

Equity Valuation

Models from Leading Investment Banks

Edited by

Jan Viebig
Thorsten Poddig
and
Armin Varmaz



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Equity Valuation

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Foreword

Every student of finance or applied economics learns the lessons of Franco Modigliani and Merton Miller. Their landmark paper, published in 1958, laid out the basic underpinnings of modern finance and these two distinguished academics were both subsequently awarded the Nobel Prize in Economics. Simply stated, companies create value when they generate returns that exceed their costs. More specifically, the returns of successful companies will exceed the risk-adjusted cost of the capital used to run the business. Further, these returns and the securities of the underlying companies must be judged against an uncertain backdrop, such that the risk-adjusted expected returns are attractive.

Investors seek to identify these successful companies. They strive to calculate the appropriate pricing of securities. How can this best be done? Every practitioner knows that the two simple declarative sentences at the beginning of this paragraph belie the complexity of the search for successful companies and financial instruments that offer favorable prospects for investors. The world is messier than models. Accounting data can be unreliable, economic conditions can change, investor risk tolerance can shift, and low-probability scenarios can occur.

This book is written from the perspective of practitioners, and the editors have chosen leaders in the field who can describe the theory and implementation behind their various approaches. The contributors to *Equity Valuation: Models from Leading Investment Banks* also describe the potential weakness of different models. This perspective is essential to understanding why there is no single magical solution. Investors are urged to use models as tools, often very powerful tools, but not as replacements for sound analysis and common sense.

Most successful investors believe that the fundamentals of economic and company performance will ultimately determine the performance of financial assets. Indeed, models are typically constructed in the hope of identifying deviations from fundamentally determined prices for entire classes of financial assets as well as specific securities. In Part I, Jan Viebig and Thorsten Poddig, the lead authors of this book, describe the basics of many valuation models, which are linked to key metrics such as cash flow, earnings and book value.

To paraphrase the authors, valuing a company would be simple if balance sheets and income statements were always accurate. In the real world, balance sheets may not fully reflect the fair value of assets, debt and equity, and earnings per share may not capture the sustainable earnings power of the company. Even when there is no intention to deceive, there is an underlying tension between corporate accounting, which seeks to take a snapshot at a specific point in time and to do so in a timely way, and the economic reality.

Even well-constructed models can lead to errors if the inputs to the model are wrong. This happens most often when there are notable changes, for example, in the macroeconomic

backdrop or a structural shift in technology. In such cases, model inputs tend to be simple extrapolations of the past rather than a guide to the future. Part II describes a situation in which another technique, often referred to as Monte Carlo simulation, can be used to best advantage. When there is a wide range of possible scenarios, and fundamental outcomes, Monte Carlo techniques often provide answers that are approximately correct. Under similar circumstances, one-scenario models provide answers that are precisely wrong.

In Part III, Tom Larsen and David Holland describe two approaches that are used to adjust accounting measures and emphasize long-term returns. Both the Economic Value Added (EVA) approach developed by Stern Stewart and the Cash Flow Return on Investment (CFROI) system developed by Holt Value Associates attempt to emphasize those metrics that are most related to long-term company performance. By examining the returns that companies can generate on their cash flows and invested capital, these approaches seek to determine which managements are adding true value to their companies and, hence, shareholders. The implications can be critical. For example, in the early 1990s, analysts at Goldman Sachs concluded, using an EVA-type approach, that most large corporations in Japan were generating disappointing returns on their capital employed. This led to a (correct) multiyear bearish view on Japanese equities.

Trevor Harris and his colleagues at Morgan Stanley have developed ModelWare which attempts to assess the intrinsic value of enterprises. Their approach, described in Part IV, begins with adjustments to reported accounting data, attempting to move accounting metrics closer to economic reality for each company. They then apply the basic concepts of the discounted cash flow approach described in Part I, such as the tradeoff between risk and reward, and consider the components of return on equity, including operating margins, asset turnover, and financial leverage. Their discussion provides an extremely useful review of the state of model building among professional investors.

Part V, written by David Bianco, describes the model developed at UBS which considers the value-added growth potential of each company, referred to as the Economic Growth Quotient (EGQ). This approach incorporates the principles of discounted cash flow and economic profit analysis. Further, Bianco applies regression analysis to help explain why certain companies are more highly valued in the marketplace than others, looking at factors such as return on capital.

