

Preface

The volatility of major asset classes is a key driver of portfolio performance affecting institutional and individual investors alike. Portfolio volatility may be managed by diversification through asset allocation and security selection decisions as well as by derivatives supplying direct exposure to volatility. Of the two main traditional assets—stocks and bonds—volatility derivatives and methodologies underlying their designs and pricing have been well-developed for equity markets, while fixed income markets have lagged in this respect despite its principal role in capital markets. This book fills, or at least aims to significantly narrow, this gap.

While the exposition of this book is of a theoretical nature, its ultimate objective is to serve as a foundation upon which a market for standardized fixed income volatility trading may be built. In fact, some of the interest rate volatility index designs proposed in this book have already been brought to life in the US and in Japan—by far the two largest government bond markets by notional outstanding. The Chicago Board Options Exchange (CBOE), home to the omnipresent CBOE Volatility Index[®] (VIX[®]), launched the CBOE Swap Rate Volatility IndexSM (SRVIXSM) in 2012, and subsequently partnered with the CME Group to launch the CBOE/CBOT 10-Year US Treasury Note Volatility IndexSM (TYVIXSM) in 2013. Across the Pacific, S&P Dow Jones Indices and Japan Exchange Group partnered to launch the S&P/JPX JGB VIX in 2015; a Japanese Government Bond analogue of TYVIX. CBOE listed TYVIX futures in 2014 as its first-ever listed derivative for standardized fixed income volatility trading, and counterpart to its popular VIX for broad equity market volatility trading.

This book presents a unified fixed income volatility evaluation framework and in-depth accounts of its application to four major fixed income asset sub-classes: interest rate swaps, government bonds, time deposits, and credit. It develops model-free, forward-looking volatility indexes for each of these asset types, which involves dealing with disparate market conventions and numerous complexities that are absent when pricing equity volatility. Some of these complexities had long been recognized by practitioners as hurdles for creating VIX-like indexes for interest rate volatility, but left bereft of mathematically rigorous solutions for a number of years,

which presumably contributed to the stunted development of standardized measurement and trading of fixed income volatility until recently.

Our work draws its origins from a series of research notes and implementation details that we developed over the last six years. The present monograph organizes this work in a self-contained fashion by providing the reader with a comprehensive piece with interconnected parts. Our work does not focus on purely mathematical innovations; rather, it relies on existing methods and develops new tools aimed at facilitating contract evaluation in the fixed income space. It is our hope that this work will lead to significant and positive contributions in the world of financial engineering, and will help investors measure and better manage risks arising from fixed income volatility.

This book will appeal to both applied researchers and theorists. Researchers in academia and at financial institutions are the main audience of this book, while advanced students in finance, economics, and mathematics should also find the material useful for further study in the area of asset pricing. Applied researchers will gain access to the mathematically rigorous background required for undertaking empirical research in relatively new topics such as: time series behavior of forward-looking interest rate volatility indexes; interest rate volatility risk-premiums; linkages between volatility and market liquidity; and the impact of macroeconomic developments and monetary policy on fixed income volatility. Theorists will find contributions to an exciting area in asset pricing regarding interest rate volatility evaluation as well as the evaluation of new financial products referenced to forward-looking gauges of interest rate volatility, such as TYVIX futures.

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