EQUITY VALUATION FOR ANALYSTS & INVESTORS

A Unique Stock Valuation Tool for Financial Statement Analysis and Model-Building

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McGraw Hill

New York Chicago San Francisco Lisbon London Madrid Mexico City
Milan New Delhi San Juan Seoul Singapore Sydney Toronto

The McGraw-Hill Companies

ISBN: 978-0-07-175952-6

MHID: 0-07-175952-2

The material in this eBook also appears in the print version of this title: ISBN: 978-0-07-163923-1, MHID: 0-07-163923-3.

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ACKNOWLEDGMENTS

I have spent most of my financial career and all of my analysis career at Argus Research, an independent equity research firm founded by Harold Dorsey in 1934. My nearly 20 years at Argus have been marked by unprecedented tumult in the financial world, which the firm has navigated steadily and professionally. I am indebted to Argus and the Dorsey family for creating a culture that invites and rewards independence, self-motivation, and innovation while maintaining consistently high standards in investment analysis and portfolio management.

Argus CEO and president John Eade hired me at Argus nearly two decades ago. His support for my succeeding him as Director of Research strengthened my confidence in my ability to write this book. Richard Cuneo, Director of Operations at Argus, is another mainstay at the company and in my professional development. Sharon Dorsey Wagoner and Fern Dorsey serve ably as heads of Argus Investors' Counsel and Vickers Stock Research, respectively.

The composer, musician, and private wealth manager Dana Richardson worked as an analyst at Argus earlier in the decade. Discussions with Dana were the seedbed for the set of concepts that evolved into Peer Derived Value. I am indebted to Wendy Abramowitz, skilled analyst and top stock-timer, for introducing me to comparable historical analysis as well as key themes in technology-sector analysis. Jim Solloway, CFA, former Chief Economist and Director of

Research at Argus, taught me the fundamentals of OLS regressions for smoothing long-term growth rates. Bob Becker, CFA, was my partner in innumerable projects at Argus, and his counsel was always excellent—particularly his guidance on passing the CFA ("take the practice tests 'till you're climbing the walls").

Other analysts whose work directly or indirectly influenced the body of knowledge underpinning this work include Chris Graja, Joe Bonner, Kevin Calabrese, Suzanne Betts, Bill Selesky, Erin Smith, David Toung, Martha Frietag, David Kerans, Phil Weiss, John Staszak, David Ritter, and Gary Hovis, dean of the electric utility analyst community. Kevin Tynan is the only automotive analyst in captivity who can break down a carmaker's pension obligations while simultaneously rebuilding a carburetor; he has been my chief guide in decoding the mysteries of Excel.

The person identified with the quote that opens the book is Betty "B.J." Edwards, long-time Chief Editor at Merrill Lynch. Seemingly with a few pencil strokes, she helped transform my compositional skills from a scattering of concepts to a well-ordered file cabinet of handy rules and strategies. Though we've never met, I am indebted to Frederick Crews, author of *The Random House Handbook*, who showed that a light touch, far from degrading the seriousness of a work, helps make valuable lessons indelible (". . . who but that orderly's mother . . ." indeed).

Sophie Efthimiatou was the McGraw-Hill editor who, on the strength of a recommendation and my pleas over a cup of coffee, became my early champion. She helped me tighten and hone my proposal until it became the book I'd spent 20 years preparing to write. Jennifer Ashkenazy, CPA, gave the accountant's thumbs-up to the project. Morgan Ertel was indispensible in suggesting the restructuring of the book into its four-part structure and advancing the project from rough manuscript to finished product. Daina Penikas guided me through the copyediting and proofreading process with great good humor.

At my nephew James' wedding in August 2008, I ran into my cousin Trish Pignataro, CPA, who immediately started giving me the needle: "When are we going to see that book?" and "I always thought you were going to write a book." At a time when I was mulling just such a project, this goad proved to be a tipping-point event. On her behalf, I wrote a book that only an accountant could love.

My wife Marie has nudged me out of one rut after another over the years and is largely responsible for my semi-respectable state. While I was writing at all odd hours, the kids managed to keep the mayhem at sub-Bedlam levels. The year this book was written, 2009, was without doubt the busiest of my corporate life. Despite all the time stolen from family by book and work, no one complained and everyone was supportive.

My delusions of mathematical grandeur notwithstanding, I might burn out the batteries on my calculator trying to figure out what I owe Rich Yamarone, Bloomberg economist and author of the invaluable *The Traders' Guide to Key Economic Indicators*. Most directly, he introduced me to his editor, with a kind word and a recommendation, and brought to bear his considerable reputation in the financial publishing world on my behalf. Without his nod, there would likely have been no book. Less directly and more importantly, he demonstrated that the guy in the next office could have the audacity and tenacity to conceive, design, write, and publish a highly useful text for the financial services industry. I am eternally indebted to Rich, unless he actually asks me for money.

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INTRODUCTION

"There are many ways to skin a cat." So spoke a senior editor at Merrill Lynch, explaining her unerring ability to wring clarity and concision from the varied but consistently gnarled prose styles of the equity analysts. Bad writing in all its iterations—stuffy, unreferred, thin, florid, lacking in segue or sequence—never boxed her into a corner; she knew multiple ways out.

Despite the shortcomings in their writing styles, the analysts with which we worked too seemed to skin cats—or analyze stocks—in a lot of different ways. However varied their approaches, they always sought to derive the same thing: the dollar value of the asset. Editing and analysis, I was learning, traveled many paths to a single outcome.

Having barely digested this wisdom, I left for Dallas where I wrote and typeset an automotive trade journal. Back in New York in the early 1990s, I returned to financial editing while being charged with a fair amount of writing. Surmising that editing would never pay New York City rents, I became a financial analyst early in the decade. Eventually I entered the CFA (Chartered Financial Analyst) program and had my financial analyst charter in hand by 1999.

As a former English major, I was *tabula rasa* for the business world and had no bad habits to unlearn. And armed with the excellent knowledge garnered in the three-year CFA program, I felt prepared for the measured and precise long-term valuation of assets.

The first thing I learned, however, was that those assets wouldn't stand still, which—as far as investors were concerned—meant that long-term valuation be damned. The movement in equities I observed rarely correlated to longer-term trends within their peer groups or even within their own financial histories. Instead, stocks appeared to be dancing to their own tune, and they took a step this way or that each time a new product was introduced (or flopped), the competitive landscape underwent secular or cyclical changes, regional market surged or retreated, and so on.

The longer-term movements in stocks tended to supersede these daily gyrations. Yet some companies meaningfully diverged from trends when their competitive position cumulatively changed, or their asset portfolio was overhauled, or new entrants ate their lunch. Analysis, I was learning, involved blending cyclical, secular, and company-structural events into the mix without spoiling the soup. Within the market noise, I was eventually able to discern the signal: consistent profits. Just as reliable earnings differentiated the successful companies from the pretenders, reliably modeled income flows and cash streams informing the valuation process became the best guide as to whether a company was successfully navigating industry transitions or succumbing to competitive pressures.

In an earlier, seemingly more staid time, swaths of companies devoted to a single industry—paper, say, or railroading—could be valued from the top down, with a focus on return on equity (ROE) and reasonably consistent variations from growth in gross national product (GNP). But as competition grew more intense and global, as companies—even those competing around a single commodity—increasingly pursued their own paths to profits, conclusions derived from top-down analysis veered further and further from market reality. As top-down analysis fell from favor, bottom-up analysis not only proliferated, it produced its own mantra: go granular. It was no longer enough to produce rounded earnings per share (EPS) estimates based on general and long-term trends. EPS forecasts and other inputs, such as cash flow, needed to reflect the myriad forces and fast-flowing information driving line items on a segment-by-segment and even subsegment basis.

Finding and Refining the Approach

How to derive those income flows and cash streams? As I immersed myself in analysis and got to know my colleagues, I realized there was no single template for calculating income and cash flow. Nor was there a single reliable method for valuing equities. This went well beyond inherent differences from industry to industry; within single industries and even within narrow niches, income modeling and asset valuation approaches varied widely. Everyone seemed to be doing it their own way. Some analysts had inherited models or relied on the advice of mentors. Other analysts, dissatisfied with inherited wisdom, were fashioning their own models, particularly for companies and industries that were previously nonexistent but now seemed to be at the center of the market's obsession.

Almost without realizing I was doing so, I felt my way toward a sustainable analysis model. Skittering at the edge of consciousness were a few constants. In the market there are no rights and wrongs, no light under the bushel basket; the market is driven by perceptions and realities, and a comprehensive valuation scheme must accommodate both. If earnings and cash flow drive the valuation process, they must be precisely modeled and then seamlessly integrated into valuation analysis. The valuation model must accommodate both minute-to-minute developments and long-term trends. And no pertinent data point could be orphaned, marginalized, or left behind.

As this overriding objective began to coalesce, I realized the scheme was easier envisioned than executed. The variety of tools for modeling and valuation, though individually useful, are in their abundance the analysts' greatest challenge. Certainly, the industry tool kit was plentiful. From the CFA process, related courses, mentors, and colleagues, I learned financial statement modeling, comparable historical valuation, discounted free cash flow valuation, industry analysis, and a host of other neat tricks. What I needed, though, was a way to organize all these inputs into a single stream that all contributed to the final output.

How to rank and prioritize among them? For the modeling of income and cash flows, there was no single template; ditto for the determination and application of growth rates. Historical comparables analysis captured the past valuation experience with precision but carried within itself the warning that it could not look too far ahead.

The various present value schemes, such as the dividend discount model and discounted free cash flow (DFCF) valuation, were ingeniously constructed to capture the long-term value of the asset. But what about the here and now? If DFCF signaled that a reliable growth rate for the company was 6 percent, but then that company indicated a glitch in its production—a fire at a motors plant in Jakarta, say—what next? Shave the growth rate to 5.875 percent? And for how long?

Valuation within the peer group presented even bigger challenges. Seemingly nothing could be more vital or telling than peer valuation, yet it had a surprisingly touchy-feely aspect. What's more, peer evaluation's implicit message (e.g., "This stock used to trade at a premium, it is now at a discount, so do something") really carried no guidance on how to proceed.

As time passed, knowledge accrued. When one is seeking to prioritize among schemes, when one is looking to assign each value its own gradient on the valuation curve, nothing substitutes for experience. More specifically, there is no better way to learn the art of valuation than enduring the humbling experience of forecasting great things for a stock only to see it sink (or watching the overlooked asset soar out of sight). You begin to calibrate, a term defined as adjustments based on recent experience but that in practice entails using past failures to steer you closer to the vital truth. Gradually ego subsides; you stop fighting the market and begin to work with it. You fit your scheme to encompass all of the market's information.

The analyst's challenge then begins to compound into a linked series of procedures. We commence by estimating income and cash flows reliably. We cast these estimated values into the web of historical inputs and value relationships. We incorporate industry data where appropriate. And we weave this information consistently into the valuation process without leaving any loose ends. As much as possible, we seek to systemize the market's valuation processes and then rank and weight them. Even while establishing and enacting this dry and clinical process, the analyst must incorporate the market's chaos and dynamism, wherein hunches and rumors can sometimes supersede rigorous valuation process. As various goals and themes intermingle, the challenge becomes the practical and consistent application and interaction of the various information inputs needed to arrive at a value forecast.

The developing analyst is immersed in and eventually becomes conversant in the various theoretical approaches to asset valuation. In the end, the analyst serves masters—research directors, portfolio managers, and ultimately the end user or asset owner—far removed from financial academia. The phone rings; steps are skipped; compromises are made. The analyst simply needs to value that asset; few are interested in his or her process. Our task is not to argue financial theory but to deploy it. So, we won't, for example, defend or seek to upend such widely accepted industry verities as capital asset pricing model (CAPM); we won't even explain it much. We're going to take it as a given and simply put it to work.

Gradually, you arrive at the realization that estimating the dollar value of the asset is not so much valuation theory application as it is valuation choreography. The model needs to be supple and responsive enough that, if an input changes, an entire chorus line of data points kicks in time. In a real-world example, if an analyst changes an assumption about current-quarter pricing for second-generation mobile handsets at Motorola, the information needs to ripple across the current and next-year income statement, up through comparable and discounted free cash flow valuations, and into the calculated dollar-based fair value.

An Overview of Equity Valuation for Analysts and Investors

On the one hand we've acknowledged that the analyst can follow many paths to deriving dollar value of the asset; on the other, we've constructed a fairly specific approach to building the model. Now, how do we reconcile the two? We won't take a "my way or the highway" approach; but working within our system provides a functioning and (double emphasis) beginning framework for financial statement modeling and valuation analysis. Our goal is to provide a basket of unified concepts so the self-directed analyst can construct his or her own model. We'll show you *exactly* how we do it while leaving room for variation as the maturing analyst spreads his or her wings.

Learning and teaching, while sharing some points in common, are very different processes. If our goal is to have you learn how to apply modeling and valuation technique, we'll need to teach you specifically how to apply this in the format of an excel workbook. In writing this book, I was struck with the challenge facing any instructor standing before a group of students, each with varying degrees of intelligence, experience, and willingness to learn.

Like that instructor, we'll begin with a lot of hand-holding and the assumption that even the most rudimentary formula and application must be thoroughly explained. As such, the information and instructions that are offered in this book will be accompanied by a level of exacting detail. Most of these exhaustive explanations can be found in the very first section of this book, which details how to build the modeled P&L. As we proceed, we'll assume everyone is learning at the same rate, and this almost paint-by-number level of detail will recede. We will further assume the modeler has developed some familiarity with the workbook and worksheet, and our instructions, while never cursory, will become less detailed. As the book moves along, we'll gradually reduce the accompanying detail around every Excel formula.

The book is concerned with two main themes: modeling and valuing. It is structured in four parts: financial statement modeling; comparable historical valuation; discounted free cash flow valuation; and relational valuation. Each of the four parts begins with an opening essay, followed by multiple chapters. The biggest section, financial statement modeling, has seven chapters; the three other parts have three chapters each. The text is book-ended by this introductory chapter as well as a concluding chapter.

As in any interconnected whole, concepts in any one chapter might arguably be better suited for inclusion in another; but that would risk ripping the fabric created by other relationships. In every chapter we begin with a discussion of the topic, including the changing currents and fast-formulating priorities that are shaping each topic as we speak.

In a first introductory chapter, we describe the real-world challenges inherent in modeling and valuation, describe the basic structure of the book, and discuss our processes.

Financial statement modeling, and most particularly income statement modeling, is the topic of the book's first section, encompassing seven chapters. A first step in the valuation process is to build an income statement—forecast from five to eight quarters out—that can incorporate company developments, industry trends, and our best estimate of what the future will hold based on past practice and experience. Anyone in the field has encountered many of volumes on valuation. Income statement modeling gets second-class status on the premise that it's all percentage-of-revenue compilation. In fact, investors cannot reliably value the asset if the financial statement model is not nuanced and comprehensive and provides all the information possible.

In practice, what we call the income statement presentation encompasses the income statement model, but it also covers the accompanying margins, ratios, segment data, and industry detail that enable more precise modeling. One feature of this book is the recognition that the mundane and atypical can distract us from the core task of valuation. Hence, in subsequent chapters we spend some time on the exceptions—modeling foreign companies, accommodating stock splits, and so on—that can disrupt the valuation process.

We wrap up this long first section by demonstrating means of calculating smoothed growth rates and normalized earnings—tools to better assess performance across the various points in the economic cycle. A key danger in the valuation process is the inability to reliably adjust for the economic cycle. Unpredictable as it is, the economic cycle at one stage or another is continually impacting companies. The last chapter in Part 1 provides some tools to accommodate these cyclical forces.

After a rigorous discussion of the modeling process, we move onto a comprehensive discussion of common—and proprietary—tools for equity valuation. In Part 2, we discuss comparables historical valuation—that is, the use of historical price-relationship data and modeled inputs to derive asset value. The historical comparables chapters also include various useful ratios, some of which figure directly in individual asset value decision, some of which inform the industry valuation framework, and some of which subjectively influence the valuation decision.

Part 3 is devoted to our take on present value modeling, specifically the "discount to the firm" flavor of discounted free cash flow valuation. We examine the risks inherent in this method, specifically DFCF's implicit reliance on return on equity at a time when accounting regulations and corner-office practice are degrading the very validity of stockholders' equity. We also use this format to first discuss incorporating various inputs into determining value of the assets on a risk-adjusted basis.

In Part 4, we use the individual equity workbooks we've created to build and populate an industry matrix. In it we can track industry data and performance of the equity and its peer group on a simple average and weighted basis and construct various alerts to capture gains or limit losses. The industry matrix also provides a fulcrum for beginning analysis of the asset within its industry group, along with techniques for market-weighting returns.

Concluding Part 4 of the book, we address what we deem to be an industry shortfall by explaining our method for peer-group relative value, called Peer Derived Value.

In the conclusion we briefly discuss the role of modeling and valuation analysis within the analyst's role.

How to Best Use This Book

How good is a newborn model? About as useful in the workspace as a newly minted college graduate—which is to say that it is more likely to knock over the coffee on your desk than it is to increase sales. College may not bestow a lot of practical information to young people, but it does teach them how to learn how to learn (at least we *hope* it does). Similarly, our wet-behind-the-ears model is well-intentioned but awkward, not to mention alarmingly deficient on day one in real-world common sense. But it is structured to accommodate ever more information. A few months into the job, our recent college graduate may surprise us with fresh insights and new energy brought to a familiar task. Similarly, our model is designed to incorporate new inputs in the formulation of investment opinion and determination of investment value.

The new model must be structured to gather more data, so along the way we'll elaborate steps to enable an ever-more-granular approach. It also must calibrate and, finally, replicate. By that I do not mean that the new model just needs to be able to spawn like models for like (or even unlike) companies. It also must be able to add a new measurement and valuation period (typically one year, divided into quarters) without needless repetition of steps. It must be able to reflect changes in company data presentation, something that happens a lot more often than you'd think. Remember, our model lives in a world of ringing phones, urgent e-mails, tense morning squawk sessions—no ivory tower, all business.

One of the biggest challenges for analysts working in the real world is balancing the rigorous application of theory and process with shortcuts. When modeling a balance sheet, the analyst can model each account in accord with the line items in the cash flow statement—or he or she can increase all balance sheet accounts uniformly at forecast gross domestic product or the asset's historical growth rate. Whenever possible, we describe the more rigorous process as well as the shortcut. Again, our goal is not to bog you down in process or theory but to help you build the model. Sometimes, the choice of formal process versus the shortcut is related to your position in the value chain. The buy-side analyst charged with keeping an eye on entire industries and sectors may make different choices and compromises than a sell-side analyst charged with monitoring a tidy group of 12 or fewer stocks.

Modelers need to respond to new real-time information inputs; the model is built to accommodate company information as it is issued. For instance, a company typically may report its results 20 days after quarter end and use a somewhat amended or modified income statement. Sometime later, within a 45-day window, it will issue its formal quarterly financial results within the 10-Q format, and this income statement may be more detailed and nuanced. But if you wait for this later input, you'll be lagging a market that has already digested and moved on from the real-time information issued on day 20.

Once you've completed a full company modeling, don't admire it too much: the company has a fair chance of changing its reporting style. This may reflect maturation of a one-time growth company, appointment of a new chief financial officer's competitive concerns, or a response to changes mandated by the U.S. Securities and Exchange Commission. As much as possible, we build the overall valuation model to seamlessly accommodate such changes, which typically occur within the Income Statement Presentation. In these situations, our approach is to keep a copy of the old model so informational content is not lost while moving forward with the new model.

A lot of times in this book I'll tell you what to do with a fair amount of exactitude. I apologize in advance for the knee-jerk imperative. It's not that I assume my approach is superior to the many other paths to the dollar value of the asset. Given the organic nature of the process I've built, it works well in its totality but is unreliable in its bits and pieces. And I can't put *please* or *kindly* before every command; all that wheedling would eventually get on your nerves too.

This book sets out to accomplish much, and to get it all done, we need to stay on task. The operative metaphor I'll sometimes use in this process is the cattle drive. Yes, I'll pause to spin some stories along the way. I could argue the merits of every financial theory we encounter until the campfire goes out. But the imperative is to push those cattle a little farther down the trail every day.

Sticking with the western theme, old analysts can come to resemble old cowboys left too long in the sun: similarly grizzled and at risk for turning crusty, curmudgeonly, and cynical (and we're not even out of the C's). Despite the inevitable crankiness that sets in with too much time in the Wall Street sun, I'll try to keep my rants to a minimum and mainly stay on topic.

Within every financial writer lives the soul of a frustrated novelist. Long before learning the basics of finance, such writers learn the basics of three-act drama and story arc: the setup, the "backstory," the denouement, and so on. Central to delivering an effective and satisfying conclusion at story's end is the resolution of those themes identified within the dramatic exposition. These backstory elements can turn the early going into a tough slog, but they can equally make the climactic wrap-up all the more compelling and satisfying.

In this book, the income statement serves as a species of dramatic exposition, and valuation technique as the story arc. I'll begin to weave all the strands in the discussion of "Industry Matrix." And with "Peer Derived Value," we reach a climax as all the elements of our prior work coalesce to enable a new and proprietary valuation technique. I offer final thoughts on "Dollar Value of the Asset" as a postscript. If you keep that in mind, the detailed slog through the income statement with which I begin the book may not seem so arduous.

The Uses of Modeling

If you've already plunked down money for this book, it's a bit late to ask this question, but I'll ask it anyway: why model? It may seem like needless trouble in an era in which historical and forecast data is widely available. I'd suggest that if you haven't run this data through your fingers, it can be more misleading and dangerous than no data at all.

I've tried to create a concise and sufficiently compact model that with time you'll be able to build and populate in little more than a day. While even that may seem like too much of a commitment in your busy life, the asset manager often finds that key names—Kimberly-Clark, or IBM, or Emerson—will be bought and sold numerous times in the course of your investing life. Doing the modeling process yourself rather than relying on outside sources makes you better able to wring value from what you read in the 10-K or 10-Q. Throughout this book, I'll draw on my extensive modeling experience in the communications technology space while straying now and again into semiconductors, manufacturing, and other industries. I always try to use illustrations with bearing across the entire universe of investable equities (banks excluded; their income statement presentations warrant their own book).

Modeling will fine-tune your BS detector. Time and again you will hear CFOs and CEOs promise millions of dollars in savings from this or that restructuring initiative. With the market's short memory, management is rarely held accountable for failure to deliver on these promises. Investors are too busy chasing the next carrot of operating cost reduction down the road to notice when they are whacked with the stick of earnings shortfall. But the careful modeler will have the quarterly operating cost totals before his or her eyes; and they're visceral, because he or she has typed them in.

The financial models referenced in this book were built over years and in some cases decades. The mature models tend to be hundreds of columns wide and hundreds of rows deep. Presenting these models "as is" is simply impractical on the page. The book includes upward of 65 figures or examples that represent snapshots or snippets in each case of a living model. In constructing the examples, I faced a choice: freeze the snippets to include the original column and row references; or use the column and row references created in the scaled-down snippets. Had I used the first choice, an income statement example might have referenced cells within columns BF through BJ, and rows 167 through 174. I felt this would be needlessly confusing. Accordingly, throughout the text I use column and row references created within the snippets. Because putting column and row headers on the snippets would give a false impression of the size and scale of the actual models, I have eliminated column and row headers from the figures. As much as possible I have indicated truncation within the models by the use of dark shading. Light shading is used to highlight rows, columns, or cells of interest.

Finally, a word on nomenclature, or specifically the pronouns, that are employed throughout this book. As you may have noticed, I'll variously use I or we. This is not as random as it may at first appear. The word *I* refers to the author, Jim Kelleher, and generally relates to my anecdotal experiences in some area. The word *we* refers to the legions of analysts, investors, students, and others who have directly and indirectly contributed to this process; to them I am eternally grateful.

PART 1

INCOME STATEMENT PRESENTATION

Overview

A successful, comprehensive financial workbook that includes modeled financial statements as well as valuation enablers is so neatly shaped that, for the model builder, it is hard to know where to begin. In classic chicken-or-egg fashion, we ask: should we start with financial modeling or with valuation?

Any discussion of beginnings begins with "Begin the Beguine," a 1940s pop song based on the eponymous dance that is a close cousin to the rumba. Imported from Martinique and Guadeloupe, the beguine is a slow dance requiring very close partners to move tightly in sync. Our goal is to make modeling and valuation move in sync.

In the business school library, you'll see row upon shining row of tomes dedicated to the topic of valuation. Squeezed in at the end, maybe, will be a single volume on financial statement modeling. And why should it get any more shelf space, given that income statement modeling is treated as a straightforward exercise in percentage-of-revenue analysis?

In the dance of asset analysis, valuation is Fred Astaire while modeling is Elaine from *Seinfeld*. The academic treatment of valuation is elegant and comprehensive, while the treatment of modeling is sometimes slapdash and awkward. Yet how can the most precise and imaginative valuation techniques be put to full use if the modeling of financial statements is treated as an afterthought? We're going to move forward in this book with the premise that financial statement modeling is Ginger Rodgers to Fred Astaire's valuation: doing everything backward and in high heels, and always in tight coordination.

In our process, we build what we call the income statement presentation in four stages or phases. Chapters 1 and 2 introduce Phase 1, which we call "The Income Statement," and is dedicated to building a flexible and responsive model of the income statement, along with a "percentage-of" (mainly revenue) section immediately thereafter. Phase 1 is by far the longest section, so I have broken it up into two chapters to ease your digestion of lessons learned.

Within Phase 1, we have several tasks that should be performed consecutively. We will create a visually appealing and informative format. We will gather historical data for past years and quarters. We will adjust the historical presentation to include interim periods. We will next adjust historical periods to accommodate real-world events, such as the one-time or nonrecurring costs that influence adjusted or non-GAAP earnings. Next, we will build an eight-quarter forward income statement model that accommodates both a GAAP and an adjusted representation of earnings. We will build this model even for companies that only report GAAP results, based on the reality that cyclical impairment of assets eventually leads every company to be valued on adjusted results from time to time.

Phase 2, called "Segment Modeling," is presented in Chapter 3 and is based on presentation of company-issued data that we will use to model the consolidated revenue line. In Phase 3, located within Chapter 4, we discuss modeling segment operating income, mainly so we can use it in a proprietary technique. In a variation on standard percentage-of-revenue modeling, we will demonstrate how to model so-called percentage of difference (between revenue and segment operating income) up from the segment level into the P&L.

Chapter 5 details Phase 4, called "The Worksheet," and represents the marshaling of company reported and anecdotal information, public information from various sources, purchased information, and other data to model the individual revenue segments. At this point we also discuss tailoring the cost inputs, as well as replicating the model for future years.

In Chapter 6, we consider several special challenges through the prism of one company: Ericsson. Consideration of this company's experience in the U.S. market enables us to address multiple issues, such as ADR-to-stock equivalency and changes in that relationship; stock splits; joint venture modeling; and other special circumstances. And in Chapter 7, we round out our modeling tool-kit with an introduction to normalized earnings as well as the OLS (ordinary least squares) refinement to determining compound annual growth rates.

We begin at the beginning with the income statement because the modeling of per-share earnings drives so much of the valuation process and figures so heavily in the market's valuation mindset. Within a standard Excel workbook, on worksheet 2 and in cell A1, write "[Company Name] Income Statement." On the identity tag on the bottom of the worksheet, we title this page "Incm Stmnt."

We always begin with the income statement in our models because an inordinate portion of valuation is derived from one simple metric: the price/earnings (P/E) multiple. It's easy to understand the lure of the P/E if you think like an asset manager, particularly all those generalists out there charged with making money on the funds entrusted by friends, family, and a group of clients. P/Es are easy to understand, apply to every equity, and lend themselves to instant analysis: that is, historical P/Es are readily available for comparison to projected P/Es.

We'll develop and analyze many more valuation methodologies across the course of this work, but we are keenly attuned to the importance of accurate modeling of earnings. Keep in mind that "earnings" bear no relation to the cash generated by a company in the course of its everyday business.

Analysts recognize earnings as a witch's brew of compromises and uncertain inputs that can be subject to, if not manipulation, then at least massaging. These inputs include revenue recognition, inventory recognition decisions, straight-line depreciation, "accounting"-based as opposed to cash-based taxes and interest. Earnings per share (EPS) are further complicated by changes in the share base. To arrive at diluted EPS, net income is divided by a share base that rises and falls on numerous inputs, including net income level and the stock price in relation to the status of various common stock equivalents.

Yet earnings are not just universally accepted; they are a bedrock of valuation, and for one key reason: they are calculated the same way. The constancy of earnings brings us to an important early takeaway. Sometime the value of valuation is not in its accuracy but in its constancy. Because earnings are always realized in the same fashion for every company, they form a common ground for analysis—even if that common ground is tilted by all the inherent uncertainty in the inputs.

In Russia, before embarking on a long journey, it is customary for travelers to sit a few moments in quiet contemplation. (In the United States, we pause only long enough for, “Where are the car keys?”) Let’s take a moment to contemplate the task ahead. Broadly, we’re going to wade into the digital data stream to seek, capture, and tame data for use in deriving equity value. Specifically, we’re going to model financial statements, use modeled and historical data to value equities, and replicate the process to further enhance individual equity valuation within a group of like companies. Let’s get started on a vital task for any analyst: accurately modeling the income statement.

Chapter 1

PHASE 1: INCOME STATEMENT AND MARGIN MODEL, PART 1

Modeling in a Workbook

Modeling requires populating countless cells on a spreadsheet. Some of those cells hold complex formula; others hold numbers. As you build your model, you'll know which is which; but to the uninformed eye, a formula cell and a number cell are indistinguishable.

One difficulty with describing a dynamic process in a static medium such as a book is that our spreadsheet examples (designated as Figure 1.1, Figure 1.2, etc.) cannot fully display the formulas residing within; that would make for indecipherable gibberish. We thus ask that you read the text closely, refer carefully to the model when requested, and make the needed abstract connections between written word and illustration on the page.

We are going to conduct our analysis of a single equity, as much as possible, on a single workbook with linked worksheets. Later we'll discuss a matrix workbook in which we aggregate data from the individual workbooks. Later still we'll throw data from the matrix workbook back to the individual worksheet to provide a kind of peer group relative ranking that will help inform the valuation calculation. For now, though, we can begin with a focus on the individual equity workbook.

Our goal is to build a workbook that, once created, can be replicated for other companies in the coverage universe with the least amount of disruption. We'll spend a great deal of time discussing communications equipment companies, so let's borrow a metaphor from the industry to describe a key element of our task. In an astounding transformation, the legacy communications infrastructure has been torn down and replaced with protocols such as Ethernet borrowed from the data network. Ethernet was chosen partly because it is ubiquitous (there is only one Ethernet jack in use the world over) but mainly because it is easily replicable.

When we build a workbook, we'll have a few tasks in mind. We want the individual equity workbook to fully capture value for a single stock. But we also want it to lend itself to relatively straightforward manipulation whereby it can transformed into a second company model, and a third, and so forth.

No two companies are alike; equally important, no two companies report their financial data in exactly the same way. Creating a replicable workbook is a key element of our task, given that we are working in a world of jangling phones and deadlines, and we certainly are not within that proverbial ivory tower—which, as metaphors go, must be at least as politically insensitive as skinning cats.

Our individual company workbook will have several worksheets. At a minimum, our generic workbook will include income statement (or income statement presentation, as we'll call it); ratios and valuations, where we'll conduct historical comparable valuation and also aggregate annual ratios and annual financial statements; a present value worksheet for discounted free cash flow valuation; a query page for real-time pricing; and a worksheet to calculate "smoothed" historical growth rate and forecast normalized earnings. In practice, any workbook used to model and value an individual equity will over time sprout additional worksheets that will be used to track changes in manufacturing footprint, model the combination of acquired assets, or accommodate other real-world events.

We'll discuss formatting of individual worksheets and necessary historical backup data as we go. For the past two years, we have been modeling in .xlsx workbooks. All our techniques work in prior-generation .xls workbooks as well. If you are new to this process, we highly recommend that you begin with the .xlsx workbooks consistent with the latest version of Excel.

Given that we need to create a replicable workbook, choose for your first model the most "normal" company in coverage. In other words, for your template use a company with steady and even boring growth, consistent profitability, little to no history of changing segment presentations, and a reasonably stable business model. If no such company exists in your coverage, take the best of the bunch.

Every workbook needs to access a source for real-time pricing of the asset. As a first step, we will label worksheet 1 as our "Query" page. Our recommended price-data source, and the one used in all our workbooks, is the Money page from MSN. Guidelines for linking data to this worksheet will vary; the process typically requires that a ticker be placed on the query worksheet for immediate reference, or on an adjacent worksheet for a linked reference. In addition to the ticker for the individual equity, we will need real-time pricing for the market benchmark—in this case, the Standard & Poor's 500 Index (S&P 500). Given that the pricing function can accommodate dozens of tickers, it is also highly useful to include prices for the other major indexes [Dow Jones Industrial Average (DJIA), Nasdaq, and New York Stock Exchange Composite (NYSE Composite)]; you may also want to include industry indexes in which the equity is a member.

Figure 1.1 shows the Query worksheet in the Motorola (MOT) model. In addition to prices for MOT, we have priced the S&P 500; much further down the line, this will come in handy for calculating the relative P/E. Also note what is not there; at this point, we have no need to price the peer group.

Tracking Down Historical Data Sources

Having built several hundred income statement models, I can tell you that individual company income statement presentations are like snowflakes or fingerprints: remarkably similar, but if you squint, you can see the differences. Individual income statements aren't issued by cookie cutters; they come from the finance departments of disparate companies, peopled with individuals with their own quirks.

The modeled income statement has at its heart a variety of percentage-of-revenue inputs. The trouble is, being married to pure percentage-of-revenue procedure robs your model of nuance and precision. As we'll demonstrate later on, depending on the data, you can build an income statement model not on percentage of sales but on percentage of *difference* between forecast revenue and forecast operating income.

To model future financial statements, you need historical data as issued by the company. This historical data will be most usefully recorded in the company's own filings with the Securities and Exchange Commission (SEC), available on every company Web site (typically, see Home Page>Investor Relations>Financials>SEC filings). A variety of pay-for sites exist that enable download of data into Excel; they may charge a one-time fee or a subscription. Because these come and go, we'll limit our mentions to EDGAR.

Figure 1.1

A Query page from MSN Money in the Motorola model. Real-time pricing of the asset and its benchmark (the S&P 500) is vital to the valuation process.

Stock Quotes Provided by MSN Money

Click here to visit MSN Money

			Last	Previous Close	High	Low	Volume	Change	% Change	52 Wk High	52 Wk Low	Market Cap	EPS	P/E Ratio	# Shares Out
Motorola Inc	Chart	News	7.04	7.28	7.29	7.01	5,327,398	-0.24	-3.30%	10.5	2.98	16,159,362,472	-1.87	0	2,295,364,000
S&P 500 INDEX	Chart	News	997.17	1012.73	1012.6	994.6	0	-15.56	-1.54%	1303.04	666.79	0	0	0	0

Symbol Lookup	MSN Money Home	Microsoft Office Tools on the Web
Find stocks, mutual funds, options, indices, and currencies.	Discover MSN Money's tools, columns, and more!	Get the latest from Microsoft Office

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Prepare for some confusion. EDGAR (electronic data gathering, analysis, and retrieval) is a useful and free service sponsored by the SEC that simplifies the tracking down of SEC filings for every company. News headlines on the Web, however, will frequently steer you to EDGAR Online Pro, which is a pay service. Your particular situation—including the extent of your coverage responsibilities, your company's resources, and time constraints—will determine whether you rely on a vendor for historical data or transcribe the data the old-fashioned way.

Public companies in the United States are compelled to report their results every 90 days. They may or may not do so through their investor relations function. Some firms provide all the bells and whistles, including 20-page press releases, an accompanying slide deck, conference call, and even conference call transcript. Sometimes you get no more than a press release with abbreviated financial data. More and more companies have discovered the virtues of being user-friendly toward investors. As part of that outreach, many firms now furnish their financial statements in Excel format for easy download into your model.

You will also find that financial data is available on the major financial sites, both free (Yahoo! Finance, Google Finance) and pay (Bloomberg). True, you can gather financial statements from these and other sources. But be careful; you don't want a cookie-cutter synopsis of all the main points. That is typically what you get on Yahoo! Finance, which uses a cooked-down version of the income statement, balance sheet, and cash flow statement.

For your sanity while maintaining a model over the long term, you'll need to model every line, because you need your model to think and act like the issuing CFO. So here is another of our bona fides: we will begin by recreating the model exactly as the issuing company does. Later we will change it to accommodate the real world as well as our own organizational needs.

We recommend beginning with (at least) a base of the five preceding historical years, with the immediately preceding two years modeled in historical quarters. Perhaps most important, for all annual periods, we are going to reinvent the past one or two years not as a series of discrete quarters, but as a process.

Amending the Status Quo

To my thinking, the standard business school guidance on income statement modeling is replete with problems. The standard guidance is something like this: Represent the figures in the income statement as percentages of revenues. Line the quarters up one next to the other; sum them for the full year. For certain high-priority inputs, position year-over-year or quarter-over-quarter percentage changes immediately below the line item. Situate the percentage of revenue percentages at the bottom of the sheet for each quarter; link them to the individual cells below the revenue line. Rinse and repeat for year 2.

Some form of percentage-of-revenue modeling is a given, and we'll use percentage of revenue as a starting point. But, to my thinking, the importance of presentation on the page is overlooked in that standard template. So too is convenience, a vital need for the time-challenged analyst. For example, Excel makes for easy summing. The introduction of annual or sequential rate-of-change percentages in the column thwarts that process or introduces inaccuracy into the model. Sure, percentages amount to less than 1, but why introduce any inaccuracy in a carefully modeled income statement?

Here's another early key takeaway: think like the reporting company. The reporting company sees the year not as four discrete baskets but as a process. Companies are dynamic; they set goals based around new product ramps and extensions, cost management, competitive progress, and host of other things. Therefore, our income statement mirrors the company's presentation and models the year cumulatively. Moreover, the progress or lack thereof should be visually immediate to the modeler. To this end, we include summary columns as the year progresses, for the first half, nine months, and full year.

Structuring the Income Statement Model

If you are beginning with that standard model of four side-by-side historical quarters from the preceding year lined up next to one another, adjust them as follows: Immediately to the right of historical quarter 1 and between quarter 2, add a column enabling visualization of year-over-year percentage change for every line item. Italicize this column too, further distinguishing it from any column containing dollar values. Next comes historical quarter 2; similarly position next to it a column enabling year-over-year percentage change in every line item.

Here's where our divergence begins, enabling us to see the year as a process. In the next column we sum the half-year to date. Then comes quarter 3 and its attendant annual percentage change column, followed by a nine-month sum of the year to date. Finally we position quarter 4 and its attendant percentage change column, with the full-year summary and its annual change column.

In Figure 1.2, we see the four historical quarters for ADTRAN in 2004. I do not typically include a year-over-year rate of percentage change comparison column for the half year or the nine months, because investors don't usually

Figure 1.2

The four-quarter and interim-period P&L presentation for ADTRAN for the year 2004. The pro forma (PF) line items reflect the company's conventions for adjusting GAAP earnings to exclude nonrecurring events and noncash items.

ADTRAN												
Income Statement	**1Q04**	**Yr/Yr %**	**2Q04**	**Yr/Yr %**	**1H04**	**3Q04**	**Yr/Yr %**	**9mos04**	**4Q04**	**Yr/Yr %**	**2004**	**Yr/Yr %**
Net Sales	114.0	*32%*	120.6	*33%*	234.6	115.3	*9%*	349.9	104.9	*-8%*	454.8	*15%*
COGS	48.5	*24%*	50.8	*25%*	99.4	48.5	*3%*	147.9	45.7	*-4%*	193.5	*11%*
Gross Profit	65.5	*39%*	69.8	*40%*	135.3	66.8	*13%*	202.0	59.3	*-11%*	261.3	*18%*
SG&A	22.3	*11%*	24.0	*18%*	46.3	22.2	*8%*	68.4	23.4	*6%*	91.8	*10%*
R&D	14.8	*4%*	15.9	*17%*	30.7	18.9	*26%*	49.6	17.8	*17%*	67.4	*16%*
Stock Option Expnsng												
Operating Costs & Exp	37.1	*8%*	39.9	*17%*	77.0	41.1	*15%*	118.0	41.2	*10%*	159.2	*13%*
PF Optng Costs & Exp												
Operating Earnings	[illegible]	[illegible]	[illegible]	[illegible]	58.3	25.7	*10%*	84.0	18.1	*-38%*	102.1	*27%*
PF Oprtng Ernngs	28.4	*125%*	29.9	*90%*	58.3	25.7	*10%*	84.0	18.1	*-38%*	102.1	*27%*
Interest Income	(2.2)		(2.6)		(4.8)	(2.1)		(6.9)	(3.8)		(10.7)	
Interest Expense	0.6	*-4%*	0.6	*-2%*	1.3	0.6	*3%*	1.9	0.6	*2%*	2.5	*0%*
Other Income	(0.4)	*-93%*	-		(0.4)	-		(0.4)	-		(0.4)	*-78%*
Net Realized Invstmnt Gains	0.1	*-9609%*	-		0.1	-		0.1	-		0.1	
Pretax Income	30.2	*104%*	31.8	*77%*	62.0	27.2	*6%*	89.2	21.2	*-30%*	110.4	*24%*
PF Pretax Income												
Income Taxes	9.8	*128%*	10.3	*85%*	20.2	8.5	*-1%*	28.7	6.4	*-28%*	35.0	*28%*
PF Income Taxes												
Tax Rate	*32%*	*12%*	*33%*	*5%*	*33%*	*31%*	*-6%*	*32%*	*30.0%*	*2%*	*32%*	*3%*
PF Tax Rate												
Net Income	20.4	*94%*	21.5	*73%*	41.9	18.7	*9%*	60.6	14.9	*-31%*	75.4	*23%*
PF Net Income												
Basic Shares Outstndng	79.5	*4%*	79.3	*4%*	79.4	77.8	*0%*	78.9	76.6	*-3%*	78.2	*2%*
Diluted Shares Outstndng	82.8	*7%*	82.2	*3%*	82.5	80.4	*-1%*	81.8	78.7	*-5%*	81.0	*0%*

(continued)

Figure 1.2 *(continued)*

ADTRAN												
Income Statement	**1Q04**	**Yr/Yr %**	**2Q04**	**Yr/Yr %**	**1H04**	**3Q04**	**Yr/Yr %**	**9mos04**	**4Q04**	**Yr/Yr %**	**2004**	**Yr/Yr %**
Reprtd EPS Basic	0.26	*87%*	0.27	*66%*	0.53	0.24	*8%*	0.77	0.19	*-28%*	0.96	*21%*
Reprtd EPS Diluted	0.25	*82%*	0.26	*68%*	0.51	0.23	*10%*	0.74	0.19	*-27%*	0.93	*22%*
Adjstd EPS Basic	0.26	*87%*	0.27	*66%*	0.53	0.24	*8%*	0.77	0.19	*-28%*	0.96	*20%*
Adjstd EPS Diluted	0.25	*82%*	0.26	*68%*	0.51	0.23	*10%*	0.74	0.19	*-27%*	0.93	*22%*
Dividend	0.08		0.08		0.16	0.08		0.24	0.08		0.32	

think in these terms. But these interim-period columns are available for easy comparisons.

Modelers may wonder: where are the sequential comparisons? These can matter more than annual comparisons for some companies, particularly firms with a limited seasonal influence and those still in their early growth phase. Given proximity on the page, visual rather than percentage change is sufficient for sequential comparison for many line items. For higher-priority inputs, we will furnish formal sequential comparisons as needed, mainly further down the income statement presentation.

A Not-So-Random Walk Down the Income Statement

For thoroughness, let's take a quick walk down the income statement. Purists, be forewarned: the emphasis here is on *quick*, and what follows is by necessity a very cursory treatment of complex topics. Much more thorough treatments of income statement line items are available elsewhere. Whole volumes have been devoted to revenue recognition, depreciation, FIFO-LIFO accounting, tax treatment, and other issues; it would be a distraction to detail them here. At least on a summary basis, the model builder must know the basis of individual line item inputs in order to best represent them.

The first line item on the income statement is revenues. Many companies have taken to breaking out product from service revenues. We always welcome enhanced granularity.

Remember that revenues do not reflect cash that has *ca-chinged* the cash register within a 90-day span. Instead, it reflects revenues "recognized" in a period. Given the payment terms of 30 to 60 days in the United States and often much longer overseas, recognized revenues may not jingle the cash register for months. This tally also includes proportional payments from lump sums collected earlier (e.g., one-twelfth of a 12-issues-per-year magazine subscription). Service revenues in particular will reflect timed recognition of cash paid either in lump sum or over a period for regularly scheduled maintenance and/or special services.

Cost of goods sold, or COGS, primarily reflects what is recognized (again, as opposed to what is spent) to physically produce goods or, in some cases, services. This mainly includes costs for materials, manufacturing, maintaining the supply chain, procurement, and most of the costs of keeping the factory going. The difference between revenue and COGS is gross profit or gross margin.

Another element in COGS is depreciation, reflecting assumed loss of value in a physical asset from usage and time's passage. Formerly, depreciation was lumped in DDA (depreciation, depletion, and amortization); depletion is mainly of interest to energy investors, while companies now prefer to separately list amortization (more below in our continuing operations discussion).

Throughout this text, when we address financial statement accounting, our shorthand is "book" accounting; what happens in the real world we refer to as "cash" accounting. On a book basis, assets are depreciated on a straight-line basis, meaning in equal increments over the asset's useful life. In the real world, companies use the more tax-friendly accelerated depreciation, where high levels of depreciation are recognized early on followed by ever-decreasing decrements. This discrepancy is one of several that influence the difference between income statement accounting and real-world accounts.

COGS will also be influenced by inventory treatment decisions. LIFO accounting is an acronym for "last in, first out," meaning a company records a profit from sales based on the company's cost for its most recently purchased inventory. Remember that this is not a product-flow issue but an accounting recognition one. LIFO is regarded as better matching costs to prices. In a period of normally increasing prices, or inflation, LIFO reduces profits and therefore taxes compared with FIFO, which is an acronym for "first in, first out." FIFO is considered appropriate when a company ships an undifferentiated product, such as a commodity. Start-ups may favor FIFO; in a period of normally increasing prices, FIFO increases inventory values and makes a company look "bigger." For the small company, conveying size can matter in winning new financing. The prevailing International Financial Recordings Standards, or IFRS, does not accept LIFO.

Continuing down the income statement we come to the two or three key elements of operating cost. Most often, these are (1) research and development (R&D) and (2) selling, general, and administrative (SG&A); less often, they are (1) R&D, (2) selling and marketing (S&M), and (3) general and administrative (G&A). Fans of the granular, we always prefer the second three-part representation, because it better breaks out selling and marketing costs from the cost of the corporate function.

These key operating costs are also of interest because embedded within them are stock-compensation costs that some companies, in league with their covering analysts, will disaggregate in order to better represent real costs of doing business. FAS 123R is a relatively new standard that compels corporations to reflect components of stock-option compensation within the income statement line item in which they are expensed. In other words, if a portion of an engineer's compensation is in the form of stock, this payout must be included as a cost within R&D. Prior to this standard, the cost to the company of stock granted to that engineer would not appear in the R&D line item. FAS 123R has had a profound impact on operating costs and thus on net income. Its disruptive appearance in current income statements makes a strong argument for staying current on accounting standards, and on creating a financial model flexible enough to accommodate them as they occur.

Other elements of operating costs that frequently earn a regular spot as separate line item on the income statement include amortization of intangibles and "other," a deliberately vague catch-bag of items that may include legal settlements, disposition of minor assets, current exchange effects, or "other."

In an ideal world, companies would operate flawlessly, every acquisition would be perfectly timed and seamlessly integrated, and the economy would always be in the up part of the cycle. Back here in the real world, companies overshoot on expectations and underdeliver on performance, buy ill-fitting assets that gum up their core operations, and navigate a macroeconomy in which bumps alternate with pitfalls.

The space on the income statement between the main operating cost items (i.e., R&D and SG&A) and GAAP operating income is clogged with monuments to ill-planning and economic reality, mixed in with noncash items that must be recognized in the course of normal business. Companies all recognize these differently. Some larger companies may fold their mistakes into a larger operating cost line item such as SG&A, while smaller companies that need to put the best spin on their performance will exclude every one-time or noncash item to bolster earnings. These items mainly include restructuring, asset impairment, goodwill impairment, acquisition integration, write-down of acquired in-process R&D, settlement costs, and other. (Note that while actual asset-acquisition costs do not flow through income statements, costs attendant on that acquisition or its integration can be included.)

The difference between gross profit and the sum of operating costs is operating income. Operating income is then impacted primarily by interest costs and interest income. Depending on presentation style, this may be reflected as separate line items or a net figure. Again depending on style, companies may choose to include line items that typically recognizes value changes in investment assets, in shares held in trust for a settlement, or other similar items that impact accounting net income but are deemed to be nonoperating in nature. Interest earned on cash and equivalents and investments, as expressed on the income statement, often has a close correlation with real-world cash from these items. By contrast, "book" or income statement interest cost can vary, sometimes meaningfully, from cash interest costs.

Operating income less these items is pretax income. Income taxes on a book basis may look like a single number, but they are actually an amalgam of inputs from different jurisdictions. Corporate income tax rates for industrialized nations tend to run in the 30% to 40% range; emerging economies are usually characterized by low income tax rates meant to encourage new business investment. Given the widely varied tax rates from different nations, a globally diverse company may report an operating loss but still be liable for net income taxes because the company made money in one or more countries despite losing money in others. The difference between book taxes and cash taxes from varying jurisdictions and (reaching back to our discussion of depreciation) the difference between straight-line and accelerated depreciation are among several items that can cause a profound difference between book taxes and cash taxes.

From pretax income on down, individual company presentation of the income statement can take on a very individualized tint. The main contributor to this variation is the relationship with partner companies. On a very cooked-down basis (purists: shield your eyes), and allowing exceptions, joint-venture (JV) companies are consolidated on the income statement of the majority partner (i.e., the one that owns more than 50%). Consolidation means that all the joint venture's revenues are recorded in one (but not both) of the partners' top lines. For 50/50 joint ventures, one partner elects to consolidate and the other doesn't; there is no joint consolidation. While many companies, including nearly all large-cap companies, participate in JV companies, many do not.

Nonmajority partners, particularly those owning 20% to 50% stakes in the joint venture, will typically record proportional income (or loss) as equity income below the pretax income line and above net income. Majority partners will recognize as a proportional cost (or gain) against JV profits (or losses). The majority partner is effectively disgorging profit (or loss) to its smaller partners proportional to the position the majority partner does not hold in the joint venture. Large corporations may be majority partners in some joint ventures and minority partners in others; their EI (equity income) and MI (minority interest, also called noncontrolling interest) lines are an amalgam of these inputs. In Figure 1.3, we see Corning's equity income and minority interest line items for two years (2002 and 2008) with two very different profiles.

A less-frequent variable standing between pretax income and net income is under the heading "Accounting Changes." These can be a one-time impact on the income statement from a change in accounting treatment mandated by the Financial Accounting Standards Board (FASB).

A final adjustment can and frequently does intrude. If a company indicates plans to sell an operating asset, net results from that asset are stripped from consolidated operations and moved to discontinued operations. This accounting

Figure 1.3

Within the (compressed) income statements for 2002 and 2008, we show a comparison of Corning's equity income and minority interest. Note that minority interest, nearly equal to equity income in 2002, had all but vanished by 2008. Meanwhile, equity income had grown so large as to become roughly equivalent to operating income.

Corning Inc.														
Income Statement	**1Q02**	**2Q02**	**1H02**	**3Q02**	**9mos02**	**4Q02**	**2002**	**1Q08**	**2Q08**	**1H08**	**3Q08**	**9mos08**	**4Q08**	**2008**
Revenues	730	753	1,483	762	2,245	736	2,981	1,617.0	1,780.0	3,397.0	1,555.0	4,952.0	1,084.0	6,036.0
Cost of Sales	655	643	1,298	633	1,931	631	2,562	773.0	858.9	1,631.9	820.0	2,451.9	777.0	3,228.9
Gross Profit	75	110	185	129	314	105	419	844.0	921.2	1,765.2	735.0	2,500.2	307.0	2,807.2
SG&A	188	188	376	157	533	183	716	242.0	249.2	491.2	220.0	711.2	179.0	890.2
R&D - Engnrng	126	131	257	113	370	113	483	151.0	173.6	324.6	160.0	484.6	153.0	637.6
Amortization Intngbls	11	11	22	11	33	10	43	2.0	5.0	7.0	2.0	9.0	5.0	14.0
Acquisition, Asbsts	-	-	-	-	-	-	-	(327)	-	(327.0)	6	(321.0)	(28)	(349.0)
Res[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(86)	(176)		-		(2)	(3.0)	22	19.0
Impairment		494	494	125	619	1,461	2,080							
Operating Earnings	(250.0)	(646.0)	(896.0)	(255.0)	(1,151.0)	(1,576.0)	(2,727.0)	777.0	493.4	1,270.4	349.0	1,619.4	(24.0)	1,595.4
PF Oprtng Ernngs	(250.0)	(220.0)	(470.0)	(152.0)	(622.0)	(201.0)	(823.0)	451.0	498.4	949.4	355.0	1,304.4	(25.0)	1,279.4
Interest Income	(14)	(10)	(24)	(10)	(34)	(7)	(41)	(30.0)	(36.7)	(66.7)	(22.0)	(88.7)	(11.0)	(99.7)
Interest Expense	48	44	92	44	136	43	179	18.0	20.1	38.1	15.0	53.1	11.0	64.1
Debt Prpmnt														
Other, Net	9	-	9	1	10	28	38		(40.0)	(41.0)	30.0	(11.0)	32.0	21.0
Pretax Income	(293.0)	(680.0)	(973.0)	(290.0)	(1,263.0)	(1,640.0)	(2,903.0)	790.0	550.0	1,340.0	326.0	1,666.0	(56.0)	1,610.0
PF Pretax Incm	(293)	(186)	(479)	(165)	(644)	(179)	(823)	464.0	555.0	1,019.0	332.0	1,351.0	(57.0)	1,294.0
Incm Tax	(50)	(184)	(234)	(91)	(325)	(401)	(726)	66.0	82.5	148.5	(60.0)	88.5	(23.0)	65.5
PF Incm Tax	(50)	(47)	(97)	(45)	(141)	(48)	(189)	67.3	80.5	147.8	(15.0)	132.8	(18.0)	114.8
Tax Rate	*17.1%*	*27.1%*	*24.0%*	*31.4%*	*25.7%*	*24.5%*	*25.0%*	*8.4%*	*15.0%*	*11.1%*	*-18.4%*	*5.3%*	*41.1%*	*4.1%*
PF Tax Rate	*17.1%*	*25.0%*	*20.1%*	*27.0%*	*21.9%*	*27.0%*	*23.0%*	*14.5%*	*14.5%*	*14.5%*	*-4.5%*	*9.8%*	*31.6%*	*8.9%*
Income bfr MI & EE	(243)	(496)	(739)	(199)	(938)	(1,239)	(2,177)	724	468	1,192	386	1,578	(33)	1,545
PF Income bfr MI & EE	(243)	(140)	(383)	(120)	(503)	(131)	(634)	397	475	871	347	1,218	(39)	1,179

(continued)

Figure 1.3 *(continued)*

Corning Inc.															
Income Statement	**1Q02**	**2Q02**	**1H02**	**3Q02**	**9mos02**	**4Q02**	**2002**		**1Q08**	**2Q08**	**1H08**	**3Q08**	**9mos08**	**4Q08**	**2008**
Minority interst	6	6	12	5	17	81	98.0		1	-	1.0	-	1.0	-	1.0
Dividends Cnvrtbl Prfrd (Sub)			-		-		-				-		-		-
Equity Earnings, net Imprmnts	30	25	55	42	97	19	116.0		304	264	568.0	382	950.0	282	1,232.0
Impairmnt Eqty Invstmnt			-		-		-				-		-		-
Incm Bfr Dscntnd Ops	(207)	(465)	(672)	(152)	(824)	(1,139)			1,029	732	1,761	768	2,529	249	2,778
PF Incm Bfr Dscnrd Ops, Prfrd	(207)	(109)	(316)	(73)	(389)	(31)			702	739	1,440	729	2,169	243	2,412
Dscntnd Ops Income	8	21	29	19	48	430									
Prfrd Dvdnd				(128)	(128)		(128)								
Net Incm	(199)	(444)	(643)	(261)	(904)	(709)	(1,963)		1,029	732	1,761	768	2,529	249	2,778
PF Net Income	(207)	(109)	(316)	(201)	(517)	(31)	(128)		702	739	1,440	729	2,169	243	2,412
Basic Shrs Out	945	945	945	1036	977	1230	1039		1569	1572	1571	1574	1572	1576	1573
Diluted Shrs Out	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1230	1039		1604	1607	1606	1575	1595	1577	1591
Rprtd Basic EPS	(0.22)	(0.47)	(0.68)	(0.25)	(0.93)	(0.58)	(1.89)		0.66	2.01	1.12	0.49	1.61	0.16	1.77
Rprtd Diluted EPS	(0.22)	(0.47)	(0.68)	(0.25)	(0.93)	(0.58)	(1.89)		0.64	2.01	1.10	0.49	1.58	0.16	1.75
Pro Forma Basic EPS	(0.22)	(0.15)	(0.37)	(0.19)	(0.57)	(0.02)	(0.59)		0.45	0.50	0.95	0.46	1.41	0.15	1.56
Pro Forma Diluted EPS	(0.22)	(0.15)	(0.37)	(0.19)	(0.57)	(0.02)	(0.59)		0.44	0.49	0.93	0.46	1.39	0.15	1.54
Dividends Declared			-		-		-		0.05	0.05	0.10	0.05	0.15	0.05	0.20

treatment need not await final disposition of the asset, or even announcement of a prospective buyer; it occurs immediately upon determination that the asset is being shopped, shut down, or otherwise dispatched. The discontinued asset continues to warrant this kind of treatment as long as it takes for full asset disposition and related effects, which may straddle several periods.

Across its reporting history and depending on its business development strategy, accounting changes, partner relationships, and other factors, every company will need to represent some basket of these below-the-line line items, including equity income, minority interest, accounting changes, and discontinued operations. The effects of these items can be persistent or transitory, meaningful or insignificant. Accordingly, no one standard for presentation prevails when a company is initially presenting its quarterly results.

A company's income statement presentation may subtract taxes and as many as applicable of these items from pretax income and proceed directly to net income. Sometimes a company may subtract taxes from pretax income to arrive at net income before MI and EE; present a number; then separately subtract discontinued operations and accounting changes to arrive at net income. The point is, there is no single method.

Net income is then divided by the share count to arrive at net income per share, per-share earnings, or EPS; whatever you call it, this is the most intensely analyzed number coming off the income statement. Basic EPS reflects net income as is—that is to say, divided by a stated number of shares outstanding. Diluted EPS features an amendment to both numerator and denominator. The numerator (i.e., net income) may also include the equivalent of interest that would be earned by convertible debt, along with other inputs. The denominator (i.e., share count) will be inflated by various common stock equivalents, or CSEs. These include various stock options as well as the shares that would be included upon conversion to common of any convertible debt. Investors are most interested in and make valuation decisions based on diluted EPS.

Nonrecurring and Noncash

Now that you have exactly replicated a company's single-quarter historical representation of its income statement, let's amend it to make it more useful. Our first task is to reconcile the real-world reporting with the continuing-operations analysis that will inform stock valuation going forward. To do so we are going to add continuing operations lines, which for simplicity and consistency we will call pro forma (abbreviated PF).

In Figure 1.4, we have shown Cisco's income statement for 2005 amended to our presentation style. Like many companies providing both GAAP and pro forma results, Cisco aids the analytic community by providing a detailed walk-through between GAAP and adjusted results. That is not the case with some companies that are coy about adjusted results even though analysts value their stocks on adjusted results. Refer to this model as we walk through.

You may or may not be aware that technology companies, biotechs, and start-ups of every flavor frequently provide two sets of operating metrics for investor analysis: GAAP results and pro forma results. Increasingly, companies outside these designated "growth" sectors are providing GAAP and adjusted or pro forma results as well.

GAAP results are presented in accordance with an extensive body of accounting standards prevailing in the home country. Investors are also interested in how a company is performing on a continuing operations basis, which is to say excluding one-time items—such as restructuring costs or acquisition-related costs—as well as noncash items. The list of noncash items can be lengthy; primary examples include stock option compensation (as outlined in FAS 123R), intangibles amortization, and write-downs of acquired in-process R&D.

Although earnings and changes in earnings estimates drive so much of the investment decision process, you may be surprised to know that no clear consensus exists on whether a company should be modeled on GAAP or pro forma performance. The decision to model on a GAAP or pro forma basis resides with the companies that maintain the analysts' consensus; these companies are to some degree in league with the analysts. Consensus earnings estimates that appear on publicly available sites may or may not contain an indication that they are GAAP or non-GAAP.

Line items that analysts and investors exclude from pro forma results fall into two categories: noncash and nonrecurring. Noncash items are those that, like amortization of intangibles, reflect no real cash cost to the company. But these items do have accounting effects; for example, amortization causes the intangibles balance to decline on the balance sheet, and it thus must go through the income statement. FAS 123R, the provision mandating the expensing of stock options used as compensation, impacts the cash flow statement.

Many analysts and investors cast a baleful eye on exclusion of noncash items from results. The convention was born of the adage "give the little person a chance." Exclusion of noncash but nonetheless GAAP expenses was originally intended for garage-born tech companies and other start-ups. The idea was to give them time to grow and eventually establish earnings for valuation purposes. Many of those start-ups have long since burst the garage walls; but, by habit or

Figure 1.4

Cisco provides detailed GAAP and adjusted or pro forma results all the way down its P&L, but *it does not publish a P&L in this format in its SEC filings.* Modelers need to incorporate line items for PF (pro forma) values if they wish to capture both GAAP and adjusted earnings calculations in their model.

Cisco Systems												
Income Statement	**1Q05**	**Y/Y %**	**2Q05**	**Y/Y %**	**1H05**	**3Q05**	**Y/Y %**	**9mos05**	**4Q05**	**Y/Y %**	**2005**	**Y/Y %**
Products	5,033	*18.1%*	5,106	*12.2%*	10,139	5,189	*9.7%*	15,328	5,525	*10.3%*	20,853	*12.4%*
Services	938	*11.9%*	956	*12.7%*	1,894	998	*12.1%*	2,892	1,056	*14.9%*	3,948	*13.0%*
Total Sales	5,971	*17.1%*	6,062	*12.3%*	12,033	6,187	*10.1%*	18,220	6,581	*11.1%*	24,801	*12.5%*
Products COGS	1,646	*25.1%*	1,669	*17.1%*	3,315	1,697	*16.9%*	5,012	1,746	*11.0%*	6,758	*17.2%*
Services COGS	310	*11.1%*	340	*23.6%*	650	355	*17.9%*	1,005	367	*23.2%*	1,372	*19.0%*
Total COGS	1,956	*22.6%*	2,009	*18.2%*	3,965	2,052	*17.1%*	6,017	2,113	*12.9%*	8,130	*17.5%*
Total Gross Profit	4,015	*14.5%*	4,053	*9.6%*	8,068	4,135	*6.9%*	12,203	4,468	*10.2%*	16,671	*10.2%*
R&D	787	*7.1%*	785	*3.4%*	1,572	790	*-1.4%*	2,362	858	*9.3%*	3,220	*4.5%*
S&M	[illegible]	[illegible]	[illegible]	[illegible]	2,234	1,180	*4.3%*	3,414	1,257	*9.3%*	4,671	*5.1%*
G&A	225	*15.4%*	222	*13.8%*	447	237	*10.2%*	684	250	*25.6%*	934	*16.2%*
Pyrl T+A41x Stk Optn Excrs	1	*-50.0%*	3	*-57.1%*	4	3	*0.0%*	7	5	*25.0%*	12	*-25.0%*
Amrtzn Dfrd Stk-Bsd Cmpnsn	40		39		79	47		126	39		165	
Amrtzn Intngbls	60	*-3.2%*	57	*-5.0%*	117	54	*-10.0%*	171	56	*-6.7%*	227	*-6.2%*
In-Process R&D	12	*0.0%*	2	*100.0%*	14	6	*200.0%*	20	6	*0.0%*	26	*766.7%*
Acquisition Costs	-		-		-	-		-	-		-	
Oprtng Expenses	2,227	*5.2%*	2,240	*4.1%*	4,467	2,317	*0.2%*	6,784	2,471	*9.6%*	9,255	
PF Oprtng Expenses	2,114	*5.6%*	2,139	*1.2%*	4,253	2,207	*2.8%*	6,460	2,365	*10.8%*	8,825	
Oprtng Incm	1,788		1,813		3,601	1,818		5,419	1,997		7,416	
PF Oprtng Incm	1,901	*26.3%*	1,914	*15.9%*	3,815	1,928	*12.1%*	5,743	2,103	*9.5%*	7,846	*15.4%*
Gain Sale Invstmnt	-		-		-	-		-	-		-	
Interest & Othr Incm	130	*-5.8%*	127	*2.4%*	257	150	*18.1%*	407	156	*25.8%*	563	*9.7%*

(continued)

Figure 1.4 *(continued)*

Cisco Systems												
Income Statement	**1Q05**	**Y/Y %**	**2Q05**	**Y/Y %**	**1H05**	**3Q05**	**Y/Y %**	**9mos05**	**4Q05**	**Y/Y %**	**2005**	**Y/Y %**
Mnrty Intrsts/Othr	40	*0.0%*	17	*-87.5%*	57	-		57	-		57	*-69.5%*
Pretax Income	1,958	*28.1%*	1,957	*8.3%*	3,915	1,968	*14.4%*	5,883	2,153	*11.2%*	8,036	*14.9%*
PF Pretax Income	2,018		2,058		4,129	2,078		6,207	2,259		8,466	
Incm Taxes	562	*27.1%*	557	*7.9%*	1,119	563	*10.4%*	1,682	613	*10.3%*	2,295	*13.4%*
PF Incm Taxes	565		576		1,141	582		1,723	633		2,356	
Tax Rate	*28.7%*	*-0.8%*	*28.5%*	*-0.3%*	*28.6%*	*28.6%*	*-3.5%*	*28.6%*	*28.5%*	*-0.9%*	*28.6%*	*-1.3%*
PF Tax Rate	*28.0%*		*28.0%*		*27.6%*	*28.0%*		*27.8%*	*28.0%*		*27.8%*	
Accnt Chges												
Net Income	1,396	*28.5%*	1,400	*93.4%*	2,796	1,405	*16.0%*	4,201	1,540	*11.6%*	5,741	*15.6%*
Pro Forma Net Oprtns	1,453	*22.8%*	1,482	*12.7%*	2,988	1,496	*10.1%*	4,484	1,626	*9.9%*	6,110	*12.7%*
Basic Shares	6,635	*-4.3%*	6,521	*-5.1%*	6,578	6,435	*-5.6%*	6,530	6,366	*-5.5%*	6,489	*-5.1%*
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6,713	6,541	*-7.5%*	6,655	6,480	*-6.6%*	6,612	*-6.3%*
Rptd Basic EPS	0.21	*34.3%*	0.21	*103.8%*	0.43	0.22	*22.9%*	0.64	0.24	*18.1%*	0.88	*21.8%*
Rptd Dltd EPS	0.21	*34.9%*	0.21	*106.7%*	0.42	0.21	*25.5%*	0.63	0.24	*19.4%*	0.87	*23.4%*
Adjstd Basic EPS	0.22	*28.3%*	0.23	*18.8%*	0.45	0.23	*16.6%*	0.68	0.26	*16.3%*	0.93	*19.6%*
Adjstd Dltd EPS	0.21	*28.9%*	0.22	*20.4%*	0.44	0.23	*19.1%*	0.67	0.25	*17.6%*	0.92	*21.2%*

inertia, analysts covering such "start-ups" as Cisco and Microsoft still routinely exclude noncash charges. Once Financial Accounting Standards Board (FASB) established FAS 123R, it was no stretch to lard stock option compensation in with the other noncash items.

The exclusion of nonrecurring items is more defensible—or would be, if certain companies did not always manage to find something that they can sneak across the line as "nonrecurring." Companies whose balance sheets are as large as those of small nations will routinely be incurring nonrecurring costs related to new deals and to cleaning up the mess from past failed deals.

Even well-structured acquisitions executed at fair prices can now trigger massive impairments once the market sours. Nearly every significant asset purchase entails recognition of goodwill on the balance sheet; in our experience, this will equate to anywhere from 40% to 70% (or more, rarely less) of the purchase price. In our view, the FASB doomed investors to a regular barrage of nonrecurring charges in the form of goodwill impairment when it changed the treatment of goodwill.

Goodwill used to be depreciated, meaning that the excess from assets acquired at a premium in good times would be steadily worked down on a scheduled basis. True, as in any game of musical chairs, some companies closed major asset deals immediately before a severe market downturn, prompting significant write-downs. But in the aggregate, depreciation of goodwill gradually cleansed balance sheets of excess goodwill and prevented immense write-downs of a very vulnerable asset class in tough times.

Beginning in mid-2001, under FASB standard 142, goodwill was no longer depreciated. Instead, it was to be left on the balance sheet and impaired as need be to reflect changes in peer-group values. Now that the balance sheet–cleansing mechanism of depreciation is gone, every down cycle triggers a huge number of huge goodwill impairments. Goodwill write-downs and other impairments flow through the income statement and onto retained earnings on the balance sheet, thus impacting stockholders' equity; that is playing havoc with return on equity and debt-to-capitalization ratios, in our view. Figures 1.5 and 1.6 show the consequences of this change in accounting treatment, in the form of massive goodwill impairments at Vishay Intertechnology and ADC Telecom taken during the market downturn of 2007–2009.

The upshot for analysts is that every income statement model should be built to accommodate the high likelihood of a major impairment event—and the concomitant high likelihood that investors, for an indeterminate period, will value the company on adjusted earnings rather than GAAP earnings. In the age of goodwill impairment as opposed to goodwill depreciation, *every* income statement model *must* be ready to accommodate pro forma earnings. Think of it as a

Figure 1.5

Vishay, a company with a healthy and disciplined business development strategy, impaired goodwill in every quarter of 2008 as the market collapse drove down asset values.

Vishay Intertech												
Income Statement	**1Q08**		**2Q08**		**1H08**	**3Q08**		**9mos08**	**4Q08**		**2008**	
Net Sales	733,313	*11%*	774,364	*8%*	1,507,677	739,092	*1%*	2,246,769	575,442	*-21%*	2,822,211	-0%
COGS	560,850	*16%*	594,645	*11%*	1,155,495	579,591	*4%*	1,735,086	484,134	*-14%*	2,219,220	4%
Loss Purchs Cmmtmnts					-			-	6,024		6,024	
Gross Profit	172,463	*-2%*	179,719	*1%*	352,182	159,501	*-9%*	511,683	85,284	*-49%*	596,967	-14%
SG&A Costs	119,063	*11%*	121,021	*7%*	240,084	112,844	*3%*	352,928	97,951	*-11%*	450,879	3%
Restructuring	18,202	*798%*	8,909	*618%*	27,111	6,849	*-31%*	33,960	28,577		62,537	
LT Prchs Cmts/Trmndt Tender						4,000			878		878	
Amortzn					-			-			-	
[illegible]	[illegible]		[illegible]		804,195	357,917		1,162,112	565,257		1,727,369	
Purchased R&D					-			-			-	
Operating Costs	141,460		929,930		1,071,390	481,610		386,888	692,663		1,079,551	
PF Oprtng Costs	116,682		119,811		236,493	108,330		344,823	97,951		442,774	
Operating Income	31,003	*-53%*	(750,211)	*-1332%*	(719,208)	(322,109)	*-686%*	124,795	(607,379)	*-1803%*	(482,584)	-301%
PF Oprtng Incm	55,781		59,908		115,689	51,171		166,860	(6,643)		160,217	
Interest Expense	6,584	*-8%*	6,078	*-18%*	12,662	4,873	*-35%*	17,535	6,729	*2%*	24,264	-15%
Trmt IR Swp/Xtngsh Debt					-	13,601		13,601			13,601	
Extrdny Gain (Loss)					-			-			-	0%
Other	198	*-103%*	(4,673)	*11%*	(4,475)	(6,853)	*318%*	(11,328)	(3,548)	*-6%*	(14,876)	-11%
Minority Interest	478	*65%*	269	*4%*	747	144	*-67%*	891	173	*-12%*	1,064	-10%
Ttl Othr Expnss	7,260	*1738%*	1,674	*-52%*	8,934	11,765	*89%*	20,699	3,354	*10%*	24,053	83%
Pretax Income	23,743	*-64%*	(751,885)	*-1409%*	(728,142)	(333,874)	*-786%*	104,096	(610,733)	*-1973%*	(506,637)	-323%
ProForm Prtx Incm	48,521		58,234		106,755	39,406		146,161	(9,997)		136,164	

(continued)

Figure 1.5 *(continued)*

Vishay Intertech												
Income Statement	**1Q08**		**2Q08**		**1H08**	**3Q08**		**9mos08**	**4Q08**		**2008**	
Income Taxes	6,173	*-61%*	(10,194)	*-166%*	(4,021)	(21,007)	*-281%*	(25,028)	36,215	*70%*	11,187	*-83%*
ProForm Incm Txs	12,616		15,141		27,756	5,517		33,273	2,599		35,872	
Tax Rate	*26.0%*	*8%*	*1.4%*	*-95%*	*0.6%*	*6.3%*	*-74%*	*-24.0%*	*-5.9%*	*-109%*	*-2.2%*	*-108%*
PF Tax Rate	*26.0%*		*26.0%*		*26.0%*	*14.0%*		*22.8%*	*-26.0%*		*26.3%*	
Discontinued Operations	42,136.00								(5,690.00)		(5,690.00)	
NetIncome	(24,566)	*-149%*	(741,691)	*-1920%*	(724,121)	(312,867)	*-989%*	129,124	(652,638)	*-13479%*	(523,514)	*-441%*
PF Net Income	35,906		43,093		78,999	33,889		112,888	(12,596)		100,292	
Basic Shares Out	186,343	*1%*	186,371	*1%*	186,357	186,651	*0%*	186,455	186,544	*0%*	186,477	*1%*
Diluted Shares Out	186,540	*-13%*	186,820	*-3%*	186,680	187,100	*-3%*	186,820	186,544	*-6%*	186,751	*-6%*
Rprtd Basic EPS	(0.13)	*-149%*	(3.98)	*-1911%*	(4.11)	(1.68)	*-988%*	(5.79)	(3.50)	*-13415%*	(9.29)	*-1416%*
Rprtd Diluted EPS	(0.13)	*-152%*	(3.97)	*-1892%*	(4.10)	(1.67)	*-993%*	(5.77)	(3.50)	*-12071%*	(9.29)	*-1448%*
Adjstd Basic EPS	[illegible]	[illegible]	[illegible]	[illegible]	0.42	0.18	*-29%*	0.61	(0.07)	*-134%*	0.54	*-46%*
Adjstd Diluted EPS	0.19	*-27%*	0.23	*-10%*	0.42	0.18	*-28%*	0.60	(0.07)	*-135%*	0.54	*-44%*

Figure 1.6

ADC Telecom took a huge impairment charge in the first quarter of its September 2009 fiscal year, resulting in a deep GAAP loss for the year.

ADC Telecom													
Income Statement	**1Q09**	**Yr/Yr %**	**2Q09**	**Yr/Yr %**	**1H09**	**3Q09**	**Yr/Yr %**	**9mos09**	**4Q09E**	**Yr/Yr %**	**2009E**	**Yr/Yr %**
Prodct Sales	218.50	*-27%*	239.30	*-32%*	457.8	245.8	*-28%*	703.6	152.54	*-50%*	856.1	*-34%*
Service Revenue	35.80	*15%*	35.80	*-10%*	71.6	37.6	*-8%*	109.2	22.50	*-50%*	131.7	*-16%*
Net Sales	254.3	*-23%*	275.1	*-30%*	529.4	283.4	*-26%*	812.8	175.0	*-50%*	987.8	*-32%*
Product COGS	147.50		155.40	*-31%*	302.9	155.1	*-31%*	458.1	96.30		554.36	*-34%*
Service COGS	28.10		29.60	*-14%*	57.7	29.6	*-15%*	87.2	18.34		105.59	*-19%*
Net COGS	175.6	*-19%*	185.0	*-29%*	360.6	184.7	*-29%*	545.3	114.6	*-50%*	659.9	*-32%*
Gross Profit	78.7	*-30%*	90.1	*-32%*	168.8	98.7	*-20%*	267.5	60.4	*-50%*	327.9	*-33%*
Research & Development	19.0	*-3%*	18.4	*-16%*	37.4	17.3	*-20%*	54.7	10.1	*-51%*	64.8	*-22%*
Selling & Administration	71.9	*-3%*	66.1	*-15%*	138.0	62.9	*-16%*	200.9	37.6	*-63%*	238.5	*-27%*
Intngbl Amrtzn					-	-		-	-		-	*0%*
In-Prcss R&D/Rthr					-	-		-	-		-	
Impairment Charge	413.5	*0%*	0.7	*0%*	414.2	0.1	*0%*	414.3	-	*0%*	414.3	*0%*
Restructuring Charge	0.5	*-58%*	7.3	*0%*	7.8	5.3	*-763%*	13.1	5.0	*-77%*	18.1	*19%*
Operating Costs & Expns	504.9	*389%*	92.5	*-15%*	597.4	85.6	*-18%*	683.0	52.7	*-52%*	735.7	*72%*
PF Optrng Costs & Expns	82.6		78.3	*-21%*	160.9	72.0		232.9	42.7		275.6	
Operating Earnings	(426.2)	*-4889%*	(2.4)	*-110%*	(428.6)	13.1	*-28%*	(415.5)	7.7	*-28%*	(407.8)	*-761%*
PF Oprtng Ernngs	6.1	*-68%*	11.8	*-65%*	17.9	26.7	*2%*	44.6	17.7	*-62%*	62.3	*-50%*
Net Interest Income	-		-		-	-		-	-		-	*0%*
Gain (lss) Investments			(0.7)									
Gain on Patent Settlment												
Other Loss (Income)	20.3	*-59%*	5.8	*-64%*	26.1	7.1	*-18%*	33.2	6.0	*-2100%*	39.2	*-61%*
Pretax Income	(446.5)	*1140%*	(7.5)	*-194%*	(454.7)	6.0	*-31%*	(448.7)	1.7	*-88%*	(447.0)	*1070%*
PF Pretax Income	(11.4)		6.7		(4.7)	19.6		14.9	11.7		26.6	
Income Taxes	(4.0)	*-367%*	1.4	*-26%*	(2.6)	0.4	*-86%*	(2.2)	0.2	*-88%*	(2.0)	*-133%*

Figure 1.6 *(continued)*

ADC Telecom												
Income Statement	**1Q09**	**Yr/Yr %**	**2Q09**	**Yr/Yr %**	**1H09**	**3Q09**	**Yr/Yr %**	**9mos09**	**4Q09E**	**Yr/Yr %**	**2009E**	**Yr/Yr %**
PF Income Taxes	(4.0)		1.4		(2.6)	4.3		1.8	2.6		4.3	
Tax Rate	*1%*		*-19%*		*1%*	*7%*		*0%*	*10%*		*0%*	
PF Tax Rate	*35%*		*22%*		*54%*	*22%*		*12%*	*22%*		*16%*	
Income Cntng Oprtns	(442.5)	*1080%*	(8.9)	*-246%*	(452.1)	5.6	*-3%*	(446.5)	1.5	*-88%*	(445.0)	*902%*
PF Incm Cntng Oprtns	(7.4)		5.3		(2.1)	15.3		13.1	9.1		22.3	
Incm/Lss Dscntd Optrns	(0.3)		(1.3)		(1.6)	(6.4)		(8.0)	-		(8.0)	
Loss/Gain Sale												
Net Income	(442.8)	*1103%*	(10.2)	*-273%*	(453.7)	(0.8)	*-112%*	(454.5)	1.5	*-88%*	(453.0)	*981%*
PF Net Income	(7.4)		5.3		(2.1)	15.3		13.1	9.1		22.3	
Basic Shares Outstndng	99.4	*-15%*	96.6	*-18%*	98.0	96.6	*-18%*	97.5	96.7	*-18%*	97.3	*-17%*
Diluted Shares Outstndng	99.4	*-33%*	96.9	*-18%*	98.2	97.8	*-17%*	98.0	97.9	*-17%*	98.0	*-16%*
[illegible]	[illegible]		[illegible]		(4.61)	0.06		(4.58)	0.02		(4.57)	
Cntng Ops EPS Diluted	(4.45)		(0.09)		(4.61)	0.06		(4.55)	0.02		(4.54)	
Reprtd EPS Basic	(4.45)	*1324%*	(0.11)	*-311%*	(4.63)	(0.01)	*-106%*	(4.66)	0.02	*-85%*	(4.65)	*1201%*
Reprtd EPS Diluted	(4.45)	*1986%*	(0.11)	*-226%*	(4.62)	(0.01)	*-106%*	(4.64)	0.02	*-89%*	(4.62)	*1192%*
Dscntd Ops EPS Basic	(0.00)	*-151%*	(0.01)	*692%*	(0.02)	(0.07)	*-809%*	(0.08)	-	*0%*	(0.08)	
Dscntd Ops EPS Diluted	(0.00)	*-164%*	(0.01)	*693%*	(0.02)	(0.07)	*-804%*	(0.08)	-	*0%*	(0.08)	
Adjstd EPS Basic	(0.07)	*-124%*	0.05	*-85%*	(0.02)	0.16	*-42%*	0.14	0.09	*-49%*	0.23	*-79%*
Adjstd EPS Diluted	(0.07)	*-126%*	0.05	*-86%*	(0.02)	0.16	*-42%*	0.14	0.09	*-49%*	0.23	*-80%*

form of disaster planning. You don't try to buy flood insurance when your desk is floating out of the room. Similarly, we can't try to adjust on the fly for the catastrophic impairment, particularly given that well-intentioned accounting standards (by definition, the worst kind) have nearly preordained such an event as a regular or at least cyclical occurrence.

