

Source: BIS OTC Derivatives Statistics

The periods we examine
⇔ Expansion of central clearing

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3. Natural questions & our findings

Q1. Was Japan also in the middle of reforms?
   A1. Yes (but not now)

Q2. Those reforms resolve the price heterogeneity?
   A2. Yes by bilateral margin rules (w/ temporal responses)

Q3. Any ideas about the source of price heterogeneity?
   A3. Insufficient margin provision in bilateral clearing

⇔ **CVA & KVA↓↓** > **FVA & MVA↑** **for bilateral price**

Obliged!

4. Literature & Contribution

- **Microstructure**
  - Seminal works by Duffie (e.g., *Duffie '12*) and his co-authors
    - Pass-through of inventory cost reflecting "bargaining power" (*Duffie '12*):
      - Lack of outside option (*Duffie et al. '05*, *'07*), network centrality (*Li & Schurhoff '19*), expertise (*Glode et al. '12*), information (*Bolton t al. '16*)

- **Heterogeneous price** in OTC derivative markets
  - Interest rate (*Cenedese et al. '20*): Pass-through of regulatory costs through valuation adjustment (XVA: *Gregory '15*)
  - Currency (*Hau et al. '21*): Dealers' discriminatory pricing
  - Credit (*Du et al. '19*): Network centrality matters

- <u>Ours</u>: **First to "explicitly" evaluate the impacts of reforms**
  - CCP (survey of theoretical studies) : *Menkveld & Vuillemey '21*
  - Calibration (*Ghamami & Glasserman '17*): CCP cost > Bilateral
  - Volker rule (*Wang & Zhong '21*): CDS

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*Definitions of parties

R_C: Regulated customers	**NR_C**: Non-regulated customers
R_D: Regulated G16 dealer banks	**NR_D**: Non-regulated G16 dealer banks

- ***D = D** in Cenedese et al. '20*
  - Focus on so-called <u>G16 dealer-banks</u> (**RD** + **NRD** vs. **R+NR**): Bank of America, Barclays, BNP Paribas, Citibank, Credit Agricole, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JP Morgan, Morgan Stanley, Nomura, Royal Bank of Scotland, Societe Generale, UBS, and Wells Fargo
  - Not to be arbitrary: Classified as "Participating Dealers" in the OTC Derivatives Supervisors Group, chaired by the New York Fed
- ***C** ="not **D**"*
- Another important distinction:
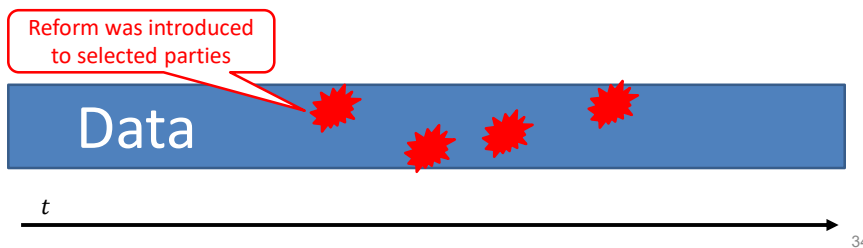 - <u>Regulated/Non-regulated parties</u>*: **R_** , **NR_**

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3. Empirical Strategy

☐ **Natural experiment** (i.e., DID for IM/VM "shocks")

$$SwapReturn_{i,s,b,t} = \alpha + \sum_j \beta_j Non\text{-}CCP_{i,s,b,t} \times 1\big(\{i,s,b,t\} \in Reg(j)\big)$$
$$+ \boldsymbol{X}_{i,s,b,t}\boldsymbol{\gamma} + \boldsymbol{FE}_{s,b,t} + \varepsilon_{i,s,b,t}$$

$1\big(\{i,s,b,t\} \in Reg(j)\big)$: Taking the value of one after the introduction of a reform in the case that the transaction i is the target of the regulation
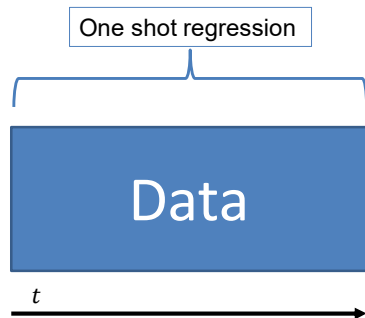

Reform was introduced to selected parties

Data

t

34

34

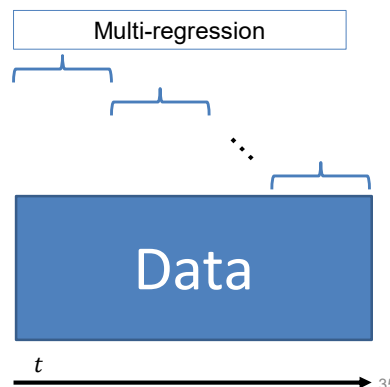# 5. Empirical Strategy

Key years: 2014 & 2016

Time-invariant

- One shot regression based on all over the period of our data

Time-variant

- Before/after the introduction of CCP mandate & margin rules
- Sub-period (1 year) regression

One shot regression

Data

t

Multi-regression

Data

t

35

35

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6. <u>Data</u>

❑ Sample selection process

  ■ Exclude the records <u>missing information</u> such as fixed rates, the identifiers of sellers, or those of buyers

  ■ Exclude the records for which we cannot find the corresponding <u>Bloomberg benchmark rate</u> to compute swap return

    • Swap return = each trade's fixed rates – Bloomberg benchmark rate

  ■ Exclude the records with a fixed rate that is outside 150 basis points from Bloomberg benchmark rate in accordance with *Cenedese et al. '20*

❑ Sample selection result

  ■ Originally, we have 736,841 trades reported to Japanese FSA

  ■ Eventually, we are left with **603,038** trade-level records

# 4. <u>Data</u>

❑ Transaction-level granular data

  ■ "FSA-Trade Repository (TR) data"

  ■ JPY-denominated spot fixed-to-floating IRS contracts executed between Apr. 2013 and Oct. 2021

    • >0.6 million records: Comparable observation in *Cenedese et al. '20*

  ■ All the JPY-denominated IRS contracts including at least one Japan-based entities (including Japanese branch of foreign entities)

  ■ ID of sellers and buyers, notional amount, maturity, and the fixed rates are available

  ■ Swap return = each trade's fixed rates – Bloomberg benchmark rate in accordance with *Cenedese et al. '20*
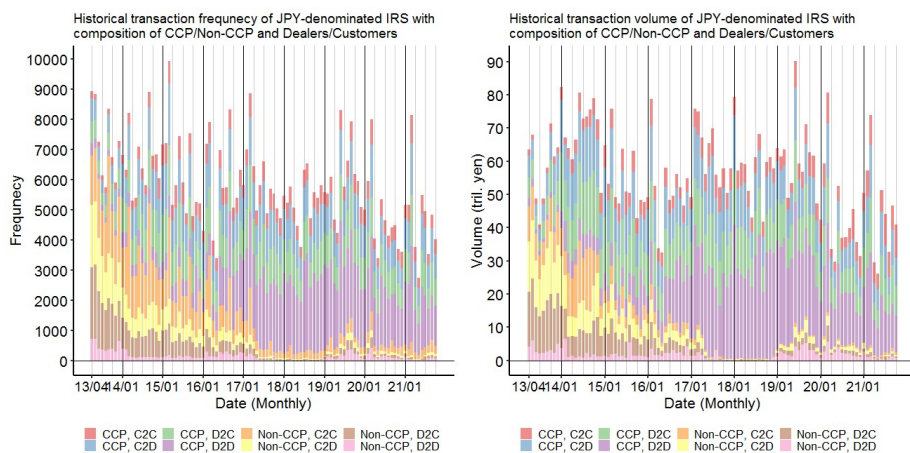
*Data

□ Transaction frequency & Volume
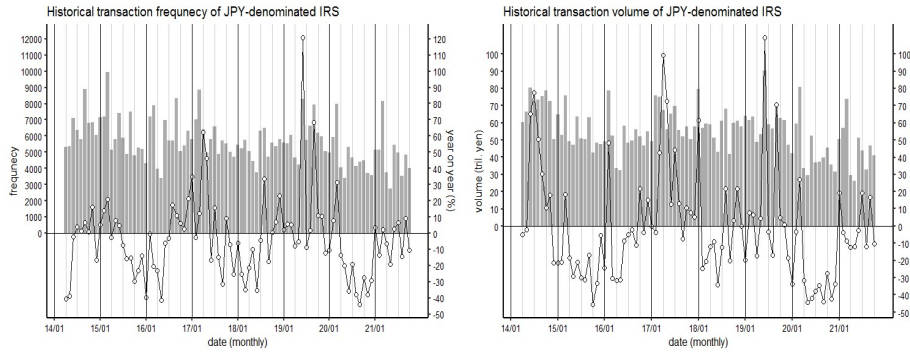
38

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*Data

□ Transaction frequency & Volume: Break down
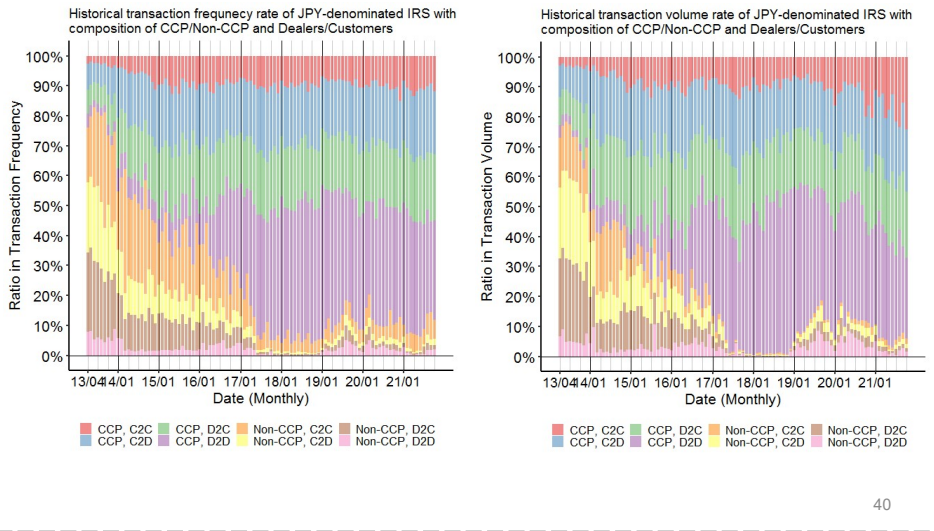

