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**REFORM AND PRICE
DISCOVERY AT
THE TOKYO STOCK
EXCHANGE**

From 1990 to 2012

**Keiichi Kubota and
Hitoshi Takehara**



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Reform and Price Discovery at the Tokyo Stock Exchange: From 1990 to 2012

Keiichi Kubota

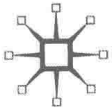
Professor of Finance, Chuo University, Japan

and

Hitoshi Takehara

Professor of Finance, Waseda University, Japan

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First published in 2015 by
PALGRAVE MACMILLAN®
in the United States—a division of St. Martin's Press LLC,
175 Fifth Avenue, New York, NY 10010.

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ISBN: 978-1-137-54040-9 EPUB
ISBN: 978-1-137-54039-3 PDF
ISBN: 978-1-137-54038-6 Hardback

Library of Congress Cataloging-in-Publication Data is available from
the Library of Congress.

A catalogue record of the book is available from the British Library.

First edition: 2015

www.palgrave.com/pivot

DOI: 10.1057/9781137540393

"Reform and Price Discovery at the Tokyo Stock Exchange: From 1990 to 2012 is a lucid account of the price discovery, reforms, risks, and liquidity of the Tokyo Stock Exchange. Written by experts in the field, Keiichi Kubota (a former PhD student of mine) and Hitoshi Takehara, this book will enrich the perspective of any professional, policy maker, and student of the TSE." —George M. Constantinides, Leo Melamed Professor of Finance, Booth School of Business, The University of Chicago, USA.

"The way we trade stocks has changed considerably over the past 20 years. While this has been a world-wide phenomenon, the changes in Japan have been especially noteworthy. I congratulate Professors Kubota and Takehara for their thorough analysis of the Japanese reforms and their effects on the microstructure and liquidity of the Japanese stock market." —Sheridan Titman, Professor, Walter W. McAllister Centennial Chair in Financial Services, McCombs School of Business, The University of Texas at Austin, USA.

"Professors Kubota and Takehara provide an in-depth and insightful analysis of how the Japanese reforms and deregulation have affected price discovery, liquidity, and risks in the stock market. This is an excellent reference book for professionals, policy makers, and students who are interested in the Japanese stock market." —Ravi Jagannathan, Chicago Mercantile Exchange/John F. Sander Professor of Finance, Kellogg School of Management, Northwestern University, USA.

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*To Kaoru Kubota and Kazuko Takehara
for their continuous moral support*

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Preface and Acknowledgments

This book's intention is to convey trading facts and statistics about stocks traded on the Tokyo Stock Exchange, utilizing variables used in financial economics. We hope to present an intuitive exposition and interpretation for a readership involved in finance theory and practice.

Our intended readers are primarily academics in finance, economics, and accounting, but also stock traders, portfolio managers, and financial analysts. Those who study return and risk behavior of Japanese stocks should also derive significant benefit from this book.

We try to identify how the Tokyo Stock Exchange (TSE), as a competitive world stock exchange, recovered from various financial shocks. We also focus on the effects of stock exchange regulation reforms, accounting standards, and corporate laws. We discuss how the TSE reemerged as an important source of corporate financing as well as a primary stock market for both institutional and individual investors. A full detailed analysis on the influence of high-frequency traders is yet to be conducted for the US and Japan, but we attempt to produce this for the TSE in relevant places in this book.

Although there are other stock markets in Japan that list smaller emerging firms, such as the Tokyo Mothers and the JASDAQ, in this book the focus is on the stocks traded on the First and Second Sections of the TSE. These two sections are composed of listed larger firms: multinationals and other corporations which have been important players in the Japanese product and service markets. We

hope we will be successful in our aim of providing readers with a new insight into the pricing structure of the Tokyo Stock Exchange.

We believe this book will also be readable without a deep knowledge of finance and market microstructure theory. We also hope we can assist readers to comprehend the impact of reforms and regulations upon the risk and return structure and price discovery process of the TSE.