A final thought on goodwill impairment and its consequences, and this counts as my first real rant. In some ways, the impairment of goodwill has accustomed investors to accept non-GAAP, or pro forma, results as readily as GAAP results. In a kind of cascading effect, that may have led aggressive managements in areas outside traditional growth niches to begin calling out noncash and nonrecurring events that were previously treated as ordinary costs of doing business. I'm suggesting that by opening the floodgates of goodwill impairment, FASB may have inadvertently encouraged a lot of questionable callouts to wash over the reporting process.

Amending Historical Income Statement Data

Now, an important point: analyst convention, based on collusion between the consensus-gathering companies and the analysts, will determine (1) whether GAAP or non-GAAP earnings drive the investment decision for a particular company, and (2) if non-GAAP prevails, which line items are regularly excluded. Believe me when I say there is much variation on this matter among the roughly 5,000 stocks trading on the NYSE and the Nasdaq Composite Index. A call to the consensus manager (e.g., Bloomberg, Thomson-First Call) can sometimes provide an answer; paying close attention to the footnotes in a company's results release will also provide some clues.

So let's retrace our walk down the income statement, ready to add a few new elements. Remember income statement convention will vary from CFO to CFO. Some of our additions will be to "normalize" the income statement for easy cross-industry comparisons; others will be to provide a ready means for easy pro forma calculation. Key point: the ability to call out and isolate items to create pro forma results does not mean we say to do so; we merely want to have that option as the need arises. Note, we use the term *pro forma* for non-GAAP or adjusted line items at least partly because the acronym *PF* fits easily on the amended-item line.

Pro Forma Line Items

Our first task is to adjust the income statement so we can record, measure, and analyze GAAP and pro forma results—and modeled results—simultaneously.

The alternative is to maintain separate income GAAP and pro forma income statements. That is a repetitive task, particularly if one-time events really are scarce.

As an overview, we will generally insert lines to sum pro forma operating costs and to show the following:

- Pro forma operating earnings
- Pro forma pretax income
- Pro forma income tax
- Pro forma tax rate
- Pro forma net income
- Pro forma basic and diluted EPS

For companies with meaningful joint venture exposure, we will also show PF net income before MI and EE and then reflect the equity income and minority interest inputs to arrive at pro forma net income. We generally show basic and diluted share count only once, on a GAAP basis. For companies with significant convertible debt, or for companies with a chronically huge gap between GAAP and pro forma results, we might include a line item showing PF diluted share base.

For the most part, GAAP and pro forma revenues are not materially different from each other. Non-GAAP cost of goods sold (COGS) can be reduced, typically by stock option compensation. You have the discretion to create a new line item for non-GAAP COGS. For some larger companies in which this is a large item, we will include a line item for non-GAAP COGS. For the smaller firm, we are less apt to create this line item.

Some companies, in their income statement presentations, display gross profit, defined as the difference between revenues and COGS; some don't. We always will; so if the presentation does not include a line for gross profit (revenue minus COGS), insert a line and display gross profit. Again, we do not typically display PF gross profit.

Of the main operating cost items, SG&A and R&D are typically big sites for stock option compensation. Some nonrecurring or irregular items, such as legal costs, can sometimes be carried within these lines. Below these main operating cost line items we will list noncash and nonrecurring items; we will call out each separately so they can be easily excluded from non-GAAP computations.

Making Room for Nonrecurring and Noncash Items

In Chapter 11, we will discuss companies' increasing propensity for behavior that seems destined to trigger "nonrecurring" events. Putting aside the occasional positive one-time event, such as a legal settlement resulting in a gain or a tax reversal, most such one-time events involve sizable impairments to assets or to goodwill. We will suggest in fact that the system as currently structured seems to make such one-time and nonrecurring events commonplace, thanks to ill-timed and ill-conceived acquisitions, sudden veers in the economic cycle, and FASB standard 142, which compels goodwill tests and impairment rather than goodwill depreciation.

For now it is sufficient to know that these events are more frequent than in the past and that our models must be able to accommodate them. So as we amend our income statement presentation, we will include at least two lines to accommodate these errors when acknowledged. We'll call one line item restructuring and the other impairment.

In practice, I make use of at least three lines, the third usually being called acquisition-related. There's a certain crazy and circular logic to this presentation. Without fail, companies overpay for acquisitions, eventually take restructuring costs for their hubris, and impair oodles of goodwill generated by ill-advised acquisitions.

In our adjusted presentation, we will always make room for a final operating cost item that we call "other." Many companies already have such a line item. However, even if a company does not list an "other" category, we'll include one anyway. In short, if we've modeled multiple forward quarters and years and suddenly at the company's behest need to sandwich in another line item—a very common occurrence—we would need to change all our sum-of–operating cost formulas. We would have to, that is, if we were unprepared. If a company hatches such a line item—and I've seen some doozies—we'll insert a line directly above "other" to accommodate the new curiosity. This way, we don't need to amend the summary formulas that are in every quarterly calculation of GAAP and pro forma operating costs.

Within the actual income presentation from the company, conventions will vary, and companies may or not sum operating costs. We always will; as need be, insert a line for GAAP operating costs. Insert a line and call it pro forma operating costs. So now we have two operating cost tallies, one for GAAP operating costs and one for pro forma operating costs.

GAAP operating cost sums the headline operating costs—SG&A and R&D, or alternately S&M, R&D, and G&A—along with the called-out and thus easily excluded noncash and nonrecurring items. Non-GAAP or pro forma operating income sums only the headline items and is adjusted as needed to exclude items not called out.

Adjusting Historical Quarters for Stock Option Compensation

Most nonrecurring and noncash items earn their own line in the income statement and are easily excluded. Remember, *FAS 123R stock option compensation is not an income statement line item.* It can sometimes be tricky to find and thus sometimes difficult to exclude from historical comparisons.

For our historical determination of pro forma operating costs, particularly if we are going to regularly exclude stock option compensation, we need to find a historical basis. Every public company in the United States reports its quarterly results. If covering analysts are accustomed to excluding noncash items, companies usually cooperate by listing them. In particular, we'll typically be able to find allocation of stock option compensation per quarter divvied up among the recipients by line item (i.e., by COGS, SG&A, and R&D). But your best source is not the 10-Q, which by convention still tends to bury this data. Consult the quarterly results release issued by the company and archived on its Web site; here you'll typically find the stock option compensation detail by line item.

Most of the hourly workers toil in the factories, while most of the salaried workers are in sales, engineering, and other white collar occupations. Stock option compensation is usually minor as a proportion of COGS (typically less than 1%), while it can be meaningful in the main operating cost lines (3% to 10%, or more, of operating costs).

There are several ways to capture or re-create stock option compensation in historical presentations with the goal of excluding FAS 123R from PF operating costs. One, we can measure the percentage of individual line-item costs represented by FAS 123R for several quarters and adjust each line item by the average of several periods. Thus, if we determine that, on average, FAS 123R amounts to 7% of SG&A and 9% of R&D, in our PF operating cost calculation we will reference the actual Excel cells representing SG&A and R&D (let's say A7 and A8, respectively). For pro forma SG&A, we will use the formula `=A7*.93`; and for R&D, `=A8*.91`.

The second way would be to capture the historical data, culled from the pro forma portion of the press release, and list the actual FAS 123R contributions by line item in a column immediately below that quarter's income statement. Thus, if we learn that GAAP COGS contains $8 million in FAS 123R costs, we list it, along with the $20 million included in SG&A and the $23 million included in R&D; hypothetically, these are in cells A40, A41, and A42. In our pro forma operating cost calculation we will reference the actual Excel cells representing

SG&A and R&D (again, A7 and A8, respectively) and adjust as follows: `=A7−A41` and `=A8−A42`. Notice we did not reference cell A40? We'll get to it.

Another option is to calculate FAS 123R stock option compensation cost as a percentage of GAAP operating expenses. Remember, stock option compensation for the middle tier of engineers and salespeople is not a given (as it too often is in the executive suite) but is based on performance. When GAAP operating costs are rising, the cause would be sloppy execution (seldom) or, more often, rising sales performance and thus rising compensation. We put four to eight quarters of historical P&L in our model for just such situations where we need to see the precedent.

To proceed, measure FAS 123R stock option compensation as a percentage of GAAP operating costs for four to eight historical quarters; determine any average; check for any seasonal outliers; and use that seasonally adjusted percentage in appropriate quarters. Asset-light companies with a higher proportion of variable costs [e.g., software firms or electronics original equipment manufacturers (OEMs) that rely on contract manufacturers] tend to have a higher percentage figure, often 5% or more. Traditional asset-intensive companies with high fixed costs will have a lower percentage, say 2% to 3%, in FAS 123R compensation as a percentage of operating costs.

In Figure 1.7, in shaded cells at the bottom of the worksheet we see Juniper's historical stock option compensation costs by line item; these items are also expressed in percentage terms, to give some sense of their size and scope. These can easily be deducted from PF operating costs, along with more visible nonrecurring and noncash line items.

Amending Historical Adjusted Operating and Pretax Income

Beneath GAAP operating cost and pro forma operating cost, we want to have a line for GAAP operating income and a line for pro forma operating income. GAAP operating income consists of gross profit minus GAAP operating cost. Pro forma operating profit consists of adjusted gross profit minus pro forma operating cost.

How do we adjust gross profit so it is reflected in our pro forma operating cost? Again, we can go one of two ways. Let's begin with the premise that GAAP gross profit is in cell A4. The first method by which we model adjusted operating profit is to increase gross profit in this formula to reflect stock option compensation cost *as a percentage*. So in the hypothetical cell A13, which shows pro forma operating profit, we use the formula `=(A4*1.005)−A10`. The second method by which we model adjusted operating profit is to increase gross profit in this for-

Figure 1.7

In 2006, Juniper's FAS 123R stock option compensation typically amounted to 6% to 8% of GAAP operating costs. (The 2Q06 outlier reflects the $1.2 billion impairment in that quarter.) Note that less than 10% of stock option compensation goes to production workers (expressed in COGS), while over 90% goes to the salaried staff (represented in operating cost line items such as R&D, S&M, and G&A).

Juniper Networks												
Income Statement	**1Q06**	**Y/Y %**	**2Q06**	**Y/Y %**	**1H06**	**3Q06**	**Y/Y %**	**9mos06**	**4Q06**	**Y/Y %**	**2006**	**Y/Y %**
Product Revenue	474,125	*21%*	467,237	*10%*	941,362	467,524	*0%*	1,408,886	483,500	*-1%*	1,892,386	*7%*
Service Revenue	92,589	*63%*	106,330	*53%*	198,919	107,090	*34%*	306,009	112,330	*29%*	418,339	*43%*
Revenue	566,714	*26%*	573,567	*16%*	1,140,281	574,614	*5%*	1,714,895	595,830	*4%*	2,310,725	*12%*
Prdct COGS	140,995		144,843		285,838	147,906		433,744	133,866		567,610	
Srvc COGS	43,952		47,849		91,801	41,717		133,517	56,379		189,896	
Cost of revenue	[illegible]	[illegible]	[illegible]	[illegible]	377,639	189,623	*11%*	567,261	196,624	*8%*	757,506	*16%*
Gross profit	381,767	*25%*	[illegible]	[illegible]	762,642	384,991	*3%*	1,147,633	405,595	*3%*	1,553,218	*10%*
Research and development	113,688	*49%*	120,449	*48%*	234,137	123,542	*37%*	357,679	128,103	*29%*	485,782	*40%*
Sales & Marketing	129,429	*42%*	141,958	*39%*	271,387	143,653	*24%*	415,040	148,958	*18%*	563,998	*29%*
General and administrative	23,099	*49%*	25,811	*68%*	48,910	25,858	*-4%*	74,767	26,812	*65%*	101,579	*37%*
Amrtzn & Deferred Comp	23,221	*6%*	22,000	*-8%*	45,221	22,000	*-25%*	67,221	22,000	*-7%*	89,221	*-10%*
Restructuring	1,404				1,404			1,404	-		1,404	
Impairmnt/Charitabl			1,283,421		1,283,421			1,283,421			1,283,421	
Total expenses	290,841	*42%*	1,593,638	*630%*	1,884,479	315,053	*18%*	2,199,532	325,873	*18%*	2,525,406	*161%*
PF Total expenses	245,031		267,009		512,040	272,299		784,339	286,895		1,071,235	
Operating income (loss)	90,926	*-10%*	(1,212,763)	*-1114%*	(1,121,837)	69,938	*-36%*	(1,051,899)	79,722	*-32%*	(972,187)	*-319%*
Pro Forma Op Income	139,985		126,702		266,687	121,661		388,348	120,105		508,453	
Interest, othr incm (expns)	20,767	*95%*	23,882	*78%*	44,649	26,143	*68%*	70,792	26,143	*37%*	96,935	*65%*
Intrst Expense	(1,089)		(750)		(1,839)	(750)		(2,589)	(750)		(3,339)	
Gain Debt Extgt/Invstmnts					-			-			-	
Pretax Income	110,604	*-1%*	(1,189,631)	*-1002%*	(1,079,027)	95,331	*-24%*	(983,696)	105,115	*-22%*	(878,591)	*-275%*
PF Pretax Income	159,663		149,834		309,497	147,054		456,551	145,498		602,049	

(continued)

Figure 1.7 *(continued)*

Juniper Networks												
Income Statement	**1Q06**	**Y/Y %**	**2Q06**	**Y/Y %**	**1H06**	**3Q06**	**Y/Y %**	**9mos06**	**4Q06**	**Y/Y %**	**2006**	**Y/Y %**
Taxes	34,841	*-3%*	(344,993)	*-904%*	(310,152)	27,646	*-33%*	(282,506)	25,228	*-11%*	(257,278)	*-274%*
PF Taxes	46,302		43,452		89,754	42,646		132,400	34,920		167,319	
Tax rate	*32%*		*29%*		*29%*	*29%*		*29%*	*24%*		*29%*	
PF Tax rate	*29%*		*29%*		*29%*	*29%*		*29%*	*24%*		*28%*	
Net income (loss)	75,763	*0%*	(844,638)	*-1049%*	(768,875)	67,685	*-19%*	(701,190)	79,887	*-25%*	(621,313)	*-276%*
Pro Forma Net Incm	113,361		106,382		219,743	106,119		324,151	112,636		438,529	
Shares Basic & diluted	565,927	*4%*	565,927	*4%*	565,927	563,097	*0%*	564,984	560,282	*-1%*	563,808	*2%*
Pro Forma Shares	603,589	*3%*	603,589	*2%*	603,589	600,571	*-1%*	602,583	597,568	*-2%*	601,329	*1%*
Rprtd Basic EPS	0.13		(1.49)		(1.36)	0.12		(1.24)	0.14		(1.10)	
Rprtd Dltd EPS	0.12	*-7%*	(1.40)	*-1029%*	(1.27)	0.11	*-19%*	(1.16)	0.13	*-24%*	(1.10)	*-287%*
Pro Forma Basic EPS	0.20		0.19		0.39	0.19		0.58	0.20		0.78	
Pro [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.36	0.18	*-7%*	0.54	0.19	*-4%*	0.73	*1%*
Cash & Equivalents	2,614,304		2,614,304			2,614,304			2,614,304			
Debt	399,944		399,944			399,944			399,944			
COGS	1,883		1,968			2,101			1,571			
R&D	10,013		9,407			9,364			7,000			
S&M	7,627		8,486			8,071			7,121			
G&S	3,545		3,315			3,319			2,857			
FAS 123R	23,068		23,176			22,855			18,549			
% GAAP Operating Costs	7.9%		1.5%			7.3%			5.7%			
FAS 123R % Mnfctng	8.2%		8.5%			9.2%			8.5%			
FAS 123R % R&D and SG&A	91.8%		91.5%			90.8%			91.5%			

mula to reflect stock option compensation cost *as a modeled number.* So in the hypothetical cell A13, which shows pro forma operating profit, we use the formula =(A4+A4)−A10.

Now we have GAAP operating income and PF operating income. Next are the nonoperating items, principally interest income and interest cost. Do these vary for GAAP and PR purposes? Not typically, though some companies (usually very large or very global ones) may call out a slight difference. The catch-all category, "other," however, may be excluded by analysts and/or the company from pro forma results.

GAAP operating income less net interest cost and less nonoperating "other" is equal to pretax income. Pro forma operating income less (possibly adjusted) net interest cost and (possibly excluded) nonoperating "other" is equal to pro forma pretax income. We therefore need to create a line to accommodate PF pretax income. It follows that if we have two calculations of pretax income, we need to tax them separately. Accordingly, we create a separate line for GAAP taxes and PF taxes.

Finishing the Historical Adjustments

The standard corporate tax rate in this country is 34%. But most midsized and larger public companies, and not a few small-capitalization companies, have at least some foreign pretax income, which is taxed at different rates around the world.

Honestly achieved losses (e.g., through simple incompetence, badly misjudged markets, and wildly overpriced asset buys) trigger losses that are taxed at about the corporate rate. So, if you honestly lose $1 million, and assuming a 34% tax rate, your tax bill might be a credit in the amount of about $340,000. Now that goodwill is no longer depreciated but impaired, huge impairments flowing through the income statements are a commonplace. Yet impairment-related losses rarely trigger commensurate tax breaks; and again, the issue is origination of loss. If a company impairs assets, including goodwill, in a mature market but makes money in other markets, that $1 million loss may actually be accompanied by GAAP taxes, not tax losses. More significantly, impairments can also result in significant deferred tax valuation allowance charges.

Given the wide variety of special items, regional markets, and other effects, I find it particularly challenging to model GAAP taxes. By contrast, modeling PF taxes are a breeze. What's interesting here, and speaking anecdotally, is that PF income taxes tend to be (somewhat) predictable, while GAAP taxes vary enormously. Having adopted the fiction of PF earnings—a variation on that other collective hallucination known as the GAAP income statement (but now I'm starting to rant)—CFOs add some "stability" to the picture by forecasting a PF tax rate. Since impairments don't figure in PF results, PF taxes attempt to simulate a rate appropriate to those "honestly achieved losses" mentioned previously. Surprisingly often, PF taxes are delivered at the company-projected rate of 28%, 34%, or whatever.

Below the GAAP and PF income taxes, we like to include the tax rate represented in percentage form as a percentage of pretax income. We italicize these lines, which represent the only percentage figures shown within the individual quarter P&L columns. True, these percentages are represented in the margin analysis immediately below. But again, within our income statement presentation, we always emphasize visual representation of useful information.

Earlier, we briefly discussed the significant below-the-line items, including minority interest, equity income, accounting adjustments, and discontinued operations. As a guideline rather than a rule, PF net income needs to accommodate minority interest and equity income but only rarely accounting adjustments and discontinued operations. GAAP net income needs to accommodate all these items.

Net income is the difference between pretax income and GAAP taxes and all items, whereas pro forma net income is the difference between PR pretax income and PF taxes and (most typically) equity income and minority income. Below GAAP and PF net income, and regardless of their positioning within the company presentation, we position basic and diluted shares. We do not typically create a line item for PF diluted shares outstanding, except for those companies with significant convertible debt or huge chronic differences between GAAP and PF results. Your signal that a company has lots of convertible debt, without looking at the balance sheet (shame on you), is a large gulf between diluted shares outstanding and basic shares outstanding.

If a company has no discontinued operations to speak of, the company's income statement presentation will not show this line item. Nevertheless, every company at some point will hold an asset for disposition. Given the eternal disconnect between sellers and buyers, this could be a long process, one that will stretch across several (from the CFO's perspective) nail-biting quarters.

Accordingly, below basic and diluted shares, we allocate six lines: basic and diluted reported EPS; basic and diluted discontinued operations EPS; and basic and diluted pro forma EPS. We're almost at the bottom of our remodeled income statement; but there are a couple of must-haves for the conscientious modeler. We already mentioned that for companies whose valuations are driven by pro forma earnings, and because the analyst convention is to exclude stock option compensation, we have the option of listing the FAAS 123R numbers for each line item.

Casual investors may be surprised that many dividend-paying companies do not include their dividends within the income statement presentation. That is actually appropriate; the income statement is a record of operations, while the dividend decision is a reflection of financial policy. Many companies do include the dividend at the bottom of their income statement presentation, usually because they're feeling pretty good about the payout.

Within our income statement presentation, we're *always* going to situate the quarterly dividend beneath pro forma diluted EPS, not because we're feeling particularly good about anything but because—linked to another worksheet—it will prove useful later on.

We've now built the structure for modeling the income statement. As noted, we've made several preemptive adjustments based on the high likelihood that corporate or economic events will fracture the relationship between GAAP results and adjusted results. Now we need to model the line-item inputs that provide the basis for our forecast GAAP *and* forecast adjusted results.

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Chapter 2

PHASE 1: INCOME STATEMENT AND MARGIN MODEL, PART 2

Margin Analysis

We've now amended the historical income statement presentation to make it more user-friendly. We need a visual representation of the value of these inputs before we can begin modeling individual line items for forward quarters and interim and annual periods. We're going to conduct all of the following discussion under the heading "Margin Analysis." By that we generally mean representing income statement items as a percentage of revenue. But there will be some exceptions.

As always, what the company gives us will partly inform our margin model. Many companies include as part of their income statement presentation a breakout of product and service revenues. If so, the first lines in our margin analysis represent percentage of revenues for product and percentage of revenues for services. If revenue is presented as a single number, it earns no place in our margin analysis.

We next represent cost of goods sold (COGS) as a percentage of sales; for this and all future lines, we'll express percentages as "(Item) % Revenue." Below COGS as a percentage of revenue, we have gross profit, which is simply revenue minus COGS and represented as a percentage of revenue. In the next few lines, we represent R&D and, depending on presentation, either S&M and G&A, or alternately SG&A, as a percentage of revenue.

Beyond these major cost categories, it makes sense to represent amortization of intangibles. The amortization schedule typically though not always lends steadiness and predictability to this account; as such, it most often impacts GAAP net income in a predictable way. The item being amortized—acquired intangibles—resides not on the income statement but on the balance sheet. In our margin analysis bloc, we will represent amortization as a percentage of revenue. But in our modeling of future quarters, whenever possible we will be modeling intangibles amortization as a percentage of the balance sheet item "acquired intangibles."

The other noncash and nonrecurring items impacting operating costs will also be portrayed as a percentage of revenue. We then have a line for GAAP operating costs as a percentage of revenue, and PF operating costs as a percentage of revenue. Below this are lines for GAAP operating income as a percentage of revenue and PF operating income as a percentage of revenue.

Beneath these are the nonoperating lines for items that impact pretax income; depending on presentation, these will include interest cost, interest income, and/or net interest expense. Each warrants a representation as a percentage of revenue. Less frequently we will need to measure sundry, other, and losses/gains from purchases/dispositions; these only find a place in our margin analysis bloc if they occur frequently and are meaningful.

We then present both GAAP pretax income as a percentage of revenue and PF pretax income as a percentage of revenue. Following are the GAAP tax rate and PR tax rate—but not as a percentage of revenue. These are represented as percentages of GAAP and PF pretax income, respectively. We conclude our margin bloc with GAAP net income as a percentage of revenue (net margin) and PF net income as a percentage of revenue.

Once we've created the template for these representations for a single quarter, we copy and paste them for all periods: the quarters, and also the half year, nine months, and full year. In Figure 2.1, the margins for JDSU (formerly JDS Uniphase) are shown for the fiscal year 2007.

Modeling Forward Periods

To review, we now have at least one and preferably two complete historical years represented. These years are laid out to accommodate a rolling performance measurement that includes half-year, nine-month, and full-year compilations. A column enabling year-over-year percentage comparisons now adjoins each quarter (though not the interim cumulative periods) as well as the full year; in each case,

Figure 2.1

In fiscal 2007, JDSU—which had long struggled to reach adjusted profitability, much less GAAP profitability—had a 4.6% pro forma net margin for the year. On a GAAP basis, however, net margins were negative.

JDS Uniphase										
MARGINS	**1Q07**		**2Q07**		**1H07**	**3Q07**		**9mos07**	**4Q07**		**2007**
COGS % Rvns	66.1%		59.8%		62.7%	62.7%		62.7%	65.1%		63.3%
Gross Margin	30.8%		37.4%		34.4%	34.6%		34.4%	31.9%		33.8%
Non-GAAP Gross Margin	34.6%		42.1%		38.6%	38.8%		38.7%	35.9%		38.0%
R&D % Rvns	12.6%		11.7%		12.1%	12.0%		12.1%	12.0%		12.1%
SG&A % Rvns	26.1%		25.8%		25.9%	26.5%		26.1%	27.2%		26.4%
Amrtzn % Rvns	2.0%		1.9%		1.9%	1.8%		1.9%	2.0%		1.9%
Total Operating Expenses	42.3%		41.7%		42.0%	41.3%		41.7%	44.1%		42.3%
Operating Income	-11.5%		-4.2%		-7.6%	-6.7%		-7.3%	-12.1%		-8.5%
Pro Forma Operating Income	[illegible]		4.1%		0.8%	-1.7%		-0.0%	-3.2%		-0.8%
Interst % Rvnus	-5.6%		-4.2%		-4.8%	-4.0%		-4.5%	-6.1%		-4.9%
Pretax Margin	-5.8%		7.3%		1.2%	-2.8%		-0.2%	-6.4%		-1.7%
PF Pretax Margin	2.7%		8.2%		5.7%	2.3%		4.5%	3.0%		4.1%
Taxes as % Pretax Income	5.9%		13.8%		31.0%	-39.2%		-36.7%	20.4%		-8.2%
Net Margin	-5.5%		6.3%		0.8%	-3.9%		-0.8%	-5.1%		-1.9%
Pro Forma Net Margin	2.1%		8.2%		5.4%	3.4%		4.7%	4.3%		4.6%

the annual percentage-change comparison column is situated immediately to the left. The income statement presentation has been amended as described previously to enable quick visual surveys of important figures (gross margin, operating cost, etc.) in those cases where the company's own presentation lacked those tallies. Finally, the presentation has been expanded to accommodate both GAAP and pro forma results via the addition of several PF-tagged lines. This has been done to accommodate the (nearly inevitable) major one-time, nonoperating events that need to be recorded within GAAP results but that would distort our go-forward assessment of continuing operations.

For ease of explanation, we'll create a "model" modeled income statement with specified cells for each input. For the first time, we will be discussing formulas that reside in certain cells. Our apologies to the Excel-proficient, but we must begin with the assumption that our modelers are Excel neophytes. As quickly as we can, we'll phase down the level of formula detail.

In transitioning the template of a historical income statement representation to a living multiquarter model, we will again face numerous chicken-and-egg moments where we have yet to create inputs that our model needs. In these instances, we will recommend placeholders in the form of static numbers or simple percentage changes (reflecting their usual percentage relationship to historical data). With time, we'll kick out the placeholders and incorporate live inputs drawn from other parts of the workbook into our income statement presentation.

Turning the Historical Template into Modeled Quarters

As a first step, copy and paste a full historical model for a single year complete with static data immediately to the left of the latest historical year. If the model has been constructed as described previously, all the columns, including the interim periods and comparison columns, will total 12. In the cells atop the columns of the newly copied model, assign the quarters and interim periods as follows: $1Q0_n$, Y/Y %, $2Q0_n$, Y/Y %, $1H0_n$, $3Q0_n$, Y/Y %, $9mos0_n$, $4Q0_n$, Y/Y %, 200_n, Y/Y %. I recommend putting an "E" (for estimated) next to all periods.

We'll work one quarter at a time. And we'll assume our historical replicated years and quarters have pushed us to the right on the spreadsheet as far as column CA. As a first step, our period designation (i.e., $1Q0_n$) resides in cell CA3, total revenue resides in cell CA4 (or CA6, if the presentation includes product and service revenue break-outs in CA4 and CA5, respectively), cost of goods is CA5, and so on.

If you've copied the preceding historical year, revenue in quarter 1, $1Q0_n$, matches revenue in $1Q0_{n-1}$. Later, we'll refine our forecast based on a granular assessment; for now, let's leave it at that. Let's first model COGS as a percentage of revenue equal to the preceding full-year average of COGS as a percentage of revenue. The information on which we base this first formula will be contained in the historical margin analysis section immediately below the most recent historical income statement presentation. For COGS for period 1, and assuming total revenue is in cell CA4, our formula is `=CA4*0.57`, where 57% is the annual average COGS for the prior historical year.

Isn't it true that seasonality and other factors influence COGS, resulting in sometimes predictable variations in gross margin for each quarter? Very true. On that basis, we could model that first quarter's gross margin based on the prior year's first quarter. But remember, we are in the early stages of efficiently building a replicable model for *each* quarter; that essential level of refinement comes later.

When you begin to model seasonal effects in individual COGS, remember that unlike operating costs, which have a high variable element, COGS contain many fixed costs. Intuitively, seasonally strong revenue periods will better leverage these fixed costs, typically resulting in improved gross margin. But we will always posit that the best initial guide to seasonal adjustment is to reflect the experience of prior periods.

Our hypothetical model includes the three main operating cost categories: R&D, S&M, and G&A. We will again model these as percentages of revenue based on the preceding full-year averages. As with COGS, only when the model is up and running will we amend to reflect seasonal factors.

Assuming revenue is in CA4 and gross profit in CA6, our three main operating cost categories are in cells CA7, CA8, and CA9. We will again use the annual average percentage of revenue shown in the prior year's margin analysis as our starting point. If R&D averaged 7.5% of revenue for the prior year, in CA7 we would use the formula, `=CA4*.075`.

Even at this simple level of modeling, potential adjustments crowd the imagination and seek to crowd the page. We would halt the cattle drive dead in its tracks if we detoured for a discussion of every possible influence on these line items. But a few are worth mentioning, so at the risk of contorting meaning, we'll seek to make these digressions as compact as possible.

One such topic is incremental margin. After wringing efficiency gains, companies find that they can generate excess margin on the next, or incremental, dollar of revenue. As business improves, however, companies need to ramp spending to match demand, and incremental margin compresses. We're already seeing that simple, across-the-board percentage of sales inputs won't do in the final model. Since we're already sidetracked, we'll also take a moment to note that R&D and G&A are generally less susceptible to seasonal effects than gross margin, which, with its high fixed-cost component, more meaningfully reflects swings in the top line. But S&M can have a strong seasonal factor, typically in the fiscal year's final quarter. As a rule, if full-year revenues are up nicely, then the sales staff will receive excess compensation that can increase S&M as a percentage of revenue in the quarter.

We'll be able to accommodate this level of detail more easily in a fully completed model. In Figure 2.2, for 2009 we highlight Juniper's actual and modeled main operating cost items in dollars at the top and as percentages of revenues in shaded cells at the bottom. Even after a tough first half of 2009, in which sales were down in the midteens, we assumed that tough comparisons would persist in 2H09. As of midsummer 2009, we were modeling rising SG&A in 3Q09 to support new initiatives (mainly Juniper-NSN Carrier Ethernet) and to reflect sequential top-line gains that would drive compensation. We modeled R&D to rise as new initiatives took hold, while anticipating that both R&D and S&M would moderate as such activity slowed in the back half of the year. And we modeled G&A to come down as the company sought cost efficiencies within the corporate office.

If, and only if, the company's income statement presentation includes amortization of intangibles, we want to represent this as well—but in relation to a balance sheet account, not as a percentage of revenue. In our first-phase model, we use the placeholder of historical four-quarter average amortization. We will want to tie this in to our balance sheet presentation at a later stage.

We've created lines for the most common nonrecurring or noncash contributors to operating income: acquisition-related, restructuring, impairment, and the catch-all "other." Looking forward, it's a brand-new day, and our modeled company can do no wrong. So we'll leave these blank for now; most likely the company will fill them in as it missteps through its operating cycle. Let's assign these cells hypothetical values of CA10 through CA13.

Modeling Operating Costs and Operating Income

Our next line represents GAAP operating costs. In cell CA14 on this line, we put the formula `=Sum(CA7:CA14)`. The following line represents PF operating costs. In cell CA15, we put the formula `=Sum(CA7:CA9)`. But we're not done. If we have learned that the convention for this company's pro forma results is to exclude FAS 123R stock option compensation, we proceed as follows.

Figure 2.2

At the time of our writing, we modeled that Juniper would need to ramp some operating costs (principally R&D and sales and marketing) as the Juniper-NSN Carrier Ethernet joint venture took flight, while it simultaneously sought to contain general and administrative operating costs.

Juniper Networks												
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09E**	**Y/Y %**	**9mos09**	**4Q09E**	**Y/Y %**	**2009E**	**Y/Y %**
Product Revenue	587,863	*-13%*	606,959	*-16%*	1,194,822	620,762	*-19%*	1,815,584	634,890	*-15%*	2,450,474	*-16%*
Service Revenue	176,320	*19%*	179,404	*16%*	355,724	184,376	*2%*	540,100	193,595	*9%*	733,695	*11%*
Revenue	764,183	*-7%*	786,363	*-11%*	1,550,546	805,138	*-15%*	2,355,684	828,485	*-10%*	3,184,170	*-11%*
Prdct COGS	193,061		207,576		400,637	209,441		610,078	200,328		810,405	
Srvc COGS	75,451		78,385		153,836	59,073		212,909	56,503		269,412	
Cost of Revenue	268,512	*1%*	285,961	*-1%*	554,473	268,514	*-13%*	822,987	256,830	*-16%*	1,079,817	*-7%*
Gross Profit	495,671	*-11%*	500,402	*-15%*	996,073	536,625	*-16%*	1,532,698	571,655	*-8%*	2,104,352	*-13%*
Research & Development	185,400	*9%*	183,894	*-1%*	369,294	189,208	*-2%*	558,502	178,124	*-1%*	736,626	*1%*
Sales & Marketing	[illegible]	[illegible]	[illegible]	[illegible]	351,818	201,285	*0%*	553,103	190,552	*-8%*	743,654	*-5%*
General & Administrative	39,211	*17%*	39,175	*16%*	78,386	36,231	*-4%*	114,617	33,139	*-13%*	147,757	*2%*
MARGINS												
Product GM	67.2%		65.8%		66.5%	66.3%		66.4%	68.4%		66.9%	
Service GM	57.2%		56.3%		56.8%	68.0%		60.6%	70.8%		63.3%	
Gross Margin	**64.9%**		**63.6%**		**64.2%**	**66.7%**		**65.1%**	**69.0%**		**66.1%**	
COGS % Rvnus	35.1%		36.4%		35.8%	33.4%		34.9%	31.0%		33.9%	
R&D % Rvnus	24.3%		23.4%		23.8%	23.5%		23.7%	21.5%		23.1%	
S&M % Rvnus	23.7%		21.7%		22.7%	25.0%		23.5%	23.0%		23.4%	
G&A % Rvnus	5.1%		5.0%		5.1%	4.5%		4.9%	4.0%		4.6%	

Down below the bottom of our income statement, we use the information garnered from historical stock option costs to model average quarterly FAS 123R costs for the period. The more granular, the better, I always say (up to a point). If historical information enables identifying and modeling FAS 123R costs by line item (e.g., COGS and R&D), use the three or four cells needed to do so, and sum to a single cell; for description purposes, we'll designate the four line-item cells as CA36–CA39 and the summary cell CA40. If the information exists as a single number, model a composite number within the single cell CA40.

Returning to our PF operating costs line, we amend our formula to read =Sum(CA7:CA9)−CA40, meaning we're subtracting stock option costs from pro forma operating costs. Alternatively, we can make an adjustment to percentage of operating costs. Our analysis of historical precedent for our hypothetical company may have shown us that, once FAS 123R costs are deducted from the main operating cost items, these items fairly consistently run at a percentage of main operating costs (though we may later need to refine this on a per-quarter basis).

For many technology firms, this is often about 90% of GAAP main operating costs. For an engineering-intensive firm such as Broadcom, FAS 123R–adjusted main operating costs can run at a surprising 75% or even 70% of the GAAP total. For a company whose FAS 123R–adjusted main operating costs tend to run at 91% of GAAP main operating costs, our formula for PF operating costs becomes =(Sum(CA7:CA9))*.91. As a reminder, we'll make seasonal adjustments to reflect quarterly variation only after we've replicated this quarterly column across a full four-quarter year. Figure 2.3 shows a snippet of Cisco's 2009 actual and 1Q10 forecast income statement, with a focus on pro forma versus GAAP operating costs.

The next line shows GAAP operating income. For this line, in cell CA16, we use the formula =CA6−CA14, which expresses GAAP gross profit minus GAAP operating costs.

For the PF operating income line, we'll begin with a similar formula, =CA6−CA15 (GAAP gross profit minus non-GAAP operating costs), modeled in cell CA17. We did not model PF gross margins, so we can't use it in our formula. To square up PF operating income, we need to "muscle up" GAAP gross margin so it becomes PF gross margin; we do so by adding in FAS 123R costs to GAAP COGS. I've pointed out that this is not a large number, but it is meaningful; for technology companies, it tends to run a little under 0.5% of revenue. Assuming we modeled FAS 123R costs to COGS in cell CA36, our amended formula for PF operating income reads =(CA6+CA36)−CA15. Alternately, using the percentage method, we can use =(CA6*1.005)−CA16, assuming COGS-based FAS 123R costs are typically half a percent of sales, to model PF operating income.

Figure 2.3

This truncated representation of Cisco's income statement shows actual fiscal 2009 and modeled 1Q10. Amortization (modeled at the prior four-quarter average) and stock option compensation are the main reasons PF operating costs are much lower than GAAP operating costs.

Cisco Systems														
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09**	**Y/Y %**	**9mos09**	**4Q09**	**Y/Y %**	**2009**	**Y/Y %**	**1Q10E**	**Y/Y %**
Products	8,635	*7.7%*	7,347	*-10.9%*	15,982	6,420	*-21.7%*	22,402	6,729	*-22.1%*	29,131	*-12.0%*	6,842	*-20.8%*
Services	1,696	*10.2%*	1,742	*9.8%*	3,438	1,742	*9.4%*	5,180	1,806	*4.8%*	6,986	*8.5%*	1,836	*8.3%*
Total Sales	10,331	*8.1%*	9,089	*-7.5%*	19,420	8,162	*-16.6%*	27,582	8,535	*-17.6%*	36,117	*-8.7%*	8,678	*-16.0%*
Products COGS	2,981	*5.6%*	2,737	*-5.0%*	5,718	2,327	*-18.8%*	8,045	2,436	*-20.4%*	10,481	*-9.9%*	2,446	*-17.9%*
Services COGS	669	*19.9%*	629	*3.3%*	1,298	606	*-2.4%*	1,904	638	*0.2%*	2,542	*4.8%*	652	*-2.6%*
Total COGS	3,650	*8.0%*	3,366	*-3.6%*	7,016	2,933	*-15.9%*	9,949	3,074	*-16.9%*	13,023	*-7.3%*	3,098	*-15.1%*
Total Gross Profit	6,681	*8.2%*	5,723	*-9.7%*	12,404	5,229	*-17.1%*	17,633	5,461	*-18.1%*	23,094	*-9.4%*	5,580	*-16.5%*
R&D	1,406	*18.0%*	1,279	*5.2%*	2,685	1,243	*-13.6%*	3,928	1,280	*-2.0%*	5,208	*1.1%*	1,237	*-12.1%*
S&M	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,956	*-8.1%*	6,394	2,009	*-7.2%*	8,403	*0.3%*	1,974	*-13.5%*
G&A	395	*-19.4%*	380	*-26.9%*	775	302	*-37.0%*	1,077	488	*-5.8%*	1,565	*-22.0%*	456	*15.3%*
Pyrl Tx Stk Optn Excrs	-	*0.0%*	-	*0.0%*	-	-	*0.0%*	-	-	*0.0%*	-	*0.0%*	-	*0.0%*
Amrtzn Dfrd Stk-Bsd Cmpnsn	-		-		-	-		-	-		-		-	
Amrtzn Intngbls	112	*-4.3%*	136	*17.2%*	248	121	*3.4%*	369	164	*10.1%*	533	*6.8%*	133	*18.8%*
In-Process R&D	3	*0.0%*	-	*0.0%*	3	-	*0.0%*	3	60	*0.0%*	63	*0.0%*	-	
Acquisition Costs	-		-		-	-		-	-		-		-	
Oprtng Expenses	4,199	*10.4%*	3,950	*0.4%*	8,149	3,622	*-13.0%*	11,771	4,001	*-3.3%*	15,772		3,800	*-9.5%*
PF Oprtng Expenses	3,824	*11.6%*	3,515	*-1.6%*	7,340	3,146	*-15.2%*	10,662	3,379	*-8.2%*	14,181		3,271	*-14.5%*
Oprtng Incm	2,482		1,773		4,255	1,607		5,862	1,460		7,322		1,781	
PF Oprtng Incm	2,898	*3.5%*	2,246	*-19.9%*	5,145	2,125	*-20.5%*	7,094	2,129	*-29.6%*	9,083	*-19.3%*	2,356	*-18.7%*

(continued)

Figure 2.3 *(continued)*

Cisco Systems														
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09**	**Y/Y %**	**9mos09**	**4Q09**	**Y/Y %**	**2009**	**Y/Y %**	**1Q10E**	**Y/Y %**
FAS 123R:														
COGS-Prdcts	15	*0.5%*	14	*0.5%*	29	14	*0.6%*	43	13	*0.5%*	56		13	*0.5%*
COGS-Srvcs	27	*4.0%*	25	*4.0%*	52	28	*4.6%*	80	34	*5.3%*	114		34	*5.2%*
	42	*1.1%*	39	*1.2%*	81	42	*1.4%*	123	47	*1.5%*	170		47	*1.5%*
R&D	95	*6.8%*	86	*6.8%*	181	89	*7.2%*	270	85	*6.6%*	355		84	*6.8%*
S&M	131	*5.8%*	124	*5.8%*	255	118	*6.0%*	373	120	*6.0%*	493		119	*6.0%*
G&A	34	*8.5%*	32	*8.5%*	66	28	*9.3%*	94	53	*10.9%*	147		52	*11.5%*
Subtotal	301		281		583	277		860	305		1,165		302	
Cmpsnation Expns Acqstns	102		101		203	120		323	100		423		100	
Higher Amortization	40		40		80	40		120	40		160		40	
Tax Effect	(84)		(79)		(163)	(156)		(319)	(85)		(405)		(69)	
[illegible]	[illegible]		[illegible]		[illegible]	281		984	360		1,343		373	
P&L Aftr-Tx GAAP to PF	*292*		*381*			*394*			*703*				*443*	

Interest Cost and Interest Income: Preliminary

We now need to sum for GAAP and pro forma pretax income. But first, having modeled operating costs and income, we need to model those nonoperating items that impact pretax income.

Interest income and interest costs are considered nonoperating for a reason: they are not a function of operations, but of financial strategy and decisions. For this reason alone, interest income and interest cost should not be modeled as a percentage of revenue. Intuitively, we know that for companies with a strong seasonal component to their quarterly reporting (e.g., retailers and consumer electronics manufacturers), percentage-of-revenue estimates for relatively stable balance sheet–based items would oscillate unrealistically from quarter to quarter and lead to inaccurate modeling of these important line items.

To model interest costs or interest income earned, we need to import information on cash on hand and debts owed from the balance sheet. For cash, these most typically include cash and equivalents and short-term investments from current assets, and long-term investments from long-term assets. For debt, this includes short-term debt and/or long-term debt due within one year from current liabilities, and long-term debt from long-term liabilities.

In our chicken-or-egg quest to get to value, however, we haven't modeled a balance sheet yet. Rather than link to a cell on our as-yet-nonexistent balance sheet, we'll use as a placeholder the most recent historical quarterly numbers entered as static values.

In the very early stages, we use placeholders for interest cost and interest income. We express interest expense as a positive number, but we express interest income as a negative number. This may seem a bit counterintuitive, but it is consistent with our presentation. All our line items below revenue so far have been costs against revenue expressed as positive numbers; interest income is the first offset to those costs. Note that U.S.-based companies operating under U.S. GAAP present income statement costs as positive numbers, while foreign companies operating under IFRS present cost line items as negative numbers.

The placeholder for both interest income and interest cost is the most recent quarterly number, typically 4Q of the preceding historical year. Note that we are *not* using the average for the full preceding year. The income statement shows a company's progress across a given period, while the balance sheet is our most timely measure of a company's financial status right now. Over the preceding year, the company may have used up cash, reducing its interest income line, or paid off debt, benefiting its interest income line.

We put our roughly modeled interest cost in cell CA18 and interest income in cell CA19. We have also reserved two lines: for (1) sundry nonoperating other and (2) gains (or loss) on investments. In our modeled template quarter, these occupy CA20 and CA21, both of which we leave blank.

Interest Cost and Interest Income: Adjustments

Later in our process, we'll model the balance sheet and cash flow statement. Once the balance sheet for forward periods is modeled on a worksheet called Ratios and Valuations (R&V), we need to link to this sheet to complete our interest income and interest cost models.

All the balance sheet line items related to cash, cash equivalents, short-term investments, and (often) long-term investments will contribute to cash and will contribute to interest income. On the top of our balance sheet annual compilation on the R&V worksheet, we sum all these accounts. All the balance sheet line items related to short-term debt, commercial paper, long-term debt due within one year, and long-term debt will impact interest costs. We sum these atop the liabilities section in our annual balance sheet presentation. (We italicize both summed cash and summed debt so they stand out from the balance sheet itself.)

At the bottom of the income statement presentation, we've left room for items not purely part of the actual income statement (e.g., dividends and stock option compensation) but that either impact the pro forma calculation or will be useful later on. Immediately below dividends and above FAS 123R (stock option compensation), insert a line for cash and investments and a second line for total debt. For our example, let's assume cash and investments is in row 50 and total debt is in row 51.

In the column for the first quarter of any modeled year, link the annual cash tallied on the balance sheet to the cash and investments row in cell CA50; and link the summed debt from the balance sheet to the total debt row in cell CA51. For the remaining three quarters of that year, link these tallies with a simple equal sign in rows 50 and 51. There is no need to reference the annual cash and debt in the interim-period columns.

The company's own representation of interest income, interest cost, and/or net interest cost (income) will drive our modeling procedure. The company that provides both interest income and interest cost in its quarterly presentation is easiest to work with. For the first quarter, in the interest cost cell CA18, put in the formula, `=CA50*.25*.07`; in this formula, CA50 is the debt to be serviced, the .25 represents one-quarter's interest obligation, and the .07 is a hypothetical

7% interest rate that about hits the corporate average coupon. This formula will produce a value that will have some relationship to the nearest historical quarter's interest cost.

Now the calibration begins. In advance of this exercise, using data from the 10-K or Q you can weight the company's debt adjusted by interest cost and produce your own estimate. But we find this number is often not a reliable predictor of income statement interest cost. The quicker procedure is try on different interest rates until you get the rate that best matches the nearest historical quarter. Remember, quarterly debt payments have (almost) no seasonal component. At each quarterly report, changes in balance sheet debt will change the interest cost estimate. But you must track the nature of those changes; for example, if a 5% coupon instrument is rolled over into a 9% bond, your modeled quarterly interest rate must adjust upward.

The interest income process and calculation is similar, with a few significant differences. First, yield on cash is rarely more than 3% and often a great deal lower. During the worst days of late 2008 and early 2009, CFOs were telling us they were moving their cash "closer to the printer" (i.e., buying only Treasury debt, which at the time had fractional yields). Second, companies tend to lard in other and sundry items into interest income; in our experience it is rarely as clean a number as interest expense. In modeled quarter 1, the formula for interest income in cell A19 would be =CA51*.25*.0275, where our return on cash assumption is about 2.75% annually. When you calibrate this cell, you almost always model the rate down.

For companies providing net interest income (cost) only, and assuming our initial assumptions were correct and confirmed by the calibration, the formula in CA18 would be =(CA50*.25*.07)−(CA51*.25*.0275). Always, we want to model these line items with links to the financial structure information. But we also want to accommodate information from the company, such as news that the board will engage in early debt retirement.

Pretax Income

In cell CA22, our formula for GAAP pretax income is =CA16−(SUM: CA18:CA21). We will not be adjusting any of the GAAP line items between GAAP operating income and GAAP pretax income.

We generally do not need any overt adjustments to net interest expense within our standard formula for PF pretax income. The formula for PF pretax income in cell CA23 is =CA17−(SUM: CA18:CA21). Companies will sometimes provide GAAP versus adjusted net interest expense information. Qualcomm is an example of a company that provides this level of information; the discrepancy mainly results from its pro forma treatment of an entire business unit (i.e., Qualcomm Strategic Initiatives). Figure 2.4 shows a snippet of Qualcomm's 2006 P&L, with distinctive values for GAAP and pro forma interest income. Oddly, the two columns roughly square up by year end.

In their post-release presentations, some companies may also call out items in "other" or in gains/loss on investments that they feel should be excluded from pro forma consideration. Although such callouts are reasonably common, they are irregular enough that we will not allot a line item for this purpose.

GAAP and PF Taxes

In cell CA24 we model GAAP income tax expense. Income tax expense is a percentage-of calculation, but not percentage of revenues; companies are taxed on their pretax earnings, so we'll use percentage of pretax income.

I've always found GAAP taxes to be an elusive animal. Particularly in the presence of nonoperating events, GAAP taxes move in mysterious ways. Impairments frequently trigger charges for tax valuation allowances; even amid big GAAP losses, a company may report paying GAAP taxes. As discussed earlier, this can reflect global companies making good money in some nations and losing money in others.

Corning, for example, is structured to be unprofitable in the United States. Its nonpareil R&D business, largely U.S.-based, is unmatched in turning "blue-sky" research into hard dollars. But the products issuing from Corning's research, such as precision glass, are mainly sold in Asia and other markets. It is not easy getting Corning's GAAP tax mix just right, even with guidance from the company. Nonetheless, we'll model as best we can using historical precedent and/or direct information from the company. For our model, and assuming historical information (or company guidance) has pointed to a GAAP tax rate averaging 34%, in cell CA24 we use the formula `=CA22*.34`.

Pro forma taxes, by contrast, are often set by the company and end up being a fairly consistent percentage of PF pretax income, come rain and come shine. Given that adjusted profits increasingly drive investment decision making, in topsy-turvy thinking that (scarily) might make sense companies reason that pro forma results, and thus pro forma taxes, should be reliable—even though they're a shared hallucination. Ours is not to reason why . . . again using historical precedent and/or direct information from the company, and assuming an average 28% rate, we model PF income tax expense in cell CA25 with the formula `=CA23*.28`.

Figure 2.4

Qualcomm is one of a handful of companies that reports (or at least shares with analysts) both GAAP and adjusted interest income. However you slice it, this company earns a lot on its cash horde.

Qualcomm												
Incm Stmnt (Sept)	**1Q06**	**Y/Y %**	**2Q06**	**Y/Y %**	**1H06**	**3Q06**	**Y/Y %**	**9mos06**	**4Q06**	**Y/Y %**	**2006**	**Y/Y %**
Eqpmnt, Servcs	1,150.0		1,122.0	*32%*	2,272.0	1,240.0	*41%*	3,677.7	1,264.0		5,015.7	*31%*
Licensing, Royalty Fees	591.0		712.0	*38%*	1,303.0	711.0	*49%*	1,849.0	735.0		2,510.0	*37%*
Total Revenue	1,741.0	*25%*	1,834.0	*34%*	3,575.0	1,951.0	*44%*	5,526.7	1,999.0	*28%*	7,525.7	*33%*
Cost of revenue	517.0	*20%*	521.0	*35%*	1,038.0	559.0	*44%*	1,597.0	586.0	*33%*	2,183.0	*33%*
R&D	340.0	*55%*	390.0	*55%*	730.0	395.0	*61%*	1,125.0	411.0	*61%*	1,536.0	*58%*
SG&A	239.0	*67%*	263.0	*70%*	502.0	293.0	*94%*	795.0	321.0	*91%*	1,116.0	*81%*
Amortization	-		-		-	-		-	-		-	
Prchsd In-Prcss R&D					-			-			-	
Other Cost/Exp[illegible]	[illegible]	*0%*	[illegible]	*0%*	-		*0%*	-		*0%*	-	*0%*
Total Oprtng Expns	1,096.0	*38%*	1,174.0	*48%*	2,270.0	1,247.0	*56%*	3,517.0	1,318.0	*48%*	4,835.0	*49%*
PF Oprtng Expnss	948.0		1,001.0		1,949.0	1,084.9		3,033.9	1,153.3		4,187.2	
Op Incm P&L	645.0	*8%*	660.0	*15%*	1,305.0	704.0	*26%*	2,009.7	681.0	*2%*	2,690.7	*10%*
PF Op Incm	793.0		833.0		1,626.0	866.1		2,492.1	845.8		3,337.9	
GAAP Interest Incm	91.0	*0%*	125.0	*0%*	216.0	120.0	*0%*	336.0	129.0	*0%*	465.0	*0%*
PF Interest income	111.0	*68%*	129.0	*111%*	240.0	110.0	*31%*	350.0	114.0	*-3%*	464.0	*41%*
Invst Loss/Dstrbtns	-	*0%*		*0%*			*0%*	-		*0%*	-	*0%*
Other								-			-	
Pretax Incm P&L	736.0	*5%*	785.0	*24%*	1,521.0	824.0	*20%*	2,345.7	810.0	*3%*	3,155.7	*14%*
PF Pretax Incm P&L	904.0		962.0		1,866.0	976.1		2,842.1	959.8		3,801.9	

In cell CA26, we express GAAP taxes as a percentage of GAAP operating income; in cell CA27, we express pro forma taxes as a percentage of PF operating income. I typically italicize these lines to make them jump out, and these are the only percentages within the quarterly columns. Yes, we replicate these percentages in our margin presentation below. Remember that our model is about visual reference and quick trend identification, with pertinent items in their logical places.

The next step is to tally up GAAP and PF net income before various "below-the-line" items. In cell CA28 in our hypothetical Q1 model, our header is "Net Income before MI, EE, DC, & D"; these acronyms are discussed both above, in our historical section, and below. The formula for cell CA28 (GAAP net income before MI, EE, DC, & D) is `=CA22−CA24`. The formula for cell CA29 (PF net income before MI, EE, DC, & D) is `=CA23−CA25`.

GAAP and PF Net Income

We're almost ready to model net income, but first we need to model the final items that may impact it. We'll designate four cells for equity income (CA30), minority interest (CA31), discontinued operations (CA32), and accounting changes (CA33).

So far we've expressed every cost against revenue as a positive number, and every add-back (e.g., interest income) as a negative number. That accords with most companies' presentation style. Below pretax income, however, many companies will present costs to income (e.g. minority interest and losses from discontinued operations) as negatives; and they treat add-backs to income (e.g., equity income and income from discontinued operations) as positives.

In our style, we will use the same convention throughout. Minority interest (assuming it represents disgorgement of income and not sharing in a loss) and losses from discontinued operations are expressed as positive numbers; equity income (assuming it is positive) and income from discontinued operations are expressed as negative numbers.

Although they are straightforward to model, equity income and minority interest are not easy to model reliably. As our model grows in sophistication, we can include information on equity and minority partners; that will give us a more granular basis for predicting these inputs. Remember that equity income is the portion of income allotted to a 20%-to-50% equity partner. Beginning with the base assumption that the joint venture is profitable, we would model this input as a negative number. Minority interest expresses that portion of JV income disgorged or not retained by the majority partner. Because it is in effect a "cost," we will model it as a positive number.

Until our model gains the necessary sophistication, we will use the one-year average value for equity income and for minority interest. We will express minority interest not as a percentage of revenue, but as the historical average percentage of pretax income based on the preceding four quarters. Equity income is a bit trickier, as it is coming from an off-screen partner. In the preliminary stages, and until we know more about this partner (and the partnership), we will also model equity income as a four-quarter average.

The last two items, discontinued operations (CA32) and accounting changes (CA33), we can leave as blanks for now.

Cell CA34 in our hypothetical model represents GAAP net income. We'll use the formula, `=CA28– (Sum:CA30:CA33)`.

Cell CA35 in our hypothetical model represents PF net income. In general, and there may be exceptions, we will include minority interest and equity income in our PF calculation, but not accounting effects or income/losses from discontinued operations. In cell CA36, our formula for PF net income is `=CA29– (Sum:CA30:CA31)`.

Per-Share Earnings

The next two lines are devoted to basic and diluted shares; we'll be modeling them in CA37 and CA38. Up above we discussed, in capsule form, the distinction between basic and diluted share count. For both, we will model off the nearest historical period, not the year-earlier period or the full-year average.

One of the reasons that we include pro forma calculations as a basic part of our model (the other being the chance/likelihood of catastrophic impairments) is because of share-issuance policy. All public companies use shares as compensation to one degree or another. Information industry companies tend to have high levels of share compensation; manufacturing companies tend to have lesser share compensation. To put it more graphically, companies whose employees shower before work issue lots of stock as compensation; companies whose employees shower after work issue less stock as compensation.

Companies will also publicize their intention to buy shares (although they are typically less forthright when they disengage from this practice). Through perfectly permissible accounting devilry, a company may use cash to repurchase shares; this is treated as a financial, not an operating event. These costs do not run through the income statement. But they reduce the share base and the denominator for EPS calculations, thus giving the impression of operating improvement.

This perfectly legal accounting sleight of hand, as far as I can tell, is the main reason companies pour cash down the sinkhole of share repurchase. Granted, companies with high dividend payouts may want to reduce their income obligation by shaving the share base. Many companies will choose to repurchase sufficient stock to offset, to one degree or another, stock issued as compensation.

The worst offenders are often dividend-free and are buying Treasury stock well in excess of their stock-compensation issuance. Repurchased shares are recorded in the "Treasury" account in stockholders' equity, thus improving return on equity. Because the corollary effect is to boost the debt/capitalization (debt/cap) ratio (see Chapter 9), this practice is usually (though not always) limited to low-debt companies. In the "justice served" department, at the depth of the market downturn during spring 2009 dozens of companies were identified as having market capitalizations that were less than the amount of money they had spent to repurchase stock in 2008.

A cursory examination of the preceding eight quarters' historical share base will indicate the direction of the outstanding share count. Unless recent policy has shown us otherwise, we will model some "creep" in the share base, perhaps a quarter-percentage point per sequential quarter. If the company has historically been a repurchaser, we'll assume some modest decline in quarterly share base.

Assuming the share base has historically crept higher and that column BW contains the most recent historical period, our formula for basic shares outstanding in cell CA37 is `=BW37*1.0025`. This formula indicates that the share base will grow one-quarter of a percentage point for the quarter. Drag and drop this formula down one cell to CA38 for diluted shares outstanding; thus, `=BW38*1.0025`.

With our share bases now established, we can finally model earnings per share, the single most important number in most valuation calculations (for better or worse). In cell CA39, GAAP basic EPS, we use the formula `=CA35/CA37`, where CA35 is GAAP net income and CA37 is basic shares outstanding.

For GAAP diluted EPS, *as a starting point* in cell CA40, we can use a similar formula, `=CA35/CA38`, where CA35 is GAAP net income and CA38 is diluted shares outstanding. For most companies, particularly those whose basic and diluted share bases are similar (within 1% to 2% of one another), this will be sufficient.

There is, however, an important potential variable in the calculation of GAAP diluted EPS (and in pro forma diluted EPS). Common stock equivalents (CSEs) can affect both the numerator and the denominator in our diluted EPS calculations. In the snuggest possible nutshell, the CSE that most notably affects diluted net income and share count is convertible debt. When a company is profitable, the number of shares that would be represented assuming the debt were converted into common must be added to the denominator. If we are assuming that this is no longer debt but equity, we need to pull out that portion of interest paid related to the convertible debt turned converted shares and add it back to income.

What does this mean to the modeler trying to herd cattle rather than wrangle with theory? Begin by surveying the prior periods. In our experience, a wide gap between basic shares and diluted shares—say, more than 3%—is often a flag for the presence of convertible debt. (We're assuming it is early enough in the process that we haven't seen much of the balance sheet.) You can and should go through the 10-K and the 10-Qs, and that's never a bad idea, for data on the convertible debt.

In Figure 2.5, we see the variability in Ciena's share base for the October 2007 year. While basic shares mainly stayed near 85 million in all four quarters, diluted shares outstanding rose much higher. Accordingly, basic share count increased 2% on average for the year, while diluted share count rose 11%. Ciena ended fiscal 2007 with more than $500 million in short-term convertible debt and $800 million in long-term convertible debt. "Convertible" debt is debt that at maturity can convert into common shares; the common shares represented within the convertible can potentially be counted as CSEs. The more profitable the quarter, the higher the diluted share base as more of the CSEs qualified for conversion.

More prosaically, for companies with wide variation between basic and diluted shares, use the starting point formula, `=CA35/CA38`, (where CA35 is GAAP net income and CA38 is diluted shares outstanding) for four to eight historical quarters. See if the formula consistently renders a number different from reported GAAP diluted EPS; if so, that degree of variation is a guideline for adjusting for the convertible debt. It is important to perform this test with GAAP diluted EPS, because it always is reported; pro forma diluted EPS might be a footnote in the press release.

If you consistently determine a one-penny difference between what is rendered by the formula and what the company reports, then you can treat one

Figure 2.5

This snippet from Ciena's fiscal 2007 income statement shows that basic shares outstanding stayed consistent near 85 million across the four quarters, while the diluted share base ranged from 93 million to 109 million. The company had over $1.3 billion in convertible debt at fiscal year-end 2007. Note that the higher the net income per quarter, the higher the diluted share base.

Ciena												
Income Statement	**1Q07**		**2Q07**	**Y/Y %**	**1H07**	**3Q07**	**Y/Y %**	**9mos07**	**4Q07**	**Y/Y %**	**2007**	**Y/Y %**
Operating expns	70.84	*8%*	79.09	*13%*	149.93	81.64	*-3%*	231.57	82.03	*19%*	313.59	*8%*
PF Operating expns	61.82	*-1%*	68.04	*8%*	129.86	72.29	*14%*	202.15	77.48	*29%*	279.62	*13%*
Operating income	2.79	*-118%*	2.74	*-138%*	5.53	16.03	*-225%*	21.56	27.12	*599%*	48.68	*-255%*
Pro Forma Oprtng Incm	11.81	*-201%*	13.79	*13287%*	25.60	25.38	*211%*	50.98	31.67	*158%*	82.65	*782%*
Purchased R&D												
(Loss) Gain Mrktbl Debt												
Interest/other incm	14.85	*60%*	16.90	*51%*	31.74	19.46	*39%*	51.21	25.28	*61%*	76.48	*52%*
Interest exp	[illegible]	[illegible]	[illegible]	[illegible]	(12.30)	(6.93)	*13%*	(19.23)	(7.77)	*26%*	(27.00)	*12%*
Lss on Invstmt, Dbt Extng	-		-		-	0.59		0.59	(13.01)		(12.42)	
Pre-tax income	11.49	*-292%*	13.49	*-976%*	24.98	29.15	*-835%*	54.13	31.62	*135%*	85.74	*4239%*
PF Pretax Incm	20.51	*-539%*	30.03	*218%*	53.74	42.16	*112%*	95.90	52.18	*110%*	148.07	*196%*
Income Tax	0.42	*41%*	0.48	*29%*	0.90	0.84	*163%*	1.74	1.21	*207%*	2.94	*113%*
PF Incm Tx	0.42	*-127%*	6.01	*93%*	6.43	0.84	*-87%*	7.27	1.21	*-88%*	8.47	*-52%*
Tax rate	*4%*	*-173%*	*4%*	*-115%*	*4%*	*3%*	*-136%*	*3%*	*4%*	*31%*	*3%*	*-95%*
PF tax rate	*2%*	*-94%*	*20%*	*-39%*	*12%*	*2%*	*-94%*	*8%*	*2%*	*-94%*	*6%*	*-84%*
Net income	11.07	*-276%*	13.01	*-781%*	24.08	28.31	*-761%*	52.39	30.41	*132%*	82.80	*13816%*
Pro forma net income	20.086	*-743%*	24.02	*280%*	47.31	41.32	*204%*	88.63	50.97	*241%*	139.60	*333%*
Avg Basic Shares	84.95	*2%*	85.20	*2%*	85.08	85.56	*2%*	85.24	86.24	*2%*	85.49	*2%*
Avg diluted shares	93.26	*12%*	93.74	*7%*	93.50	101.57	*9%*	96.19	108.81	*17%*	99.34	*11%*
Reprtd Basic EPS	0.13	*-272%*	0.15	*-768%*	0.28	0.33	*-750%*	0.61	0.35	*128%*	0.97	*13547%*
Rprtd Dilutd EPS	0.12	*-257%*	0.14	*-736%*	0.26	0.28	*-705%*	0.54	0.30	*113%*	0.87	*12985%*
Pro forma Basic EPS	0.24	*-727%*	0.28	*272%*	0.56	0.48	*199%*	1.04	0.59	*235%*	1.63	*325%*
Pro forma Dltd EPS	0.22	*-672%*	0.26	*254%*	0.51	0.41	*178%*	0.92	0.48	*198%*	1.41	*289%*

penny as a fairly reliable add-back. I can hear the purists gnashing their teeth. We are going to designate a line below our other imported inputs (e.g., cash, debt, intangibles). We call this line CSE interest add-back. And in cell CA50, we put in the calculated difference, in this case $0.01, as a static number.

Moving forward, in cell CA40 our amended formula for GAAP diluted EPS is `=(CA35/CA38)+CA44`, where CA35 is GAAP net income, CA38 is diluted shares outstanding, and CA44 is our per-share-based average interest add-back.

If a company has income and/or loss from discontinued operations to report, it will be reported, both as an absolute number and on a per-share basis. To prepare for this eventuality (no company avoids it forever), we will create blank placeholder cells CA41 (basic discontinued ops EPS) and CA42 (diluted discontinued ops EPS).

Because we've been so careful to distinguish GAAP from pro forma results all through the income statement, we won't need any awkward plug-in number given by the company and taken on faith. For pro forma results we'll mainly replicate the two formulas used for GAAP per-share results. In cell CA43, pro forma basic EPS, we use the formula `=CA36/CA37`, where CA36 is PF net income and CA37 is basic shares outstanding.

For pro forma diluted EPS, *and assuming that convertible debt or other CSEs have no impact on per-share results*, in cell CA44 we can use a similar formula, `=CA36/CA38`, where CA35 is PF net income and CA38 is diluted shares outstanding. If we have identified and noted the CSE interest add-back and recorded it in cell CA50, our cell CA44 amended formula for pro forma diluted EPS, is `=(CA36/CA38)+`CA50, where CA36 is PF net income, CA38 is diluted shares outstanding, and CA50 is our per-share-based average interest add-back.

As a reminder, we'll include the quarterly dividend immediately below PF diluted EPS, even though this is not part of the formal income statement. Use the immediately preceding historical quarterly payout as a placeholder, unless you have information about a change in dividend policy.

Turning One Column into a Full-Year Model

Remember we have a 12-column full-year model, which encompasses the four quarters and the interim periods (half year, nine months, and full year), along with five year-over-year percentage-change columns. Consistent with our historical period presentation, to distinguish the year-over-year comparison columns from modeled quarters and rolling summary periods in modeled periods, italicize the Y/Y comparison columns. These five columns get an identical header: Y/Y %.

For all but the Y/Y comparison columns, copy and paste an exact replica of our freshly modeled quarter onto the remaining columns, including the rolling summary periods. We'll now proceed to make the necessary adjustments, first in the modeled quarters and then in the rolling summary periods.

The copying and pasting of Q1 onto subsequent quarters is fairly straightforward. However, when you use 1Q as a template to replicate Q2, Q3, and Q4, remember that the nonsymmetrical staging of periods means you must be mindful of values drawn from preceding quarters. This has bearing, for example, in the share count, which needs to reference the nearest period. For example, we modeled the Q1 share base off the preceding 4Q, which is four columns distant. But 2Q will model its share count off 1Q, which is two columns distant. If you simply copy and paste values here, the source column will be not 1Q, but a full year. Be mindful of needed amendments to link to the proper period.

For the rolling summary periods, the adjustments are not complicated, but they take some care. And generally, *we will make distinctions* between rolling summary compilation of GAAP line items compared to pro forma line items.

Compilation Columns (Half Year, Nine Months, and Full Year)

In our half-year rolling summary, we will generally sum reported line items from 1Q and 2Q. For GAAP formula cells, we will retain single-column summary formulas *down the column* for line items such as GAAP operating costs and GAAP pretax income. For pro forma formula cells, we will most typically sum the results of individual quarterly cells for Q1 and Q2 *across the page*. Let's first talk most broadly about the half year, then extrapolate those practices to the nine months and half year.

Walking down the income statement, on the premise that revenue is in CA3 for 1Q and in CC3 for 2Q, in cell CE3 use the formula `=CA3+CC3`. When you get to formula cells, for instance gross margin, retain this across-the-page summary formula. After summing the operating cost line items across the page, retain the down-the-column formulas for GAAP operating costs and GAAP operating income. We typically do not retain the formula for PF operating cost and operating income; instead we sum the two quarterly values across the page. Companies are not always fully transparent about what they include in their pro forma calculations; and as the interim periods progress from half year to nine months to a full year, small discrepancies are amplified.

Interest income, interest expense, gains and losses on investments, and other are summed. Similar to our treatment of operating cost and income, while we retain the down-the-column formula for GAAP pretax income in the half-year column, for PF pretax income we sum the two quarterly values across the page. Once pro forma is acknowledged by a company, line items such as interest income can be adjusted in unpredictable ways.

Like the individual operating cost line items, taxes are summed across the page, both GAAP and PF. The summed tax rate as a percentage of half-year pretax income remains a formula. I retain the down-the-column formula for GAAP net income, and I use the across-the-page formula to sum PF net income. For basic shares outstanding for the half year, in column CE37 we use the formula `=(CA37+CC37)/2`, representing the average of quarters 1 and 2. For diluted shares outstanding, drag and copy this formula into cell CE38.

In cell CE39 for GAAP basic EPS, retain the formula. For GAAP diluted EPS, however, remember that convertible debt and other CSEs can alter both the numerator and the denominator in unpredictable ways. Therefore, in cell CE40 for GAAP diluted EPS we sum the two quarterly values. In cells CE41 and CE42, for discontinued operations, we sum the placeholders (zero plus zero equals zero).

In cell CE43 for pro forma basic EPS, retain the down-the-column formula. For pro forma diluted EPS, in cell CE44 we sum the two quarterly values across the page, again because convertible debt and other CSEs can alter both numerator and denominator.

Conclude by summing the two quarterly dividend payments, which though not part of the income statement are part of our income statement presentation.

For the nine-month column, repeat the process as directed for the half-year column. Again, for multiquarter periods, sum GAAP inputs down the column; and sum pro forma inputs across the page (e.g., 1H plus 3Q). Note that because of the nonsymmetrical spacing of the quarterly columns, you cannot copy and paste the half-year column onto the nine-month column; you will need to adjust all values. For the basic and diluted share base, you must average three quarterly periods.

You can, however, cut and paste the nine-month column to create the full-year column—assuming you have strictly replicated the 12-column full-year scheme I have delineated. The essential adjustment after cutting and pasting the nine-month column onto the full-year column is in basic and diluted shares outstanding, which must now average all four quarters.

You have now, incompletely, modeled a full-year income statement. You could cut and paste this model and begin on the following year. But that is premature, from our perspective, because the model is static, unresponsive to market realities, and not at all attuned to the company's prospects. Not just revenue but the individual cost line items are unrealistic.

Before we can begin inputting seasonality and other real-world flavors into the individual quarters, we need to make the top line more reflective of market realities.

We've now completed the two parts of our first phase: (1) building, or rather rebuilding, the income statement structure for real-world analysis and (2) modeling, at least on a preliminary basis, the inputs that will get us from top line to bottom line. In our next chapter, we'll discuss means by which we can make that top line more informed and more nuanced, in pursuit of a more accurate bottom line.

Chapter 3

PHASE 2: SEGMENT MODELING OF REVENUES

Segment Modeling: A Discussion

Let's take a real-world situation, and a common one at that. A company announces that its mobile-device unit sales in Europe were "disappointing" in the just-concluded quarter, particularly for high-end devices. The press release is scant. Calls to the company are met with the official brick wall known as Reg FD [Regulation Fair Disclosure is designed to level the investing playing field by compelling IR departments to share the same level of information with all investors. Given the complications attendant on universal disclosure, the practical effect of Reg FD has been to prompt companies to reveal less and less information. (see Reg FD).] What to do?

Standard-issue top-line modeling consists of using the historical annual percentage growth pertinent to that period; let's say it is 7%. We just found out about the lousy mobile phone sales, and we need to do something. Do we shave that forecast growth to 6.75%? How about 6.875%? What do we do with subsequent periods? The inadequacy of the answers suggests that any such change is guesswork, with a bad input likely to pay compound interest over time.

It is possible to build a multistage revenue model that can reflect a better, if not perfect, representation of that announced effect not just on current period revenues but on go-forward modeling. Equally important, our overarching goal is to create a model whereby each such change in revenue assumptions ripples up the income statement, out across the valuation worksheets, and into our final dollar-based calculation of asset fair value. First, though, we need to refine our revenue growth assumptions.

The goal of segment-based modeling is to model revenues as precisely as possible. We don't ever want to assume that revenues in aggregate will grow by some predictable percentage relative to prior-period aggregate numbers, simply because that has been the experience in the past.

To model revenue in the real world, we need to work with what companies give us, what competitor companies are saying about the environment, and all other available sources. We always begin with what companies are saying officially about their business.

For U.S.-based publicly traded companies, the Securities and Exchange Commission (SEC) has mandated that revenue contributions be identified when they reach certain thresholds as a percentage of revenue. This division may be done on a product-line basis or on a geographic basis.

In the past, public companies often fought to keep their segment data private for competitive purposes. Companies gradually came to recognize that their competitors had sufficient research capabilities and were able to collect this information regardless of efforts to safeguard such information. The investing public, meanwhile, was being left uninformed by such secrecy. Companies have further realized that the some level of disclosure prompts increased brokerage coverage, which in turn raises their profile before investors. We would say that, compared to prior decades, companies are no longer hoarding information that their competitors have had anyway.

In providing more detailed disclosure, companies can highlight what's going right (e.g., "We're winning in printers!") while downplaying the negative (e.g., not mentioning poor sales of mobile phones). Interestingly, more detailed disclosure enables more accurate modeling of a company's business. This capability minimizes inaccurate consensus modeling, which can lead to nasty earnings surprises and huge disappointment-based sell-offs. It would be the height of solipsism to assume that the parlay between management and Wall Street drives the disclosure decision, though that doesn't stop analysts from thinking it so.

At the same time, companies are engaged in an ongoing balancing act between providing too much data and too little. The nature of this kind of segmented data can vary from CEO to CEO and from CFO to CFO, even within a single company. Strategic realignment can also play a role. Consider the case of General Electric, an acquisitive and dispositive company. Even without the passion for business development hardwired into GE's DNA, the company has a penchant for revising its segment organization—and consequently its segment presentation.

When I covered the stock in the mid-1990s, GE's Financial Service business had five main competencies and 20 to 25 identifiable subsegments. In time, the information flow lessened, complicated by Reg FD. Industrial GE, which once reported about a dozen segments, began spinning off consumer units and developing new competencies (e.g., water and security). Simultaneously, GE was collapsing its industrial businesses one into the other to reflect broad areas of concentration rather than product segments.

If an analyst covering GE from the 1980s or 1990s had stepped away and only now resumed GE coverage, he or she would confront a nearly unrecognizable segment representation. These continual changes represent a modeler's nightmare. The model as built must be flexible enough to accommodate change as it occurs; and if you cover 12 to 20 companies, something is always changing.

Revenue Modeling: Two Cases

Let's consider the two major kinds of company presentations. The first is a company that provides segment revenue data, either on a product-line or geographic basis. This company may also provide some degree of granularity related to a complete or partial breakout of the individual revenue segments.

The other kind of company provides segment revenue as well as some form of segment income, be it operating income, EBIT, or pretax income. This level of data permits not only a more granular revenue modeling process but also a way to completely rethink the income statement model itself. We emphasize that this unique modeling method, which we detail in the following paragraph, is an option and not a requirement for successful modeling. But we also want to take maximum advantage of information presented, and this is one way to do so.

In the remainder of this chapter, we will discuss modeling up to the P&L for companies that provide segment revenue only. In chapter 4, we will begin our discussion with a treatment of companies that provide segment revenue as well as individual segment income.