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*Data

☐ Transaction frequency & Volume: 100% Break down

Historical transaction frequency rate of JPY-denominated IRS with composition of CCP/Non-CCP and Dealers/Customers

Historical transaction volume rate of JPY-denominated IRS with composition of CCP/Non-CCP and Dealers/Customers

---

5-iii. Results: Consider *R/NR*

	NR_C
R_D	NR_D
R_C	

☐ *D/C* × *R/NR*: Margining rules?

- β of $Non\text{-}CCP_{i,s,b,t}$
  - OTC premia>0 only for the case without the margining rules

Buyer \ Seller	NR_D	NR_C	R_D	R_C
NR_D	4.612*** (1.319) [7.1%]	3.093*** (0.840) [14.3%]	2.134 (1.248) [3.3%]	1.615*** (0.551) [1.2%]
NR_C	0.756* (0.434) [14.1%]	0.642** (0.311) [14.4%]	-0.477 (1.240) [1.5%]	-4.181* (2.047) [0.8%]
R_D	0.616 (0.887) [3.2%]	3.009 (2.136) [1.6%]	-0.325 (0.314) [14.5%]	0.749 (0.559) [7.8%]
R_C	0.099 (0.871) [1.2%]	-3.198 (3.867) [2.4%]	0.489 (0.499) [8.0%]	-0.412 (1.012) [4.5%]

7-iv. <u>Results: Experiment</u>
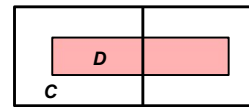
☐ Temporal widening in D2C

	All	D2C
	(1)	(3)
Non-CCP dummy	1.918***	2.964***
	(0.412)	(0.819)
Non-CCP dummy × IM mandate dummy 1	-1.141*	-2.335**
	(0.578)	(0.860)
Non-CCP dummy × VM mandate dummy 1	9.365*	16.491***
	(5.296)	(1.179)
Non-CCP dummy × VM mandate dummy 2	-1.270*	-1.762*
	(0.660)	(0.997)
Non-CCP dummy × IM mandate dummy 2	-5.065**	-4.477***
	(2.038)	(1.002)
Non-CCP dummy × IM mandate dummy 3	0.093	-0.420
	(1.391)	(2.034)
Non-CCP dummy × IM mandate dummy 4	-1.098	-1.557
	(0.711)	(1.109)
Non-CCP dummy × IM mandate dummy 5	-1.604***	1.315*
	(0.433)	(0.739)
Log-notional	-0.905**	-0.299***
	(0.392)	(0.103)
Maturity	-0.096*	-0.057***
	(0.048)	(0.019)
Day, (Month × Seller ID × Buyer ID) FE	Yes	Yes
$\overline{R}^2$	0.61532	0.38650
Obs	603,038	150,911

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Session 12
BrainKorea21 Four Seminar

The Cleanup of US Manufacturing through Pollution Offshoring[*]

JAERIM CHOI[†] JAY HYUN[‡] GUEYON KIM[§] ZIHO PARK[¶]

University of Hawai'i HEC Montréal UC Santa Cruz National Taiwan University

This version: July 2023

Abstract

We study the role of offshoring in understanding long-run environmental impacts of trade liberalization and the cleanup of US manufacturing. Leveraging detailed establishment-level data and a change in US trade policy toward China in the early 2000s, we show that US establishments decrease toxic emissions in response to a reduction in trade policy uncertainty. Emission abatement is more pronounced for establishments that are more likely to engage in offshoring activities. We provide comprehensive evidence that supports the pollution offshoring hypothesis: US manufacturers, especially those that emit pollutants intensely, source from abroad and establish more subsidiaries in China following the event.

JEL Codes: Q53, Q56, D22, F14

Keywords: Manufacturing Cleanup, Pollution Offshoring Hypothesis, Pollution Haven, Environmental Regulation, Environment and Trade.

Session 13
Financial Markets

How Does Stock Liquidity Affect Default Risk?

Eujin Kang

Seoul National University

November, 2022

Abstract

Firms with greater liquidity experience decreased default risk through firm policy deci-
sions. Specifically, empirical evidence in this paper suggests that bankruptcy risk is mitigated
for liquid firms due to less risky investment choices of research and development expenditures
and conservative tax avoidance activities. I identify these channels by exploiting exogenous
liquidity provisions through decimalization event and S&P index additions. Results from both
event studies provide support for the aforementioned firm policy channels, and are robust to
other possible explanations and endogeneity.

Regime-Switching Macro Risks
in the Term Structure of Interest Rates[*]

Sun Ho Lee[†]
Kyu Ho Kang[‡]

August 2023

Abstract

A key question to estimate and understand term premium (TP) movements is to identify which macro variables affect TP and whether their effects are time-variant. To address these questions, we propose a new macro-finance arbitrage-free Nelson-Siegel model with regime shifts. In the model, two observable macro factors (i.e., real activity and inflation expectation) widely used in previous studies are considered, and each factor is allowed to have a regime-switching effect on the market price of risks. Further, we estimate the proposed model using a Bayesian MCMC method, and compare it with the resulting restricted models in terms of marginal likelihood. This empirical study using the U.S. yield curve and macroeconomic data reveals that the real activity variable has an unspanned risk and its influences on TPs substantially differ across regimes, where the estimated regimes coincide with the NBER business cycles. In other words, the unspanned real activity risk is more pronounced during expansions than recessions. (JEL classification: E43, G12, C11)

Keywords: yield curve, term premium, Bayesian estimation, monetary policy

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Effect of sustainability policies on investments in the emerging markets

Teshaboev Sarvar

The green bond market has been growing rapidly worldwide since its debut in 2007. We present an empirical study on the announcement returns and real effects of green bond issuance by firms in largest emerging market, China. The economic magnitude of the Chinese green bond pricing premium is greatly larger than that of an international green bond documented in prior studies. Despite the fact that US holds top position with most issued bond amount, China is remaining largest amount issuer for several consequent years. Comparing to growth rate of climate bonds initiative between Supranationals and corporates, corporate green bonds lost its trend with recent economic conditions of last half decade such as Covid and global energy crisis, 2022 showing slight decrease in annual green bond issuance amount. Energy crisis triggered high inflation and other difficulties in world economy, which in turn slowed increase of corporate green bonds initiative. In this research, we are focusing on how corporate green bond issuance is affecting company's financial status in recent economic conditions, especially from investors' point of view. After compiling a comprehensive green bond dataset, we analyze how green bond issuance affect stock's price movement and liquidity. Comparing to stock's prior price movement, we document that stock prices positively respond to green bond issuance. However, we do not find a consistently significant premium for green bonds, suggesting that the positive stock returns around green bond announcements are not fully driven by the lower cost of debt. Moreover, stock liquidity significantly improves upon the issuance of green bonds. Overall, our findings suggest that the firm's issuance of green bonds is effective tool to attract institutional investors and beneficial to its existing shareholders in emerging markets.

The impact of financial reform policies on enterprises

Yichen Liu (Jiujiang Univ., China)

Climate change and environmental issues have become major global concerns, prompting widespread attention from the international community on carbon emissions and sustainable development. With the rapid advancement of industrialization and urbanization, corporate carbon emissions have become one of the main reasons for the rise in atmospheric greenhouse gas concentrations.

Green financial policies are seen as a key tool to achieve carbon reduction and promote the transition to a low-carbon economy. As one of the world's largest carbon emitters, China has continuously strengthened its green financial policy initiatives to address climate change and environmental challenges. In 2017, the Chinese government launched green financial reform policies aimed at guiding funds to encourage high-energy-consuming enterprises to adopt environmentally-friendly and low-carbon business practices. The fundamental purpose of these policies is to incentivize businesses to reduce carbon emissions, promote industrial structure upgrades, and ultimately achieve the dual goals of economic growth and environmental protection.