As background information for readers outside Japan who are not familiar with trading and regulation, in Chapter 1 we present a bird's-eye view of the TSE's daily stock trading and the transmission mechanism of market trading information sent to investors. In Chapter 2 we summarize the regulatory changes surrounding TSE trading from 1990 to 2012.

In Chapter 3, we present the theory behind the use of the standard variables used in market microstructure; this is followed by a formal Appendix in which those variables are defined. The reader thus armed will be able to comprehend the more advanced concepts presented in the rest of the book.

In Chapters 4 to 6, we analyze how reforms affected stock returns and risk as well as stock liquidity and the degree of information asymmetry. The methodology used in Chapter 4 is from the traditional asset pricing framework with a longer observation period starting in 1977. In Chapters 5 and 6 we present some illuminating results observed during our sampling period. These changes can only be fully understood by correctly assessing the impact of regulatory reforms on trading rules and regulations, accounting disclosure rules, the new Companies Act of 2005, and the Financial Instruments and Exchange Act (FIEA) of 2006 (explained in Chapter 2).

Practitioners who are specifically interested in recent changes in pricing and information dissemination patterns of the TSE might prefer to read the first two chapters, skip Chapters 3 and 5, then read Chapter 4, to learn of our new findings on TSE stocks. This is to make readers more familiar with the basic pricing mechanism of stocks traded on the TSE; that is, changes in risk and return structure over time; market microstructure analyses of TSE stocks are covered in the Chapters 5 and 6.

For the general reader, we suppress detailed expositions of market microstructure research methodologies until Chapter 3. A novice in the market microstructure area with knowledge of a standard finance textbook and/or expertise in stock trading can read about Japanese capital market reforms in the first two chapters, and then learn about long-term changes in risk and return structures of TSE stocks in Chapter 4. With

a little more patience and study in Chapter 3, a reader should be able to absorb the essence of our new findings in Chapters 5 and 6. The Appendix of Chapter 3 will help the reader without going into detail about market microstructure disciplines.

In writing this book, we would like to thank the many people who gave us so much help. First of all, we thank the late Kazuyuki Suda, who conducted joint research with us and first suggested that we apply market microstructure concepts to accounting. He passed away too soon, at the age of 55 in May 2011, but we nevertheless consider his influence still strong in guiding our research. The paper for Chapter 5, which we presented at various international conferences in finance, accounting, and econometrics, was initially written with him. We very much regret that he is no longer able to contribute to our research.

We would also like to thank Kalok Chan, Nai-fu Chen, Tarun Chordia, Jonathan Cohn, George Constantinides, Sudipto Dasgupta, Thierry Foucault, Tsugioki Fujinuma, Zhaoyang Gu, Milton Harris, Takashi Hatakeda, Kentaro Hayashi, Masato Ishibe, Kentaro Iwatsubo, Ravi Jagannathan, Chandra Kanodia, Noriyuki Kikuchi, Wataru Ohta, Kosuke Oya, Christine Parlour, Artur Raviv, Ghon Rhee, Jan Shanken, Kelly Shue, Bruno Solnik, Nobuhiko Sugiura, Norihiro Takeda, Sheridan Titman, Yoshihiro Tokuga, Masashi Toshino, Yuri Tserlukevich, Eiko Tsujiyama, Jun Uno, and John K C Wei for their valuable comments and suggestions.

The authors acknowledge financial support from the Grant-in-Aid for Scientific Research ((A) 25245052, (B) 19330071, (C) 24530581, and (C) 12630111) from the Ministry of Education, Culture, Sports, Science and Technology of Japan.

We also want to thank Wendy Williamson for proofreading. To our editors, Leila Campoli and Sarah Lawrence of Palgrave Macmillan, we are grateful for all your wonderful assistance in getting the book published.