Revenue Data Only

The most common presentation format is revenue by segment, with little to no below-the-line color and no segment operating income. All but the largest companies can convincingly argue that segment margin disclosures provide too-detailed information to competitors. There's another interested party that many companies prefer to keep in the dark regarding segment margins: their customers.

Smaller companies with a somewhat uniform product and geographic mix in a segment in particular have a good reason for holding their segment operating income data close to the vest. Simply, if a good customer buys goods or services from company A on the underlying premise that this company is entitled to a 10% margin on the sale, and the segment in which this customer participates reports a 5% operating margin, the aggrieved customer will conclude that other customers are getting a better deal. Larger companies tend to aggregate so many products and geographic markets in their segment presentation that the various high or low margins accorded various classes of products get lost in the blend.

There is a whole class of companies, some of them quite large, that once provided segment revenue and operating income data but now only provide segment revenue. Some of these firms may have had concerns about providing too much information to competitors and customers; others may have gotten tired of publishing data about money-losing segments alongside data about profitable business units.

Ciena Corp. is a company that provides formal segment revenue data, which is available in its SEC filings as well as its quarterly results release. The company also provides less formal data points shared in other public forums, such as its post–results release conference call and in various presentations that are archived on its Web site. Let's first concern ourselves with the representation and modeling of segment revenue that the company provides to everybody, including the SEC.

The company began as a more or less pure play on optical communications infrastructure. After years of business development mainly related to small-scale acquisitions, Ciena has added various data networking, broadband access, storage networking, and related capabilities to its core competency. In recognition that its solution suite lacked various parts of an integrated network offering, the company has cast itself as a network specialist. The company's segment presentation has equally undergone various permutations.

As of early 2009, Ciena reported three business units: Optical Service Delivery, Carrier Service Delivery, and Global Network Services. Ciena does not provide segment income information. Figure 3.1 shows Ciena's revenue segments by quarter for the October 2007 fiscal year. Pay attention to this illustration, because it contains many of the basics in segment presentation and modeling. The segments are presented down the page and summed across the interim periods. In

Figure 3.1 we compile sequential percentage-change comparisons and percentage of revenue per segment. This percentage of revenue compilation will be useful later on when, for example, we go more granular on gross margin.

For our presentation of historical segment revenue, we again compile eight quarters (four at absolute minimum) of historical segment data. We've already created our 12-column annual presentation structure, so the historical data is segmented logically beneath the respective quarters. We also sum for our rolling summary periods, including half year, nine months, and full year. We populate the adjacent annual percentage-change cells as well.

To get the historicals on the page the way we like them, we reiterate our earlier assumptions regarding presentation format: that modeled year 1 begins in column CA, and eight quarters of historical data are to the left. Historical segment data for quarter 1 (two years prior) begins in cell BA70. In our title column A, in A70 through A72, we list Optical Service Delivery, Carrier Service Delivery, and Global Network Services. In column A73, we indent and type in "Total."

In our title column A, skip row 74. In cell A75, type in "Sequential & Percentage Revenue." In A76 through A79, copy the three segments as well as Total.

In our initial historical quarter cell, calculate Optical Service Delivery as a percentage of total revenue; repeat for the two other segments. Leave the total column blank, as this always sums to a percentage of 100 percent and provides us no useful information.

Let's now use our annual comparison columns for some closer analysis. In row 76, calculate a sequential comparison for Q1 of our beginning historical period. We have no actual predecessor period in our model, but beginning in 2Q these values become real as they do for subsequent 1Q periods. In our summary columns, replicate percentage of revenue; we obviously have neither the place nor method to model sequential change in the compilation periods. I would typically italicize the entire sequential and percentage revenue presentation. This visually differentiates it from the presentation of segment revenues immediately above.

Once the quarterly data is entered for historical year two, we can copy and paste the sequential and percentage revenue presentation for year 2; note that 1Q now has a working sequential comparison. And we are ready to proceed to model year 1.

Segment Revenue Modeling: Sequential or Annual?

For each revenue segment, the historical percentage growth on an annual basis or sequential basis may stand as a sufficient modeling guideline. This is most

Figure 3.1

Ciena's segment revenues for fiscal 2007. The presentation features both annual and sequential revenue percentage-change comparisons, along with percentage-of-revenue contributions to the total top line.

Ciena												
SEGMENTS	**1Q07**	**Y/Y**	**2Q07**	**Y/Y**	**1H07**	**3Q07**	**Y/Y**	**9mos07**	**4Q07**	**Y/Y**	**2007**	**Y/Y**
Optical Service Delivery	132.1	*63%*	159.5	*68%*	291.6	167.0	*45%*	458.6	180.9	*46%*	639.5	*54%*
Carrier Service Delivery	9.4	*-62%*	9.6	*-57%*	19.0	15.2	*-27%*	34.2	12.8	*-7%*	47.0	*-43%*
Global Network Services	18.8	*30%*	20.3	*45%*	39.1	22.8	*55%*	61.9	22.5	*22%*	84.4	*37%*
Total	160.3	*33%*	189.4	*44%*	349.7	205.0	*36%*	554.7	216.2	*38%*	770.9	*38%*
Sqntl & Pcntg Rvnu	**% Rvnu**	**Sqntl**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	
Optical Service Delivery	*82%*	*7%*	*84%*	*21%*	*83%*	*81%*	*5%*	*83%*	*84%*	*8%*	*83%*	
Carrier Service Delivery	[illegible]	[illegible]	[illegible]	[illegible]	*5%*	*7%*	*58%*	*6%*	*6%*	*-16%*	*6%*	
Global Network Services	*12%*	*2%*	*11%*	*8%*	*11%*	*11%*	*12%*	*11%*	*10%*	*-1%*	*11%*	
Total Rvnu		*3%*		*18%*			*8%*			*5%*		

likely to be the case for the casual modeler, or the buy-side generalist charged with monitoring a broad basket of stocks.

Even for those who will do a deeper dive on segment modeling in our Phase 3 worksheet, which is located in Chapter 4, for now we will base our current-year and forward-year segment revenue modeling on historical growth rates. Don't forget we have a total five-year rear-view on the segment: the three annualized segment totals (if available) as well as two years of individual historical segments by quarter. We want to take care in analyzing the historical growth rates as a starting point.

There are various ways to "seasonalize" an assumed full-year revenue calculation. But a year is a long, long time in the life of a corporation. We rarely seasonalize something as large and lumpy as a full-year consolidated revenue total. Instead, we are disposed to growing the revenue hypothetically from the appropriate historical 90-day period, be it the immediately preceding one or one from one year earlier.

Which is the appropriate historical period? For heavily seasonal industries such as retail, the best growth gauge is against the year-earlier period. For many technology companies, the best gauge can be sequential growth. This can also be true for resources-intensive industries such as energy and basic materials, where the prevailing commodity price rather than the prior-year commodity price is the primary top-line driver.

Once a technology company gains consumer end-product exposure, however, the company's formerly seasonless operating model may take on a seasonal color—particularly around fourth-quarter holiday sales. For industrial companies and a whole host of other industries, various factors can introduce uncertainty into the revenue modeling process; these include new product introductions, competitive threats, economic cycles, and social and political events.

The fact is that modeling segment revenues for most companies falls into neither the purely sequential nor the purely annual camp. For companies with neither a seasonless operating model nor a highly seasonal profile, our rule of thumb is to use sequential growth if we have highly granular inputs such as individual product family tallies at the subsector level. If our only guidance is very general and at the segment level or even solely at the top-line level (customary with retailers), we will model quarterly growth on a year-over-year basis.

Your historical grid of segment revenues shows both annual and sequential growth rates for each segment. Depending on your industry, model growth using the appropriate historical sequential or annual rate of change for each period. Later, we'll have a chance to go more granular at the segment level as well.

Product and Services Revenue Within the P&L

A large number of companies introduce a highly useful level of granularity directly into the income statement. These companies break out product revenues from services revenues.

We made the point earlier in this book that investors want the final data input—the asset's calculated value—and care not if you get the line items right along the way. So, why pay such attention to the bifurcated revenue presentation? Because it is typically accompanied by distinct COGS data, and that will give us two inputs for our gross margin calculation. Along with operating margin, gross margin is one of the most crucial determinants of the final bottom line.

A weighted gross margin calculation for a company that provides product and service data in the revenue and COGS lines is fairly straightforward; calculate percentage of total revenue from products multiplied by its gross margin and the percentage of total revenue from products multiplied by its historical gross margin, and sum the two.

Assuming a company does break out revenue by product and services, how should the line items be modeled? There are several ways to model revenue up from segments into this bifurcated top line, and as always the modeling method begins with the company presentation. The simplest case (and less common than you might think) is an instance where the presenting company that uses this bifurcated top-line presentation also provides segment data that includes services revenue, *and* this segment services revenue historically accords exactly with services segment revenues.

In this instance, one models services revenue at the segment line and plugs the number into the P&L services revenue line item. For top-line product revenue, one simply sums revenue contribution from all product-based segments.

Doesn't P&L services revenue always line up with segment services revenue? Not always; and the logic is straightforward. The P&L is simply a reckoning sheet; it divides consolidated revenues strictly by whether a dollar was recorded based on the contribution from product sales or from services delivered. The segment services, on the other hand, commonly represents a functioning business unit. And the service personnel in this unit, in the course of their daily tasks, acquire product at arm's length from the product segments, which is then installed and serviced as needed. Intuitively in this instance, the segment services revenue will be higher than P&L services revenue.

Figure 3.2 shows ADC Telecom's fiscal 2007 top line, including the product-to-service breakout, as well as the segment breakout. For ADC Telecom's October 2006 through 2008 fiscal years, P&L services revenue ranged between 74% and

Figure 3.2

ADCT's fiscal 2007 P&L services revenues do not line up with its segment services revenues because the Global Services unit acquires product internally that it then resells in the course of doing business, whereas the top line reflects only revenue earned purely from services.

ADC Telecom												
Income Statement	**1Q07**	**Yr/Yr %**	**2Q07**	**Yr/Yr %**	**1H07**	**3Q07**	**Yr/Yr %**	**9mos07**	**4Q07**	**Yr/Yr %**	**2007**	**Yr/Yr %**
Prodct Sales	259.64	*7%*	312.00	*-3%*	571.6	306.00	*-0%*	877.6	290.50	*9%*	1,168.1	*3%*
Service Revenue	36.85	*-7%*	37.40	*0%*	74.3	40.10	*11%*	114.4	39.10	*-6%*	153.5	*-1%*
Net Sales	296.49	*5%*	349.4	*-2%*	645.9	346.1	*1%*	992.0	329.6	*7%*	1,321.6	*2%*
Product COGS	168.80	*7%*	195.90	*-6%*	364.7	196.80	*-2%*	561.5	182.50	*1%*	744.00	*-0%*
Service COGS	33.40	*-8%*	33.00	*14%*	66.4	35.70	*19%*	102.1	33.50	*-2%*	135.60	*5%*
Net COGS	202.2	*4%*	228.9	*-3%*	431.1	232.5	*0%*	663.6	216.0	*1%*	879.6	*0%*
Gross Profit	94.3	*8%*	120.5	*-1%*	214.8	113.6	*1%*	328.4	113.6	*22%*	442.0	*7%*
Segment	**1Q07**		**2Q07**		**1H07**	**3Q07**		**9mos07**	**4Q07**		**2007**	
Revenues												
Global Connectivity	228.8	*10%*	272.1	*-3%*	500.9	268.7	*-1%*	769.6	251.4	*10%*	1,021.0	*3%*
Network Solutions	22.5		26.5		47.3	24.5		71.8	24.4		96.3	
Professional Services	47.6	*7%*	50.8	*-3%*	98.4	52.9	*4%*	151.3	53.7	*3%*	205.0	
Total Revenues	297.2	*9%*	349.4	*-2%*	646.6	346.1	*1%*	992.7	329.6	*7%*	1,322.3	*1%*
PrSrvc % of P&L Srvcs											75%	
Segment Srvcs as % P&L Srvcs											75%	

77% of segment services revenue. To model this relationship up from the segments to the top line, we would represent P&L services revenue as 75.5% of estimated segment services revenue. Top-line product revenue would be the sum of the product segments, plus segment services revenue minus P&L services revenue. (As a sign of how company presentations can change, by fiscal 2008 ADCT's P&L services revenue *was* lining up with its services segment revenue; and by 2009 ADCT was no longer showing a services component of revenue on the P&L within its quarterly results releases.)

Some companies that provide top-line breakouts of services versus products do not break out a distinct services revenue component within the segment reporting. To model services revenue for these companies, we'll initially rely on the historical amount of services revenue as a percentage of total revenue.

Now that we have summed segment revenue in line 73 of our example, it is a simple step to link this to total revenue in the top line for each quarter. Companies may show all in top-line revenue (product and service revenue combined); they may break out product and services revenue in which P&L services revenue aligns exactly with segment services revenue; or they may present product and services revenue in which services revenue is out of sync with (and usually lower than) segment services revenue.

If the company has only one top-line revenue number, link the summed segment revenue into that cell. If the company has an exact relationship between P&L services revenue and segment services revenue, link the summed segment tally directly into top-line services revenue. In the P&L product revenue cell, link to the sum of all product-based divisions.

If, like ADCT, this relationship between P&L and segment services revenue is inexact, we need an adjustment. Assuming P&L services revenue is in CA4 and segment services revenue is in CA72, our formula in cell CA4 would be, `=CA72*.75`. For P&L product revenue, our formula in CA3 would be `=CA70+CA71+(CA72*.75)`. A final step is to establish these links for all quarters. We've already summed the "placeholder" values in each quarter across the interim periods, so by linking summed segment revenue to all top-line cells, all our interim-period tallies (including full year) will be in place.

We've shared some of the common methods by which individual companies present their segment data, and how to use those common presentations to more accurately model the top line. While most presentations hew to the methods we've discussed, you will encounter other presentation modes in your analytic career.

Further along we'll discuss other means to refine the inputs within the individual segment line items. But first we offer a unique method to reimagine the income statement presentation altogether, in which segment inputs take preeminence over the normal operating cost line items.

Chapter 4

PHASE 3: SEGMENT OPERATING INCOME AND PERCENTAGE-OF-DIFFERENCE MODELING

"Percentage of Difference"—Modeling the P&L from Segment Income

For companies that provide both segment revenue and segment operating income (or EBIT), we model segment revenue as well as segment income. Later in this chapter, we show how to use modeled segment income directly to recast the income statement.

Even if that option is not available or not preferred, we model this level of detail. Additionally, we display the margins for each segment for each quarter and interim periods below the operating profit bloc.

It is not uncommon for analysts to use the historical margin percentages, along with company guidance and their own analysis of industry dynamics, to forecast segment margins and—applying those margins to estimated segment revenues—to forecast segment operating income. The sum of segment operating profits, adjusted by the historical percentage eliminations, should be near the analyst's forecast of operating income modeled in the P&L. Analysts will use this information to calibrate their P&L operating income.

While it is useful to "eyeball" estimated segment operating profits in relation to estimated P&L operating profits, whenever possible we want to quantify such relationships. Hence, we use what we call percentage-of-difference modeling to make these tallies not just close but identical.

Percentage of Difference: The Concept

Percentage-of-revenue representation is a mainstay of P&L modeling. When done right, it provides precision—and even some satisfaction, most of it internal to the modeler. If you've modeled a company's quarter on a percentage of basis and that company reports line items that are spot on with, say, your SG&A and R&D assumptions, be sure to give yourself a high five—because no one else cares. We'll say it again, and frequently, in this book: the important outputs are conclusions, not components.

If a company provides segment income data along with segment revenue, there are special instances in which this information can be used to model the P&L. Rather than flowing down strictly from the top, this kind of modeling emanates both up and down from the middle and specifically from operating income modeled at the segment level. The "difference" in percentage of difference is that between revenue and operating income.

For this kind of modeling, we require a company that regularly provides investors—via its financial press releases and/or its 10-Q—with both segment revenues and segment income. Moreover, at some place in the income statement presentation, we require a point at which P&L operating income accords exactly with segment operating income. One such company is Motorola; its P&L operating income accords exactly with the sum of its segment income (including the other and eliminations line). During 2006, we modeled Motorola using percentage-of-difference modeling. Hence, the segment operating profit tallies (which were given their own line item on row 11 in the P&L) lined up exactly with the segment earnings, and with the P&L operating income estimate. Figure 4.1 shows the historical presentation of Motorola's 2006 year; we've included a snippet of the P&L up to operating income, as well as segment revenue and operating income, to show how P&L and segment operating income line up exactly.

At the segment earnings level, some companies may present EBT (earnings before taxes); one such company is Qualcomm. For Qualcomm, the sum of segment income along with what it calls corporate and eliminations matches exactly its pretax income; in other words, nonoperating items such as interest income have been allocated to the segments. The corporate and eliminations figure for Qualcomm was historically always positive, because it included the sizable Treasury contribution of interest income. Now that Qualcomm like other companies has had to restructure, this line item is sometimes negative.

Figure 4.1

Using percentage-of-difference modeling, modeled segment operating income and P&L operating income become identical. Pictured is data from Motorola's 2006 year.

Motorola Inc.												
	1Q06		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	**Y/Y %**
Revenue	10,013	*23%*	10,876	*23%*	20,889	10,603	*13%*	31,492	11,792	*13%*	42,879	*16%*
COGS	6,993	*27%*	7,517	*26%*	14,510	7,226	*13%*	21,736	8,723	*22%*	30,152	*21%*
Gross Margin	3,020	*13%*	3,359	*17%*	6,379	3,377	*12%*	9,756	3,069	*-7%*	12,727	*7%*
SG&A	1,116	*11%*	1,195	*16%*	2,311	1,174	*15%*	3,485	1,158	*1%*	4,504	*7%*
Restructuring & Other Charges	-		-			-			65		133	
R&D	980	*21%*	1,016	*19%*	1,996	1,027	*20%*	3,023	1,061	*16%*	4,106	*20%*
Other/FreeScl	30	*-529%*	(374)	*-2178%*	(344)	205		(139)	32	*-106%*	(108)	
P&L Op Incm	849		1,522	*55%*	2,416	968	*-12%*	3,387	753	*-57%*	4,092	*-13%*
Segment Op Incm	[illegible]		1,522		2,371	968		3,339	753		4,092	
Pro Forma Op Incm	976		1,196		2,172	1,220		3,392	894		4,286	
Segment Sales	**1Q06**		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	
Mobile Devices	6,403	*45.0%*	7,140	*45.7%*	13,543	7,034	*25.5%*	20,577	7,806	*19.4%*	28,383	*32.3%*
Home & Networks	2,520	*-7.9%*	2,343	*-17.1%*	4,863	2,262	*-18.2%*	7,125	3,043	*5.9%*	10,168	*-9.2%*
Enterprise Mobility	732	*7.3%*	1,355	*82.4%*	2,087	1,329	*78.9%*	3,416	980	*39.4%*	4,396	*53.1%*
Other	-	-	-	-	-	-	-	-	-	-	-	-
Eliminations	(47)	*0.0%*	(18)	*-71.0%*	(65)	(22)	*-66.2%*	(87)	(37)	*-51.3%*	(124)	*-54.1%*
TOTAL	9,608	*22.6%*	10,820	*28.7%*	20,428	10,603	*17.2%*	31,031	11,792	*17.5%*	42,823	*21.4%*

(continued)

Figure 4.1 *(continued)*

Motorola Inc.												
	1Q06		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	**Y/Y %**
% Rvnu & Sqntl	**%Sales**	**Q/Q %**	**%Sales**	**Q/Q %**	**%Sales**	**%Sales**	**Q/Q %**	**%Sales**	**%Sales**	**Q/Q %**	**%Sales**	
Mobile Devices	*66.6%*	*-2.1%*	*66.0%*	*11.5%*	*66.3%*	*66.3%*	*-1.5%*	*66.3%*	*66.2%*	*11.0%*	*66.3%*	
Home & Networks	26.2%	*-12.3%*	21.7%	*-7.0%*	23.8%	21.3%	*-3.5%*	23.0%	25.8%	*34.5%*	23.7%	
Enterprise Mobility	7.6%	*4.1%*	12.5%	*85.1%*	10.2%	12.5%	*-1.9%*	11.0%	8.3%	*-26.3%*	10.3%	
Other	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	
Eliminations	*-0.5%*	*-38.2%*	*-0.2%*	*-61.7%*	*-0.3%*	*-0.2%*	*22.2%*	*-0.3%*	*-0.3%*	*68.2%*	*-0.3%*	
TOTAL		*-4.3%*		*12.6%*			*-2.0%*			*11.2%*		
PF Operating Profit												
Mobile Devices	702	*60.3%*	804	*63.1%*	1,506	843	*42.2%*	2,349	341	*-48.6%*	2,690	*23.0%*
Home & Networks	161	[illegible]	222	*55.1%*	383	181	*-61.1%*	564	428	*-21.0%*	992	*-48.2%*
Enterprise Mobility	142	[illegible]	239	[illegible]	381	254	*551.3%*	635	118	*126.9%*	753	*466.2%*
Othr & Eliminations	(156)	*-351.6%*	257	*0.0%*	101	(310)	-	(209)	-	-	(209)	
Segment Totals	849	*-8.1%*	1,522	*58.9%*	2,371	968	*-10.4%*	3,339	753	*-56.0%*	4,092	*-11.1%*
Operating Margin												
Mobile Devices	*11.0%*		*11.3%*		*11.1%*	*12.0%*		*11.4%*	*4.4%*		*9.5%*	
Home & Networks	*6.4%*		*9.5%*		*7.9%*	*8.0%*		*7.9%*	*14.1%*		*9.8%*	
Enterprise Mobility	*19.4%*		*17.6%*		*18.3%*	*19.1%*		*18.6%*	*12.0%*		*17.1%*	
Eliminations	*0.0%*		*0.0%*		*0.0%*	*0.0%*		*0.0%*	*362.2%*		*108.1%*	
Segment Margin	*8.8%*		*14.1%*		*11.6%*	*9.1%*		*10.8%*	*6.4%*		*9.6%*	

At first blush, the distinction between Motorola's presentation and that of Qualcomm may seem insignificant. But it is infinitely simpler to model up to P&L operating income from segment operating income than it is to model up to P&L EBT from segment EBT. The wild card in EBT is the uncertainty around any quarter's net interest cost/income.

Percentage of Difference: Basis

As always, a walk-through best makes our case. We'll begin doing our walk-through with Motorola, and we'll first consider a period in which Motorola was profitable. Then we'll up the ante by attempting to model during one of the many unprofitable phases of this "serial" restructurer.

With that in mind, in Figure 4.2 we take another look at the alignment between P&L profit and summed segment profit at Motorola. During 2006, everything was working for Motorola; in the third quarter, as sales of its ultraslim RAZR mobile phone took off, margins hit their peak. All three of its divisions (actually, these were historically recast from a preceding organizational structure) were profitable. In 2Q06, Mobile Devices had an 11.3% operating margin; Home and Networks had a 9.5% margin; and Enterprise Mobility had a rich 17.6% margin. We use these hypothetical margins to model segment income, adjusting for some volume leverage for this pre-Christmas period in which sales were rising as dealers stocked inventories (as it turned out, 3Q06 segment margins were higher for two of the three divisions).

In 2Q, as opposed to other periods, other and eliminations contributed rather than deducted from segment operating income. For all of 2006, other and eliminations at the segment level was a cost of $209 million, on total operating income of $4,100. This item typically reduces operating income by 5%. In mid-year 2006, having recorded the 2Q actual, we would have tweaked our 3Q segment income and margins assumptions. Our segment income calculation for 3Q06 at the time was the respective segment margins times forecast revenue and summed, with the sum reduced by 5% to reflect other and eliminations. On a modeled basis, our summed and adjusted segment operating income—which anticipates a cost rather than a gain in others and eliminations—is 9.1% of revenue, or $968 million.

We need a line in our P&L model to accommodate this calculation. So, between GAAP operating income and pro forma operating income in the P&L we insert a line to accommodate what we call segment operating income. In that line, we pull up our segment income calculation from the segment model.

Figure 4.2

Another look at Motorola from the perspective of percentage-of-difference modeling.

Motorola Inc.												
	1Q06		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	**Y/Y %**
Revenue	10,013	*23%*	10,876	*23%*	20,889	10,603	*13%*	31,492	11,792	*13%*	42,879	*16%*
COGS	6,993	*27%*	7,517	*26%*	14,510	7,226	*13%*	21,736	8,723	*22%*	30,152	*21%*
Gross Margin	3,020	*13%*	3,359	*17%*	6,379	3,377	*12%*	9,756	3,069	*-7%*	12,727	*7%*
SG&A	1,116	*11%*	1,195	*16%*	2,311	1,174	*15%*	3,485	1,158	*1%*	4,504	*7%*
Restructuring & Other Charges	-		-			-			65		133	
R&D	980	*21%*	1,016	*19%*	1,996	1,027	*20%*	3,023	1,061	*16%*	4,106	*20%*
Other/FreeScl	30	*-529%*	(374)	*-2178%*	(344)	205		(139)	32	*-106%*	(108)	
P&L Op Incm	849		1,522	*55%*	2,416	968	*-12%*	3,387	753	*-57%*	4,092	*-13%*
Segment Op Incm	849		1,522		2,371	968		3,339	753		4,092	
Pro Forma Op Incm	976		1,196		2,172	1,220		3,392	894		4,286	
Segment Sales	**1Q06**		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	
Mobile Devices	6,403	*45.0%*	7,140	*45.7%*	13,543	7,034	*25.5%*	20,577	7,806	*19.4%*	28,383	*32.3%*
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Enterprise Mobility	732	*7.3%*	1,355	*82.4%*	2,087	1,329	*78.9%*	3,416	980	*39.4%*	4,396	*53.1%*
Other	-	-	-	-	-	-	-	-	-	-	-	-
Eliminations	(47)	*0.0%*	(18)	*-71.0%*	(65)	(22)	*-66.2%*	(87)	(37)	*-51.3%*	(124)	*-54.1%*
TOTAL	9,608	*22.6%*	10,820	*28.7%*	20,428	10,603	*17.2%*	31,031	11,792	*17.5%*	42,823	*21.4%*

Figure 4.2 *(continued)*

Motorola Inc.												
	1Q06		**2Q06**		**1H06**	**3Q06**		**9mos06**	**4Q06**		**2006**	**Y/Y %**
% Rvnu & Sqntl	**%Sales**	**Q/Q %**	**%Sales**	**Q/Q %**	**%Sales**	**%Sales**	**Q/Q %**	**%Sales**	**%Sales**	**Q/Q %**	**%Sales**	
Mobile Devices	*66.6%*	*-2.1%*	*66.0%*	*11.5%*	*66.3%*	*66.3%*	*-1.5%*	*66.3%*	*66.2%*	*11.0%*	*66.3%*	
Home & Networks	26.2%	-12.3%	21.7%	-7.0%	23.8%	21.3%	-3.5%	23.0%	25.8%	34.5%	23.7%	
Enterprise Mobility	7.6%	4.1%	12.5%	85.1%	10.2%	12.5%	-1.9%	11.0%	8.3%	-26.3%	10.3%	
Other	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	
Eliminations	*-0.5%*	*-38.2%*	*-0.2%*	*-61.7%*	*-0.3%*	*-0.2%*	*22.2%*	*-0.3%*	*-0.3%*	*68.2%*	*-0.3%*	
TOTAL		*-4.3%*		*12.6%*			*-2.0%*			*11.2%*		
PF Operating Profit												
Mobile Devices	702	60.3%	804	63.1%	1,506	843	42.2%	2,349	341	-48.6%	2,690	23.0%
Home & Networks	161	-61.2%	222	-55.1%	383	181	-61.1%	564	428	-21.0%	992	-48.2%
Enterprise Mobility	142	[illegible]	239	[illegible]	381	254	551.3%	635	118	126.9%	753	466.2%
Othr & Eliminations	(156)	-351.6%	257	0.0%	101	(310)	-	(209)	-	-	(209)	
Segment Totals	849	-8.1%	1,522	58.9%	2,371	968	-10.4%	3,339	753	-56.0%	4,092	-11.1%
Operating Margin												
Mobile Devices	*11.0%*		*11.3%*		*11.1%*	*12.0%*		*11.4%*	*4.4%*		*9.5%*	
Home & Networks	*6.4%*		*9.5%*		*7.9%*	*8.0%*		*7.9%*	*14.1%*		*9.8%*	
Enterprise Mobility	*19.4%*		*17.6%*		*18.3%*	*19.1%*		*18.6%*	*12.0%*		*17.1%*	
Eliminations	*0.0%*		*0.0%*		*0.0%*	*0.0%*		*0.0%*	*362.2%*		*108.1%*	
Segment Margin	*8.8%*		*14.1%*		*11.6%*	*9.1%*		*10.8%*	*6.4%*		*9.6%*	

Percentage of Difference: Execution

A key takeaway is that the percentages we will use must sum to 100% of revenue. Normally, in a pure P&L-based model, our modeling of various percents of revenue for the main line items would sum to the difference between 100% and the operating margin. Using these estimates, we would arrive at costs as a percentage of revenue of, say, 93% for an industrial company or 73% for a software company. In percentage-of-difference modeling, we'll estimate our operating margin at the segment level and then let that margin level drive the manufacturing and operating cost inputs, rather than the other way around.

In modeling Motorola's 3Q06 at the P&L level, consolidated revenue as always comes up from the summed segment revenue. But in this case we model cost of goods sold *not* as a percentage of revenue but as a percentage of the difference between revenue and summed segment operating income of 9.1%. The other main line items of operating cost—SG&A and R&D—will also be represented not as a percentage of revenue but as a percentage of the difference between sales and our modeled 9.1% margin.

All of our line items have to reflect that 9.1% of revenues that has been captured as operating income. We would adjust for this margin by increasing the line items by this amount. With Motorola's COGS running at about 68% at the time, our COGS formula would begin with 68% × 1.091 = 74.4%. In a scenario in which 3Q06 revenue is cell CV3, COGS is cell CV4, and segment operating income is cell CV16, the formula for COGS will be `(CV3−CV16)*.74.4`.

SGA has been a bit over 11%, and R&D has been 9.7%. These items must be similarly "squared up" by that 1.091 factor. We also know Motorola's catch-all "other" category typically runs at 2% of revenue; it too must be adjusted. Adjusted by this 1.091 multiplier or factor, SG&A is 11.05% times 1.091, or 12.1%; R&D is 9.7% times 1.091, or 10.6%; and Other is 2.0% times 1.091, or 2.2%.

In a scenario in which 3Q06 SG&A is cell CV6, our SG&A formula is `(CV3−CV16)*.12.1`. In cell CV8, our R&D formula is `(CV3−CV16)*.106`; and in cell CV9, our other formula is `(CV3−CV16)*.022`.

The four multipliers sum to 99.3, so we need to bump them up to sum to 100%. The multiplier for COGS becomes 74.5; the multiplier for SG&A becomes 12.4; the multiplier for R&D becomes 10.8; and the multiplier for "other" becomes 2.3. These sum to 100%. How can we be so cavalier about adjusting these percentage-of-revenue tallies? Because, remember, no one is paying you for accuracy in calculating COGS, R&D, or SG&A; these calculations are just means to an end in modeling.

At this point, you will see that the segment income line item is exactly equivalent to the GAAP P&L calculation of operating income. Then, news flash: the company preannounces that, due to a shortage of capacitors in Kazakhstan, phone margins will suffer. Based on your determination that this event will cost 100 basis points of Mobile Device segment margin, you shave your 3Q06 margin assumption for mobile devices to 11% from 12%. The dollar value of your segment operating income is reduced. And a funny thing happens: so too is your P&L operating income assumption, by exactly the same amount.

Percentage of Difference: From GAAP to Pro Forma

As you know, we've made a determination to include line items in our income presentation to allow for pro forma modeling, either because this is *de rigueur* for the company or because the company has entered into a rough period in which restructuring and impairment costs must be accommodated without distorting go-forward progress.

For the company for which pro forma operating income is the exception rather than the rule, we can simply equate summed segment operating income to GAAP P&L operating income *as well as* pro forma P&L operating income. We can then accommodate those special cases when the company must incur costs to restructure or impair.

As we know, many companies always exclude noncash items (intangibles amortization, FAS 123R stock option compensation, acquired in-process R&D) and routinely differentiate pro forma operating income from GAAP operating income. For these companies, at the segment level we model while excluding these items from segment income.

We're aided by the fact that most companies that provide segment revenue and segment income will provide adjusted as well as GAAP segment income (adjusted to exclude one-time events and/or noncash items). Armed with historical comparisons, we can conclude how the inclusion and exclusion of such items will impact individual segment margins.

Now that we've determined which kind of company we're dealing with—serial excluder, occasional excluder, or never-say-die includer—we can direct the summed segment operating income to the appropriate cell. If the summed segment income is modeled to *exclude* noncash items and anticipated one-time restructuring or impairment costs, the segment operating income cell is modeled to match up or exactly reconcile to the cell for pro forma P&L operating income. If the summed segment income is modeled to *include* noncash items and anticipated one-time restructuring or impairment costs, the segment operating income cell is modeled to match up or exactly reconcile to the cell for GAAP P&L operating income.

From this point, we then proceed down the P&L presentation to adjust for all the nonoperating items on the way to our GAAP and pro forma net income and per-share calculations.

Modeling segment revenue and income will be sufficient for many investors and analysts, particularly those charged with covering a large group of companies or industries. But it is possible and even preferable to model each revenue segment at a more detailed level. The difficulty is that each revenue segment is subject to multiple forces; modeling at this granular level is not easily categorized or systematized. In our next chapter, we offer some guidance on this broad-based topic.

Chapter 5

PHASE 4: THE WORKBENCH, PART 1

Down below the income statement, margin analysis, and the segment model in every workbook-based model we build is an area variously called the workbench, the worksheet, the work zone, or some similar such construction-related term. No two of these workbench presentations are ever the same, even for companies that organize their reported information in similar ways. The worksheet is almost always a means of deriving a more granular revenue assessment, which in turn improves the efficacy of the segment revenue model. The workbench can also be directly and indirectly helpful in shaping our segment margin assumptions. And only when we are satisfied with our revenue model do we fine-tune our gross margin and operating cost assumptions

Data from the workbench is used to model individual segment revenue. Much as the summed segment revenue is linked to the cell representing consolidated company revenue, the summed worksheet data per segment is directed to the cell representing individual segment revenue.

In terms of income statement presentation, representation, and modeling, this will be by far our most (and in fact only) touchy-feely chapter. Beyond transcribing information from SEC documents, analysis is not a quantifiable science, the groaning shelves of analysis treatises notwithstanding. It is a mix of science and art, with a subtext of detection—which necessarily involves a fair amount of gumshoeing.

The workbench straddles publicly available, company-furnished company information that is not part of the formal segment model; anecdotal and oral company information; industry information; economic information; analyst gossip; and all matter of directly or indirectly pertinent blog blather, scuttlebutt, rumor, and nonsense. It is up to the gumshoe-analyst to determine and incorporate only those data points that reliably and predictably enhance the quality of the segment modeling.

So far in our discussion, we have mainly made use of common modeling techniques (e.g., percentage-of-revenue modeling) and less common techniques (e.g., percentage-of-difference modeling up from segment income). Always, we've worked with a fairly straightforward information set, which has informed a fairly straightforward set of assumptions.

The workbench is a different animal. It incorporates informal as well as formal data. Much of the best and easiest-to-use information is available for sale; like any scarce good, it is not cheap.

Culling Information Sources for the Workbench

The workbench is the place where the good analyst exploits whatever applicable information is afloat in the ether—and I use that term pointedly. The Internet is a great source of secondary information about a company. The first place to start is with trade journals. Thanks to the Internet, this species—endangered by paper, printing, and shipping costs—has revived and is indeed flourishing. Because advertising by industry participants supports electronic publishing and operating costs, most trade journals are free. And while most require some industry affiliation to qualify for a subscription, most journals consider financial services an applicable and acceptable affiliation.

Over the years, trade journals have often developed data tables that industry insiders regard as indispensible. The creative analyst can make excellent use of this data. At various times in my career, I covered the automotive industry, aerospace/defense, and the chemicals industry. *Chemical Week* carried extensive hydrocarbon, monomer, and polymer pricing tables down to the product level, both on a merchant basis and a spot basis. Within the worksheet sections of various models for companies such as Dow, DuPont, and Lyondell, I used changes in the pricing data to accurately forecast changes in various business units sensitive to pricing trends.

Automotive Week regularly publishes monthly, quarterly, and year-to-date data not only on individual companies and brands but also on per-vehicle unit shipment data. Coupled with wholesale pricing data and assumptions culled from the Internet, which was a much smaller and more manageable beast in the late 1990s, I was able to fairly accurately project revenues for the various units and whole companies. Using airplane shipment data from Boeing as well as industry wholesale pricing information picked up in *Aviation Week*, I was able to model revenue for Boeing.

As the above implies, don't look for much creativity in trade journal titles. But do look to these publications for invaluable industry insight along with the data. It is also true that you can purchase much more comprehensive industry data that dissects every data point by user, geography, customer type, and more. Such data is expensive. For the multi-industry buy-side analyst charged with monitoring 10 industries within a few sectors, the cost would be prohibitive.

Beyond trade journals, simple Internet searches can direct you to industry blogs, user groups, even disgruntled former employees with an axe to grind. Amid the relentless boosterism provided by the spin doctors in Investor Relations, (IR machine), such axes can cut away the clutter and provide rare insider insight.

Company Information

Often the best source of information about a company is the company itself, but the interchange between analyst and management is rarely a full and frank exchange of views. The frequent forum for this exchange is the post–results release investor conference call. During these calls, the ability to ask questions is often limited to industry professionals, meaning investment analysts from major and midsized brokerages. In this setting, the interplay between company officials and analysts falls somewhere between a poker game and a minuet.

Companies, as we have noted, must forever balance their information disclosure; they cannot afford to release too much detail or it might tip off rivals or, worse, aggravate their major customers. At the same time, managements want to highlight areas of progress and successful execution. Often, particularly in down markets or amid withering competition, these highlights can be hard to find.

Analysts must never overlook the fact that all company presentations, regardless of their veneer of cool objectivity, pass through the hand of skilled spin doctors. In this spirit, a company's quarterly presentation may trumpet an obscure niche (e.g., "coat hanger sales in Burma tripled") while conveniently overlooking inconvenient facts: as coat hanger prices in Burma went from $10 to $30, total coat hanger sales fell $100 million.

For all that, companies do provide useful and what I would call anecdotal information—anecdotal in the sense that it is spoken from prepared or ad lib remarks, but not published in any formal documents filed with the SEC or even on the company's own Web site.

Impediments to Company Information

In the months and years after the market collapse of 2000–2002, regulators sought a variety of remedies for the real and perceived ills that had at the least exacerbated if not triggered the market's downward skid. Demonstratively closing the barn door well after the value had vanished, regulators came up with a few fixes, including Sarbanes-Oxley and Reg FD. Sarbanes-Oxley, enacted in 2002 in the wake of Enron, Tyco, and other scandals, sets a higher standard for public companies and the accounting firms that certify their financial statements. For investors, however, the well-intentioned act is viewed with some skepticism. On the upside, it requires top executives to sign off on the veracity of SEC documents; on the downside, it is a cost and time burden for smaller public companies.

Reg FD, or Regulation Fair Disclosure, is noble in intent and flawed in execution. Reg FD mandates that no employee of a public company may share information with one or more investors that is not available to the public. It was meant to eliminate the information advantage that bulge bracket analysts garnered from cozying up to the CFO or CEO—bits of insider information casually discussed over golf or at the 19th hole.

In the Reg FD era, IR officials and CFOs are well schooled in information distribution. IR personnel won't go much off the official results release script during follow-up calls. Inadvertent admissions on a morning conference call often prompt an afternoon press release. But the most privileged information, oddly, is available to one source: industry analysis firms. These firms gather information in confidence from public firms, slice and dice it for useful consumption, and put it up for sale.

For technology companies, multiple information providers will slice and dice sales data from every niche and every region in every imaginable way. For energy companies, there are multiple firms providing reserve, exploration, refining, and pricing data for every product from crude through the countless distillates.

This information, thus collected, collated, and pinned up for inspection like so many butterflies, is then purchased by those same cash-rich bulge bracket firms that used to get their information anecdotally on the golf course but now get it neatly organized in tables and charts. The individual investor, the buy-side multi-industry generalist, the private money manager—all are effectively priced out of this information grid. Meant to level the playing field, Reg FD ultimately results in even more exclusive information segregation than the system it supplanted.

Formal Company Presentations

Investor interactions in such public forums as post–results release conference calls and corporate presentations can be useful in the modeling process, both for specific periods and in shaping the modeling process overall. The two parts of any such company-investor interaction have a completely different feel. The formal presentation is tightly scripted and controlled. The Q&A follow-up can be much more freewheeling.

The formal portion of industry presentations and post–results release calls can be highly informational. These meetings are carried over the Web and thus meet the threshold of public availability. Accordingly, company officers will regularly disclose data that is never published in SEC documents or on the company's Web site, which only lives on in transcripts of these meeting.

When Juniper Networks was a smaller company, the CEO at the time began every discussion by listing the unit shipment numbers for router chasses and blades (i.e., discrete devices that fit into chassis slots.) This information existed nowhere else on the company's Web site, in its SEC documents, or even in the flip books used for corporate presentations. The chassis and port unit data was immensely helpful in analyzing and modeling unit and pricing trends in Juniper's infrastructure business. Like all good things, it was doomed to go away; now that Juniper is a bigger company, it has. The replacement data is less directly informative, but it too can be used to get under the covers of the published information.

In another example, Motorola accompanies its quarterly results release with a sizable PDF presentation published on the company's Web site. At one time, that presentation included handset unit data segmented by standard or protocol (e.g., GSM, iDEN, or CDMA 1x). In time, Motorola changed its presentation to one in which it presented its units as percentages shipped to various regional markets. Both data series were and are highly useful, and you will search high and low without finding them anywhere in Motorola's official publications.

No one in the analytic community is happy to see any such anecdotal or oral data series discontinued. The data is useful in the absolute, but most useful in the way it informs quarter-over-quarter changes within the series, which in turn correlates to broad segment trends.

Post–Results Release Q&A

After a company offers its formal remarks in such settings, the floor is opened to questions. We count on analysts to be unbiased and analytical, but representational heuristics can loom large. (Translation: the osmotic gain in self-worth from time spent with a high-powered executive can subconsciously sabotage our objectivity.) Representational heuristics means judging a person based on his or her relationship to a mental category. Still, most analysts can put aside their collegial feelings toward corporate officers long enough to ask hard questions.

The surface civility of the Q&A session may seem like an extension of the formal remarks presentation, but beneath the surface, tension bubbles. Analysts are dedicated to prying loose useful information; IR people and C-levels (i.e., chief executive officer, chief financial officer, and other top executives) want to divulge nothing more than is in the script. If you are an analyst who covers 15 to 25 companies and have been in the business for 10 years, you will have listened to (or read the transcript of) at least 1,000 such calls. If you are not by then wise to the nuances of such interactions, you're in the wrong business.

Specifically, analysts seek to pry apart and amplify the available information, such as line items and margin data on the P&L, segment data on a product-line or regional basis. They tug at the threads of broad announcements (e.g., partnerships, asset sales, restructuring, and impairments) in hopes of unraveling corporate strategy. Figure 5.1 shows a truncated version of Ciena's income statement presentation, including workbench. Information on the main revenue drivers comes from the post-results conference call and is rarely published elsewhere; information on the minor revenue contributors is an estimate and comes from discussions with management.

Having been blunted in direct questioning, analysts seek not the head-on approach but the off-directional approach; rather than seek actual undisclosed and guarded customer, product, or regional data, they seek clues on the dynamic or direction—the trend—of such subsegment data. Some analysts always pick at a particular vein. One communication industry analyst always begins his questions with a request for gross margin information on a segment basis. That's a fairy shrewd opener for any analyst working in an industry with lots of segment revenue data but limited segment profit data. Operating costs are more apt to be shared in an efficient organization, so gross margin differences are the primary profit drivers for individual segments. While this analyst rarely gets a direct answer to his gross margin questions, he is provided sufficient directional data to better model EBIT for those segments at companies where profit is not disclosed.

Figure 5.1

In this compacted view of Ciena's income statement presentation, we see the segment and subsegment modeling used to get to the P&L top line.

Ciena												
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09**	**Y/Y %**	**9mos09**	**4Q09E**	**Y/Y %**	**2009E**	**Y/Y %**
Product Sales	139.72		118.85		258.57	139.90		398.47	141.11		539.58	
Svc Rvns	27.68		25.35		53.04	24.86		77.89	26.00		103.89	
Revenue	167.40	*-26%*	144.20	*-40%*	311.60	164.76	*-35%*	476.36	167.11	*-7%*	643.47	*-29%*
SEGMENTS	**1Q09**	**Y/Y**	**2Q09**	**Y/Y**	**1H09**	**3Q09**	**Y/Y**	**9mos09**	**4Q09E**	**Y/Y**	**2009E**	**Y/Y**
Optical Service Delivery	129.8	*-32%*	106.0	*-48%*	235.8	117.1	*-41%*	352.9	118.7	*-13%*	471.6	*-36%*
Carrier Service Delivery	9.8	*-11%*	13.0	*0%*	22.8	23.0	*-3%*	45.8	22.4	*87%*	68.2	*14%*
Global Network Services	27.8	*9%*	25.0	*-4%*	52.8	25.0	*-15%*	77.8	26.0	*-13%*	103.8	*-7%*
Total	167.4	*-26%*	144.0	*-41%*	311.4	165.1	*-35%*	476.5	167.1	*-7%*	643.6	*-29%*
Sqntl [illegible] Rvnu	**% Rvnu**	**Sqntl**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	
Optical Service Delivery	*78%*	*-5%*	*74%*	*-18%*	*76%*	*71%*	*10%*	*74%*	*71%*	*1%*	*73%*	
Carrier Service Delivery	*6%*	*-18%*	*9%*	*33%*	*7%*	*14%*	*77%*	*10%*	*13%*	*-3%*	*11%*	
Global Network Services	*17%*	*-7%*	*17%*	*-10%*	*17%*	*15%*	*0%*	*16%*	*16%*	*4%*	*16%*	
Total Rvnu		*-6%*		*-14%*			*15%*			*1%*		

(continued)

Figure 5.1 *(continued)*

WORKBENCH Optical Service Delivery	1Q09		2Q09		1H09	3Q09		9mos09	4Q09E		2009E	
CoreDirector	45.0	*-36%*	43.0	*-48%*	88.0	38.0	*-52%*	126.0	39.5	*4%*	165.5	*-39%*
CoreStream	26.0	*-60%*	23.0	*-58%*	49.0	27.0	*-51%*	76.0	28.4	*1%*	104.4	*-49%*
Multisrvc Acss T&S (InPho)	1.0	*-75%*	1.0	*-66%*	2.0	1.7	*-55%*	3.7	1.8	*-12%*	5.5	*-57%*
Storage Extension (Akara)	2.0	*-50%*	2.1	*-49%*	4.1	2.1	*-61%*	6.2	2.2	*-27%*	8.4	*-49%*
Total Core	74.0	*-48%*	69.1	*-52%*	143.1	68.8	*-52%*	211.9	71.8	*1%*	283.7	*-44%*
Metro Optical	4.0	*-67%*	3.0	*-73%*	7.0	3.2	*-73%*	10.2	3.2	*-35%*	13.4	*-66%*
Cn 4200 FlexSelect	50.0	*61%*	32.0	*-29%*	82.0	43.0	*4%*	125.0	41.5	*-30%*	166.5	*-6%*
Total Metro & Enterprise	54.0	*26%*	35.0	*-38%*	89.0	46.2	*-13%*	135.2	44.7	*-30%*	179.9	*-17%*
Total Transport & Swtch	128.0	*-31%*	104.1	*-48%*	232.1	115.0	*-42%*	347.1	116.5	*-14%*	463.6	*-36%*
Data Networking	2.00	*0.27*	2.10	*0.27*	4.1	2.12	*-29%*	6.2	2.14	*7%*	8.4	*-30%*
TOTAL Cnvrgd Ethrnt Infra	130.0		106.2		236.2	117.1		353.3	118.7		472.0	*-35%*
	% Rvnu	**Sqntl**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	**% Rvnu**	**Sqntl**	**% Rvnu**	
CoreDirector	*35%*	*18%*	*40%*	*-4%*	*37%*	*32%*	*-12%*	*36%*	*33%*	*4%*	*35%*	
CoreStream	*20%*	*-7%*	*22%*	*-12%*	*21%*	*23%*	*17%*	*22%*	*24%*	*5%*	*22%*	
Multisrvc Acss T&S (InPho)												
Storage Extension (Akara)												
Total Core	*57%*	*4%*	*65%*	*-7%*	*61%*	*59%*	*-0%*	*60%*	*61%*	*4%*	*60%*	
Metro Optical	*3%*	*-20%*	*3%*	*-25%*	*3%*	*3%*	*5%*	*3%*	*3%*	*3%*	*3%*	
Cn 4200 FlexSelect	*38%*	*-15%*	*30%*	*-36%*	*35%*	*37%*	*34%*	*35%*	*35%*	*-4%*	*35%*	
Total Metro & Enterprise	*42%*	*-16%*	*33%*	*-35%*	*38%*	*39%*	*32%*	*38%*	*38%*	*-3%*	*38%*	
Total Transport & Swtch	*98%*	*-5%*	*98%*	*-19%*	*98%*	*98%*	*10%*	*98%*	*98%*	*1%*	*98%*	
Data Networking	2%	*0%*	2%	*5%*	2%	2%	*1%*	2%	2%	*1%*	2%	
TOTAL Cnvrgd Ethrnt Infra		*-5%*		*-18%*			*10%*			*1%*		

Techniques for the Workbench

Units Shipped

The goal of the workbench is to provide more granularity on segment revenue and margin. Our goal as always is the process, not explication of the theory. So let's move on to some examples. In doing so we'll incorporate all the above-cited information sources and try to apply them in creative ways in pursuit of greater accuracy. Here we introduce an important concept: the nature of the market and the products and solutions offered will partly drive the final revenue tally, particularly as it relates to the mix of product and services revenue.

During company presentations, company officers sometimes provide oral, nonpublished details on segment. Let's consider a large and diverse (and hypothetical) technology company that participates in multiple market niches, some serving the consumer and some serving the commercial and industrial markets; the company is also active in government markets. This particular company on a recent (hypothetical) conference call confided that it sold 10.1 million home networking devices in a quarter. The company published the segment revenue. How do we use this information to better model sector revenue going forward?

First we'll want to reference historical conference call transcripts in which the company provides this information each quarter (again, without publishing it anywhere else). While there are multiple pay transcript services, and transcripts are included with a Bloomberg subscription, there are also research vendors that publish transcripts soon after the conference call. Some companies provide transcripts as well. More and more companies are including their prepared remarks as a handout with the results report and presentation.

At a first cut, the number of units shipped divided by segment revenue would suggest a wholesale unit average selling price (ASP). But hold on; there will be a service component. Understanding the product, we know it is a pack-and-ship product deployed by cable companies and telephone companies. So services will be small but not immaterial; we can assume 3% to 5%. In determining ASP, we extract some consistent proportion of revenue from segment sales.

To model the next quarter, we would use a price based on the modeled ASP, unit sales, and the service component. But what price? Disaggregate four to eight past quarters for the segment along these lines. Check the price trend; cross-check for correlations in inflation gauges such CPI, PPI, and the GDP deflator.

And how many units? Use the past-quarters' historical disaggregation to determine unit trends; look for seasonal patterns. But also use publicly available data within the GDP accounts and other published federal data on indicators such as housing creation, incomes, and anything else that might correlate with growth in home networking. Cull the Internet for growth patterns in broadband access. And assess revenue trends at near rivals.

Polycom is small enough that it still provides data on unit volumes (something Juniper used to do but then outgrew). Figure 5.2 shows how we arrived at our modeled Video Communications revenue estimates throughout 2008. Note that if our subsegment estimates for a just-reported quarter proved wrong, we would square them up with the published segment data so that our forward modeling would be based on the most accurate projections.

Mainly, build the segment revenue model and move on. Don't agonize over a fine-tune. Instead, wait for actual results and assess your veracity; how wide was your miss? Use the miss in subsequent quarters to calibrate and refine future projections. Here's a somewhat surprising truth: if your underlying subsegment assumptions are flawed but you are forecasting accurate segment-level revenues, keep doing what you're doing.

Book to Bill

Another hypothetical company forgoes the unit information but does provide fairly detailed segment book-to-bill information. This might be particularly applicable for a company that produces lots of relatively inexpensive goods that do not require financing. Such companies operate a "book-and-ship" business. Companies producing more complex and customized products likely have some variant on a "book-and-build" model involving much longer lead times.

For our book-and-ship company, again we use information from past quarterly presentation, in this case to reconstruct an important relationship: prior quarter book-to-bill ratio in relationship to sequential revenue growth. For our hypothetical company, we see that in a normal or nonseasonally influenced quarter, book to bill has averaged 1.04 (life is good!), whereas sequential sales growth has averaged about 0.75% (life is not bad). While those numbers may seem widely disparate, they actually suggest that the company is converting 96.9% of bookings into billings. So to model revenue growth for this particular segment, we would multiply recent quarter book to bill—let's say 1.06 (life is really good) times our multiplier of 96.9%; this figure suggests that sequential sales growth will be about 2.7%.

Regional Color

Motorola has changed the information it provides regarding mobile devices a few times in the past decade. At one time, we modeled Motorola's handset division

Figure 5.2

Polycom provides unit detail on its enterprise video systems and its desktop software-based solutions; using public data, management information, and simple arithmetic, you can back out the per-unit pricing.

Polycom											
Income Statement	**1Q08**	**Yr/Yr %**	**2Q08**	**Yr/Yr %**	**1H08**	**3Q08**	**Yr/Yr %**	**9mos08**	**4Q08**	**Yr/Yr %**	**2008**	**Yr/Yr %**
Product Revenue	222.45	*31%*	233.85	*16%*	456.3	235.40	*14%*	691.69	222.07	*-3%*	913.76	*13%*
Service Revenue	36.47	*57%*	37.74	*18%*	74.2	40.38	*22%*	114.58	40.98	*17%*	155.56	*26%*
Net Sales	258.92	*34%*	271.58	*16%*	530.50	275.78	*15%*	806.3	263.04	*-0%*	1,069.3	*15%*
Segments	**1Q08**		**2Q08**		**1H08**	**3Q08**		**9mos08**	**4Q08**		**2008**	
Product Revnues												
Video Communications	130.3	*21%*	141.2	*25%*	271.5	144.2	*27%*	415.7	141.7	*10%*	557.4	*20%*
Network Systems	29.2	*2%*	28.0	*-10%*	57.2	33.9	*4%*	91.1	34.2	*-4%*	125.3	*-2%*
Video Solutions	[illegible]	[illegible]	[illegible]	[illegible]	328.7	178.1	*22%*	506.8	175.9	*7%*	682.7	*15%*
Voice Communnications	99.4	*77%*	102.4	*14%*	201.8	97.7	*4%*	299.5	87.1	*-11%*	386.6	*14%*
Total Revenues	258.9	*34%*	271.6	*16%*	530.5	275.8	*15%*	806.3	263.0	*-0%*	1,069.3	*15%*

(continued)

Figure 5.2 *(continued)*

WORKBENCH	**1Q08**		**2Q08**		**1H08**	**3Q08**		**9mos08**	**4Q08**		**2008**	
Video Comm												
Group Video Units												
(HDX, VSX, Vseries, iPwr_	19,618	*9%*	20,845	*6%*	40,463	21,126	*8%*	61,589	19,831	*-6%*	81,420	4%
Rvnue per Unit (000)	60	*18%*	61	*21%*		61	*22%*		63	*21%*		
Grp Vdeo Rvnu	117,218	*29%*	126,728	*29%*	243,946	128,437	*32%*	372,383	124,784	*15%*	497,166	26%
		Q/Q %		*Q/Q %*			*Q/Q %*			*Q/Q %*		
Group Video Units		*-7%*		*6%*			*1%*			*-6%*		
Grp Vdeo Rvnu		*8%*		*8%*			*1%*			*-3%*		
Desktop Video												
(ViaVideo, PBX Software)	10,703	*-5%*	11,773	*-7%*	22,476	12,332	*29%*	34,808	12,764	*17%*	47,572	7%
Rvnue per Unit (000)	1	*-88%*	1	*-89%*		1	*-89%*		1	*-89%*		
Dsktp Vdeo Rvnu	[illegible]	[illegible]	[illegible]	[illegible]		744	*-86%*	744	781	*-88%*	1,525	*-87%*
		Q/Q %		*Q/Q %*			*Q/Q %*			*Q/Q %*		
Desktop Video Units		*-2%*		*10%*			*5%*			*3%*		
Dsktop Vdeo Rvnu		*-89%*		*2%*			*5%*			*5%*		
Video Prdct Rvnu	117.9	*21%*	127.4	*20%*	245	129.2	*26%*	375	125.6	*9%*	500	*19%*
Video Srvcs Rvnu	13.0	*21%*	13.4	*15%*		15.5	*37%*		15.1	*9%*		
Video Rvnu	130.9	*21%*	140.8	*20%*	272	144.7	*27%*	416	140.6	*9%*	557	*19%*

based on our assumptions about units shipped per technology along with ASP assumptions per technology. At the time we went to press, Motorola was providing gross handset unit data (total units shipped worldwide). While it was not breaking out units by technology (e.g., CDMA, GSM, iDEN), it was providing unit data on a regional basis. This information was typically provided in public forums such as the post–results release conference call and in brokerage presentations, but it did not necessarily make it into SEC documents.

The regional units data provided by Motorola made it possible to model total units per quarter, based on prevailing regional trends. We could then arrive at forecast mobile device segment revenues by using our modeled ASP. In Figure 5.3, we show our actual as well as modeled regional unit assumptions. Based on our summed regional unit assumptions plus overall unit ASP assumptions, we can model Mobile Devices segment revenue.

Trade Journal and Industrywide Data

Most industries and many niches are served by one or more trade journals. Trade journals provide a variety of roles; they contain articles on industry participants, mainly fawning but sometimes reminiscent of harder-hitting journalism. They are advertiser supported, and so provide a showcase for new products; they can also be a forum for experienced industry voices championing or decrying new developments. Many trade journals additionally provide data—systematic, anecdotal, or both—about industrywide products and services, on a unit basis and sometimes on a revenue basis.

To make use of such data, you must have an informed opinion about a company's individual place in the industries and niches in which it participates. Let's assume that you're modeling a producer of polystyrene, bulk shipments in a given quarter, and pricing assumptions on the merchant and spot markets. Say the covered company provides some guidance on revenue from polystyrene in a given quarter. You can simply model that revenue to grow in line with the company's overall forecast growth, adjusted for a seasonal component.

Or you can actually try to gauge revenue by disaggregating price per unit from number of units produced. If you are using industry data supplied by a trade association, you need to have a sense of the company's competitive place in the industry. Let's say that by a combination of sweet-talking IR and utilizing other industry sources, you determine that the company has a 15% share of the polystyrene market.

Let's begin by using past quarter revenues for polystyrene and the pricing prevailing in past periods to determine unit volumes. We can then make pricing

Figure 5.3

Motorola discloses regional breakouts of its handset unit shipments, a level of detail that now shapes our Mobile Devices revenue assumptions. In past years, we had used company-supplied color on technology type (e.g., GSM, iDEN, CDMA 2000) to arrive at our quarterly handset unit forecasts. Our handset unit projections made at mid-year for the second half of 2009 subsequently proved too aggressive, as the company shifted from a unit-volume focus to a smartphone-based, profit-per-handset focus.

Motorola Inc.												
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09E**	**Y/Y %**	**9mos09**	**4Q09E**	**Y/Y %**	**2009E**	**Y/Y %**
Revenue	5,371	*-27.9%*	5,497	*-32.0%*	10,868	5,604	*-25.1%*	16,472	6,203	*-13.1%*	22,675	*-24.8%*
Segment Sales	**1Q09**		**2Q09**		**1H09**	**3Q09E**		**9mos09**	**4Q09E**		**2009E**	
Mobile Devices	1,801	*-45.4%*	1,829	*-45.1%*	3,630	1,931	*-38.0%*	5,561	2,215	*-5.7%*	7,777	*-35.7%*
Home & Networks	1,991	*-16.4%*	2,001	*-26.9%*	3,992	2,051	*-13.4%*	6,043	2,122	*-18.3%*	8,164	*-19.1%*
Enterprise Mobility	1,599	*-11.5%*	1,685	*-17.5%*	3,284	1,636	*-19.4%*	4,920	1,881	*-15.1%*	6,801	*-16.0%*
Other	[illegible]	[illegible]	[illegible]	[illegible]	-	-	*0.0%*	-	-	*0.0%*	-	*0.0%*
Eliminations	(20)	*-50.0%*	(18)	*-43.8%*	(38)	(14)	*-59.9%*	(52)	(16)	*-37.8%*	(68)	*-48.8%*
TOTAL	5,371	*-27.9%*	5,497	*-32.0%*	10,868	5,604	*-25.1%*	16,472	6,203	*-13.1%*	22,675	*-24.8%*
Handset Units	14,700	*-46.4%*	14,800	*-47.4%*	29,500	15,551	*-38.8%*	45,051	17,747	*-7.6%*	62,798	*-37.3%*
Revnues Per Unit	117.78	*-1.4%*	123.58	*4.7%*		124.20	*1.0%*		124.82	*1.7%*		
TOTAL	1,731	*-47.2%*	1,829	*-44.9%*	3,560	1,931	*-38.2%*	5,492	2,215	*-6.0%*	7,707	*-36.2%*
Sqntl MOT unit price												

(continued)

Figure 5.3 *(continued)*

Motorola Inc.												
Income Statement	**1Q09**	**Y/Y %**	**2Q09**	**Y/Y %**	**1H09**	**3Q09E**	**Y/Y %**	**9mos09**	**4Q09E**	**Y/Y %**	**2009E**	**Y/Y %**
North America	8,379	*-40.1%*	8,673	*-41.9%*	17,052	9,193		26,245	10,480		36,726	
South America	3,087	*-51.1%*	3,234	*-50.0%*	6,321	3,493		9,814	4,086		13,900	
EMEA	735	*-66.5%*	441	*-73.9%*	1,176	454		1,630	504		2,134	
Asiac-Pacific	2,499	*-49.4%*	2,352	*-53.6%*	4,851	2,411		7,262	2,676		9,938	
Units Total	14,700	*-46.4%*	14,700	*-47.8%*	29,400	15,551		44,951	17,747		62,698	
		Q/Q	% Rvnu	*Q/Q*	% Rvnu	% Rvnu	*Q/Q*	% Rvnu	% Rvnu	*Q/Q*	% Rvnu	
NA % sales	57%	*-23%*	59%	*4%*	58%	59%	*6%*	58%	59%	*14%*	59%	
SA % sales	21%	*-23%*	22%	*5%*	22%	22%	*8%*	22%	23%	*17%*	22%	
EMEA % sales	5%	*-23%*	3%	*-40%*	4%	3%	*3%*	4%	3%	*11%*	3%	
A-Pac % sales	17%	*-23%*	16%	*-6%*	17%	16%	*2%*	16%	15%	*11%*	16%	
Units Total		*-23%*		*0%*			*6%*			*14%*		
Global Handset Share	5.8%		5.8%									
Implied Global Units	253,448		255,172									
Sequential Global												
Sequential MOT units												

assumptions based on developing supply and demand trends, which will affect raw materials costs. (Petroleum-sensitive chemicals will move around a great deal in cost and price based on changes in petroleum prices.) Once we've used back periods to accurately calibrate pricing and unit volumes, we can use our assumptions about go-forward pricing and unit volume outlook to model a revenue figure for the company's polystyrene business.

Adjustments to Cost Items

When we are satisfied that our top line for the period reflects our best estimate, we'll return to the individual quarters and perform a final tweak of cost items (this applies to standard P&Ls, not to percentage-of-difference P&Ls). The granular revenue data provides good insight into cost items that we had previously treated as simple percentage-of-revenue calculations.

The first order of business is incorporating any company information, and this data can be extensive. Companies provide varying levels of disclosure on near periods and full fiscal years, and they can provide particular guidance on gross margin and operating cost.

Nonetheless, the modeler should also work with what the model provides. In our segment revenue presentation, we also weighted each segment in the revenue total. This information can shape the gross margin model. Let's take a company for which a consumer-sensitive segment represents 60% of revenue; a segment with a mixed consumer and industrial customer base represents another 15%; and a segment with a pure industrial customer base represents the final 25% of sales. Based on our knowledge of the industry and the company, we expect purely consumer-driven businesses to have 30% gross margin, while industrial units generate 45% gross margin. Using a simple formula—(.60×.30)1(.15×.375)1(.25×.45)—we arrive at a weighted gross margin of 35%. Calibrating our estimate against the actual gross margin, once reported, will get us closer for the next quarter.

Another necessary adjustment is to replicate the seasonal flavor of the cost structure. There are various methods for injecting seasonal adjustments into costs. These range from sophisticated time series methods such as ARIMA-12 developed by statisticians for the U.S. government, to simple visual confirmation of past patterns. In an ideal world, we might apply sophisticated formulas to modeling every cost item. But remember that your investment clients are not paying you to exactly model R&D; they're more concerned with your getting the bottom line right, and *most* concerned with your getting the valuation right.

Companies trade on earnings, or rather the pattern of past, present, and future earnings. Given earnings' preeminence, and thus the need to model them with some precision, our above discussion of seasonal adjustment of cost items may seem cursory. In my experience, seasonal adjustment of costs can be illusory. As we develop below, much of the seasonal component of cost adjustment is actually more tied to revenue than the period. We can't assume every Christmas will be a home run for retailers; and we can't assume that an identically successful year will always prompt the same bonuses in the fourth quarter for the sales team.

Cost Items: R&D vs. SG&A

Costs at publicly traded firms can be fairly static on a quarter-over-quarter basis, once a seasonal tweak is assumed. Radical changes in costs on a sequential basis are rare, unless a company is in the midst of a significant realignment. Every employee at every company, every process, every site—all are entrenched and have a shouting interest in staying put. When companies begin cutting costs in trying times, or conversely adding to operating infrastructure in prosperous times, the changes begin gradually and often move at a predictable pace, despite grandiloquent claims to the contrary.

Given the immense sweep of our project and just a few hundred pages in which to get it done, we acknowledge our occasional penchant for short-cuts. Here's one for the principal cost items: it is typically easier for a company to vary the SG&A line than the R&D line, on a quarter-over-quarter basis. On a year-over-year basis, however, we may see more variability in R&D.

R&D spending reflects costs of developing new ideas, creating and prototyping new products and solutions, producing new and improved iterations of existing products, and determining how to achieve these objectives in a profitable way. Every project once undertaken has an embedded cost that grows as the project moves along, making it that much harder to abandon as it moves (however unsteadily) toward fruition. Each project brought to fruition represents an increment to revenue.

Accordingly, even companies in cost-cutting mode find it hard to cancel projects in which they've invested and that beckon with a payout just a few (weeks, months, quarters) away. Immediately after a company announces a cost-reduction initiative, the R&D line may not budge much. But planned new products may be shelved; and as existing projects mature, the engineers associated with that project may be laid off. Accordingly, over an extended period R&D will begin to work down.

SG&A, on the other hand, feels the axe quicker when cost actions are demanded. When an available market shrinks, fewer sales personnel are required. Compensation per sales person declines, and performance bonuses decline even more dramatically. There are long-tailed effects in the SG&A line as well, including costs for IT systems. But there is simply more *immediately* variable cost in the SG&A line. As conditions and demand improve, the SG&A line tends to inflate more quickly than R&D for all those same reasons.

Operating Leverage

The factor that in my experience has the deepest effect on operating costs is not seasonality nor the suppleness of R&D or SG&A spending, but operating leverage. This is defined as the amount of change in operating income resulting from a change in revenue.

Our mission, to reiterate, is not to diagram theory, not to explicate, defend, or debunk it, but to grab and use it. The cut-down-to-size theory on operating leverage is that it is higher for companies with high fixed costs than for companies with high variable costs. This suggests that high-variable-cost companies are more nimble in a downturn. The corollary is that high-fixed-cost companies, after suffering in a downturn, should be able to utilize their fixed costs more effectively in an economic up cycle, dropping a higher proportion of revenue to the bottom line than high-variable-cost companies can do.

What this theory does not account for is that companies do not operate in a static environment while watching the economic cycle turn up or down. In an example of cognitive dissonance, we acknowledge Schumpeter's creative destruction while averting our eyes to what it does to the fixed-cost company. In his work *Capitalism, Socialism and Democracy*, Joseph Schumpeter built on the work of Werner Sombart to describe the disruptive innovation necessary to sustain and nourish capitalism. The cost of new ideas and innovation is the demise over time of entrenched interests and their displacement by new waves of entrepreneurs.

Creative destruction is most intense in periods of upheaval. Downswings in the economic cycle—which tend to be more abrupt than the painful and prolonged climb back that is the up cycle—are particularly good at scattering verities in the wind. The fixed assets of high-fixed-cost companies come out of every down cycle more timeworn, more shopworn, but mainly more competitively displaced than they were going in. We model operating leverage in our model. But we give due respect to its predictive deficiencies as well.

In time, you will come to distinguish the variable cost from the fixed cost in any cost structure and make the necessary adjustments. Our treatment of cost modeling may seem cursory compared with the time taken with revenue. In our experience, the top line ultimately drives the bottom line more than the operating structure. Paradoxically, costs are both more predictable than sales and yet more specific to the individual company's operating structure and philosophy

While the top line is reflective of company-specific practices and processes, revenue is equally (or perhaps more) influenced by the economic cycle, by new and existing competitors, and by a host of measures beyond the company's ken. While this adds complexity to top-line modeling, it also enables the modeler to borrow from the broader trends in setting his or her top-line estimates.

Operating costs, by contrast, are firmly in the company's control; that means they tend to be particular to that company. You will learn over time that granular modeling of individual cost items for a specific company requires familiarity with that company's long-run operating strategy as well as here-and-now tactics, which can range from compensation methodology, to litigation appetite, to adherence to six sigma, to unusually high seasonality . . . and so on. Because the approach to operating costs is firmly in the company's hands, the modeler over time needs to build an operating cost model that is attuned to the individual company.

What happens when your finely tuned financial model is upended by, say, a stock split? How about if your covered company decides to move a substantial business into a joint venture (JV), and that revenue is (or is not) consolidated on the other JV partner's top line? What if you need to model an overseas' competitor that reports in a foreign currency? Those are some of the topics in our next chapter.

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Chapter 6

PHASE 4: THE WORKBENCH, PART 2

Special Considerations: Ericsson

Equity Income, Foreign Companies, Stock Splits, and More

We've covered most of the techniques required to model the income statement to a fairly granular level. Inevitably, special situations and exceptions arise that slow the modeling process. We've tried to anticipate some of the situations in this section, which we've built around a single company. The domestic analyst, in seeking the most comprehensive picture of an industry, will frequently determine that one or more foreign companies belong in coverage.

We've only briefly touched on equity income and minority interest. Moreover, just when you think your model is good to go, companies have a tendency to suddenly change their income statement presentation; leading examples including stock splits and reverse splits along with new segment and revenue presentations.

In the following pages, we'll examine and adjust the model for LM Ericsson Telefon (stock symbol: ERIC), a company that hits all those notes. Swedish-based Ericsson reports in local currency but trades ADRs on a major U.S. exchange; has long had one significant unconsolidated joint venture and now has another; changed its segment presentation; and engaged in a reverse stock split. We'll walk through the "old" Ericsson P&L presentation on the way to getting it into shape as the "new" Ericsson.

Modeling Foreign Companies

The topic of modeling foreign companies could certainly fill a book of its own. Nevertheless, a few basics apply. First, we always model the financial statements—the income statement, balance sheet, and the cash flow statement—in the native currency. This is actually a great deal simpler than it was in the days of French Francs, Spanish pesos, and Italian lira. Now, most of the major European nations, and thus many of the major companies of interest, report in euros and thus are best modeled in euros. Sweden has maintained its own currency, and we'll model Ericsson in kroner.

Second, be aware of the differences between U.S. GAAP and the prevailing foreign accounting standards. Again, the adoption of International Financial Reporting Standards—IFRS—is making things more uniform and thus making comparisons across boarders easier and more fruitful.

Finally, we'll make the presumption that any foreign-domiciled company you are modeling has an American Depository Receipt (ADR) that trades actively on a major U.S. exchange. Most foreign companies of interest to the U.S.-based analysts trade ADRs on the NYSE or Nasdaq Exchange (a few exceptions, such as Samsung and BMW, come to mind). The same holds true for depository receipt equivalents of major U.S. companies that trade on foreign exchanges. If we were modeling overseas, we would model the financial statements of these U.S. companies in U.S. dollars.

The principal challenge with foreign modeling comes with valuation, and we'll deal with that in our valuation discussion. But in advance of these later considerations, we'll make a few adjustments in the foreign-company model that will facilitate our future valuation analysis in the local currency rather than in the native currency.

LM Ericsson Telefon is the leading worldwide provider of communications infrastructure gear for wireless networks. With an approximate 40% market share, Ericsson should be followed and at least needs to be acknowledged by any analyst covering the communications equipment industry. Ericsson is based in Sweden, the largest industrialized continental European nation not to adopt the euro. Ericsson reports its results in Swedish kroner; while Ericsson issues translated results and even conducts its conference calls in English, it does not report in dollars.

The Translation Decision

To model the Ericsson P&L, which is based on IFRS, we're going to proceed as we would with any U.S.-domiciled company: use the template of past quarters and the company's own presentation style to build the original model and then amend for a concurrent pro forma presentation. Ericsson provides both segment revenue and segment operating income, enabling a percentage-of-difference approach. So far we've resisted the temptation to model up from segment operating income, given that there are so many other things happening in the model. We model COGS and the operating cost line items in Ericsson's krona-based results on a fairly straightforward percentage-of-revenue basis, and link line items sensitive to the financial structure (i.e., interest income and cost) to the balance sheet.

The adjustments to the Ericsson P&L are fairly simple but can have significant implications if they are mismanaged. The U.S. investor in an overseas company usually wants dollar translations on two key items: revenues and earnings. Above the krona-based revenue line, we insert a line and include a translation of all actual and forecast revenue into dollars. Down below the pro forma diluted EPS line, we insert a line for dollar-based earnings for the ADR. Finally, remember that we've allowed a line for dividends, even though these are not part of the formal P&L presentation. Like most European companies, Ericsson pays its dividend semiannually rather than quarterly. We include a dollar translation below the dividend line.

It sounds straightforward, but what translation rate do we use? If you've built our recommended model that includes five historical years, two of which are cut into quarters, you should use company resources or other sources to determine the historical native currency-to-dollar relationship, expressed in dollars. Foreign companies do not file 10-Qs and 10-Ks but typically file a form 20-F with the SEC; this is equivalent to a 10-K or annual report. Within the 20-F, the company will often publish the historical relationship of dollar to native currency; use those published figures. Lacking that, the Internet can furnish historical exchange rates.

Let's assume you've been covering Ericsson for some time now, and the third quarter of 2009 is winding down. How do we model our currency translations for the various periods? For the historical first and second quarters (already reported), we used the historical krona-dollar relationship for each approximately 90-day period. For the third quarter, we use the average rate for the current quarter. And for all forward periods, we use the exchange rate prevailing right this minute.

While there's no arguing with the translations for past periods, in the "many ways to skin a cat" department, analysts adopt various techniques to model future translations. Some will incorporate formal top-down guidance from in-house or consensus economists on future exchange relationships. If your firm has the input of an economist or strategist who has specific forecasts for dollar–native currency forward exchange rates, you can use those for forward periods. Unless you can draw on the wisdom of an authority who has been consistently correct on exchange rate movements (fairly rare), we typically model against the current exchange rate; at least you know it's correct today.

Stock Splits and Reverse Splits: The Concept

What do you do if a foreign company's ADR is not equivalent on a one-to-one basis with the company's stock issued in the native country? We'll also take up this topic in our valuation discussion. For now, we need to keep the currency translations correct on a quarterly basis. In the valuation part, we'll perform the necessary translation from ADR count to share count.

For most of the time it has traded ADRs on the Nasdaq Exchange, Ericsson was one such company. Prior to mid-2008, each ERIC ADR traded on the Nasdaq was equivalent to 10 ERIC shares traded on the Swedish Exchange. For that period, the actual Ericsson share base was around 15 billion; calculations of U.S. dollar–denominated results were converted from kroner and based on a hypothetical share count of approximately 1.5 billion. On June 2, 2008, the ERIC shares of LM Ericsson were reverse split at a 1/5 ratio on the Swedish Exchange. That brought the share base down from about 16 billion at the time to about 3.2 billion. Commencing on June 10, 2008, the U.S. ADRs of ERIC ceased trading at a 10/1 ratio to the parent company stock and instead moved to trading at a 1/1 ratio.

For U.S. investors, the net effect of these two events was a doubling in the ADR base in any existing position and a halving in the ADR price. For the Swedish investor, the net effect of these two events was that share positions were pared to one-fifth their original sizes, and the share price rose fivefold. For the analyst, the net effect was a familiar progression: a few choice epithets and a sigh of resignation, followed by work to amend the model.

On the upside, Ericsson's decision to establish a one-to-one relationship of ADR to native country stock eliminated a step in our dollar-based valuation process. It's fair to say that in squaring its ADR count to its share count, Ericsson had not the analyst in mind but the investor. In mid-2008, when the transition occurred, Ericsson was closing out a period of asset acquisitions, including many

U.S.-based assets, as it sought to round itself out from a pure-play wireless infrastructure company to an integrated network provider. Reacting to its raised profile in the United States, the company wisely aligned its stock with its ADR.

Stock splits and reverse stock splits follow the fortunes of the market. It's fair to say most share-count realignments in the late 1990s and in the 2003–2007 period were stock splits. It is equally fair to say that most realignments in 2000–2002 and again in 2008 were reverse stock splits, as companies fought to remain in investors' view. Many investment portfolios and managers are proscribed from owning shares priced below a certain threshold; the most common threshold is $5, though lower (or higher) thresholds are sometimes in effect.

The official investment theory is that stock splits and reverse splits are mathematical events with no bearing on a stock's future trading pattern. If you can find an investor who actually believes that, you're Sherlock Holmes. Stock splits are happy events that tend to draw in momentum investors. Reverse splits are not death knells, but they do frequently prompt the shorts to get the knives out. In fairness, I confess to limited familiarity with Swedish investment patterns. I believe the reverse split in ERIC's native-country stock was an attempt by the board to align the ADRs with the stock as a means of encouraging a higher level of foreign (and specifically U.S.) ownership.

Stock Splits and Reverse Splits: Execution

For the analyst, either kind of split requires some work on the model. This work is again straightforward, but sensitive; pasting a misplaced "copy" when you should be pasting a "cut" can cause the model to go haywire. Let's continue to work with our ERIC model. And let's assume we're maintained the formulas within the P&L presentation for historical periods. That won't always be so, incidentally. Try as we may, we can't always square our pro forma calculations with a company's own pro forma numbers; in that case, we may type the company's number in the cell. We'll handle both eventualities.