This study uses financial data from companies listed on the Chinese A-share market from 2017 to 2022 to explore the impact of green financial reform policies on the carbon emission performance of high-energy-consuming enterprises. We employ a difference-in-differences model to analyze the differences between high-energy-consuming and non-high-energy-consuming enterprises in reform pilot areas and non-pilot areas. Preliminary empirical results indicate that the dummy variable for the pilot areas is significantly positive, suggesting that the carbon emission performance in the pilot areas might be relatively higher. Meanwhile, the dummy variable for high-energy-consuming enterprises and the interaction term of the two dummy variables are both significantly negative, indicating a significant improvement in the carbon emission performance of high-energy-consuming enterprises in the pilot areas. When we further introduce control variables, the aforementioned results remain robust.

Overall, the findings of this study suggest that the green financial reform policies have, to some extent, reduced the carbon emissions of high-energy-consuming enterprises, especially in the reform pilot areas. This provides valuable insights for policymakers and further attests to the effectiveness of green financial policies in encouraging enterprises to reduce carbon emissions.

Following the Leader?
Size-Dependent Herding in the US Equity Fund Market

Sei-Wan Kim (Ewha Womans University)

Young-Min Kim(Kangwon National University)

Abstract

We examine the herding behavior of individual investors on institutional investors in the US equity fund market. Based on a theoretical background, our empirical investigation determines that the significant herding behavior of individual investors is based on the trading size of institutional investors. In particular, we find evidence that herding in the US equity mutual fund market is triggered by the largest selling and buying of institutional investors. This indicates that the presence of asymmetry in individual investors' herding behavior depends on the size of institutional investors' trade. Further, we find that herding in the US equity fund market is related to market-wide risk aversion, which is intensified in institutional investors' big selling.

Session 14
Young Scholars Consortium

Asymmetric relationship between news sentiment and stock indices:

Differences between U.S. and South Korean Markets

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[Preliminary Draft] Please do not cite or circulate.

Abstract. We investigate whether there is a long-run asymmetry in the relationship between news sentiment and stock indices in U.S. and South Korean markets. Monthly news sentiment index data published by FRB San Fransisco and Bank of Korea are adopted in combination with the nonlinear autoregressive-distributed lag (ARDL) approach of Shin et al. (2014) while controlling for macroeconomic variables. We show that the long-run relationship between positive news sentiment and U.S stock markets is statistically more significant than that of negative news sentiment, whereas no such asymmetry is found in South Korean stock market. The result persists even when we examine the cross-market relationship between news sentiment and stock indices.

Military Alliance, Geopolitical Risks, and International Energy Trade

Sunjin Kim[*], Songyi Paik[†]

June 25, 2023

Highlights

· Military alliances promote international energy trade in oil, coal, and natural gas.

Abstract

Energy is a key source of economic activity due to its involvement as a basic input in various production and consumption activities. Hence, establishing stable partnerships with trading partners allows long-term energy security. This paper examines the relationship between military alliances and energy exports and imports for the period 1993-2018 among 192 countries. We narrow the energy trade down to six different groups by energy resources: crude oil, refined oil, coal, natural gas, natural uranium, and enriched uranium. Using a gravity model in multiplicative form, we find that military alliances have a positive impact on the trade of oil, coal, and natural gas. This result implies that when a conflict with a country's trading partners is unlikely to occur, the state is enabled to procure stable and reliable energy resources.

Keywords: Energy Trade, Military Alliance, Geopolitical Risks, Nonrenewable Energy, Energy Security

JEL codes: Q37, Q43

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Decomposing the options order imbalance: Arbitrage and informed trades

Jaeram Lee, Doojin Ryu, Heejin Yang, and Jinyoung Yu[†]

January 2023

Abstract

We suggest a novel approach for decomposing an options order imbalance according to trading motives into two components: one that contains arbitrage trading and one that consists of other types of trades such as informed trading. As expected, the proportion of the former component increases when arbitrage opportunities in the options markets increase and decreases when the markets are favorable for informed trading. The options order imbalance decomposition shows that arbitrage trading has contracted as liquidity dropped after the market reform. Domestic institutions holding sufficient amounts of stocks significantly respond to mispricing between options and stock markets, whereas foreign institutions take an arbitrage between options and futures markets. Domestic retail investors cannot significantly participate in arbitrage trading. Further, our approach reveals that arbitrageurs are reluctant to trade near market openings and closings to avoid unnecessary price fluctuations.

Keywords: Arbitrage trading; Informed trading; Options; Order imbalance; Put-call parity

JEL Classification: G11, G14, G18

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Dynamic legislative cosponsorship network formation model

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Abstract

This study investigates the determinants shaping a dynamic legislative cosponsorship network. We conducted an in-depth analysis using an extensive dataset derived from the 20th Korean National Assembly, where a minimum of 10 cosponsoring lawmakers is requisite to introduce a bill. The richness of our dataset enables employing dynamic models for analysis. Our findings reveal that the cosponsorship network exhibits a path dependent nature, with both the initial value and lagged variables playing pivotal roles in network formation. Furthermore, when lawmakers share common legislative interests, such as representing the same region or serving on the same committee, it leads to an augmented probability of cosponsorship and an increase in the weight of the cosponsorship.

Keywords : dynamic network formation; path dependence, cosponsorship network; cooperative behavior; partisanship; legislative process

A Dynamic Model of Governmental Venture Capital

Hyun Joong Kim[1]

There has been a lack of consensus over the efficiency and underperformance of governmental participation in venture capital industries relative to private investments. This paper provides a theoretical explanation of the mixed empirical findings on government-backed venture capital (hereafter, GVC) inefficiency through a dynamic model of a venture capital-backed startup under various forms of governmental participation. The paper shows that how the public-private partnership is structured within a startup completely determines its investment decisions and outcomes: either (i) socially optimal but economically suboptimal ones under active GVC roles or (ii) economically optimal ones under a collaboration between governmental and private investors under relatively passive GVC roles.

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Session 15
Special Lectures on Financial Derivatives

Yesterday's Tomorrows: Past Visions of Future Financial Markets.

Robert I. Webb

McIntire School of Commerce
University of Virginia

27 October 2023

The Future of Derivative Markets

- It is easy to imagine that the present—yesterday's tomorrow-- was always the future expected in the past.

The Future of Derivative Markets

- Yet, what we now accept as the normal state of affairs--the present-- was not the only possible outcome that could have come to pass nor was it often the most commonly expected one.

- What is now considered "inevitable" –when viewed from the vantage point of 20/20 hindsight---was often not immediately embraced or accepted.

The Future of Derivative Markets

- In order to understand where we are going it is important to understand where we have been and how we got there.

The Future of Derivative Markets

- I want to discuss some past visions of the future of financial markets, in general, and derivative markets in particular as seen by academics, practitioners and policymakers at various points in time.

The Future of Derivative Markets

- I have been fortunate to have had a catbird seat to witness some of these changes as a student, researcher, trader, and from my stints at the US Commodity Futures Trading Commission and the Chicago Mercantile Exchange (where I designed new financial futures and option contracts and later traded them) as well as at the World Bank, and as the former Editor-in-Chief of the *Journal of Futures Markets*.

The Future of Derivative Markets

- Most of you have always lived in a world where exchange traded derivatives on financial assets existed.

The Future of Derivative Markets

- Many of you have always lived in a world where interest rate swaps and other Over the Counter (OTC) derivatives were important.

The Future of Derivative Markets

- Many of you have always lived in a world where exchange traded derivatives on energy, in general, and crude oil, in particular existed and were important.

The Future of Derivative Markets

- Some of you have always lived in a world where large Asian financial and commodity futures markets existed and were important in the global price discovery process.

- Yet, this was not always the case.

Yesterday's Tomorrow: 1972

- Last year, 2022 marked the 50th anniversary of the development of the first successful financial futures contracts.
  - May 16, 1972—trading on FX futures begins on the International Monetary Market in Chicago.
- FX futures were introduced earlier but failed.
  - April 23, 1970—International Commercial Exchange—New York
- Reason: Bretton Woods Agreement collapsed.

Yesterday's Tomorrow: 1973

- This year, marks 50 years since the successful introduction of exchange traded equity options.
  - On April 26, 1973, options trading in 16 listed stocks began on the Chicago Board Options Exchange. In 2021, CBOE was the 6th largest derivatives exchange in the world.
- Just 911 option contracts traded on opening day. Only call options were allowed to trade. Today, exchange traded equity options are an integral part of financial markets.

Yesterday's Tomorrow

- What did the future look like in the past? Specifically, what did it look like for exchange traded equity options?

- Past worries:
  - A successful options market would cause trading volume on the stock market to dwindle as people traded options instead of stocks.
  - Put options would push down stock prices. The SEC prohibited trading puts for almost 4 years.

Futures Option Markets

- It is important to note that exchange traded options did not begin with exchange traded equity options.

- For instance, options on futures ("privileges") were common on U.S. commodity futures markets over a century ago.

- However, trading in "privileges" (futures options) was subsequently prohibited and then re-allowed in the 1980s.

Fiftieth Anniversary of the Black Scholes Article on Option Pricing

- 2023 also marks the 50th anniversary of the publication of the seminal article by Fischer Black and Myron Scholes on option pricing.

- The article was published in the *Journal of Political Economy* in May 1973.

  - Black, Fischer, and Myron Scholes, "The Pricing of Options and Corporate Liabilities." *The Journal of Political Economy*, Vol. 81, No. 3 (May–June, 1973), pp. 637-654

Fiftieth Anniversary of the Black Scholes Article on Option Pricing

- Two facts are important to remember about the Black-Scholes article.

