An Introduction to Algorithmic Finance, Algorithmic Trading and Blockchain

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INVESTOR IN PEOPLE

Satya R. Chakravarty dedicates this book to his granddaughter,
Anvi Ananyo Chakravarty (Gini).
Palash *Sarkar dedicates this book to his mother.*

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Preface

Our motivation for writing this book is to provide a broad-based and accessible introduction to three of the presently most important areas of computational finance, namely, option pricing, algorithmic trading and blockchain. To the best of our knowledge, no other book in the market provides such a coverage. It is our hope that the book will be useful to senior undergraduates, graduates and MBA students, as well as researchers and practitioners. In its first part, the book reflects option pricing in different frameworks. A simple treatment of assessment of cash flows and fixed security derivatives is also presented. Finally, the problem of asset ranking is addressed in this part of the book. In a broad sense, the second part of the book covers algorithmic issues related to finance. The first three chapters of the second part addresses some computational issues related to the theory discussed in the first part. The rest of the second part, consisting of five chapters, discusses approaches for algorithmic trading, portfolio optimisation and risk management. The third part of the book is devoted to blockchain and cryptocurrency. A fairly detailed introduction to both of these topics is presented along with various applications of blockchain to financial and other applications. The wide coverage of the book and its authentic and well-expressive presentation make the book quite up-to-date from both theoretical and practical sides, and highly reactive to the problems of recent concern. We believe that in satisfying its objectives, our book offers a unique perspective to contemporary aspects of finance in a lucid manner for senior undergraduates, graduates, MBA students and regulators. Further, the book can serve as a useful reference for basic theory to practitioners in the area. Much of finance today involves a fair amount of mathematics. In the book, we have tried to find a balance between having too much and too little mathematics. Detailed mathematical derivations have been given in some cases, helpful aids have been provided in some other cases so that a reader can complete the derivations, and for cases where the proofs takes us too far away from the discussion at hand, the proofs have been omitted. In our opinion, the first two parts of the book can be understood by somebody having a college-level introduction to calculus, linear algebra, probability and statistics. The mathematical requirement for the third part is markedly different from that of the first two parts. It is due to this reason we have tried to keep the mathematical description of the third part to a bare minimum. Several chapters of the book have been used for offering a course on the theory of finance to Master of Science in Quantitative Economics students at the Indian Statistical Institute, Kolkata, India, in the Fall Semester of 2019. The materials were well received by

the students. We express our sincere gratitude to the students for their enthusiasm and helpful comments in the process of direct interactions. We thank Pinaki Sarkar for providing several suggestions to improve the coverage of the book. We also thank Sanjay Bhattacherjee for reading and commenting on some chapters of the third part.

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