

# Valuing Employee Stock Options: Under 2004 FAS 123 Proposals (CD-ROM Included) Dr. Johnathan Mun

Dr. Johnathan Mun ISBN: 0471705128 (2004) Hard Cover and Cloth 320 Pages

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#### PREFACE

This book was written after FASB released its Proposed FAS 123 Revisions in March 2004. As one of the valuation consultants and FASB advisors on the FAS 123 initiative in 2003 and 2004, I would like to illustrate to the finance and accounting world that what FASB has proposed is actually pragmatic and applicable. I am neither for nor against the expensing of employee stock options and would recuse myself from the philosophical and sometimes emotional debate on whether employee stock options should be expensed (that they are a part of an employee's total compensation, paid in part for the exchange of services, and are an economic opportunity cost to the firm just like restricted stocks or other contingent claims issued by the company) or should not be expensed (that they simply dilute the holdings of existing shareholders, is a cashless expense, and if expensed, provides no additional valuable information to the general investor as to the financial health of the company but reduces the company's profitability and hence the ability to continue issuing more options to its employees). Rather, as an academic and valuation expert, my concern is with creating a universal standard of understanding on how FAS 123 can be uniformly applied to avoid ambiguity, and not whether employee stock options should be expensed. Therefore, let it not be said that the new ruling is abandoned because it is not pragmatic. This book is also my response to FASB board member Katherine Schipper's direct request to myself at the FASB public panel roundtable meeting (Palo Alto, California, June 2004) for assistance in providing more guidance on the overall valuation aspects of FAS 123.

Hopefully the contents of this book will subdue some of the criticisms on how binomial lattices can be used and applied in the real world. The results, tables, graphics, and sample cases illustrated throughout the book were calculated using customized binomial lattice software algorithms I developed to assist FASB in its deliberations, and were based on actual real-life consulting and advisory experience on applying FAS 123. Inexperienced critics will be surprised at some of the findings in the book. For instance, criticisms on the difficulty of finding the highly critical volatility may be unfounded because when real-life scenarios such as vesting, forfeitures, and suboptimal exercise behavior are added to the model, volatility plays a much smaller and less prominent role. In addition, the book illustrates how Monte Carlo simulation with correlations can be added (to simulate volatility, suboptimal exercise behavior multiple, forfeiture rates, as well as other variables for thousands and even hundreds of thousands of simulation scenarios and trials) to provide a precision of up to \$0.01 at a 99.9 percent statistical confidence, coupled with a convergence test of the lattice steps, provides a highly robust modeling methodology. Future editions of this book will include any and all changes to the FAS 123 requirements since the March 2004 proposal. Parts One and Four are written specifically for the chief financial officer and finance directors, who are interested in understanding what are the impacts and implications of using a binomial lattice versus a Black-Scholes model. Parts Two and Three are targeted more toward the analysts, consultants, and accountants who require the technical knowledge and example cases to execute the analysis.

#### PRAISES FOR REAL OPTIONS ANALYSIS

"Veritas has modeled the valuation of its employee stock options for analytical purposes using a proprietary customized binomial lattice, developed by Dr. Johnathan Mun. The valuation based on the customized binomial lattice model allows us to take into account the impacts of multiple vesting periods, employee suboptimal exercise behavior, forfeiture rates, changing risk-free rates, and changing volatilities over the life of the option which are required under the 2004 FAS 123 issued by the Financial Accounting Standards Board. It is not possible to consider these factors in a valuation based on the traditional modified Black-Scholes model. Under the assumptions used by Veritas when modeling the valuation of employee stock option grants both based on the customized binomial lattice model as well as the traditional modified Black-Scholes model, the customized binomial lattice model resulted in a considerably lower expense, considering the expensing guidelines as included in the FAS 123 Proposed Statement."

"This is one of those rare books written in anticipation of a major shift in the industry and economy. FAS 123 will throw a lot of public companies in a frantic, however the smart ones are identifying the opportunity to master the process and take over the driving seat. The methodology and the tools developed by Dr. Johnathan Mun are proven, pragmatic, and offer a great deal of value and benefit to those early adopters. IBCOL Consulting AG is using Dr. Mun's algorithms and methodology because of their applicability, accuracy, and the fair-market values that we have obtained for our clients are significantly less than traditional Black-Scholes models."

Dr. Markus Junginger Managing Partner IBCOL Consulting

"After extensive review of the FASB exposure draft and consideration of a variety of option valuation methodologies, E\*TRADE FINANCIAL has decided to implement a binomial lattice model in Equity Edge, our stock plan management and reporting software, in consultation with Dr. Johnathan Mun. We found Dr. Mun's work on employee stock option pricing very valuable."

Naveen Agarwal Director, Product Management E\*TRADE FINANCIAL Corporate Services

#### **ABOUT THE AUTHOR**

Dr. Johnathan C. Mun is the founder and CEO of Real Options Valuation, Inc., a consulting, training, and software development firm specializing in real options, employee stock options, financial valuation, simulation, forecasting, optimization, and risk analysis located in northern California. He is the creator of the Super Lattice Solver software, Risk Simulator software, and Employee Stock Options Valuation software at the firm. The Super Lattice Solver software showcased in this book supersedes the previous Real Options Analysis Toolkit software which he also developed. He has also authored numerous other books including Real Options Analysis Course: Business Cases (Wiley 2003), Applied Risk Analysis: Moving Beyond Uncertainty (Wiley 2003), Valuing Employee Stock Options (Wiley 2004), Modeling Risk: Applying Monte Carlo Simulation, Real Options Analysis, Forecasting, and Optimization (Wiley 2006), and others. His books and software are being used around the world at top universities (including the Bern Institute in Germany, Chung-Ang University in South Korea, Georgetown University, ITESM in Mexico, Massachusetts Institute of Technology, New York University, Stockholm University in Sweden, University of the Andes in Chile, University of Chile, University of Pennsylvania Wharton School, University of York in the United Kingdom, and Edinburgh University in Scotland, etc).

Dr. Mun is also currently a finance and economics professor and has taught courses in financial management, investments, real options, economics, and statistics at the undergraduate and the graduate M.B.A. levels. He is teaching and has taught at universities all over the world, from the U.S. Naval Postgraduate School (Monterey, California) and University of Applied Sciences (Switzerland and Germany) to Golden Gate University (California) and St. Mary's College (California), and has chaired many graduate research thesis committees. He was formerly the Vice President of Analytics at Decisioneering, Inc. where he headed up the development of real options and financial analytics software products, analytical consulting, training, and technical support, and where he was the creator of the Real Options Analysis Toolkit software, the older predecessor of the Super Lattice Software discussed in this book.

Dr. Mun received his Ph.D. in Finance and Economics from Lehigh University, where his research and academic interests were in the areas of Investment Finance, Econometric Modeling, Financial Options, Corporate Finance, and Microeconomic Theory. He also has an M.B.A. in business administration, an M.S. in management science, and a B.S. in Biology and Physics. He is Certified in Financial Risk Management (FRM), Certified in Financial Consulting (CFC), and is Certified in Risk Analysis (CRA). Finally, he has written many academic articles published in the Journal of the Advances in Quantitative Accounting and Finance, the Global Finance Journal, the International Financial Review, the Journal of Financial Analysis, the Journal of Applied Financial Economics, the Journal of News, and the Journal of the Society of Petroleum Engineers.

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