- First, the article was rejected at several journals it was sent to. This says something important about the editorial and review process. *The editorial process is measured with error*. Potentially important papers are sometimes not *initially* seen as such. Editors are worried about making Type 2 errors.

Fiftieth Anniversary of the Black Scholes Article on Option Pricing

- Second, the critical insight that Fischer Black and Myron Scholes had was an *economic* insight and not a *mathematical* one.

- Namely, they realized that a perfectly hedged security position would earn the risk-free rate. Their research was built on, and extended, earlier research on option pricing.

- Other researchers, such as James Boness [1962], came very close to the Black Scholes model, albeit Boness had a discrete time model.

Fiftieth Anniversary of the Black Scholes Article on Option Pricing

- Indeed, Galai [1978] contends that "the only difference between the evaluation formulas of Boness and Black and Scholes" is that in the Boness model "r is rate of expected appreciation in the of stock price, per unit time," while in the latter, r is the short-term risk- less interest rate."

- Boness, J. A. "A Theory and Measurement of Stock Option Value." Ph.D. Dissertation, University of Chicago (March 1962).
- Boness, J. A., "Elements of a Theory of Stock-Option Value," *The Journal of Political Economy*, Vol. 72, No. 2 (April 1964), pp. 163-175.
- Galai, D., "On the Boness and Black Scholes Models for Valuation of Call Options," *The Journal of Financial and Quantitative Analysis*, Vol. 13, No. 1 (March 1978), pp. 15-27.

Black-Scholes and Option Markets

- The seminal article by Fisher Black and Myron Scholes played a crucial role in stimulating the use and study of options.

- In a testament to the power of the wisdom of (trading) crowds, later studies showed that competitive markets reached similar prices even before the Black Scholes model was developed.

  – Moore and Juh [Journal of Finance, 2006] report that Johannesburg Stock Exchange "warrant prices were surprisingly accurate" during 1909-1922.

Lessons

- *Innovations in practice* may precede discoveries in *academic theory*. For instance, practitioners had to price options before academics determined how options should be priced.

- It also means that other option markets that existed prior to the creation of CBOE offer a natural experiment of how closely early option transaction prices came to their theoretical values.

- Finally, it is important to remember that even path-breaking research is often built on the contributions of earlier researchers.

The Initial Reaction to New Derivative Markets

- It is tempting to believe that all currently successful financial futures were an immediate success.

- However, they were not always immediately embraced or successful.

The Initial Reaction to New Derivative Markets

- The Chicago Board of Trade introduced Treasury bond futures on August 22, 1977.

- The 30-year U.S. Treasury bond futures market traded around 4,000 contracts a day until October 1979 when the Federal Reserve switched to targeting the quantity of money rather than interest rates.

- Over 658,000 contracts were traded on 6 October 2023 following the U.S. jobs report.

The Initial Reaction to New Derivative Markets

- The ensuing volatility in interest rates created a need to manage interest rate risk exposure.
- This policy action unintentionally made interest rate futures markets exceptionally successful.
- Volatile financial markets penalized those who failed to avoid risk by not hedging.

Yesterday's Tomorrow: 1981

- It has been almost 34 years since the first interest rate swap was transacted in 1981 between the World Bank and IBM.
- This market quickly took off.
- Eurodollar futures took longer to become successful.

Yesterday's Tomorrow: 1980s

- Chicago dominated financial futures and would have dominated U.S. equity options trading were it not for a SEC desire to regulate multiple option exchanges by dividing potential stocks for listed options among multiple exchanges.

Yesterday's Tomorrow: 1980s

- The Chicago futures exchanges recognized the growth potential in financial futures markets outside the U.S.A. They took two different approaches.
  - Evening pit trading to accommodate foreign order flow--CBOT
  - Alliances with non-US markets--CME

Yesterday's Tomorrow: 1982

- The London International Financial Futures Exchange was formed in 1982. It was an open outcry market.

- By 1996, after mergers with the London Traded Options Market and the London Commodity Exchange, it was the dominant futures market in Europe with its most important contract being German bund futures.

Crude Oil Futures

- 2023 also marks the 40th anniversary of the introduction of crude oil futures by the New York Mercantile Exchange (NYMEX).

- Heating oil futures and gasoline futures had already been introduced and were successfully trading.

Crude Oil Futures

- However, many observers were skeptical whether the NYMEX could achieve similar success given that the "Seven Sisters" dominated the spot oil market at the time.
- Some industry participants argued that they didn't need crude oil futures to hedge and that they wouldn't use the new futures contracts.
- They were wrong

Financial Market Competition

- At the time, futures exchanges viewed energy as the last great untapped commodity market.
- Both the Chicago Board of Trade (CBOT) and the Chicago Mercantile Exchange (CME) sought to wrest control of the energy markets from the NYMEX.
- They failed.

Financial Market Competition

- I remember the CME's challenge to the NYMEX well as I was on a local on the CME trading floor at the time.

- We were encouraged to support new contracts by spending time trading them.

- Opening day was broadcast live.
  - Only unleaded gasoline and heating oil were opened for trading.

Financial Market Competition

- Why did the NYMEX –an exchange whose most important futures contract less than a decade earlier was Maine potatoes--succeed and the far larger CBOT and CME fail?

- Was it a lack of resources?

Yesterday's Tomorrow: 1988

- 2022 marked the 35th anniversary of the U.S. stock market crash of October 19, 1987.
- 2023 marks the 35th anniversary of the official Brady Commission report which examined the nature of the crash.
- At the time, some observers blamed index arbitrage and portfolio insurance for the crash.
- However, while index arbitrage was not the culprit, the cause of crash remains unknown.

The 1987 Stock Market Crash

- The '87 Crash impacted how options are priced. After the crash deep out of the money option prices reflected the leptokurtic nature of financial markets and the possibility of a crash.
- The '87 Crash stimulated research applying extreme value theory to financial markets.
- The '87 Crash also stimulated research on behavioral finance as the assumption of market efficiency was called into question

The Virtual Collapse of LTCM

- 2023 marks the 25th anniversary of the virtual collapse of LTCM in 1998. It was not a derivatives event per se but it did stimulate research on *liquidity risk* across markets.

- Interestingly, earlier examples of the failure of similar types of funds-- such as the 1994 collapse of Askin Capital and the loss of $640 million—failed to impact academic research on liquidity risk. This contains an important lesson for researchers.

Yesterday's Tomorrow

- Electronic trading dominates today's markets.

- Yet, the seemingly inevitable "electronic" future of futures trading took longer to dominate U.S. futures markets than expected.
  - Intex—an all electronic exchange failed—1984
  - When Globex was first introduced by the CME the Matif accounted for most of the trading volume.

- Options remain the last area where pit trading remains important in the U.S. though even here pit trading has decreased in importance.

Yesterday's Tomorrow: 1997

- For many years the all electronically traded Deutsche Terminboerse (DTB) had captured about a third of the bund futures market.

- In the Autumn of 1997, it captured about half of the trading volume with LIFFE capturing the balance. And LIFFE's share continued to fall.

- Electronic trading beat pit trading. This was the death knell for LIFFE bund futures.

Yesterday's Tomorrow: 1997

- The dramatic collapse of pit trading on the Matif and the rapid loss of market share in bund futures by LIFFE to the DTB sent a shockwave of fear to open outcry markets around the world.

- The end of open outcry trading was near.

- The Sydney Futures Exchange (now part of the ASX) started to phase out open outcry in 1997 and went fully electronic on November 15, 1999.

Yesterday's Tomorrow: 1998

- It has been 25 years since the all-electronically traded Deutsche Terminboerse (DTB) merged with the Swiss Options and Financial Futures Exchange to form Eurex.

- Electronic trading was the future. Eurex was the future. How long would pit trading in Chicago last?

Yesterday's Tomorrow: 2003

- It was 20 years ago that Eurex filed an application with the U.S. Commodity Futures Trading Commission to create a U.S. based electronic exchange. The objective was to compete directly with the largely pit traded Treasury futures contracts traded on the Chicago Board of Trade.

- Everyone knew that Chicago was doomed and Eurex USA would displace the Chicago Board of Trade (and eventually the Merc).

Yesterday's Tomorrow: 2004

- It was 19 years ago that Eurex USA started to trade in February 2004.

- Yet, a funny thing happened en route to Eurex USA's expected total domination of U.S. Treasury futures markets.

- 2004 was not 1997. The CBOT fought back with lower fees and electronic trading of its own.

- Eurex USA was defeated.

The Future of Derivative Markets

- Electronic trading lessens the need for numerous physical derivatives exchanges.

- However, transnational mergers are difficult in many jurisdictions—ask the SGX.

- Electronic trading has increased the demand for physical proximity to exchange servers to reduce (exchange) latency.
  - Frino, Mollica and Webb [2012] studied co-location on the ASX futures markets.

Yesterday's Tomorrow: 2008

- This September marks 15 years since the bankruptcy of Lehman Brothers during the depths of the Global Financial Crisis (GFC).

- Derivative exchanges worked well during the GFC. None failed.

- However, uncertainty about positions in OTC derivatives led to calls to change OTC derivatives trading.

Yesterday's Tomorrow: 2008

- Credit default swaps which by some accounts originated at JPMorgan in 1997 had grown to $62 trillion in notional value by the time of the GFC.

- Concern over the potential for OTC traded credit default swaps, in particular, to create systemic risk prompted calls for change.