When Ericsson decided to reverse-split its stock 5/1, here is how we proceeded in our native-currency model. We first create a little working room; below the dividend line and above the cash and debt lines, insert sufficient lines (10 should be sufficient) that are at least equivalent to accommodate diluted and basic shares, reported basic and diluted EPS, and pro forma basic and diluted EPS. Because we're modeling ADRs for a foreign-domiciled company, we need two more lines, for the dollar translation and the dollar value of native-country earnings. And we need two further lines for the dividend and the dividend translated into U.S. dollars.

From the existing P&L presentation, copy the following headers and paste them into our newly created workspace: basic shares outstanding, diluted shares outstanding, reported EPS basic, reported EPS diluted, adjusted EPS basic, adjusted EPS diluted, U.S. dollar EPS, dividends, and U.S. dollar dividends. Let's work in the oldest full year, which in this case should be 2007.

In 1Q07, from the cell showing basic shares outstanding, bring down the original share count value and divide by 5; do the same for diluted shares. In the original cell for reported EPS basic, it is not enough to simply copy the cell; remember, this is a formula cell that divides GAAP net income by basic shares out. There are a few ways to proceed. You can copy and paste-special the original values. You can also create a new formula, dividing original GAAP net income by the new share count, but you'll eventually need to copy and paste-special this value before moving it.

A quick word on what it means to copy and paste-special. When you create formulas in a cell, and then move those cells further down the page, the cells referenced in the formula will move as well. For example, if your formula references dividing cell A2 by cell A5, and you move your formula 10 rows down the page, the formula will now reference dividing cell A12 by cell A15. Accordingly, once we attain a value in a cell that we wish to retain, it is sometimes necessary to freeze that value and kill the formula in order to retain the value. The procedure is to first "copy" the cell; once we arrive at the appropriate the location, choose "paste-special"; and from the formula of options provided, choose "values."

So let's take the original value for reported EPS basic, copy and paste-special into the new cell, and multiply by 5. One line below, do the same for reported EPS diluted. Repeat this process for pro forma EPS basic and diluted. For U.S. dollar EPS, again it makes sense to copy and paste-special the value into the new cell. Do the same for SEK (Swedish krona) dividend and U.S. dollar dividend. Remember, this foreign company pays a semiannual dividend and is unlikely to show a first-quarter dividend. Nonetheless, put these formulas in place for dividend and dollar dividend as we plan to replicate these cells as part of a "stack" of formulas. Copy this stack of formulas for all periods and interim periods for the year 2007 and for all historical quarters and years; let's assume we're doing this exercise early in the year 2009 before the 1Q09 report.

Next, copy and paste-special all these cells to freeze their values. Then, one year at a time for historical periods, copy and paste the new and correct cells over the original share counts, reported and pro forma EPS, dollar values and dividends.

Figure 6.1 shows Ericsson's native-currency P&L model for 2008 on a presplit basis (taken from a spreadsheet used at the time) and also on a postsplit basis. While the 2008 second quarter and second half were modeled in the presplit presentation, the second-quarter and second-half results are actual in the postsplit showing. Conditions were deteriorating quickly in the second half of 2008, and we can see that actual results badly missed our forecast if we "eyeball-adjust" for the 5/1 split.

What about go-forward periods? Recall that the share count for our first nonhistorical and modeled quarter, in this case 1Q09, is based on share count for the preceding (4Q08) period. If the model has been properly built, all future periods should automatically begin using the new share count. On that basis, all the per-share calculations going forward will adjust to the new share basis.

Formal Modeling of Equity Income and Minority Interest

Sony Ericsson Mobile Communications (Sony-Ericsson) was established in 2001. At the time, several European-based handset makers were discovering and confronting the difficulty of competing on a stand-alone basis with leaner, low-cost Asian operators. With the exception of Nokia, by 2005 all the European handset divisions—most notably Alcatel, Siemens, and Ericsson—had been blended into ventures with Asian partners or sold. Ericsson is the only one of those three to retain any parent-company identity.

We've already touched on equity income and minority interest modeling in our P&L presentation discussion. For the buy-side analyst or other analyst charged with modeling a large number of companies, we recommended using historical relations to model these values. For example, if minority interest typically equates to 3% to 5% of income, disgorge that amount from each quarterly model. We have generally found it easier to accurately model minority interest than to accurately model equity income.

For the analyst with more support or time, a more accurate input can usually be derived from modeling the joint venture that contributes to equity income or subtracts minority interest. This is particularly true if public information is available to help us. Sony-Ericsson provides detailed information each quarter, including a brief P&L statement, the number of handsets shipped, and the average selling price per handset. Early in 2009, Ericsson formally began participation in ST-Ericsson, a joint venture that competes in communications semiconductors. Initially, the ST-Ericsson JV provided less financial detail than Sony-Ericsson.

Figure 6.1

In mid-2008 Ericsson reverse-split its shares one for five and split its ADRs two for one at least partly in an effort to align its shares with its ADRs (which formerly traded ten for one).

Ericsson												
Income Statement	**1Q08**		**2Q08E**		**1H08**	**3Q08E**		**9mos08**	**4Q08E**		**2008E**	**Yr/Yr %**
Krona/dollar	5.977		5.977		5.977	5.977		5.977	5.977		5.977	
US Dollar sales	7,391		7,582		14,973	7,774		22,747	8,632		31,378	*9%*
Net Sales	44,175.0	*4.8%*	45,315.8	*-4.8%*	89,490.8	46,465.2	*6.7%*	135,955.9	51,590.9	*-5.3%*	187,546.9	*-0%*
Pre-Split												
Net Income	2,645.0	*-54.8%*	4,005.7	*-38.5%*	6,624.7	5,081.8	*28.5%*	11,706.5	5,804.6	*2.9%*	17,511.1	*-21%*
PF Net Income	3,445.0	*-41.1%*	4,005.7	*-38.5%*	7,424.7	5,081.8	*28.5%*	12,506.5	5,804.6	*2.9%*	18,311.1	
Basic Shares Outstndng	15,905.0	*0.1%*	15,944.8	*0.3%*	15,924.9	15,944.8	*0.3%*	15,931.5	15,944.8	*0.3%*	15,934.8	*0%*
Diluted Shares Outstndng	[illegible]	[illegible]	[illegible]	[illegible]	16,003.0	16,023.0	*0.3%*	16,009.6	16,023.0	*0.3%*	16,013.0	*1%*
Reprtd EPS Basic	0.17	*-54.8%*	0.25	*-37.2%*	0.42	0.32	*28.1%*	0.73	0.36	*2.6%*	1.10	*-21%*
Reprtd EPS Diluted	0.17	*-55.1%*	0.25	*-37.5%*	0.41	0.32	*28.1%*	0.73	0.36	*2.6%*	1.09	*-21%*
Adjstd EPS Basic	0.22	*-41.2%*	0.25	*-37.2%*	0.47	0.32	*28.1%*	0.79	0.36	*2.6%*	1.15	*-18%*
Adjstd EPS Diluted	0.22	*-41.5%*	0.25	*-37.5%*	0.46	0.32	*28.1%*	0.78	0.36	*2.6%*	1.14	*-18%*
US Dollar EPS	0.36		0.42		0.78	0.53		1.31	0.61		1.91	-9%
Dividend					0.25			0.25			0.50	
Post-Split												
Basic Shares Outstndng	3,181.00	*0%*	3,183.00	*0%*	3,182.00	3,184.00	*0%*	3,182.67	3,185.00	*0%*	3,183.25	*0%*
Diluted Shares Outstndng	3,196.60	*1%*	3,226.45	*2%*	3,211.53	3,184.00	*-0%*	3,202.35	3,200.00	*0%*	3,201.76	*0%*
Reprtd EPS Basic	0.83	*-55%*	0.60	*-70%*	1.47	0.89	*-28%*	2.39	1.22	*-31%*	3.68	*-47%*
Reprtd EPS Diluted	0.83	*-55%*	0.59	*-71%*	1.45	0.89	*-28%*	2.37	1.21	*-31%*	3.66	*-47%*
Adjstd EPS Basic	1.08	*-41%*	0.60	*-70%*	1.72	0.89	*-28%*	2.64	1.22	*-31%*	3.93	*-44%*
Adjstd EPS Diluted	1.08	*-41%*	0.59	*-71%*	1.70	0.89	*-28%*	2.62	1.21	*-31%*	3.91	*-44%*
US Dollar EPS	0.18		0.10		0.28	0.13		0.41	0.16		0.57	*-46%*
Dividend					0.25			0.25			0.50	

As of this writing, additional detail was being provided, though less than you would find with an independent public company.

Modeling an Existing Joint Venture

As a continent-straddling joint venture, or JV, Sony-Ericsson reports neither in kroner nor dollars but in euros. This provides another useful modeling exercise as we incorporate a third currency along with the kroner and dollars. Before crybabying about three currencies, count yourself lucky that ST-Ericsson is not incorporated in Geneva and reporting in Swiss francs; as it happens, JV partner ST Microelectronics is based in Switzerland. To complete the trifecta, ST Microlectronics reports in dollars, because most communications semiconductor transactions occur in dollars.

For Sony-Ericsson, for the first time we are going to stray off our P&L presentation worksheet. As a first step, insert a new worksheet into our workbook, something that we have not yet done often. We'll assume that you are sufficiently familiar with Excel to add a worksheet. Later, we'll be adding multiple new worksheets (and even a linked multicompany workbook); but that's further along in the cattle drive.

On our spanking new worksheet, we will download the historical data available from Sony-Ericsson. Remember that this joint venture does not have its own SEC filing obligations. We can find all of the information we need on the Sony-Ericsson Web site. You can purchase financial statements for Sony-Ericsson from various fee-based services, which are ready to download into Excel format. Notice that the Sony-Ericsson P&L does not conclude with per-share data but instead ends with after-tax earnings for the joint venture. All earnings (losses) are shared by the partners, and there are no Sony-Ericsson shares trading on any exchange.

However you acquire the data, input our usual four to eight historical quarters of essential information. Essentials for this presentation are the P&L and the usual percentage of revenue items below the income statement. In an abbreviated workbench, at a minimum we'll include the number of handset units shipped and the average selling price. Remember that we are modeling in euros and that all currency values, including ASPs, will be in euros.

Those inputs are the absolute minimum you can use to contribute useful information to your Ericsson consolidated P&L presentation. Because I perform deeper-dive analysis on Ericsson, my Sony-Ericsson worksheet also incorporates other information provided either formally or anecdotally by the company, including revenue by region (reported) and some color on technology type and model types shipped (provided anecdotally in the post–results release conference call or from other sources).

To model Sony-Ericsson, we will use percentage-of-revenue inputs for most line-item cells. To estimate the top line, we multiply handset units times ASPs. For ASP, we reference nearest-quarter ASP, adjusted up or down. (Like most average selling prices in the technology sector, handset ASPs are almost invariably heading down; for a blended mix of handsets, the variable to this near-constant would be a richer mix of smart phones or other higher-margined units.)

To derive a forecast for unit shipments, we can build the shipment model based on our anecdotal information about product types (e.g., Cybershot, Diskman, and smart phone). But since this is a merely a supporting worksheet, we can model unit shipments based on some variation of nearest historical quarter shipments. We also need to be aware of historical patterns; because handset end users are most often consumers, the fourth quarter will have a bulge not explained by normal sequential progression.

As you can see, so far this is nothing more than a cooked-down P&L presentation. The way it impacts the consolidated income statement is slightly complicated in the case of Sony-Ericsson because of the necessary currency conversions. Because many joint ventures are domiciled outside the native country, knowledge of this process will be useful going forward for many other companies.

In this model, the adjustments impacting the master consolidated P&L occur about 100 lines down the Sony-Ericsson worksheet. There are two key adjustments: (1) the currency conversion and (2) the adjustment to strip out Sony's share of the profit (or loss). For the currency conversion, the relationship we need to model is euros to kroner. It is important that we gauge the accuracy of past adjustments of Sony-Ericsson data to the consolidated P&L, so I recommend that you obtain the preceding four to eight historical quarters of the relationship of euros to kroner.

For the currency adjustment, insert a line within which to convert euros into kroner at the prevailing exchange rate for each period. As we've stated, these are the historical exchange rate for past periods, average exchange rate for current period, and current exchange rate for future periods. Let's begin our work with a historical period for which we know: (1) the euro/krona exchange rate; and (2) the actual contribution from the joint venture to the consolidated P&L. For 1Q08, each euro was equivalent to approximately 9.35 kroner.

The contribution to the consolidate P&L occurs above the income tax line, so we will concern ourselves with Sony-Ericsson pretax income. For our historical period of 1Q08, Sony-Ericsson pretax income was equivalent to 193 million euros; at the prevailing average exchange rate for that period, Sony-Ericsson pretax income converts to 1.804 billion kroner. Sony-Ericsson is a 50/50 joint venture; on that basis, half the 1.804 billion kroner, or 902 million kroner, should go to Sony, while the other half should be contributed to the LM Ericsson consolidated income statement.

Remember that Ericsson, as a multibillion-dollar organization, may have more than one JV relationship; some may be so insignificant that they hardly bear mentioning. The company may have calculated the euro/krona conversion differently, based on the actual pace of business transactions. Various other transfer or administrative fees and costs can interfere. For all that, our 902 million kroner calculation lines up well with the actual historical contribution of 911 million kroner for 1Q08.

Figure 6.2 captures a happy year for Ericsson, as the joint venture was attaining record market share in the 9% range, and the parent company was solidly profitable. For all of 2007, our Sony-Ericsson worksheet indicates a modeled contribution of 7.136 billion kroner; the actual contribution was 7.232 billion. For full year 2007, our model was 98.7% accurate; for 1Q08, the accuracy was within 1%. You can't always count on such good results; indeed, by late 2008, the accuracy had degenerated. Late 2008 was a period in which formerly highly profitable Sony-Ericsson found itself ill prepared for a shift in tastes away from its feature phones and toward smart phones. The joint venture's growing losses may have contributed to the decreasing alignment between modeled contribution from the Sony-Ericsson sheet and actual contribution on the consolidated income statement.

What are we to make of this information, and specifically this level of correlation? Generally, I find that modeled Sony-Ericsson pretax income, post–currency conversion, is approximately 95% accurate. When the joint venture is running hot (which hasn't happened in a few quarters), I tend to accord a 5% premium to the modeled pretax contribution. When the joint venture is forecast for modest and/or declining profits, I assume that only 95% or even 90% of the modeled contribution will make it to the consolidated equity income lines. When I'm modeling a loss (like the experience I had in 2009), I'll assume the loss will be somewhat worse by 5% or 10% by the time it reaches the consolidated P&L.

As for moving this information onto the consolidated P&L, we'll again assume some passing familiarity with Excel. On the consolidated P&L, for the period to be modeled, place an = sign in the Equity income cell; then go to the Sony-Ericsson worksheet and select the appropriate period from the line for 50% share to Ericsson.

Figure 6.2

Sony-Ericsson's revenues are consolidated on the Sony P&L, not that of Ericsson. Half the joint venture's pretax earnings, translated from euros to Swedish kroner, appear on Ericsson's P&L as Share in JV Earnings.

Sony-Ericsson (Euros)	**1Q07**	**Y/Y %**	**2Q07**	**Y/Y %**	**1H07**	**3Q07E**	**Y/Y %**	**9mos07**	**4Q07**	**Y/Y %**	**2007**	**Y/Y %**
Sales	2,925.0	*46.8%*	3,112.0	*37.0%*	6,037.0	3,108.0	*6.7%*	9,145.0	3,771.0	*-0.3%*	12,916.0	*17.9%*
COGS	2,038.7	*38.8%*	2,192.0	*34.9%*	4,230.7	2,154.0	*8.0%*	6,384.7	2,573.0	*-4.2%*	8,957.7	*15.2%*
Gross Margin	886.3	*69.1%*	920.0	*42.2%*	1,806.3	954.0	*4.0%*	2,760.3	1,198.0	*9.3%*	3,958.3	*24.3%*
R&D	261.0	*29.2%*	283.0	*26.9%*	544.0	280.0	*24.4%*	824.0	349.0	*36.3%*	1,173.0	*29.5%*
SG&A	284.0	*52.7%*	321.0	*30.5%*	605.0	280.0	*-2.4%*	885.0	375.0	*2.2%*	1,260.0	*16.0%*
Operating Expense	545.0	*40.5%*	604.0	*28.8%*	1,149.0	560.0	*9.4%*	1,709.0	724.0	*16.2%*	2,433.0	*22.1%*
Other Op Lss (Incm)	(5.0)	*-28.6%*	2.0	*-107.7%*	(3.0)	1.0	*-104.8%*	(2.0)	(15.0)	*50.0%*	(17.0)	*-73.4%*
Operating Income	[illegible]	[illegible]	[illegible]	[illegible]	660	393	*-7.7%*	1,053	489.0	*1.2%*	1,542	*22.8%*
Financial Income	(18.0)	*100.0%*	(18.0)	*125.0%*	(36.0)	(7.0)	*-12.5%*	(43.0)	(19.0)	*0.0%*	(62.0)	*40.9%*
Financial Expense	2.0	*0.0%*	6.0	*0.0%*	8.0	16.0	*1500.0%*	24.0	7.0	*0.0%*	31.0	*3000.0%*
Pretax Income	362	*138.4%*	326	*53.8%*	688	384	*-11.3%*	1,072	501.0	*-0.2%*	1,573	*21.1%*
Taxes	100	*194.1%*	97	*51.6%*	197.0	109	*-14.2%*	306.0	118.0	*174.4%*	424.0	*58.2%*
Tax Rate	*28%*	*23.4%*	*30%*	*-1.4%*	*29%*	*28%*	*-3.2%*	*29%*	*24%*	*175.0%*	*27%*	*30.6%*
Minority Interest	9	*0.0%*	10	*100.0%*	19.0	8	*0.0%*	27.0	10	*-16.7%*	37.0	*8.8%*
Net Income	254	*133.0%*	219	*53.1%*	472	267	*-10.4%*	739	373	*-16.6%*	1,112	*11.6%*

Figure 6.2 *(continued)*

Sony-Ericsson												
(Euros)												
	1Q07	**Y/Y %**	**2Q07**	**Y/Y %**	**1H07**	**3Q07E**	**Y/Y %**	**9mos07**	**4Q07**	**Y/Y %**	**2007**	**Y/Y %**
Euro-Krona Conversion	9.390		9.390			9.114			9.114			
PreTax Incm Converted	3,249.0		2,957.90			3,499.58			4,565.86			
50% Share to ERIC	1,624.49		1,478.94		3,103.43	1,749.79		4,853.22	2,282.93		7,136.15	

Ericsson												
Income Statement	**1Q07**	**Yr/Yr%**	**2Q07**	**Yr/Yr%**	**1H07**	**3Q07**	**Yr/Yr%**	**9mos07**	**4Q07**	**Yr/Yr%**	**2007**	**Yr/Yr %**
Krona/Dollar	6.698		6.698		6.698	6.407		6.601	6.303		6.526	
US Dollar sales	6,294		7,110		13,404	6,797		20,198	8,640		28,773	
Net Sales	42,156.0	*6.5%*	47,619.0	*7.8%*	89,775.0	43,545.0	*6.8%*	133,320.0	54,460.0	*0.5%*	187,780.0	*5%*
COGS	24,034.0	*8%*	27,166.0	*6.1%*	51,200.0	28,050.0	*10.3%*	79,250.0	34,809.0	*11.1%*	114,059.0	*9%*
Gross Profit	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15,495.0	*1.0%*	54,070.0	19,651.0	*-14.1%*	73,721.0	*-0%*
R&D	6,453.0	*-3%*	7,208.0	*5.1%*	13,661.0	7,229.0	*2.2%*	20,890.0	7,952.0	*9.9%*	28,842.0	*4%*
SG&A	5,322.0	*11%*	5,856.0	*11.3%*	11,178.0	4,783.0	*-9.7%*	15,961.0	7,238.0	*19.2%*	23,199.0	*8%*
All Other	(162.0)	*41%*	(389.0)	*-52.4%*	(551.0)	(402.0)	*-89.3%*	(953.0)	(781.0)	*-8.0%*	(1,734.0)	
Share in JV Earnings	(1,642.0)	*136%*	(1,477.0)	*48.9%*	(3,119.0)	(1,751.0)	*-14.0%*	(4,870.0)	(2,362.0)	*6.9%*	(7,232.0)	

Modeling the New JV

In early 2009, Ericsson and ST Microelectronics formed a JV company that contained the communications semiconductor businesses and related assets of the two parent companies. Like Sony-Ericsson, this business is not consolidated on the Ericsson top line. Instead, it will contribute equity income (or loss) to Ericsson. By way of background, ST Microelectronics had only recently concluded the acquisition of Royal Philips' semiconductor assets when it agreed to combine its communications semiconductor business into the ST-Ericsson joint venture. The combination of these established business units has so far been balanced by the predictable disruption of combination and integration; the unit also began life in the worst demand climate for handsets and thus for communications semiconductors in a decade.

For the modeler, the takeaway is that this unit is in its early days only a modest contributor or detractor from overall equity income. Its contribution (or decrement) is currently swamped by the much more volatile contribution from Sony-Ericsson. But keep in mind that on the Ericsson P&L presentation the two contributions will not be disaggregated but will be presented as one number.

In the very early phase, we did not create a separate worksheet in the workbook to model ST-Ericsson in detail. Initially, with little historical data to build on, we used a "plug" number to reflect the (loss) contribution from ST-Ericsson and to adjust the equity income line that was dominated by Sony-Ericsson. As we were wrapping up preparation of this book, the joint venture gathered some momentum and built some history; at that point it earned its own detailed worksheet. And the Ericsson equity income line began to reflect contributions (in each case, losses) from the two ventures. These were dollar-based losses from ST-Ericsson and euro-based losses from Sony Ericsson, both translated into Swedish kroner.

There is another key takeaway for the modeler who began to follow Ericsson in the period after the Sony-Ericsson inception but before the ST-Ericsson launch. That is, the revenue from the unit formerly known as Ericsson Mobile Platforms (EMP) is now contributed to the ST-Ericsson joint venture and accordingly no longer figures in the Ericsson consolidated top line. The point is that the Ericsson handset revenue and contribution has long been absent from the consolidated P&L. Modeling the new joint venture requires more than calculating the effect on the equity income line, as we routinely do with Sony-Ericsson. To accommodate the effects of ST-Ericsson, the modeler must simultaneously calculate its effect on equity income and disaggregate the effects of the absent business (in this case, EMP) from the parent company's consolidated financial statements.

New Segment Modeling Presentation

Ericsson, a large company, is generous in filling all our special-interest needs. So far it has helped us by trading ADRs while modeling in a foreign currency, reverse-splitting its stock and splitting its ADRs, and participating in an existing and now a new JV company. The company has also sold and (mainly) acquired assets. Most of the asset acquisitions were intended to transform the company from a pure-play wireless infrastructure equipment company to a provider of converged next-generation network solutions.

Whenever this fine-sounding gobbledygook is ringing out, you can bet there is a cadre of analysts somewhere tearing their hair out. That's because segment reorganization can completely shatter a carefully crafted P&L presentation. Sometimes a change in reporting segments reflects the maturation of a company; this is particularly true in a dynamic segment such as technology. Almost from inception, Juniper Networks during its post–results release conference call would provide very granular details on its operations. Specifically, the company would disclose the number of router chasses sold in the quarter; it would also disclose the number of blades, which are the high-value-added products that are slotted into an empty or partially filled chassis. As Juniper Networks matured from a $100 million revenue company in 1998 to a $3.5 billion revenue company by 2008, analysts recognized that it was only a matter of time before this information would stop being available; that happened sometime in 2007.

General Electric (GE) has changed its segment presentation repeatedly over the years. For GE, we have always felt that each new segment presentation provided a kind of mirror into managements' strategic thinking. For the GE financial part of the business, the company used to hold as many as 25 competencies in five broad areas: equipment leasing, insurance, consumer finance, commercial finance, and diversified. The company eventually boiled down to a tighter focus in each of these areas; realignment of GE Capital is an ongoing process and will likely always remain so. For industrial GE, formerly disparate lines such as lighting and appliances were either divested or folded into a broad Consumer category, itself slated to go away. Jet engines and gas turbines lost their headings and were grouped into a Power unit; the Infrastructure unit gathered formerly disparate businesses into a niche of its own.

Our concern, as always, is not with corporate motive and strategy, but with how we reflect the changes and—importantly—whether and how we capture and save the obsolete segment information. We have already discussed the mechanics of adjusting a model to accommodate a stock split or reverse stock split. Any P&L

presentation that draws inputs from below the margin presentation must be amended carefully to ensure that key inputs do not go awry or reflect out-of-date modeled segments. For that reason, it is probably a good idea to remove the obsolete segment representation from the P&L worksheet as soon as the new segment data become available.

At the same time, the old segment data often contain useful information that might inform or color our analysis going forward, even if that analysis is based on a new data set. Given that consideration, it makes sense to save a copy of the old workbook that includes the historical and now obsolete segment presentation.

Later in our discussion, in Part 4, we will describe how to create a matrix workbook that incorporates data from various individual company workbooks in order to analyze industry participants and data in aggregate. This matrix workbook will have multiple links to the individual company workbooks. Accordingly, once the matrix workbook is created, we need to be careful about simply "saving as" copies of old presentations and filing them away. We need to be mindful of creating the new segment presentation and segment model on the individual company workbook that is linked to the matrix workbook, and not inadvertently stashing the still-linked workbook in a folder labeled "old stuff" or the like.

Procedure

As noted, beginning in the middle of the decade, Ericsson made a series of asset acquisitions principally in North America that were intended to transform the company from a pure-play wireless infrastructure equipment company to a provider of converged next-generation network solutions. Historically and through most of 2007, the company reported both mobile networks and wireline network, which were summed in total network equipment; network rollouts were presented as a subset of this total. Ericsson also reported professional services and other services. Ericsson also provided operating income per segment.

Late in 2007, the company announced that new segment reporting was imminent. And beginning in 2008, Ericsson started to report network equipment as a single figure, while continuing to break out network rollouts as a subset of this total. The company continued to report professional services, but added managed services as a subset of this total. And the "other" category was replaced with multimedia. As in the past, Ericsson furnished operating income per segment for the new reorganization.

As is often the case, the company used the segment reorganization to shift assets from one broad heading into another. So, while you might expect services to be unaffected by its new title, for 2006, recalculated professional services for 2006 was 14% larger than the historical representation of services used prior to 2008. It follows that segment income was also altered by the reallocation of assets under the new headings.

With all this in mind, and assuming the links to the matrix workbook are already established, here's how we proceed upon learning that Ericsson has changed its segment reporting. Study the new presentation and determine how much space you'll need in your existing Ericsson workbook. In this case, you'll need quite a lot, about 50 lines. That's because we need to accommodate the new presentation of segment revenue, with annual comparisons side by side; our standard percentage-of-revenue and sequential change representation, which replicates the segments and takes up equal room immediately beneath; the operating income presentation; and the segment margin presentation. (I typically dispense with a percentage-of and sequential change representation for operating income.)

Add as much restated historical data as the company provides in the new representation. Typically, the company will go back a complete year by quarters as well as any quarters reported for the current year. Use the restated segment data, as well as any contributing data from your workbench below, to model the new segment presentation.

Once you have a complete set of percentage-of and sequential change representations for the restated year, copy and paste them below each to-be-modeled segment presentation. Use the historical segment income data and segment margin information, along with information about current conditions, to model income for each segment going forward.

The next step is delicate and is the place where the model can go awry. At the very top of the P&L presentation, in the modeled consolidated revenue cells, you need to substitute your new modeled segment total to replace the old segment totals (still residing beneath the new segments). Remember that linked cells don't show their links visibly. If you fail to carefully reassign the links, you'll have no visible indication that your crucial top-line model is drawing from the wrong data source.

That's why we recommend eliminating the old segment presentation once the recalculated segment data has been inserted and the new segment presentation is now the linchpin of our top-line model. Keeping in mind the need to preserve links to the matrix (all-company) workbook, at this stage we recommend "Saving As" a copy of the Ericsson workbook with a designation in the title (such as "old" or "defunct"). Close the workbook. Store the workbook with the "defunct" designation in a file folder created specifically for stashing old data that you won't actively need but may need to source some day.

Open the original Ericsson workbook that has links to the matrix workbook. Only at this point will we eliminate the obsolete segment presentation. We do so for two reasons. One is clarity; we want to maintain only that data on the model that is actively useful for our modeling purposes. The other is as a fail-safe. If you eliminate the obsolete presentation and the model goes haywire, it means you failed to fully sever the inputs to the top line coming from the obsolete data. If you encounter such an issue, which will sometimes reduce all future quarters to chaos, don't panic. Coolly check the top-line inputs to make sure that they are aligned with the new segment presentation. That will solve your problem.

We've now covered some of the special situations—foreign companies, stock splits, treatment of JV-related minority interest and equity income—that commonly confront the analyst. With these specials and exceptions out of the way, we're nearly done with our income statement modeling overview. But before we finish, let's use historical and modeled data to prepare normalized or "economic-cycle-free" earnings. And let's refine our approach to historical growth to accommodate a more representative data set.

Chapter 7

ORDINARY LEAST SQUARES REGRESSIONS AND NORMALIZED EARNINGS

Static Growth, Dynamic Cycles

If companies behaved themselves—always grew the top line, carefully managed costs to prudently expand margins, and delivered ever-improving net income—the valuation process would be infinitely simpler. They don't, of course; and for the course of business, that's a good thing. We need Schumpeter's creative destruction to invigorate the economy and ensure a healthy, inclusive, and expanding capitalism. Innovation is the gardener, constantly turning over the competitive landscape; last year's blue ribbon winner is this year's mulch.

And then there's the economic cycle, which moves across our landscape metaphor like a cyclone; it's an equal-opportunity town leveler. The business "cycle" is a misnamed phenomenon, if ever there was one, because the business cycle is anything but cyclical. Once you are within a business cycle, you can expect the economy to work through various phases, albeit erratically: growth, hypergrowth, downturn, trough, stabilization, early recovery, and growth once more. But the business cycle does not arrive cyclically, like spring following winter; it tends to hit an individual company's earnings cycle like a car crash. After the crash, the gawkers will say they "saw it coming."

The healthy chaos of competition creates challenges to the growth modeling and valuation process. To derive valuation assumptions based on forward-looking inputs, we need those inputs to be as reliable as can be; equally important, we expect them to be as economy sensitive as they can be. Yet analysts and investors are wedded to a five-year forecast of annualized EPS growth. And they tend to base forward-growth assumptions on historical growth rates or that five-year hypothetical rate, regardless of the economic climate.

Analysts worth their salt adjust forward assumptions based on necessarily subjective perceptions, such as management performance and stability, dynamic positioning within dynamic end markets, financial health, quality of customers, and the like. For all that, and even if we bake in variations based on our perceptions of these subjective circumstances, growth assumptions lean heavily on historical growth patterns and performance.

Shortfalls of Unadjusted CAGRs

The problem is that historical growth itself is dodgy. What's the appropriate historical measurement period? More significantly, how do we measure? To get a five-year look-back on EPS growth, some analysts will measure five annual rates of change and then average the five rates of change. That's a far-from-optimal method, we believe, in that it equal-weights typically faster-growth earlier periods with slower-growth later periods, thus distorting the actual trend. More commonly, analysts will use a multiperiod compound annual growth rate (CAGR) formula, which incorporates each year's growth rate into the final tally and likely gives a more "honest" reading.

The chief shortcoming of unadjusted CAGR, however, is that it relies on two single data points: the initial-period data, and the end-period data. What would happen if company-specific strategy or economic cycle gyrations distorted one of those inputs?

Consider a hypothetical company that earns $1.00 per share in 2004 and grows its earnings 20% annually on average from 2004 through 2007. In 2008, in response to aggressive competitors, the company meaningfully ramps its R&D development costs, attacks the market more aggressively with its sales effort, and slashes prices to win share in fast-closing emerging markets; earnings for the year total $1.10. At the tail end of 2008, management reassures investors that resumption of its normal go-to-market, pricing, and operating practices will restore growth in 2009. On the bottom line, you take that to mean 2009 EPS will be building off a base somewhere between the $1.74 EPS earned for 2007 and the $1.10 earned for 2008.

Based on the $1.00 earned in 2004 and the $1.10 earned in 2008, the standard CAGR calculation shows the company's five-year annual growth rate as 1.92%. Your model is structured to use the five-year CAGR to project forward. Based on all other available data and your knowledge of the company and industry, 2% forecast growth meaningfully understates operating prospects. You can't simply plug in the prior 20% growth rate and act as though the 37% single-year drop (from $1.74 in 2007 to $1.10 in 2008) didn't happen.

Ordinary Least Squares (OLS) Regressions

You can, however, get a much truer assessment of the underlying trend if you incorporate data from all the individual periods. By its nature, a CAGR calculation must use beginning and end points. But those two points can be adjusted based on the data flow across the individual periods. The method we use to incorporate all of the pertinent annual data points is ordinary least squares regression (OLS growth, for short). Using OLS growth, CAGR for the hypothetical company and the period described above is 4.6%.

That may or may not be your final EPS growth forecast, but it is a more honest and certainly more comprehensive appraisal of the five years just concluded. As a look-back mechanism, OLS can appropriately size individual company events that by Wall Street convention were not eliminated from pro forma calculations. We believe OLS is particularly useful in mature industries where pro forma calculations are not commonly used to adjust out one-time events. Perhaps its biggest value, however, lies in its ability to wrest a growth rate when one of the end points is negative

It is difficult, if not impossible, to predict when a company will make a sudden veer in its operating philosophy or marketing strategy. No less difficult to predict, but inevitable in outcome, are changes in the economic cycle. A further merit of the OLS is that it can reach back through all aspects of one or more economic cycles to give a more comprehensive picture of long-trend earnings. While a long-term simple CAGR could do that as well, it is again subject to the vagaries of the end points chosen.

Well and good for historical data, but what about the economic surge or decline that is five years, or two months, away? Should we blithely issue EPS projections for coming years, ignoring the chance that a recession could chop them down like corn rows before an Iowa twister? Why, yes. Remember, the market trades on collective perceptions, not our superior wisdom. We can't time the cycle, and we can't ignore the consensus.

Normalized Earnings

We *can* construct a kind of parallel valuation universe based not on specifically timed events but on the average outcome of the inevitable. In other words, we can "normalize" revenues and, most notably, earnings. Our formal income growth models are based mainly on the things a company can control—its costs, its technology, its best practices and processes—and only somewhat on the unpredictable. We put these assumptions out there, because to do otherwise—to bake in our own recession, for example—would be to create a misleading variant for clients who are trading on our advice right now.

But for many of our models, we separately and privately track valuation metrics based on normalized earnings. As the sketchy clouds of a spent-up cycle coalesce into the gray cumulus of oncoming recession, the normalized earnings trend assumes a larger place in our thinking. And most often, the growth rates informing our normalized EPS projections into the future are based on our OLS growth calculations.

In summary, OLS is based on a smoothing of historical data, permitting a more comprehensive look-back to help predict the future. By minimizing the importance of aberrant CAGR beginning or end points, it provides a smoothed growth rate that is useful in minimizing or eliminating temporary company strategy effects while capturing economic cycle effects. It can overcome the limitations of negative beginning or end points. OLS is also a broad brush that can be applied to growth in any metric, from pro forma EPS to how many times a year you change your shoelaces.

Normalized earnings are more forward looking and, as the name implies, are of most use in the realm of profits projection (although we could hypothetically normalize the shoelace changing as well). To my knowledge, any OLS calculation is going to look almost the same. There are, however, numerous ways to normalize forward earnings; we'll discuss a few and then indicate our preferred methodology.

As the previous discussion suggests, it makes sense to calculate OLS growth rates based on historical performance so we have them available for use in our normalized earnings calculations. On that basis, we'll first describe the OLS process; we'll then move on to a discussion of normalized earnings (NE).

Also note that we are discussing OLS and normalized earnings in a single chapter, and we are going to situate the OLS calculations and our normalized earnings work on a single worksheet. This simply reflects the fact that we reconfigured a "normal" normalized worksheet from vertical by years to horizontal by years. Feel free to use separate worksheets, if you prefer.

OLS Growth Rates

Worksheet Setup and Method

The OLS and NE worksheet uses annual data ranked left to right. Essential to this process and the OLS process is the inclusion of all years in our measurement. In this case, our example shows the years 1996 to 2008. You can work with much shorter or longer periods as needed.

We can link to much of this data, conveniently, from our ratios and valuation worksheet, where most of the standard financial statement data (i.e., income statement, balance sheet, and cash flow statement) resides in annual stacks. Eventually you'll determine what is most useful in your analysis. Here are the basics you would normally want to include:

From the Income Statement Presentation:

- Revenue
- Operating income (GAAP or pro forma)
- Pretax income (GAAP or pro forma)
- Net income (GAAP or pro forma)
- Per-share earnings (GAAP or pro forma)
- Any segment revenues and operating income

From the Balance Sheet:

- All-in cash
- Accounts receivable and inventories
- Accounts payable
- All-in debt
- Total assets
- Total liabilities
- Stockholders' equity

From the Cash Flow Statement:

- Depreciation and amortization
- Net working capital cash flow (use)
- Cash flow from operations
- Capital expenditures
- Dividends

This is one worksheet that, if properly constructed, can generate data rather quickly, because the calculation strings are designed for easy copy and paste. Our example company in this exercise is Motorola (MOT), an industry pioneer with an unmatched legacy that has had difficulty executing in the modern age. We chose this troubled giant, not out of sentiment, but because companies whose performance oscillates wildly and swings from profits to loss normally frustrate the simple calculation of growth rates.

If we look at Motorola's revenue line, we do not see much progress. From 1996, when sales were $27.97 billion, to 2008, when revenues were $30.15 billion, revenues grew just 0.5% annually, according to our simple end point–to–end point CAGR calculation.

The standard CAGR formula we use to get this calculation is `=(N5/B5)^(1/13)—1)`, where `N` is 2008 revenues and `B` is 1996 revenues. To get to the appropriate discount rate, we use the "^(1/13)-1" portion of the formula to discount the growth over the appropriate amount of years, in this case 13.

To calculate an OLS growth rate for this period, we need to derive OLS values for all the years 1996 to 2008; the string of years, in turn, will normalize the beginning and end points. If the year 1996 is in cell B3 and actual revenues are in cell B5, the formula in cell B6 is `=TREND($B5:$N5,$B$3:$N$3,B$3)`. Drag and drop this formula across the page to cell N6, directly beneath actual revenues for 2008. Figure 7.1 is a first look at an OLS worksheet; it shows an OLS regression for Motorola's revenues from 1996 to 2008, as well as a five-year OLS regression for 2004 to 2008. (To make the model fit better on the page, we have hidden years 1998 to 2001; but they are part of the formula.)

In no other formula we use is it so vital to get the dollar signs right! Taking apart the formula `TREND` is what it says it is, providing us the underlying trend across this specified set of data points. In the first part of the formula, the dollar signs before `B5` and `N5` make sure you keep the range intact (1996 revenue to 2008 revenue) across all data points. The second range cites the years and uses dollar signs to lock both the left-to-right range (the years 1996 to 2008) and to ensure that the years are maintained as you go down the page. The third part of

Figure 7.1

Motorola's revenues have been on a wild ride, ranging from $26 billion to $42 billion. If we smooth the growth rates with OLS rather than relying solely on the end points for our CAGR, we see that annual growth averaged closer to 1.5% than to the 0.6% suggested by the unadjusted end points.

Motorola												
Ordinary Least Squares												
	1996	**1997**		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**		
Incm Stmnt												
Revenue	27,973.00	29,794.00		26,681.00	23,155.00	31,323.00	36,843.00	42,879.00	36,622.00	30,146.00	**0.58%**	**Unadjusted**
	28698.011	29224.214		31855.231	32381.434	32907.637	33433.841	33960.044	34486.247	35012.451	**1.54%**	**OLS Smoothed**
					5-Year:	31,323.00	36,843.00	42,879.00	36,622.00	30,146.00	**-0.76%**	
					5-Year:	36077.6	35820.1	35562.6	35305.1	35047.6	**-0.58%**	

the formula allows the individual year to move laterally but keep the formula linked to the year line.

Now that we have smoothed values for all periods, we can use our standard CAGR formula to derive a "truer" growth rate. Using the =(N6/B6)^(1/13)–1 formula, our OLS-adjusted CAGR tells us that Motorola's annual revenue growth across this 13-year span was actually closer to 1.5% annually.

Reading the Data: Income Statement

Even though they can be volatile, revenues are one of the relatively steadier line items in most income statements. And, notwithstanding a few biotech companies (most of which I've owned at one time or another), it is hard to have negative revenues.

As companies move down the income statement—particularly mature giants like Motorola, constantly swatting at the upstarts continually upsetting their markets—producing consistent profit growth is an endless challenge. You need go no further than the gross margin line to see where this company's troubles begin. Although OLS "smoothed" revenues grew at a 1.5% annual clip from 1996 to 2008, cost of goods sold increased a smoothed 3% annually. Consequently, gross margin has declined a smoothed 1.1% annually over this span—double the 0.5% rate that a simple CAGR calculation produces.

If we want to measure Motorola's operating income over this span, we immediately confront the GAAP operating loss of $2.39 billion for 2008. Anyone who has used a CAGR point-to-point formula in the past knows that negative values in either of the end points whacks out the formula and makes its useless. According to a simple CAGR calculation, Motorola's operating income has declined 200%—every year. Even this company is not that troubled.

Let's now adjust the GAAP operating income using an OLS regression; the regression is shown in Figure 7.2. The regression has the effect of cutting 1996 operating income by one half, to $1.25 billion from an actual $1.96 billion. But the regression also produces a positive end point. The CAGR formula works with the positive beginning points and end points, showing us that Motorola's GAAP net income has declined 5% annually since 1996. On the other hand, over the 2004–2008 span the operating profit decline was so severe that even OLS cannot produce a positive end point, thus rendering the CAGR calculation meaningless.

The story is the same in pretax income and net income. GAAP pretax income is down over 200% annually from 1996 to 2008 according to the useless simple CAGR formula; using an OLS regression, pretax income edged up one half

Figure 7.2

Revenues will be a much steadier input than operating income for almost any company, and the likelihood of operating losses in any one year is greater. OLS can smooth away negative end points over long spans, although it cannot work miracles amid deep declines in profits.

Motorola											
Ordinary Least Squares											
	1996		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**		
Oprtng Incm	1,960.00		(1,750.00)	1,273.00	3,150.00	4,696.00	4,092.00	(553.00)	(2,391.00)	***-201.54%***	**Unadjusted**
	1247.537		932.413	879.893	827.372	774.852	722.331	669.810	617.290	***-5.27%***	**OLS Smoothed**
				5-Year:	3,150.00	4,696.00	4,092.00	(553.00)	(2,391.00)	***-194.64%***	
				5-Year:	5065.000	3431.900	1798.800	165.700	-1467.400	***-178.05%***	

a percent annually. Net income, down 210% on simple CAGR, is off a more reasonable, though hardly pretty, 9% annually since 1996.

Use of OLS regressions on pro forma results can get an analyst in trouble, and the Motorola example shows us why. While a simple CAGR calculation shows a 175% annual decline in pro forma net income, we calculate an 11% pro forma net income growth rate based on OLS. If you were unaware of the laundry list of problems facing Motorola, you might think this growth rate can be blithely plugged into formula. We are not (ever) passing judgment on a mathematically sound formula, but be aware that use of OLS regression on pro forma anything amounts to a double cooking of the books and should be used with eyes wide open.

Is OLS regression of end points always superior to simple CAGR calculations? We can think of one example where the answer is no. In 2008, Motorola's enterprise value was $35.9 billion; at the end of 2008, it was closer to $23 billion. A smoothed regression of this change suggests a 2% annual decline, whereas the actual point-to-point decline was 3.3% annually. We are not looking to use the OLS data to model change in enterprise value; we are more interested in whether the decline signals a good entry point in the stock or a bad one. To make this decision, we need the actual numbers. The 3% actual point-to-point decline in enterprise value is more favorable to the bull-value case than the 2% OLS-derived decline.

Moving back to revenues and revisiting Figure 7.1, we now look at the company's simple CAGR and OLS-smoothed CAGR over the market's look-back period, which tends to be five years. Without delving too deeply, we note that this has been a tough patch for Motorola, as its global mobile handset share was cut to one third of peak levels, and its wireless networks business contracted meaningfully. Pricing became more difficult, the business mix worsened, and cash—depleted by asset buys (of Symbol Technologies)—was reduced as an earning asset.

Accordingly, while five-year revenue growth was declining 1 point annually, gross margin was declining at five times that rate. For the preceding five years, the GAAP end points for operating income, pretax income, and net income are negative, resulting in screwy negative growth rates, even on an OLS basis. On a pro forma basis, the end points are positive, making it possible to calculate meaningful growth rates; however, they're not good, typically declining in double digits over the preceding five years.

Reading the Data: Balance Sheet

The balance sheet has shown its strains as well. As illustrated in Figure 7.3, over the long time frame, cash grew much faster (11% annually) than debt (less than

Figure 7.3

In addition to difficulty with operating profits, Motorola's net was impacted in recent years by an accelerating decline in cash matched with a rising pace of debt growth.

Motorola															
Ordinary Least Squares															
Balance Sheet	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**		
Cash Invstmnts Total	3,509.00	3,442.00	3,451.00	5,536.00	5,301.00	9,116.00	8,619.00	11,351.00	13,949.00	15,208.00	16,535.00	9,443.00	7,496.00	***6.01%***	**Unadjusted**
	3585.297	4435.901	5286.505	6137.110	6987.714	7838.319	8688.923	9539.527	10390.132	11240.736	12091.341	12941.945	13792.549	***10.92%***	**OLS Smoothed**
								5-Year:	13,949.00	15,208.00	16,535.00	9,443.00	7,496.00	***-11.68%***	**Unadjusted**
								5-Year:	16260.400	14393.300	12526.200	10659.100	8792	***-11.57%***	**OLS Smoothed**
Debt Total	3,313.00	3,426.00	5,542.00	5,593.00	10,684.00	9,242.00	8,818.00	7,571.00	5,295.00	4,319.00	4,397.00	4,323.00	4,184.00	***1.81%***	
	6267.791	6206.582	6145.374	6084.165	6022.956	5961.747	5900.538	5839.330	5778.121	5716.912	5655.703	5594.495	5533.286	***-0.95%***	
								5-Year:	5,295.00	4,319.00	4,397.00	4,323.00	4,184.00	***-4.60%***	
								5-Year:	4947.2	4725.4	4503.6	4281.8	4060	***-3.88%***	

1%). In the preceding five years, however, cash declined faster than debt. Analysts do not operate in an information vacuum, so the changes need to be seen in context. Subjectively, we feel the $4 billion spent to buy Symbol Technologies was better than the $2 billion spent on share buybacks.

On the upside, MOT likely hit bottom at the cycle bottom—and this was a deep cycle bottom. The difficulties in the handset business have distracted investors from incredible franchises in connected home and first-responder networks. Other areas are benefiting from the reservoir of engineering excellence, but this cash-rich company is running leaner. For these reasons, it may be worthwhile to calculate Motorola's normalized earnings, in order to get some sense of the company's potential multiyear earnings power.

Normalized Earnings

NE Worksheet Concept

Don't confuse normalized EPS projections with the real thing, particularly on a single-year basis. Normalized earnings mainly have value in projecting a company's potential earnings power across a bigger span: the economic cycle, for example, and perhaps the years leading in and out.

What does it mean to "normalize" earnings? The process involves calculating historical growth rates and margin percentages and using them to project earnings out over a multiyear period. While OLS calculations are usually done one way, the same is not true for normalized earnings. Given the many significant line items in the income statement, it is possible to trend any combination of them to arrive at normalized earnings. The lack of a single standard makes them all the more awkward to implement in a model, even a "shadow" model.

Most investors agree that normalizing earnings means to adjust them to eliminate variations related to the business cycle. Many approaches are backward looking only. That is, normalized earnings are nothing more than the simple average earnings for a given period. Given the rapid shifts in the market, that kind of calculation is not much use in attempting to determine future earnings power.

Our NE method is a hybrid, which is the modern way of saying "ramshackle." Despite its less than blue-blood origins, we think it hits all the main points, or rather draws from the appropriate data, to derive an estimate of the average outcome.

Normalized Earnings Method

Stage One: NE Compilation

As noted, our normalized earnings process is sited on the bottom of the OLS worksheet so we have handy access to that data. Start by referring to Figure 7.4 to get some sense of the process. This is effectively a two-stage process. In stage one, we compile data and derive margins on that data; in stage two, we extrapolate the data growth trends and rolling five-year margin trends out a few years to derive EPS estimates.

While we consider this to be a two-stage process, note that data for stage one in the Motorola model has been compiled on both an unadjusted basis and also on a smoothed or OLS basis. (For both we used pro forma inputs, not to deliberately add to the confusion but because the market values MOT that way.) If you have a healthy company with somewhat steady top-line growth and margin expansion, you can forgo use of OLS values in your normalized earnings calculation.

In stage one, we "stage" key inputs linked from our actual and OLS-smoothed data above and then use margin data implied by these figures to calculate EPS afresh. In the first part of stage one, we show the non-OLS inputs, and for this company they end with a thud: our 2008 EPS is a one-penny loss. This is not a good basis to go forward; so we rely on the second set of stage one inputs, which uses OLS-based inputs.

In this second rendering of stage one and using smoothed data across a 13-year span, we see that operating margin moves in a tighter 4.1% to 1.8% range. Net margin is actually higher (reflecting all those years when the cash horde was throwing off huge interest income). We arrive at nicely positive "smoothed" earnings of $0.50 by 2008.

In the third part of stage one, where we've compiled the OLS tallies (in Figures 7.1 through 7.3 these were shown on the far right), we see a relatively healthy 9% growth rate for pro forma earnings. Remember, keep the eyes wide open when using both OLS and pro forma in the same calculation.

Stage Two: NE Application

In stage two, we apply the revenue, income, and margin data we derived in stage one. We begin with at least five preceding years, so we have a place to compile five-year average margins. In the first line, we begin with actual OLS-derived

Figure 7.4

Normalizing earnings can help paint a picture of a company's average EPS strength across coming periods. When this data is built on OLS inputs, in our view, it may better capture performance across the ups and downs of the earnings cycle.

Motorola													
Normalized Earnings													
Stage ONE: NonNrml w/o OLS	**1996**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**				
Revenue	27,973.00	29,451.00	26,681.00	23,155.00	31,323.00	36,843.00	42,879.00	36,622.00	30,146.00				
Pro Forma Op Incm	1,960.00	(636.00)	847.00	1,273.00	3,150.00	4,696.00	4,286.28	642.00	373.74				
Oprtng Margin	7.0%	-2.2%	3.2%	5.5%	10.1%	12.7%	10.0%	1.8%	1.2%				
Pro forma Income	1,154.00	(3,937.00)	(2,301.00)	932.00	2,199.00	4,599.00	3,186.67	569.15	(30.26)				
Net Margin	4.1%	-13.4%	-8.6%	4.0%	7.0%	12.5%	7.4%	1.6%	-0.1%				
Shares Out Diluted	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,521.16	2,506.37	2,341.14	2,266.60				
Pro forma EPS	0.63	(1.78)	(1.01)	0.40	0.89	1.82	1.27	0.24	(0.01)				
Stage ONE: NonNrml w/OLS	**1996**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**				
Revenue	28,698.01	31,329.03	31,855.23	32,381.43	32,907.64	33,433.84	33,960.04	34,486.25	35,012.45				
Pro Forma Op Incm	1,247.54	984.93	932.41	879.89	827.37	774.85	722.33	669.81	617.29				
Oprtng Margin	4.3%	3.1%	2.9%	2.7%	2.5%	2.3%	2.1%	1.9%	1.8%				
Pro forma Income	319.45	765.10	854.23	943.37	1,032.50	1,121.63	1,210.76	1,299.89	1,389.02				
Net Margin	1.1%	2.4%	2.7%	2.9%	3.1%	3.4%	3.6%	3.8%	4.0%				
Shares Out Diluted	1,970.06	2,198.44	2,244.12	2,289.79	2,335.47	2,381.14	2,426.82	2,472.49	2,518.17				
Pro forma EPS	0.16	0.35	0.38	0.41	0.44	0.47	0.50	0.53	0.55				

Figure 7.4 *(continued)*

Motorola													
Normalized Earnings													
	1996	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**				
OLS Adjusted:													
Revenue CAGR	***1.54%***												
PF Op Incm CAGR	***-5.27%***												
Aveage Oprtng Margin	***2.98%***												
PF Net Incm CAGR	***11.97%***												
Average PF Net Margin	***2.63%***												
Diluted Shares CAGR	***1.91%***												
PF EPS CAGR	***9.88%***												
Stage Two: Normalized w/OLS		**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	**2011E**	**2012E**
Revenue		31,811.99	32,302.39	32,800.36	33,306.00	33,819.44	34,340.79	34,870.18	35,407.73	35,953.57	36,507.82	37,070.62	37,642.09
Oprtng Incm		933.04	883.89	837.32	793.21	751.42	711.83	674.33	638.80	605.15	573.27	543.07	514.46
Rolling 5-year Net Margin		1.7%	1.9%	2.2%	2.4%	2.7%	2.9%	3.1%	3.3%	2.9%	3.0%	3.1%	3.1%
Pro forma Income		529.16	623.18	716.98	810.66	904.27	997.90	1,091.61	1,185.46	1,042.09	1,092.07	1,132.45	1,161.12
Shares Out Diluted		2,198.44	2,244.12	2,289.79	2,335.47	2,381.14	2,426.82	2,472.49	2,518.17	2,566.17	2,615.08	2,664.93	2,715.73
Pro forma EPS		0.24	0.28	0.31	0.35	0.38	0.41	0.44	0.47	0.41	0.42	0.42	0.43

revenue from 2001 through 2008, and then grow revenue for forecast periods (2009 through 2012) at the OLS CAGR of 1.54%. Our formula would be something like =N201*(1+$B189), where N201 is 2008 OLS revenue and B189 is the 1.54% growth rate. (Remember, we do this work way down at the bottom of an actual OLS worksheet. In the snippet shown in Figure 7.4, 2008 OLS revenue is found in cell N40, and the 1.54% growth rate is found in cell B28.) Although we include an operating income line, our main driver will be net income. So we average five-year net margin (again based on the OLS calculations) and apply the rolling average beginning in 2009. The rolling five-year net margin applied to revenue drives our net income forecast for the forward years.

We also grow out the share base at the OLS growth rate, and that finally provides a basis for our modeled pro forma EPS for the years 2009 through 2012. In the case of Motorola, our model rendered fairly consistent EPS across the period. This is a mechanical process based on the data, not our perceptions and subjective assessments of the company's progress in a dynamic market. Motorola has shown Houdini-like skill in extricating itself from bad operating models. With the admirable Sanjay Jha at the company's helm, we have confidence it will beat our normalized outlook. But if the economy comes crashing down again, these numbers may be the more reliable figures for modeling the company.

Companies with steadier sales growth and margin expansion will typically produce rising normalized earnings, even without the assist of pro forma data and OLS-adjusted inputs. But we prefer to use OLS inputs when we normalize even the healthiest companies, because this in our view best captures past economic cycles and pushes that data forward into our NE calculation.

Granted, we can't fully "normalize out" the cycle even for the best-functioning companies. Over the 2007–2009 span, we learned that fully informed recessions (those that have real-time information on demand, inventories, and all other inputs) hit harder and faster than the old, blind recessions that used to stumble forward in a knowledge vacuum. Hopefully, informed recessions lead to quicker recoveries; that's what the inventory software salespeople promised. Given this quick-change reality, normalized earnings capacity could take on increased importance within the modeling architecture.

With OLS and normalized earnings now in the tool kit, we really are winding down the modeling-intensive portion of our work. It is now time to consider the next part of the analyst's task: to take our modeled or forecast inputs, integrate them with historical data, and, based on their interaction, to begin valuing the equity.

PART 2

RATIO AND VALUATION WORKSHEET

Introduction

In this second part of the book, our objective is to compile annual data from the main financial statements to perform ratio analysis. We'll use historical and modeled inputs from the financial statements as well as historical, real-time, and forecast asset prices to estimate asset value based on comparable historical analysis. And we'll lay the groundwork for present value calculations to be performed on a separate worksheet.

Now that we've built our income statement projection, we need to gather historical data from two other key financial statements: the balance sheet and the income statement. We'll also need to project these financial statements out for our modeling period of two years. For the purpose of compiling ratios and performing historical comparables analysis, at a minimum we need to model annual totals for the balance sheet and cash flow statement projected out at least two years.

We can model the balance sheet and cash flow statement with real rigor, so that the accounts in each sheet are interleaved with one another. Certainly, for the sell-side analyst in training, that level of modeling is expected. At the same time, it can be efficacious (better known as "quick and dirty") to model growth in balance sheet accounts in line with historical experience, typically as some multiple of GDP growth or in relation to the company's own revenue growth. And we can model a cooked-down cash flow statement that mainly focuses on the key accounts that will drive our discounted free cash flow model.

Most sell-side analysts keep a running quarterly balance sheet, either at the very bottom of the income statement presentation or on a separate worksheet (which is our usual practice). Some keep a running quarterly cash flow statement as well (we're usually remiss). But on this worksheet, we will focus primarily on annual balance sheet and cash flow assumptions, because historical comparable valuations such as price/earnings ratios, or P/Es, are normally expressed on an annual basis.

The ratio and valuation worksheet meets several goals. It is a place to compile common ratios that give us some sense of a company's performance in several broad areas. These include internal liquidity, operating efficiency, operating profitability, risk analysis and profile, and profits and cash flow. Some of that data figure immediately in our comparables valuation analysis. Some of it will figure in our discounted free cash flow analysis. Further out, much of it will be linked to a matrix or master spreadsheet on which we compile and compare data from multiple companies. And finally, the collated information on the matrix spreadsheet will be manipulated to produce a proprietary peer-determined value (PDV) that quantifies a company's value relationship within a designated peer group. This proprietary metric is one of several that will ultimately figure in our final assessment of the dollar value of the equity.

Historical Comparables and DFCF: Is It Either/Or?

In the third section of the book, we will prepare a worksheet for discounted free cash flow (DFCF) analysis. This form of analysis projects (and discounts) future cash flows and also calculates (and discounts) a "terminal" value for the asset. Accordingly, it is regarded as mainly forward looking. While DFCF is predicated on a historical performance across a time frame, that period is typically not long, on average two to three years. DFCF, with its summed future cash flows and terminal value, all discounted to the present, most readily lends itself to creation of a dollar value for the asset.

Comparable historical valuation, on the other hand, uses a longer historical period (typically five years) to model the valuation outlook for a relatively short span—say two years. Use of a five-year historical period is designed to encompass all phases of the economic cycle as a means to guard against cyclical distortions. Given the shorter forward time span, discounting back to present value is not regarded as necessary in comparables analysis. Comparables valuation also generates a like value—for example, historical P/E is used to determine a likely forward range of P/E—whereas DFCF is designed to predict or calculate a dollar value for the asset. Historical comparables data, however, can be used to model a dollar value for an asset, and we'll share our methodology for doing so presently.

The two valuation styles—historical comparables and DFCF—move in and out of vogue with analysts, much as dividend-paying and non-dividend-paying stocks move in and out of vogue with investors. To reiterate our approach: we're not here to argue relative merits of forward-looking versus backward-looking valuation. We'll take their merits as a given and use them to help determine dollar value of an asset. What we will do in our final analysis is assign each style (and a third peer-based valuation style as well) a weighting within our final determination of dollar value of an asset, based on the market climate and other objective and subjective considerations.

Historical Comparables: A Primer

The heart of comparables valuation is determining a basis of historical valuation relationships that will be used *in tandem with modeled inputs* to forecast future valuation measures. These valuation measures are typically based on the interplay between the price of an individual common share and various per-share metrics, the most common of which are price to earnings, price to revenue, price to book value, price to cash flow, and relative P/E.

Overreliance on P/Es

Our goal is to determine what the stock is worth on a dollar basis, adjusted for its riskiness within its trading universe. Equity analysis has been described as an art and a science. That is a fair surmise; unfortunately, it is also describes a gray zone where valuation analysis can grow fuzzy and—most often—fall back on the familiar.

Anyone who has earned an MBA in finance or who has been through the CFA program has encountered a plethora of valuation methodologies. These sometimes follow the fashion of the moment; the long-disparaged dividend discount model (DDM) seems to be cycling back into favor, as it often does when growth stocks fall from the heavens. In the academic finance setting, valuation methodologies such as DDM, discounted free cash flow (DCFC), and historical comparable methodologies all are given a fair schooling.

Ultimately, analysts are left on their own to conclude how much weight to assign to any valuation methodology. With multiple methodologies percolating in their heads, newly hatched analysts are plunked down in the real world. Mentors notwithstanding, these new analysts must sort for themselves to find which methods best fit the available information set. At a micro level, the markets and stocks respond to real-time news flow. Not surprisingly, analysts eventually gravitate to the valuation methodology that encompasses the most current and plentiful information. This information can come from all sources, ranging from industry blogs and boards to chats with IR people and other analysts, or breaking news in the *Wall Street Journal* or the *Financial Times*.

Often, breaking information will directly or indirectly impact earnings. What to make of the news that Ceylon Telephone & Telegraph is coping with diminishing pay-phone revenues? It is not easy to reflect such minutiae in a DDM or DCFC model. Such models are meant to determine a long-range or ultimate value. Clients don't want to hear that, of course, when their Ceylon Tel & Tel shares are getting killed.

But every analyst knows that they can back out some portion of the Borneo pay-phone contribution from projected earnings; voilà, there's an instant change in the forward P/E. Moreover, because the analyst has been digesting information and adjusting earnings all through a given period, he or she can track the resultant changes in the EPS trend and—in league with an assessment of the stock price trend—monitor the resultant trend in P/Es.

And that is why analysts, from the most tightly focused bulge-bracket specialist to a buy-side generalist charged with covering a few sectors, rely—overrely, really—on P/Es. There's another reason why analysts fall back on P/Es: it's what the investing public wants. Consider the individual charged with managing someone else's money. Whether a fresh-faced financial consultant or an ensconced private wealth manager, he or she is expected to be conversant in the 5,000 stocks trading on the NYSE and the Nasdaq main exchange. The Street cries out for a *tabla rasa,* a common metric that reduces a company's worth of financial complexity into a simple ratio; P/E is our Rosetta Stone.

The Timing Problem with P/Es

Earnings are an accounting fiction, a witch's brew of data influenced by thousands of sub-sub-segment P&L decisions made regarding revenue recognition, accounting for inventories, depreciation schedules, research and development

(R&D) cost assignment, compensation timing, tax assessments—the list goes on and on. There is surprising leeway in many of these decisions, regardless of whether or not a company is tempted to make the most favorable interpretation. On a good day, earnings are suspect.

The problem with P/Es in isolation is not that that they are based on this fiction. Any metric, even one predicated on false data, can have useful information content as long as it is universally applied. The problem with P/Es is that they provide such a limited amount of information and are so easy to misread at different times in the economic cycle.

The investor with a little bit of knowledge senses that stocks should be bought when P/Es are low and sold when P/Es are high. But everyone in the business knows that highly cyclical stocks should be bought when P/Es are high and sold when P/Es are low. That strategy certainly worked in the spring and summer of 2009, when the most money was being made. This is counterintuitive, and—back to our wealth manager with 5,000 tickers dancing before his or her eyes—that knowledge can get lost when in so many other areas, low P/Es are the right prescription.

A More Balanced Approach to Comparables Valuation

Earnings may be no more tangible than a hallucination, but at least they are a shared hallucination. Because every company determines earnings in more or less the same way, this creates a common ground not just for measuring growth and margins but for valuing the asset.

Our goal, however, is to use not just earnings but the breadth of income statement, cash flow statement, and balance sheet data to derive a more balanced picture of the ongoing enterprise. Moreover, we are not content to just determine a ratio and see how it "feels" when we lick our finger and hold it up in the air. As always, our goal is to use information—in this case, the ratio and historical information that contributes to what we call historical comparable valuation—to derive a fair value assessment of the asset in dollars. As much as possible, we're going to dispense with the rubbery ranges that sometimes strip value from these assessments. We want a hard dollar value.

As often as not, that hard dollar value will be wrong. But in the process of creating hard dollar values for assets and then tracking their variance from actual value over a period of years, we will refine the calibration until we get it right.

The Ratios and Valuation Worksheet Described

We have been meticulous in modeling income statements on a quarterly basis, because this level of flexibility and granularity best mirrors the market's demand that we incorporate the timeliest data. Ultimately, however, the most common valuation metrics—absolute and relative P/Es, discounted free cash flow valuations—are based on annual assessments of a set of inputs, be they earnings, cash flow from operations, or another data point. Again, along our cattle drive, we're not going to stop to question this valuation convention, any more than we stop to question the ethics of branding (as opposed to, say, matching sweaters for the cattle). Our job is to keep those doggies rollin'.

We need a place to "stack up" annual data so it can be measured, manipulated, modeled, and used in ratio and valuation analysis. Our ratios and valuations page is where lots of this information will be stored and then used to assess valuation according to conventional and traditional metrics.

The top 40 to 60 lines of the ratios and valuation worksheet will be devoted to common ratios. We will then dedicate a roughly comparable space to valuation analysis based on historical comparables: P/E, the price/sales ratio, the price/book value ratio, the price/cash flow ratio, the price/ free cash flow ratio, and relative P/E. The data that forms the basis for valuation analysis—primarily annual compilations of the income statement, balance sheet, and cash flow statement—will be located on the bottom of the worksheet.

The ratios and valuation worksheet has five sections:

- Cash flow statements
- Annual financial income statements
- Balance sheets
- Ratios
- Historical comparable valuations

Because we need the financial statement data first, we'll work our way down the previous bulleted list. As such, cash flow statements, annual financial income statements, balance sheets, and ratios will be discussed in Chapter 8 and Chapter 9 of Part 2 of this book, while historical comparable valuation will be covered in Chapter 10.

Chapter 8

RATIO ANALYSIS, PART 1: INTERNAL LIQUIDITY AND OPERATING EFFICIENCY

Annual Financial Statements

We cannot perform ratio analysis and valuation analysis without data, so we begin with annual data that is either imported or added directly on the page. We will be importing from, or more specifically linking to, our income statement presentation to get the annual tallies. But what about the balance sheet and the cash flow statement?

The answer lies with your work assignment and the depth of coverage you can bring to a subset of individual equities. The sell-side analyst is tasked typically with analysis of 12 to 25 companies in a tightly defined universe. This analyst will be visiting management, participating in quarterly conference calls, and generally modeling his or her covered companies with a high level of detail. Moreover, high-velocity traders such as hedge funds that offer the highest commissions will expect these analysts to have the most current analysis, modeling almost in real time. The sell-side analyst needs access to all the publicly available information to best serve these real-time needs; equally important, this relatively small universe needs to be meticulously modeled. A private wealth manager working in a tightly defined style—say, very large cap blue chips from the Dow 30 or the S&P 100—may also have the time and resources to model at this level.

Accordingly, these analysts and wealth managers will typically maintain quarterly balance sheets and quarterly cash flow statements as separate worksheets within the workbook, or alternately far down the income statement. Much as we extract only the annual summary columns on our income statement for linkage to the ratios and valuation (R&V) page, the specialty analyst or wealth manager will link the year-end columns from these individual worksheets to the R&V worksheet.

Portfolio managers and analysts charged with monitoring an entire sector, managers whose portfolios are driven more by style (e.g., growth or value) than by sector, buy-side analysts, and generalists in general find it possible to dispense with maintaining separate worksheets for quarterly balance sheet and cash flow statement data. This group, in their income statement presentations, likely did not have the luxury of "going granular" to the workbench level, and likely modeled the P&L only and perhaps any available segment data. For these generalists, inputting annual balance sheet data and cash flow statement data directly onto the page is sufficient; so too is modeling these financial statements at an annual rather than quarterly level.

Given that valuation analysis is based on annual data inputs, there is no difference in the outcomes when building valuation "bedrock" based on already reported (historical) periods whether data is originated on a supporting quarterly worksheet or copied directly onto the R&V worksheet. In a bit, we'll get to modeling annual balance sheet and cash flow statements. Here, too, the scope of the analysts' duties will influence the sophistication of the modeling process; we'll offer various options.

Practical Tips in Data Inputting and Linking

To reiterate, our work is not intended as an Excel primer; that topic has a groaning bookshelf of its own, and we can't possibly cover even a smattering of key points. But we'll share some practical tips and observations based on what we've discovered in building R&V worksheets.

At its most basic, linking a cell from one worksheet to another requires the user to type the equal sign in the target cell, switch to the worksheet, and click on the individual cell where the data resides, and affirm the link either by pressing Enter or by clicking the checkmark cell in the task pane.

When a cell is linked from another worksheet *within the workbook*, you can drag and drop a stream of linked data. This makes its easy to import and link data from the income statement presentation worksheet or from quarterly balance sheet and cash flow statement worksheets (if maintained). When attempting to link from a *different workbook*, however, keep in mind that the linked cell will include the $ symbol in front of the row and column designation. If you attempt to drag and drop a cell with this designation, you will instead replicate the source cell again and again. So when linking from a different workbook, as a first step remove the $ symbol within the cell.

In linking to the income statement presentation worksheet, begin with the line item headers (e.g., revenues, R&D, interest income) usually in column A. Drag and drop the link to encompass everything from the period designation (e.g., 1997) to the dividend. We do not need to link and copy the line items that we use to refine our quarterly model (e.g., cash and debt) or distinguish GAAP from pro forma calculations (e.g., FAS 123R and amortization).

If our line item headers on the income statement presentation worksheet are in column A and our first historical year (say, 1997) is in column B, on our R&V worksheet we can drag and drop the entire 1997 historical year in a single step. Simply highlight the line item headers down to dividend and drag and drop them one column to the right. As soon as we get to our first quarterly breakdown on the income statement presentation—say, 2002—we need to change the link to reflect the change; otherwise we'll be dragging and dropping 1Q02 instead of full year 2002.

Populating the R&V Worksheet with Annual Financial Statements

As a practical matter, we find that the annual financial statement stacks start between row 80 and row 85 on the R&V worksheet. We also note that we consistently order our financial statement presentations with the income statement on top, followed by the balance sheet and then the cash flow statement. We do not typically include a model of the financial statement for the changes in stockholders' equity.

The easiest way to populate the annual income statement portion of R&V is to link each annual revenue cell from the income statement presentation, arrange them all next to one another, and drag and drop down the page. (Unlike on the income statement presentation, we do not need adjacent columns for annual or sequential comparisons.) In addition to the historical period annual income statements, we will also drag and drop our modeled annual income statements.

In the course of time, the income statement presentations provided by the companies you cover or monitor will change to incorporate one-time events or permanent shifts. A familiar presentation might suddenly feature a line for restructuring, impairment, or special charges related to a spin-off. As you incorporate this line item into your income statement P&L, remember to incorporate it into your annual income statement presentation on the R&V workbook as well.

For the balance sheet and cash flow statement, whether you link from separate quarterly sheets or input directly on the R&V worksheet, align so that values for each year line up with the annual accounts on the income statement. Even more so than on the income statement, companies will insert new and one-time or permanent line items on the balance sheet. If you are using separate quarterly balance sheet and cash flow statement worksheets and the covered company adds new line items that you input on those worksheets, be sure to adjust your R&V presentation to accommodate those inputs.

We will require annual balance sheet and cash flow data to complete the modeled ratios for the two forward years. At this early stage in model building, we recommend that you model the forward balance sheet and cash flows based on their historical growth, at the appropriate multiple of GDP growth, or based on the historical relationship between top-line growth and accounts in the balance sheet and cash flow statement.

Once the model is complete, you can return to this process and refine your financial statement modeling to integrate cash flow and balance sheet data and to reflect more precise modeling of individual line items. Immediately, however, you should incorporate new information that impacts the major balance sheet and/or cash flow statement accounts. Figure 8.1 shows the annual financial statement data from Celestica, a leading North American contract manufacturer. When Celestica announced plans to exercise its option and use cash to retire debt, we modeled the forecast changes in the appropriate accounts into our balance sheet. The revised cash and debt tallies linked from the R&V worksheet to our income statement presentation will influence our net interest assumptions for forward periods.

Ratios

Use of Ratios

At the very top of our R&V page, we compile a variety of ratios. Many will be used directly in our calculation of dollar value of the asset. Some will be used to assess the trajectory of the enterprise, across both its own history and in relation to those of its peers. Some are gathered in one space primarily because they can then most easily be added to the matrix valuation workbook for peer group comparison. All add value.

Figure 8.1

The annual financial statement stacks from the ratios and valuation of Celestica, a leading North America–based electronic manufacturing services (EMS) company. The company's actions and plans to reduce debt by paying it down from cash are reflected in the modeled balance sheet.

