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## BOOK REVIEWS

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Mark Kritzman, Senior Editor

### **CREDIT RISK MODELING**

*By David Lando*

*(Reviewed by Mark Kritzman)*

Credit risk modeling is one of the fastest evolving sub-fields of financial economics, and in a pleasing way, one in which academics and practitioners actively engage one another. This unusual collaboration of the academy and industry is beneficial to both communities; academics apply their theories and mathematical tools in a relevant laboratory, and practitioners learn how to hedge credit exposure more efficiently. Although there are several books and myriad technical articles that deal with credit risk, David Lando's excellent contribution resides in the "sweet spot" that bridges theory and practice.

This book is very nicely organized. Lando begins with an introductory chapter in which he lays out the landscape of

the book. He then introduces the Merton model, which treats corporate liabilities as contingent claims on a firm's assets, and he presents a variety of extensions amenable to closed formed solutions including, for example, stochastic interest rates, jumps in asset prices, and discrete coupons. Next Lando abandons the assumption that capital structure is determined exogenously and analyzes optimal capital structure as a function of the trade-off between bankruptcy costs and the tax benefits of issuing debt.

Having established the theoretical underpinning of credit modeling, Lando turns to statistical estimation of defaults, covering a variety of methods including logistic regression, discriminant analysis, and hazard regressions. He then addresses rating migration and covers Markov chains as well as continuous

time approaches. He follows this discussion with a thorough review of default intensity modeling, starting with the Cox process, but he also considers extensions of this framework. He demonstrates how default intensities are used for asset pricing.

Next Lando addresses rating-based term structure models, which have important implications for financial instruments with rating-based provisions. He begins with the Markov structure and progresses to more advanced techniques.

In the next two chapters, Lando analyzes credit related securities. He first reviews interest rate swaps and shows the relationship between swap pricing and credit risk. He then analyzes vehicles for transferring credit risk, including credit default swaps and collateralized debt obligations. This discussion raises the issue of default

dependence, the topic of the final chapter. Lando's penchant to remain intuitive leads him to eschew detailed treatment of copulas and instead to explore dependence from the framework of financial networks.

An especially pleasing feature of this book is the bibliographical note that concludes each chapter. These notes, which abstract the relevant contributions in the subject area, serve as an excellent literature review.

To assist those who are not fully conversant with the some of the technical material, Lando includes several appendices in which he reviews such topics as Markov chains, Brownian motion, and stochastic calculus for jump-diffusions.

Technical topics such as credit risk modeling presents researchers with an opportunity to develop elegant mathematical models which often yield insights that might be obscured by less elegant solutions. Elegance and the simplifying assumptions necessary to facilitate tractability, however, often lead to models that are unacceptably distant from the truth. Lando understands this tradeoff, for he has struck just the right balance. I strongly recommend this book for anyone—academic or practitioner—who is concerned with modeling credit risk or

who would like an outstanding reference for some of the key financial engineering tools in use today. Lando has made a terrific contribution to this important field.

### **MY LIFE AS A QUANT REFLECTIONS ON PHYSICS AND FINANCE**

*By Emanuel Derman  
(Reviewed by Mark Kritzman)*

I have had the good fortune to know Emanuel Derman for more than a decade, during which time I witnessed his ascent to the pinnacle of Wall Street's quantitative community. On the various occasions when I've conversed with Emanuel, I was struck by three things: first and most conspicuously, his brilliance; second his humility; and third his extraordinary command of non-quantitative topics, all of which shine through in this fascinating memoir.

Derman shares his remarkable journey from South Africa to Columbia University to an assortment of post doc appointments to Bell Labs and finally to Wall Street with disarming candor, keen insight, and an abundance of wit. As we share Derman's adventure we learn much about the politics and culture of both academia and industry and not an insignificant

amount about physics and finance.

Derman sets the stage with a prologue, in which he describes the exalted position of physics in the intellectual hierarchy, and then contrasts this with Wall Street's less than exalted application of scientific methods to the pursuit of profit. He then traces his experiences chronologically beginning with his arrival at Columbia University.

At Columbia we are introduced to a faculty of Nobel laureates and some destined for this honor. Derman has a great knack for crafting descriptions which touch upon each person's physical appearance, personality traits, and intellectual contributions. Moreover, he recreates the atmosphere of Columbia and New York's upper west side with impressive detail—even to the point of recalling the songs that were playing on the radio.

Following his graduation from Columbia, Derman began a series of post doc appointments which took him to UPenn, Oxford, Rockefeller University, and finally to a faculty position at the University of Colorado. Again, Derman skillfully recreates each environment, replete with detailed observations about the key characters (and I choose this word intentionally), along with relatively

accessible explications of their assorted scientific innovations. He also provides candid glimpses into his family life.

Eventually Derman abandoned the academic grind and accepted a position at Bell Labs, AT&T's prestigious research arm. Here Derman shifted gears and embarked upon a brief but successful career as a software developer. However, Derman was unaccustomed to the bureaucracy of Bell Labs where hierarchy and conformity ruled, and became obsessed with exiting this environment. Eventually, he landed a job at Goldman Sachs.

At Goldman Sachs Derman came face to face with the tension between intellectual rigor

and the incessant quest to make money. One of my favorite anecdotes is about how Derman's boss responded to what he perceived as Derman's slow progress on a particular project. He took Derman aside and said, "in this job you really need to know only four things: addition, subtraction, multiplication, and division—and most of the time you can get by without division!"

But despite this admonition, Derman found many opportunities to apply rigorous mathematics, which resulted in two celebrated financial innovations: the Black-Derman-Toy one factor interest model, in which he collaborated with the legendary Fischer Black, and the implied binomial tree. Derman describes step-by-step the creative process

that lead to these innovations as well as his interactions with his brilliant but quirky collaborator, Fischer Black. Derman was especially impressed that Fischer was free from artifice—a quality that applies just as well to Derman.

I was given the opportunity to read this book when it was still in manuscript form. When I picked up the published version to refresh my memory for this review, I found myself re-reading it in its entirety and enjoying it just as much the second time around. Whether you are a physicist, a Wall Street quant, or a doctor or lawyer, I enthusiastically recommend this book. It is one of my all time favorites.