Introduction

In the two decades surrounding the turn of the 20th–21st centuries, the Tokyo Stock Exchange implemented several important reforms in regulations, market trading mechanisms, and IT trading systems (TSE, 2012 and 2014). In this book we analyze the impact of the evolution of the Tokyo Stock Exchange (TSE), at the same time discussing reforms in stock trading by related accounting standards and legal regulations. With the help of daily stock return and market microstructure data, we analyze how these reforms have significantly influenced the pricing structure and price discovery process of traded stocks, as well as the trading style of institutional investors, individual investors, and high-frequency traders.

The research methodology we employ is primarily standard market microstructure tests, as well as methods used in conventional empirical financial economics (Stoll 2003, Cochrane, 2005, Foucault et al., 2013). Note that Madhavan (2000) classifies sub-fields of market microstructure theory as (1) price formation, (2) market structure and design, (3) transparency, and (4) applications to other areas of finance including asset pricing. We simultaneously use the most relevant concepts in these sub-fields for our empirical tests, and provide a comprehensive picture of trading, price discovery, pricing structure, and public vs. private information dissemination. According to Madhavan, the third sub-field, transparency, is relatively new. Amihud et al. (2005) also emphasize the role of private information in the determination of bid–ask spreads. Hence, the main characteristic of our analysis in Chapters 5 and 6 is that we

incorporate the element of information asymmetry in empirical analyses of market microstructure.

In Chapter 1 we present a bird's-eye view of the TSE's daily stock trading and the transmission mechanism of market trading information sent to investors. The trading system at the TSE was renovated in January 2010, and was named "arrowhead." In Chapter 2, we summarize regulatory changes of TSE trading from 1990 to 2012. We also highlight important reforms in securities trading, the Companies Act, the Financial Instruments and Exchange Act (FIEA), and accounting standards by the Accounting Standards Board of Japan (ASBJ), newly imposed upon public companies during this time period.

In Chapter 3 we explain basic tools used in market microstructure analysis and demonstrate time trends of these variables. The market microstructure field has a long history in financial economics (Stoll, 2003) and has been advanced with applications from game theory and economics under uncertainty. For a comprehensive review of the market microstructure field, see Thierry et al., 2012. As data observation frequency and computational capacity have become increasingly "big," market microstructure is one of the richest and most important sub-disciplines in financial economics (Madhavan, 2000, Amihud et al., 2000).

In Chapter 4, risk and return characteristics are explored, and should inform the reader of the basic pricing structure of TSE stocks for the long-term observation period starting in 1977. For fund managers dealing with large portfolios, this chapter might be particularly useful, as well as Chapter 6.

Chapter 5 is an event study to assess effects of the quarterly regulations imposed by the TSE in the early 2000s, which helped highlight the difference between good and bad firms. No formal sanctions were imposed upon firms, and they did not have to abide by these regulations until the implementation of the new quarterly accounting standard by ASBJ effective as of April 1, 2008, reflecting the Financial Instrument and Exchange Act of 2006.

Finally, in Chapter 6, for the first time in the literature, we demonstrate the impact of TSE's 2010 "arrowhead" trading system on the liquidity and information asymmetry of large cap vs. small cap stocks. The "arrowhead" system surely affected trading patterns of large institutional investors and high-frequency traders, which we have detailed in a precise data analysis.

However, some market microstructure measures like ours are imperative to fully understand our results. So we refer the reader to the Appendix of Chapter 3, which explains the minimum required level of market microstructure measures used in this book.

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1

Introduction to the Trading System at the Tokyo Stock Exchange

Abstract: *In Chapter 1 we provide an overview of trading at the First and Second Sections of the Tokyo Stock Exchange. We discuss how investors can send bid–ask orders to the TSE and outline how these orders are executed. We also explained the arrowhead trading system, implemented January 2010; by reading our example of the market clearing process, readers should become familiar with TSE trading systems. Then we summarize relevant financial characteristics of the firms listed on both sections of the TSE.*

Kubota, Keiichi and Hitoshi Takehara. *Reform and Price Discovery at the Tokyo Stock Exchange: From 1990 to 2012*. New York: Palgrave Macmillan, 2015.
DOI: 10.1057/9781137540393.0006.