Celestica: Ratios, Valuations, Finances													
Income Statement	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**		
Revenues	1,989.1	3,249.2	8,271.5	6,735.4	8,839.8	8,470.6	8,811.7	8,070.4	7,678.2	6,037.7	6,815.3		
Cost of Goods	1,872.6	3,018.7	7,715.8	6,474.4	8,431.9	7,986.3	8,359.9	7,647.0	7,147.1	5,589.7	6,304.2		
Gross Profit	116.5	230.5	555.7	261.0	407.9	484.3	451.8	423.4	531.1	448.0	511.2		
SG&A	44.4	130.6	298.4	249.8	322.5	300.5	285.6	294.7	303.8	272.6	289.7		
Amortization	-	45.4	95.9	48.5	34.6	28.4	27.0	21.3	15.1	20.6	20.0		
Acquisition/Accretion	-	8.1	3.0	-	3.5	7.9	0.9	2.3	-	-	-		
Restructuring/Other	-	64.7	677.8	175.4	636.1	130.8	211.8	45.3	23.3	43.2	20.0		
Operating Income	72.1	(18.3)	(537.5)	(236.7)	(597.9)	16.7	(73.5)	59.8	188.9	111.6	181.5		
Intrst/Other [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	18.9	48.4	64.6	57.0	51.7	41.6	25.6		
P&L Prtx Income	68.3	(50.5)	(534.9)	(232.6)	(617.8)	(25.5)	(136.1)	8.6	146.4	70.3	155.9		
Income Taxes	26.3	(2.1)	(91.2)	33.2	245.2	21.3	14.5	(23.3)	5.0	3.7	28.1		
Tax Rate	*39%*	*4%*	*17%*	*-14%*	*-40%*	*-84%*	*-11%*	*-271%*	*3%*	*5%*	*18%*		
Net Income	42.0	(48.5)	(443.7)	(265.8)	(845.4)	(46.8)	(150.6)	31.9	141.4	66.7	127.9		
PF Net Income			216.5	(7.7)	104.2	140.6	93.5	61.9	188.5	114.9	168.0		
Basic Shares Out	69.6	103.0	231.2	216.5	225.7	226.1	226.7	228.3	229.1	230.3	232.6		
Diluted Shares Out	81.6	103.0	235.0	217.3	226.7	227.7	228.6	229.0	229.2	230.3	232.6		36.84
Rprtd Basic EPS	0.49	(0.47)	(1.92)	(1.23)	(3.76)	(0.21)	(0.66)	0.13	(3.15)	0.29	0.55		
Rprtd Diluted EPS	0.49	(0.47)	(1.88)	(1.21)	(3.74)	(0.21)	(0.66)	0.13	(3.14)	0.29	0.55		
Adjusted Basic EPS	0.49	0.44	0.90	(0.10)	0.42	0.58	0.41	0.27	0.82	0.50	0.72		
Adjusted Diluted EPS	0.49	0.42	0.89	(0.10)	0.43	0.57	0.41	0.27	0.82	0.50	0.72		
EBIT		(18.3)	(537.5)	(236.7)	(597.9)	16.7	(73.5)	59.8	188.9	111.6	127.9		
EBITDA		68.7	(226.5)	(14.6)	(390.2)	169.4	60.7	190.6	298.1	211.6	228.9		
Enterprise Value		1,072.7	4,135.4	2,136.0	3,226.7	2,462.8	2,220.8	1,182.6	1,023.3	1,552.5	1,558.3		

(continued)

Figure 8.1 *(continued)*

Celestica: Ratios, Valuations, Finances										
Income Statement	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Cash			*1,851.0*	*1,028.8*	*968.8*	*969.0*	*803.7*	*1,116.7*	*1,201.0*	*1,119.3*	*806.7*
Balance Sheet	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Cash and ST Invstmnts		31.7	1,851.0	1,028.8	968.8	969.0	803.7	1,116.7	1,201.0	1,119.3	806.7
Accounts Receivable		463.0	785.9	771.5	1,023.3	982.6	973.2	941.2	1,074.0	808.9	825.1
Inventories		430.9	775.6	1,030.6	1,062.9	1,058.4	1,197.9	791.9	787.4	634.3	647.0
Prepaid and Other Assets		38.9	115.1	158.4	127.4	124.0	111.0	126.2	87.1	67.1	69.1
Incm Tx Rcvrbl					89.1	113.5	31.2	19.8	14.1	18.7	19.3
Deferred Income Taxes		18.4	36.9	40.8	1.8	10.9	3.8	3.8	8.2	6.1	6.3
Current Assets		982.9	3,564.5	3,030.1	3,273.3	3,258.4	3,120.8	2,999.6	3,171.8	2,654.4	2,373.4
Capital Assets		214.9	727.8	679.6	569.3	544.8	567.1	466.0	467.5	422.4	435.1
Goodwill			948.0	948.0	872.9	874.5	854.8	850.5	-	-	-
Intangible Assets		[illegible]	[illegible]	[illegible]	104.5	79.0	60.1	35.2	20.1	44.9	46.2
OtherAassets		64.1	354.6	339.1	119.8	101.1	83.5	119.2	126.8	123.7	127.4
Total Assets		1,636.4	5,806.8	5,134.7	4,939.8	4,857.8	4,686.3	4,470.5	3,786.2	3,245.4	2,982.1
Debt			*6.9*	*3.4*	*503.4*	*750.9*	*750.8*	*758.5*	*733.1*	*583.3*	*255.6*
Accounts Payable		428.5	947.2	1,101.9	1,107.9	1,153.3	1,193.6	1,029.8	1,090.6	790.5	814.2
Accrued Liabilities		174.9	475.4	382.3	486.6	492.1	487.9	402.6	463.1	312.5	321.9
Accnts/Pybl, Accrd		603.3	-	-	-	119.9	-	-	-	-	-
Income Taxes Payable		18.6	24.5	8.2	93.2	4.5	42.7	14.0	13.5	10.7	11.0
Deferred Income Taxes		2.5	21.5	21.4	0.6	0.5	1.1	-	-	-	-
Cnvrtbl Debt						-	-	-	0.2	0.2	0.2
Crrnt Prtn LT Debt		2.3	2.7	2.7	2.6	-	0.6	0.2	1.0	0.1	0.1
Current Liabilities		626.7	1,471.3	1,516.5	1,690.9	1,770.3	1,725.9	1,446.6	1,568.4	1,114.0	1,147.4
Acrdd PstRtrmnt Bnfts		6.3	77.2	86.0	81.0	76.8	54.9	70.4	63.2	66.9	68.9
Long-Term Debt		133.5	4.2	0.7	500.8	750.9	750.2	758.3	732.1	583.2	255.5
Convertible Debt					124.1	-	-	-	-	-	-

Figure 8.1 *(continued)*

Celestica: Ratios, Valuations, Finances										
Income Statement	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Other Long-Term Liabilities		1.9	4.3	6.0	30.8	27.6	13.2	13.7	9.8	9.1	9.4
Deferred Income Taxes		8.7	46.2	57.2	23.4	17.8	47.5	63.3	47.2	35.6	36.7
Total Liabilities		777.2	1,603.2	1,666.4	2,451.0	2,643.4	2,591.7	2,352.3	2,420.7	1,808.8	1,517.8
Net Cash			*1,844.1*	*1,025.4*	*465.4*	*218.1*	*52.9*	*358.2*	*467.9*	*536.0*	*551.1*
Optn Cmpnt Convrtbl Debt			804.6	603.5	210.2	-	-	-	-	-	-
Capital Stock		912.1	3,670.6	3,297.8	3,559.1	3,562.3	3,576.6	3,585.2	3,588.5	3,588.7	3,696.4
Warrants					8.9	8.4	8.4	3.1	-	-	-
Cntrbtd Srpls			5.8	115.7	142.9	169.9	179.3	190.3	204.4	219.9	226.5
Retained Incm/(Dfct)		(52.2)	(294.7)	(578.8)	(1,473.6)	(1,545.6)	(1,696.2)	(1,716.3)	(2,436.8)	(2,412.3)	(2,284.4)
Foreign Currency		[illegible]	[illegible]	[illegible]	41.3	19.4	26.5	55.9	9.4	40.3	41.5
Shareholders' Equity		[illegible]	[illegible]	[illegible]	2,488.8	2,214.4	2,094.6	2,118.2	1,365.5	1,436.6	1,679.9
Liablts & Shrhldr Eqty		1,636.4	5,806.8	5,134.7	4,939.8	4,857.8	4,686.3	4,470.5	3,786.2	3,245.4	3,197.8
Celestica											
Cash Flow Stmnt	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Net Earnings		(48.5)	-445.2	-265.8	(854.1)	(46.8)	(150.6)	(13.7)	(720.5)	66.7	127.9
Dprctn & Amrtzn		86.9	311.0	222.1	207.7	152.7	134.2	130.8	109.2	100.0	101.0
Deferred Income Taxes		-	(107.8)	27.1	234.6	(15.6)	55.2	6.4	(13.4)		
Accretion Cnvrtbl Debt					17.6	7.6	-				
Nn-Csh Chg Optn Issnc			-	0.3	7.6	9.0	5.1	7.0	6.6		
Restructuring			194.5	(2.3)	35.3	11.0	47.9	5.1	1.1		
Other Charges		64.7	292.1	80.5	482.4	(15.3)	34.6	14.0			
Settlmnt Cnvrtbl/Other		(18.3)	(6.1)	(14.0)	(32.9)	(13.9)	-	18.0	850.3		
Invtry Writedown Rstrcng					61.2				16.6		
Other					1.9	14.5	1.9				
Cash from Earnings		84.9	-	-	-	-	-	-	-	-	-

(continued)

Figure 8.1 *(continued)*

Celestica: Ratios, Valuations, Finances										
Income Statement	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
A/R			297.4	14.4	(253.0)	42.0	(24.8)	32.0	(132.8)		
Invntrs			623.9	(252.6)	85.6		(172.0)	406.0	4.5		
Prpd, Othr			26.1	(43.2)	(12.9)	17.3	2.7	(6.8)	22.5		
Incm Tx Rcvrble					(50.0)	(24.4)	72.1	11.4	5.7		
A/P & Accrd Lblts			(202.7)	65.2	(113.8)	51.2	108.0	(237.6)	58.9		
Incm Tx Pybl			(0.4)	9.8	43.6	29.0	(75.1)	(21.2)	(0.5)		
Noncash WC Changes		(3.3)	-	-	-	-	-	-	-	-	-
Cash frm Operations		81.6	982.8	(158.5)	(139.2)	218.3	39.2	351.4	208.2	166.7	228.9
Acquisitions, Net Cash		(48.7)	(111.0)	(0.5)	(39.6)	(6.5)	(19.1)				
Purchase of Capital		(65.8)	(151.4)	(175.9)	(142.2)	(158.5)	(189.1)	(63.7)	(88.8)	(120.0)	(120.0)
Asse[illegible]		[illegible]	[illegible]	[illegible]	101.3	50.9	1.0	27.0	7.7		
Other		(5.2)	(0.7)	(0.4)	0.6	2.2	(0.7)	(0.2)	0.3		
Cash Used Investing		(119.7)	(191.5)	(169.5)	(79.9)	(111.9)	(207.9)	(36.9)	(80.8)	(120.0)	(120.0)
Bank Indebtedness		(0.9)	(1.6)	-							
Increase LT Debt		-	-	-	500.0	250.0		(1.4)			
Repay LT Debt		(423.2)	(146.5)	(3.5)	(41.1)	(3.4)	-	(0.6)	-	-	-
Debt Rdmptn Fees			(6.9)	-	(12.0)	(4.2)	(0.6)	3.5	-	-	-
Deferred Financing Costs		(2.2)	(2.6)	(1.6)	(4.0)	(1.1)	5.3	(3.0)	(0.5)	-	-
Rprchs Nts/Cnvrtbl			(100.3)	(223.5)	(299.7)	(352.0)	(1.3)	-	(30.4)	-	-
Issuance ST Debt		-	-	-	-	-	-	-	(0.4)	-	-
Issuance of Share Capital		423.7	7.4	5.1	14.6	8.0	-	-	2.1	-	-
Repay ST Debt		-	-	-	-	-	-	-	-	-	-

Figure 8.1 *(continued)*

Celestica: Ratios, Valuations, Finances												
Income Statement	**1994**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	
Issue Shr Cptl		(26.9)	-	-	-	-	-	-	-	-	-	
Rprchs Cptl Stock			(32.5)	(274.9)	-	-	-	-	-	-	-	
Dividends Paid		-	-	-	-	-	-	-	-	-	-	
Other		(6.7)	(0.1)	4.2	1.3	(3.5)	-	-	(13.9)	-	-	
Cash Used Fncng		(36.2)	(283.1)	(494.2)	159.1	(106.2)	3.4	(1.5)	(43.1)	-	-	
				-	-	-	-	-	-	-	-	
Change in Cash		(74.3)	508.2	(822.2)	(60.0)	0.2	(165.3)	313.0	84.3	46.7	108.9	
Cash, Beginning of Period		106.1	1,342.8	1,851.0	1,028.8	968.8	969.0	803.7	1,116.7	1,201.0	1,247.7	
Cash, End of Period		31.7	1,851.0	1,028.8	968.8	969.0	803.7	1,116.7	1,201.0	1,247.7	1,356.5	
Cash & Short-Term Invstmt		-										

So far, we have three annual financial statements on our R&V page. This data will contribute to our analysis but is not in and of itself our primary focus; we always want to make best use of precious "eyeball" time. We will assume that the ratios portion will occupy approximately 40 to 45 lines at the top of our R&V page.

We will include up to 30 highly useful ratios in this section. We lack space to give each its full due, but for each ratio we provide a cursory description of its value and use. For a highly useful, compact, and yet thorough analysis of ratios, please see *The Analysis and Use of Financial Statements* by White/Sondhi/Fried.

Ratios can be grouped thematically; we do so as much for consistency as for convenience. In nearly every case as we go down this list, we will construct our ratios from the data available in the annual financial statements that are either input or linked to the R&V page.

In general, the income statement and the cash flow statement measure performance across a period of time. The balance sheet, by contrast, provides data on the status of the enterprise at a single point in time. In our ratios, we want to make the static data from the balance sheet approximate performance across a period, thus better aligning with data coming from the income statement and cash flow statement. Accordingly, when we use balance sheet data in our ratios, we will generally use an average of two periods, to best mimic the period-spanning nature of the income statement and cash flow statement data.

Keep in mind that financial definitions are not hard and fast; various investors may use the same terms to mean different things. As much as possible, we hew to the widest conventional use. In addition to describing and explaining how to construct the ratio, we'll try to lend some real-world color when applicable.

From a practical perspective, we will construct our ratios in a single "strip" down the page. Once we've completed the process, we will drag and drop for all periods.

Internal Liquidity

The internal liquidity ratios provide information on the immediate cash availability or liquidity of the enterprise and also, in the measurement across multiple periods, how consistently a company maintains its liquidity. The half dozen we most closely track follow.

Working Capital

Working capital (WC) measures the difference between a company's current assets and current liabilities. Historically, high levels of working capital (e.g., excess of current assets over current liabilities) have been regarded positively because they show a company as being highly liquid to meet immediate cash needs. In a downturn, high working capital can serve as a kind of "bank" for the well-managed enterprise; key current asset accounts (principally, accounts receivable and inventories) can be drawn down, which is contributory to cash flow and may help keep cash flow positive amid negative profit performance. Poor working capital management in a down cycle, on the other hand, is seen by investors as an indictment of management.

To calculate working capital in a cell, let's assume that for 2007 current assets are in cell M125 and current liabilities are in cell M140. The working capital measure for that snapshot in time (most typically December 31, 2007) would be =M140–M125. To simulate the period-spanning nature of an ongoing enterprise, we use an average drawn from the current end of period and the prior end of period. There are a few ways to do this, such as using =AVERAGE or (n+n1)/2, where n equals the prior period. For consistency, I mainly use AVERAGE. To calculate working capital, the formula in this instance would be =AVERAGE(L140:M140)–AVERAGE(L125:M125).

Trade Working Capital

You won't find the term "trade working capital" cited in discussions of ratio analysis. Working capital plays a key role in discounted free cash flow calculation—but not working capital per se. Instead, the period-over-period change in working capital is contributory (or depletive) to free cash flow. But if a company has generated cash in its current account, should that company be penalized by this seeming "use" of cash in the DFCF calculation? For many analysts, the answer is no. From a practical perspective, you will find that many analysts adjust working capital so that companies are not penalized in cash flow valuation for good practices such as cash generation. CFA Institute, for example, in its measurement of free cash flows, uses the change in working capital excluding cash and short-term debt.

Current assets and liabilities contain various accounts that are unpredictable and variable in nature; these include deferred tax assets, income taxes receivable, income taxes payable, and deferred revenues. Some of these accounts are influenced by financial events rather than operating events. In our calculation of working capital for use in DFCF, we take it a step further and include only the principal operating line items in current accounts. These are accounts receivable and inventories from current accounts, and accounts payable from current liabilities.

To calculate trade working capital in a cell, sum the average of two-period accounts receivable and inventories and subtract the average of two-period accounts payable.

Current Ratio

Current ratio shows the difference between current accounts and current liabilities, expressed as a ratio. Historically, for most sectors, investors want to see positive current ratios; they would prefer to see current accounts at two or more times the level of current liabilities (a current ratio of 2.0). When the economy tanks, however, investors want to see current ratio decline as companies improve collections and cut inventories to free up and preserve cash. There are, of course, some variations in these trends based on industry specifics. Sectors with nontypical current ratios can include finance and energy; industries can include retail and other consumer-sensitive areas.

To calculate current ratio in a cell, divide the multiperiod average of current liabilities by the multiperiod average of current assets. Current ratio is an example of a ratio that will not figure specifically in the calculation of dollar value of the asset. But it has a lot of informational value. Current-ratio changes across the cycle speak volumes about management responsiveness in a dynamic environment.

Quick Ratio

Quick ratio is considered by some investors a better gauge of liquidity and cash availability than current ratio. It sums real and perceived liquidity and measures this figure against current liabilities. Quick ratio has answered to multiple definitions over the years. Most typically, it is defined as the sum of cash and accounts receivable divided by current liabilities. Some investors and analysts (e.g., Investools.com) calculate quick ratio as current assets less inventories divided by current liabilities. However it is measured, creditors like to see a quick ratio exceeding 1; again, there can be some sector-based and industry-based variability in average ratios.

To calculate quick ratio in a cell, we use the traditional methodology. Divide the multiperiod average of cash plus accounts receivable by the multiperiod average of current liabilities. Quick ratio is an example of a ratio that we do not use in the calculation of dollar value of the asset. It has informational value, particularly in times of financial distress. It is also useful when viewed in comparison to the peer group within the matrix workbook.

Working Capital/Sales Ratio

The working capital/sales ratio is not as intuitive as the other ratios; it is not directly applicable to DFCF calculations; it also does not figure in our determination of dollar value of an asset. Still, it has useful information content. Analysts and investors track this figure to gauge a company's ability to finance a higher level of sales from existing capacity—that is, without incurring additional short-term debt or (CP commercial paper is a form of very short-term financing used to meet day-to-day expenses). Watching this ratio is particularly useful in times of economic distress. As the economy weakens and company revenues decline in tandem, working capital should be reduced, to lessen strains on cash use and to help maintain positive cash flows. Thus, investors want to see this ratio hold constant in trying times. A decline in the ratio would signal distress at the company itself and an inability to fund sales at current levels.

To calculate the ratio of working capital to sales in a cell, divide working capital (calculated a few cells above) by sales for the given period. Figure 8.2 shows the internal liquidity ratios for Texas Instruments, a cash-rich company with a solid quick ratio.

Operating Efficiency

The operating efficiency ratios measure execution and efficacy of asset use. The key inputs measure turnover time, including days sales outstanding, and provide information on the cash cycle. A cash-rich company operating in high-margin niches can mask a flawed operating strategy or sloppy execution; the operating efficiency ratios provide early warnings on such companies.

Receivables Turnover

Receivables turnover describes the duration of accounts receivable, or how long receivables are held in relation to revenue. A high turnover figure is desirable, because it shows that the enterprise collects its receivables efficiently and effectively and that it does business with good credits. Low receivables turnover ratios may signal struggling customers and can be a prelude to the use of factoring companies to securitize or otherwise take poor-quality receivables off the balance sheet at a discount. Receivables turnover is also viewed as a good indicator for cash flow and for operating performance in general.

In the internal liquidity ratios cited so far, which have all been based on balance sheet data, we find it useful and informational to take a multiperiod

Figure 8.2

Dallas-based Texas Instruments had $2.6 billion in cash and no debt as of mid-2009. Accordingly, its liquidity measures were top of the industry.

Texas Instruments									
RATIOS	**1998**	**1999**		**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**
Internal Liquidity									
Working Capital	2,776	3,656		6,839	5,776	4,893	4,258	4,272	4,267
Trd Wrkg Captl	1,468	2,116		2,335	2,651	2,503	1,964	1,886	1,952
Current Ratio	2.2	2.4		3.9	3.8	3.4	3.8	3.9	3.8
Quick Ratio	0.9	1.0		1.3	1.4	1.5	1.3	2.0	2.0
Working Capital/Sales	0.3	0.4		0.5	0.4	0.4	0.3	0.4	0.3

perspective. For those ratios that mix balance statement line items such as receivables with income statement data such as revenue, it is essential to take a multiperiod approach with balance statement line items.

To calculate receivables turnover in a cell, divide revenue for a given year by the two-period average of accounts receivable, using most recent annual period and nearest prior annual period.

Receivables Collection Period

The information value of receivables turnover is enhanced when we calculate the receivables collection period, also called receivables days outstanding. This tells us how many days are required to turn over average receivables. Information measured in days is essential to determining days sales outstanding and cash cycle, widely viewed as measures of operating efficiency and—indirectly—the quality and solvency of customers.

To calculate receivables collection period in a cell, we use the value calculated immediately above—receivables turnover—and divide it by the days in the period, or 365 days. There are variations on this measurement period. Some investors and analysts round to 360 days; others may use the number of business days in a year (about 250). If you use anything other than 365 days, the point is to be consistent throughout all your models. However, use of anything besides 365 days erodes the comparable value of your measures when you bring them outside the self-contained world of your models.

Total Asset Turnover

In between our analysis of receivables turnover and inventory turnover, we measure total asset turnover. This is just what it sounds like: total revenues divided by total assets. This broad measure stands alone and does not contribute to sales cycle information such as days sales outstanding or cash cycle. But it is an information-rich reading on the underlying efficiency of an enterprise.

Some investors and analysts are more interested in a cleaner asset return number, so they strip out intangibles and goodwill from total assets. As always, if you are going to make this adjustment, be sure to do so consistently throughout your coverage universe; and make sure any comparisons made outside the universe are against like-adjusted measures.

To calculate total asset turnover in a cell, divide revenue for a given year by the two-period average of total assets, using most recent annual period and nearest prior annual period.

Inventory Turnover

Much as receivables turnover provides insight on the quality of the customer base as well as a company's efficiency in collecting bills, inventory turnover is more than just a number; it provides insight on how well the supply chain is functioning and how optimally procurement officers are making purchases. The important distinction between accounts receivable turnover and inventory turnover is in the denominator: inventories are measured as a multiple of cost of goods sold, not of revenues.

To calculate inventory turnover in a cell, divide cost of goods sold for a given year by the two-period average of total inventories, using most recent annual period and nearest prior annual period.

Inventory Collection Period

Again mimicking receivables turnover, the information value of inventory turnover is enhanced when we calculate the turnover collection period (also called inventory days outstanding). Inventory collection period is also a referendum on the quality and solvency of customers, pricing power, market share trends, and many other useful (though not easily quantifiable) data points.

To calculate inventory collection period in a cell, we use the value calculated immediately above—receivables turnover—and divide it by the days in the period, or 365 days. There are variations on this measurement period. Some investors and analysts round to 360 days; others may use the number of business days in a year (about 250). If you use anything other than 365 days, the point is to be consistent throughout all your models. However, use of anything besides 365 days erodes the comparable value of your measures when you bring them outside the self-contained world of your models.

Days Sales Outstanding

Cash cycle is simply another way of saying receivables turnover period or receivables days outstanding. An alternate way to record days sales outstanding (DSO) in a single cell is to divide accounts receivable for the period by revenues and multiply the result by the days in the period. In our ratios presentation, we have been careful to maintain ratios based on a full year. Sell-side analysts and investors who model more meticulously may want this DSO information on a more timely or quarterly basis. For them, we recommend creating space within the quarterly balance sheet workbook to perform this calculation. You'll need to import quarterly revenue data from the income statement presentation and then proceed as below.

To calculate days sales outstanding in a cell, divide accounts receivable for the period by revenue for the period and multiply the result by days in the period. For quarterly measurements, analysts typically use 90 days. For annual measurements, analysts may use 360 or 365 days. Whatever the measurement period, remember to use it consistently across all your covered companies.

Fixed Asset Turnover

The next two ratios—fixed asset turnover and equity turnover—are mainly for informational and comparison purposes; they do not figure in the calculation of dollar value of the asset. They are mainly tracked on a company-specific basis for variance from the historical norm and within the industry comparison matrix for changes in the historical relationship to the peer group.

Fixed assets are tangible assets, mainly property, plant, and equipment (PP&E). Fixed asset turnover indicates the revenue generated by the money spent on PP&E. Because PP&E is depreciated over time while sales presumably are growing, in a normally progressing company this ratio should be increasing. If this ratio flattens out or begins a sustained fade (as opposed to a cyclical blip), that can be a sign that a company has invested unwisely in unproductive assets.

To calculate fixed asset turnover in a cell, divide net sales for the period by the average (two-period) PP&E taken from the balance sheet.

Equity Turnover

Shareholders' equity is share capital (money invested in the company at inception, such as par value of common stock and additional paid-in capital) plus retained earnings (net income after dividends) minus treasury shares (costs to repurchase stock); a few other items such as accumulated other comprehensive income and foreign exchange can impact this number. Alternately, shareholders' equity can be calculated by what it isn't: assets less liabilities. As mentioned, we contend that FAS 142, the accounting board's decision to impair rather than depreciate goodwill, has had consequences for shareholders' equity that far outweigh the rationale for the standard's imposition. These include reducing the informational value and even validity of stockholders' equity in ratios such as debt to capitalization and return on equity.

Despite these distortions to shareholders' equity, the fact that they've manifested across the entire universe of public stocks creates a common ground for comparison. To calculate equity turnover in a cell, divide net sales for the period by average (two-period) stockholders' equity taken from the balance sheet.

Payables Turnover

Payables turnover and payables days outstanding (PDO) are our final operating efficiency ratios. They play a role in determining cash cycle, perhaps the single best measure of operating efficiency. But payables turnover and PDO have informational value all their own. In a normally functioning economy, a company's ratio of what it pays out to its vendors should about track the rate of sales growth. In a weakening economy, payables will decline; in a recovering economy, payables will rise as companies prep for higher activity levels. Because revenue recognition can introduce lags, cyclical changes can distort payables turnover. We are therefore more interested in the long-term trend. A deterioration in payables turnover would signal acquired consumables (i.e., payments to vendors) are not generating the necessary level of sales growth.

To calculate payables turnover in a cell, divide net sales for the period by average (two-period) accounts payable taken from the balance sheet.

Payables Collection Period

Again mimicking receivables turnover, the information value of payables turnover is enhanced when we calculate the turnover collection period (also called payables days outstanding). This is the final step in advance of calculating cash cycle, viewed as one the best measures of operating efficiency. It is also a referendum on the quality and solvency of customers, pricing power, market share trends, and so on.

To calculate payables collection period in a cell, we use the value calculated immediately above—payables turnover—and divide it by the days in the period, or 365 days. There are variations on this measurement period. Some investors and analysts round to 360 days; others may use the number of business days in a year (about 250). If you use anything other than 365 days, be consistent throughout all your models. However, use of anything besides 365 days erodes the comparable value of your measures when you bring them outside the self-contained world of your models.

Cash Cycle

Cash cycle, sometimes called cash conversion cycle, measures the length of time taken to convert inputs into cash flows. More prosaically, it measure the time between the purchase of raw materials and the collection of accounts receivable on items or services sold. Cash cycle aggregates the efficiency of accounts receivable, inventories, and accounts payable. Accordingly, it draws on the days outstanding calculations we have derived above for all three of these accounts.

Intuitively, we would like to see cash cycle shorten rather than lengthen. We have already discussed how the economic cycle can affect these measures. In tough times, companies typically seek to mitigate downshifts in operating cash flow by reducing working capital. Given lags in revenue recognition, this can have short-term distortive effects on cash cycle. So again, we are less concerned with cyclical blips and more concerned with structural lengthening or shortening in the cash cycle.

One effect we have not discussed relates to regional patterns. In Europe, receivables and payable terms tend to be longer than in the United States; terms in Asia as of this writing are not so easy to categorize. Firms in most sectors (exceptions can be financial and utility) have global ambitions. Accordingly, the careful analyst or investor needs to assess changes in cash cycle within the context of changes in regional business mix.

To calculate cash conversion cycle in a cell, add receivables days outstanding and inventory days outstanding and subtract payables days outstanding.

The operating efficiency of Singapore- and California-based Flextronics International is on display in Figure 8.3. Flextronics operates massive global manufacturing campuses and produces high-velocity items such as mobile phones and PCs. As such, the company is meticulous in driving down its cash cycle, which now runs at one third to one quarter of peak levels.

We've now determined key elements of the company's liquidity and operating efficiency. Next we'll look at what ratio analysis tells us about profitability (return), as well as cash-generating capacity.

Figure 8.3

Operating in the EMS industry, where razor-thin margins prevail, Flextronics has been relentless in driving down its cash cycle.

Flextronics International: Ratios, Valuations, Finances													
RATIOS	**1994**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Operating Efficiency													
Receivables Turnover		6.66	7.33	7.02	9.44	7.76	8.60	10.36	10.74	7.76	13.36	12.52	14.58
Receivables Collect Period		55	50	52	39	47	42	35	34	47	27	29	25
Total Asset Turnover		[illegible]	[illegible]	[illegible]	1.59	1.52	1.44	1.42	1.53	1.41	2.73	2.49	2.90
Inventory Turnover		5.27	6.23	9.46	11.08	11.62	9.73	8.33	6.96	6.31	9.85	9.20	10.72
Inventory Turn Time (days)		69	59	39	33	31	37	44	52	58	37	40	34
Days Sales Outstanding		124	108	91	72	78	80	79	86	105	64	69	59
Fixed Asset Turnover		5.24	6.62	6.45	6.81	8.94	9.29	9.77	9.43	11.18	13.26	11.62	13.53
Payables Turnover		5.56	8.18	6.68	8.35	6.77	6.28	5.62	5.48	5.19	7.64	7.12	8.30
Payables Turn Time (days)		66	45	55	44	54	58	65	67	70	48	51	44
Equity Turnover		2.59	3.00	2.94	2.95	3.32	3.03	2.89	3.05	3.38	16.87	14.82	15.34
Cash Cycle		58	64	36	28	25	22	14	20	35	17	18	15

Chapter 9

RATIO ANALYSIS, PART 2: RETURN RATIOS AND CASH FLOW RATIOS

The return ratios on our R&V page include some tallies we've calculated elsewhere, mainly measurements of margin, as well as some return ratios not yet measured such as return on assets (ROA) and return on equity (ROE). The previously calculated margin ratios provide value on the R&V page by being available in a compact format. This makes it visually easier to track expansion or contraction in the margins. Equally important, this array best lends itself to importation into the industry matrix workbook, where we can track margin trends not just for the individual equity but in relation to the historical relationship to the group.

Margin Ratios

While these margin-based ratios exist elsewhere in our workbook, we won't link to the existing calculations to display these ratios. Instead we'll derive them as formulas directly in the cell. There are two reasons for doing so. One, while links are indispensible to our calculation of dollar value of an asset, every link is another place where information can go awry. Links have been known to imperfectly adjust if the linked-to or linked-from workbook is not open when changes are made on its counterpart. We'll discuss this issue in more detail in Part 4, our discussion of relational valuation. At that point we'll be we transferring data between individual company workbooks and an industry "matrix" workbook—and the risk of links-gone-awry will intensify. Two, links do not always lend themselves to drag-and-drop replication, particularly if the linked-to columns are consecutive while the linked-from columns are dispersed.

We've discussed margins extensively in Part 1 on income statement presentation, so our discussion here will be cursory. But we do want to hit on a few key points and tendencies.

Gross Margin

Gross margin measures the percentage of gross profit left after cost of goods is deducted from revenues. Generally, gross margin will be lower for companies with capital intensity and high fixed costs; lower gross margins are associated with companies that do their own manufacturing. Higher gross margins are associated with lower capital intensity, outsourced production, and a higher proportion of variable costs; information processing and business services are examples of industries with higher gross margins. Accordingly, analysis of gross margin trends across the company or peer group supersede the value of analyzing trends in relation to all sector and industries. Because gross margins play such an enormous role in operating margin, pretax margin, and net margin, the same basis of comparison holds true for all margin measures.

All the inputs needed for margin calculation are in the annual income statement data imported onto the R&V page. Because income statement data expresses performance across a span (as opposed to the snapshots provide by the balance sheet), it is sufficient to use one period only rather than the average of two periods.

To calculate gross margin in a cell, divide gross profit for the period by revenue for the period (in both cases, for the full year), and express it as a percentage.

Operating Margin

Operating margin ideally indicates a company's profitability purely from the course of its business and to the exclusion of inputs related to prior financial decisions (i.e., interest paid on debt or earned on cash) or nonoperating events (i.e., taxes along with distortions in tax rates related to impairments, restructurings, or other events).

Depending on the nature of your coverage universe, you may want to create space for pro forma operating margin. Remember, however, that the value of margin analysis is not in isolation but in relation to historical trends within the individual company and in relation to the peer group. For this reason, even though my most recent coverage has been in technology—an industry where adjusted earnings and valuations are the rule rather than the exception—for this section of the R&V page I pretty much use GAAP margins. Also be aware that if you enter margin data into your matrix workbook, it must have measurement consistency. Because all firms provide GAAP data but not all provide pro forma data, GAAP values should be used at any place where trends within the matrix supersede the value of stand-alone analysis.

To calculate operating margin in a cell, divide operating income for the period by revenue for the period, and express it as a percentage.

Pretax Margin

Pretax margin is effectively operating margin adjusted for nonoperating financial structure strategy and decisions. The primary adjustment levers are interest income and interest cost, but they are not the only factors. Line items between operating income and pretax income can include effects of other financing decisions, including debt prepayments and net realized investment gains, as well as foreign exchange effects, and sundry/other.

To calculate pretax margin in a cell, divide pretax income for the period by revenue for the period, and express it as a percentage.

Net Margin

Net margin represents net income as a percentage of revenue. Line items that contribute to the difference between pretax income and net income of course include taxes, but also may include equity income, minority interest, earnings (or loss) from discontinued items, accounting changes, and other.

To calculate pretax margin in a cell, divide pretax income for the period by revenue for the period, and express it as a percentage.

EBITDA Margin

EBITDA margin measures earnings before interest, taxes, depreciation, and amortization (EBITDA) as a percentage of revenue. EBITDA and EBITDA margin are seen as the best measure of the pure cash-based operating performance of the company, as they exclude the two most significant noncash items (depreciation and amortization) from the return calculation.

Personally I've always been wary around EBITDA margins. I can remember attending a company presentation in which the CEO was touting growth in EBITDA—while failing to mention that the $800 million in interest costs incurred in the acquisition binge that drove EBITDA growth was larger than operating income in any prior year. (The CEO and his firm were put out of their misery when the assets of the collapsed company were subsequently sold at fire-sale prices.)

Nonetheless, EBITDA does figure in two prominent valuation equations. The first is in determining values for mergers and acquisitions (M&A) purposes. In analyzing acquisition of an asset, the key concern is with cash-based operating characteristics; nonoperating items, such as interest cost and taxes, have little role in the analysis. In the normal course of business, large firms acquire small ones. Interest costs that seem prohibitive for a small firm can vanish into the folds of a much larger firm; similarly, the tax structure of the larger firm will supersede that of the smaller firm. Accordingly, analysts tend to evaluate proposed acquisitions on the basis of multiples of revenue and EBITDA.

Before calculating EBITDA margin in a cell, you need first to compile EBITDA. Every income statement presentation is different or at least has some different elements. There is no one-size-fits-all formula that we can use in our ratio section. So we find it useful to compile EBITDA for each year immediately under the appropriate annual income statement presentation. To calculate EBITDA margin in a cell, use that EBITDA value, divide it by revenue for the period, and express it as a percentage.

EBITDA/Enterprise Value (EV)

The second highly efficacious use of EBITDA is within the EBITDA/enterprise value (EV) calculation. EBITDA/EV is in that rare valuation ratio seen as cutting across all sectors and industry classes. In terms of stand-alone valuation methodologies, it is likely second only to P/Es, and it is preferred over P/Es by professional investors. Like EBITDA, we first calculate and situate enterprise value for each year under the appropriate annual heading immediately below the income statement.

Enterprise value at its simplest is the market value of equity (share price times shares outstanding) plus the market value of debt minus any cash and equivalent holdings. EV is felt to give the fullest picture of valuation because it incorporates input from all holders (including stock and bond investors).

To calculate EBITDA/EV in cell, divide EBITDA by EV, and express as a percentage.

Enterprise Value (EV)/EBITDA

The inverse of EBITDA/EV (which is expressed as a percentage), EV to EBITDA is expressed as a floating-point number. Much as high EBITDA/EV percentage values are seen as superior to low values, low EV/EBITDA values are superior to high values.

To calculate EV/EBITDA in a cell, divide EV by EBITDA, and express it as a number with at least one digit to the right of the decimal.

Return Ratios

The return ratios we calculate figure both in our assessment of the ongoing enterprise and in our calculation of the dollar value of the asset. Again, we are mainly monitoring these to determine the ability to widen return ratios in a normally functioning economy, or at least maintain them at appropriate levels. One of the ratios, return on equity, figures prominently in discounted free cash flow analysis.

Return on Invested Capital (ROIC)

Investors in the aggregate are likely to overemphasize P/E ratios in their investment decisions, because P/Es are easily understood and because earnings are widely modeled; that enables P/E ratios to encompass new information easily and quickly. Simultaneously, many investors distrust the quality of information contained in accounting earnings and the imperfect and sometimes speculative information contained in the stock price. These investors have turned to more cash flow–based calculations of value.

One method for measuring historical cash flow performance of a company is return on invested capital (ROIC). The value of ROIC is that it can be used to provide a consistent measure of cash-based return of a company over an extended period. Single-period cash flows can be manipulated by management, but cash flow over an economic cycle is more difficult to massage.

ROIC shares the common problem of any ratio with more than two inputs: variability in calculation. Some sources define ROIC as net income minus dividends divided by total capital. Many firms are not dividend paying; anyway, this method does not satisfy the cash-conscious investor.

On the other hand, ROIC is used in the Stern-Stewart Calculation of Economic Value Added (EVA), and this ROIC has some variations of its own. EVA advocates believe that companies whose ROIC exceeds their weighted average cost of capital are creating value.

Our preferred method of calculating return on invested capital is net operating profit after taxes, or NOPAT, divided by adjusted assets. NOPAT, the numerator in this equation, is net operating earnings before interest and amortization minus cash taxes. For the denominator, we adjust total assets by subtracting cash and subtracting non-interest-bearing current liabilities—that is, all current liabilities except current debt-related items (e.g., notes payable, short-term debt, and debt due within one year) as well as accrued liabilities. Cash taxes can be found at the bottom of most cash flow statements as supplementary information.

Because of this reliance on cash taxes, we need to adjust our cash flow statement model to encompass this line item. Gather historical cash taxes, and list them immediately below your formal cash flow presentation; we also include a line to represent cash taxes as a percentage of accounting or book taxes. Because accounting earnings use straight-line depreciation while cash taxes are based on accelerated depreciation, you can assume that for a normally functioning (i.e., nonimpairing) company, accounting taxes will usually exceed cash taxes.

To calculate ROIC in a cell, our numerator consists of net income with added-back interest and amortization (the former brought up from the annual income statement, the latter from the cash flow statement), minus cash taxes (listed immediately below the formal cash flow statement). The denominator consists of total assets minus cash and equivalents (from current assets on the balance sheet) and non-interest-bearing current liabilities as described above.

ROIC is seen as a measure of historical performance of a company, and purists might gasp at a forward calculation of this ratio. But we are already modeling nearly every input needed, and cash taxes can be expressed as a percentage of book taxes. In my experience, cash taxes tend to run at 55 to 70 percent of book taxes for a normally functioning company. Using these inputs, we can model a company's ROIC one or two years in advance. While this has less informational value than measuring historical ROIC, we can project whether a company will continue to exceed (or lag) its weighted average cost of capital and thus create (or destroy) economic value.

Return on Total Capital

For the generalist, this ratio is simpler to calculate and, with fewer variables, inputs, and adjustments, may have more forward-looking and predictive value than estimated ROIC. Return on total capital is akin to EBITDA/EV, but it uses a more straightforward calculation. Even so, adjustments are needed for a true definition.

One definition of return on total capital is net income divided by the book value of equity and the book value of debt. Alternatively, some investors use NOPAT or EBITDA in the numerator, and some may use the market value of debt or the market value of equity. Again, we stress that consistency across the universe, and when comparisons are made outside the universe, the methodology must conform to the comparison universe.

We use a very straightforward ratio: net income divided by the sum of equity and debt, both at book value. To calculate return on total capital in a cell, bring net income for the year up from the income statement and divide by the sum of the book value of total debt and shareholders' equity.

Return on Assets

Return on assets (ROA) is a very well known financial ratio and perhaps the second-most-common in valuation analysis, after return on equity. It is a straightforward ratio built from well-known inputs in the financial statements: net income divided by average (two-period) assets.

The chief danger in misusing ROA is its lack of applicability across industry groups. Financial firms and insurers in particular tend to have low ROA; technology firms and software firms in particular—really, any industry in which low capital intensity is the norm—tend to have high ROA. So, more so than with almost any ratio, ROA has the most value when used to compare return performance across carefully constructed universes of like entities.

To calculate return on assets in a cell, divide net income for the period by the two-period average of total assets.

Return on Equity: Two Methods

Later, we'll examine in some detail what we regard as dangerous patterns in stockholders' equity related to company practice (i.e., risk-taking) as well as bureaucratic blunder (i.e., impairment rather than depreciation of goodwill). For now, and without passing judgment, we will focus on calculating return on equity (ROE), given its paramount place in the valuation pantheon. ROE, to paraphrase (in the loosest sense of the word) Winston Churchill, is the worst of the valuation methodologies, except for all the others. Its strengths, like those of the P/E, are its universal applicability, its familiarity to professional and casual investors, its ease of calculation and interpretation, and its widespread use that cuts across sectors and nations.

Standard ROE

The most straightforward method of calculating ROE is to divide net income by stockholders' equity, or conversely net income per share by book value (i.e., stockholders' equity per share). Because share count and thus EPS can be affected by financial strategy decisions—that is, nonoperating inputs—for comparison over extended periods it is much more useful to divide net income by stockholders' equity; that is what we do in the ratio section on our R&V page. To calculate ROE in a cell, divide net income by the two-period average of stockholders' equity.

DuPont ROE

Professional investors also calculate return on equity using the DuPont method. We do this on our stock value worksheet, which we'll discuss later on. There are variations on the DuPont method; we use a three-stage DuPont. The advantage of this three-stage method is that it gives a visible presentation of the three stages of the ratio calculation, providing additional input.

To calculate DuPont ROE in a cell, in three separate cells divide (1) net income by sales, (2) sales by assets, and (3) assets by equity. This will produce three percentage calculations; in a fourth cell, multiply these three percentages together. Again, for inputs coming from the balance sheet (i.e., assets and stockholders' equity), use two-period averages. For a cross-check, compare this outcome to the ratio produced by net income divided by stockholders' equity; if they vary, then one of your inputs is out of whack.

Figure 9.1 shows return measures for Analog Devices Inc. Targeted benefits from the company's restructuring efforts and asset dispositions in low-return niches have been superseded by the economic tsunami. In the absence of major goodwill impairment, Analog Devices Inc. will have to rebuild ROE the old-fashioned way, by earning it.

Figure 9.1

Analog Devices Inc. participates in the high-margin semiconductor space, specializing in analog chips. After a dip in the October 2009 year, the company is looking to rebuild its margins going forward.

Analog Devices											
RATIOS	**1997**	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**
Return Ratios											
Gross Margin		47.8%	53.0%	54.9%	59.0%	57.9%	58.5%	61.2%	61.1%	55.0%	57.8%
Operating Margin		[illegible]	6.9%	18.3%	26.9%	21.6%	21.4%	23.1%	24.2%	12.1%	18.2%
Pretax Margin		[illegible]	[illegible]	[illegible]	28.2%	24.6%	25.7%	26.8%	25.8%	12.7%	18.0%
Net Profit Margin		9.7%	6.2%	14.6%	22.0%	17.4%	21.3%	20.5%	35.4%	10.4%	13.9%
Return on Invested Capital											
Return on Total Capital		21.2%	3.7%	9.6%	16.4%	11.1%	15.5%	17.5%	38.5%	8.4%	11.2%
Return on Assets		12.8%	2.1%	6.6%	13.2%	9.1%	13.1%	14.5%	30.2%	6.5%	9.1%
Return on Equity		21.2%	3.7%	9.6%	16.4%	11.1%	15.5%	17.5%	38.5%	8.4%	11.2%
EBITDA Margin		22.6%	22.2%	26.9%	34.0%	31.1%	32.4%	33.1%	31.5%	20.4%	25.2%
EBITDA/Enterprise Value		6.0%	3.2%	4.5%	5.1%	5.3%	6.7%	7.0%	9.9%	5.0%	7.0%
Enterprise Value/EBITDA		16.5	31.2	22.4	19.5	18.9	15.0	14.2	10.1	20.0	14.3

Risk Analysis

While modeling can help us calculate dollar value of an asset, the analyst's kit bag is incomplete without other tools such as industry knowledge and company knowledge. Beyond operating performance and prospects, attributes of company knowledge include management assessment, risk analysis, and financial strength. A small subset of risk ratios analyzed across one or more cycles and in relation to the market and peer group provides a solid base for determining financial strength.

Risk analysis ratios enable us to gauge a company's financial strength in relation to its past health, or lack thereof, and in relation to its peers. Some of the ratios provide insight into a company's ability to meet its cash obligations while servicing debt. Others provide information on how a company's operating profits will respond to a meaningful change in revenue levels. Some show how encumbered a company is with debt in relation it its equity and its full capitalization.

Risk analysis ratios are a key determinant of financial strength. Calculating financial strength via risk analysis ratios has its perils. The alternative is to rely on credit rankings from the credit rating agencies—the same group that had triple-A ratings on Fannie Mae and Freddie Mac nearly to the bitter end, and now are in a (likely futile) race to fend off lawsuits with overly aggressive "impartial" ratings on long-neglected corporate credits now deemed risky.

For the analyst, a practical consequence of irresponsible M&A activity at the company level and goodwill impairment at the FASB level is that not a few companies have impaired away all (and more) of their stockholders' equity. For these companies, debt to cap is meaningless. In these situations, interest coverage takes on disproportionate significance. And measures used in fixed-income analysis, such as measures of cash to indebtedness, take on new importance.

Operating Leverage

Operating leverage measures the magnitude of change in operating earnings in relation to changes in revenue levels. As we discussed earlier, companies with high fixed costs and capital intensity can be expected to have high operating leverage, meaning that a rise (or decline) in revenue will produce a much larger rise (or decline) in operating profits. This knowledge can influence investment decisions, particularly at inflexion points in the economic cycle. While it is too simple to say avoid high-fixed-cost companies heading into a downturn and buy them heading into recovery, awareness of the effects of operating leverage on a proposed investment should be part of the investment decision.

To calculate operating leverage in a cell, you want to divide the percentage change in operating income over the course of a period by the percentage change in revenue over the course of the same period. Operating leverage calculations are expressed as a percentage. For example, the one-period formula might look like this: =((N102/M102)−1)/((N95/M95)−1), where M102 and N102 are operating income for successive years, and M95 and N95 are revenues for successive periods.

Single-period analysis is of limited use, in our view; to get more of a cycle-spanning view, we calculate the five-period historical average for five years.

Times Interest Earned (Interest Coverage)

Times interest earned, sometimes called interest coverage or coverage ratio, measures a company's ability to meet the accounting interest obligations on its debt. While various operating earnings measures may be used, investors typically use EBIT, or earnings before interest and taxes. Although EBIT, like net income, is a book accounting concept, the exclusion of book taxes and book interest remove the two inputs with the most variance from cash-based taxes and interest. Therefore, it is the best measure to use.

To calculate times interest earned in a cell, divide EBIT by interest. Recall that we calculated EBIT along with EBITDA immediately below the income statement.

Debt/Equity

The debt/equity ratio typically takes a back seat to the debt/capitalization ratio. Debt/equity provides a quick snapshot on how a company chooses to fund its strategy: with a preponderance of debt, with equity, or with a balanced approach. Investors typically calculate both long-term debt/equity and total debt/equity.

To calculate debt/equity in a cell, divide period debt by period equity, both brought up from the balance sheet. For this exercise, as for debt/capitalization, you'll need to sum all debt sources, including notes payable, short-term debt, long-term debt due within one year (all to be found within current liabilities), and long-term debt from long-term liabilities. Separately, to calculate debt/long-term equity in cell, divide long-term debt only by stockholders' equity.

Debt/Capitalization

Like debt/equity, debt/capitalization (debt/cap) provides a snapshot of a company's financing strategy. More so than debt/equity, investors use debt/capitalization as a key ratio in the assessment of financial strength. Capitalization includes all a company's financing sources, including debt, stockholders' equity, and minority interest.

A few things to keep in mind are that high debt/cap ratios can be problematic but also that debt/cap is really most useful in a peer group comparison. Certain stable industries with high capital intensity, such as utilities, are characterized by high debt/cap ratios. Other industries, including much of technology, are characterized by generally low debt/cap ratios. Context is everything with this ratio.

We typically measure both total debt to cap along with long-term debt/cap. These figures are often close. When there is a meaningful gap between them, that usually signals maturing debt moved to current. If there is a meaningful gulf between total debt/ cap and long-term debt/cap on a sustained basis, however, that may indicate that a company is straining to operate profitably with its working capital resource. Such companies may be overly reliant on commercial paper and/or may have nearly drawn down the totality of available revolving credit.

To determine the debt/total capitalization ratio in a cell, sum all debt inputs as above: notes payable, short-term debt, long-term debt due within one year (all to be found within current liabilities), and long-term debt from long-term liabilities. Divide this sum by stockholders' equity plus total debt. To calculate the long-term debt/capitalization ratio, divide long-term debt by the sum of stockholders' equity and long-term debt.

Few companies have been as resolute in regaining control of their financial structure as Corning. In the midst of crisis in 2002, as bandwidth prices and fiber demand collapsed, chairman Jamie Houghton returned to the CEO post and made restoring blue chip finances his first priority. Figure 9.2 shows Corning's success in restoring financial stability, expressed in times interest earned and debt/cap.

Cash Flow Ratios

In the next chapter we'll move on to comparables valuation. But before we do, we will take some time to compile a set of ratios directly related to cash flows. Our model, remember, is not only constructed to deliver information; it is designed

Figure 9.2

Despite Corning's success in improving its financial structure, the company's operating leverage can be misleading. A substantial portion of income (from the Samsung Corning Precision joint venture) does not appear in the operating income or pretax income lines and thus does not impact operating leverage.

Corning Inc.: Ratios, Valuations, Finances											
Risk Analysis	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009E	2010E
Operating Leverage (1-yr)	0.1	(7.2)	1.0	(106.7)	17.3	4.2	2.2	2.7	(5.4)	10.0	2.7
Operating Leverage (5-yr)					(19.1)	(18.3)	(16.4)	(16.0)	4.2	2.8	2.4
Interest Coverage	5.5	(41.0)	(17.2)	(5.0)	0.8	5.6	12.5	17.3	19.2	6.3	9.9
Debt/Equity Ratio	38.5%	91.1%	88.8%	51.5%	70.5%	32.2%	23.7%	16.2%	11.9%	13.2%	13.4%
LT Debt/Equity Ratio	37.3%	82.3%	84.5%	48.8%	58.0%	31.9%	23.4%	15.9%	11.4%	12.6%	12.9%
Debt/Capital Ratio	27.8%	47.7%	47.0%	34.0%	41.4%	24.4%	19.1%	13.9%	10.7%	11.6%	11.8%
LT Debt/Capital Ratio	27.2%	45.2%	45.8%	32.8%	36.7%	24.2%	19.0%	13.8%	10.2%	11.2%	11.4%

to facilitate organization, convenience, and information availability. These cash ratios will mainly be used later in our discounted free cash flow analysis. But, taking advantage of our stacked-up annual financial states, this is the best place to situate them. And, as we collate cash flows even as we prepare to analyze several earnings-based valuation techniques, this is as good a spot as any to weigh in on the merits and demerits of each.

Cash Flows and Earnings

The broad mass of investors have come to rely on P/Es because they are ubiquitous, easy to construct, and easy to comprehend. Many investors distrust earnings-based valuations and instead have come to trust cash flows. A buck is a buck, this thinking goes; cash talks and everything else walks.

But cash flow is something of a straw man, put up (worse yet) by the earnings gang. The very first input in cash flow from operations is net income, the sup of the P/E crowd and the bane of the cash flow brigade.

In advance of pursuing a CFA, in the mid-1990s, I took a course taught by Paul Sondhi, one of the authors (along with White and Fried) of the excellent *The Analysis and Use of Financial Statements*, (Wiley, 1994). He distinguished between a "direct" cash flow statement and an "indirect" cash flow statement. The indirect cash flow statement, which begins with net income, is an industry standard; you see it in 10-Q and 10-K (respectively, the quarterly and annual filings mandated by the Securities and Exchange Commission for every publicly traded U.S. company).

One of our exercises in the course was to recast an indirect cash flows statement into a direct cash flow statement. In the direct cash flow statement, every line item is a summary of cash-based activities only: cash received from customers, rents, interest income, and so on, and cash paid for supplies, interest costs, assets, and so on. Some casual investors may assume their cash flow–based models begin from a hard dollar basis. In fact, the cash flow–based models favored by investment professionals all begin with the indirect cash flow statement.

While cash flow modeling is thus subject to some of the same artificial accounting constructs that (arguably) distort earnings-based models, it does avoid some noncash inputs that can have unpredictable effects on earnings. As a first step, cash flow excludes depreciation by adding it back to earnings. Depreciation is logical; assets have useful lives. But the pace of decline in an asset's useful life rarely lines up exactly with the straight-line depreciation used in calculating cost of goods sold.

In real-world asset analysis, the key distinction between earnings-based valuation and cash flow–based valuation lies less in their calculation differences and the "veracity" of inputs, and more in their application time frame. For earnings-based analysis (i.e., P/Es and relative P/Es), investors tend to use a relatively lengthy (e.g., five-year) historical period to project value over a relatively short forward period of one or two years. Cash flows, with fewer variables, better lend themselves to adjusting or discounting to present value. Discounted cash flow analysis is able to use a relatively short history to estimate (and discount back to present value) cash flows over extended periods, up to and including a "terminal" asset value calculation.

Discounted cash flow valuation has been around since immediately after the Great Depression. Pioneers in the field include Irving Fisher, who wrote *The Theory of Interest* in 1930 (New York: the MacMillan Company), and John Burr Williams, who wrote *The Theory of Investment Value* in 1938 (Harvard University Press). In the modern era, discounted cash flow valuation has become widespread because of the theory organization and refinement, advocacy, articulation, and (unavoidable in our millennium) marketing efforts of Aswath Damodaran, Distinguished Professor at the NYU Stern School of Business.

Operating Cash Flow

Immediately we need some clarity on terminology. As we'll explain later, because we rely on valuations of cash flow to equity (rather than cash flow to the firm), we are in pursuit of operating cash flow for our analysis. The term operating cash flow sounds an awful lot like cash flow from operations (CFO), the first and most closely studied section in the cash flow statement. However, to project forward operating cash flows, it is cumbersome to include every component of CFO, many of which are one-time in nature.

For this exercise, we use the term operating cash flow to distinguish it from cash flow from operations, or the first section of the cash flow statement. We do so, even though (in a further complication) some investors equate the term operating cash flow with EBITDA. For us, operating cash flow is the bare bones of cash flow.

While it is straightforward to use historical cash flow statements to assess historical cash flow–based calculations, the value of cash flow analysis lies in assessment of forward periods. It is arguably irresponsible to introduce additional difficult-to-forecast elements into a calculation in which risk to the outcome is extrapolated and exacerbated by the number of inputs and time's passage.

Our definition and modeling of operating cash flow, by contrast, relies on just a few inputs. Net income is the first; we've already modeled it with some precision. The other inputs are depreciation and amortization. These inputs can be reliably modeled, based on the fact that the underlying accounts (PP&E and intangibles) are subject to scheduled, straight-line reductions. As well, the changes in these accounts over time provide good guidance as to their levels in forward periods. Finally, companies routinely provide guidance on their forecast depreciation schedules for the coming year. No such guidance is furnished on any other line item in CFO, with the possible exception of stock option compensation (categorized in CFO as, for example, noncash compensation).

To calculate operating cash flow in a cell, combine net income (from the annual income statement) and depreciation and amortization (from the cash flow statement) for the one-year period.

Free Cash Flow (FCF)

Within the cash flow statement, cash flow from operations is succeeded by cash flow from investing (CFI) activities. While there is no hard and fast rule, in a normally functioning enterprise the positive CFO number is succeeded by a negative number in CFI. Routinely, the biggest single negative or cost in CFI is capital spending, represented by one of several names: expenditures PPE, capital costs, and so on. This line item does not contain major asset purchases and is somewhat predictable in nature, thanks to the operations and maintenance (O&M) component. Capital spending, like depreciation, is a line item that companies often forecast in their addresses to the investment community. Other line items in CFI are more erratic in nature, more difficult to extrapolate, and not addressed in company guidance.

Thus, in our cooked-down cash flow valuation model, we first adjust operating cash flow by excluding capital spending. This tally is universally called free cash flow. To calculate free cash flow in a cell, adjust the operating cash flow calculated in the cell immediately above by subtracting capital spending. Because capital spending is presented in the cash flow statement as a negative number, in practice your cell formula will reflect the *addition* of operating cash flow and capital spending.

FCF Minus Change in Working Capital

Working capital, as discussed previously, represents the available near-term resources a company may draw on without accessing the capital markets.

Although only the cash component is fully liquid, in the normal course of business, accounts receivable will be paid and inventories will be converted into items sold. As balance sheet items, current accounts and current liabilities and thus working capital represent a reservoir of cash in varying states of availability.

Remember, our concern is not with cash snapshots but with cash flows. Thus we are less concerned about the actual amount of cash in the reservoir and more concerned about changes in the cash reservoir across periods. Intuitively, when working capital rises from one period to the next, cash is tied up and unavailable to flow, and when working capital declines, the cash dispersed is part of the cash flow.

We thus need to adjust our free cash flow (FCF) further by the change in the working capital reservoir. To calculate FCF minus change in working capital in a cell, adjust the free cash flow calculated in the cell immediately above by subtracting the change between prior-period-end working capital and current-period-end working capital. To illustrate, the formula will look something like this: `=N39−(N4−M4)`, where N39 is current period free cash flow, N4 is current period working capital, and M4 is prior-period-end working capital.

Free Cash Flow Minus Change in Trade Working Capital

So far we've included in our cash flow calculations the largest and most predictable sources and uses of cash. In our working capital discussion above, we identified three other line items that can represent the tying up or dispersal of significant amounts of cash: accounts receivable, inventories, and accounts payable. We further identified these three as the components of trade working capital.

Always in cash flow valuation, we seek to limit the inputs to only those accounts that significantly affect cash and, equally important, occur with sufficient regularity to have a predictive component. The elements of trade working capital, which meet this test, constitute their own reservoir of cash. To paraphrase from what was said previously, when trade working capital rises from one period to the next, cash is tied up and unavailable to flow; when trade working capital declines, the cash dispersed is part of the cash flow.

To calculate free cash flow minus change in trade working capital in a cell, adjust the free cash flow calculated in the cell immediately above by subtracting the change between prior-period-end trade working capital and current-period-end trade working capital. You'll recall that we calculated trade working capital in the line immediately below working capital. To illustrate, the formula will look something like this: `=N39−(N5−M5)`, where N39 is current period free cash flow, N5 is current period trade working capital, and M5 is prior-period-end trade working capital.

Dividend Payout Ratio

Dividend payout ratio is a percentage representation that shows how much the dividend payout is in relation to earnings. Net income is contributory to retained earnings, but only after it has been modified by a few inputs; typically the chief input is dividends paid.

This percentage ratio is useful for a few reasons. In and of itself, it does not show that much cash is being consumed in dividends and thus unavailable to contribute to cash holdings. But as a percentage, it does show the trend in cash consumption by dividends in relation to earnings. If dividend payout ratio is rising steadily in the normal course of business, then the dividend may well be at risk in a down cycle.

Separately, dividend payout ratio will contribute to retained earnings ratio, which is a component of the constant growth rate used in discounted free cash flow analysis. To calculate dividend payout ratio in a cell, divide dividends per share by fully diluted GAAP earnings per share. Remember that we placed per-share dividends at the bottom of our income statement presentation and then carried them over to our annual income statement on the R&V page.

Alternatively, you can use dividends paid from the annual cash flow statement and GAAP net income from the annual income statement. To calculate dividend payout ratio in a cell by this method, remember that dividends paid will be represented as a negative number. And so you must adjust your formula to something like this: `=−N190/N110`.

Retained Earnings Ratio

The retained earnings ratio is also sometimes called the retention ratio. Historically, one measure of a firm's progress in a normally functioning economy has been growth in its stockholders' equity account. Even with all our caveats about the perils to stockholders' equity—including management recklessness about mergers and acquisitions and the fact that down cycles now routinely trigger severe goodwill impairments—we still want to know how much and how regularly a company plows its earnings back into the firm.

The calculation for retained earnings ratio is net income minus dividends divided by net income. Alternatively, and because retained earnings is the opposite of dividend payout ratio, we can use the dividend payout ratio calculated above to calculate retained earnings ratio. To calculate retained earnings ratio in a cell, use the formula =1−N42, where N42 is dividend payout ratio.

Constant Growth Rate

Also called retained earnings growth rate, and often called by the shorthand g, the constant growth rate provides information on the real rate of growth in retained earnings. We mentioned in the preceding section that we wanted to know the percentage of earnings being returned to the firm, shown by the retained earnings ratio. Of even more intense interest is the underlying growth rate of the firm.

To calculate constant growth rate or retained earnings growth rate in a cell, multiply return on equity by retained earnings ratio. Retained earnings ratio is available immediately above, while ROE is a few rows higher in our ratios section on our R&V page.

Why adjust ROE by retained earnings? You could argue that return on equity has implicitly been distorted and overstated by the exclusion of dividend cost from retained earnings. The use of the retained earnings ratio to modify constant growth rate is effectively an adjustment of that "distortion."

While changes in this number are useful for multiperiod analysis, this figure will be used extensively in our discounted free cash flow valuation. The tumult in 2007 and 2008 reminded investors that any single year figure can be distortive to the valuation process. Hence, for constant growth rate, we like to calculate a five-year average rate to get a better picture of ongoing operations. Figure 9.3 shows Corning's strong cash generation patterns—and, because the cash flow calculation begins with net income, it captures the strong equity income component not reflected in Corning's operating leverage (see Figure 9.2).

Finishing the Ratios Section

The ratios we have calculated and compiled above are far from exhaustive. We think they represent a useful set of ratios that have informational value in and of themselves; they can be assessed in comparison to industry peers and will contribute to our valuation calculations. In time, each investor and analyst will modify this list to his or her liking by adding some new ratios and discontinuing or deemphasizing some on the original list.

So far, all ratios have been calculated in a single column. They have been constructed to lend themselves to drag-and-drop propagation across the page. To

Figure 9.3

Corning, a 150-year-old company, had to suspend its dividend amid the technology implosion in 2001–2002. The company reinstated the dividend in 2007, a positive move that nonetheless reduced its constant growth rate.

Corning Inc.: Ratios, Valuations, Finances											
Cash Flow	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**
Interest Coverage	[illegible]	[illegible]	[illegible]	[illegible]	0.8	5.6	12.5	17.3	19.2	6.3	9.9
Cash Flow (NI + DDA)	1,122	(4,550)	(1,545)	428	1,183	1,115	2,456	2,770	3,473	2,379	2,940
Fre Csh Flw (NI+DDA-CX)	146	(6,271)	(1,702)	62	326	(438)	1,274	1,509	1,552	1,480	2,042
FCF - Chng in WC	(2,110)	(5,644)	(1,788)	1,066	522	(1,137)	439	1,206	1,767	1,200	2,371
FCF - Chng in Trd WC	(2,253)	(4,745)	(1,399)	473	698	(804)	254	2,265	1,424	1,107	2,016
Dividend Payout Ratio	19%	71%	0%	0%	0%	0%	0%	7%	13%	17%	14%
Retained Earnings Ratio	81%	29%	100%	100%	100%	100%	100%	93%	87%	83%	86%
Constant Growth Rate	3%	-30%	-42%	-2%	-9%	11%	26%	21%	18%	11%	15%
5-Yr Constant Growth Rate					-15.9%	-14.4%	-3.3%	9.3%	13.3%	17.3%	18.1%

expand these ratios across the page, drag and drop this column across the page (preferably from left to right) for all historical periods and for all estimated periods.

All ratios that include two periods from the balance sheet have been designed to encompass the preceding and current period, not the current and forward period. If we used that current-and-forward-period construction, we'd drag and drop to a meaningless conclusion for our final forward period—arguably the most significant in setting stock value! So as a final test prior to the drag-and-drop phase, test that your ratios drawing on multiple periods use past and current.

Keep in mind that, should you drag and drop *to the left* (meaning back in time) and reach the final input historical column, any ratios that include two-period averages will seek a prior period that is not included. You can exclude this period from your analysis, assuming it is sufficiently distant from the five-year comparison time frame. Alternatively, you can adjust this column to one-period inputs; for example, assuming 1999 is the last historically input year, inventory turnover for 1999 becomes that year's COGS divided by that year's inventories.

Figure 9.4 shows the complete ratios section for Analog Devices Inc. We had to shoehorn in an expanded risk analysis section when this company, long debt free, decided to take on debt during fiscal 2009 (calendar 2008). As a dividend-paying stock, the company now has a retained earnings ratio, but its five-year constant growth rate signals a strong return on its capital structure. The company's cash cycle seems kind of long; however, that partly reflects low inventory turnover partly resulting from high gross margins as well as a strong overseas customer base. (Overseas terms tend to be longer.) Overall, the ratios section paints a picture of Analog Devices Inc. as an efficient, high-margined, and financially strong entity.

That's it for our extensive but not exhaustive ratios compilation. In the following chapter, we'll use our modeled financial statement data and ratio analysis to calculate value based on comparable historical valuation.

Figure 9.4

The complete ratios section for Analog Devices Inc. After a debt-free period in the middle of this decade, ADI now has some debt along with a manageable 13.2% debt/capitalization ratio.

Analog Devices										
RATIOS	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**
Internal Liquidity										
Working Capital	696	3,141	2,422	2,926	2,862	2,520	1,431	1,521	2,002	2,077
Trd Wrkg Captl	479	443	483	549	597	568	517	455	391	405
Current Ratio	4.4	7.5	6.2	6.2	5.1	6.1	3.6	3.7	6.6	6.7
Quick Ratio	2.5	6.5	1.8	0.6	0.5	0.7	0.6	0.6	0.7	0.7
Receivables Turnover	12.1	7.6	7.8	8.4	7.0	7.5	7.4	7.9	7.1	8.8
Receivables Collection Period	30	48	47	43	53	49	49	46	52	41
Working Capital/Sales	0.6	1.8	1.2	1.1	1.2	1.0	0.6	0.6	1.0	0.9
Operating Efficiency										
Inventory Turnover	4.7	2.9	3.1	3.4	2.9	2.9	2.6	3.0	3.0	3.3
Inventory Turn Time (days)	78	126	117	107	128	126	139	120	122	111
Days Sales Outstanding	108	173	164	150	180	175	188	166	173	152
Fixed Asset Turnover	3.5	2.0	2.8	3.9	3.9	4.6	4.4	4.6	3.7	4.4
Equity Turnover	2.2	0.6	0.7	0.7	0.6	0.7	0.9	1.1	0.8	0.8
Payables Turnover		20.0	21.5	23.3	19.4	19.8	16.1	15.1	13.0	16.7
Payables Days Outstndng		18	17	16	19	18	23	24	28	22
Cash Cycle		155	147	135	162	157	165	142	145	130
Return Ratios										
Gross Margin	47.8%	53.0%	54.9%	59.0%	57.9%	58.5%	61.2%	61.1%	55.0%	57.8%
Operating Margin	12.8%	6.9%	18.3%	26.9%	21.6%	21.4%	23.1%	24.2%	12.1%	18.2%

Figure 9.4 *(continued)*

Analog Devices										
RATIOS	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**
Pretax Margin	12.2%	8.2%	18.7%	28.2%	24.6%	25.7%	26.8%	25.8%	12.7%	18.0%
Net Profit Margin	9.7%	6.2%	14.6%	22.0%	17.4%	21.3%	20.5%	35.4%	10.4%	13.9%
Return on Total Capital	21.2%	3.7%	9.6%	16.4%	11.1%	15.5%	17.5%	38.5%	8.4%	11.2%
Return on Assets	12.8%	2.1%	6.6%	13.2%	9.1%	13.1%	14.5%	30.2%	6.5%	9.1%
Return on Equity	21.2%	3.7%	9.6%	16.4%	11.1%	15.5%	17.5%	38.5%	8.4%	11.2%
EBITDA Margin	22.6%	22.2%	26.9%	34.0%	31.1%	32.4%	33.1%	31.5%	20.4%	25.2%
EBITDA/Enterprise Value	6.0%	3.2%	4.5%	5.1%	5.3%	6.7%	7.0%	9.9%	5.0%	7.0%
Enterprise Value/EBITDA	16.5	31.2	22.4	19.5	18.9	15.0	14.2	10.1	20.0	14.3
Risk Analysis										
Operating Leverage		(0.59)	13.21	20.51	(43.11)	56.46	(107.24)	105.67	(5.56)	25.52
5-Year Operating Leverage					(2.8)	4.6	(9.7)	2.4	4.9	8.2
Debt/Equity Ratio	[illegible]	[illegible]	[illegible]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LT Debt/Equity Ratio	27.5%	43.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Debt/Capital Ratio	21.6%	30.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.2%	11.3%
LT Debt/Capital Ratio	21.6%	30.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.2%	11.3%
Cash Flow										
Cash Flow (NI + DDA)	247	286	464	721	568	716	639	1,063	358	462
Free Csh Flw (CF-CapX)	80	229	396	574	483	587	497	916	206	305
FCF - Chng in WC	(616)	(5)	1,115	71	546	928	1,587	826	(275)	229
FCF - Chng in Trd WC	(399)	171	357	509	434	616	548	979	269	291
Dividend Payout Ratio	0.0%	0.0%	0.0%	12.2%	27.0%	37.5%	47.1%	42.9%	95.8%	75.2%
Retained Earnings Ratio	100.0%	100.0%	100.0%	87.8%	73.0%	62.5%	52.9%	57.1%	4.2%	24.8%
Constant Growth Rate	21.2%	3.7%	9.6%	14.4%	8.1%	9.7%	9.2%	22.0%	0.4%	2.8%
5-Yr Cnstant Grwth Rate					14.5%	13.1%	12.4%	11.3%	9.6%	9.5%

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Chapter 10

HISTORICAL COMPARABLE VALUATION

Overview

The use of historical comparable ratios waxes and wanes, though P/Es are always highly popular. The difficulty with historical comparables in general, including P/Es, is translating the informational content into an investment decision based on estimated dollar value of the asset. When we read, for instance, that ABC Corp. is trading at 15 times earnings and usually trades closer to 20 times, that sounds like a good deal. But do we have enough information to proceed? What about cycle effects on past and current projected P/Es?

Despite the shortcomings in P/Es, investors rely on them because they are ubiquitous, easy to construct, and easy to comprehend. As mentioned, the market moves not on realities but on shared perceptions. In the financial world, no perception is as widely shared as P/E. So whether you like them or not, you'd better understand—and calculate—P/Es.

Fortunately, a range of other price-based historical valuations are available for comparable analysis. In most industries, revenues are more stable than earnings, even in down cycles. The inclusion of depreciated and amortized inputs in cash flows tends to compensate for cyclical declines in earnings, resulting in smoother cash flows for use in historical comparable analysis. Price/book value is inherently stable, notwithstanding all the assaults on stockholders' equity (and all the ink we've spilled on that theme).

There are even workarounds to normalize P/Es. Recall that we calculated normalized earnings and described methods for calculating smoothed (ordinary least squares) growth rates. Those inclined to do so can substitute these inputs into forward P/Es.

As a reminder, the key distinction between earnings-based valuation and cash flow–based valuation lies in their application time frame. For earnings-based analysis (i.e., P/Es and relative P/Es), a five-year historical look-back is used to project value over the coming one or two years. Discounted free cash flows value is predicated on determining present value of future cash flows; combined with a terminal value for the asset, these are used to determine the dollar value of the asset. The challenge with historical comparables is also to determine dollar value of the asset, but perhaps not so far out in the future.

A Range or a Pinpoint Number?

Generating dollar value of an asset from comparables is a common and somewhat straightforward process. One such process is to determine the average for a particular valuation technique and multiply that average by the forward input per share used in the valuation methodology.

For instance, to determine dollar value based on P/E, lets begin with a stock trading at $20, a forecast of $1 per share in earnings, and a five-year average P/E of 25. Multiply the five-year average P/E (25) for a stock times its earnings per share ($1), and that provides a dollar value of $25. Given that $25 is 25% higher than $20, the stock would appear to be undervalued.

What I've just described is nonstandard. The standard methodology on determining dollar value of an asset from historical comparables is more conservative and, frankly, mushy. Analysts and investors are taught to calculate the average five-period high valuation and average five-period low valuation and then use them to forecast a price range in which the asset should trade.

I was taught this technique. It immediately became evident that the information rendered by this technique provided almost no trading or investing guidance. These low and high average inputs are based on the lows and highs in the stock price. Intuitively, the low and high in the stock price stretch a few dollars and maybe a few standard deviations from where they should be. When I used average high and average low valuation, I almost invariably produced a valuation range that captured 80% to 90% of the 52-week price range.

So, if you perform this analysis on a $21 stock and then tell the investor, "I think the stock should trade in a range of $12 to $30," why did you bother opening your mouth? Even if you offer this same opinion and range on a $14 stock—in other words, one much closer to the range low end and thus implicitly attractive—you've introduced such a wide range of potential prices as to mute the value of your call.

Yet at the same time we acknowledge the danger of using a single-point valuation such as we illustrated with that $20 stock noted previously. To minimize this danger, we increase the number of inputs. And to minimize the reliance on an input as inherently volatile as earnings, we include more stable inputs, such as revenues, book value, cash flow, and free cash flow.

The point in common for all these inputs is that they can be calculated on a per-share basis. We can use any per-share input; in some of our models, though not all of them, we use EBITDA per share. For P/Es, price to sales, price/book, or any input, the basic methodology is the same. Calculate the input per share per period, divide that period input per share by the period price, calculate the five-year average, and multiply that figure by the forecast period input.

You can actually use any value converted to a per-share basis. For example, you can calculate forward value using not just EBITDA but the percentage value for EBITDA/EV. To do so, calculate an average stock price to EBITDA/EV percentage for each period, determine the five-year average, and multiply by the forecast of period price divided by EBITDA/EV.

We can use this valuation methodology, but we don't. It is not proven, understood, or accepted in the market. And in the world of historical comparables, we only use what is proven, understood, and accepted.

Time Frames for Comparables Valuation

We all know that you calculate P/E by dividing the stock price by earnings. We also know you calculate a trailing P/E by using most recent 12-month earnings. And you calculate a forward P/E by using forward-period earnings.

Does that mean that at midyear, your forward P/E estimate should borrow the final two quarters of the current year and the first two quarters of next year? It should. But this is one method that is honored in the breach. When investors and analysts speak of forward P/Es, they are almost always using a full period's earnings rather than a bifurcated approach borrowing some from this year and some from next year. More often, however, trailing 12-month P/Es really are based on trailing four quarters.

Our goal is always to respect the convention or risk creating misleading valuations. Unfamiliarity with the market's not always consistent conventions can result in misconceptions.

Excluding the analysis we perform on December 31 and January 1, at any other time we are amid periods. The convention is to have at least one full period ahead on which to base valuation. In practice, the valuation target is both fluid and soft. Thus, on March 7, 2002, investors were concerned about forward P/Es for 2002 and 2003 but most focused on the 2002 P/E. By June 2002, they were beginning to give more weight to the 2003 P/E. And by October 2002, they had looked past 2002 P/Es, were most interested in 2003 P/Es, and were awaiting some color on 2004 P/Es.

Lagged, Coincident, or Leading?

The question of valuation time frame raises another interesting question/dilemma: should comparable valuations be lagged, coincident, or leading? Here we are on the horns of the dilemma. Knowing that the market is an anticipatory beast, investors tend to look forward—that is, they are much more concerned with forward P/Es, despite the risk represented by modeled earnings, than with historical or trailing P/Es, which can be calculated with unerring accuracy.

We have touched on the calculation of the five-year historical periods used as a basis to value forward based on current inputs. More than one budding analyst has asked: if we used forward P/Es in the valuation and purchase decision, why use historical valuations that match the period rather than reflect the historical anticipation that drove the asset purchase? In other words, why match 1996's prices to 1996's earnings, when 1996's prices were based on anticipations formed in mid-1995?

It's a fair question, and not easily answered. One way to solve the question would be to adjust for, say, a half-year of anticipation. That is, in measuring historical P/E for, say, 2003, use six average prices for calendar 2003 but use six months of earnings from the back half of 2002 and six months from the front half of 2003. We could even do it right on our ratios and valuation (R&V) page with a few adjustments.

The problem is that there is no optimal bifurcated period; we used only the half year in our example because it's, well, six of one, a half dozen of the other. To better mimic investor thinking, why not seven months from 2002 and five from 2003? Or four from 2002 and eight from 2003? In practice, the broad mass of investors conducting comparable valuation analysis simply line up calendar year earnings (or fiscal year earnings) with calendar year prices (or fiscal year prices). Once again your mother's nightmare—everyone's doing it, so you have to as well—is required to attain true comparables compatibility outside and even within your model.

At the same time, we urge modelers to test and experiment with lagged and leading inputs in performing comparables analysis.

Preparing the Historical Comparables Grid

For simplicity's sake, we use the term "comparables" to stand in for comparables historical valuation. We will situate this section beneath our ratios bloc and above the annual stack of income statement, balance sheet, and cash flow statement. We required about 40 to 50 lines on our R&V worksheet for our ratios analysis. We will need a comparable amount of space for the comparables historical valuation section.

The P in P/E is price; per-share price is required for all the historical comparables. We already have current prices for the individual asset and the market benchmark (the S&P 500), courtesy of our query worksheet. Our periods are always, unless stated otherwise, one year. We need period prices for all historical years. Ideally, we want high price, low price, and average price for each historical year, with an emphasis on average price.

There are numerous ways to gather historical prices. Pay services such as Bloomberg and Thomson Reuters provide an average of all closing prices for the approximately 250 trading sessions in any given year. If you lack access to a paid provider, you can download prices for any security from Yahoo!Finance on the handy Excel sheet provided right on its Historical Prices tab. Using the download function right on the historical prices sheet, you can then use Excel to calculate period average, and data sort to grab high and low prices.

Or, for the generalist, you can sum the high and low price, divide by 2, and call that the average for the year. Once again I'm baiting the purists. Yet we find that here in the real world, the simple average of high and low falls within 90% of the actual average nearly every time. I'm not advocating this shortcut, but I never want the valuation process sidetracked by time constraints in a world of jangling phones, harassing bosses, and piddling considerations like eating and sleeping.

We're going use the price/earnings ratio as a means to describe the full process of calculating comparable historical valuation and using it to project the dollar value of the asset. Along the way we'll discuss some challenges particular to this most integral of valuations. Most of the techniques described apply to all other historical comparable valuations as well.

Historical and current asset-price data will be used in all the comparables valuations in our grid. For all of the comparables, we need two metrics. We need the input (earnings, revenues, cash flow, etc.) on a per-share basis; and then we need to divide that per-share input by the average price. We'll then multiply the five-year average of that value times the forward or estimated input to arrive at a forecast asset value based on that information set.

Price/Earnings Ratio: Historical

As a start, beneath the valuations heading, prepare three more headings in descending order—(ticker) stock price high, (ticker) stock price low, and (ticker) stock price average—in three consecutive lines. Fill out the multiperiod range of high, low, and average annual prices for the asset for *at least* a five-year period. For both the current year and next year, input the current price from the query page; we'll explain why in a minute.

In the line immediately beneath these three lines, input the appropriate earnings per share directly below the appropriate period. Remember that as a safeguard, we've built our income model to include both pro forma and GAAP earnings. Input the appropriate measure that the market consensus uses to value the stock. Some investors stand on principle and insist on the use of GAAP measures. You are doing your investors a disservice if you vary from the accepted metrics used to value the stock in the market.

We recommend entering three lines here: high P/E, low P/E, and average P/E. Calculate high P/E by dividing (ticker) stock price high by period EPS. Calculate low P/E by dividing (ticker) stock price low by period EPS. You can calculate average P/E by averaging high P/E and low P/E or—our preferred method—by dividing (ticker) stock price average by period EPS. Comparables models were originally built with a high, low, and average price and a high, low, and average for every valuation input (price/sales, price/book, etc.). This partly reflects the habit of producing a valuation range rather than a pinpoint value. It may also reflect the fact that in the past, obtaining full-year average price was cumbersome and not easily available, and analysts often used the high-low average as a stand-in for actual average. In any event, we rely on high and low valuation less and less, and rely on true average valuation more and more.

Repeat this process for every historical period.

Price/Earnings Ratio: Forward

Historical P/E could not be more straightforward: period average price divided by period earnings, producing a price/earnings valuation. Remember that our R&V grid contains historical years as well as at least two full or partial forward years: the current year and next year. What stock price do we use for forward periods?

We have several choices. If the current year is well along, we can use an average price for the year to date. Or we can input the up-to-the-minute price, which you'll recall is on our query sheet. For the forward year, we can adjust the current price to reflect the normal progress in the market. According to Ibbotson, the acknowledged benchmark provider in these matters, the broad market has historically delivered total average annual return in the 8% to 10% range. To adjust the next-year price for "normal" market gains, you would multiply the current price by 1.08 to 1.10.

Personally, we tend to use current price, direct from the query page, for both current year and next year. Typically, this is, if not the most accurate, then the least inaccurate of all alternatives. Let's shoot them down one at a time. If for this year we use the average price year to date, we may be injecting past events (earnings misses, executive firings, etc.) already discounted in the stock price into a purportedly current valuation. If for next year we adjust for normal market gains, then we introduce timing issues. The Ibbotson averages are most accurate, intuitively, on January 1, a time when we're wearing funny hats and swinging noisemakers. Much more common is a look forward at next year's price in March or July; do we introduce another adjustment to our adjustment factor each time we look at the stock?

The main reason we use current prices in forward P/E calculation is that when investors want a P/E, they assume your calculation has up-to-the-minute price information. We again (and again and again) run into the need to conform to the consensus methodology, given that the market runs on shared wisdom (or shared hallucinations, depending on the degree of your dyspepsia).

Producing Dollar Value of the Asset from Comparables

We've now calculated P/E for all the historical years and for the current and following year. The historical look-back is typically five years. In the line immediately below average P/E, in one cell identify the appropriate five-year period (i.e., average 2004–2008); a few cells to the left, average the P/Es from 2004 through 2008.

Create two more columns immediately to the right of the current year and following year. Replicate the current and following year headers in these columns. For simplicity's sake, let's say the current (2009) and following year (2010) annual stack-ups are in columns N and O. We replicate the current year (2009) and following year (2010) headers in columns P (2009) and Q (2010). These are now the columns in which we'll calculate dollar value of the asset. Furthermore, let's say our average 2004–2008 P/E has been calculated in line 53.

In cell P53, multiply the 2004–2008 average P/E by forecast 2009 EPS. In cell Q53, multiply the 2004–2008 average P/E by forecast 2010 EPS. These values tell us the level at which the asset should be priced based solely on the relation between historical average P/E and forecast earnings.

Here are a couple of visual checks. Remember that we calculated P/E for the current and following year. If our calculated P/E for 2009 is *lower* than the 2004–2008 average, the forecast asset value should be *higher* than the current price. If our calculated P/E for 2009 is *higher* than the 2004–2008 average, the forecast asset value should be *lower* than the current price.

Figure 10.1 shows Broadcom's price history, pro forma earnings, and single-year average P/Es for 2002 through 2008. It also shows the five-year (2004–2008) average P/E of 24.7. Based on modeled earnings for 2009 and 2010, the P/Es on those modeled earnings, and a current price of $28.54 imported from the query page, in columns N and O Broadcom appears, respectively, overvalued on the 2009 pro forma earnings forecast and undervalued on the 2010 EPS projection.

