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# Innovations in Derivatives Markets

Fixed Income Modeling, Valuation  
Adjustments, Risk Management,  
and Regulation

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 Springer Open

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# Preface

The financial crisis of 2007–2009 swallowed billions of dollars and caused many corporate defaults. Massive monetary intervention by the US and European central bank stabilized the global financial system, but the long-term consequences of this low interest rate/high government debt policy remain unclear. To avoid such crises scenarios in the future, better regulation was called for by many politicians. The market for portfolio credit derivatives has almost dried out in the aftermath of the crisis and has only recently recovered. Banks are not considered default free anymore, their CDS spreads can tell the story. This has major consequences for OTC derivative transactions between banks and their clients, since the risk of a counterparty credit default cannot be neglected anymore. Concerning interest rates, it has become unclear if there are risk-free rates at all, and if so, how these should be modeled. On top, we have observed negative interest rates for government bonds of countries like Switzerland, Germany, and the US—a feature not captured by many stochastic models.

The conference *Innovations in Derivatives Markets—Fixed income modeling, valuation adjustments, risk management, and regulation*, March 30–April 1, 2015 at the Technical University of Munich shed some light on the tremendous changes in the financial system. We gratefully acknowledge the support by the *KPMG Center of Excellence in Risk Management*, which allowed us to bring together leading experts from fixed income markets, credit modeling, banking, and financial engineering. We thank the contributing authors to this volume for presenting the state of the art in postcrisis financial modeling and computational tools. Their contributions reflect the enormous efforts academia and the financial industry have invested in adapting to a new reality.

The financial crisis made evident that changes in risk attitude are imperative. It is therefore fortunate that postcrisis mathematical finance has immediately accepted to go the path of critically reflecting its old paradigms, identifying new rules, and, finally, implementing the necessary changes. This renewal process has led to a paradigm shift characterized by a changed attitude toward—and a reappraisal of—liquidity and counterparty risk. We are happy that we can invite the reader to gather

insight on these changes, to learn which assumptions to trust and which ones to replace, as well as to enter into the discussion on how to overcome the current difficulties of a practical implementation.

Among others, the plenary speakers Damiano Brigo, Stéphane Crépey, Ernst Eberlein, John Hull, Wolfgang Runggaldier, Luis Seco, and Wim Schoutens are represented with articles in this book. The process of identifying and incorporating key features of financial assets and underlying risks is still in progress, as the reader can discover in the form of a vital panel discussion that complements the scientific contributions of the book. The book is divided into three parts. First, the vast field of counterparty credit risk is discussed. Second, FX markets and particularly multi-curve interest-rate models are investigated. The third part contains innovations in financial engineering with diverse topics from dependence modeling, measuring basis spreads, to innovative fee structures for hedge funds.

We thank the *KPMG Center of Excellence in Risk Management* for the opportunity to publish this proceedings volume with online open access and acknowledge the fruitful collaboration with Franz Lorenz, Matthias Mayer, and Daniel Sommer. Moreover, we thank all speakers, visitors, the participants of the panel discussion—Damiano Brigo, Christian Fries, John Hull, Daniel Sommer, and Ralf Werner—and the local supporting team—Bettina Haas, Mirco Mahlstedt, Steffen Schenk, and Thorsten Schulz—who helped to make this conference a success.

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# Foreword

The conference “Innovations in Derivatives Markets—Fixed Income Modelling, Valuation Adjustments, Risk Management, and Regulation” was held on the campus of Technical University of Munich in Garching-Hochbrück (Munich) from March 30, until April 1, 2015. Thanks to the great efforts of the organizers, the scientific committee, the keynote speakers, contributors, and all other participants, the conference was a huge success, bringing together academics and practitioners to learn about and to discuss state-of-the-art derivatives valuation and mathematical finance. More than 200 participants (35 % of whom were academics, 60 % practitioners, and 5 % students) had many fruitful discussions and exchanges during three days of talks.

The conference “Innovations in Derivatives Markets” and this book are part of an initiative that was founded in 2012 as a cooperation between the Chair of Mathematical Finance at the Technical University of Munich and KPMG AG Wirtschaftsprüfungsgesellschaft. This cooperation is based on three pillars: first strengthening a scientifically challenging education of students that at the same time addresses real-world topics, second supporting research with particular focus on young researchers, and third, bringing together academic researchers with practitioners from the financial industry in the areas of trading, treasury, financial engineering, risk management, and risk controlling in order to develop trendsetting and viable improvements in the effective management of financial risks.

The main focus of the conference was the topic of derivatives valuation which is a subject of great importance for the financial industry, specifically the rise of new valuation adjustments commonly referred to as “XVAs”. These XVAs have gained significant attention ever since the financial crisis in 2008 when banks suffered tremendous losses due to counterparty credit risk reflected in derivatives valuation via the credit valuation adjustment, CVA. A debate on the incorporation of funding costs in derivatives valuation starting in 2012 introduced a new letter to the XVA alphabet, the so-called funding valuation adjustment, FVA, together with its specific impact in banks’ profit and loss statements. With the conference, we intended to discuss these topics in the light of market evolutions, regulatory change,



and state-of-the-art research in financial mathematics by bringing together renowned scientists, practitioners, and ambitious young researchers.

Over the first two days of the conference, several keynote speeches and invited talks addressed various aspects of derivatives valuation. Topics included the fundamental change of moving from one interest rate curve to a multiple curve environment, taking into account counterparty credit risk and funding into derivatives valuation, new approaches to modeling negative interest rates, and also presenting other advances in mathematical finance. The panel discussion on the first day brought together the views of renowned representatives from academia and the financial industry on the necessity, reasonableness and, to some extent, the future of derivatives valuation and XVAs. The conference was rounded out by a day of contributed talks, giving young researchers the opportunity to present and discuss their results in front of a broad audience. All in all, the topics presented during the conference covered a large spectrum, ranging from market developments and the management of derivative valuation adjustments to theoretical advances in financial mathematics.

We would like to thank everyone who contributed to make this event a great success. In particular, we express our gratitude to the scientific committee, namely Kathrin Glau, Zorana Grbac, Matthias Scherer, and Rudi Zagst, the organizational team, namely Kathrin Glau, Bettina Haas, Mirco Mahlstedt, Matthias Scherer, Steffen Schenk, Thorsten Schulz, and Rudi Zagst, the keynote speakers, the moderator and participants of the panel discussion, all speakers of invited and contributed talks, and, last but not least, all participants that attended the conference.

We are convinced that this book will help you to gain insights about state-of-the-art research in the area of mathematical finance and to broaden your horizon on the use of mathematical concepts to the fields of derivatives valuation and risk management.

Dr. Matthias Mayer

Dr. Daniel Sommer

Franz Lorenz

KPMG AG Wirtschaftsprüfungsgesellschaft