The Future of Derivative Markets

- In September 2009 leaders of the G-20 nations agreed that: "All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end 2012 at the latest. OTC derivatives should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements."

Frozen Pork Bellies Futures 1961

- The Chicago Mercantile Exchange introduced futures trading on frozen pork bellies futures in 1961 to help merchants hedge their price exposure to this volatile commodity.

- This contract –which was introduced before the advent of financial futures—soon became emblematic of commodity futures markets.

- The 1984 movie, *Trading Places*, was initially going to be set in the pork bellies futures pit.

Frozen Pork Bellies Futures 2011

- The Chicago Mercantile Exchange delisted frozen pork bellies futures on 18 July.

- Why? Anemic volume as the exposure to price risk of frozen pork bellies dropped dramatically.

- Lesson: Futures contracts—like other financial innovations—arise to meet an economic need. When the need disappears trading in the innovation soon follows.

The Future of Derivative Markets: 2023

- As long as financial and commodity market prices are volatile, exposure to those price risks need to be managed.

- Derivatives securities offer a convenient way of doing so in most cases.

- However, one must distinguish between the future of derivative securities and markets and the future of derivative exchanges.

The Future of Derivative Markets: 2023

- The question naturally arises as to how many derivative exchanges are needed.

- Charles Kindleberger observed that the process of centralization is common in financial markets.

- Centralization of derivative exchanges can be hindered by political factors that preclude mergers of exchanges and limited competition across exchanges for the same commodity.

Potential Challenges

- Some observers argue that the large market capitalization of futures exchanges stems from a competitive advantage they enjoy from the lack of fungible futures contracts.

- Witness the February 5 and 6, 2008 reaction of the CME stock price to the announcement that the Antitrust Division of the U.S. Department of Justice suggested a separation of the clearinghouse from futures exchanges.

The Future of Derivative Markets: 2015

- The academic view of what is good for markets is not always what the market adopts.
- Derivatives exist because they are needed. They facilitate price discovery and risk transference.
- As long as prices are volatile the outlook for derivatives markets will remain strong.

Questions

- I am happy to answer any questions you may have.

Derivative instruments, insider trading and manipulation

Jonathan A. Batten
Royal Melbourne Institute of Technology, Australia

2023 SKKU-KAFE International
Conference on Finance and Economics
October 25-27, 2023
Sungkyunkwan University, Seoul, Korea

Part II:
Insider trading and strategies using derivatives

- Background
- Summary of insider-trading issues and theory
- Overview of relevant derivative markets: stock markets and foreign exchange
- Insider trading-definitions and examples of opportunistic trading
- Simple trading strategies that have been used for insider trading
    - Foreign exchange markets: Kamay and Hill and strategic insider trading
- Concluding comments and lessons for markets
- https://www.sciencedirect.com/science/article/pii/S0929119920302625
- https://www.sciencedirect.com/science/article/pii/S0929119921000110

Insider trading: Background

- Financial markets are well known for their information asymmetries- and trading reflects attempts at price discovery by participants
- Insider traders act strategically not spontaneously and choose specific trading times to mask their activities
- Enforcement has also shifted from regulatory surveillance to legally required whistle-blowing by market participants to authorities
- Many whistle-blowers seek immunity from prosecution: do means justify ends?

Context: The Debate on Insider Trading

- Some economists and legal scholars (such as **Henry Manne, Milton Friedman, Thomas Sowell, Daniel Fischel, and Frank H. Easterbrook**) have argued that laws against insider trading should be repealed.
- They claim that insider trading based on material non-public information **benefits** investors, in general, by more quickly introducing new information into the market.
- Friedman (a Nobel Laureate) said: "You want more insider trading, not less. You want to give the people most likely to have knowledge about deficiencies of the company an incentive to make the public aware of that."
- Friedman did not believe that the trader should be required to make their trade known to the public, because the buying or selling pressure itself is information for the market.

Context: The Debate on Insider Trading

- Do insiders act opportunistically on the private information that they receive?

- They may try to leverage their information to maximise the economic benefits- e.g., using options

- Detection is often based on investigation of both volume and price effects:
  - identifying above trend trading volume, especially on exchange traded derivatives
  - Unusual price effects. Detection using event study techniques and determination of abnormal returns prior to announcements

- Most prosecutions arise in stock markets

- Regulators have shifted the task of identifying suspicious trades to market participants (especially in OTC markets) and so are reliant on whistle-blowers

Context: The Debate on Insider Trading

- Key models of market microstructure show that additional source of uncertainty (apart from random new information) can work in favour of insiders or those that have an incentive to gather and process information (informed traders).

- Results in a number of recent empirical studies on illegal insider trading in stock markets **are consistent with the notion that insiders act strategically and tend to "hide" among the so-called "noise traders"**.

- This is different to **stealth trading** where insiders (institutions) trade gradually to maximise the profit from their trades). For example, you need to buy100 but buy carefully over the trading day in small lots.

- "Although the majority of trades are small, most of the cumulative stock-price change is due to medium-size trades. This evidence is consistent with the hypothesis that informed trades are concentrated in the medium-size category, and that price movements are due mainly to informed traders' private information".

- https://doi.org/10.1016/0304-405X(93)90029-B

Context: The Debate on Insider Trading

- These case-studies provide evidence on why insider trading **should** be illegal
- Arguments about it improving market efficiency etc. simply don't stack up
    - Markets may need diversity, but information (knowledge) access is invariably asymmetric
    - Impediments to market entry ensure markets are not frictionless and access is costly
    - The economic payoffs from exploitation of asymmetric information are potentially enormous (etc.)
    - Some people get caught- but had they been more careful they would still be trading!

Context: The Difficulty of Trading and Making Money in an Interconnected World

- Financial markets are interconnected and shocks from one region affect those in others
- Local or idiosyncratic information may be superseded by news from an exogenous events (e.g. Tsunami; Fed interest rate decision; Trump winning the US Presidency)
- E.g. Foreign exchange markets trade currency pairs and so are affected by two separate local news as well as international news
- As former SEC commissioner Mary Schapiro put it about "insider trading," the "beauty of insider trading laws is the flexibility in interpreting them."
- "right to the point, it's no easy feat to divine the future direction of markets when armed with information that others lack….see the varied reactions to any bit of news. Perception is rarely uniform".
- https://www.forbes.com/sites/johntamny/2021/12/08/the-tragic-and-needless-destruction-of-raj-rajaratnam-price-giver-extraordinaire/?sh=1b77223944b8

THE WORLD'S
Top 25 Stock Exchanges

Here are the largest stock exchanges in the world, spanning $106T in total market capitalization in 2023.
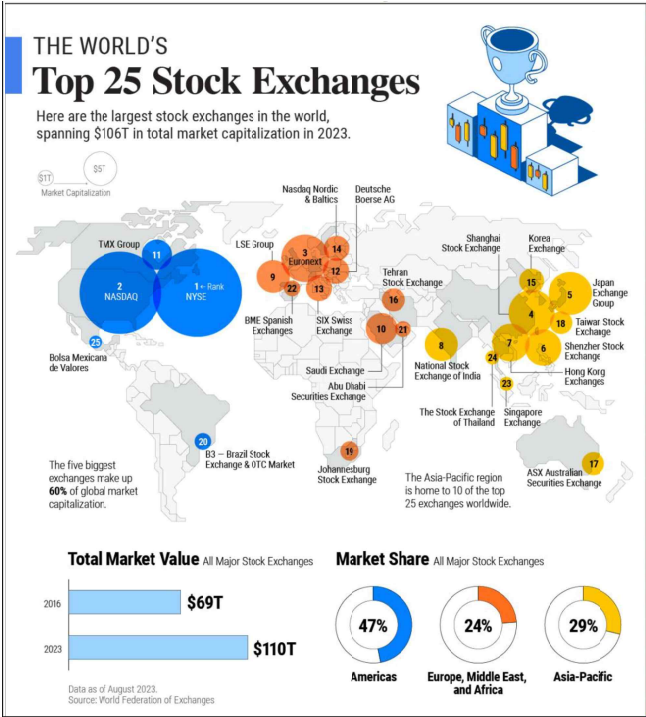
Insider trading in stock markets

Opportunistic insiders either

1. Buy or sell existing positions based on private information (Martha Stewart)

2. Buy or sell new positions based on private information (Galleon Group)

These trades may be leveraged using options, or the offsetting position may involve futures or forward contracts

Strategic insiders carefully time trades to avoid detection

Notional value of stock index futures trading worldwide
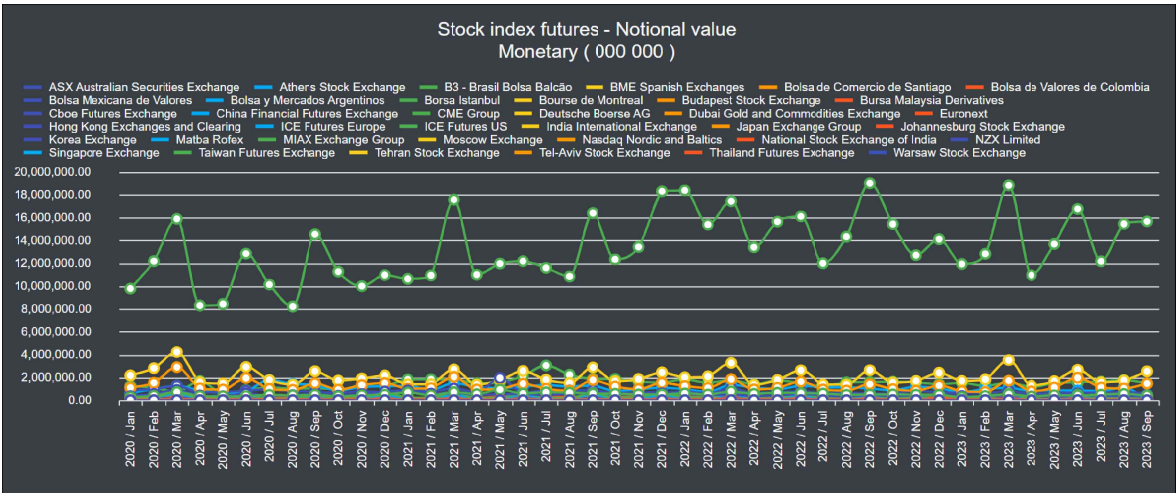
CME Group (Chicago) and Deutsche Boerse AG, World Federation of Exchanges Data

Insider trading in stock markets: Enforcement is costly

In 2020 alone, the US Securities and Exchange Commission (SEC

- employed approximately 1,300 staff members in its Enforcement Division
- committed $550 million in resources to investigating and prosecuting illegal insider trading.