Price/Sales Ratio

We now have two inputs to begin our calculation of dollar value of the asset based on historical comparables valuation. Let's gather a few more.

Investors like the price/sales (P/S) ratio—and some prefer it over P/E—because revenues are inherently more stable than earnings. We know that operating leverage—the degree of variation in operating income caused by variation in revenue—impacts different companies differently, depending on their structure and their operating execution. Revenue will vary, particularly within the economic cycle, by typically much less. (An exception would be the end of bubble periods, such as the Internet implosion in 2001–2002). Intuitively, greater stability in a series increases the validity of the information contained in the historical period calculation.

Figure 10.1

Broadcom built its EPS steadily from mid-decade through 2008, before EPS came crashing down in 2009. As such, the 2009 P/E climbed above the five-year average, indicating a value of $22.35 at a time when the stock traded above $28.

Broadcom												
VALUATIONS	**1999**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
BRCM Stock Price High		[illegible]	[illegible]	[illegible]	33.00	50.00	43.07	29.74	28.54	28.54		
BRCM Stock Price Low		8.23	8.23	17.00	18.32	21.98	26.38	13.64	28.54	28.54		
BRCM Stock Price Average		16.56	16.56	24.03	25.66	37.59	32.62	21.73	28.54	28.54		
EPS	-	(0.31)	0.32	0.82	0.97	1.35	1.21	1.69	0.91	1.24	**2009**	**2010**
Average P/E		(53.24)	51.95	29.47	26.37	27.86	26.90	12.83	31.52	22.96		
				Average 04-08		**24.69**					**22.35**	**30.68**

The historical and current asset price data we've gathered previously will be used in all the comparables valuations in our grid. For all of the comparables, we need two metrics. We need the input (revenues, cash flow, etc.) on a per-share basis; then we need to divide that per-share input by the average price for each period. Similar to our work with P/Es, we'll then multiply the five-year average of that value times the forward or estimated input to arrive at a forecast asset value based on that information set.

For the full price/shares calculation, we'll need three lines: one for revenue per share; one for average P/S; and one line for our five-year average P/S and calculated asset value based on historical and forward inputs. For P/S, begin by dividing period revenue by period diluted shares. These are conveniently available in our income statement stack for the period. We'll work on one year and then drag and drop for the historical and forward periods. In Figure 10.2, we see that in year 2002, Alabama-based network equipment producer ADTRAN Inc. (ADTN) had revenue of $346 million on a share base of 76 million diluted shares. Revenue per share roughs out to 4.5 times. The average price per share of stock in 2002 was $11.82. Therefore, we can say that for 2002, ADTN traded at an average price/sales ratio of 2.61.

To calculate the dollar value of the asset based on P/S, we repeat the process used with P/Es. In the third line of our P/S section, we calculate the five-year average P/S. For consistency with our P/E discussion above, columns N and O represent 2009 and 2010, respectively; column P represents the column in which we calculate the dollar value of the asset based on 2009 inputs, while column Q represents the column in which we calculate the dollar value of the asset based on 2010 inputs.

On the actual worksheet, row 60 shows period revenue per share, row 61 shows period average price/sales, and row 62 is where we compile our five-year average P/S and calculate dollar value of the asset based on this input. To calculate dollar value of the asset for 2009 based on P/S, in cell P62 multiply the five-year average P/S times the 2009 average price to sales. To get that value based on 2010 inputs and current price, in cell Q62 multiply the five-year average P/S times the 2010 average price to sales. To ensure that your inputs are correct, you can use the same visual checks you used for P/E. That is, if our calculated P/S for 2009 is *lower* than the 2004–2008 average, the forecast asset value for 2009 should be *higher* than the current price. If our calculated P/S for 2009 is *higher* than the 2004–2008 average, the forecast asset value should be lower than the current price.

With two years of P/E and two years of P/S, we now have four inputs for calculation of dollar value of the asset based on historical comparables valuation, with more to come.

Figure 10.2

This illustration blends portions of the income statement with our comparable historical grid. The shaded cells all contribute to the average price to sales for 2001. The five-year average of price to sales for 2004 to 2008, along with our forecast price/sales ratio for 2009 and 2010, suggest that ADTRAN is about 24% undervalued at current prices.

ADTRAN													
VALUATIONS	**1998**		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
ADTN Stock Price High	17.19		17.13	37.48	37.18	33.48	30.12	28.26	26.06	22.39	22.39		
ADTN Stock Price Low	8.19		7.51	14.78	18.23	15.50	19.96	20.70	12.31	22.39	22.39		
ADTN Stock Price Average	12.7		11.82	25.37	26.98	24.49	25.04	24.48	19.19	22.39	22.39		
Revenue Per Share	3.66		4.52	4.91	5.62	6.58	6.28	6.85	7.77	7.50	8.45	**2009E**	**2010E**
Average Price/Sales	3.47		2.61	5.16	4.80	3.72	3.98	3.57	2.47	2.99	2.65		
					Average 04-08			**3.71**				**27.82**	**31.36**
Income Statement	**1998**		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Net Sales	287		346	397	455	513	474	477	501	472	535		
COGS	130		171	175	194	210	194	194	202	188	215		
Gross Profit	157		175	222	261	303	280	283	299	284	321		
Basic Shares Outstndng	77		76	77	78	76	73	68	64	63	63		
Diluted Shares Outstndng	78		76	81	81	78	75	70	64	63	63		

Price/ Book Value

Beware: Like many of the terms we use, book value has several meanings. In general terms, book value is the value at which an asset is carried on the balance sheet, reflecting any changes wrought on its value upon acquisition by depreciation, amortization, and impairments. For the enterprise, book value is the value of stockholders' equity. In equity valuation, book value is commonly regarded as the per-share representation of stockholders' equity. To clarify, in our valuation discussion and analysis we use price/book value (P/BV) strictly to mean the relation of the stock price to the per-share value of stockholders' equity.

Beyond figuring in our comparable valuation analysis, price/book value figures in the growth versus value debate waged by asset managers. Investors have long held that stocks trading below the mean of some group (say, the S&P 500) are value stocks, while those trading above are growth stocks. The two valuation methods most often cited on either side of the mean are price/earnings and price/book value; purists favor price/book value for the reasons we mention below.

We have alerted investors to the perils to stockholders' equity in the modern era. Despite modern-era pressures on retained earnings, stockholders' equity is regarded as the best long-term record of a company's earnings progress and as the best record of the long-term management of the enterprise. Earnings for a single period can oscillate because they have been deliberately or inadvertently manipulated, because of unsustainable operating practices, because a fad or mania supersedes long-term fundamentals, or some other factor.

Calculation of dollar value of the asset based on P/BV is similar to the P/E process and identical to the P/S process. For the inputs, we need the share count for each period, available within our annual income statement stack, and stockholders' equity at period's end, available in our balance sheet stack.

For the full P/BV calculation, we'll need three lines: one for book value per share; one for average P/BV; and one line for our five-year average P/BV and calculated asset value based on historical and forward inputs. To calculate the dollar value of the asset based on P/BV, we repeat the process used with P/E and P/S. Drag and drop these single-period calculations to fill in values for all historical and forward periods. In the third line of our P/BV section, we calculate the five-year average price/book value.

Again using ADTRAN as well as example columns, lines, and cells, ADTRAN closed 2002 with stockholders' equity of $435.2 million. Based on the 76 million diluted shares outstanding that year, book value per share for 2002 was 5.69. The average price per share of ADTN stock in 2002 was $11.82; for 2002, ADTN traded at an average price/book value ratio of 2.08. Dragging and dropping formulas across these two lines for all periods provides interesting information, as we can see in Figure 10.3.

Stockholders' equity grew about 2.5% a year from 2001 to 2004; average stock price grew faster, at a roughly 30% compound annual growth rate, and in fact it more than doubled to $27 by 2004. Intuitively, this tells us that average price/book value should be rising, and indeed for 2004 it was 4.8. For the 2004–2008 period, price/book averaged 4.06, as the share price moderated to the mid-$20s while stockholders' equity continued its single-digit growth.

At the point at which we performed this calculation, forecast price/book value was 3.63 for 2009 and 3.20 for 2010. Based on our work so far, we've learned that the *lower* P/BVs for 2009 and 2010 in relation to the five-year average P/BV will result in a calculated dollar value for the asset *higher* than the current price, which was about $22 at the time. And indeed, at the time of our calculation, our comparables model produced P/BV values of $25.05 for 2009 and $28.47 for 2010.

Price/Cash Flow

Cash flow is an open-ended term with several meanings. In comparables valuation analysis, we need a compact calculation of cash flow for projection purposes. So in this case, we use the definition of cash flow to mean net income plus depreciation and amortization. Conveniently, we've collated that above in our ratios section. Instead of reaching down to get data from our annual income statement or balance sheet stacks, we reach up to get the data from our ratios section.

For the full price/cash flow (P/CF) calculation, we need one line for cash flow per share, one for average P/CF, and one line for our five-year average P/CF and calculated asset value based on historical and forward inputs. To calculate dollar value of the asset based on P/CF, in our first line divide cash flow (calculated in ratios) by diluted shares. In our second line, divide average price by cash flow per share. Drag and drop these single-period calculations to fill in values for all historical and forward periods. In the third line of our P/CF section, we calculate the five-year average price/cash flow.

Figure 10.4 shows that for 2001, ADTRAN's net income of $17.3 million and depreciation and amortization of $16.8 million summed to $34.1 million. Based on the 77 million diluted shares outstanding for that period, our simple calculation of cash flow per share was $0.44 (about twice the level of pro forma per-share earnings). Based on the $12.23 stock price average for the year, P/CF for 2001 was 27.7. Cash flow and cash flow per share rose in subsequent years as earnings strengthened while DDA and the share base stayed relatively constant. The five-year average P/CF for 2004–2008 was 18.24.

Figure 10.3

In this illustration, we've left out the average pricing and per-share data furnished in Figure 4.9. But the same average price and share count inputs still figure in our price/book calculation.

ADTRAN													
VALUATIONS	**1998**		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Book Value Per Share	2.95		5.69	6.12	5.77	6.95	5.79	5.44	5.84	6.16	7.01	**2009E**	**2010E**
Avg Price/Book Value	4.30		2.08	4.15	4.68	3.52	4.33	4.50	3.29	3.63	3.20		
						Average 04-08		**4.06**				**25.05**	**28.47**
Balance Sheet	**1998**		**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Cash & Equivalents	10.01		125.1	132.1	151.0	112.8	40.1	13.9	41.9	54.0	59.4		
Shrt-Trm [illegible]	[illegible]		[illegible]	[illegible]	[illegible]	154.1	99.7	148.4	96.3	77.9	85.7		
Common Stock	0.4		0.4	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0		
Addtl PIC	90.6		97.0	135.8	141.9	110.0	113.3	103.0	106.3	109.5	112.8		
Accmltd OCI	-		3.1	10.0	11.3	6.6	6.8	7.0	8.0	8.2	8.5		
Retained Earnings	163.6		375.0	347.2	349.2	424.8	315.1	275.0	303.0	312.1	321.5		
Treasury Stock	(23.2)		(40.3)	-	-	-	-	-	-	-	-		
Shareholders Equity	231.4		435.2	493.8	466.9	542.2	436.1	378.4	375.8	388.0	443.7		
SE & Liabilties	301.7		521.2	593.9	559.8	652.6	542.4	479.2	473.6	495.0	553.6		

Using our forecast inputs, on Figure 10.4 we calculated that P/CF was 17.89 for 2009—just under the five-year average—and 15.78 for 2010. Based on what we have learned so far, intuitively this tells us that the dollar value of the asset calculated with the 2009 inputs should be above the current price, *but not by much*, and that the 2010 value should be comfortably above the current price. And indeed, the value based on 2009 P/CF was $22.82, compared with a price at the time of $22.39. The value based on 2010 P/CF, by contrast, was just under $26.

Price/Free Cash Flow

As a reminder, simple free cash flow for comparable valuation purposes is simple cash flow reduced by capital spending. We also calculated free cash flow in our ratios section, and this line is also shown in Figure 10.4.

Whereas cash-based depreciation for cash tax purposes is exponential, "book" or accounting depreciation is scheduled as a simple average of depreciable asset value, levied on a constant basis year after year. Assuming no massive change in depreciable assets, depreciation does not move around much. Capital spending, by contrast, can be highly variable. At the down cycle, companies reduce capital spending to not much more than that required for operations and maintenance spending as a means to conserve cash. At the time of our writing, the company was preparing to follow a year (2008) of relatively high capital spending with more subdued spending plans for the current and following year.

In general, companies disclose their capital spending plans, particularly at watershed moments in the economic cycle. They do so partly out of self-preservation; no management wants to be seen as profligate with cash when core net income is weak. Accordingly, the price/free cash flow valuation (P/FCF) is inherently less stable than price/cash flow valuation.

You know the drill by now. To calculate P/FCF, allocate one line for free cash flow per share; one for average P/FCF; and one line for our five-year average P/FCF and calculated asset value based on historical and forward inputs. To calculate dollar value of the asset based on P/FCF, in our first line divide free cash flow (available in our ratios section) by diluted shares. In our second line, divide average price by free cash flow per share. Drag and drop these single-period calculations to fill in values for all historical and forward periods. In the third line of our P/FCF section, we calculate the five-year average price/cash flow.

Intuitively, use of this input has several predictable outcomes. Free cash flow per share will be lower than cash flow per share. P/FCF will be higher than P/CF. The five-year average P/FCF will be higher than the five-year average P/CF.

Figure 10.4

This illustration blends portions of our ratio analysis, specifically devoted to deriving cash flow, with our comparable historical calculation of price to cash flow.

ADTRAN													
RATIOS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Cash Flow													
Cash Fl[illegible]		54	[illegible]	[illegible]	91	117	95	93	96	79	90		
Free Csh Flw (CF-CapX)		21	39	70	84	108	89	87	87	72	83		
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Cash Flow Per Share		0.44	0.54	0.95	1.13	1.50	1.26	1.34	1.49	1.25	1.42	**2009E**	**2010E**
Avg Price/Cash Flow		27.72	21.94	26.68	23.98	16.28	19.84	18.24	12.84	17.89	15.78		
					Average 04-08						**18.24**	**22.82**	**25.88**

ADTRAN's experience bears this out. In 2001, the company reduced its $34.1 million in cash flow by $13.2 million in capital expenditures, resulting in simple free cash flow of $20.9 million. Free cash flow per share for 2001 was 0.27, fractionally above EPS, and P/FCF for the period was 45.24.

Five-year average P/FCF for 2004–2008 was 19.74—about 8.2% higher than the five-year average P/CF for 2004–2008. Based on our forecast inputs, at the time of this exercise P/FCF was 19.50 for 2009—barely under the five-year average—and 17.05 for 2010. Based on what we've learned so far, intuitively this tells us that the dollar value of the asset calculated with the 2009 inputs should be above the current price by even less than the price premium based on 2009 forecast P/CF. The value based on 2009 P/FCF was $22.66, or less than the $22.82 value based on 2009 P/CF. Value based on 2010 P/FCF was nearly $26.

Relative P/E

Relative P/E refers to the relation between the price/earnings of the company and the market price/earnings. The market proxy is almost invariably the S&P 500, a market-weighted index. The earnings of the 500 members of the S&P 500 are also market weighted to determine the earnings of the index. The market P/E is the price level of the S&P 500 divided by the annualized four-quarter earnings of the index.

Can we calculate dollar value of the asset based on relative P/E? Of course. The process is similar to the process we've used with our other comparable valuations but more complicated; it also needs a few more inputs and a few more lines on our valuation grid.

We're going to allocate about 9 or 10 lines to the relative P/E section, and we're going to consider the calculation in two separate pieces. First we need a place to calculate the historical and forward market P/E, along with its five-year average. Next we need to calculate the relative P/E of the asset. Using this information, we'll calculate dollar value of the asset based on this relationship. Given the (slightly more) complex nature of this calculation, refer to Figure 10.5 as we go along.

Start with three lines for S&P 500 high, low, and average price. You can gather this information for the historical periods from the usual pay or free sources. Historical S&P 500 prices are straightforward. For the forward periods, what price is best? I recommend using the current S&P 500 price level for both the current and following year. Recall the key points we made in our discussion of the appropriate price to use for the individual asset in P/E and other comparable valuation. Average S&P 500 price for the year to date may fail to discount

Figure 10.5

The interaction of the asset input (2009 forecast EPS), the market input (the 2009 market P/E based on forecast S&P 500 adjusted earnings), and the P/E relationship between ADTN and the market (relative P/E for the five-year historical period) enable us to project dollar value of the asset based on relative P/E. Note that the projected rise in S&P 500 earnings in 2010 from depressed 2009 levels makes ADTN less attractive based on 2010 inputs, even though the company's earnings are rising—just not as fast as S&P 500 earnings.

ADTRAN												
VALUATIONS	**1998**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
ADTN Stock Price High	17.19	17.13	37.48	37.18	33.48	30.12	28.26	26.06	22.39	22.39		
ADTN Stock Price Low	8.19	7.51	14.78	18.23	15.50	19.96	20.70	12.31	22.39	22.39		
ADTN Stock Price Average	12.70	11.82	25.37	26.98	24.49	25.04	24.48	19.19	22.39	22.39		
EPS	0.51	0.32	0.76	0.93	1.29	1.14	1.17	1.32	1.15	1.27	**2009E**	**2010E**
Average P/E	24.68	36.47	33.30	28.97	18.94	21.93	20.86	14.54	19.50	17.61		
					Average 04-08		**21.05**				**24.16**	**26.76**
S&P 500 High	1,241.00	1,172.51	1,111.92	1,214	1,270.0	1,427.0	1,562.0	1,425.4	923.3	923.3		
S&P 500 Low	970.00	776.76	800.73	1,063	1,136.0	1,223.0	1,374.0	752.4	923.3	923.3		
S&P 500 Average	1,085.50	993.76	965.23	1,131	1203.0	1310.0	1,468.0	1,088.9	923.3	923.3		
Operating Earnings	45.37	48.61	55.4	66.5	77.00	87.75	82.50	50.00	50.00	63.00		
S&P 500 Avg P/E	23.93	20.44	17.44	17.00	15.62	14.93	17.79	21.78	18.47	14.66		
					Average 04-08		**17.43**			**-21%**		
Average Relative P/E	1.03	1.78	1.91	1.70	1.21	1.47	1.17	0.67	1.06	1.20		
					Average 04-08		**1.25**				**26.39**	**23.20**

the new events reflected in the current price. Meanwhile, attempts to adjust next year's S&P 500 price level must accommodate a constantly moving time frame.

In the next line record the historical annual earnings for the S&P 500; your best source for this information may be the Standard & Poor's Web site, although it is available elsewhere as well. We run into a familiar question: for the S&P, do we use reported earnings or adjusted earnings? We use adjusted earnings; the valuation calculations for the 500 component stocks are most often performed based on adjusted earnings. For the forward period, both top-down and bottom-up forecasts of market earnings are widely available. (Top-down forecasts come from market strategists and investment strategists; bottom-up forecasts represent the consensus views of individual analysts.)

Using this information, in our fifth line we can calculate average market P/E for the historical periods as well as the forward periods. In a sixth line, we always calculate the five-year average of market P/E. This number does not figure directly in our valuation calculation. But every self-respecting analyst should have an awareness of where the market traded for the past five years, and it's nice to have it at hand.

The next step is to calculate the historical and forward relative P/Es for the individual asset. To do so, divide the P/E for the asset by the market P/E. We need just a single line for this exercise. Below this line, we include a line in which we calculate the five-year historical relative P/E for the asset.

In 2002, the market multiple was a 20.44, reflecting still overheated stock levels and fast-retreating earnings. With its rich 36.47 average P/E multiple for 2002, ADTRAN traded at an average relative P/E of 1.78 for the year. Over the 2004–2008 period, as the market P/E came in, ADTRAN's P/Es declined even more meaningfully.

To calculate the dollar value of the asset based on relative P/E, we need input from all players: that is, from the asset, from the market, and from *the relationship between* the asset and the market. For ADTRAN, we've been calculating the dollar value of the asset for 2009 and 2010 in columns P and Q, meaning the two columns adjacent to N and O, where we are modeling forward valuations for 2009 and 2010. For 2009, we'll calculate the dollar value of the asset based on relative P/E in column P.

Of the three inputs specifically required in this exercise, the first is forecast 2009 EPS; that is available in our income statement stack but—most handily—in our P/E calculation as well. For the market input, we'll use the S&P 500 P/E based on forecast 2009 earnings. And for the relationship between the two, we'll use the five-year average relative P/E. To calculate the dollar value of the asset, multiply these three inputs together. For 2009, this formula tells us that on a relative P/E basis, the ADTN shares are worth \$26.39, or about a \$4 premium to the stock price at the time of calculation.

What are our checks on the validity of his method? Our 2010 calculation provides some insights. The calculated dollar value should increase or decline based on changes in the inputs. The five-year average P/E for 2004–2008 is not going to change; so the inputs that can vary are company EPS for the period and forecast market P/E for the period. Moreover, it will be the net effect of changes in the two variables; a big change in one should supersede a more modest change in the other.

For 2010, our model suggests that ADTRAN will earn \$1.27, up 11% from our \$1.15 forecast for 2009. But bigger changes are afoot in market valuation. Both market strategists and individual analysts are anticipating something like a normal—that is to say, robust—earnings recovery out of the recession. So the consensus call is for S&P 500 earnings to rise from a net \$50 for 2009 to \$63 for 2010—a 21% growth rate. For 2009, ADTRAN looked "cheap" relative to the market at a relative P/E of 1.06. If all our expectations prove out, ADTRAN will be more expensive relative to the market in 2010, at a relative P/E of 1.20—very close to its historical 2004–2008 relative P/E of 1.20. We would thus expect calculated dollar value for ADTRAN based on relative P/E for 2010 to be below that in 2009. At \$23.20 for 2010, ADTRAN's dollar value based on 2010 relative P/E is 12% below the calculated value of \$26.30 for 2009. And that 12% rate of change is in the ballpark of the difference between the 11% gain in ADTRAN's forecast earnings between 2009 and 2010 and the market's 21% gain in forecast earnings between 2009 and 2010.

PEG and PEGY

Recall that between P/E and P/S we left a considerable bloc of six to seven empty lines. In this space, we want to calculate a set of values that do not contribute to our comparables dollar-value calculations but that make sense being situated near our P/E calculations. PEG and PEGY are two more values we could wrangle into a per-share calculation and use to calculate dollar value of the asset; but we choose not to. We think they provide more visual information value; they'll also find a place in our industry matrix.

PEG is the ratio of P/E valuation to forecast or actual growth in earnings. PEGY is the ratio of P/E valuation to total return, meaning earnings growth plus dividend yield. These calculations are easy enough to prepare given the inputs and calculations abounding in the valuation section, so this is where they are situated. We can see ADTRAN's PEG and PEGY in Figure 10.6; we can also see that ADTRAN began paying a dividend in 2003.

Figure 10.6

The calculations of PEG and PEGY are not manipulated to estimate dollar value of the asset—although they could be. This information is most useful when compared across the peer group.

ADTRAN												
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
ADTN Stock Price High		15.00	17.13	37.48	37.18	33.48	30.12	28.26	26.06	22.39	22.39		
ADTN Stock Price Low		9.00	7.51	14.78	18.23	15.50	19.96	20.70	12.31	22.39	22.39		
ADTN Stock Price Average		12.23	11.82	25.37	26.98	24.49	25.04	24.48	19.19	22.39	22.39		
EEPS		0.22	0.32	0.76	0.93	1.29	1.14	1.17	1.32	1.15	1.27	**2009E**	**2010E**
Average P/E		54.59	36.47	33.30	28.97	18.94	21.93	20.86	14.54	19.50	17.61		
						Average 04-08		**21.05**				**24.16**	**26.76**
LT EPS Growth		12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%		
PEG Ratio		[illegible]	[illegible]	[illegible]	2.41	1.58	1.83	1.74	1.21	1.63	1.47		
						Average 04-08		**1.75**					
Dividend Yield		0.0%	0.0%	0.6%	1.2%	1.4%	1.4%	1.5%	1.9%	1.6%	1.6%		
PEGY		4.55	3.04	2.64	2.20	1.41	1.63	1.55	1.05	1.43	1.29		

For the numerator in PEG and PEGY, we've already calculated P/E, and it is immediately available to us. One-period earnings change, needed for short-term PEG, requires nothing more than a line in which we measure the percentage change in earnings growth. Forecast long-term earnings growth is available from pay or free sources. Don't forget that in our normalized earnings and regression (ordinary least squares) section, we measured normalized and smoothed earnings growth; these calculations may provide the best basis for forecasting long-term growth. To get the yield for PEGY, remember that we carried the dividend payout over from the income statement presentation onto our R&V page for just this sort of situation.

So let's carve out seven lines for our PEG and PEGY section. We don't typically bother with short-term PEG, which is seen as having a lower quality of investible information. But in case we want that information in the future, we usually add a line in which we calculate the annual change in EPS on a percentage basis. In our next line, we enter our forecast five-year growth rate. You can enter the consensus forecast, or you can use historical normalized earnings or ordinary least squares to produce your own five-year growth forecast.

In the next line we calculate PEG ratio. For this calculation, we need to divide a percentage (growth) into a number (P/E); so we have to "square up" the calculation by multiplying growth by 100. On our ADTRAN R&V worksheet, where P/E for 2001 is in cell F52 and long-term growth is in cell F57, the formula will look like `=F52/(F57*100)`. Using a constant 12% long-term growth rate, ADTRAN's PEG ratio dropped from 4.55 early in the decade to 1.21 by 2008. After dragging and dropping to derive PEGs for all periods, in the following line calculate the five-year historical average. Again using a constant 12% rate, ADTRAN's five-year average PEG was 1.75. As a general rule, the lower the PEG ratio, the more attractive the asset.

For PEGY, we need to calculate dividend yield in a convenient spot. In the next dedicated line, divide the period annual dividend (from the annual income statement) by the period average price (from the top of the valuation grid). ADTRAN began paying a slight dividend in 2003; by 2008 the yield was above 1.5%. Given that this dividend yield is additive to total return, PEGY for ADTRAN should be lower (and more attractive) than PEG for the company. And indeed, five-year average PEGY is 1.57.

Finishing the Grid: Dollar Value of the Asset Based on Comparables

We have calculated two years' worth of six inputs—P/E, P/S, P/BV, P/CF, P/FCF, and relative P/E—that we will use to calculate dollar value of the asset. Note that these need not be the only inputs used in our comparables valuation. Any input that can be rendered on a per-share basis can be included; many analysts will use EBIT and EBITDA per share to calculate dollar value of the asset. As further noted, means and methods exist in which we can tweak percentage ratios—such as EV/EBITDA, PEG, or PEGY—into a per-share configuration and derive dollar value of the asset on that basis. But the method is unproven; more importantly, the market has no place for it.

To complete the process, we will average the six values created in column P, for 2009, and the six in column Q, for 2010. Finally, we will create an average of these two values. At the time of our calculation, with the ADTN common shares of ADTRAN trading just above $22, Figure 10.7 shows that our comparables historical valuation process calculated a fair value for ADTN of $24.47. Just to show it could be done, we have also included a series in which we calculate dollar value of the asset based on enterprise value (EV) to EBITDA. Though shown in the grid, this series is not included in our actual valuation work.

Annual Updates

Around the time you're finishing your first ratio and historical comparable valuation grid and feeling pretty good about yourself, you suddenly realize it's October. The market is no longer looking at the nearly done year and next year; it is looking at next year and the year after that. What to do?

Based on the assumption that your income statement presentation has been modeled to include that new year, let's get right to it. Insert a column between your last modeled year (2010 in this case); label that column 2011. Drag and drop the 2010 column into the 2011 column.

Within the annual income statement stack, you'll now have meaningless data in the 2011 column. Link the line items in this column to the actual full-year 2011 column on the income statement presentation. Prepare and adjust the 2011 balance sheet and cash flow statement estimates, either by growing the accounts at a reliable multiple (which is the easy way) or performing a more complicated interaction among all the financial statements.

For your oldest modeled year (the current year, of which two months are left in October), you can begin to think about substituting high, low, and average price for current price; by year end, that data needs to go in. Ditto for the S&P 500 Index price.

Move the five-year average time frame from 2004–2008 to 2005–2009. We find the F2 function key highly useful at this time, because if you strike it from within a cell it will show the components of any formula in this cell. From within the five-year average cell for P/E hit F2; move the highlighted range down one

Figure 10.7

At the time this "snapshot" of the comparables historical valuation section was taken, the 12 inputs for historical comparable valuation for ADTRAN suggested the stock was worth just under $24.50 per share, or about 9% more than its price at the time.

ADTRAN												
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
ADTN Stock Price High		15.00	17.13	37.48	37.18	33.48	30.12	28.26	26.06	22.39	22.39		
ADTN Stock Price Low		9.00	7.51	14.78	18.23	15.50	19.96	20.70	12.31	22.39	22.39		
ADTN Stock Price Average		12.23	11.82	25.37	26.98	24.49	25.04	24.48	19.19	22.39	22.39		
EPS		0.22	0.32	0.76	0.93	1.29	1.14	1.17	1.32	1.15	1.27	**2009E**	**2010E**
Average P/E		54.59	36.47	33.30	28.97	18.94	21.93	20.86	14.54	19.50	17.61		
						Average 04-08		**21.05**				**24.16**	**26.76**
LT EPS Growth		12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%		
PEG Ratio		4.55	[illegible]	[illegible]	[illegible]	1.58	1.83	1.74	1.21	1.63	1.47		
						Average 04-08		**1.75**					
Dividend Yield		0.0%	0.0%	0.6%	1.2%	1.4%	1.4%	1.5%	1.9%	1.6%	1.6%		
PEGY		4.55	3.04	2.64	2.20	1.41	1.63	1.55	1.05	1.43	1.29		
						Average 04-08		**1.57**					
Revenue Per Share		5.00	4.52	4.91	5.62	6.58	6.28	6.85	7.77	7.50	8.45		
Average Price/Sales		2.44	2.61	5.16	4.80	3.72	3.98	3.57	2.47	2.99	2.65		
						Average 04-08		**3.71**				**27.82**	**31.36**
Book Value Per Share		5.66	5.69	6.12	5.77	6.95	5.79	5.44	5.84	6.16	7.01		
Avg Price/Book Value		2.16	2.08	4.15	4.68	3.52	4.33	4.50	3.29	3.63	3.20		
						Average 04-08		4.06				25.05	28.47

Figure 10.7 *(continued)*

ADTRAN												
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
Book Value Per Share		5.66	5.69	6.12	5.77	6.95	5.79	5.44	5.84	6.16	7.01		
Avg Price/Book Value		2.16	2.08	4.15	4.68	3.52	4.33	4.50	3.29	3.63	3.20		
						Average	**04-08**	**4.06**				**25.05**	**28.47**
S&P 500 High		1,373.00	1,172.51	1,111.92	1,214	1,270.0	1,427.0	1,562.0	1,425.4	923.3	923.3		
S&P 500 Low		965.00	776.76	800.73	1,063	1,136.0	1,223.0	1,374.0	752.4	923.3	923.3		
S&P 500 Average		1,194.18	993.76	965.23	1,131	1203.0	1310.0	1,468.0	1,088.9	923.3	923.3		
Operating Earnings		45.79	48.61	55.4	66.5	77.00	87.75	82.50	50.00	50.00	63.00		
S&P 500 Avg P/E		26.08	20.44	17.44	17.00	15.62	14.93	17.79	21.78	18.47	14.66		
						Average	**04-08**	**17.43**			**-21%**		
Average Relative P/E		2.09	[illegible]	[illegible]	1.70	1.21	1.47	1.17	0.67	1.06	1.20		
						Average	**04-08**	**1.25**				**26.39**	**23.20**
Cash Flow Per Share		0.44	0.54	0.95	1.13	1.50	1.26	1.34	1.49	1.25	1.42		
Avg Price/Cash Flow		27.72	21.94	26.68	23.98	16.28	19.84	18.24	12.84	17.89	15.78		
						Average	**04-08**	**18.24**				**22.82**	**25.88**

(continued)

Figure 10.7 *(continued)*

ADTRAN													
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
EV/EBITDA		3.9%	6.5%	4.9%	5.7%	8.7%	6.8%	7.4%	11.3%	8.1%	9.1%		
Avg Price/EV/EBITDA		317.54	181.91	520.37	477.32	282.01	367.75	328.77	170.31	276.19	246.44		
						Average 04-08		**325.23**				**26.37**	**29.55**
Free Cash Flow Per Share		0.27	0.50	0.87	1.04	1.39	1.18	1.25	1.35	1.15	1.31		
Avg Price/Free CF		45.24	23.45	29.27	26.03	17.62	21.20	19.61	14.24	19.50	17.05		
						Average 04-08		**19.74**				**22.66**	**25.92**
					Comparables Value							**25.04**	**23.90**
													24.47

year. Change the years in the adjacent title cell. Copy these cells and paste for every series that requires a five-year average.

The value calculations, once performed in columns P and Q, will have moved over to columns Q and R because of the inserted column. Once again, use the F2 key to highlight formula components; adjust to the following year. Be particularly careful when adjusting the relative P/E calculation, as it has extra inputs.

Historical Comparables for ADRs of Foreign Companies

We have been consistent in modeling ADRs in their native currency, and you might assume this complicates the modeling process. Actually, the main head scratcher with international companies that trade dollar-based ADRs is to decide which discounting mechanism to use. There is no real template.

When we originally began covering Nokia in the early 2000s, the dollar/euro relationship was fairly close. The euro, which began at dollar parity and then slipped to as low as $0.90, by 2002 was worth more than the dollar. For most of that year, the euro was worth from $1.05 to $1.15.

If we assume that this exchange rate is going to be stable at around $1.10, and assuming a 1/1 ADR to share exchange rate, we can very simply build in a 9% to 10% P/E discount to compensate for foreign country risk. Assuming we use our existing historical comparables grid and apply it to Nokia, we would show Nokia's ADRs priced in dollars. If we priced EPS in euros rather than dollars, the P/E would reflect a roughly 10% discount to the P/Es priced in dollars; this 10% discount would serve as a proxy for foreign country risk.

This method began to break down in 2003, when the euro/dollar cross moved from $1.06 to $1.23, and is completely out the window now that the euro is near $1.50. We now adjust the currency as well as the inputs for every historical comparable calculation immediately above the valuation calculation; we adjust for the foreign country risk factor at a later stage in the valuation process.

Take a look at our final illustration in this chapter, Figure 10.8. It shows our translation work for Ericsson. (We considered using Nokia or Alcatel-Lucent, but the euro/dollar cross is dynamic at present, and the latter company is finding profits highly elusive.) We will focus on the shaded area. The first row, showing the stock/ADR conversion, is an anachronism; it dates from the period in which the ADR/common share ratio was 10/1. Now it is 1/1. The next line is most important; here we convert krona to dollars. Note that for each year, the krona/dollar conversion uses the average data directly from the income statement.

Figure 10.8

We can use our historical comparables valuation grid to value ADRs of overseas companies such as Ericsson even if those companies are modeled in their home currency. The shaded section enables conversion first of the currency and then of the various financial statement inputs required.

Ericsson													
Stock/ADR Conversion			2,514.6	3,164.6	3,165.8	3,164.8	3,174.2	3,185.9	3,201.8	3,193.0	3,202.0		
Kroner/Dollar Conversion			0.104	0.124	0.136	0.133	0.136	0.153	0.152	0.127	0.134		
EPS/ADR			(0.78)	(0.43)	0.82	1.02	1.12	1.06	0.59	0.65	0.82		
Revenue/ADR			15,095	14,653	17,999	20,197	24,242	28,773	31,692	27,983	32,524		
SE/ADR			7,622	7,527	10,972	13,925	16,294	20,549	21,361	18,035	19,585		
Cash Flow/ADR			(1,292)	(305)	3,347	4,007	4,581	4,005	2,438	2,351	3,331		
Free Cash Flow/ADR			(417)	(263)	122	85	102	339	(257)	(255)	(167)		
ERIC ShrPrice KR			137.66	44.15	87.14	112.64	121.56	103.28	64.18	73.13	69.36		
VALUATIONS	**1997**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**		
ERIC ADR Price High			26.86	8.54	15.66	17.20	19.22	20.81	13.83	9.31	9.31		
ERIC ADR Price Low			1.65	2.45	8.11	12.77	13.76	10.84	5.64	9.31	9.31		
ERIC ADR Price Average			14.26	5.50	11.89	14.99	16.49	15.83	9.74	9.31	9.31		
EPS ($)			(0.78)	(0.43)	0.82	1.02	1.12	1.06	0.59	0.65	0.82	**2009E**	**2010E**
Average P/E			(18.21)	(12.89)	14.50	14.66	14.70	14.86	16.43	14.33	11.40		
						Average 04-08		**15.03**				**9.76**	**12.28**

Figure 10.8 *(continued)*

Ericsson													
Current Yr EPS Growth				-46%	-292%	25%	10%	-5%	-44%	10%	26%		
LT EPS Growth				15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	115.0%	215.0%		
PEG Ratio				(0.86)	0.97	0.98	0.98	0.99	1.10	0.12	0.05		
						Average 04-08		**1.00**					
Revenue Per Share			6.00	4.63	5.69	6.38	7.64	9.03	9.90	8.76	10.16		
Average Price/Sales			2.37	1.19	2.09	2.35	2.16	1.75	0.98	1.06	0.92		
						Average 04-08		**1.87**				**16.36**	**18.96**
Book Value Per Share			3.03	2.38	3.47	4.40	5.13	6.45	6.67	5.65	6.12		
Avg Price/Book Value			4.70	2.31	3.43	3.41	3.21	2.45	1.46	1.65	1.52		
						Average 04-08		**2.79**				**15.77**	**17.08**

(continued)

Figure 10.8 *(continued)*

Ericsson													
S&P 500 High		1,373.00	1,172.51	1,111.92	1,214	1270.0	1427.0	1,562.0	1,425.4	996.31	996.31		
S&P 500 Low		965.00	776.76	800.73	1,063	1136.0	1223.0	1,374.0	752.4	996.31	996.31		
S&P 500 Average		1,194.18	993.76	965.23	1,131	1203.0	1310.0	1,468.00	1,088.90	996.31	996.31		
Operating Earnings		45.79	48.61	55.4	66.5	77.00	87.75	82.50	50.00	50.00	63.00		
S&P 500 Avg P/E		26.08	20.44	17.44	17.00	15.62	14.93	17.79	21.78	19.93	15.81		
						Average 04-08		**17.43**					
Average Relative P/E			-0.89	-0.74	0.85	0.94	0.98	0.84	0.75	0.72	0.75		
						Average 04-08		**0.87**				**11.30**	**10.78**
Cash Flow Per Share			(0.51)	(0.10)	1.06	1.27	1.44	1.26	0.76	0.74	1.04		
Avg Price/Cash Flow			[illegible]	[illegible]	[illegible]	11.84	11.43	12.59	12.79	12.65	8.95		
						Average 04-08		**11.98**				**8.82**	**12.46**
Free Cash Flow Per Share													
Avg Price/Free CF													
								Comparables Value				**12.40**	**14.31**
													13.36

In the next few rows, we use the dollar/krona relationship to convert krona-based inputs—EPS, revenue, stockholders' equity, cash flow, and free cash flow—that we will need in our standard comparable historical inputs of P/E, P/S, P/BV, P/CF, and P/FCF. Note that we need not provide anything specific for relative P/E, as the inputs noted have already captured what we need.

As an example, consider price/sales for 2008. In the shaded area, we see that based on the dollar/krona average exchange rate for 2008, Ericsson's revenue amounted to $31.7 billion in U.S. dollars. Using the stock/ADR conversion data (again, ADR to common is currently 1/1, but we keep the converter available in case the company again changes that ratio), we see that Ericsson had the equivalent of $9.90 per-share in revenue in 2008, and that, based on an average ADR price for that year, its average price/sales ratio was 0.98. Just as with our U.S.-based companies, we compile the averages and model the forward inputs—all translated into dollars—to arrive at the dollar value of the asset.

In our view, the U.S. analyst had better be equipped to model foreign stocks, at least those that trade ADRs on U.S. exchanges. The BRIC nations (Brazil, Russia, India, and China) are an investing obsession. Resource-rich BRAC nations (Brazil, Russia, Australia, and Canada) are of growing interest to investors as well. ADRs provide the opportunity for easy investment overseas; the currency-adjusted model provides a common ground in which to situate the company.

We've now drawn on financial sheet data and some of our ratios in the calculation of historical comparable valuation. Other ratios and data points that we've not yet used go to work in our next section, in which we discuss the most common form of present value analysis known as discounted free cash flow valuation. Like comparable historical valuation, present value and DFCF contain pitfalls and dangers for the uninformed analyst—particularly given the degraded state of stockholders' equity. But also like historical comparables, present value methodologies provide tremendous amounts of information useful to the analyst.

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PART 3

STOCK VALUE WORKSHEET

In Part 3 of this book, we will dive into our next worksheet, stock value, which is so called because all the valuation conclusions will coalesce here. Stock value is the site of our present value calculation based on discounted free cash flow (DFCF). It is also the place where we aggregate our other valuation inputs, such as the dollar value estimate based on comparable historicals. We'll also include values based on our proprietary technique known as Peer Derived Value, although that input needs to traverse a roundabout path: out to the industry matrix workbook (our next task) and then back to the individual company workbook.

Our first task on the stock value worksheet is to build the second of our valuation methodologies, based on discounted free cash flow analysis. Our second task is to use the stock value worksheet to compile and integrate three valuation methodologies: (1) DFCF analysis and (2) comparable historical valuation, two widely accepted methodologies, along with our proprietary relational valuation methodology known as (3) Peer Derived Value (PDV). We'll then risk-adjust the integrated valuation to estimate the dollar value of the asset, and—based on its relation to current price—make our asset decision or our investment recommendation (most typically buy, hold, or sell).

A word on content organization on this particular worksheet and in general: most valuation texts focus on concepts. We're allotting the concepts little more than a thumbnail sketch while focusing mainly on the alignment of data on the worksheet and across the workbook. That's a necessary step when one is concerned with organizational flow from one worksheet to another.

We've been fairly specific about layout so far. The income statement presentation is straightforward; it represents an expanded version of what the companies themselves provide. We modeled the income statement so the EPS would be readily available for P/E calculation; we also needed to reference COGS for inventory turns, dividends for retained earnings percentage, and so on. In our ratios and valuations worksheet, we've planted annual information in straight furrows in the field, the better to harvest the data; no data farmer wants a crazy-quilt layout.

Our stock value layout, which includes both our DFCF process as well as the compilation of other valuation conclusions (comparables and PDV), is arguably arbitrary. There's no compelling reason for how we organize data on this worksheet. We recommend a specific layout mainly because it has always worked for us. For that reason, we're going to ask you to focus a bit more on the accompanying illustrations in this section. You might want to examine them in detail and then return to the text. As always, we suggest you do it our way at first; you can rearrange the structure to your liking later on.

In the beginning of Chapter 12, we show the stock value worksheet from Cisco to illustrate the main components of our layout. In the upper left corner is a subset of data points—some imported from other worksheets, some to calculated—that will be used for weighted average cost of capital calculations. On the top right, we keep a running tally of return on equity calculated by the DuPont technique.

In the middle of the worksheet, beginning on the left, we perform discounted free cash flow valuation analysis. Typically we do so in a two-stage model and a three-stage model. We can perform the calculation of cash flows one of two ways, and we'll detail that in the following paragraphs.

At the bottom left of the worksheet, we tally up various valuation inputs from this page and from historical comparables. We also include an input from a proprietary industry-specific valuation technique that we call Peer Derived Value (PDV), which is imported back from our industry matrix workbook. We average these inputs to determine a "blended" dollar value of the asset.

Finally, at the bottom middle we have a section wherein we assess the difference between the current stock price (imported from the query page) and the blended value. This difference shows the capital appreciation potential of the asset. We'll also add current yield (imported from the ratios and valuation page) to get a sense of total return potential on a risk-adjusted basis.

Whether you're an analyst assigning buy, hold, and sell ratings or a portfolio manager making buy, hold, or sell decisions, you need to assess total return potential in relation to the market benchmark. The benchmark, or S&P 500, has a long history of delivering 10% average annual total return (unadjusted for inflation). Over time, you'll set your own risk bands. But for starters, you could say that an asset whose total return potential exceeds the market average (i.e., 10%) warrants a buy, an asset within the market total return band (0% to 10%, or alternatively –10% to 10%) should be held, and an asset whose total return potential is less than –10% should be sold.

Before we make that call, however, we'll risk-adjust the total return potential by adjusting for the asset's variability from the market. We could use standard deviation. In the realm of U.S. equities measured against the U.S. market benchmark, we use beta, and we'll explain how in the following paragraphs.

If you have some familiarity with DFCF schemes, you may be thinking that risk adjusting with beta amounts to double counting. Beta is already factored into the cost of equity (the capital asset pricing model, or CAPM), which is a key component of the discount rate (for discounting to the firm) and the only discount rate (for discounting to equity). We would argue that with the inclusion of other value inputs (e.g., comparables and PDV) into blended value, beta is muted nearly completely. Besides, the consensus risks-adjusts its return assumptions, both implicitly and explicitly. Not only do asset managers make a like (i.e., explicit) adjustment, the investment style whereby riskier investors pursue riskier assets is a form of implicit risk adjustment.

Now that we have discussed the stock value worksheet methodology, let's proceed. In Chapter 11 we discuss the place of present value analysis in relation to other accepted methodologies; we also touch on the advantages, disadvantages, dangers, and benefits of discounted free cash flow, and why it is our preferred present value methodology. In Chapter 12, we delve into DFCF theory and methodology for the individual company. And in Chapter 13 we present two techniques for deriving value of the asset from discounted free cash flow valuation.

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Chapter 11

PRESENT VALUE MODELING AND THE STOCK VALUE WORKSHEET

Present Value versus Comparables

Which is better, historical comparables or present value analysis? Even though our fully realized architecture later on will indicate which technique we weight more heavily, always remember that "which is better?" is rarely what the market is asking. The market is ruled not by reality, but by perception, and specifically by shared perceptions. The collective trust in P/Es and to a lesser extent in present value calculations means that asset prices will respond to the shared perceptions of value based on those valuation methodologies.

Even if we thought that discounted free cash flow (by far the most widely accepted present value methodology) and historical comparables had no more basis in reality than phrenology, we would fold them into our valuation methodology for (as your mother always told you) the worst possible reason: everyone else is doing it. Again, our goal is to drive cattle, not argue theory until the campfire goes out. If the market is using it, we're using it—and we'd be irresponsible if we did not. Fortunately, we think these methodologies have value. And, with precise modeling, we think we can add insight of our own.

We employ both historical comparables and DFCF because we believe they provide valuable information on asset valuation and the investment decision. But we are as mindful of their limitations as we are of their relative advantages; here's our short-hand on each.

Use of historical comparables should invoke the disclaimer language on your mutual fund proxies that warns that past performance is no guarantee of future outcomes. Certainly, the five-year look-back on which we base comparables provides insight into the present and future. But as the revolution in information technology accelerates the pace of change at companies and whole industries, that value may be limited and is certainly incomplete. Every cycle leaves different detritus in its wake; some come through like a rainstorm, others like Hurricane Katrina. The downturn of 2007–2009 has had structural and secular implications, in our view, that supersede the normal cycle effects. Depending on industry and the damage sustained, five-year look-backs dating from 2004–2008 may be as applicable in coming years, to paraphrase the writer Luc Sante, as crinoline and moustache wax.

Discounted free cash flow valuation methodologies are more forward looking. The danger in looking forward is to utterly misread the future. The danger in discounted free cash flow is subtly different; if we begin with incorrect or misjudged inputs, with each new forward increment we amplify the original erroneous assumptions. Discounted free cash flow also directly incorporates more market, economic, and interest rate assumptions than historical comparables, which are mainly inward looking. It is tough enough forecasting growth rates for a single enterprise; adding assumptions related to the market, the economy, and interest rates adds to predictive risk.

Nonetheless, and much as historical comparables have demonstrated their validity, discounted free cash flow does provide demonstrated value. After all, companies are dedicated to safeguarding and growing their cash flows, and it is right to model the ongoing enterprise, because the enterprise is ongoing. If we incorporate outside forces (e.g., risk-free rates) in our DFCF valuation, we must be as rigorous in adapting our market expectations as we are in updating individual company cash flow expectations. With these guidelines in mind, we can jump into our abbreviated DFCF valuation methodology.

Thorns and Brambles of Discounted Free Cash Flow

Historical comparables is safely shrouded in the mists of time; its time-tested concepts are no more contentious than a phone book. Discounted free cash flow valuation is not exactly new, but it is newly propagated. Its adherents are as vociferous as they are splintered; they're ornery about their turf.

As is our custom, as much as possible we'll circumnavigate theory and drive the herd right past the academic literature. While it is unavoidable that we touch on the key concepts underlying DFCF, we intend to touch lightly. No matter how light the touch, of course, we express a preference.

Be forewarned: we are about to discuss a very abbreviated form of DFCF valuation. We structured our income statement presentation as a framework enabling basic modeling with the proviso that it permits more detailed asset modeling and analysis as the modeler becomes more familiar with the entity. Here, too, we create a framework of basic modeling that can over time be adjusted to encompass the specific circumstance of the asset. To delve into every nuance of discounted free cash flow would risk sending the modeler down countless byways in a quest to anticipate every special situation. We are all for taking on an oceanic concept such as DFCF; we just don't want to drown in the puddle of details.

We regard discounted free cash flow as another tool in the box rather than the tool box itself. Some DFCF adherents find it contradictory to use both a present value scheme and a historical comparables scheme. The market, however, is not so pure; asset prices reflect the smorgasbord of inputs, from complex algorithms to hot tips. While we haven't decoded the market's DNA valuation, we can provide the modeler with a range of tools so as to have the right one at hand at the right time.

While reiterating our need to keep the cattle drive moving, we'll take the risk of driving the herd right into a DFCF border war by questioning a key concept associated with DFCF modeling. The constant growth rate that we modeled in Chapter 9—defined as retained earnings percentage times stockholders' equity—is a frequently modeled growth rate in DFCF valuation. Accordingly, we need both inputs to be rock solid—or at least reasonably constant. We would argue that stockholders' equity is under pressure on a variety of fronts; furthermore, the industry does not appear to be very concerned with reversing this trend.

Assessing Behavioral and Structural Impacts on Stockholders' Equity

Are companies today less "responsible" than they've been historically? Certainly, the operating environment in which they play has changed. The field has leveled to encompass players from all nations. Most new business originations are in low capital intensity fields such as technology and business services; in the future, outsourcing and "virtual infrastructure" enablers such as cloud computing could further lower capital needs to launch a company. Gary Wendt, former CEO of GE Capital, once said that anyone with a phone, a yellow pad, and a pencil could be a competitor to his firm; update this to the digital age, and a smart phone alone may be enough.

In capital-intensive areas, unprecedented capital flows and the demise of capital borders has made $100 billion (and more) mergers and acquisitions (M&A) deals a reality. The proliferation of hedge funds and a concomitant explosion in high-velocity trading has telescoped the performance analysis period for many investors from an already too-tight 90 days to something much less.

With competitive barriers lowered to admit one and all, competitive threats to the entrenched are rising. Companies may feel a need to move dangerously far beyond core competencies in pursuit of excess return. In this environment, risk taking in pursuit of improved returns has become not just common but expected. CEO behavior once deemed prudent is now seen as stodgy and a ticket to early retirement. When risk taking is not just rewarded but requisite, the outcome can be big and unproven M&A bets as well as the displacement of tactical adjustments by strategic lurches.

With all these corporate reinventions going on, it follows that the number of failed corporate experiments must rise as well. Risen they have, at least in part because the penalty for failed experiments is itself devalued. Given investors' willingness to trade on adjusted rather than GAAP results, failed strategies come crashing through GAAP results—and are forgotten. The "Big Bath" was at one time orchestrated to coincide with the market down cycle; even so, this bundling of bad news cloaked the executive suite in a mantle of shame. Now, serial restructurers blithely report operating fiascos related to strategic missteps every quarter.

Even the appropriately strategic and perfectly executed acquisition, however, will likely wrack the balance sheet and thus stockholders' equity over time. In our opinion, the Financial Accounting Standards Board, with its implementation of FAS 142, doomed companies to a nearly inevitable barrage of nonrecurring charges in the form of goodwill impairment. As usual we can blame good intentions, which pave the road to Wall Street and other destinations.

Goodwill used to be depreciated. In the go-go 1990s, pressure was brought to bear on FASB to stop depreciating goodwill and instead subject it to periodic tests. The thought, in those "New Paradigm" days, was that depreciating goodwill was a tax on earnings, and anyway the market was going up forever. According to FASB Summary of Statement No. 142, issued in June 2001, the substituting of impairment of goodwill for depreciation of goodwill "will improve financial reporting," because financial statements from acquiring companies will "better reflect the underlying economics of those assets."

FASB mandates impairment tests on a regular basis. When the underlying value of like assets declines, as in a broad market collapse, goodwill associated with those like assets must be impaired to mirror the market experience.

Almost as soon as this change was enacted early in the decade, the market collapsed. Huge piles of goodwill that previously would have been worked down gradually had to be impaired all at once. For a decade or more, technology companies had been printing stock certificates, watching investors bid them to hysterical heights, and using them to buy other helium-infused assets. When the crash came, technology companies were forced to practice impairment by chain saw. JDSU and Nortel were two companies that purchased vastly inflated assets by issuing vastly inflated stock. In 2001, Nortel reported a $24 billion loss, most of which came from goodwill impairments. But that is peanuts compared with JDSU, which in its fiscal 2001 year reported a $45 billion loss, again mainly from impairments. Nortel as we went to press was nearing extinction. JDSU has been able to get back to a positive shareholders' equity account, mainly because its additional paid-in capital account (also called capital surplus) of $69.4 billion at year-end fiscal 2009 was roughly equivalent to its retained deficit of $69.5 billion.

Nontech investors in the early part of the decade snickered at technology's profligate ways. There's no one left to laugh now; the market evisceration of 2007–2009 (and counting) has spared no sector. Amid a market in collapse, acquisitions once deemed as prudent in 2005 or 2006 have been suddenly revealed to carry the baggage of overvalued goodwill—all of it to be whacked at once, regardless of future market prospects.

The switch to impairing rather than depreciating goodwill can lead to spectacular hits to earnings in down cycles, which in turn flow through and reduce retained earnings and thus stockholders' equity. This heartier corporate appetite for strategic risk, and the concomitant impact on earnings based on failed strategies, takes a further bite out of stockholders' equity.

To test the validity of this perception, in Figure 11.1 we measure S&P 500 GAAP earnings per share as a percentage of S&P 500 "adjusted" earnings per share, going back to 1989 in two 10-year periods. Whereas operating earnings represented 90% of GAAP earnings between 1989 and 1998, the operating earnings to GAAP percentage is below 78% for the period 1999 to 2008.

As expected the ratio has degraded over time, with the decline intensifying in the more recent 10-year period (much of which was subsequent to the change in goodwill accounting). While two years in the more recent decade contributed disproportionately to this discrepancy, that is precisely the point. The years in which the gulf between GAAP and operating earnings is most glaring are 2003 (59.9%) and 2008 (30.1%). These are years of major market declines in which

Figure 11.1

Riskier acquisition activity, the FAS decision to impair rather than depreciate goodwill, and investors' willingness to ignore GAAP losses and focus on ongoing operations have all weakened the ties between GAAP earnings and adjusted earnings.

S&P 500 Earnings: GAAP vs. Operating			
Year	OPERATING EARNINGS PER SHR (ests are bottom up)	AS REPORTED EARNINGS PER SHR (ests are top down)	GAAP EPS as a Percentage of Oprtng EPS
2008	49.51	14.88	30.1%
2007	82.54	66.18	80.2%
2006	87.72	81.51	92.9%
2005	76.45	69.93	91.5%
2004	67.68	58.55	86.5%
2003	54.69	48.74	89.1%
2002	46.04	27.59	59.9%
2001	38.85	24.69	63.6%
2000	56.13	50.00	89.1%
1999	51.68	48.17	93.2%
		10-Year Average	**77.6%**
1998	44.27	37.71	85.2%
1997	44.01	39.72	90.3%
1996	40.63	38.73	95.3%
1995	37.70	33.96	90.1%
1994	31.75	30.60	96.4%
1993	26.90	21.89	81.4%
1992	20.87	19.09	91.5%
1991	19.30	15.97	82.7%
1990	22.65	21.34	94.2%
1989	24.32	22.87	94.0%
		10-Year Average	**90.1%**
Source: Standard & Poor's			

companies were compelled to impair goodwill regardless of future prospects for the acquired businesses.

To further test this hypothesis, we looked at the ratio of stockholders' equity to market capitalization over an extended time frame. The implication of our thesis is that stockholders' equity should be shrinking as a percentage of market capitalization if stockholders' equity is being decimated by flawed strategic thinking, and, equally important, investors are not treating this as a grave event. Our research supports the view that stockholders' equity has declined as a percentage of market capitalization.

Despite our overheated rhetoric, we're not condemning this shift so much as reporting it because of its long-tailed impact on the valuation process. Return on equity (ROE) is one of the most closely monitored measures of corporate performance. Impairments and restructuring charges reduce stockholders' equity; but, as noncash events, they do not degrade the ongoing enterprise. A company with stable earnings that has reduced its stockholders' equity through these events will suddenly report much-improved return on equity.

The seeming counterbalance to this development would be that decrements to stockholders' equity would cause expansion in debt/capitalization ratios. Obviously, if equity is reduced and debt is unchanged, debt/cap will rise. Many bonds carry indentures that permit the debt to be called should debt/cap ratios exceed certain limits. These should act as gatekeepers to undue risk in corporate strategy and M&A activities. Yet in the past decade, many of these indentures have been rewritten to exclude effects from impairments to stockholders' equity based on noncash events. In other words, another mechanism that might have served to limit risky strategic behavior has been defanged.

While both ROE and debt/cap may be sending false valuation signals in the immediate term, our chief concern is not with ROE on a stand-alone basis. ROE is a linchpin metric in the calculation of valuations based on discounted free cash flow. The constant growth rate, sometimes called g, is calculated as retained earnings percentage (calculated as earnings per share less dividends per share, divided by EPS) multiplied by ROE. If ROEs, as we are suggesting, are at risk of being overstated, than forward growth prospects are at risk of being overstated. In that situation, the risk would be in the assessment of the long-term value of the asset.

Again, we're not here to bang the podium about wrong or right. Our sole concern is that this behavioral shift in risky corporate behavior may be causing distortions in valuation measures based on return on equity. We'll tackle this topic in more depth in Chapters 12 and 13 during our discussion of discounted free cash flow valuation. For now, we'll just say that investors need to be aware of the sensitivity of valuation analysis to the inputs to stockholders' equity.

Dividend Discount Model and the Financial Structure Decision

Why have we embraced one present value methodology and disowned another?

Discounted free cash flow is the more complicated of the two prevailing present value methodologies. The dividend discount model, or DDM, is the oldest and best known of present value calculations, first appearing in *The Theory of Investment Value* by John Burr Williams in 1938. DDM values a company based on the view that the asset is worth the present value of the sum of all future dividend payments. To determine the value of an asset based on DDM, and assuming no change in the dividend rate, divide the annual dividend by the required rate of return, meaning the rate a rational investor believes can be earned within that investor's risk parameters. If you assume the dividend will grow, reduce the required rate of return by the rate of dividend growth.

For example, the GLPC shares of Global Pincushion pay a $0.70 dividend; the company has little likelihood of changing this rate. Assuming a required return of 6%, the value of the asset is $0.70/.06, or $11.67. If, on the other hand, Global Pincushion has historically grown its dividend 2% annually, then its value would be $0.70/(.06 – .02), or $0.70/.04, or $17.50.

DDM has a satisfying simplicity. And it is widely available, enabling like comparisons across disparate universes—one of our favorite criteria for leveling the valuation field. On Bloomberg.com, you can enter any ticker, the Equity key, and type "DDM" and you are transported instantly to the dividend discount model for that stock. You can tweak the inputs such as required rate of return of dividend growth assumption.

We don't use DDM in our models. You might assume that's because not every company pays a dividend. There are workarounds to that issue. You can calculate DDM based on a company's dividend-paying potential, even if that company pays a dividend in distant years or not at all. Or you might assume we distrust DDM because dividends are inherently unstable; in the 2008–2009 recession, dividends were the early ballast jettisoned in a (usually futile) effort to save a sinking ship.

Neither consideration would dissuade us from DDM. The reason we don't use DDM is because dividend payments are part of a company's financial structure decision and have nothing directly to do with operations. And, quite simply, stocks trade on operating performance, not financial structure.

For example, there is a small subset of technology companies that have no debt, still hold a significant portion of their founding cash, but have tiny operations. Their balance sheets are blue chip, their dividend-paying capacity is significant—and investors won't touch them. Many of these issues (uncharitably called dead men walking) trade at or near cash per-share; during the 2008–2009 recession, several traded at a discount to cash. That still failed to spark interest among investors, who invariably seek operating progress in technology names.

Dividends alternate between academic approbation and disapproval. The mid-1990s, a time when I was pursuing a CFA and in touch with academic financial thinking, was a period in which dividends were viewed as somewhere between unclean and evidence of slothful management. It has been widely noted that dividends are responsible for up to 40 percent of total market return in the modern era, and now they have swung back into favor—at least until they swing out again. Corporate boards can be investment fashion followers. One such swing in the prevailing attitude can undo a company's historical dividend pattern—and with it the most thoughtfully crafted DDM model.

Dividends should probably be paid based on a company's operating progress—but then again, maybe not. Certain categories, such as real estate investment trusts (REITs) and master limited partnerships (MLPs), vary their payouts based on operations. But many investors cherish dividend stability because they require income stability. Aftermarket auto parts distributor and retailer Genuine Parts Co. (GPC) is one of a handful of companies that have for decades consistently paid a quarterly dividend and raised the payout every year. Amid the collapse in automotive stocks in 2008–2009, the GPS shares of Genuine Parts Co. held up better than most, largely because its loyal income-oriented investor base was not about to discard a sure thing in uncertain times.

Genuine Parts would seem at first blush to have it backward, operating not to build the enterprise but to steadily pay out its income to its holders. Of course GPC has it exactly right, for its particular operating model. Perhaps DDM would be the best way to value Genuine Parts and some other steady dividend plays.

But companies of this nature are decidedly in the minority. Average companies are obsessed with growth. They'd better be; most investors insist on it, for better or worse. Given the prevailing valuation drivers, we do not believe the dividend discount model gives us the best picture of the growing, or failing-to-grow, enterprise.

"Discount to the Firm and Discount to Equity

The market's growth and operating obsession will even inform the "flavor" of discounted free cash flow we choose. New York University distinguished professor Aswath Damodaran, the reigning authority on DFCF, in his widely read book *Investment Valuation* (John Wiley, 1995), distinguishes between "discount to the firm" and "discount to equity." The former incorporates capital structure decisions into the modeling process; the latter does not factor in debt. Discount to the firm is straightforward on a historical basis but requires capital structure projections on a go-forward basis. The introduction of yet more uncertainty is among the reasons, but not the principal reason, why we don't use discount to the firm.

The market's focus on operations does not fully discount implications of capital structure decisions. Or, to put it another way, the market doesn't care what you borrow, if it helps you grow your operations. Whether that's right or wrong is immaterial. We have to deal with the weather we get; and in the stock market, it's raining growth.

Puts and Takes of Discounted Free Cash Flow Valuation

The core concepts in discounted free cash flow valuation have been around for some decades but have not always been widely embraced. The wise man from Omaha (i.e., Warren Buffett) advised investors to invest in things they understand, such as retailers or detergent makers. The same underlying philosophy of sticking with the familiar informs many of the investment decisions made by all kinds of investors, from the bulge bracket firms to kitchen-table hedge funds. While many sophisticated investors like to think they apply all the best tools to the investment process, at the end of the day they often fall back on, "What's the P/E?"

Many investors ignore DFCF valuation based on its complexity; others cite the unreliability of the inputs. The second objection is more pertinent. Discounted free cash flow takes a limited subset of inputs and extrapolates them over an extended period; rather than a leap of faith, it is more of a steady hop farther and farther away from the current price. Many variables are involved, from asset-specific data (e.g., betas, growth rates, and ROE) to marketwide inputs (e.g., risk-free rate and market risk premium). These data points are used to project value over an extended period. The market will likely undergo several cycles, and the asset will undergo many changes, before the projection period is completed. The underlying exercise—discounting future cash flows back to present value—is nearly an exercise in futility, in that the likelihood of forecasting the actual cash flows with a high degree of accuracy is slim.

And yet the exercise is inherently logical. Historical comparables is a useful look forward—back through the looking glass. But, amid emerging competitors, shifting technologies, new business and service models, and dynamic market forces, the looking glass of history can quickly turn into a fun-house mirror. Discounted free cash flow is unequivocally forward looking. Because cash flows can be adjusted mid-stream, via two-step and three-step DFCF modeling, the methodology can encompass assumptions that the enterprise will undergo changes in response to market forces and amid movement along its own development path; it can also incorporate new inputs based on your own changed perceptions.

No doubt, taking a basket of market and asset inputs and extrapolating them well into the future introduces variability and risk. Disciplined DFCF modeling incorporates consistent market inputs and inputs for the asset based on historical and peer trends. Use of a consistent set of rules may not increase the likelihood of accuracy, but it increases the likelihood that all outcomes will skew in the same direction.

Ultimately, DFCF requires a degree of calibration. You cannot take DFCF out of the box and plug and play. In the real world, modelers gather information on the variations in projected asset values versus real prices over time; they learn which assumptions led them astray; and they make the necessary modifications and tweaks. We would argue that you can open a can of historical comparables and serve it right at the table. Discounted free cash flow models need to stew for a while, preferably for a few years, before they really begin to render their full flavor.

In the preceding chapter we thumped the podium on the risks to DFCF related to the misleading signals that it sends, given its reliance on growth rates founded on return on equity in an era when stockholders' equity is unreliable. In our next chapter, we blithely explain the concepts underpinning DFCF as a prelude to deploying it. A clear case of dissociative personality disorder? No, and no again. Discounted free cash flow is the backbone of present value analysis and, in our view, indispensible in the ever more rapidly involving markets in which companies play. We simply need to approach DFCF with eyes wide open.

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Chapter 12

DISCOUNTED FREE CASH FLOW: SETTING THE TABLE

Underlying Concepts of Discounted Free Cash Flow Valuation

The primary concept behind discounted free cash flow is that an asset is worth the sum of future cash flows and a terminal value. In essence, our task is to determine base-line cash flows, estimate growth in cash flows from the base line, find the appropriate discount rate for these cash flows, determine inputs for a terminal value, and create a structure in which we can generate the needed outputs that sum to the dollar value of the asset. Figure 12.1 shows the completed DFCF valuation model on the Cisco stock value worksheet. This is just a taste, as we have quite a few concepts to develop and formulas to build before we get there.

In the pages that follow, we'll discuss two possible approaches to discounted free cash flow and show how to construct both or either on the page. Some organizational aspects are similar in both methods. We also need to make the structure able to accommodate change, so we don't have to tear the thing down and start over every time we want to incorporate new data or push the projection out a year further. But before we can actually deploy DFCF, we need to understand a number of key concepts underlying the approach.

We've already laid much of the groundwork for determining company-specific cash flows in the last set of calculations in the ratios section of our ratios and

Figure 12.1

Cisco has seen its beta come down as the once-speculative technology group becomes associated with stable earnings, high cash, and low debt. Within DFCF modeling, low betas have the effect of reducing discount rates and thus increasing forecast values.

Cisco												
Discounted FCF	**Calculation**			**Dupont ROE**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
				Net Income/Sales	23%	23%	22%	22%	20%	17%	17%	18%
Stock Price	21.05			Sales/Assets	62%	73%	66%	65%	67%	53%	53%	60%
Shrs Outstndng '09	5,872			Assets/Equity	138%	146%	181%	169%	171%	176%	176%	176%
Mkt Vlu Equity	123,611			Return on Equity	19.2%	24.8%	25.9%	24.1%	23.4%	15.9%	16.3%	18.7%
Book Debt '09	10,295.0											
Cost of Debt	7.0%			Retained Erngs Prcntg	100%	100%	100%	100%	100%	100%	100%	100%
Total Capital	133,906			Constant Growth Rate (g)	19.2%	24.8%	25.9%	24.1%	23.4%	15.9%	16.3%	18.7%
Equity/Total Capital	92.3%			EPS Growth Rate	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Debt/Total Capital	[illegible]			Avg [illegible] Rates	15.0%	18.9%	15.0%	18.5%	15.0%	14.4%	14.6%	15.8%
Tax Rate '09	20%			1st 5-Yr LT Growth Rate	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
WACC (k)	9.3%			2nd 5-Yr LT Growth Rate	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
				Terminal Growth Rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Risk-Free Rate	4%			Beta	1.20							
Market Risk Premium	5%			Cost of Equity	9.7%							

Figure 12.1 *(continued)*

		1	2	3	4	5	6	7	8	9	10		
2-Stage Dscntd FCF		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2016**	**2017**	**2017**	**Termnl**	
Traditional CF (NI+DDA)		9,992.7	11,205.1										
Free CF (NI+DDA-CX)		9,042.7	10,205.1										
Free CF - Chng in Trd WC		8,953.3	10,113.5										
FCF per Share		1.55	1.75	2.01	2.32	2.66	3.06	3.52	4.05	4.66	5.36	115.25	
FCF Pr Shr/		1.41	1.46	1.53	1.60	1.68	1.76	1.85	1.94	2.03	2.13	45.87	
Sum of DCFs 2002-11	17.40												
Dscntd Terminal Vlu	45.87												
2-Stg DFCF Value	**63.27**												
3-Stage Dscntd FCF		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Termnl**	
Traditional CF (NI+DDA)		9,992.7	11,205.1										
Free CF (NI+DDA-CX)		[illegible]	[illegible]										
Free CF - Chng in Trd WC		8,953.3	10,113.5										
FCF per Share		1.55	1.75	2.01	2.32	2.66	2.90	3.17	3.45	3.76	4.10	88.16	
FCF Pr Shr/Discounted		1.41	1.46	1.53	1.60	1.68	1.67	1.66	1.65	1.64	1.63	35.09	
Sum of DCFs 2002-11	15.94												
Dscntd Terminal Vlu	35.09												
3-Stg DFCF Value	**51.03**							Target Price		27			
DCF Avg Value	**57.15**			To Blended Value:		79.4%		To Target Price:		28.3%			
Comparables Stk Vlu	**27.63**			Dvdnd Yld:		0.0%		Dvdnd Yld:		0.0%			
Peer Calculated Value	**9.16**			Indctd Total Return:		79.4%		Indctd Total Return:		28.3%			
Blended Average	**37.77**			Risk-Adjusted Rtrn:		66.2%		Risk-Adjusted Rtrn:		23.6%			
For HOLD-rated stocks, target price is blended value													

valuation worksheet. As a refresher, or if you've skipped ahead, in the cash flow portion of our ratios section on the ratios and valuations page we defined some terms and created some values that we'll carry forward to the DFCF page. We defined and calculated basic cash flow as net income plus depreciation and amortization, and basic free cash flow as basic cash flow less capital spending. We adjusted free cash flow to reflect the changes in cash usage as encompassed by current assets and liabilities; we further modified this adjustment to include only the primary movers in working capital, which are inventories and accounts receivable on the current assets side and accounts payable on the current liabilities side.

We regard these inputs as (relatively) predictable based on past company patterns and the economic environment. While this makes for a cooked-down DFCF model, it excludes less reliable elements. And it makes for a more consistent calibration when applied uniformly across the coverage universe.

Discount Rates

Given the time value of money, we need to discount cash flows and terminal value back to present value, but at what rate? We could use a universal rate, such as "risk-free" coupon rate on a highly secure fixed-income investment, or the average return for a riskier asset, such as the historical annual stock market return. Yet every company is different, and each company's common equity will be assessed differently in the market. We therefore need to determine a reliable rate of cash flow growth for each company; that growth will influence the company-specific rate at which we discount those flows back to present value.

Having created the mechanism to forecast individual company cash flows in our ratios and valuations section, let's now turn to the asset-specific rates we'll use to discount those cash flows. To do so, we're going to define and calculate a few more needed inputs. Bear in mind that these inputs are widely discussed and exhaustively available in financial texts and on financial Web sites. Peruse these Web sites and you'll discover variations and permutations in the calculation and methodology of inputs. We could immerse ourselves in minutiae, argue and nitpick, strive to find a common ground—and wander off the trail. Or, we can use the middle path of widely accepted doctrine in this area, accept the orthodoxy, and derive some valuations. You already know which way we're going.

We start with example data from the Qualcomm workbook; we'll assume we are modeling for the September 2009 year. We'll examine the concepts before examining the Qualcomm example.

Weighted Average Cost of Capital (WACC): The Concept

Let's start in the upper-right-hand corner of the worksheet; for shorthand we'll call this the WACC (weighted average cost of capital) section. Organizationally, we're going to run these inputs down the left-hand side in columns A and B. Your column B tallies can be adjusted every year; conversely, you can add successive years in columns C, D, E, and so on. Typically, the column A cell will describe the input (the stock price in A4), and the column B cells contain the inputs ($43.33 in B4).

In the A and B columns, we begin with the following descriptions and inputs:

- Stock price (in this case, $43.33, imported from the query worksheet);
- Shares outstanding 2009 (1.655 billion, imported from the annual income statement on the R&V worksheet)
- Market value of equity (stock price times shares)
- Book value of debt 2009 ($0, imported from the annual balance sheet on the R&V worksheet)
- Cost of debt

For WACC, we really want the *market* value of debt. Pricing of fixed-income securities is a little harder to find; that's what made Mayor Michael Bloomberg of New York City a wealthy man. If possible, substitute the market value of debt for book value; this is particularly important for speculative debt, unkindly called junk debt. For cost of debt, you can use the average annual interest cost we calculated for our income statement presentation (purists, abide).

If there is a meaningful premium of book value of debt to market value of debt, reduce the book value of debt by the discount. For example, assume a company shows $2.69 billion in book debt; its average interest cost on the income statement is 6.5%; and its debt trades at $93 against a par of $100. (Bonds have $1,000 par value but are discussed and traded as though priced at $100.) To adjust the value of debt, divide market value of debt by book value, producing a value of .93. Multiply the book debt of $2.69 billion times .93, which comes to $2.501 billion. To adjust cost of debt, divide the book interest cost by .93, which brings its market cost of debt to 6.989%.

Now we'll start to calculate or gather a few more needed inputs:

- Total capital
- Equity as a percentage of total capital

- Debt as a percentage of total capital
- Tax rate
- Weighted average cost of capital

To calculate total capital, add the market value of equity (shares outstanding multiplied by price) plus the market value of debt, as described above. Calculate equity as a percentage of total capital by dividing market value of equity by total capital. Immediately below that, calculate debt as a percentage of total capital by dividing market value of debt by total capital. We will also need the tax rate for our weighted average cost of capital calculation.

Weighted average cost of capital is the sum of two percentages: cost of debt and cost of equity. Cost of debt is self-contained for the asset, in that it contains only asset-specific information. To calculate the cost of equity, however, we need both asset-specific inputs as well as market inputs.

Cost of Equity

To calculate cost of equity, we use the capital asset pricing model (CAPM). The CAPM is the asset-specific return calculated as the sum of the risk-free return, and the market risk premium adjusted by the company's variability to the market, or beta. Again, refer to Figure 12.1. Below the bloc of data in the upper left corner, we've allotted two lines for calculation of cost of equity. In these two lines are four descriptive as well as four data cells: risk-free rate, beta, market risk premium, and cost of equity.

The risk-free rate is the return an investor can expect from an asset with no risk. The standard risk-free rate is the return on the long bond, meaning the 10-year U.S. Treasury. Here we encounter one of those inputs whose inherent uncertainty dissuades some investors from adopting DFCF valuation. During the first half of 2009, the long-bond yield varied significantly—between 2.2% and 4.0% as fears of inflation alternated with ultra-safe-haven investing. In recent decades, the long yield has mainly ranged in the 3.5% to 6.5% area. So it is perhaps best to use the long-term trend in this series. Given the more global nature of fund flows, interest rates will likely remain toward the lower end of the range in a normal market. In mid-2009, we most commonly used a risk-free rate ranging from 4.0% to 4.5%.

The market risk premium reflects what investors can expect, on average, from risky assets such as stocks. The basis for market risk premium is long-term appreciation in a risky metric such as the most common U.S. equity measure, for instance the S&P 500. You can use a regression series, such as ordinary least squares, to get smoother picture of appreciation. We exclude return from dividend income; we adjust for inflation; and we use an exponential average, meaning we value the recent inputs more than less recent ones, with a progressive degradation in the value of older inputs. All of these considerations lead to an average market risk premium of 4.75% to 5%.

Beta measures the variation in returns between the asset and a broader market measure. U.S. investors are typically most concerned with the relationship between the individual equity and the S&P 500. In relation to itself, the S&P 500 has a beta of 1.0. Historically, growth companies in industries such as Internet or biotechnology have had high betas around 1.3 to 1.6; slower growth and regulated companies, such as electric utilities, have low betas. The most common measurement for beta is five year's worth of weekly readings; newer companies use a shorter time period. Hence, if your area of concern includes lots of immature companies, you'll want to adjust your measurement period. Betas are widely available, but you need to take care not to use raw beta if your measurement group is based on adjusted beta. We use adjusted beta, which adjusts for severe outliers.

Plenty of models are available for calculating cost of equity using the capital asset pricing model. All essentially involve a risk-free rate plus beta-adjusted market risk premium. Let's take a spreadsheet where cell B15 shows a risk-free rate of 4.25%; cell B16 shows a market risk premium of 4.7%; and cell J15 shows a beta of 1.33. The cell holding the CAPM or cost-of-equity formula will look like this: `=B15+(J15*B16)`.

Weighted Average Cost of Capital: The Formula

We're now ready to return to cell B13 to calculate weighted average cost of capital. The formula has two components: (1) weighted cost of equity and (2) weighted cost of debt. Weighted cost of equity is the equity percentage of total capital times cost of equity. Weighted cost of debt is the debt percentage of total capital times the cost of debt times a tax adjustment. The tax adjustment is equal to 1 minus the tax rate.

For our example, let's put aside Qualcomm for a moment. As of this writing, the company was considering levering its balance sheet; still, its most current balance sheet shows no debt. When a company has no debt, its cost of equity and its weighted average cost of capital are identical.

Instead, consider a company with equity percentage of total capital of about 78% and debt percentage of total capital of 22%. For this company, the risk-free rate of 4.25%, market risk premium of 4.7%, and beta resulted in a cost of equity of 10.1%. For the cost-of-debt calculation, the market cost of debt is 7.0% and the tax rate is 35%. Our formula looks like this: =(B10*J17)+(B11*B8*(1–B12)). It results in a weighted average cost of capital of 8.9%.