In Part VI, Jan Viebig, Daniel Stillit and Thorsten Poddig provide readers with a glimpse into yet another type of model, one that is best applied to leveraged buyout (LBO) analysis. Unlike many other approaches which attempt to assess the public value of a security, the LBO model takes the view of a private equity investor. In such cases, returns are linked not only to current and extrapolated performance of the company, but also to the benefits of control, and the possibility of restructuring the company's operating and financial structures. Goldman Sachs has made such a model available to our clients; it is fully interactive, and allows the user to change critical inputs and to assess alternative scenarios.

Aswath Damodaran has written Part VII, a superb summary of valuation approaches and alternatives. Professor Damodaran is the author of one of the most widely used and acclaimed text books on the topic of valuation. His contribution to this volume provides an overview of the basic principles that support theoretically sound valuation methodologies and also lays out several of the underlying issues now confronting users of valuation methods. These include the accounting challenges affecting both income statements and balance sheets. Damodaran also describes the logical extension of these computational techniques to new

securities and applications. Examples include real options valuation and the assessment of relative valuation.

This detailed yet readable book concludes in Part VIII with an up-to-date discussion by Varmaz, Poddig and Viebig on the current issues under discussion by practitioners and academics alike. These include the manner in which models may be improved, extended to other asset categories, and broadened to portfolio management as well as security selection. This book will give you the context in which to judge different approaches and to understand the basis on which these models may fail or succeed. A complete bibliography will be useful to students and practitioners alike.

The approach at my own firm is one of discipline, and we are proud of our emphasis on economic and investment theory and model building. But this must be viewed against a backdrop of common sense, recognizing that the underlying structures and assumptions may change. John Maynard Keynes, best noted for his contributions to economic theory in the twentieth century, was also an accomplished investor. Indeed, his work in the 1930s on the marginal efficiency of capital lays the groundwork for much modern finance. I will therefore give Lord Keynes the last word on being overly dependent on models and theory, and failing to recognize that models may be precisely wrong. Even when the model's result is ultimately correct, timing can be variable. In a quote often attributed to him, he noted that "Markets can remain irrational longer than you can remain solvent."

Abby Joseph Cohen, CFA
Goldman, Sachs & Co.
New York, NY

September 2007

Preface

The goal of this book is to open the doors of leading investment banks to our readers and to explain in a clear and user-friendly way how portfolio managers and financial analysts at leading investment banks analyze firms. This book reveals how experts at leading investment banks such as Deutsche Bank, Goldman Sachs, Morgan Stanley, Credit Suisse and UBS really value companies. Unlike most other publications, *Equity Valuation: Models from Leading Investment Banks* does not focus on just one valuation model but discusses different valuation frameworks used in the investment industry today. The book is organized as follows:

Part	Title	Authors	Organization
	Foreword	Abby Joseph Cohen	Goldman Sachs
I	Discounted Cash Flow (DCF) Models	Jan Viebig, Thorsten Poddig	DWS Investment GmbH University of Bremen
II	Monte Carlo Free Cash Flow to the Firm (MC-FCFF) Models	Jan Viebig, Thorsten Poddig	DWS Investment GmbH University of Bremen
III	HOLT CFROI [®] Framework	Tom Larsen, David Holland	Harding Loevner Management Credit Suisse
IV	Morgan Stanley ModelWare's Approach to Intrinsic Value	Trevor S. Harris, Juliet Estridge, Doron Nissim	Morgan Stanley Morgan Stanley Columbia Business School
V	UBS VCAM and EGQ Regression-based Valuation	David Bianco	UBS
VI	Leverage Buyout (LBO) Models	Jan Viebig, Daniel Stillit, Thorsten Poddig	DWS Investment GmbH UBS University of Bremen
VII	Valuation 101: Approaches and Alternatives	Aswath Damodaran	Stern School of Business, New York University
VIII	Final Thoughts on Valuation	Armin Varmaz, Thorsten Poddig, Jan Viebig	University of Bremen University of Bremen DWS Investment GmbH

This preface provides a summary of the content and the key concepts of each part, and introduces the authors.