Year-by-Year SEC Enforcement Statistics

Enforcement Actions by Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Broker-Dealer	94	75	89	67	109	70	112	134	121	166
Delinquent Filings	n/a	91	52	113	92	106	121	127	132	107
FCPA	n/a	n/a	n/a	n/a	n/a	n/a	* 20	15	5	7
Insider Trading	50	46	47	61	37	53	57	58	44	52
Investment Adviser/Investment Co.	97	87	79	87	76	113	146	147	140	130
Issuer Reporting and Disclosure	185	138	219	154	143	126	** 89	79	68	99
Market Manipulation	46	27	36	53	39	34	35	46	50	63
Securities Offering	60	61	68	115	141	144	124	89	103	81
Other	98	49	65	21	27	35	31	39	13	50
Total Enforcement Actions	**630**	**574**	**655**	**671**	**664**	**681**	**735**	**734**	**676**	**755**

* Prior to FY 2011, FCPA was not a distinct category and FCPA actions were classified as Issuer Reporting and Disclosure.

** Prior to FY 2011, this category included FCPA actions, which are now tracked as a distinct category.

Insider trading in stock markets

- The likelihood of insider trading is higher for stocks with more liquidity.
- Higher levels of market liquidity allow individuals to trade strategically and hide among other traders as well as earn larger profits from their information.
- The likelihood of insider trading is also higher for more material information as measured by market reactions to the information.
- https://sites.duke.edu/thefinregblog/2021/03/31/how-much-insider-trading-happens-in-stock-markets/

Insider trading in stock markets

- When the materiality of information is greater, it becomes more attractive for individuals to illegally trade as the potential profits are larger.

- For M&A, our research shows that the probability of insider trading is higher when the chances for information leakage are larger, such as deals with a large number of financial or legal advisors, and for stocks with larger levels of information asymmetry (greater information advantage of the insiders).

- All of these results are consistent with theories of rational crime, whereby potential offenders weigh the potential profits against the probability of detection and potential penalties.

- https://sites.duke.edu/thefinregblog/2021/03/31/how-much-insider-trading-happens-in-stock-markets/

Insider Trading: Martha Stewart: What is insider trading?

- On December 27, 2001, Martha Stewart sold all her 4000 shares in ImClone Systems Corp. ("ImClone") after her securities broker told her ImClone's president was trying to sell all his ImClone stock and one of his family members sold all her stock.

- The next day, ImClone announced that the Food and Drug Administration had refused ImClone's Biologics Licensing Application for approval of the cancer drug Erbitux.

- After this press release, ImClone's stock declined from $55.25 to $45.39 (she saved about 50,000).

- Martha Stewart herself was not an insider of ImClone since she had no corporate position with ImClone, whether as officer, director or employee

- The DOJ indicted Martha Stewart for conspiracy to obstruct justice in the course of the investigation and for making false statements but she wasn't charged with insider trading

The
Economist ≡ Menu   Weekly edition   The world in brief   🔍 Search ⌄

Business | Face Value

Cooking Martha's goose

The Martha Stewart scandal may cripple a media empire built on an image of perfection

Sep 12th 2002   ⤴ Share
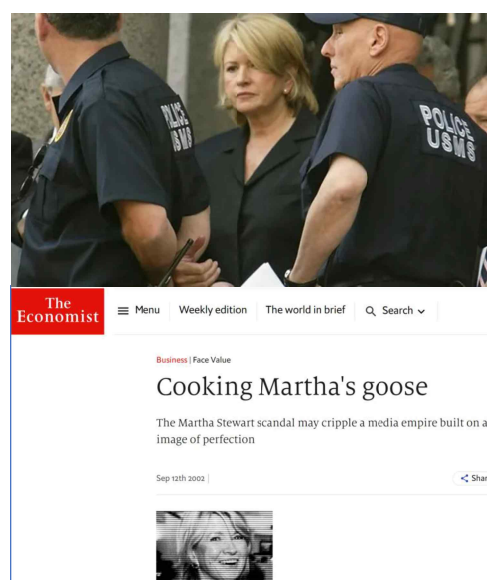
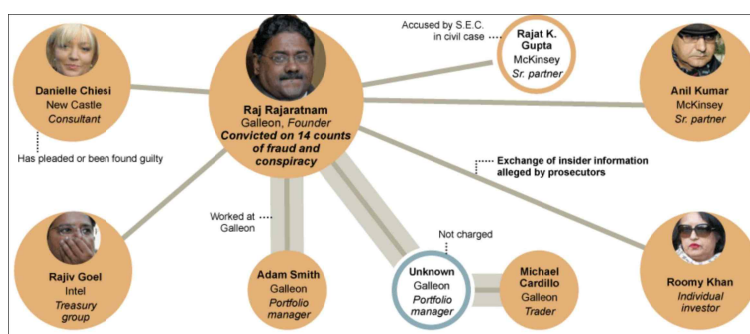# Insider Trading: Martha Stewart: What is insider trading?

Issue: The focus of the prohibitions on insider trading should be the actual use of the material nonpublic information to trade in securities and not any information which may be conveyed by the insider (or misappropriator's) trade.

- For example, if a trader believes that the person placing the order has special knowledge or information on which the trade is based.

- The trader does not know the reasons for the trade, just the existence of the trade itself.

- Anyone piggybacking on an insider's trade would not be knowingly participating in an insider's breach of duty.

Grzebielski, Ray J. (2007) "Why Martha Stewart Did Not Violate Rule 10b-5: On Tipping, Piggybacking, FrontRunning and the Fiduciary Duties of Securities Brokers©,"Akron Law Review: Vol. 40 : Iss. 1 , Article 2. :http://ideaexchange.uakron.edu/akronlawreview/vol40/iss1/2

Insider Trading: Raj Rajaratnam and Galleon Group

- Rajat Gupta, the former managing director of McKinsey & Company, was convicted for passing confidential information to Raj Rajaratnam founder of Galleon Group a NY hedge fund.

- This information was used for trading on multiple stocks and often involved derivative instruments such as options.

- The use of options allowed for leveraged positions, magnifying potential gains.

- They profited from movements in stock prices and changes in the value of options based on their insider information.

- They were caught through wiretapped conversations where they discussed non-public information.

https://archive.nytimes.com/www.nytimes.com/interactive/2011/03/08/business/galleon-graphic.html?ref=rajrajaratnam

Insider Trading: Raj Rajaratnam and Galleon Group

- The US Securities and Exchange Commission (SEC) and the DOJ argued this was one of the largest insider trading cases.
- Gupta received a prison sentence (11-years) and a significant fine(150M).
- Preet Bharara, the government's attorney, argued in the case that Raj Rajaratnam had made approximately $60 million in illicit profits from inside information.
- Rajaratnam's conviction in fact falls into a larger post-recession crackdown on insider trading undertaken by the SEC and the US Justice Department, led by Preet Bharara
- https://www.ft.com/content/bb5fb31c-4cb0-11e9-8b7f-d49067e0f50d
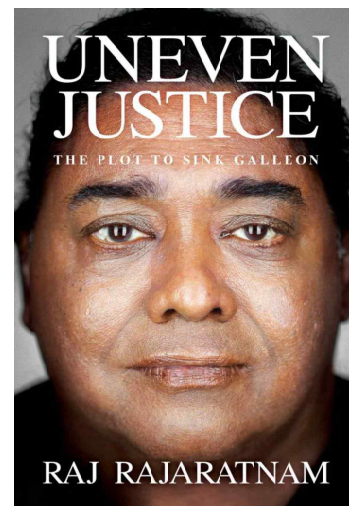
Insider Trading: Raj Rajaratnam and Galleon Group: Facts tendered in court documents