And now the punch line: we are not going to use WACC in the calculation of discount to equity, which is our prevailing methodology for DFCF. For discount to equity, our primary discount rate will be the cost of equity. An alternative scheme, discount to the firm, uses WACC as the primary discount rate. We won't use discount to the firm because, while it is useful on a historical basis, it presupposes the modeler will have some accuracy in forecasting capital structure decisions of the board going forward, and specifically future debt issuance.

We nevertheless want to have that option available, particularly for financial firms. Remember our model is a framework on which analysts and investors can build fuller structures to meet their particular needs. Those needs may include modeling based on discount to the firm; and for that WACC is a necessary input.

We are also very interested in how much WACC varies from cost of equity. Generally (though not always), the higher that debt weighs in the total capitalization calculation, the lower the WACC. Figure 12.2 shows Qualcomm's weighted average cost of capital and its cost of equity. Because Qualcomm is debt free, the two figures were an identical 9.7% as of mid-2009.

Forecast Growth

We've now calculated the primary discount rates, specific to the asset, that will be used to discount cash flows back to present value. Next we turn our attention to the growth metrics we will use.

There are two primary ways to "get to" the forecast individual cash flows that will be discounted back to present value. One is to calculate a reliable series of growth rates for the free cash flows over the discount period out to terminal value. The other is to model growth of all the principal inputs (earnings, depreciation, capital spending, etc.) over the discount periods and calculate each cash flow discretely.

We'll begin with method 1, in which we model phased growth stages for the free cash flows over the discount period. This is the more well known and arguably the simpler approach.

Figure 12.2

The weighted average cost of capital (WACC) calculation for Qualcomm, done in mid-2009. While WACC may not be needed in calculating "discount to equity" DFCF, we want it handy in case we transition the model to "discount to the firm" DFCF.

Qualcomm					
Discounted FCF	**Calculation**				
Stock Price	43.43				
Shrs Outstndng '09	1,655.6				
Mkt Vlu Equity	71,903.5				
Book Debt '09	-				
Cost of Debt	7.0%				
Total Capital	71,903.5				
Equity/Total Capital	100.0%				
Debt/Total Capital	0.0%				
Tax Rate	31%				
WACC (k)	9.7%				
Risk-Free Rate	4.25%		Beta		1.15
Market Risk Premium	4.50%		Cost of Equity		9.7%

Method One: Forecasting DFCF per Share

Use of DuPont ROE

Our first step is to create an expanded or components-based view of return on equity, based on the DuPont method. So-called DuPont ROE dates from a finance executive who early in the twentieth century wanted a more granular look at return on equity. There are variations on this methodology, which can be expanded to five steps or more. For our purposes, three-stage DuPont ROE is sufficient. We want an accurate and detailed read on ROE because it is a key input in the growth forecast.

Given that we already calculated one-step ROE on our Ratios and Valuations worksheet, why do we derive a three-stage ROE calculation on our Stock Value worksheet? First, it acts as a check on the simple one-stage equation we used on our ratios and valuations worksheet. More important, it provides detailed information on the source of any expansion or contraction in ROE.

The three formulas within our DuPont ROE calculation are net margin (net income divided by sales), asset turnover (sales divided by assets), and equity as a percentage of assets (assets divided by stockholders' equity). The disaggregated or exploded ROE calculation may be of most interest to investors and analysts monitoring industries or companies sensitive to turnover, net margin, leverage, or some combination of the three.

When we look at Corning's one-stage ROE in Figure 12.3, we see that ROE is contracting (albeit from and to high levels relative to peers). From 25.6% in 2006, Corning's ROE slipped to 22.8% for 2007 and to 20.7% for 2008. When we look at its DuPont ROE, we see that net margin substantially improved and is thus not the problem. However, revenue generated by each dollar of asset fell substantially: asset turnover dropped from 40% in 2006 to 31% by 2008. While that was the principal drag on ROE, we also see that equity as a percentage of assets fell from 180% in 2006 to 143% in 2008.

During 2009, Corning's ROE headed down to the low teens, principally reflecting effects of the massive global recession. At the same time, and unlike many rivals, Corning was not engaging in the massive goodwill impairments that would have artificially boosted ROE. We can see that for this particular downleg in ROE, the culprit had shifted from revenue on assets to net margin, which dropped 1,800 basis points between 2008 and 2009.

Putting aside the recession of 2009, there is a justifiable explanation for the ROE slippage at Corning between 2006 and 2008. During this period, stockholders' equity rose from $7.25 billion in 2006 to $13.44 billion in 2008. Thanks to the very high margin and fast-growing precision glass business, Corning pulled off the near miracle of transitioning from a retained deficit of nearly $5 billion in 2006 to a retained profit of $1.94 billion by 2008. For most companies, declining ROEs carry no such silver linings. Information on the source of ROE degradation or growth can steer the modeling process.

Modeling DuPont ROE

On the upper right of the stock value worksheet, we situate the DuPont ROE calculation. In our example, we'll reach back to just beyond the end of the five-year historical period (2004–2008 at the time of this writing) to 2003. We begin with year 2003 in cell J1. In cell J2, we divide Corning's 2003 net income by its sales; both inputs can be linked from the ratios and valuations page. Express this and all other outcomes in the calculation as a percentage.

In cell J3, divide sales by assets. Sales is again imported from the income statement and assets from the balance sheet, both on the ratios and valuations worksheet. In cell J4, divide assets by equity; both are imported from the ratios and valuations worksheet. To calculate DuPont ROE, in cell J5 multiply the three

Figure 12.3

DuPont ROE provides an “exploded,” or more detailed, view of the components of return on equity, including net margin, sales divided by assets, and assets divided by equity.

Corning

		DuPont ROE	2003	2004	2005	2006	2007	2008	2009E	2010E
Discounted FCF	**Calculation**	Net Income/Sales	-3%	-9%	13%	36%	37%	46%	31%	36%
		Sales/Assets	29%	40%	41%	40%	39%	31%	29%	33%
Stock Price	15.59	Assets/Equity	197%	255%	199%	180%	160%	143%	144%	145%
Shrs Outstndng ‘09	1,562.5	Return on Equity	-1.6%	-9.1%	10.8%	25.6%	22.8%	20.7%	13.0%	17.2%
Mkt Vlu Equity	24,359.6									
Book Debt ‘09	1,664.0									
Cost of Debt	6.5%									
Total Capital	26,023.6									
Equity/Total Capital	[illegible]									
Debt/Total Capital	6.4%									
Tax Rate	8%									
WACC (k)	9.4%									
Risk-Free Rate	4.3%	Beta	1.20							
Market Risk Premium	4.5%	Cost of Equity	9.7%							

preceding values together. On the illustration, we see that several net loss years at Corning led to negative ROE through 2004. Beginning in 2005, net margin turned positive, resulting in a significant ROE swing of nearly 2,000 basis points into positive territory.

As a final step in the DuPont ROE process, drag and drop the inputs and calculations out to the final modeled year. Drag and drop works well because it is drawn from our annual stacks on the ratios and valuations worksheet.

Constant Growth Rate (g)

Our next set of values is the growth rate, or g. We could simply use historical earnings growth, based on normalized earnings or actual earnings adjusted with ordinary least squares regression. But remember that we are modeling cash flows, not income. Return on equity reflects not only income growth but also asset efficiency. At the same time, not all income is retained by the entity; some is paid out in the form of dividends. For our growth rate, we use return on equity multiplied by the percentage of earnings retained (as opposed to paid out in dividends).

We need to import the retained earnings percentage, which we calculated in the ratios section on our ratios and valuations worksheet. Returning to our Corning model, we see that the firm paid no dividend in 2003 (it was suspended in the earlier crisis of 2001–2002). This is expressed in the fact that our imported retained earnings percentage for that year is 100%. If we drag and drop this value, we see the dividend reinstated during 2007, to negligible effect; retained earnings percentage remained in the mid-90s. With a full year of dividends from 2008 on, and with the global recession weighing on earnings, we can see Corning's retained earnings percentage drifting lower, to a targeted range in the low to mid-80s.

Somewhere there's a company that grows stably and steadily; it's most likely a candy shop on a corner in Duluth, Minnesota. In the real world, the Corning worksheet shows the immediate challenges in this methodology. In the span of half a decade, Corning's growth varied from negative, to the mid-to-upper 20s, to the low double digits. Based on that all-over-the-map performance, what are the company's true growth prospects?

To get there, we need to introduce some stabilizers. We can use a simple average of historical g. We can normalize ROE for a set period and use that in our growth equation. We can season either of those inputs with a qualitative assessment of the company's prospects over the coming decade. We can rely on the consensus long-term earnings growth forecast, adjusted for retained earnings percentage. A degree of subjective input is nearly unavoidable. We've normalized earnings across several cycles; any average or normalizing process can also incorporate the forecast g values for the modeled years.

Growth Periods

If the number is not too distorted by global crisis or company-specific factors, constant growth rate, or g, will stand as our forecast growth rate for the first five years and possibly beyond. Our assumption is that the company's structure and strategy—including product suite and development, go-to-market strategy, manufacturing and operating cost structure, financial structure, and other factors—will enable it to maintain growth at the current pace for a reasonable time. Five-year projections—for sales, earnings, and other growth rates—are the financial analysis standard.

We also need to estimate a growth rate for the following five years. The law of large numbers tells us that maintaining growth at past rates becomes more difficult as the enterprise grows in size. New competitive threats will surface; superseding technologies will emerge; and various known and unknown forces will coalesce. The logical assumption is that maturity of the enterprise will be associated with slower growth; this is also an appropriately conservative approach.

Finally, for terminal value calculation, we need to project a long-term growth rate. This growth rate should hold some relationship to national GDP growth; that relationship should be based on the long-term experience of the company's peer group.

Presentation of Growth Periods

The discussion that unfolded in the early pages of this chapter signals the amount of variability and necessary degree of subjectivity in any entity's long-term growth forecast. In our growth presentation, we accommodate multiple inputs as we attempt to steer toward the best-efforts growth forecast for the company. Figure 12.4 shows the set of growth options we can use for Corning's DFCF valuation model. Although we'll try to use g (or 5-year g, or smoothed g) whenever possible, we also want some additional growth information on the worksheet.

We aggregate and present our growth assumptions immediately below the DuPont ROE and retained earnings percentage presentations. To calculate forecast growth rate, g, multiply DuPont-derived return on equity times retained earnings percentage. If we first perform this calculation in cell J8 on the Corning

Figure 12.4

This snippet from the Corning stock value worksheet shows the constant growth rate as well as average growth rates, interim period growth rates, and terminal growth rates that will figure in our DFCF calculation.

Corning													
			Dupont ROE		**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	
Discounted FCF	**Calculation**		Net Income/Sales		-3%	-9%	13%	36%	37%	46%	31%	36%	
			Sales/Assets		29%	40%	41%	40%	39%	31%	29%	33%	
Stock Price	15.59		Assets/Equity		197%	255%	199%	180%	160%	143%	144%	145%	
Shrs Outstndng '09	1,562.5		Return on Equity		-1.6%	-9.1%	10.8%	25.6%	22.8%	20.7%	13.0%	17.2%	
Mkt Vlu Equity	24,359.6												
Book Debt '09	1,664.0		Retained Erngs Prcntg		100%	100%	100%	100%	93%	87%	80%	84%	5-yr avg.
Cost of Debt	6.5%		Constant Growth Rate (g)		-1.6%	-9.1%	10.8%	25.6%	21.2%	18.0%	10.4%	14.5%	**17.9%**
Total Capital	26,023.6		EPS Growth Rate		15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	
Equity/Total Capital	93.6%		Avg of Growth Rates		6.7%	2.9%	12.9%	20.3%	18.1%	16.5%	12.7%	14.7%	
Debt/Total Capital	6.4%		1st 5-Yr LT Growth Rate		13.0%	13.0%	13.0%	13.0%	**12.2%**	**14.1%**	**16.1%**	**16.5%**	
Tax Rate	8%		2nd 5-Yr LT Growth Rate		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
WACC (k)	9.4%		Terminal Growth Rate		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Risk-Free Rate	4.3%		Beta		1.20								
Market Risk Premium	4.5%		Cost of Equity		9.7%								

worksheet, we can drag and drop to get a sense of likely growth even over the forecast period of 2009 and 2010.

In the next line, beginning in cell J9, we collect the consensus or proprietary forecast long-term (five-year) EPS growth rate for the company. We can use this as a further stabilizer in our long-term forecast of g, if need be. We allocate the next line, beginning in cell J10, for an average of our g calculation and the long-term growth forecast. While we average the two variables in this line, we will only use this line if average g is too erratic to be predictive. We also show a five-year average for g in cell R8.

In the next line, beginning in J11, we position our first five-year long-term growth rate. In most cases, this will be our calculation of five-year average g based on DuPont ROE multiplied by retained earnings percentage. Again, if this input is too erratic or otherwise unusable (a negative number, for instance), we will incorporate the five-year average from our lines for average of two growth rate. Note: for easy identification purposes, all five-year averages in this bloc are bolded; and in row 11, the five-year average begins in 2007 (cell N11). Drag and drop average five-year long-term growth rate across all periods.

In the following line, beginning in cell J12, we input our second five-year growth forecast. This should be based on a variation off the initial five-year growth forecast based on g. The best gauge for the appropriate degree of variation will come from the performance of industry rivals. We model the second phase of growth to be two to four percentage points below the initial growth phase. Drag and drop across all periods.

Beginning in cell J13 on our illustration, we model terminal growth. This is the long-term sustainable growth rate, typically modeled as some variation on GDP growth and reflective of the industry experience.

We've taken pains to first describe the arbitrary (proprietary) structure of our stock value worksheet, in Chapter 11, and then to define and explain the key concepts at work in discounted free cash flow valuation, in Chapter 12. In Chapter 13, our final chapter on the topic, we lay out two conventional means of DFCF valuation—two-stage and three-stage—and then introduce a slight variation in which our OLS CAGRs come into play.

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Chapter 13

DISCOUNTED FREE CASH FLOWS: TWO METHODS

Calculating DFCF Valuation

Method One, Part One: Two-Stage Discounted Free Cash Flow

The centerpiece of our present value work, determination of asset value based on DFCF, is also the centerpiece of our stock value worksheet. Here we bring together the three elements of our process—current period free cash flows, discount rates, and forecast growth rates—and use them to calculate value of the asset. We will model and discount free cash flows and terminal value on a two-stage basis, and then immediately below we will replicate the process on a three-stage basis.

Figure 13.1 shows Corning's two-stage discounted free cash flow valuation. Corning's two-stage DFCF calculation begins with the assumption that cash flows will grow faster than earnings. That's because Corning has invested heavily in glass tanks for years and now will likely slow its capital spending in a meaningful way.

Figure 13.2 shows Qualcomm's two-stage discounted free cash flow valuation. Qualcomm is a cash machine, because of its royalty and licensing business with unheard-of operating margins of 85% and higher. Even as it invests heavily in new technologies, its cash flow per share typically exceeds its earnings per share comfortably. Refer to Figure 13.1 and Figure 13.2 as we go along, to understand the staging of our model.

Figure 13.1

Corning's two-stage DFCF calculation begins with the assumption that cash flows will grow faster than earnings. That's because Corning has invested heavily in glass tanks for years and now will likely slow its capital spending in a meaningful way.

Corning													
			Dupont ROE		**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	
Discounted FCF	**Calculation**		Net Income/Sales		3%	17%	28%	34%	38%	40%	34%	36%	
			Sales/Assets		29%	40%	41%	40%	39%	31%	29%	33%	
Stock Price	15.59		Assets/Equity		197%	255%	199%	180%	160%	143%	144%	145%	
Shrs Outstndng '09	1,562.5		Return on Equity		1.7%	17.3%	23.1%	24.2%	23.2%	17.9%	14.2%	17.4%	
Mkt Vlu Equity	24,359.6												
Book Debt '09	1,664.0		Retained Erngs Prcntg		100%	100%	100%	100%	93%	87%	83%	86%	5-yr avg.
Cost of Debt	6.5%		Constant Growth Rate (g)		1.7%	17.3%	23.1%	24.2%	21.6%	15.6%	11.7%	14.9%	**17.6%**
Total Capital	26,023.6		EPS Growth Rate		15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	
Equity/Total Capital	93.6%		Avrg of Growth Rate		8.4%	16.2%	19.0%	19.6%	18.3%	15.3%	13.4%	14.9%	
Debt/Total Capital	6.4%		1st 5-Yr LT Growth Rate		13.0%	13.0%	13.0%	13.0%	**16.3%**	**17.7%**	**17.1%**	**16.3%**	
Tax Rate	8%		2nd 5-Yr LT Growth Rate		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
WACC (k)	9.6%		Terminal Growth Rate		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	
Risk-Free Rate	4.25%		Beta		1.20								
Market Risk Premium	4.70%		Cost of Equity		9.9%								

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
2-Stage Dscntd FCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2016**	**2017**	**Trmnl**
Traditional CF (NI+DDA)		2,378.6	2,940.3									
Free CF (NI+DDA-CX)		1,479.6	2,042.3									
Free CF - Chng in Adj WC		1,106.6	2,015.7									
FCF per Share		0.71	1.28	1.50	1.76	2.06	2.41	2.83	3.31	3.88	4.54	92.86
FCF Pr Shr/Discounted		0.64	1.06	1.13	1.21	1.29	1.37	1.46	1.56	1.66	1.77	36.16
Sum of DCFs 2002-11	13.15											
Dscntd Terminal Vlu	36.16											
2-Stg DFCF Value	**49.31**											

Figure 13.2

Qualcomm is a cash machine, thanks to its royalty and licensing business with unusually rich operating margins 85% and higher. Even as it invests heavily in new technologies, its cash flow per share typically exceeds its earnings per share comfortably.

Qualcomm											
Discounted FCF	**Calculation**	**Dupont ROE**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	**AVG**
		Net Income/Sales	33%	34%	37%	33%	37%	28%	15%	28%	
Stock Price	43.43	Sales/Assets	45%	47%	45%	49%	48%	46%	46%	56%	
Shrs Outstndng '09	1,655.6	Assets/Equity	119%	112%	113%	113%	117%	145%	137%	130%	
Mkt Vlu Equity	71,903.5	Return on Equity	17.5%	17.8%	19.0%	18.4%	20.8%	18.8%	9.2%	20.5%	
Book Debt '04	-										
Cost of Debt	7.0%	Retained Erngs Prcntg	88%	82%	72%	73%	74%	73%	66%	78%	
Total Capital	71,903.5	Constant Growth Rate (g)	15.4%	14.6%	13.8%	13.4%	15.5%	13.8%	6.1%	15.9%	13.5%
Equity/Total Capital	100.0%	EPS Growth Rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	
Debt/Total Capital	0.0%	Avg of 2 Grwth Rates	15.2%	14.8%	14.4%	14.2%	15.2%	14.4%	10.5%	15.4%	
Tax Rate	[illegible]	1st 5-Yr LT Growth Rate	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
WACC (k)	9.7%	2nd 5-Yr LT Growth Rate	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
		Terminal Growth Rate	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Risk-Free Rate	5%	Beta	1.15								
Market Risk Premium	5%	Cost of Equity	9.7%								

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**10**
2-Stage Dscntd FCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Trmnl**
Traditional CF (NI+DDA)		2,052.1	4,298.4									
Free CF (NI+DDA-CX)		1,202.1	3,323.4									
Free CF - Chng in Trd WC		4,180.1	3,297.8									
FCF per Share		2.52	1.99	2.26	2.57	2.92	3.31	3.76	4.27	4.85	5.51	106.41
FCF Pr Shr/Discounted		2.30	1.66	1.72	1.78	1.84	1.90	1.97	2.04	2.11	2.19	42.26
Sum of Discreet DFCFs	19.50											
Dscntd Terminal Vlu	42.26											
2-Stg DFCF Value	**61.76**											

Beginning at line 19 of Figure 13.2, in column A we set up our headers. You'll see lots of familiar concepts. Once again, we will explain the process by identifying the header in column A and then how to gather or calculate the first cell input in column C; drag and drop to follow.

We'll construct our example as though we were modeling early in 2009 with most of 2009 and all of 2010 in front of us; depending on your own point in time, adjust all periods. Before we get to the headers beginning in A19, in line 18 and columns C through L list the single integers 1 through 10; these will be used in the cash flow discounting process. In cell M18, repeat the integer 10 from cell L18.

Beginning at A19, we put in the header "2-stage Dscntd FCF" (two-stage discounted free cash flow); in cells C19 through L19, we put the years 2009 through 2018; and in cell M19, we put the word *terminal* for terminal value. In column A, we list headers for the various cash flow items imported from our ratios and valuation (R&V) worksheet. In cell A20, the header reads "Traditional CF (NI + DDA)" [traditional cash flow (net income plus depreciation, depletion, and amortization)].

In column C, we import estimated values for 2009; in column D, we import estimated values for 2010. In cell C20, we import 2009E cash flow (NI & DDA) from the R&V page. This value would be approximately in line 35 (depending on how many historical annuals you've modeled, it could be in any column from J to O). Because we are importing values from our annual stacks on the R&V worksheet, we can drag and drop the 2010 value into cell D20; but let's hold off until we get all the components.

Discreet Period Cash Flows

In cell A21, the header reads "Free CF (NI + DDA – CS)" [free cash flow (net income plus depreciation, depletion, and amortization minus capital spending]. In cell C21, we can get this value by dragging down from cell C20. In cell A22, the header reads "Free CF − Chng in Trd WC" (free cash flow minus change in trade working capital); in cell C22, import this value from the R&V worksheet. (*Don't* drag and drop from C21, or you'll get the value for free cash flow minus the change in traditional, as opposed to trade, working capital.)

Now that we've imported estimated 2009 annual free cash flow, adjusted for changes in trade working capital, we need to render it on a per-share basis. In cell A23, the header reads "FCF per Share." In C23, divide the value in cell C22 by 2009 diluted shares outstanding, imported from the annual income statement stack on the R&V page. Drag and drop the values from cells C20 through C23 into cells D20 through D23. We now have a representation of per-share free cash flow for the current (2009–2010) period, and this will serve as a baseline for future growth.

Our next step is to begin discounting these flows back to present value. The discount rate we are going to use is the cost of equity. For certain industries, it may be more appropriate in DFCF valuation to discount at the weighted average cost of capital; in this case, we discount to the firm, as opposed to discounting to equity. This requires a few more steps, which is no big deal. I've always felt that the bigger hurdle was the need for reliable insight on a firm's future capital structure decisions.

For the appropriate industries, and assuming you have a good window on financial structure planning, you can discount to the firm using the weighted average cost of capital. This will require additional stages in the worksheet to allow for financial structure assumptions and modeling. For now, let's continue with our basic technique that uses free cash flow discounted to cost of equity.

Even for 2009, we have full-year values that must be discounted back in time. In cell A24, the header reads "FCF Pr Shr/Discounted" (free cash flow per share/discounted). Assuming all the structure we've put in place, the formula will read as follows: `=C23/(1+$J17)^C18`. Let's break it down. C23 refers to the per-share amount of annual free cash flow. We're dividing this value by one plus the asset's cost of equity, discounted to the appropriate period, which in this case is one year (cell C18). Drag and drop this value from cell C24 to cell D24. Note the dollar sign in front of `J17`, which represents cost of equity; the dollar sign positioned before `J17` enables us to drag this formula across future years without losing the cost of equity cell value.

Now that we have a baseline FCF and DFCF per-share values for 2010, we need to employ a rate of growth to estimate future cash flows. If our g growth rate is stable and appears reliable, that is the best growth rate to use. If it is highly erratic, we can stabilize it by averaging it with the consensus or proprietary forecast of long-term (five-year) growth.

Using the long-term average for g, we calculate estimated 2011 free cash flow per share in cell E23 with the following formula: `=D23*(1+$R9)`. Assessing our inputs, D23 is the estimated 2010 baseline free cash flow; we are multiplying this amount by one plus the growth rate in cell R9, which is long-term average g. We are again using the dollar sign to lock this value for the drag and drop process. To discount that 2011 forecast cash flow back to present value, drag and drop the value from D24 to cell E24. To reiterate, the formula in E24 (`=E23/(1+$J17)^E18`) shows that we are discounting the estimated 2011 free cash flow back two periods or years. Next, drag and drop the values in cells E23 and E24, for the year 2011, out to cells L23 and L24, representing year 2018. We now have individual discounted free cash flows that we can sum later.

Terminal Value

The next step is to calculate terminal or ongoing value of the asset. Unlike a bond, a stock does not mature and discontinue; it has value in perpetuity, as you'd know if your forebears had been sufficiently prescient to buy scads of GE or IBM at the initial offering. We operate under the assumption that the companies we consider for valuation are financially stable and growing at some variation to normal growth for their industries. Distressed companies or those being valued for M&A considerations require a different terminal-value calculation.

By its nature, the value of a perpetuity will be exceptionally sensitive to the inputs; we're always careful with inputs, but perhaps extra careful with inputs in the terminal value calculation. The terminal value of the asset, prior to discounting, is calculated as the last-period projected cash flow divided by a denominator that incorporates the firm's long-run required return as well as its growth rate at maturity. Even for the fastest-growing enterprise, we assume that competitive forces drawn to an attractive business opportunity as well as the law of large numbers will combine to bring long-term growth down to some low multiple of GDP growth.

For value stocks a well as companies operating in mature industries, forecast terminal growth is 2% to 3%. For growth stocks and companies operating in nascent or dynamic industries, terminal growth rates of 3% to 5% may be more appropriate. This latter range puts us in conflict with the DFCF orthodoxy, which assumes that an asset's terminal growth rate cannot exceed the economy's growth. That might (or might not) be true for a domestic-centered entity; but with 40% of S&P earnings derived outside the United States, we can fairly ask, "Which economy?" For long-run required return, we use cost of equity.

Accordingly, the formula for terminal value of the asset prior to discounting is `=L23/(J17−R14)`, where the numerator L23 represents the final period (2018) forecast free cash flow and the denominator consists of the cost of equity minus the forecast long-term growth rate of 4.5%. We then discount this terminal cash flow value back to final-period present value. To do so, we can drag and drop the present value discount calculation from cell L24.

Final Value: Two-Stage DFCF Value

Returning to column A, in cell A25 we list the header "Sum of Discreet DFCFs." In cell B25, we use the formula, `=SUM(C24:L24)` to sum the DFCF inputs from

2009 through 2018. In cell A26 we list the header "Dscntd Terminal Vlu" (discounted terminal value). In cell B26, list this value by importing it from cell M24. In cell A27, our header reads "2-Stg DFCF Value" (two-stage discounted free cash flow value). In B27, we sum the values in cells B25 and B26. For Qualcomm, using these various inputs in midsummer 2009, we arrive at a value of just over $60.

Method One, Part Two: Three-Stage DFCF

Discussion of growth phases within two-stage and three-stage DFCF models begs the question: why not reduce growth gradually on an annualized basis, for instance shaving 100 or 75 basis points of forecast growth for each year? The use of a cumulative projection of several multiyear growth phases achieves that aim of averaging growth and phasing down to a sustainable rate. Growth will slow. Invariably and inevitably, success invites competitors who are eager to share in a prosperous niche. Within the enterprise, earlier risk-taking behavior may be replaced by a gradual conservatism as management seeks to preserve gains. The law of large numbers also argues against sustained hypergrowth.

Use of a three-stage DFCF model is a means of better simulating the normal growth progression for a company. Typically, firms do not shift from robust growth to GDP-mimicking growth in a single year. The three-stage model assumes that after five years at an accelerated rate, a lower average rate will prevail for the ensuing five years as the company works toward its steady-state growth.

Three-stage modeling is particularly useful for companies in the midst of an exceptional growth phase. But we tend to use it for all companies and then weight its importance based on how well a company meets the three-stage profile.

From a practical perspective, once all the inputs are in place for two-stage DFCF modeling, building a three-stage model from the two-stage structure is fast and simple. While building the three-stage model, review the two-stage DFCF procedure as outlined previously. Keep in mind that we cannot simply drag and drop values, but replicating the two-stage structure as the basis for our three-stage model keeps many of the key formulas intact.

Three-Stage DFCF: Varying the Growth Rate

We'll build the three-stage model directly beneath the two-stage model; we'll use the integers 1 through 10 in line 18 of the two-stage model in our present value discounting process. Note that Figure 13.3 shows a truncated model in which, to focus attention, we have excised the two-stage model, which is normally directly above.

Figure 13.3 shows three-stage DFCF modeling within our Qualcomm model. We begin the three-stage model in cell A21 with the header reading "3-Stg Dscnted FCF" (three-stage discounted free cash flow). Cells C21 through L21 have the years 2009 through 2018. In descending order, we have the header "traditional cash flow" in cell A22 and that value for 2009 in cell C22. Next is the free cash flow header in A23 and the 2009 value in C23; continue on down the A and C columns with free CF − change in trade WC, FCF per share, and FCF per share/discounted. Drag and drop the 2009 values in C22 through C26 to the 2010 column in E22 through E26.

As a reminder, Figure 13.3 is a truncated view of the normal model in which two-stage DFCF sits atop three-stage DFCF. We have eliminated the two-stage portion to better focus on our tasks in the three-stage process. In the full model, the row values in the formulas will be different than those discussed below.

As in the two-stage model, we'll use 2010 estimated free cash flow as a baseline. We'll drag and drop the estimated growth formula, `=D25*(1+$R9)` from D25 (2010) to L25 (2018). And we'll drag and drop the discounting formula, `=E26/(1+$J17)^E18` from D26 to L26. While in D26, hit F2 and you'll notice that the discounting formula references the integers in line 18, used in the two-stage formula as well. Therefore, if you copy this formula from the two-stage model, be careful to adjust so that it is linked to the proper discounting cell.

Now that we have the discreet annual cash flows and their present values in place, we will adjust them to accommodate another and more temperate phase of estimated growth. For the first five years, meaning 2009 through 2013, we will maintain use of the forecast growth rate based on g, or historical average return on equity adjusted by retained earnings percentage. Practically speaking, because we've hard-modeled our value for 2009 and 2010, that means using the formula, `=D25*(1+$R9)` in cell D25 and the dragged-and-dropped variation on it in cells D25 and G25.

Beginning in cell H25 for the year 2014, however, we will begin to model a more temperate pace of growth. Recall that when we set up our estimated growth grid beneath DuPont ROE, beginning in cell G13 with the header that reads "2nd 5-yr LT Growth Rate," we modeled a slower growth rate for the five-year period subsequent to the current five-year forward period. We recommended basing that growth rate on industry precedents, with inputs from the law of large numbers and SWOT analysis (strengths, weaknesses, opportunities, threats). The rate of estimated growth in the second phase, in my experience, ranges between 50% and 75% of the first growth phase.

In our Qualcomm model, we've assumed that the company will follow its current 13.5% annualized growth phase with a second phase of 10% annualized

Figure 13.3

Even mighty Qualcomm will slow down over time. We use a five-year forward growth projection based on historical and recent performance, reduced growth expectations for the ensuing five years, and a much slower growth assumption for the terminal value.

Qualcomm											
Discounted FCF	**Calculation**	**Dupont ROE**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	**AVG**
		Net Income/Sales	33%	34%	37%	33%	37%	28%	15%	28%	
Stock Price	43.43	Sales/Assets	45%	47%	45%	49%	48%	46%	46%	56%	
Shrs Outstndng '09	1,655.6	Assets/Equity	119%	112%	113%	113%	117%	145%	137%	130%	
Mkt Vlu Equity	71,903.5	Return on Equity	17.5%	17.8%	19.0%	18.4%	20.8%	18.8%	9.2%	20.5%	
Book Debt '04	-										
Cost of Debt	7.0%	Retained Erngs Prcntg	88%	82%	72%	73%	74%	73%	66%	78%	
Total Capital	71,903.5	Constant Growth Rate (g)	15.4%	14.6%	13.8%	13.4%	15.5%	13.8%	6.1%	15.9%	13.5%
Equity/Total Capital	100.0%	EPS Growth Rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	
Debt/Total Capital	0.0%	Avg Growth Rate	15.2%	14.8%	14.4%	14.2%	15.2%	14.4%	10.5%	15.4%	
Tax Rate	31%	1st 5-Yr LT Growth Rate	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
WACC (k)	9.7%	2nd 5-Yr LT Growth Rate	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
		Terminal Growth Rate	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**10**
3-Stage Dscntd FCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Trmnl**
Traditional CF (NI+DDA)		2,052.1	4,298.4									
Free CF (NI+DDA-CX)		1,202.1	3,323.4									
Free CF - Chng in Trd WC		4,180.1	3,297.8									
FCF per Share		2.52	1.99	2.26	2.57	2.92	3.21	3.53	3.88	4.27	4.70	90.80
FCF Pr Shr/Discounted		2.30	1.66	1.72	1.78	1.84	1.84	1.85	1.85	1.86	1.87	36.06
Sum of Discreet DFCFs	18.56											

growth. That is robust second-phase growth by most company standards; but Qualcomm is an extraordinary company founded by a true genius whose best growth markets (i.e., transportation and remote health monitoring) are barely visible, much less penetrated. Knowledge of the individual company and its industry—qualitative in addition to quantitative—is essential to the growth modeling process.

Accordingly, beginning in cell H25, we adjust the formula, =G25*(1+$R9), where R9 is the 13.5% first-phase growth forecast, to =G25*(1+$R12), where R12 is the average second-phase growth forecast of 10%. We don't change anything in the terminal value calculations, but note that we now begin with a smaller prediscounted terminal value than we generated in our two-stage model.

Three-Stage DFCF: Terminal Value and Finishing the Process

The procedure for terminal value for the three-stage model is just as we elaborated in the discussion of two-stage DFCF. To revisit, the formula for terminal value of the asset prior to discounting is =L25/(J17–R14), where the numerator L25 represents the final period (2018) forecast free cash flow, and the denominator consists of the cost of equity minus the forecast long-term growth rate of 4.5%. We then discount this terminal cash flow value back to final-period present value. In cell M25, the terminal value discounting formula should read =M25/(1+$J17)^M18.

Again referencing Figure 13.3, use cell A27 for the header that reads "Sum of Discreet DFCF," and in cell B27 sum those discreet cash flows from 2009 through 2018. Use cell A28 for the header "Dscntd Terminal Vlu" (discounted terminal valuation), and in cell B28 import that value from cell M25. In cell A29, the header reads "3-stg DFCF Value" (three-stage discounted free cash flow value) and in cell B29, we sum cells B27 and B28 to get the dollar value of the asset based on three-stage discounted free cash flow valuation.

Method Two: Discreet Cash Flows from Individual Components

We spent considerable time and energy finding the optimal inputs for current-period free cash flow valuations, forecast growth rates for future cash flows, and the appropriate discount factor. Still, some investors may be uncomfortable with relying on so thin a stream of data—future cash flows—for so much of the valuation calculation. They may also be less enamored of "esoteric" growth rates such as ROE adjusted by retained earnings percentage. Many investors are more comfortable with traditional growth analysis yet still want a present value calculation of future cash flows on their terms.

For analysts seeking such methodology, we offer an alternative DFCF method, in which discreet period cash flows are built from their constituents *for all periods,* and growth rates are projected based on the historical trends in the individual inputs. For want of a better name, we call the worksheet "stock value 2"; it could as easily be called "'old-timer' stock value." In Figure 13.4, we show the Qualcomm stock value 2 worksheet; refer to this worksheet throughout our discussion.

If we want to forecast individual inputs for the cash flows, we are immediately met with a challenge: at what rate should we assume growth in the various components? One number won't do for all these different categories. We need a separate basis for each of these separate inputs. And that basis should encompass various market conditions, ideally all the various phases of the economic cycle. We have such a repository of growth rates in our normalized and OLS (ordinary least squares) worksheet. We'll import those values for the individual line items.

If you studied or built two-stage and three-stage DFCF models according to our formulas, this model will look familiar around the edges (in the upper right and left sides) where we calculate the growth rates and discount rates. But it looks somewhat different in the middle, where we perform the actual modeling and discounting of cash flows.

Setting Up the Stock Value 2 Worksheet

To build this model, we must insert a new worksheet into the workbook. Copy all of the stock value worksheet, select all on the blank worksheet, and paste that content onto the new worksheet, which we'll dub "stock value 2" (if you've got a better name, go for it). We're going to leave intact everything from line 1 to line 19, including the integers 1 through 10 in line 19 which we'll use for present value discounting. We need not re-create the wheel in terms of recalculating discount rates specific to the asset (at the upper left of the worksheet), and the growth rates we calculated can stay where they are (at the upper right of the worksheet).

In the area where we formerly calculated two-stage DFCF, we'll gather the components of discounted free cash flow. But first, we need to line up the growth rates for these components; we'll do so in the cells formerly devoted to three-stage discounted free cash flow valuation.

Beginning at line 33, we gather normalized growth information from our ordinary least squares (OLS) and normalized worksheet. In cell A33, type in

Figure 13.4

Another present value calculation for modeling purposes uses historical growth rates to grow out all the major components in the free cash flow calculation for all periods. In Qualcomm's case, this methodology derived a value of $60 versus a $58 dollar value from the blended two-stage and three-stage traditional method.

Qualcomm

Discounted FCF	**Calculation**	**Dupont ROE**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	
		Net Income/Sales	33%	34%	37%	33%	37%	28%	15%	28%	
Stock Price	43.43	Sales/Assets	45%	47%	45%	49%	48%	46%	46%	56%	
Shrs Outstndng '05	1,694.3	Assets/Equity	119%	112%	113%	113%	117%	145%	137%	130%	
Mkt Vlu Equity	73,581.3	Return on Equity	17.5%	17.8%	19.0%	18.4%	20.8%	18.8%	9.2%	20.5%	
Book Debt '04	-										
Cost of Debt	7.0%	Retained Erngs Prcntg	88%	82%	72%	73%	74%	73%	66%	78%	
Total Capital	73,581.3	Constant Growth Rate (g)	15.4%	14.6%	13.8%	13.4%	15.5%	13.8%	6.1%	15.9%	13.5%
Equity/Total Capital	100.0%	EPS Growth Rate	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	115.0%	
Debt/Total Capital	0.0%	Avg Growth Rate	15.2%	14.8%	14.4%	14.2%	15.2%	14.4%	10.5%	65.4%	
Tax Rate	31%	1st 5-Yr LT Growth Rate	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	
WACC (k)	9.7%	2nd 5-Yr LT Growth Rate	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	
		Terminal Growth Rate	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%
Risk-Free Rate	5%	Beta	1.15								
Market Risk Premium	5%	Cost of Equity	9.7%								

Figure 13.4 *(continued)*

Qualcomm

		1	2	3	4	5	6	7	8	9	10	10
Component-Based DFCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Trmnl**
Net Income		1,577	3,773	4,573	5,543	6,718	8,143	9,869	12,770	16,524	21,382	
Depreciation		475	525	587	657	735	823	921	1,030	1,152	1,289	
Capital Spending		(850)	(975)	(1,288)	(1,702)	(2,249)	(2,972)	(3,926)	(5,188)	(6,855)	(9,057)	
Chng in TWC		(50)	(50)	(54)	(59)	(64)	(69)	(75)	(82)	(89)	(96)	
FCF		1,152	3,273	3,818	4,439	5,141	5,925	6,788	8,531	10,733	13,518	
Shares		1,656	1,655	1,716	1,779	1,845	1,914	1,984	2,058	2,134	2,213	
FCF per Share		0.70	1.98	2.23	2.49	2.79	3.10	3.42	4.15	5.03	6.11	118.04
FCF per Share Dscntd PV		0.63	1.64	1.69	1.72	1.76	1.78	1.79	1.98	2.19	2.43	46.88
Sum of DCFs 2002-11	17.61											
Dscntd Trmnl Vlu	[illegible]											
Component DFCF Value	**64.49**											

Normalized Growth	**Long Term**	**5-Year**		**Dscntd Terminal Vlu**							
Net Income	29%	21%									
Depreciation	12%	32%									
Capital Spending	32%	56%									
Chng in TWC	9%	10%									
Shares	4%	0%									
DCF Avg Value	**64.49**							Target		56.00	54.94
Comparables Stk Vlu	**58.03**			To Blended Value:				To Target:			
				Implied Appreciation		39.6%		Implied Appreciation		28.9%	
Blended Value	**60.62**			Dividend Yield:		1.04%		Dividend Yield:		1.04%	
				Implied Total Return:		40.6%		Implied Total Return:		30.0%	
				Risk-Adjusted Return		35.3%		Risk-Adjusted Return		26.1%	

"Normalized Growth." In descending order, we then list headers for the following inputs:

- Net income (in cell A34)
- Deprecation and amortization (in cell A35)
- Capital spending (in cell A36)
- Change in trade working capital (TWC) (in cell A37)
- Diluted shares outstanding (in cell A38)

In our OLS calculation, you'll remember that for every data point we calculated a smoothed growth trend for the longest period permitted by our historical data compilation. We also maintained a most recent five-year tally of smoothed trend-line growth. We'll stay with Qualcomm, which has historical data stretching back to 1996 and which thus reflects both good and bad times for the economy and company.

On the stock value 2 worksheet, we'll import both smoothed growth rates both for the longest period permitted by our historical data compilation and for the most recent five-year period. In cell B33, we have the header that reads "Long Term"; in cell C33, we put the header "5-year." We're now going to import from the OLS and normalized worksheet:

- For net income, OLS longest-term growth in cell B34 and 5-year growth in cell C34
- For deprecation and amortization, OLS longest-term growth in cell B35 and five-year growth in cell C35
- For capital spending, OLS longest-term growth in cell B36 and five-year growth in cell C36
- For change in trade working capital, OLS longest-term growth in cell B37 and five-year growth in cell C37
- For diluted shares outstanding, OLS longest-term growth in cell B38 and five-year growth in cell C38

Qualcomm is an uncommonly prosperous and well-run company, and its historical data provides an excellent occasion to discuss the objective recording of hard data and subjective analysis of go-forward prospects. Its long-term net income growth since 1999, even on smoothed basis, approaches 30%; its five-year growth is closer to 20%. To hammer home the importance of using OLS, a simple point-to-endpoint compound annual growth rate (CAGR) calculation signals growth topping 50 percent!

One reason net income growth has slowed is that Qualcomm is becoming a bigger and more complex organization, seeking to enter and participate in more markets. It is no surprise, then, that that pattern of faster long-term growth and slower five-year growth is reversed for the cash flow items depreciation and amortization (D&A) and CapEx (i.e., capital expenditures). As the company has matured, it has purchased assets and grown its spending in support of existing and new assets. Therefore, five-year trends in D&A and CapEx are much higher than the long-term trend.

We have used the actual change in trade working capital in our two-stage and three-stage DFCF calculation, but we had not previously measured the smoothed trend in this series. We have inserted a line in our OLS series in which we first calculate change in trade working capital and then measure the change, both on an absolute and smoothed basis.

Interestingly, Qualcomm's healthy balance sheet illustrates why we use change in trade working capital rather than absolute working capital. In late 2008, Qualcomm received an enormous one-time cash payment from Nokia as part of the royalty settlement between those two companies. Had we recorded change in absolute working capital, Qualcomm would appear to have sunk enormous sums into its working capital and thus would be seen as cash profligate.

Component-Based DFCF Calculation

In the area where we formerly calculated two-stage DFCF based purely on growing cash flows, we'll work with an expanded set of inputs. In cells C19 through L19, we have the integers 1 through 10; repeat the 10 in cell M19. In cell A20 we have the header reading "Component-Based DFCF"; in cells C20 through L20, we have the years 2009 through 2018, and in cell M20 we have "Trmnl" (terminal)."

Now lets list the components in the A column, along with the forecast inputs for each in column C (the year 2009) and D (2010). These inputs for the modeled 2009 and 2010 years we will import from our annual stacks on the ratios and valuations page. In cell A21 is the header "Net Income"; cell C21 is linked to this value for 2009 and shows the value `='QCOM Rts&Vltns'!O107`. Drag and drop this value to the right for the year 2010. Follow the same procedure for depreciation and amortization and capital spending, which are linked to the 2009 and 2010 cash flow statement on R&V. For change in trade working capital for 2009 and 2010, we calculate the value based on data in row 7 of the ratios section of our R&V worksheet. For 2009, we need to adjust because Qualcomm listed the payment from Nokia at year-end 2008 as a receivable, grossly distorting the swing in trade working capital. In cell C25 and D25, the sums of these inputs provide us with adjusted free cash flow for 2009 and 2010.

We now need to grow out the individual components to calculate period cash flows for 2011 through 2018. But we won't be using the growth data compiled in the section under DuPont ROE at the top right. Instead, we'll use the OLS data gathered below. Beginning with net income for 2011 in cell E21, we use the formula, =D21*(1+$C34), where D21 is our forecast of 2010 net income and C34 is five-year net income growth, based on an ordinary least squares regression. We've again used the dollar sign to lock in the C34 value as we drag and drop *to the right* across all periods.

For 2011 in column E, we can also drag and drop this formula *down* for depreciation and amortization, in cell E22, and for CapEx, in cell E23. In this case, however, we are going to adjust and use the longer-term trends in depreciation and amortization (cell B35) and in capital spending (cell B36). The five-year trends in these inputs are through the roof, in the 30% to 50% annual range; we do not expect Qualcomm to repeat this hyperinvestment phase on a sustainable basis. Hence, both D&A (an additive to cash flow) and CapEx (a decrement to cash flow) are forecast to grow at more moderate rates.

We can also drag down to copy this formula for the change in trade working capital in cell E24. In cell E25, we sum all inputs for component-derived free cash flow for 2011. Now we need to render this value on a per-share basis. We can replicate the formula that captures OLS growth in the share base with a copy and paste. Once again, analyst discretion and knowledge is required to best utilize the share growth data. For the past five years, share growth has been nonexistent as Qualcomm has offset compensation-related share issuance with repurchases into Treasury. Going forward, we'll take the more conservative tack and assume the share base will grow at the 4% long-term rate rather than the five-year rate of 0%.

In lines 27 and 28, we perform the same function as in our earlier DFCF method: rendering free cash flow on a per-share basis (in cell E27), and adjusting back to present value (in cell E28). To provide an example, we discount to present value in cell E28 using the formula =E27/(1+$J17)^E19, where E27 is adjusted free cash flow per share; the discount factor is the cost of capital, expressed as 1 plus cell J17; and we are discounting back from year 3, or cell E19. We can now drag and drop cells E21 through E28, representing year 2011, all the way across to L21 through L28, representing the year 2018.

We now have 10 years worth of free cash flows appropriately discounted to present value. As in our two-stage and three-stage models, these are summed in the B column. The header in cell A29 reads "Sum of DCFs 2002-11" (sum of discreet cash flows 2002 to 2011). The cash flows are summed in cell B 29, where the formula is =SUM(C28:L28).

Terminal Value of Component DFCF

The procedure for terminal value for the individual component model is identical to the process used in the two-stage and three-stage DFCF discussion. In cell M27, the formula for terminal value of the asset prior to discounting is =L27/(J17–J14), where the numerator L27 represents the final period (2018) forecast free cash flow and the denominator consists of the cost of equity minus the forecast long-term growth rate of 4.5%. We then discount this terminal cash flow value back to final-period present value. To do so, we can drag and drop the present value discount calculation from cell L28. In cell M28, the terminal value discounting formula should read =M27/(1+$J17)^M19.

In cell A30 is the header "Dscntd Terminal Vlu" (discounted terminal value), and in cell B30 import that value from cell M28. In cell A31, the header reads "Component DFCF Value"; in cell B31, we sum cells B29 and B30 to get the dollar value of the asset. For Qualcomm, our component-based present value calculation using historical growth rates renders a value around $60, as shown in Figure 13.4. If we check Figure 13.3 and look in cell B32, we see that the average value calculated from two-stage and three-stage "traditional" DFCF valuation is $58. While the two values won't always be this close, we typically see a reasonably close proximity.

Sensitivity of DFCF Valuation

We recommend playing around with the various inputs to get a sense of just how sensitive such a far-horizon calculation is to subtle changes. Here are some of our real-world observations.

If you use a lower beta, forecast DFCF value of the asset will increase; and typically, the rate-of-change relation is inversely correlated. In other words, lower the beta from 1.2 to 1.1, or by 8.3%, and the forecast asset value rises from $58.96 to $64.82, or by 8.2%. If you reduce the risk-free rate assumption or the market risk premium assumption, the estimated asset value will increase. The reason is that beta, risk-free rate, and market risk premium all figure in cost of equity (and, for that matter, in WACC); if you reduce the cost of equity, you reduce the rate at which you are discounting cash flows to present value. Conversely, and intuitively, increasing any of these inputs raises the cost of equity and lowers the estimated asset value.

In Figure 13.3, a glance at cells B25 and B26 shows that the discounted terminal value is about twice as much as the sum of discreet DFCFs. I've seen modelers frown at any relationship in which either input is out of balance, prompting them to "tweak" the model until a 1/1 relationship is restored. In my view, you need to assess the underlying asset rather than apply one-size-fits-all formulas. If you had conducted this exercise in 1909 for General Electric, a 2/1 relationship between terminal value and 10-year discreet cash flows would have woefully undercounted the ongoing value creation at GE.

If, back in 1909, you'd conducted the same exercise with General Buggy Whip, there's a fair chance your terminal value estimate overstated the ongoing prospects for the company. Investors and analysts need to understand the nature, strategy, structure, and philosophy of the entity being modeled; otherwise, any nonhistorical number is an unfounded guess, as opposed to the more honorable "guesstimate."

Annual Updates

Analysts and investors tend to look about two years out. The standard is to model the income statement on a quarterly basis for the current year as well as the next year. Sometime after second-quarter reporting is done, meaning about mid-August, analysts typically start building their following-year quarterly income statement model; using our prior example, that would entail modeling 2011. As we indicated on our discussion of the ratios and valuations input, we always want to incorporate new data, based on a reasonable degree of confidence in its validity.

Updating the stock value model to incorporate a new year's worth of data is fairly straightforward. But, as our sensitivity discussion above suggests, an errant data point can significantly skew the outcome; we want to proceed with great care in redirecting values. We are greatly aided in this endeavor by use of the F2 (i.e., Function 2) key. As experienced Excel hands know, when you are in a formula cell and you hit F2, you immediately see highlighted any cell that contributes to the formula. Any time you make a change, use the F2 key to certify that your data points are where you want them to be.

As a necessary prerequisite to adding another modeled cash flow year to the stock value worksheet, you must have (1) modeled the full quarterly income statement to include that year and (2) adjusted the ratios and valuations page so the new annual stack is in place. Assuming you've taken these steps, incorporate a new year in the model proceeding as follows.

Using Figure 13.3 as our example, drag and drop the 2010 modeled free cash flow information in cells D20 through D24 into cells E20 through E24. Between column L (in which 2018 free cash flows are modeled and discounted) and column M (terminal value), insert a column. Drag and drop L25 (FCF per share) and L26 (FCF per share/discounted) into M25 and M26. We need to move the discount periods ahead one year as well; so move the integers 1 through 10 currently in cells C18 through L18 into cells D18 through M18. Select all of the 2009 cells (currently in column C) related to two-stage and three-stage DFCF calculations; this includes cells B20 through B34. Select Delete and check the prompt Move Cells Left.

In cell B25 of the two-stage model, which shows the sum of discreet DFCFs, you will have deleted inclusion of 2009 but may not yet show inclusion of 2019. Use the F2 key to adjust to include all 10 discreet cash flow periods. For the three-stage model, do the same in cell B35.

In the two-stage model, highlight the nondiscounted terminal value in cell M23; you'll see that it is referencing the cash flow from 2018 (now in cell K23) rather than 2019 (cell L23). Adjust terminal value to reference the final discreet cash flow. For the three-stage model, do the same in line 33.

In the upper left, we also want to incorporate the most current data for our WACC calculation conducted in cells B4 through B13. We had been using year 2009 inputs from the 2009 annual stack on the ratios and valuations page. Change all these to 2010 inputs. Finally, in our DuPont ROE and growth section in the upper middle to right, drag and drop an additional year, after first making room by moving over any calculated averages; adjust those averages.

Your sheet is now updated with the most current hard-modeled data. While you're on the sheet, this is a good time to assess all your underlying assumptions (risk-free rate, market risk premium, etc.) and update any data points that may have changed (beta, long-term growth assumptions, etc.).

Completing the Stock Value Worksheet

We finish both our individual cash flow and component-based cash flow worksheets with the same group of calculations. The main items include estimation of blended value, which incorporates both our DFCF work as well as the value derived from historical comparables (we can also incorporate peer derived value, discussed in a later section). We also compare current price to our blended value and calculate the implied total return on a risk-adjusted basis. Comparing this against the market proxy (i.e., estimated average market return), we can set a rating on the stock, if need be. Finally, also using our risk metric, we can set a target price on the stock, if need be. Using the Qualcomm two- and three-stage DFCF stock value worksheet as an example, shown in Figure 13.5, let's analyze these processes one at a time.

Blended Value of the Asset

Regardless of the DFCF method (or methods) you've chosen to calculate, we now need to deploy this information in our overall asset value calculation. We've also calculated historical comparable valuations, and the final output from that work is linked to the stock value worksheet as well. It is time to begin integrating these approaches in pursuit of an estimate of the dollar value of the asset.

In cell A39 we have the header that reads "DFCF Avg Value" (discounted free cash flow average value). In cell B39, we simply average the values from B27 (two-stage DFCF) and B37 (three-stage DFCF). Use of both in our value calculation may raise some eyebrows, but we regard use of both as a conservatism mechanism. In cell A40 we have the header reading "Comparables Stk Vlu" (comparables stock value); and in cell B40, this value is imported from our R&V worksheet. We left room in cell A41 for the header to read "Peer Derived Value" (PDV) and in B41 for this value, which we'll explain later; in Qualcomm's case, we felt this value did not provide a useful or credible data point.

In cell A42, we have the header that reads "Blended Value," and in cell B42 we weight the inputs. Of all the shortcuts, compromises, and "bestimates" we'll use in our process, this one may invite the most scrutiny, debate, and criticism. First, to our weighting scheme: in instances where there is no PDV input, we typically weight our inputs two-thirds DFCF and one-third historical comparables. In cell B42, the formula reads, `=(B27+B37+B40)/3`, where B27 is two-stage DFCF value, B37 is three-stage DFCF value, and B40 is historical comparables value. We tend to overweight the more forward-looking metric (i.e., DFCF) over the more backward-looking mechanism (i.e., comparables) because the market itself is always looking forward, even as it's glancing back over its shoulder.

Purists on either side of the DFCF-comparables divide may not be happy with this commingling. But the market is precisely that, a commingling of investors' attitudes, theories, styles and beliefs, seasoned with fear and greed. We can't know the market's secret sauce, including the measures of DFCF and historical comparables poured into the stockpot. But we know for a fact both are in the soup.

Figure 13.5

The stock value page is not only the place where we conduct DFCF valuation; it is also the place where we aggregate all the different valuation methodologies (DFCF, historical comparables, Peer Derived Value), set a weighting scheme, and arrive at dollar value of the asset.

Qualcomm													
Discounted FCF	**Calculation**		**Dupont ROE**		**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009E**	**2010E**	**AVG**
			Net Income/Sales		33%	34%	37%	33%	37%	28%	15%	28%	
Stock Price	43.43		Sales/Assets		45%	47%	45%	49%	48%	46%	46%	56%	
Shrs Outstndng '09	1,655.6		Assets/Equity		119%	112%	113%	113%	117%	145%	137%	130%	
Mkt Vlu Equity	71,903.5		Return on Equity		17.5%	17.8%	19.0%	18.4%	20.8%	18.8%	9.2%	20.5%	
Book Debt '04	-												
Cost of Debt	7.0%		Retained Erngs Prcntg		88%	82%	72%	73%	74%	73%	66%	78%	
Total Capital	71,903.5		Constant Growth Rate (g)		15.4%	14.6%	13.8%	13.4%	15.5%	13.8%	6.1%	15.9%	**13.5%**
Equity/Total Capital	100.0%		EPS Growth Rate		15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	
Debt/Total Capital	[illegible]		[illegible]		15.2%	14.8%	14.4%	14.2%	15.2%	14.4%	10.5%	15.4%	
Tax Rate	31%		1st 5-Yr LT Growth Rate		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	**10.0%**
WACC (k)	9.7%		2nd 5-Yr LT Growth Rate		7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	**7.5%**
			Terminal Growth Rate		4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	**4.5%**
Risk-Free Rate	5%		Beta		1.15								
Market Risk Premium	5%		Cost of Equity		9.7%								

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**10**
2-Stage Dscntd FCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Trmnl**
Traditional CF (NI+DDA)		2,052.1	4,298.4									
Free CF (NI+DDA-CX)		1,202.1	3,323.4									
Free CF - Chng in Trd WC		4,180.1	3,297.8									
FCF per Share		2.52	1.99	2.26	2.57	2.92	3.31	3.76	4.27	4.85	5.51	106.41
FCF Pr Shr/Discounted		2.30	1.66	1.72	1.78	1.84	1.90	1.97	2.04	2.11	2.19	42.26

(continued)

Figure 13.5 *(continued)*

Qualcomm

		1	2	3	4	5	6	7	8	9	10	10
Sum of Discreet DFCFs	19.50											
Dscntd Terminal Vlu	42.26											
2-Stg DFCF Value	**61.76**											
3-Stage Dscntd FCF		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Trmnl**
Traditional CF (NI+DDA)		2,052.1	4,298.4									
Free CF (NI+DDA-CX)		1,202.1	3,323.4									
Free CF - Chng in Trd WC		4,180.1	3,297.8									
FCF per Share		2.52	1.99	2.26	2.57	2.92	3.21	3.53	3.88	4.27	4.70	90.80
FCF Pr Shr/Discounted		2.32	1.66	1.72	1.78	1.84	1.84	1.85	1.85	1.86	1.87	36.06
Sum of Discreet DFCFs	[illegible]											
Dscntd Terminal Vlu	36.06											
3-Stg DFCF Value	**54.62**											

			To Blended Value:				Target		56.00	54.94
DFCF Avg Value	**58.19**		Implied Appreciation		33.9%		Implied Appreciation		28.9%	
Comparables Stk Vlu	**58.03**		Dividend Yield:		1.04%		Dividend Yield:		1.04%	
			Implied Total Return:		34.9%		Implied Total Return:		30.0%	
Blended Value	**58.14**		Risk-Adjusted Return		30.3%		Risk-Adjusted Return		26.1%	

Risk-Adjusted Return to Blended Value

Now that we have a blended value, we need to determine the amount of return or loss implied by the span between current price and estimated value. In cell F39, the header reads “Implied Appreciation”; and in cell H30, we measure it with formula `=(B42/B4)−1`, where B4 is current price (imported from query) and B42 is blended value. Because dividend yield is part of the total return package, in cell F40 we have the header reading “Dividend Yield.” In cell G40, we calculate current annual yield with the formula `='QCOM Rts&Vltns'!L115/'Stock Value'!B4`, which imports the annual dividend from our annual income statement stack on the ratios and valuations page and divides it by the current price.

Implied total return (header in cell F41, formula in cell G41) is simply the sum of implied appreciation and dividend yield. Qualcomm began paying a dividend in mid-decade, and its annual yield adds roughly a percentage point to total return. Next we risk-adjust or normalize the return. The risk-adjusted return header is in cell F42, and the simple formula `=H41/J16` is in cell G42. The formula divides forecast total return by beta?

Why do we risk-adjust the implied total return? We see it as a necessary step in the recommendation process. We’ve generated all this data to determine the dollar value of the asset, but also to contribute to the buy, hold, or sell decision. Every shop that provides equity investment advice seems to have a different formula for the asset decision. We’ve always let the asset’s relationship to the market’s forecast behavior drive the decision.

On average, the market’s long-run annual total return is about 10%. To be recommended for purchase, an asset should have the potential to outpace that normal market return; to be recommended for sale, the asset should meaningfully lag the forecast market performance. Yet some assets will be more volatile than others; beta is the accepted measure of variance from the market norm. We risk-adjust all stocks to remove from the equation any potential return that might be related to the asset’s variability.

If our blended value estimate implies a risk-adjusted total return greater than 10%, the stock warrants a buy or market outperform rating. If the risk-adjusted total return falls within a band of –10% to 10%, we rate the stock hold or market perform. And if the stock’s forecast risk-adjusted total return is less than –10%, we believe the asset should be sold or alternatively rated market-underperform. [Regarding nomenclature, some investors dislike the implied fiduciary relationship attached to buy, hold, and sell ratings and prefer *market perform*, *outperform*, or *underperform*; others like the unambiguous clarity of *buy*, *hold*, and *sell*.]

Calculating Target Price and Risk-Adjusted Return to Target

Finally, analysts are often charged with providing target prices on their recommended buys; some shops have target prices on all rated assets. This can be a finger-in-the-air exercise, but there are methods. In our case, we only assign target prices to buy-rated assets.

Here's a method for determining target prices for buy-rated assets. In cell M38, multiply the current asset price by the average market return (10%, or 1.10) and multiply that by the beta (1.15). In Qualcomm's case, that brought us to a value fractionally under $55, at a time when the stock was trading near $43.50 and our blended value calculation was $58 on the two- and three-stage DFCF worksheet and about $60 on the stock value 2 (individual component DFCF). Investors want some stability in their recommendations; this formula would cause the target to move around every time you refresh the query page and change the current price.

So we "freeze" the target price in cell L38, with the target header in J38. In cells J39 through J42, we paste the headers from F39 to F42. Cell L39 uses the formula `=(L38/B4)–1` to measure the distance between current price and stabilized target. Cell L40 gathers dividend yield, and cell L41 compiles total return to target. We then risk-adjust total return to our stable target price in cell L42.

We typically determine the buy, sell, or hold decision based on risk-adjusted return to target price. For example, if risk-adjusted return to target for a buy-rated asset approaches 10% but is still 15% to 18% away from risk-adjusted total return to blended value, we'd likely take the buy off and put on a hold.

Just as a reminder, other factors beyond financial modeling may figure in the stock-rating decision or purchase decision. These will include economic cycle, company and industry dynamics, relative competitive advantage, and other factors.

Any discussion of discounted free cash flow compressed in a few chapters is necessarily cursory. Nonetheless, we feel we've supplied enough structure for careful modelers to begin their approach to this complex topic. We've also supplied sufficient information to value stocks via DFCF using one or more of several methodologies.

We've now addressed the two primary valuation methodologies—historical comparables and discounted present value—broadly accepted in the market. But, except for a brief discussion on relative P/Es, we've barely addressed the stock's value relationship with the broad market. And we have not yet addressed one of the most important value relationships: that of a stock to its peer group. In the final major section of our book, we'll focus on relational valuation, beginning with the construction of an industry matrix workbook. The culmination of our work is in a proprietary valuation methodology based on the interaction of historical and forward valuations for a stock within its peer group.

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PART 4

RELATIONAL VALUATION: THE INDUSTRY MATRIX WORKBOOK AND PEER DERIVED VALUE

A Note on Procedure

So far we've been meticulous in describing the formula-building process. The most complex formulas were used in the present value process. Going forward, we're going to take more of a conceptual approach and less of a mechanical approach. Based on your growing knowledge base and our change in tack, we'll continue to deemphasize detailed formula descriptions.

Introduction

Now that you've built a (fairly complete) individual company equity workbook, build about 5 or 10 or 20 more, to fill out your coverage. While that may seem a staggering request, you'll want to bring every company in your coverage to an equally granular level of modeling and valuation analysis. And realize that they do build easier after the first one. The template was built to be replicable. Understanding the organizational logic of the workbook was half the chore. We're not seeking to minimize the work that goes into each workbook, but the task becomes somewhat lighter with each company.

Use an existing individual equity workbook as your template, save it into a dedicated folder for the new company. For each company and workbook, compile the appropriate historical financial statement data within the new workbook, maintaining the organizational conventions. Companies present their financial statements and supplemental data in subtly different ways; be careful with your links.

Company equity workbooks fully unlock their value when they interact. Your wealth of individual company data represents a trove of industry data as well; it just needs to be organized.

Purpose of the Industry Matrix

For the first time, we're now going to step away from our individual equity workbook and move on to the industry matrix workbook.

The individual equity workbook has provided lots of value so far, including the preliminary determination of dollar value of the asset. But let's step back to review the analytic process. Financial modeling in and of itself is only part of the analyst's job. Equally important are an understanding of the company's business and the industry in which the company operates. Analysis is both an art and a science; in addition to compilation of data and objective analysis of the model's output, analysts are charged with both objective and subjective assessment of the company's prospects both on its own and in relationship to its peer group.

Creation of an industry matrix enables objective analysis of financial performance and valuation of the company in relation to its peer group. We hope you've used our lessons so far to build multiple models. If not, it is still possible to import valuation data for use in peer group comparisons. But for maximum flexibility with the data, we are operating under the assumption that you are linking to individual equity workbooks that you've built according to our guidance.

While we're at it, let's more fully address the topic of using publicly available data in the industry matrix, as opposed to linking to individually crafted equity models. We acknowledge that links to or importation of publicly available data sometimes makes sense. For example, if you are covering 10 industrial companies in a specific niche and there are actually more like 20 meaningful players in the space, it makes sense to incorporate data from outside your core coverage. But, given the complexity of the process we're about to describe, outside data can be a rough fit, so process it with care. And you'll need some ingenuity to adopt imported public data to the Peer Derived Value (PDV) process we describe later on.

We can more readily point to multiple advantages for using data linked directly to our individual workbooks. First off, links to your own models allows you to precisely tailor your comparative universe, with no compromises. Publicly available data can be comprehensive. But on the individual models, we have created hundreds of data points that can be easily linked.

As we have exhaustively documented, we live in an era of adjusted earnings, but not every company uses the same adjustments. Firms tend to pick and choose among the various non-cash line items to include or exclude, such as FAS 123R stock option compensation, intangibles amortization, and in-process R&D write-offs. They similarly take different tacks in adjusting their one-time items such as restructuring and impairments.

Many public data sources provide only GAAP results. For those public data sources providing adjusted earnings, adjustments are not explicit or transparent. If you seek a common ground in what you exclude or include, you need to control the exclusions yourself.

Increasingly important in a global investing environment, the industry matrix models provides a place where we can convert data from foreign companies to a common currency; in the parlance, it is the place where we "dollar up" companies such as Samsung, BMW, and Siemens that play such important roles in global business. Dollar conversions can make tangible the relationships we've studied intellectually. For example, intellectually we know how small a role U.S. companies play in the wireless infrastructure business; it is humbling and it "hits home" to when you see it in dollar terms.

Finally, a tacit benefit of using your own data is, well, tactile in nature. Imported data flies by, crossing the retina but perhaps not imprinting on the brain. If you input data you've compiled, it is somehow more familiar. This can act as a filter for rogue data points. It may be old-fashioned, but we believe you need to touch the data with your hands to really have it available in your head.

Organization of the Industry Matrix Workbook

Within the industry matrix workbook, we will have a worksheet (or in some cases several) devoted to the following information:

- Query
- Price performance grid

- Industry data compilations
- Company comparisons
- Segment worksheet
- Weightings
- Peer Derived Value (peer-adjusted value)

In brief, here are what each of these provide:

- **Query page.** This is a source of real-time prices. Recall that it is a part of each individual company workbook.
- **Price performance grid.** This grid allows the analyst to monitor absolute stock price and simple or weighted percentage changes for the stocks and the composite on a year-to-date basis, relative to the broad market, and/or from the point of time at which a ratings change is made. The grid can also provide alerts when an asset falls or appreciates by a given percentage from a year-opening price, a high or low price, or a target price.
- **Industry data compilations.** This information allows the analyst to keep all industry data in a single place; it permits easy and useful comparisons of single-market or niche trends in revenues, units, market share, and so on. It allows for visual checks of the individual asset against the simple or weighted mean for any data series.
- **Company comparisons.** These enable the analyst to track and compare peer group long-term trends and forecasts in aggregate for the various ratios, valuations, growth rates, and margin measures.
- **Segment worksheet.** This compiles data from the company comparisons for a handy tear sheet or for client presentations. It is differentiated from the company comparisons worksheet because it breaks the companies out by end-customer segments, regional focus, and other niche characteristics.
- **Weightings.** These enable market cap–weighted analysis of all outputs, which in our view provides a more accurate read on market and industry trends than simple averages. Weightings are also an essential component of Peer Derived Value.
- **Peer Derived Value (PDV).** Also called Peer Adjusted Value, PDV enables fully quantified relative valuation within the peer group (as opposed to within the broad market) via a broad range of valuation metrics.

Those are our worksheets (or, in some cases, groups of worksheets) in brief. We needn't go into great detail on the query sheet, except to say that we need a larger number of prices this time. We broaden the data set to include every company in the peer group; potential additions to the coverage group; noncovered companies, if they are meaningful players in the coverage niche; and the major averages.

Let's move on to a more detailed discussion of the contents and purpose of each worksheet, along with guidance on how to build and populate each one. In Chapter 14, you will find explanations of the query page, the price performance grid, and industry data compilation; in Chapter 15, company comparisons, the segment worksheet, and weightings are presented; and Chapter 16 addresses Peer Derived Value.

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Chapter 14

PRICE AND PERFORMANCE ANALYSIS

Every analyst has a place where he or she compiles industry data. Most have several. And having several industry workbooks, in our view, is a problem. We solve the problem by using a single industry matrix for any one industry.

Any public company is a complex entity; it may be tightly integrated in its operations or somewhat ramshackle. Representing all those integrated or disparate parts and pieces in a single valuation workbook is tough enough; in our discussion of individual equity analysis, we've expressed our concern about orphaned information and pledged our quest to leave no data point behind.

Industry analysis is not *arithmetically* more complex than individual equity analysis; it is *exponentially* more complex. Forget the orphaned data point; in the rush to compile information on covered and noncovered companies, as well as the trends shaping the industry and its place in the economy, we risk spawning whole orphanages.

To lessen the risk, we split the industry matrix into two broad themes. The first, covered in this chapter, contains price performance as well as quantifiable industry data *outside the realm of valuation*. This frees us to focus solely on a company's valuation in relationship to its peers in a separate part of the matrix. Finally, using our Peer Derived Value (PDV) methodology, we'll quantify that peer relationship and send that information back to the individual equity workbook.

Having designated a blank Excel workbook for our industry matrix, our tasks in this first industry matrix chapter are to prepare and populate the following things:

- A query page, which is a source of real-time prices.
- A price performance grid, which allows the analyst to monitor prices, measure performance, and set alerts
- One or more industry data compilations, which record in-industry trends in revenues, units, market share, and the like.

Query Page and Price Performance Grid

A first step anytime we create a new workbook is to create a query worksheet. The query page is linked via the Internet to a financial source and provides real-time pricing for an asset or a basket of assets. Refer to the individual equity workbook discussion in Part One for more color on this topic.

The company comparison worksheet we've used in communications equipment dates from early in the decade and has data dating back to 1998; with a current 17 companies in the matrix, it stretches nearly 500 lines down the worksheet. We'll limit our discussion to the communications equipment matrix; communications semiconductors and EMS companies have matrix workbooks of their own. But we include pricing for these related sectors in this matrix (as well as on their own matrices) because they are adjacent to the communications equipment industry and provide useful information in that capacity.

Overview

The financial world is forever measuring and calculating. One set of measurements is analyst performance. Amid all the number crunching and the desire to get the model right, it is easy to lose sight of the ultimate goal of making money for the client. Most analyst compensation is directly or indirectly tied to total-return performance; the higher up you go, the more your very employment hinges on your performance.

The price percentage change worksheet, once developed, allows the analyst to monitor stock price changes on an absolute and relative basis; it also enables the analyst to calculate simple or weighted percentage price changes for the components and the composite on a year-to-date basis and/or from the point of a ratings change. You can adjust the grid to alert you when an asset falls or appreciates a given percentage from a year-opening price, a high or low price, or a target price.

In short, the action sheet is a comprehensive price manager. It is also there to tap you on the shoulder when it's time to change a rating or make the asset buy-sell decision.

A grid tracking real-time asset price performance is a vital tool in the value kit. Let's turn to the example and step through the various parts and pieces within this model. Remember, we've taken off the training wheels so we won't be coaxing you through every formula; there are, however, one or two formulas that bear explaining.

Figure 14.1a and b shows absolute and relative price performance along with alert functions for separate baskets of communications equipment, communications semiconductor, and EMS companies. At the bottom of the sheet, there is a less-detailed price tracker for technology sector bellwethers. Finally on the right is an area to track performance since ratings changes. Refer to the various sections as they are discussed in the following subheads.

Year-to-Date Percentage Change

As a starting point, dedicate a worksheet to the pricing grid, which we can call just that (I call this worksheet "action sheet," for reasons that will be clear further on). Begin by listing the companies that will be included in the workbook, along with their tickers. Analyst performance is frequently measured on a calendar basis. (If this is not your situation, you can adjust accordingly later.)

Therefore, in line with each company name and ticker, enter the opening price for the current year (for example, 2009); if you are following along with the example, this goes in column C. We then put current price, which is linked to the query sheet, in column D; and percentage change from open in column E.

Figure 14.1 also shows companies grouped by several categories in the communications technology area. For each category, we show the group simple average; we also show simple average return for all the stocks on the page. This gives us an industry benchmark by which to gauge performance and identify leaders and laggards. This is all standard practice and useful in its way. But ultimately it is just another batch of numbers and percentages, swimming before our eyes with all the other data. Our buy- sell triggers help distinguish the activity of individual tickers.

Figure 14.1a

The price performance grid within the industry matrix workbook allows asset, peer group, and index price-tracking on a year-to-date or specified-period basis and can provide alerts that assist in asset-timing decisions. Space constraints prevent us from showing the worksheet exactly as it appears in the workbook; it is simply too wide. Figure 14.1a, focused on the left side of the worksheet, shows year-to-date price change for the coverage universe and for industry bellwethers, as well as various price alerts that are triggered in the event that a stock rises or falls notably.

Action Sheet										
Pricing										
Company	**Ticker**	**1/1/2009 Price**	**Current Price**	**% chnge from open**	**2009 opening price minus 10%**	**generates action if current Price less than RP-10%**	**2009 opening price plus 20%**	**generates action if current Price grtr than RP+20%**	**Current cycle high (CH) price**	**generates action if current Price less than CH-10%**
ADC Telecom	ADCT	5.47	7.57	38.4%	4.97		6.56	action	8.88	action
Adtran	ADTN	[illegible]	[illegible]	[illegible]	13.53		17.86	action	24.58	
Alcatel-Lucent	ALU	2.15	4.70	118.6%	1.95		2.58	action	4.50	
Big Band	BBND	5.52	4.23	-23.4%	5.02	action	6.62		4.08	
Ciena	CIEN	6.70	12.84	91.6%	6.09		8.04	action	16.33	action
Cisco Systems	CSCO	16.30	24.03	47.4%	14.82		19.56	action	23.24	
Ericsson	ERIC	7.81	10.03	28.4%	7.10		9.37	action	10.66	action
Extreme Networks	EXTR	2.34	2.71	15.8%	2.13		2.81		3.03	action
Corning Inc.	GLW	9.53	15.68	64.5%	8.66		11.44	action	16.17	action
JDS Uniphase	JDSU	3.65	6.96	90.7%	3.32		4.38	action	7.71	action
Juniper	JNPR	17.51	27.53	57.2%	15.92		21.01	action	27.28	
Motorola	MOT	4.43	8.48	91.4%	4.03		5.32	action	8.66	action
Nokia	NOK	15.60	14.69	-5.8%	14.18		18.72		15.74	action
Nortel Networks	NT	0.26	0.07	-73.1%	0.24	action	0.31		0.07	
Polycomm	PLCM	13.51	26.85	98.7%	12.28		16.21	action	26.44	
Sycamore Networks	SCMR	2.69	2.99	11.2%	2.45		3.23		3.21	action
Tellabs	TLAB	4.12	7.14	73.3%	3.75		4.94	action	6.95	
AVG				**46.6%**						

Figure 14.1a *(continued)*

Action Sheet										
Pricing										
Company	**Ticker**	**1/1/2009 Price**	**Current Price**	**% chnge from open**	**2009 opening price minus 10%**	**generates action if current Price less than RP-10%**	**2009 opening price plus 20%**	**generates action if current Price grtr than RP+20%**	**Current cycle high (CH) price**	**generates action if current Price less than CH-10%**
Analog Devices	ADI	19.02	27.41	44.1%	17.29		22.82	action	29.40	action
Broadcom	BRCM	16.97	29.54	74.1%	15.43		20.36	action	30.55	action
Cavium	CAVM	10.51	21.94	108.8%	9.55		12.61	action	21.48	
Qualcomm	QCOM	35.83	41.70	16.4%	32.57		43.00		46.65	action
Texas Instruments	TXN	15.52	23.64	52.3%	14.11		18.62	action	25.00	action
Vishay Intertechnology	VSH	3.42	7.86	129.8%	3.11		4.10	action	8.49	action
AVG				**[illegible]**						
Celestica	CLS	4.61	9.53	106.7%	4.19		5.53	action	9.45	
Flextronics	FLEX	2.56	7.49	192.6%	2.33		3.07	action	7.54	action
Jabil Circuit	JBL	6.75	14.35	112.6%	6.14		8.10	action	12.68	
Sanmina-SCI	SANM	2.82	7.15	153.5%	2.56		3.38	action	7.15	
AVG				**141.4%**						
Total Coverage			**Average return**	**68.1%**						
For this year	S&P 500	903.25	1,071.49	18.6%	821.14					
	NASDAQ	1577.03	2,139.28	35.7%	1433.66					
	DJIA	8668.39	9,864.94	13.8%	7880.35					
From peak	S&P 500	1565.00	1,071.49	-31.5%						
	NASDAQ	2861.00	2,139.28	-25.2%						
	DJIA	14164.53	9,864.94	-30.4%						

(continued)

Figure 14.1a *(continued)*

Action Sheet										
Pricing										
Company	**Ticker**	**1/1/2009 Price**	**Current Price**	**% chnge from open**	**2009 opening price minus 10%**	**generates action if current Price less than RP-10%**	**2009 opening price plus 20%**	**generates action if current Price grtr than RP+20%**	**Current cycle high (CH) price**	**generates action if current Price less than CH-10%**
From peak	S&P 500	1565.00	1,071.49	-31.5%						
	NASDAQ	2861.00	2,139.28	-25.2%						
	DJIA	14164.53	9,864.94	-30.4%						
Sub-Sectors										
Enterprise				43.8%						
[illegible]				[illegible]						
Components				64.5%						
Bellwethers										
Microsoft	MSFT	19.44	25.55	31.4%						
Cisco Systems	CSCO	16.30	24.03	47.4%						
Nokia	NOK	15.60	14.69	-5.8%						
Motorola	MOT	4.43	8.48	91.4%						
Qualcomm	QCOM	35.83	41.70	16.4%						
Oracle	ORCL	17.73	20.74	17.0%						
Intel	INTC	14.56	20.17	38.5%						
Hewlett-Packard	HPQ	35.94	47.38	31.8%						
Dell	DELL	10.07	15.81	57.0%						
Intl. Business Machines	IBM	83.50	125.93	50.8%						
Xerox	XRX	7.97	7.75	-2.8%						
Amazon	AMZN	49.91	95.71	91.8%						
				38.7%						

Figure 14.1b

In a compacted view, Figure 14.1b show mainly the right side of the price performance grid, which focuses on relative performance (in relation to the market benchmark), composite performance on a market-capitalization-weighted basis, and performance of the asset in the span since a ratings change and/or asset decision not necessarily made within the performance-assessment period.