Part I

Content	Today almost every sophisticated valuation model used by leading investment banks is based on discounted cash flows. Jan Viebig and Thorsten Poddig give a systematic overview about the most important discounted cash flow models used in practice and illustrate the models by hands-on examples. Readers already familiar with basic valuation models are encouraged to skip Part I.
Authors/ Organization	Jan Viebig is a managing director at DWS Investment GmbH. He manages hedge funds for DWS from Frankfurt. DWS Investment GmbH is part of Deutsche Asset Management (DeAM), the global asset division of Deutsche Bank. Thorsten Poddig is Professor of Finance at the University of Bremen.
Key concepts	Discounted Cash Flow (DCF) Model, Dividend Discount Model (DDM), Cash Flow Statement, Free Cash Flow to the Firm (FCFF) Model, Cost of Capital, Capital Asset Pricing Model (CAPM), Competitive Advantage Period (CAP), Terminal Value.

Part II

Content	According to an old adage, forecasting is especially difficult if it involves the future. Financial analysts do not know the future with certainty when building valuation models. Using Baidu.com as a real-life example, Jan Viebig and Thorsten Poddig introduce step-by-step Monte Carlo Free Cash Flow to the Firm (MC-FCFF) models to the reader. Combining modern valuation theory and statistical analysis allows investment professionals to build more realistic valuation models in a world full of uncertainty. Readers can download the complete models discussed in Part II from our website: www.wiley.com/go/equityvaluation .
Authors/ Organization	Jan Viebig is a managing director at DWS Investment GmbH in Frankfurt. Thorsten Poddig is Professor of Finance at the University of Bremen.
Key concepts	Monte Carlo Free Cash Flow to the Firm (MC-FCFF) Model, Financial Value Driver Approach.

Part III

Content	Tom Larsen and David Holland compare two of the most widely used valuation metrics in Part III of this book: the Economic Value Added (EVA) approach developed by Stern Stewart and the Cash Flow Return on Investment (CFROI) framework originated by HOLT Value Associates. Both models are rooted in the valuation framework pioneered by Miller/Modigliani and are widely used by consultants, portfolio managers, investment bankers and corporate managers all over the world. Post Enron, most people do not dispute the fact that accounting
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	data can be misleading to investors. Studying Part III helps investors, educators and the general public to understand how investment professionals adjust accounting data to understand the true performance of a company.
Authors/ Organization	Tom Larsen is Head of Research at Harding Loevner Management in Somerville, New Jersey. Before joining Harding Loevner Management, Tom Larsen worked as a senior policy analyst at the renowned CFA Institute. David Holland is a managing director at Credit Suisse and co-head of the HOLT Valuation & Analytics Group. HOLT Value Associates was the premier developer and provider of the CFROI valuation model to portfolio managers worldwide. The firm was recently acquired by Credit Suisse.
Key concepts	Cash Flow Return on Investment (CFROI), Economic Value Added (EVA).

Part IV

Content	ModelWare’s organizing principle is as simple as convincing: Separating operating from funding activities helps to better understand how companies create (or destroy) value. One of the strengths of the model is that the logic of accounting relationships is retained consistently. At the heart of ModelWare is a new analytical concept called “Profitability Tree” which illustrates that return on equity is driven by the effect of financial leverage and return on net operating assets. The “Profitability Tree” links rearranged financial statement information and performance metrics. Investors can use ModelWare to analyze operating margins, asset turnover ratios and other performance metrics implied in current share prices. Another helpful concept introduced by Morgan Stanley is the “Profitability Map” which shows how operating margins and operating asset turnover ratios evolve over time in a two-dimensional space. The “Profitability Map” is an essential valuation tool as margin and efficiency improvements usually justify higher valuations.
Authors/ Organization	Trevor Harris is a managing director and vice chairman of client services at Morgan Stanley, and formerly headed the Global Valuation and Accounting team in Equity Research. Prior to joining Morgan Stanley, Trevor Harris was the Jerome A. Chazen Professor of International Business and Chair of the Accounting Department at Columbia Business School. Juliet Estridge is a vice president at Morgan Stanley. Doron Nissim is Associate Professor and Chair of the Accounting Department at Columbia Business School.
Key concepts	ModelWare, Profitability Tree, Profitability Map.