- On September 23, 2008, Warren Buffet agreed to pay $5 billion for preferred shares of Goldman Sachs.
- This information was not announced until 6 p.m., after the NYSE closed on that day. (Daily closing price changed from $125.05 to $133.00)
- Before the announcement, Raj Rajaratnam bought 175,000 shares of Goldman Sachs.
- The next day, by which time the infusion was public knowledge, Rajaratnam sold his shares, for a profit of $900,000.
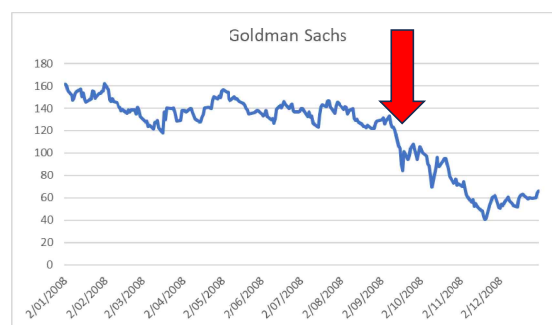
- Warren Buffet didn't pick the bottom
- prices fell due to system wide effects

Insider Trading: Raj Rajaratnam and Galleon Group: Facts tendered in court documents

- At the same time other financial stocks fell due to the GFC
- Rajat Gupta had called Rajaratnam immediately after the board meeting at which Warren Buffet's infusion had been announced, and told him of the money Goldman expected to receive.
- This information was material to the price of Goldman stock, thus inciting Rajaratnam to make the trade, something he would otherwise not have done.
- https://mail.sevenpillarsinstitute.org/case-studies/raj-rajaratnam-and-insider-trading-2/
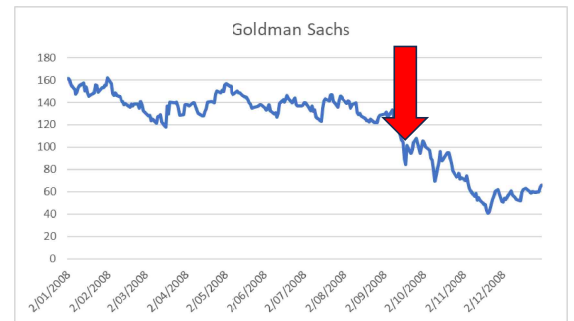
Warren Buffet didn't pick the bottom prices fell due to system wide effects

Turnover by currency in foreign exchange markets (OTC)
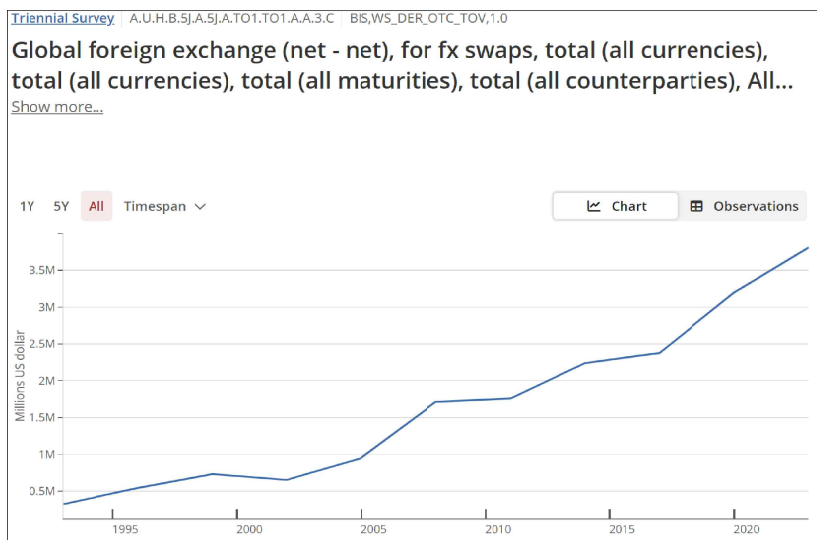
Turnover of OTC foreign exchange instruments
Daily averages in April 2022, in millions of US dollars

2022		Total	Spot transactions	Outright forwards	Foreign exchange swaps	Currency swaps	FX options
View: Value						Level: Level 4	
⌄ Total, "net-net:" basis		7,505,992	2,104,019	1,163,471	3,810,157	123,945	304,330
⌄ By currency							
	US dollar	6,638,790	1,806,765	993,631	3,457,230	115,920	265,244
	Euro	2,292,444	616,115	285,874	1,262,862	36,176	91,417
	Yen	1,253,236	438,969	182,902	557,255	14,395	59,715
	Pound (sterling)	968,139	231,023	136,089	560,164	17,759	23,104
	Renminbi	526,231	175,032	65,169	230,612	2,703	52,715
	Australian dollar	478,577	155,880	65,786	213,547	23,418	19,945
	Canadian dollar	465,776	128,230	61,804	252,317	6,865	16,559
	Swiss franc	389,700	88,328	45,256	244,552	2,248	9,316
	Other currencies	1,999,093	567,695	490,433	841,774	28,405	70,645

Highlights

- Role of USD, EUR and JPY
- OTC FX derivatives are a small segment of the market
- FX swaps the major segment (=spot +forward cash based)
- Currency swaps involve cash flows in 2 currencies (eg USD EUR) which are swapped for fixed or floating cashflows

Turnover by currency in foreign exchange markets (OTC)

Triennial Survey | A.U.H.B.5J.A.5J.A.TO1.TO1.A.A.3.C | BIS,WS_DER_OTC_TOV,1.0

Global foreign exchange (net - net), for fx swaps, total (all currencies), total (all currencies), total (all maturities), total (all counterparties), All...
Show more...

Highlights
- Changes in market concentration
- Financial crisis overall has had little impact on turnover

Turnover by currency in foreign exchange markets (OTC)

2022	📅	View: Value			Level: Level 4
	Total	Spot transactions	Outright forwards	Foreign exchange swaps	Currency swaps	FX options
Total, "net-net" basis	7,505,992	2,104,019	1,163,471	3,810,157	123,945	304,330
⌄ By currency						
⌄ By counterparty						
⌄ With reporting dealers	3,459,638	840,408	393,921	2,042,218	65,319	117,770
Local	1,122,507	253,534	112,930	692,152	25,828	38,063
Cross-border	2,337,131	586,875	280,991	1,350,066	39,491	79,707
⌄ With other financial institutions	3,621,588	1,113,742	674,794	1,619,980	53,127	159,943
⌄ With non-financial customers	424,701	149,869	94,756	147,959	5,498	26,617

- Most trading is cross-border, with reporting dealers (other banks)
- Other trading with financial institutions is about 10X non-financial

Insider trading in foreign exchange markets: Kamay and Hill

- In 2015, Lukas Kamay (NAB) and Christopher Hill (ABS) were convicted of the largest insider-trading scandal in Australian history.
- In 45 trades in the period between September 9, 2013 and May 5, 2014 they netted in excess of AUD 8m (approx. EUR 5m).
- They were trading pre-release economic data using margin FX contracts.
- In some trades they deliberately made losses. Kamay kept most of the profitable trades secret from his partner Hill.
- At the time of their activities, both NAB and ABS had strict hiring procedures and expected high ethical standards from their employees

Insider trading in foreign exchange markets: Kamay and Hill

- The conviction of Kamay and Hill (Australia) provides a natural experiment to investigate the actions and impacts of insider traders (not recent manipulation) in the foreign exchange markets, one of the least understood financial markets.
- It highlights many issues related to detection, prevention and prosecution of insider trading.
- It highlights the relationship between organisational culture, individual action and corporate accountability
- Firm and industry response needs to address the way insiders trade- not just try to stop them from trading
- https://www.cdpp.gov.au/news/insider-traders-kamay-and-hill-now-inside-gaol

Insider trading in foreign exchange markets: Kamay and Hill analysis of trading behaviour

1. BLS (2020) investigate abnormal returns and volatilities of returns on the spot AUD/USD as measured against the international portfolio of other major currencies (using both intraday and interday returns).

2. They shed light on the **strategic** decision-making behaviour of insiders when trading on their private information

3. They show insiders **will not** just act opportunistically

4. Organisation and regulatory implications suggest external monitoring may be more appropriate in OTC markets; importance of process and strategy interconnected and linked to core values

5. https://doi.org/10.1016/j.jcorpfin.2020.101818

Insider trading in foreign exchange markets: Kamay and Hill analysis of trading behaviour

- Hypothesis 1: An inside trader is more likely to trade on local private information when the price is more sensitive to local information and less sensitive to non-local (global) information.

- Hypothesis 2: An inside trader is more likely to trade on private information when the risk of confounding information disclosures is low.

- Hypothesis 3: An inside trader is more likely to trade during periods of high market t volatility

Insider trading in foreign exchange markets: Kamay and Hill analysis of trading behaviour

Figure 1
Plot of rolling estimate of 126-day beta of Australian dollar to world currency portfolio
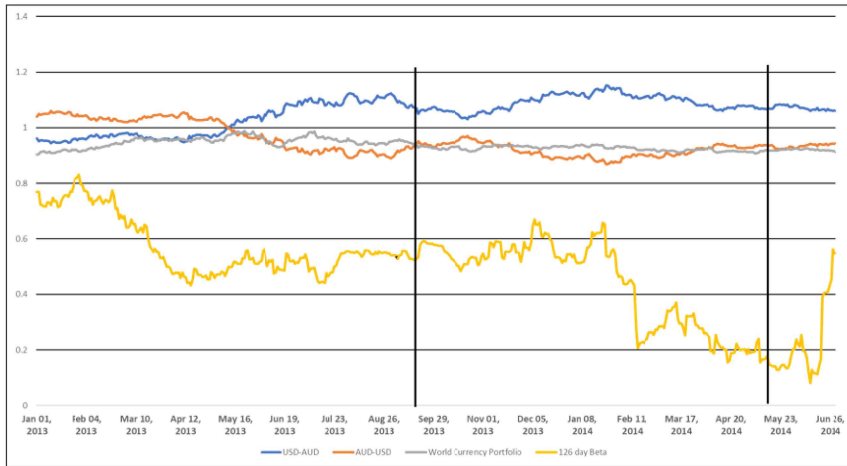
The figure shows that before Hill and Kamay began trading in September 2013, the AUD had fallen significantly against the USD.

In the same period, other world currencies (as shown by the currency portfolio) also depreciated against the USD, but much less so than the AUD.

Findings are consistent with Hypothesis 1 that inside traders are more likely to trade on local private information when the exchange rate is more sensitive to local information.

Insider trading in foreign exchange markets: Kamay and Hill analysis of trading behaviour

Appendix C
Foreign exchange market trading hours based on Coordinated Universal Time (UTC).

Financial center	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sydney (UTC+10)	X	X	X	X	X	X	X																X	X
Tokyo (UTC+9)	X	X	X	X	X	X	X	X	X															
Hong Kong (UTC+8)		X	X	X	X	X	X	X	X	X														
Singapore (UTC+8)		X	X	X	X	X	X	X	X	X														
London (UTC)									X	X	X	X	X	X	X	X	X							
New York (UTC-4)													X	X	X	X	X	X	X	X	X			

This table reports key financial center trading times as at August 8, 2013. The Australian Bureau of Statistics' (ABS) key release time for macroeconomic data is 11:30am Australian Eastern Standard Time, or 1:30am UTC. This time overlaps with the opening of all major Asian trading centers including Tokyo, Hong Kong and Singapore.

Timing is critical: AUD idiosyncratic information is only valuable for a very short time

Insider trading in foreign exchange markets: Kamay and Hill: Trade days

	ABS Release Dates January 1 2013 to June 30, 2014				RBA	67 Net News days	22^^ Total Trade days
ABS Data	Labour Force	Retail Trade	Building Approvals	CAPEX			
ABS Catalogue	6202	8501	8731	5625			
	17/01/2013	09/01/2013	10/01/2013			3	0
	07/02/2013	06/02/2013	04/02/2013	28/02/2013	05/02/2013	5	0
	14/03/2013	05/03/2013	04/03/2013		05/03/2013	3	0
	11/04/2013	04/04/2013	04/04/2013		02/04/2013	3	0
	09/05/2013	06/05/2013	02/05/2013		07/05/2013	4	0
	13/06/2013	03/06/2013	30/05/2013	30/5/2013	04/06/2013	4	0
	11/07/2013	03/07/2013	04/07/2013		02/07/2013	4	0
	08/08/2013*	05/08/2013*	30/07/2013	29/08/2013	06/08/2013	5	0^
	12/09/2013*	03/09/2013*	02/09/2013		03/09/2013	3	2
	10/10/2013*	01/10/2013*	02/10/2013*		01/10/2013	3	3
	07/11/2013*	04/11/2013*	31/10/2013*	28/11/2013	05/11/2013	5	3
	12/12/2013*	03/12/2013	02/12/2013*		03/12/2013	3	2
	16/01/2014	09/01/2014	09/01/2014			2	0
	13/02/2014*	06/02/2014*	03/02/2014*	27/02/2014*	04/02/2014	5	4
	13/03/2014*	06/03/2014*	04/03/2014		04/03/2014	3	2
	10/04/2014*	03/04/2014*	02/04/2014*		01/04/2014	4	3
	08/05/2014*	07/05/2014*	05/05/2014*	29/05/2014	06/05/2014	5	3
	12/06/2014	03/06/2014	02/06/2014		03/06/2014	3	0
24 Pre-Releases H to K *	9	8	6	1			
76 Relevant News Events	18	18	18	6	16		

- Insider trading must be carefully timed to minimise the risk from offsetting news events arising:
  - in Asia such as Japanese CPI
  - In Australia such as RBA Monetary Policy Announcements
  - But ideally, insider news should motivate Australian monetary policy direction

Insider trading in foreign exchange markets: Kamay and Hill: Trade days

ANOVA of excess returns and GKe around K&H trade and Australian News Events

126 Day Excess return (OO)	N	Mean	Standard Deviation	F-statistic	p-value	Adjusted R2
0	401	0.000165	0.00514	0.230	0.796	0.00000
1	45	0.000435	0.00445			
2	22	-0.000451	0.00415			
126 Day Excess return (CC)						
0	401	0.000210	0.00582	0.200	0.820	0.00000
1	45	0.000140	0.00543			
2	22	-0.000581	0.00381			
126 Day Excess return (OC)						
0	401	0.000124	0.00582	0.200	0.818	0.00000
1	45	0.000059	0.00547			
2	22	-0.000667	0.00378			
GKe spot USD-AUD						
0	401	5.979×10^{-6}	6.653×10^{-6}	9.580	0.000	3.540
1	45	10.45×10^{-6}	9.981×10^{-6}			
2	22	8.553×10^{-6}	5.667×10^{-6}			
GKe World Portfolio						
0	401	5.065×10^{-6}	5.112×10^{-6}	5.38	0.005	1.840
1	45	8.094×10^{-6}	8.094×10^{-6}			
2	22	4.609×10^{-6}	4.609×10^{-6}			

Notes: 2 = Kamay and Hill Trade off pre-release data; 1 = 1 Other News Event; 0 = No News Event; GKe is the Garman Klass estimator (1980)

- No significant difference in **excess returns** between AUD and the World portfolio on ABS news days (offsetting effects of non-A$ news)
- However, there is significant (higher) intraday **volatility** on AUD news days, although LOWER volatility on trade days
- This reflects careful timing in execution of insider news

Insider trading in foreign exchange markets: Kamay and Hill: Trade days

Significant difference in beta (lower) on trade versus other news days:
- This is consistent with trading on days where AUD is more sensitive to local factors (ABS news)
- This makes their news more valuable
- They traded on days when their news was important

This is suggestive of strategic trading- they didn't trade on every news event, or when they had inside news-only when they had a sure bet!
- High frequency analysis shows trading only on days of low volatility (ie more certainty of insider news impact).

Insider Trading Key Lessons: Markets

The conviction of Kamay and Hill (Australia) provides a natural experiment to investigate the actions and impacts of insider traders in the foreign exchange markets, one of the least understood financial markets.

- The actions of insiders in FX markets are similar to those in other markets- and existing theories can be applied
- It was not possible to find evidence of information leakage from the trades (the argument made for legal insider trading)
  - FX markets are unusual in that most trading is OTC and volumes are vast making identification of impacts difficult- detection software may be useless

Insider Trading Key Lessons: Markets

- It highlights many issues related to detection, prevention and prosecution of insider trading (and market manipulation).
- By doing this we shed light on the strategic behaviour of insiders when trading on their private information
- We show insiders will not just act opportunistically; not all information was acted on
- Market surveillance did not and could not detect the insider trades

Insider Trading Key Lessons: Firms and individuals

- Highlights the critical need for sound ethical rules within firms and effective laws and regulations to deal with insider trading (is more regulation the solution to trash on the train?)
- Ideally, from personal, firm, industry and societal level, these rules need to be
  - interdependent
  - inclusive
  - centred on a set of core values (which also echo regulations)
- This will allow for individual and corporate expression, while also adhering to clear and guiding ethical principles
- Importance of education to provide a baseline level of ethics training

Some Final Observations

- Ethical strategy drives other corporate actions and policy
- Strategy (including ethical strategy) can help transform a corporation
- But this requires policy to be implemented based upon this strategy- did this happen in the organisations considered?
  - How do we define, implement and monitor ethical behaviour?
  - Is it better to deter through good internal controls (firm driven) or rely on personal beliefs and external laws?

Model of Interconnected Institutional Framework
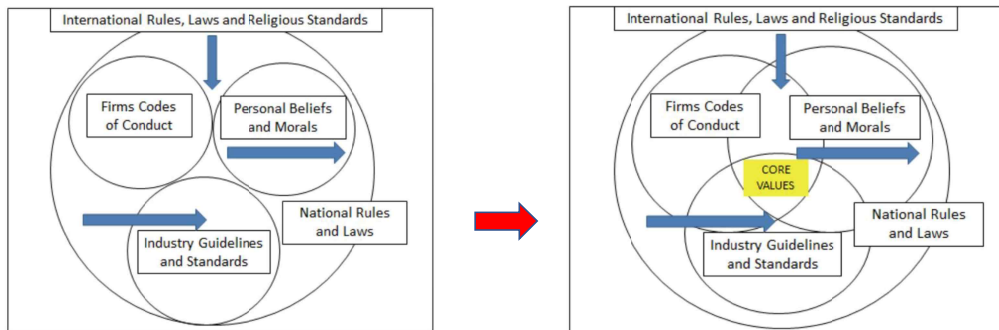
- BLS (JBE 2018) argue the need to evolve from top down, or independent, to an interdependent structure, based on core ethical and moral values with individuals taking responsibility for their own actions

- There cannot be an abdication of individual moral responsibility and a reliance on institutions and their artefacts

2023 SKKU-KAFE International Conference on Finance and Economics

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