Part V

Content	David Bianco introduces the reader to UBS Value Creation Analysis Model (VCAM) and its Economic Growth Quotient (EGQ). VCAM is a standardized discounted cash flow model which allows investors to analyze the value accretive growth potential of companies. Regression-based valuation is a new, innovative analytical concept which tries to explain why some companies trade at higher valuation multiples than others. The economic logic behind UBS's regression-based valuation framework is compelling: The higher the expected present value of a company's growth potential relative to its economic book value, the higher should be its observed valuation multiple. David Bianco uses a linear regression model to visualize the relationship between valuation multiples (EV/NOPAT) and a specifically developed explanatory variable named EGQ.
Authors/ Organization	David Bianco is UBS's Chief US Equity Strategist. According to Barron's, David Bianco is one of the "top strategists" in the United States. UBS is a premier investment banking firm and a key global asset manager.
Key concepts	Value Creation Analysis Model (VCAM), Economic Growth Quotient (EGQ).

Part VI

Content	Part VI describes the methodology and the mechanics of LBO models developed by leading investment banks such as UBS, Deutsche Bank, Goldman Sachs, Credit Suisse and Morgan Stanley. Unlike DCF models, LBO models value companies from the perspective of a private equity investor who recapitalizes the financial structure of a company and restructures operations to enhance profitability and capital efficiency. LBO models reveal that the value of controlling a company can be substantial from the perspective of a financial investor.
Authors/ Organization	Jan Viebig is a managing director at DWS Investment GmbH. Daniel Stillit is a managing director conducting restructuring and M&A situations research at UBS, one of the world's flagship financial firms. Thorsten Poddig is Professor of Finance at the University of Bremen.
Key concepts	Leverage Buyout (LBO) Model, Internal Rate of Return (IRR), Multiple Approach.

We believe that the authors of Parts III, IV and V do a good job in describing HOLT CFROI, ModelWare and UBS VCAM, arguably the three most sophisticated proprietary models used by financial analysts and portfolio managers to value equities today. They are

all experts in the field of equity valuation who helped to develop or improve these models. The aim of the two remaining parts is to discuss valuation from a theoretical perspective without supporting one approach over the other. Readers interested in valuation theory might want to read Part VII first in which Aswath Damodaran, the author of several best-selling text books on investment valuation, gives an excellent overview about alternative valuation concepts.

Part VII

Content	In Part VII, Aswath Damodaran discusses four basic approaches to valuation and how value enhancement is framed in each approach. First, he looks at discounted cash flow models and their variants – certainty equivalents, excess return models and adjusted present value models. Second, he examines accounting valuation models – book value and liquidation value. Third, he evaluates relative valuation models, where assets are priced based upon how the market is pricing similar assets. Finally, he considers real options models, where value can be derived from increasing flexibility and potential opportunities in the future, and the interaction between corporate strategy and finance in value enhancement.
Authors/ Organization	Aswath Damodaran is Professor of Finance and David Margolis Teaching Fellow at the Stern School of Business at New York University. He is the author of several highly praised books including <i>Damodaran on Valuation</i> , <i>Investment Valuation</i> , <i>The Dark Side of Valuation</i> , <i>Corporate Finance: theory and practice</i> , and <i>Applied Corporate Finance: a user's manual</i> . His papers have been published in the <i>Journal of Financial and Quantitative Analysis</i> , the <i>Journal of Finance</i> , the <i>Journal of Financial Economics</i> and the <i>Review of Financial Studies</i> .
Key concepts	Discounted Cash Flow Models, Certainty Equivalents, Excess Return Models, Accounting Valuation Models, Relative Valuation Models, Real Options Models.

Part VIII

Content	The aim of Part VIII is to focus on the underlying theory behind the models discussed in the previous parts of this book. Reviewing the literature, the authors discuss alternatives to incorporate risk into the DCF framework and show how asset allocation and DCF valuation can be linked in practice.
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(Continued)

Authors/Organization	Armin Varmaz recently finished his Ph.D at the University of Bremen where he works for Thorsten Poddig. Thorsten Poddig is Professor of Finance at the University of Bremen. Jan Viebig is a managing director at DWS Investment GmbH in Frankfurt.
Key concepts	Risk Premium, Utility-based Valuation, Certainty Equivalents, Risk Neutral Probabilities, Asset Pricing Models.

The book is richly endowed with real world, hands-on examples. Combining valuation theory with practical insights, we hope that *Equity Valuation: Models from Leading Investment Banks* can be read with profit by students, investment professionals, corporate managers, and anyone else seeking to learn about equity valuation.

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