Action Sheet												
Pricing												
Company	**Ticker**	**1/1/2009 Price**		**Relative Prfrmnc**		**Market Cap**	**MrktCp * Rtrn**		**Rating**	**Rating Change Date**	**Rating Change Price**	**since rating % Chng**
ADC Telecom	ADCT	5.47		19.8%		731,458,458	280,815,861		HOLD	2/9/2009	3.52	115%
Adtran	ADTN	14.88		48.2%		1,559,005,426	1,042,480,107		BUY	12/19/2006	21.60	15%
Alcatel-Lucent	ALU	2.15		100.0%		10,620,566,069	12,596,485,338		HOLD	1/31/2007	12.79	-63%
Big Band	BBND	5.52		-42.0%		280,541,215	(65,561,262)		HOLD	8/11/2009	4.00	6%
Cien[illegible]	[illegible]	6[illegible]		[illegible]		1,175,300,426	1,077,066,361		BUY	12/8/2006	25.56	-50%
Cisco Systems	CSCO	16.30		28.8%		139,197,984,228	66,012,295,588		BUY	2/27/2009	14.57	65%
Ericsson	ERIC	7.81		9.8%		31,985,669,148	9,091,957,171		BUY	8/8/2007	18.97	-47%
Extreme Networks	EXTR	2.34		-2.8%		241,078,731	38,119,287		BUY	11/5/2008	2.00	36%
Corning Inc.	GLW	9.53		45.9%		24,375,908,954	15,730,518,370		BUY	2/17/2009	11.56	36%
JDS Uniphase	JDSU	3.65		72.1%		1,548,320,216	1,404,093,127		HOLD	11/3/2008	5.49	27%
Juniper	JNPR	17.51		38.6%		14,431,639,310	8,258,425,236		BUY	12/5/2007	31.79	-13%
Motorola	MOT	4.43		72.8%		19,464,685,669	17,795,028,659		HOLD	3/22/2007	17.85	-52%
Nokia	NOK	15.60		-24.5%		54,462,115,764	(3,176,956,753)		BUY	1/10/2008	34.69	-58%
Nortel Networks	NT	0.26		-91.7%		35,851,585	(26,199,235)		HOLD			
Polycomm	PLCM	13.51		80.1%		2,257,073,861	2,228,672,487		BUY	6/18/2007	33.81	-21%
Sycamore Networks	SCMR	2.69		-7.5%		850,541,084	94,855,883		HOLD	6/1/2004	4.36	-31%
Tellabs	TLAB	4.12		54.7%		2,828,690,161	2,073,457,351		HOLD	1/24/2007	9.95	-28%
				28.0%			**43.9%**					

(continued)

Figure 14.1b *(continued)*

Action Sheet									
Pricing									
Company	**Ticker**	**1/1/2009 Price**	**Relative Prfrmnc**	**Market Cap**	**MrktCp * Rtrn**	**Rating**	**Rating Change Date**	**Rating Change Price**	**since rating % Chng**
Analog Devices	ADI	19.02	25.5%	7,991,360,787	3,525,106,046	BUY	10/13/2008	23.02	19%
Broadcom	BRCM	16.97	55.4%	14,648,886,454	10,850,707,291	BUY	2/2/2007	31.83	-7%
Cavium	CAVM	10.51	90.1%	910,012,423	989,670,980	BUY	4/2/2008	17.06	29%
Qualcomm	QCOM	35.83	-2.2%	69,318,328,268	11,356,365,809	BUY	2/23/2009	33.33	25%
Texas Instruments	TXN	15.52	33.7%	29,820,062,590	15,601,733,778	BUY	3/24/2009	17.01	39%
Vishay Intertechnology	VSH	3.42	111.2%	1,466,962,129	1,904,477,150	BUY	4/30/2009	5.87	34%
			52.3%		35.6%				
Celestica	CLS	4.61	88.1%	2,184,275,939	2,331,157,835	HOLD	10/2/2006	11.19	-15%
Flextronics	[illegible]	[illegible]	[illegible]	6,072,395,976	11,694,106,313	BUY	6/1/2000	31.00	-76%
Jabil Circuit	JBL	6.75	94.0%	3,065,708,251	3,451,760,401	BUY	5/19/2006	34.00	-58%
Sanmina-SCI	SANM	2.82	134.9%	0	-	HOLD	8/2/2006	3.38	112%
			122.7%		154.4%				
					-				
					196,160,639,181				
Total Coverage			**49.4%**	**weighted return**	**44.4%**				
For this year	S&P 500	903.25							
	NASDAQ	1577.03							
	DJIA	8668.39							
From peak	S&P 500	1565.00							
	NASDAQ	2861.00							
	DJIA	14164.53							

Figure 14.1b *(continued)*

Action Sheet									
Pricing									
Company	**Ticker**	**1/1/2009 Price**	**Relative Prfrmnc**	**Market Cap**	**MrktCp * Rtrn**	**Rating**	**Rating Change Date**	**Rating Change Price**	**since rating % Chng**
Sub-Sectors									
Enterprise			**25.2%**						
Carrier-Centric			26.1%						
Components			45.9%						
Bellwethers									
Microsoft	MSFT	19.44	12.8%						
Cisco Systems	CSCO	16.30							
Nokia	NOK	15.[illegible]							
Motorola	MOT	4.43							
Qualcomm	QCOM	35.83							
Oracle	ORCL	17.73	-1.6%						
Intel	INTC	14.56	19.9%						
Hewlett-Packard	HPQ	35.94	13.2%						
Dell	DELL	10.07	38.4%						
Intl. Business Machines	IBM	83.50	32.2%						
Xerox	XRX	7.97							
Amazon	AMZN	49.91							
			20.1%						

Buy-Sell Triggers

We can kick it up a notch if we add action alerts to the worksheet. We acknowledge the wealth and variety of asset-tracking software available. Here are a few quick and easy (and no-cost) action triggers you can add to your price performance grid.

By way of background, many investors have codified stop-loss rules. If you purchase an asset and it loses a given percentage, sell it and don't look back. Investors adopt these rules in recognition of human nature. Some investors set hard stops; *Investor's Business Daily* is famous for advocating this approach, recommending a hard stop at 8%. Others construct relative stops, meaning they sell the stock when it declines a given percentage (say 4% to 7%) more than the market.

Without delving too deeply into investor psychology, the academic literature supports that view that in aggregate, we are prudent in the realm of gains but risk takers in the realm of losses. Investors have no trouble taking money off the table after a stock has risen 12% or 20% or whatever. But when stocks decline, unwilling to admit our miscalculation we rationalize: I liked it at $60, I must love it at $45; other investors will see it's a bargain and come in at $30; and so it continues until it lands on the pink sheets.

Analysts have to analyze and report on so many companies and events, answer and make so many phone calls, and otherwise serve so many constituencies that important buy-sell signals can slip by unnoticed. Whether or not you believe in hard or relative stops, it is good to provide visual clues that may prompt action.

Accordingly, in column F note that we have listed the year-opening price for each stock minus 10%. Then, in column G, we have set up an alert should any stock dip below that 10% reduced price relative to opening price. Having promised to dispense with the formulas going forward, let's get right to ignoring that new rule. Under the header "Generates Action If Current Price Less Than RP [i.e., recent price] Minus 10%," we have this formula in each cell: `=IF(D5<F5,"action"," ")`. In other words, if the terms in the header are met, the cell will reveal the word *action*; otherwise the cell will remain blank. One example in row 7, Alcatel-Lucent, had a tough 2008 but was having a whip-crack 2009; with its 119% YTD gain, it plainly was not sounding the sell action alert at the time of our analysis.

The technology sector was enjoying a good 2009, with many of the gaudiest gains coming even as we were writing this section. We did not know how good it would be when the year began, but we sensed a rebound was on the way. Accordingly, we set our upside bogey a bit higher. Column H shows 2009 opening price plus 20%; and in column I, our header tells us what the formula will reveal:

"Generates Action If Current Price Grtr [greater] Than RP+20%." The formula `=IF(D5>H5,"action"," ")` is simply a reworking of the earlier formula. And again, if the terms laid out in the header are met—if the stock rises more than 20% from the opening level—the word *action* appears. At the time we were finalizing the book, only a handful of communications equipment companies had failed to meet the criteria, and one was in the process of going out of business.

The technology sector rally has been so robust, particularly in some early-cycle areas, such as semiconductors and EMS (electronic manufacturing services), that we've also set up a "rolling" stop. We want to hold the asset until it attains the full measure of its return; but we'd like to know if some portion of the gain has begun to erode, perhaps signaling a deeper downturn on the way. Certainly, momentum investors graph and follow these kinds of trends much more rigorously. Accordingly, in column J, we show the high price for the cycle; and in column K, we have our 10% stop alert. We see in Figure 14.1 that several stocks have slipped off their cycle highs. For the equity analyst, this may signal that it is time to take off the buy rating; for the portfolio manager, it may be time to lighten up or eliminate the holding.

We recognize that there are a host of asset-software solutions that can price-track and provide a range of stop and rolling-stop alerts and triggers. But we like that this sheet is situated within our industry matrix, and that all the worksheets share links to the query page—meaning that at all times, our real-time information is aligned.

Relative Performance

Every investor is interested in performance in relation to the benchmark. Adding relative performance to this price performance grid is simple. In column M of Figure 14.1b, we list the stock's relative performance on a percentage basis. There are a couple of ways we could express this; for example, we could express stock out-performance or underperformance as a ratio. But what investors want to know and what they are constantly asking is, how much more or how much less has it done than the market?

To answer that question, we need the benchmark year-to-date return on the page; in this case, the S&P 500 capital appreciation percentage is in cell E40 (Figure 14.1a). To get ADC's relative performance, for example, simply subtract the market performance from ADC's absolute performance. If you want to drag and drop this formula down the column, remember you need to lock the value of cell E40 by inserting a dollar sign before the number. (If you were dragging and dropping across the row, you lock the value with a dollar sign before the letter.) When we get to cell M22, we use the same formula to get relative return of the coverage segment; and in cell M38, we get relative return for the entire coverage universe.

Market Cap–Weighted Return

We'll discuss market-weighted returns much more extensively a little further along in this chapter. In fact, we need to get a bit ahead of ourselves in that in column O, we link to the market capitalizations that are the core element of our weightings worksheet in the industry matrix. If you are uncomfortable with jumping ahead or returning to finish this section later, you can gather the market cap data in column O from the query sheet, or by getting data for shares outstanding for the individual assets and multiplying by share price.

Once the individual market caps are in column O, you can determine the market-weighted return in column P as follows. In the individual cells of column P, multiply percentage year to date price change times that asset's market capitalization. In cell P22, we determine market cap–weighted return of the group by dividing the sum of market cap-times-return by the sum of market cap, as expressed in formula `=SUM(P5:P21)/SUM(O5:O21)`. We see that weighted return lags simple average return, likely because some heavy hitters (Nokia, most notably) were lagging at the time of this pricing "snapshot."

For the telecom equipment niche, we now have three ways of looking at peer group year-to-date return, all in row 22. We have calculated the absolute simple average return in cell E22, the relative simple average return in cell M22, and the market cap–weighted return in cell P22.

In mid-August 2009, year-to-date market cap–weighted capital appreciation for this group was about 29%, compared with an absolute simple average return of 32% and a relative simple average return of 21%.

By early October, all those metrics had moved up, but the gap between simple average and weighted average had widened. In other words, as the recovery rally intensified, tech investors were less obsessed with blue chips and willing to try on more speculative names. By printing this snapshot every week or so and examining return relationships, you can provide similar insights.

Finally, while we study all return metrics, in our opinion the market-weighted return figure gives the truest picture of how investors in this area have fared, based on the available shares in which to invest.

Absolute and Relative Return from the Asset Decision

By "asset decision," we mean the ratings change by the equity analyst, or the decision to buy or sell the asset by the portfolio manager. This is the acid test of performance; it is the source of pride and regret, and examining this data can leave you squirming. In this case, we've set up the grid to show the nature of the rating change in column R; the change date in column S; price at the change date in column T; and percentage change since the rating change in column U.

How do we stack up? Leave it to the fence-sitting hold rating to muddy the waters. We'd need to dedicate much more time, space, and computing power to calculate cumulative analyst performance based on all the ratings changes. Like the competing methodologies and algorithms, we'd need to figure out how to quantify the value of the hold ratings. Life would be so much simpler in a binary (buy and sell) world; the fact that it is not explains the multiple methodologies for calculating cumulative performance. As a reminder, we are not trying to replace or subvert the plethora of highly useful performance analysis spreadsheets and software available. Our purpose is simply to use easily input data to keep a running tally on the performance of individual assets from the time of the asset decision.

To calculate relative return from the time of the asset decision, in column Y we need to record S&P 500 price on the date of the asset purchase/sale. To calculate relative price change, we use a formula that includes the asset's absolute price change since the asset decision (ratings change or sale/purchase) minus the percentage change in the S&P 500 from the date of the asset decision to real time. The formula looks like this: `=U5–((D$50/Y5)–1)`.

On this, our first worksheet (excluding the ubiquitous query workbook) in the industry matrix workbook, we also tally the performance of some industry bellwethers; and we divvy up the communications equipment stocks further to see how the sector is performing based on the primary customer group served (carriers, enterprise, or components). Although the action sheet will be one of our more compact worksheets, it carries lots of practical information. Remember that the various value triggers are not designed to send you straight to the trading desk; they're meant to send you back to reexamine the individual valuation workbook so you can make the most informed decision.

Replicating the Action Sheet

As the new year nears, prepare next year's action sheet; price it with the January 1 prices. You'll want to save the prior year's actions sheet as a worksheet within the matrix workbook; it provides handy access to historical price information. For example, the near doubling in the price of the JDSU shares as of late 2009 is best seen in the context of its 73% decline, from $12.06 to $3.65, during 2008. And Qualcomm' peer group underperformance in 2009 takes on a new color when we consider its 9% decline in 2008, a year in which the communications-semiconductor peer group fell 44%.

Industry Data Compilations

One of the greatest challenges the analyst or finance professional faces is information management. Analysis, like intelligence itself, is a function of scope and focus. Scope—the breadth (really, the flood) of data and information that threatens to overwhelm us—must necessarily be brought into focus—into the linear stream of text or the calculated value—to provide value to the investor.

Information comes at us in splatter fashion; it is disorderly, random, and accretive. We fish in the flood for what's useful to our analysis. Yes, we can buy blocs of tailored data, but if that alone were sufficient, we could fold our valuation tents and go home. We would argue that the very act of managing the scope of ordered and random data and directing it into the funnel of useful information informs the asset decision more viscerally and successfully than perusing a cold stream of purchased data.

A more prosaic challenge facing the analyst is orphaned data. It is not uncommon for an analyst to have a dozen or more spreadsheets for a single stock, some with company-only data and some with industry data. The asset decision can be contemplative, but just as often it's opportunistic; at key moments, marshalling data off spreadsheets that don't speak to one another can be like herding those proverbial cats. (Have they ever been herded?)

In our individual data worksheet, we seek to make every data point contribute to the value decision, we strive to eliminate duplication, and we keep it timely with real-time pricing. The industry matrix worksheet is the logical place for all industry data. In many cases, compiled industry data does not contribute directly to the dollar-value-of-the-asset process. But it aids in the subjective assessment process, which for the analyst is arguably as important as objective and quantitative valuation processes.

The various industry information worksheets in our communications equipment model are concerned mainly with market share and/or technology share in various niches, such as mobile handsets, smart phones, communications semiconductors, and wire-line and wireless infrastructure equipment. Most of the worksheets are structured to show absolute revenues or units, as appropriate, for multiple quarters on an historical and (sometimes) modeled-forward basis.

Let's take a look at the Mobile Handsets worksheet, illustrated in Figure 14.2. Some of this data is publicly available; data with much more supporting detail can be purchased. This kind of table can also be put together based on company information. The data is expressed in handset units shipped (not sold) in any quarter. The worksheet is mainly concerned with the shifting fortunes of the top five handset vendors, and it is supported by other worksheets detailing

Figure 14.2

The fortunes of the top five handset vendors can experience some nasty reversals. Although summing unit shipments and determining market share in units still has value, this data seems to be becoming less relevant as high-margin smart phones grow in popularity and “dumb” phones sink to commodity pricing levels.

Global Mobile Handset Units and Market Share

Source: Companies, Gartner, StrategyAnalytics, IDC, Argus Estimates

Units Shipped (in millions)

Company	1Q05	2Q05	3Q05	4Q05	2005	1Q06	2Q06	3Q06	4Q06	2006	1Q07	2Q07	3Q07	4Q07	2007
Nokia	54.96	61.21	67.23	82.22	**265.61**	76.09	77.07	88.13	102.79	**344.92**	92.05	100.80	111.06	133.19	**437.10**
Motorola	30.14	34.26	38.63	41.88	**144.92**	45.52	50.17	51.88	61.03	**209.25**	47.62	35.55	36.54	39.29	**159.00**
Samsung	24.48	25.03	25.86	28.36	**103.75**	38.08	25.53	30.38	32.01	**116.48**	32.10	37.43	47.32	44.35	**161.20**
Sony-Ericsson	9.91	11.90	13.85	16.12	**51.77**	13.60	15.28	19.40	26.00	**73.64**	21.77	24.92	26.86	29.85	**103.40**
LG Electronics	11.46	13.07	13.51	16.88	**54.92**	14.51	14.40	14.96	17.83	**61.99**	16.01	19.10	21.85	23.54	**80.50**
All Others	50.04	48.22	47.67	49.65	**155.88**	46.25	46.67	46.31	44.89	**161.03**	49.49	41.31	33.68	59.82	**184.30**
TOTAL	180.99	193.69	206.75	235.1[illegible]	**776.8[illegible]**	234.04	229.12	251.06	284.56	**967.30**	259.04	259.11	277.30	330.05	**1,125.50**

% Market Share

Market Share	1Q05	2Q05	3Q05	4Q05	2005	1Q06	2Q06	3Q06	4Q06	2006	1Q07	2Q07	3Q07	4Q07	2007
Nokia	30.4%	31.6%	32.5%	35.0%	**32.5%**	32.5%	33.6%	35.1%	36.1%	**35.7%**	35.5%	38.9%	40.1%	40.4%	**38.8%**
Motorola	16.7%	17.7%	18.7%	17.8%	**17.7%**	19.4%	21.9%	20.7%	21.4%	**21.6%**	18.4%	13.7%	13.2%	11.9%	**14.1%**
Samsung	13.5%	12.9%	12.5%	12.1%	**12.7%**	16.3%	11.1%	12.1%	11.2%	**12.0%**	12.4%	14.4%	17.1%	13.4%	**14.3%**
Sony-Ericsson	5.5%	6.1%	6.7%	6.9%	**6.3%**	5.8%	6.7%	7.7%	9.1%	**7.6%**	8.4%	9.6%	9.7%	9.0%	**9.2%**
LG Electronics	6.3%	6.7%	6.5%	7.2%	**6.7%**	6.2%	6.3%	6.0%	6.3%	**6.4%**	6.2%	7.4%	7.9%	7.1%	**7.2%**
Others	27.6%	24.9%	23.1%	21.1%	**19.2%**	19.8%	20.4%	18.4%	15.8%	**16.6%**	19.1%	15.9%	12.1%	18.1%	**16.4%**
TOTAL	100.0%	100.0%	100.0%	100.0%	**95.1%**	100.0%	100.0%	100.0%	100.0%	**100.0%**	100.0%	100.0%	100.0%	100.0%	**100.0%**

(continued)

Figure 14.2 *(continued)*

Global Mobile Handset Units and Market Share

Source: Companies, Gartner, StrategyAnalytics, IDC, Argus Estimates

Year over Year Percentage Change in Units Shipped

Company Y/Y		1Q06	2Q06	3Q06	4Q06	2006	1Q07	2Q07	3Q07	4Q07	2007
Nokia		38.4%	25.9%	31.1%	25.0%	**29.9%**	21.0%	30.8%	26.0%	29.6%	**26.7%**
Motorola		51.0%	46.4%	34.3%	45.7%	**44.4%**	4.6%	-29.1%	-29.6%	-35.6%	**-24.0%**
Samsung		55.6%	2.0%	17.5%	12.9%	**12.3%**	-15.7%	46.6%	55.7%	38.6%	**38.4%**
Sony-Ericsson		37.3%	28.4%	40.1%	61.3%	**42.2%**	60.1%	63.1%	38.5%	14.8%	**40.4%**
LG Electronics		26.6%	10.2%	10.7%	5.7%	**12.9%**	10.3%	32.6%	46.1%	32.0%	**29.9%**
Others		-7.6%	-3.2%	-2.8%	-9.6%	**3.3%**	7.0%	-11.5%	-27.3%	33.3%	**14.5%**
TOTAL		29.3%	18.3%	21.4%	21.0%	**24.5%**	10.7%	13.1%	10.5%	16.0%	**16.4%**

Quarter over Quarter Percentage Change in Units Shipped

Company Q/Q	2Q05	3Q05	4Q05		1Q06	2Q06	3Q06	4Q06		1Q07	2Q07	3Q07	4Q07	
Nokia	11.4%	9.8%	22.3%		-7.5%	1.3%	14.4%	16.6%		-10.5%	9.5%	10.2%	19.9%	
Motorola	13.7%	12.8%	8.4%		8.7%	10.2%	3.4%	17.6%		-22.0%	-25.3%	2.8%	7.5%	
Samsung	2.2%	3.3%	9.7%		34.3%	-33.0%	19.0%	5.4%		0.3%	16.6%	26.4%	-6.3%	
Sony-Ericsson	20.2%	16.3%	16.4%		-15.6%	12.4%	26.9%	34.1%		-16.3%	14.5%	7.8%	11.1%	
LG Electronics	14.0%	3.4%	24.9%		-14.0%	-0.7%	3.9%	19.2%		-10.2%	19.3%	14.4%	7.7%	
Others	-3.6%	-1.2%	4.2%		-6.9%	0.9%	-0.8%	-3.1%		10.3%	-16.5%	-18.5%	77.6%	
TOTAL	7.0%	6.7%	13.7%		-0.5%	-2.1%	9.6%	13.3%		-9.0%	0.0%	7.0%	19.0%	

Figure 14.2 *(continued)*

Global Mobile Handset Units and Market Share															
Source: Companies, Gartner, StrategyAnalytics, IDC, Argus Estimates															
	Units Shipped (in millions)														
Company	**1Q08**	**2Q08**	**3Q08**	**4Q08**	**2008**	**1Q09**	**2Q09**	**3Q09**	**4Q09E**	**2009E**	**1Q10E**	**2Q10E**	**3Q10E**	**4Q10E**	**2010E**
Nokia	119.00	121.38	117.80	113.00	**471.18**	93.20	103.20	108.50	126.90	**431.80**	107.80	112.83	116.57	135.57	**472.77**
Motorola	27.40	28.10	25.40	19.20	**100.10**	14.70	14.80	13.60	12.00	**55.10**	11.22	11.78	12.78	14.70	**50.48**
Samsung	46.80	45.70	51.80	55.94	**200.24**	45.92	47.53	49.19	55.10	**197.75**	47.94	49.61	51.35	57.51	**206.41**
Sony-Ericsson	22.30	27.70	25.70	24.20	**99.90**	14.50	13.80	14.10	14.60	**57.00**	14.50	15.01	15.53	17.40	**62.44**
LG Electronics	24.40	26.70	23.00	25.70	**99.80**	22.60	23.39	24.21	27.11	**97.32**	24.13	24.98	25.85	28.95	**103.91**
All Others	59.00	58.00	66.12	69.43	**252.55**	64.22	66.47	68.79	82.55	**282.03**	69.34	71.77	74.28	83.20	**298.59**
TOTAL	298.90	307.58	309.82	307.47	**1,223.77**	255.14	269.19	278.40	318.26	**1,120.99**	274.93	285.98	296.37	337.33	**1,194.61**
Market Share	**% Market Share**														
Nokia	[illegible]	[illegible]	38.0%	[illegible]	**38.5%**	[illegible]	38.3%	39.0%	39.9%	**38.5%**	39.2%	39.5%	39.3%	40.2%	**39.6%**
Motorola	9.2%	9.1%	8.2%	6.2%	**8.2%**	5.8%	5.5%	4.9%	3.8%	**4.9%**	4.1%	4.1%	4.3%	4.4%	**4.2%**
Samsung	15.7%	14.9%	16.7%	18.2%	**16.4%**	18.0%	17.7%	17.7%	17.3%	**17.6%**	17.4%	17.3%	17.3%	17.1%	**17.3%**
Sony-Ericsson	7.5%	9.0%	8.3%	7.9%	**8.2%**	5.7%	5.1%	5.1%	4.6%	**5.1%**	5.3%	5.2%	5.2%	5.2%	**5.2%**
LG Electronics	8.2%	8.7%	7.4%	8.4%	**8.2%**	8.9%	8.7%	8.7%	8.5%	**8.7%**	8.8%	8.7%	8.7%	8.6%	**8.7%**
Others	19.7%	18.9%	21.3%	22.6%	**20.6%**	25.2%	24.7%	24.7%	25.9%	**25.2%**	25.2%	25.1%	25.1%	24.7%	**25.0%**
TOTAL	100.0%	100.0%	100.0%	100.0%	**100.0%**	100.0%	100.0%	100.0%	100.0%	**100.0%**	100.0%	100.0%	100.0%	100.0%	**100.0%**

(continued)

Figure 14.2 *(continued)*

Global Mobile Handset Units and Market Share

Source: Companies, Gartner, StrategyAnalytics, IDC, Argus Estimates

Units Shipped (in millions)

Year over Year Percentage Change in Units Shipped

Company Y/Y	1Q08	2Q08	3Q08	4Q08	2008E	1Q09	2Q09	3Q09	4Q09E	2009E	1Q10E	2Q10E	3Q10E	4Q10E	2010E
Nokia	29.3%	20.4%	6.1%	-15.2%	**7.8%**	-21.7%	-15.0%	-7.9%	12.3%	**-8.4%**	15.7%	9.3%	7.4%	6.8%	**9.5%**
Motorola	-42.5%	-21.0%	-30.5%	-51.1%	**-37.0%**	-46.4%	-47.3%	-46.5%	-37.5%	**-45.0%**	-23.7%	-20.4%	-6.0%	22.5%	**-8.4%**
Samsung	45.8%	22.1%	9.5%	26.1%	**24.2%**	-1.9%	4.0%	-5.0%	-1.5%	**-1.2%**	4.4%	4.4%	4.4%	4.4%	**4.4%**
Sony-Ericsson	2.4%	11.2%	-4.3%	-18.9%	**-3.4%**	-35.0%	-50.2%	-45.1%	-39.7%	**-42.9%**	0.0%	8.7%	10.2%	19.2%	**9.5%**
LG Electronics	52.4%	39.8%	5.3%	9.2%	**24.0%**	-7.4%	-12.4%	5.3%	5.5%	**-2.5%**	6.8%	6.8%	6.8%	6.8%	**6.8%**
Others	19.2%	40.4%	96.3%	16.1%	**37.0%**	8.8%	14.6%	4.0%	18.9%	**11.7%**	8.0%	8.0%	8.0%	0.8%	**5.9%**
TOTAL	15.4%	18.7%	11.7%	-6.8%	**8.7%**	-14.6%	-12.5%	-10.1%	3.5%	**-8.4%**	7.8%	6.2%	6.5%	6.0%	**6.6%**

Quarter over Quarter Percentage Change in Units Shipped

Company Q/Q	1Q08	2Q08	3Q08	4Q08		1Q09	2Q09	3Q09	4Q09E		1Q10E	2Q10E	3Q10E	4Q10E	
Nokia	-10.7%	2.0%	-2.9%	-4.1%		-17.5%	10.7%	5.1%	17.0%		-15.1%	4.7%	3.3%	16.3%	
Motorola	-30.3%	2.6%	-9.6%	-24.4%		-23.4%	0.7%	-8.1%	-11.8%		-6.5%	5.0%	8.5%	15.0%	
Samsung	5.5%	-2.4%	13.3%	8.0%		-17.9%	3.5%	3.5%	12.0%		-13.0%	3.5%	3.5%	12.0%	
Sony-Ericsson	-25.3%	24.2%	-7.2%	-5.8%		-40.1%	-4.8%	2.2%	3.5%		-0.7%	3.5%	3.5%	12.0%	
LG Electronics	3.7%	9.4%	-13.9%	11.7%		-12.1%	3.5%	3.5%	12.0%		-11.0%	3.5%	3.5%	12.0%	
Others	-1.4%	-1.7%	14.0%	5.0%		-7.5%	3.5%	3.5%	20.0%		-16.0%	3.5%	3.5%	12.0%	
TOTAL	-9.4%	2.9%	0.7%	-0.8%		-17.0%	5.5%	3.4%	14.3%		-13.6%	4.0%	3.6%	13.8%	

handsets by technology (WCDMA, GSM, CDMA2000, etc.) and smart-phone market share.

Investors in this industry are chiefly concerned about market share, even though that is arguably becoming an outdated concept in the era of the smart phone. The worksheet also shows percentage changes in units on a year-over-year and quarter-over-quarter basis. This kind of data compilation enables the analyst to discern trends that won't be visible within the individual company workbook.

One simple benefit of the industry data compilations is that it allows apples-to-apples comparisons for companies sited in different nations. While the giants in the information processing industry are mainly U.S.-based (e.g., IBM and Hewlett-Packard), the giants in communications equipment are frequently from overseas (e.g., Ericsson, Nokia, and Alcatel-Lucent). One of our industry compilation worksheets is focused on wireless infrastructure sales, and it is denominated in dollars. Only by translating the tallies in dollars and stacking them up can we see the dominance of the European companies in this space—and how fast risers from Asia such as Huawei threaten that dominance.

As you get to know your coverage industry better, you'll determine which industry data points are integral to your analysis. The price performance work with which we led off this chapter is essential to every industry, of course. In the following chapter, we turn our attention back to valuation—in this case, the valuation relationship between the individual equity and its peers.

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Chapter 15

SIMPLE AVERAGE AND MARKET-WEIGHTED COMPARISONS

The Company Comparison Worksheet

Overview

The basic premise of the company comparison worksheet is that the linking of substantially every ratio, valuation, margin, and growth rate we've calculated in the individual worksheets to this industry matrix provides both useful and easy comparison. Later, we'll use a subset of these individual and common values to derive dollar value of the equity based on its current variation from its historical relationship to the peer group.

Nothing so taxing is on this worksheet. Everything we've done so far has rewarded focus and close attention. The company comparison worksheet is big and long but not very complex; putting it together is, frankly, tedious. Console yourself with the fact that the output from this worksheet is useful; stream your favorite radio station (on low) while building it. The sheet, once finished, turns lots of raw data into lots of highly informative conclusions.

This exercise is a bit like steering a big combine harvester over Midwestern wheat fields: the process is fairly straightforward, but if you lose your concentration you might slam into the barn. The chief challenge is marshalling lots of data onto one workbook from many sources. With earlier versions of Excel, and given constraints on hardware power, we were typically limited to opening a few workbooks at a time. Impressive advances in Excel along with massively enhanced computing power allow you open dozens of workbooks at once. We think keeping just a few open at a time remains good practice.

We will also caution that in some older versions of Excel, not every change made on the individual worksheet is captured by the industry matrix *if the matrix is closed* while working on the individual workbook. Again, that seems like less of a problem with recent iterations of the software. Still, as a precaution, any time you are inserting or deleting rows or columns in linked workbooks, it makes sense to have open all workbooks that share links.

Setting up the Grid: Relations to Forecast Values

At the very top of the worksheet, we've compiled the most important set of conclusions: the relationships of our peer group to our calculated value. This is shown in Figure 15.1. In columns A and B, we begin by compiling the coverage universe and respective tickers; as a labor saver, you can link to the company price performance grid for this data. In column C we have current price, linked directly to the query page or indirectly from the price performance grid.

In column D, you can see that we have our calculated discounted free cash flow (DFCF) value for every company; in Column F are the values for every company based on historical comparables. In Column H are the values for Peer Derived Value (PDV) (not yet explained; see Chapter 16). And in Column J are blended stock values, incorporating a weighted mix of DFCF, comparables, and PDV.

These calculated values are all available on the individual worksheets. They are of interest here mainly in how they vary from the current price both individually and collectively. In columns E, G, I, and K, we see the variation between current price and estimated value calculated value by, respectively, DFCF, comparables, PDV, and blended.

Discounted free cash flow is the most forward-looking—and, I'd argue, inherently the most optimistic. Accordingly, the calculated DFCF values for this group are on average 68% higher than the current price (or were at the time of this exercise). Equity values determined by historical comparable values are on average 25% higher than current prices; this sober-sided group is grounded in the (five-year) past and looks scarcely two years forward. Value determined by PDV is the closest to current values at just an 18% average premium; this is an imperfect closed loop, and so its values should be closest to current prices. Finally, the average premium to blended stock value is 67%, even though the individual components are very different.

Figure 15.1

The information atop the comparison worksheet draws asset value data from all the individual equity workbooks. The significant premium of blended value over current price—an average of 63%—is to be expected, given the long-tailed nature of blended value. Also contributing to this significant premium is the horrific period (fall 2008 through spring 2009) from which the market and this group were still recovering at the time this chart was prepared.

Comparison Worksheet										
Communications Equipment										
		Price	**DFCF Value**	**% to DFCF**	**Cmprbls**	**% to DFCF**	**Peer Derived Value**	**% to PDV**	**Blended Stk Value**	**% to BSV**
ADC Telecom	ADCT	8.65	12.87	*49%*	7.38	*-15%*	14.13	*63%*	9.62	*11%*
Adtran	ADTN	22.66	45.19	*99%*	26.76	*18%*	23.95	*6%*	36.47	*61%*
Alcatel	ALA	3.37	11.36	*237%*	1.33	*-60%*	2.52	*-25%*	8.02	*138%*
Big Band	BBND	4.04	7.42	*84%*	6.21	*54%*	4.57	*13%*	6.41	*59%*
Ciena	[illegible]	[illegible]	[illegible]	[illegible]	13.12	*7%*	6.63	*-46%*	25.16	*105%*
Cisco Systems	CSCO	21.04	57.15	*172%*	27.63	*31%*	25.78	*23%*	37.77	*80%*
Ericsson	ERIC	9.30	20.26	*118%*	13.36	*44%*	10.66	*15%*	18.47	*99%*
Extreme Networks	EXTR	2.57	1.23	*-52%*	6.25	*143%*	6.63	*158%*	6.25	*143%*
Corning Inc.	GLW	15.79	36.11	*129%*	30.54	*93%*	19.75	*25%*	41.11	*160%*
JDS Uniphase	JDSU	5.85	2.17	*-63%*	13.90	*138%*	4.40	*-25%*	9.40	*61%*
Juniper Networks	JNPR	24.47	34.52	*41%*	28.75	*17%*	23.20	*-5%*	32.49	*33%*
Motorola	MOT	7.03	6.67	*-5%*	8.50	*21%*	10.62	*51%*	6.25	*-11%*
Nokia	NOK	12.95	33.05	*155%*	22.04	*70%*	14.74	*14%*	26.80	*107%*
Polycomm	PLCM	22.71	44.02	*94%*	33.58	*48%*	26.93	*19%*	38.04	*67%*
Sycamore Networks	SCMR	3.08	1.66	*-46%*	1.15	*-63%*	1.47	*-52%*	1.52	*-51%*
Tellabs	TLAB	6.59	8.38	*27%*	7.26	*10%*	6.41	*-3%*	7.25	*10%*
Average				**69%**		**35%**		**14%**		**67%**

Driving the Combine: Marshalling Data

We have calculated many data points on the individual worksheets, and we want to link most, though not all, to the industry matrix. We find it helpful to organize the data by a few broad categories. These are the categories:

- Earnings and revenues
- Balance sheet metrics
- Margins
- Return measures
- Valuations

We'll break these down further as we go along. The industry matrix workbooks we built over the years have tended to grow up like a city; the neighborhoods predate the city planners. You can take advantage of what we've learned in our hodgepodge construction to make more rational worksheets.

The guidelines we use when linking earnings from our worksheets apply to most of the other sections that follows on this worksheet. For that reason, we've included an illustration, even though the literally hundreds of links in this section are all invisible on the page. Even if you place emphasis elsewhere, you should review our work in this section.

Earnings

It is no surprise that earnings have pride of place in the company comparison worksheet; earnings are where valuation discussions begin and end. Revenues are nearly as important, as so much operating leverage is tied to the top line.

Copy the company names and tickers from the relations to forecast value section at the top of the worksheet. You are going to want to link to the historical annual earnings for as many years as you have. It is likely you have a wide range of historical annual earnings for the companies in your coverage or your portfolio. Accordingly, pick a common year to begin this exercise. It is highly useful to have at least five years of historical data.

Do we link the data directly from the income statement presentation worksheet? No. We put together our annual stacks on the ratios and valuations worksheet precisely so we could link to individual year values *and* drag and drop values for multiple years. So let's link to the annual EPS numbers in our annual income statements on the R&V worksheet. Always driving the model-building process is the search for balance between precision and ease of use.

We always open a single individual company workbook to start this exercise; at most, you want to have just a few workbooks open during the linking process. Under the earnings heading and in the first-year historical cell for the specific company, link to the appropriate EPS measure (GAAP or pro forma) for that year. Figure 15.2 shows our historical and forecast EPS for the peer group, along with five-year (2004–2008) compound annual growth rate (CAGR). We've also included EPS growth in our illustration; at the bottom of each EPS growth column you can see both simple average and weighted average growth.

A word about process. When you link, you'll notice that the linked value shows a dollar sign after the host cell column and another dollar sign after the host cell row. Remove these dollar signs; otherwise, when you drag and drop these values, you'll be replicating the same cell contents. Once the dollar signs are removed, drag and drop the annual EPS links up to the most recent full historical year; in our example, that year is 2008.

Let's assume we've now dragged and dropped the EPS values for all companies in our composite up to the latest historical year, which is 2008 in our case. In the next column, let's calculate five-year CAGR for each stock as well as for the composite. Many CAGR formulas will work in Excel. In the example, the simple CAGR formula we use—`=(L15/H15)^(1/5)-1`—shows Cisco's pro forma earnings grew at a compound annual growth rate of 15.5% for the five-year span between fiscal 2004 and fiscal 2008.

The trouble with a CAGR calculation is that it cannot handle a negative number in any of the inputs. Accordingly, for a few companies in our earnings grid, we've had to truncate the period to dodge opening-period losses. This is an ongoing problem; when we switch the five-year period to 2005–2009, we'll have to deal with lots of losses from the difficult 2009 year. So while we've titled this column "5-Year CAGR," it is not purely that. Remember, though, we are seeking a general trend. We can see that the general trend in EPS for the group was an average CAGR in the very low double digits over the 2004–2008 span. That's not a bad number; but, given the imperfections, we treat this only as a broad trend indicator and not as a definitive number.

Now we need our two-year EPS projections. Assuming 2008 historical was in column L and the CAGR in column M, link to 2009 estimated EPS in column N. Remember, if you copy and past this link across two columns (including the CAGR column), the source file will give you a value two columns over. So if you copy and paste or drag and drop, adjust to ensure that the 2009 EPS value is in the 2009 column. Drag and drop to get the 2010 value.

The next set of earnings-related values is earnings growth. But didn't we just do that in the CAGR column? There is a distinction; we derive annual EPS growth

Figure 15.2

Earnings in the communications equipment universe have been “feast or famine” over the years, with strong midquarter results book-ended by the technology-centered catastrophe in 2001–2002 and the much broader economic recession in 2007–2008. In our truncated view, the worst of that earlier period is mercifully hidden.

Comparison Worksheet											
Communications Equipment											
	Earnings										
EPS	**1998**	**1999**		**2004**	**2005**	**2006**	**2007**	**2008**	**5-YearCAGR**	**2009E**	**2010E**
ADC Telecom	2.02	0.80		0.15	0.88	0.89	1.18	1.12	*49.6%*	0.27	0.49
Adtran	0.51	0.66		0.93	1.29	1.14	1.17	1.32	*7.3%*	1.29	1.47
Alcatel	3.10	1.19		0.59	0.80	0.28	0.40	(0.11)	*-9.2%*	(0.07)	0.21
Big Band						0.16	0.01	0.34	*28.7%*		
Ciena	0.22	0.02		(2.15)	(1.11)	0.32	1.41	1.14	*53.0%*	(0.33)	0.32
Cisco Systems	[illegible]	[illegible]		[illegible]	0.92	1.12	1.34	1.56	*15.5%*	1.35	1.41
Ericsson				0.82	1.02	1.12	1.06	0.59	*-6.3%*	0.65	0.82
Extreme Networks		(0.02)		(0.02)	0.13	0.14	0.02	0.14	*2.1%*	0.10	0.19
Corning Inc.	0.54	0.67		0.46	0.84	1.12	1.40	1.54	*27.5%*	1.17	1.31
JDS Uniphase	0.92	1.47		(0.29)	(0.50)	(0.10)	0.29	0.51	*12.1%*	0.23	0.27
Juniper Networks	(0.24)	(0.03)		0.44	0.72	0.73	0.87	1.18	*63.6%*	0.85	1.09
Motorola	0.23	0.62		0.91	1.13	1.25	0.24	0.02	*-52.2%*	0.01	0.25
Nokia	0.36	0.56		0.81	1.06	1.33	2.14	1.99	*19.6%*	0.89	1.42
Polycomm	0.23	0.42		0.70	0.80	1.09	1.37	1.50	*16.4%*	1.26	1.66
Sycamore Networks				(0.15)	(0.04)	0.11	0.09	0.05	*-24.5%*	(0.08)	0.03
Tellabs	0.98	1.32		0.61	0.56	0.57	0.24	0.24	*-17.4%*	0.29	0.35
									11.6%		

Figure 15.2 *(continued)*

Comparison Worksheet											
Communications Equipment											
	Earnings										
EPS Growth	**1998**	**1999**		**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	-560.2%	-60.4%		-144.5%	496.0%	1.9%	32.2%	-4.8%	*76.2%*	-75.7%	
Adtran	-460.2%	27.5%		22.3%	39.3%	-11.7%	2.8%	12.5%	*13.0%*	-2.3%	14.1%
Alcatel				-147.8%	36.5%	-65.2%	43.1%	-126.4%	*-51.9%*	-29.3%	
Big Band											
Ciena	-60.2%	-92.1%		-20.0%	-48.4%	-128.6%	342.9%	-19.2%	*25.3%*	-129.1%	
Cisco Systems		22.7%		27.6%	21.2%	21.6%	20.2%	16.2%	*21.3%*	-13.1%	4.2%
Ericsson					24.7%	9.8%	-5.1%	-44.4%	*-3.7%*	9.7%	25.8%
Extreme Networks				-88.5%		10.6%	-85.6%	0.0%	*-40.9%*	0.0%	85.4%
Corning Inc.	-9.9%	24.4%		357.2%	83.4%	33.5%	25.2%	10.0%	*101.9%*	-24.3%	11.8%
JDS Uniphase	[illegible]	[illegible]		[illegible]	68.3%	-79.8%		77.3%	*-3.0%*	-55.6%	17.8%
Juniper Networks		-85.5%		203.1%	63.7%	1.3%	20.0%	34.4%	*64.5%*	-27.5%	27.6%
Motorola	-70.0%	173.6%		133.6%	24.7%	9.9%	-80.8%	-90.6%	*-0.7%*	-54.2%	
Nokia	30.0%	57.5%		-6.7%	29.7%	26.0%	60.8%	-6.9%	*20.6%*	-55.3%	59.6%
Polycomm	128.9%	82.8%		74.3%	14.7%	35.9%	25.1%	9.7%	*31.9%*	-15.7%	31.4%
Sycamore Networks				-25.6%	-73.9%	-392.8%	-16.4%	-48.5%	*-111.5%*	-262.5%	
Tellabs		35.2%		-415.8%	-9.3%	2.1%	-58.2%	-0.6%	*-96.3%*	24.5%	20.5%
Simple Average	***-119.8%***	***22.3%***		***-7.7%***	***55.0%***	***-35.0%***	***23.3%***	***-12.1%***	***3.1%***	***-47.4%***	***29.8%***
Weighted Average				***52.2%***	***32.3%***	***15.3%***	***20.3%***	***-4.3%***		***-23.8%***	***17.9%***

in this grid, not five-year growth. You can use a simple percentage change formula such as, `=(F15/E15)−1` to determine annual change for Cisco. Drag and drop both across and up and down to fill out the grid. Note that the five-year average of individual growth rates results in a value (3%) different from the five-year CAGR (11%) calculated above. The CAGR calculation, remember, only touched the five-year beginning and end points.

Revenues

We're going to set up a grid of individual company revenues that will be very similar to the earnings grid; that is, we will link to individual revenues for the companies, and we will calculate annual growth rates. Mercifully, the revenue tallies are all positive numbers, meaning we won't have to leapfrog bad data points. Look out for immature companies that may not have a five-year public reporting history. For these companies, we use the appropriate truncated period, or we can exclude them. Again, we seek the general trend.

Simple average revenue growth for this group averaged 11.6% annually for the preceding five years (2004–2008). That is a very healthy number. It is indicative not just of cyclical recovery but of the secular trends at play among global citizenry: more digital media, more mobile broadband, and an always-connected lifestyle.

When we compile the individual revenue growth rates for each year for each company and use them to calculate five-year average growth, we get a 16% annual growth rate for the five-year period. That does not square with the 11.6% cited above. Coming out of the 2001–2002 recession, industry growth was strong for several years. By 2008, of course, the world had changed; anyone doing business late in 2008 had to wonder if the world would ever be what it once was. That bad year only had a one-fifth influence on the individual average growth rates. The CAGR calculation, by contrast, only touched the 2004 beginning point as well as the 2008 end point; so its view is distorted. This is a reminder about the limitations of unadjusted CAGRs and the main reason we use ordinary least squares (OLS) regression to smooth growth rates in most places.

What have we learned from our earnings and revenue composites? From earnings, the value of the historical analysis has been limited by the many adjustments we needed to make to avoid those loss years that skew CAGR calculations. Looking at 2009 in the midst of its unfolding, we learned that communications equipment earnings were having an awful time, down 49% on a simple average basis and down 23% on a cap-weighted basis. We are anticipating double-digit recovery in 2010, however, with the simple average composite somewhat better than the weighted composite. That tells us that smaller aggressive growth companies are situated to grow faster than their larger rivals—a typical midcycle phenomenon.

Revenues, as noted, are always easier to work with. The five-year revenue growth of 11% on a CAGR basis and 16% on an average-of-averages basis were impressive—three to four times the average U.S. GDP growth in that span. Looking forward, the sum of all our individual analysis suggest that revenues will decline 16% in 2009 on a simple basis and 12% on a weighted basis. Things could have been worse; a glance back across the grid shows that the simple average revenue decline as 34% in 2002. During that earlier financial crisis, technology was at the center of the catastrophe; in the 2008–2009 global recession, technology was merely a spear carrier while the financial sector sang *Götterdämmerung*.

The revenue rebound estimated for 2010 is fairly tame: a forecast 8% on a simple basis and 6% on a weighted basis. But we see that in 2003 segment revenues were still negative. When real recovery finally came in 2004, it was in the double digits.

The point of these observations is certainly not in the observations themselves, which are common knowledge. The point is that compilation of data enables the analyst to not just quantify arithmetic trends but to discern broader industry trends within the context of past trends.

Balance Sheet Metrics

Amid all our other priorities, we have likely scanted the significance of changes in the accounts constituting working capital, and the cash flow implications of such changes. CFOs certainly do not scant on this material. Read the transcript of any earnings conference call and the CFO will devote time to the discussion of days sales outstanding and the cash cycle. In the post-results Q&A, analysts will pick at this data. And no wonder. Days spent in inventory may seem arcane, but it reflects money tied up; the massive market caps of major corporations can mask the scarcity sometimes of liquidity. Accounts receivable (A/R), accounts payable (A/P), and inventories resonate in the gross margin and really across the operating structure.

While we could import significantly more operating and liquidity data from our ratios and valuations page, we tend to focus on three areas: working capital, days sales outstanding, and cash cycle. As noted, professional investors are tightly focused on these metrics because they can tell us much about a company's efficiency and execution.

When I was first entering the analysis business, overstuffed current ratios were in vogue. I took that as a given, not realizing that I'd started my analysis career at the top of the market. As I experienced my first down cycle, I was mystified that the same senior analysts who had previously lauded companies for large current ratios now complained about them. Their complaints were valid, in that a fat current ratio in a down market likely means cash tied up needlessly in inventories that might need to be written down; a sloppy collections experience; and perhaps too many receivables at potentially insolvent companies about to be blindsided by the recessionary freight train.

In recent years, companies have come to value cash on the balance sheet much more so than in the past. On that basis, unadjusted current ratios may seem suspiciously high. As a reminder, we use trade working capital—which kicks out cash and other things from the calculation—in our DFCF work. Trade working capital is likely a better representation of the daily cash uses and needs of the enterprise. In that regard, it may be the better metric for the industry matrix.

Companies continually strive to shorten their days sales outstanding (DSO) and their cash cycle. Geographic mix is a bit of a wild card; sales terms are more liberal (longer) in Europe and Asia. Deterioration in DSO and cash cycle can actually be a sign of global growth. More significantly, no matter how effectively companies streamline their procurement and global supply chains, they cannot control the economic cycle and the end market. Inevitably, they will have built apparatuses that are somewhat oversized and underutilized for demand in bad times and somewhat undersized and strained in good times.

Therefore, we analyze the trends in DSO and cash cycle with several things in mind. Certainly, we look for progress over the year, both in absolute terms (specific to historical trends) and in relation to the peer group. But we also seek to analyze the varying performances in times of economic distress to see who has a flexible supply chain and who doesn't. One company that has had more than its share of woes since inception, Alcatel-Lucent, appears to be doing well, on these metrics at least. More than any of the company's press releases, which have been proclaiming the success of this integration for years, improvement in these important balance sheet metrics can be read as a sign that integration in all the out-of-view and nonoperating niches is finally being achieved.

Margins

The inputs on the company comparison worksheet are designed to help us determine an industry standard and to assess to what degree the individual companies vary from that standard. Not every input is equal; the cash cycle and DSO data are of interest to a slim wedge of the investing public. Everyone, however, looks at margins; they are simple, explicit, and easily understood. During company presentations, CFOs spend lots of time heralding margin progress or explaining margin shortfalls.

On the company comparison worksheet, both the individual year averages and the five-year average provide a clear industry standard. Of equal interest is the individual company trend in margins. Of course, you can track the progress in, say, gross margins, on the individual equity workbook. But it is always useful to see the progress in context.

It therefore sometimes makes sense to calculate the five-year CAGR in margins. If a company has a 2008 gross margin that lags the group, some of the stigma is reduced if this same company has expanded its gross margin at a rate exceeding that of the peer group; the CAGR measure of margins can provide that information.

The margins most typically measured in an industry matrix worksheet are gross margins, operating margins, pretax margins, net margins, pro forma net margins, and EBITDA (earnings before interest, taxes, depreciation, and amortization) margins. As with earnings and revenues, we input as many historical periods as we can for all equities, with a minimum of five years to enable an historical basis. We calculate simple average and weighted average for each year, along with simple average for the five-year period.

Figure 15.3 shows the company grid organization, and it also provides some interesting color on margins. Gross margins across this industry niche held up better in 2008 than in 2002; despite the more proactive cost-cutting this time around, pretax margins still sagged deeply from mid-decade levels.

Return Measures

The most common return measures captured on an industry-average basis on the company comparisons worksheet are return on equity, return on assets, return on capital, and return on invested capital. These are GAAP measures. Because of the long-standing habit of technology companies to focus on non-GAAP earnings, and investors' complicity in this practice, we believe technology companies place a low priority on their GAAP results.

The net effect is that when ROE or ROA are analyzed for this group, they tend to be surprisingly puny. That is particularly true of ROA. And that is likely because boards and managements can't squander the book value of assets the way they decimate the book value of equity, through pricey and misguided acquisitions and big-bath write-offs.

Figure 15.3

In the bad days of 2002, simple average gross margins for the communications equipment companies slipped under 20%. By 2008, companies had fully outsourced, substituting variable cost for fixed costs; that helped hold up gross margins. Net margins did not fare so well, however.

Comparison Worksheet														
Communications Equipment														
	Margins													
Gross Margin	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	48%	47%	49%	30%	24%	38%	38%	35%	32%	33%	34%	*35%*	33%	34%
Adtran	55%	51%	50%	45%	51%	56%	57%	59%	59%	59%	60%	*59%*	60%	60%
Alcatel	27%	29%	29%	25%	29%	34%	38%	35%	37%	32%	34%	*35%*	34%	36%
Big Band										49%	61%	*55%*	58%	62%
Ciena	50%	38%	44%	44%	-53%	24%	27%	32%	46%	46%	50%	*40%*	45%	47%
Cisco Systems	66%	65%	64%	60%	61%	70%	69%	67%	66%	64%	64%	*66%*	64%	65%
Ericsson	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	33%	46%	46%	41%	39%	36%	*42%*	37%	38%
Extreme Networks	37%	51%	52%	43%	47%	41%	51%	53%	54%	54%	57%	*54%*	57%	57%
Corning Inc.	40%	39%	43%	30%	14%	28%	37%	43%	44%	47%	47%	*44%*	37%	38%
JDS Uniphase		52%	51%	34%	-5%	11%	23%	18%	28%	34%	39%	*28%*	39%	41%
Juniper Networks	-32%	56%	65%	62%	58%	63%	69%	68%	67%	67%	67%	*68%*	66%	69%
Motorola	39%	40%	38%	32%	33%	33%	34%	32%	30%	27%	28%	*30%*	30%	31%
Nokia	38%	38%	37%	37%	39%	41%	38%	35%	33%	34%	34%	*35%*	32%	33%
Polycomm	50%	56%	59%	60%	59%	61%	63%	62%	62%	58%	58%	*61%*	57%	58%
Sycamore Networks		25%	47%	16%	-134%	8%	35%	49%	50%	43%	46%	*45%*	40%	51%
Tellabs	59%	60%	54%	46%	37%	36%	53%	45%	46%	35%	38%	*44%*	42%	41%
Simple Average	**40%**	**46%**	**49%**	**40%**	**19%**	**39%**	**45%**	**45%**	**46%**	**45%**	**47%**	**46%**	**46%**	**47%**
Weighted Average						**53%**	**54%**	**54%**	**52%**	**51%**	**51%**		**50%**	**51%**

Figure 15.3 *(continued)*

Comparison Worksheet														
Communications Equipment														
	Margins													
Pretax Margin	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	17.3%	6.3%	44.4%	-79.9%	-84.2%	-10.6%	-0.3%	7.2%	4.4%	10.8%	-2.6%	*4%*	-40.7%	2.4%
Adtran	21.2%	21.0%	39.5%	6.1%	9.3%	22.4%	24.3%	29.9%	25.1%	24.2%	23.6%	*25%*	22.0%	22.8%
Alcatel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	0.0%	2.3%	2.3%	*1%*	1.6%	1.5%
Big Band										-13.7%	6.6%	*-4%*	-8.0%	8.4%
Ciena	18%	1%	14%	-106%	-246%	-137%	-265%			10.6%	4.3%	*7%*	-88.0%	-4.0%
Cisco Systems	25%	24%	16%	14%	12%	27%	32%	32.4%	33.4%	32.0%	30.5%	*32%*	26.2%	28.6%
Ericsson					-16%	-10%	22%	22%	20%	16%	8.2%	*18%*	8.8%	11.4%
Extreme Networks	-59%	0%	12%	-19%	-52%	-17%	0%	4.3%	3.6%	-3.5%	2.9%	*2%*	1.6%	4.3%
Corning Inc.	12%	14%	[illegible]	-97%	-97%	-20%	6%	16.6%	19.8%	25.5%	21.4%	*18%*	9.7%	10.5%
JDS Uniphase	28%	[illegible]	[illegible]	[illegible]	[illegible]	-123%	-20%			-1.7%	-1.4%	*-8%*	-62.5%	-2.4%
Juniper Networks		-6%	34%	13%	-4%	11%	19%	24.3%	-38.0%	18.0%	20.8%	*9%*	13.6%	19.2%
Motorola	2%	6%	6%	-19%	-12%	6%	10%	17.7%	10.8%	-1.1%	-8.7%	*6%*	-1.0%	2.5%
Nokia	18%	19%	19%	11%	16%	18%	16%	14.5%	13.9%	16.2%	9.8%	*14%*	5.3%	10.5%
Polycomm	15%	21%	18%	1%	10%	8%	11%	16.5%	15.1%	8.8%	9.1%	*12%*	9.3%	13.2%
Sycamore Networks		-172%	15%	-71%	-583%	-150%	-103%			-7.9%	0.4%	*-4%*	-45.5%	5.9%
Tellabs	34%	35%	32%	-5%	1%	4%	19%	11.3%	13.9%	3.7%	-55.1%	*-1%*	6.8%	7.7%
Simple Average	**11.0%**	**0.1%**	**15.9%**	**-137.1%**	**-119.5%**	**-24.9%**	**-15.2%**	**16.5%**	**10.2%**	**8.8%**	**4.5%**	**8.2%**	**-8.8%**	**8.9%**
Weighted Average						**12%**	**20%**	**24%**	**20.9%**	**22.7%**	**18.8%**		**14.7%**	**18.5%**

(continued)

Figure 15.3 *(continued)*

Comparison Worksheet														
Communications Equipment														
	Margins													
Net Margin	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	11.2%	3.6%	26.4%	-53.6%	-109.9%	-9.9%	3.3%	5.4%	7.0%	10.4%	-2.9%	*5%*	-40.7%	1.8%
Adtran	14.1%	13.9%	26.1%	4.5%	7.2%	15.5%	16.6%	19.7%	16.6%	16.0%	15.7%	*17%*	14.8%	15.1%
Alcatel	-0.8%	-0.9%	-0.4%	0.1%	8.0%	3.6%	0.5%	0.1%	-0.1%	-0.6%	-30.9%	*-6%*	-3.4%	1.9%
Big Band										-14.4%	5.3%	*-5%*	-6.0%	6.8%
Ciena	10.1%	1.9%	9.5%	-111.9%	-276.7%	-136.5%	-265.1%			10.6%	4.3%	*7%*	-88.0%	-4.0%
Cisco Systems	13.5%	13.9%	6.7%	-4.5%	5.6%	19.0%	22.5%	23.1%	21.8%	21.7%	20.4%	*22%*	17.0%	17.4%
Ericsson					-13.0%	-9.2%	14.4%	16.0%	14.9%	11.8%	5.6%	*13%*	6.2%	8.0%
Extreme Networks	-59.1%	-1.6%	7.7%	-14.0%	-41.7%	-54.3%	-0.2%	3.4%	3.1%	-4.1%	2.3%	*1%*	0.8%	3.2%
Corning Inc.	11.0%	10.7%	[illegible]	-87.5%	-65.9%	-2.9%	-9.1%	13.2%	35.9%	36.9%	46.0%	*25%*	31.5%	34.6%
JDS Uniphase	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-125.3%	-17.5%			-1.9%	-1.6%	*-7%*	-62.1%	-1.9%
Juniper Networks		-8.8%	22.0%	10.0%	-4.5%	7.7%	12.5%	17.1%	-26.9%	12.7%	14.6%	*6%*	5.8%	13.8%
Motorola	1.6%	4.3%	4.5%	-13.4%	-8.6%	4.0%	7.0%	12.5%	7.6%	-0.3%	-14.1%	*3%*	-0.7%	1.6%
Nokia	12.6%	13.0%	13.0%	7.1%	11.3%	12.2%	10.8%	10.6%	10.5%	14.1%	7.9%	*11%*	4.2%	7.1%
Polycomm	13.3%	14.4%	11.4%	-5.0%	7.3%	5.5%	7.9%	10.7%	10.5%	5.9%	7.1%	*8%*	6.9%	9.6%
Sycamore Networks		-172.0%	10.3%	-74.7%	-582.5%	-149.7%	-103.2%			-8.5%	-0.1%	*-4%*	-45.3%	5.8%
Tellabs	23.2%	23.7%	22.0%	-4.0%	1.7%	4.5%	17.9%	9.3%	9.5%	3.4%	-53.8%	*-3%*	4.1%	5.1%
Simple Average	**6%**	**-4%**	**9%**	**-136%**	**-120%**	**-28%**	**-19%**	**12%**	**9%**	**7.1%**	**1.6%**	**6%**	**-9.7%**	**7.9%**
Weighted Average						**9%**	**13%**	**17%**	**16%**	**17.7%**	**14.1%**		**11.3%**	**14.2%**

For our subset of the technology universe, return on assets for the five-year historical period is a slight 4.3%. Negative outliers distort the simple average ROA for 2009, rendering it negative; this sort of number underscores our reliance on cap-weighted metrics. By 2010, companies presumably will be benefiting from a roaring recovery; and we, like most analysts, have baked nothing but sunshine into our year-out estimates, even with the knowledge that things will go awry. Even so, the simple average ROA forecast for 2010 is a paltry 5%—more akin to an insurer's ROA.

The absolute numbers in ROE are somewhat better, but it has little to do with the numerator and much to do with the denominator. We note a significant variance between simple average ROE and weighted ROE; for most of the historical period, nearly all the returns on equity were coming from two companies, Nokia and Cisco. Now it's a bit more democratic, and in fact Nokia's contribution is hurting. Off the five-year simple average of 7%, ROEs are on track to slip to a negative 16% in 2009 and then rebound to a positive 9% in 2010. But the main driver of this gain is all the impairment losses that have decimated stockholders' equity, making it that much easier to earn return on it.

Valuations

We've saved, if not the best, than certainly the area of most intense investor interest for last. The historical comparables we calculated on the individual equity workbooks helped to determine dollar value of the individual asset; they have more to do in this category. But first let's simply gather the averages for these key metrics—price to earnings, sales, book value, cash flow, and relative P/E—to see what they say about the industry averages and the various individual equity variations.

Figure 15.4 illustrates a positive fact about which many investors are evidently unaware: even as the quality of revenues, earnings, and balance sheets among technology companies have improved, price/earnings ratios have continued to moderate.

The five-year trend in P/Es in contrast to the forward P/Es demonstrates a watershed change in perception of the technology shares. Let's walk through the P/E history of this particular group for a moment to demonstrate the value of this kind of data gathering. The P/Es for the group were hysterical back in 2000 and 2001, as investors spoke of "new paradigms" and some enlightened investors declared technology profits a sign of timidity. Many stocks followed the new paradigm from the $100-plus level to the penny stock sheets, and the reputation of the tech companies—reckless, detached from reality, and an abscess in the portfolio—was set.

Figure 15.4

Valuations for technology companies in general have been coming in for years. The formerly wild and crazy group is now solvent, cash rich, low on debt—and the market keeps driving down sector P/Es.

Comparison Worksheet

	Valuations													
Price to Earnings	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	176.2	626.3	170.4	64.8	(15.2)	(50.0)	121.1	22.3	22.3	14.7	10.5	*38.2*	31.8	17.7
Adtran	24.7	23.8	18.2	54.6	27.5	33.4	29.1	18.9	21.9	20.9	14.5	*21.1*	17.6	15.4
Alcatel	-	-	-	-	(2.7)	(7.5)	24.6	16.5	47.7	28.2	(31.1)	*17.2*	-	15.9
BigBand											15.1	*15.1*	52.8	11.4
Ciena	111.0	805.5	253.8	15.0	(17.6)	(14.3)	(15.7)	(14.4)	91.4	23.9	22.2	*21.5*	-	37.9
Cisco Systems	44.0	62.4	101.3	100.5	42.8	28.9	30.8	20.5	17.5	17.5	17.9	*20.8*	14.2	14.9
Ericsson					(14.9)	(14.1)	16.0	15.8	15.6	13.3	16.4	*15.4*	14.3	11.4
Extreme Networks		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		44.8	34.4		26.3	*35.2*	22.0	13.4
Corning Inc.	21.2	43.4	59.9	150.0	(9.9)	74.9	24.9	18.8	21.0	16.3	11.4	*18.5*	13.5	12.1
JDS Uniphase	49.7	68.1	196.8	1,182.9	(38.9)	(17.9)	(116.7)	(40.2)	(226.7)	59.6	25.4	*(59.7)*	26.0	22.1
Juniper Networks		(1,083.2)	259.0	91.9	-	90.9	55.6	32.7	23.2	31.7	19.7	*32.6*	28.7	22.5
Motorola	75.5	51.5	48.1	(58.6)	88.3	25.2	17.2	17.4	18.0	75.1	428.0	*111.1*	-	28.1
Nokia	-	-	-	36.3	20.5	18.4	19.6	15.4	15.5	14.1	12.8	*15.5*	14.5	9.1
Polycomm	28.8	41.6	81.2	37.8	30.8	35.7	29.9	23.0	22.8	21.8	13.8	*22.3*	18.0	13.7
Sycamore Networks			1,679.3	(469.6)	(9.7)	(15.8)	(25.4)	(95.6)	38.7	34.6	76.2	*5.7*	-	91.3
Tellabs	26.2	41.6	33.1	116.4	-	-	15.0	16.1	22.8	39.8	21.9	*23.1*	22.4	18.6
Simple Average	**47.2**	**(100.5)**	**131.6**	**231.9**	**36.1**	**18.6**	**6.9**	**13.4**	**3.3**	**30.4**	**59.4**	**23.3**	**15.1**	**18.5**
Weighted Average						**27.3**	**26.1**	**18.6**	**18.8**	**21.1**	**40.0**	**24.4**	**13.8**	**14.8**

Figure 15.4 *(continued)*

Comparison Worksheet														
	Valuations													
Relative P/E	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**5-Yr Avg**	**2009E**	**2010E**
ADC Telecom	7.36	24.39	6.75	2.48	(0.74)	-	7.00	1.40	1.53	0.87	0.51	*2.26*	1.60	1.10
Adtran	1.03	0.93	0.72	2.09	1.35	1.92	1.71	1.21	1.52	1.31	0.67	*1.28*	0.88	0.98
Alcatel	0.42	1.07	1.46	(0.57)	(0.13)	(0.43)	1.48	1.06	3.31	1.71	(1.77)	*1.16*	-	1.12
BigBand											0.86	*0.86*	2.65	0.76
Ciena	4.64	31.37	10.06	0.58	(0.82)	(0.83)	(0.91)	(0.91)	6.28	1.45	1.32	*1.45*	(2.19)	2.53
Cisco Systems	1.96	2.51	3.96	3.94	1.85	1.62	1.73	1.22	1.15	1.10	0.84	*1.21*	0.78	0.88
Ericsson					(0.73)	(0.81)	0.94	1.01	1.08	0.79	0.75	*0.92*	0.72	0.75
Extreme Networks		(34.83)	7.29	20.36	12.50	(2.45)		2.63	2.04	11.93	1.25	*4.46*	1.06	0.78
Corning Inc.	0.89	1.69	2.37	5.75	(0.49)	4.30	1.46	1.20	1.46	0.96	0.65	*1.15*	0.68	0.80
JDS Uniphase	2.08	2.65	7.80	45.36	(1.66)	(1.01)				3.68	1.31	*2.50*	1.46	1.28
Juniper Networks	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.27	2.09	1.54	1.81	0.98	*1.94*	1.44	1.47
Motorola	3.09	1.96	1.99	(2.11)	4.41	1.45	1.01	1.11	1.25	4.45	19.65	*5.50*	-	1.86
Nokia	1.05	1.47	2.21	1.39	1.00	1.06	1.15	0.99	1.07	0.95	0.64	*0.96*	0.73	0.59
Polycomm	1.20	1.62	3.22	1.45	1.51	2.05	1.76	1.47	1.58	1.25	0.63	*1.34*	0.90	0.89
Sycamore Networks			66.52	(18.01)	(0.48)	(0.88)	(1.56)			2.47	4.84	*1.92*	-	8.70
Tellabs	1.09	1.62	1.31	4.46	-	-	0.88	1.04	1.59	2.21	1.25	*1.39*	1.13	1.21
Simple Average	**2.25**	**3.04**	**8.99**	**5.05**	**1.17**	**0.75**	**1.53**	**1.20**	**1.95**	**2.46**	**2.15**	**1.89**	**1.88**	**1.61**
Weighted Average						**1.56**	**1.53**	**1.17**	**1.27**	**1.31**	**1.79**	**1.29**	**1.22**	**0.94**

But the industry did not stand still, and elements of the sector's immaturity—garage start-ups, it turned out, had no defined-benefit pension obligations—were eventually recognized as strengths. Low debt, lots of cash, balanced global customer bases: quietly, technology turned respectable. Meanwhile, the stocks with lampshades on their heads at the party turned out to be—the money center banks.

The five-year average P/E for this formerly wild group came down to the low 20s, and former 2.0 relative P/Es were suddenly in the 1.25 range. But it is the weighted P/Es for 2009 and 2010 that reveal how investors really feel about these stocks. Technology is still massively transformative, the sudden revelation of which led to their hyperinflated status at the turn of the century. But massively transformative is woven into the investment story now, and investors tend to treat the familiar with . . . familiarity.

Once again, the point of this discussion is not so much to explain the nature of investors' changing perceptions of a specific market niche, but to illustrate the ways in which collected data of this nature substantiates and quantifies such observations. We can also trace the trajectory of investors' perceptions of individual companies. Juniper, arguably the most successful second banana in the technology industry, routinely enjoyed P/Es in the 90s; even as the industry steadied in the 2003 and 2004, its P/Es remained well above industry trend. Gradually, its P/Es have come down closer to the industry average, while still retaining a premium. Later we'll talk about quantifying this observation, but for now it is sufficient to track the change.

Segment Worksheet

We won't spend too much time on this worksheet. It is principally a compilation of the "greatest hits" from the company comparisons worksheet and, thus, makes a handy tear sheet for client handouts, presentations, "squawk-box" calls, or more formal client visits. A great deal of investment decision making comes down to the data on this worksheet, which includes EPS and EPS growth, revenue and revenue growth, P/Es, relative P/Es, and enterprise value/EBITDA.

The distinguishing feature of this worksheet compared to the company comparison sheet is that it breaks out the companies principally by their major end markets. The communications equipment world, like most technology niches, is now full of blurred boundaries; the days of distinct customer silos are over. Companies that principally serve the service providers (e.g., Verizon and AT&T) also serve enterprise or business customers, and former enterprise IT-only companies such as Cisco now have multibillion-dollar carrier businesses.

With information processing and networking now colliding in the data center as we write, the final technology silos may be coming down. Still, grouping and analyzing the principal valuation and growth data by subsectors is useful for understanding what the market is really thinking.

Figure 15.5 provides a stark view, in this particular industry, of how difficult it is to serve the service provider market. All the enterprise-centric companies are currently profitable, as are the component companies. Among the vendors primarily serving the carrier market, several are unprofitable—chronically so.

Quarterly Trends Worksheet

The matrix workbook is the logical place to aggregate key quarterly data. There are four quarters in the year, and if your industry matrix has been around for a while as this one has, it can become overloaded with quarterly pages more quickly than you'd think. (But then I've reached that age, to paraphrase the novelist Richard Powers, where my birthday seems to come around every six weeks or so.) Make a point of offloading the quarterly sheets before they build up too much and Excel gets cranky.

The market-weighting function really displays its worth in times of transition, when investors are scouring the skies for breaks in the clouds or more black cumulus. Figure 15.6 shows the revenue trends for 2Q09, a period for which investors knew they were getting negative year/year comps—and in which the investor focus was most intense on a sequential basis. The sequential revenue gain shown in cell G21—4% quarter-over-quarter growth on a simple average basis—tells some of the story. But in our view, that 4% is mainly reflective of what companies pushed out into the market.

The cap-weighted sequential change in cell I22, by contrast, tells less what the company did and much more what their customers did. Those customers grew demand by 8%, not the misleading 4% of the simple average. The industry really grew 8% sequentially, not 4%. This "better" information is one reason we dedicate an entire worksheet (or two) to market-weighting all our data.

Weightings Worksheet

Market Cap Weighting of Data Points: An Overview

One benefit of the industry matrix over public or purchased data is the ability to manage and tailor data to your specifications based on the market capitalization

Figure 15.5

The sector comparison worksheet has a "greatest hits" flavor. The huge amount of individual company data cooked down on the comparisons worksheet is cooked down further here, providing a snapshot for clients and a cheat sheet for numbers-numbed analysts.

Communications Equipment Universe																
COMPANIES	**Tckr**	**Price**	**2004 EPS**	**2005 EPS**	**2006 EPS**	**2007 EPS**	**2008 EPS**	**2009E EPS**	**2010E EPS**	**04 EPS Growth**	**05 EPS Growth**	**06 EPS Growth**	**07 EPS Growth**	**08 EPS Growth**	**09E EPS Growth**	**10E EPS Growth**
Carrier																
Adtran	ADTN	22.66	0.93	1.29	1.14	1.17	1.32	1.29	1.47	22.3%	39.3%	-11.7%	2.8%	12.5%	-2.3%	14.1%
Alcatel-Lucent	ALU	3.37	0.59	0.80	0.28	0.40	(0.07)	0.21	-	-147.8%	36.5%	-65.2%	43.1%	-126.4%	-29.3%	0.0%
Ciena (b)	CIEN	12.29	(2.15)	(1.11)	0.32	1.41	1.14	(0.33)	0.32	-20.0%	-48.4%	-128.6%	342.9%	-19.2%	-129.1%	0.0%
Ericsson	ERIC	9.30	0.82	1.02	1.12	1.06	0.59	0.65	0.82	0.0%	24.7%	9.8%	-5.1%	-44.4%	9.7%	25.8%
Motorola	MOT	7.03	0.91	1.13	1.25	0.24	0.02	0.01	0.25	133.6%	24.7%	9.9%	-80.8%	-90.6%	-54.2%	0.0%
Nokia	NOK	12.95	0.81	1.06	1.33	2.14	0.89	1.42	-	-6.7%	29.7%	26.0%	60.8%	-6.9%	-55.3%	59.6%
Syca[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(0.08)	0.03	-25.6%	-73.9%	-392.8%	-16.4%	-48.5%	-262.5%	0.0%
Tellabs	TLAB	6.59	0.61	0.56	0.57	0.24	0.24	0.29	0.35	-415.8%	-9.3%	2.1%	-58.2%	-0.6%	24.5%	20.5%
Average										**-57.5%**	**2.9%**	**-68.8%**	**36.1%**	**-40.5%**	**-62.3%**	**15.0%**
Components																
ADC Telecom (a)	ADCT	8.65	0.15	0.88	0.89	1.18	1.12	0.27	0.49	-144.5%	496.0%	1.9%	32.2%	-4.8%	-75.7%	0.0%
Corning Inc.	GLW	15.79	0.46	0.84	1.12	1.40	1.54	1.17	1.31	357.2%	83.4%	33.5%	25.2%	10.0%	-24.3%	11.8%
JDS Uniphase (d)	JDSU	5.85	(0.29)	(0.50)	(0.10)	0.29	0.51	0.23	0.27	-77.6%	68.3%	-79.8%	0.0%	77.3%	-55.6%	17.8%
Average										**45.0%**	**215.9%**	**-14.8%**	**19.1%**	**27.5%**	**-51.9%**	**9.9%**

Figure 15.5 *(continued)*

Communications Equipment Universe																
COMPANIES	**Tckr**	**Price**	**2004 EPS**	**2005 EPS**	**2006 EPS**	**2007 EPS**	**2008 EPS**	**2009E EPS**	**2010E EPS**	**04 EPS Growth**	**05 EPS Growth**	**06 EPS Growth**	**07 EPS Growth**	**08 EPS Growth**	**09E EPS Growth**	**10E EPS Growth**
Enterprise																
Cisco Systems (c)	CSCO	21.04	0.76	0.92	1.12	1.34	1.56	1.35	1.41	27.6%	21.2%	21.6%	20.2%	16.2%	-13.1%	4.2%
Extreme Networks (d)	EXTR	2.57	(0.02)	0.13	0.14	0.02	0.14	0.10	0.19	-88.5%		10.6%	-85.6%	0.0%	85.4%	0.0%
Juniper Networks	JNPR	24.47	0.44	0.72	0.73	0.87	1.18	0.85	1.09	203.1%	63.7%	1.3%	20.0%	34.4%	-27.5%	27.6%
Polycomm	PLCM	22.71	0.70	0.80	1.09	1.37	1.50	1.26	1.66	74.3%	14.7%	35.9%	25.1%	9.7%	-15.7%	31.4%
Average										**54.1%**	**33.2%**	**17.4%**	**-5.1%**	**15.1%**	**7.3%**	**15.8%**
Total																
Simple Average										**-7.7%**	**55.0%**	**-35.0%**	**23.3%**	**-12.1%**	**-47.4%**	**29.8%**
Weighted Average										**52.2%**	**32.3%**	**15.3%**	**20.3%**	**-4.3%**	**-23.8%**	**17.9%**
(a) -- September fiscal years																
(b) -- October fiscal years																
(c) -- July fiscal years																
(d) -- June fiscal years																

Figure 15.6

In periods of crisis and transition, as in early 2009, investors want to know how much the overall market grew. Whereas cell G21 tells us how much the companies on average pushed out into the market, cell I22 tells us how much the end market pulled in, and in our view that is the truer demand indicator.

2Q09 Revenue Trends							
(*) - estimated **Company**	**TCKR**	**Calendar 2Q09 Y/Y Revenue %**	**Market Capitalization**	**Times Market Cap**	**Calendar 2Q09 Q/Q Revenue %**	**Market Capitalization**	**Times Market Cap**
ADC Telecom (*)	ADCT	-25.9%	1,013	(262)	2.9%	1,013	30
Adtran	ADTN	-7.4%	1,440	(106)	10.1%	1,440	146
Alcatel	ALA	-4.8%	7,737	(370)	8.5%	7,737	660
Big Band	BBND	-9.3%	258	(24)	-11.1%	258	(29)
Ciena (*)	CIEN	-38.4%	1,284	(493)	8.3%	1,284	107
Cisco Systems	CSCO	-17.6%	129,422	(22,840)	4.1%	129,422	5,360
Ericsson	ERIC	7.4%	29,695	2,209	5.2%	29,695	1,541
Extreme Networks	[illegible]	[illegible]	296	(51)	5.3%	296	16
Corning Inc.	GLW	-21.6%	25,120	(5,433)	41.1%	25,120	10,312
JDS Uniphase (*)	JDSU	-28.5%	1,334	(380)	-0.5%	1,334	(7)
Juniper Networks	JNPR	-10.5%	13,615	(1,435)	2.9%	13,615	395
Motorola	MOT	-32.0%	15,934	(5,096)	2.3%	15,934	374
Nokia	NOK	-24.6%	48,926	(12,050)	7.1%	48,926	3,488
Polycomm	PLCM	-15.1%	1,981	(298)	2.4%	1,981	47
Sycamore Networks (*)	SCMR	4.1%	874	36	-31.7%	874	(277)
Tellabs	TLAB	-10.8%	2,705	(292)	6.6%	2,705	177
			281,635	(46,887)		281,635	22,340
Simple Average Change		**-15.8%**			**4.0%**		
Cap-Weighted Change				**-16.6%**			**7.9%**

weighting of ratios, valuations, averages, and other data points. When assessing the peer group, we regard market-weighted outputs as inherently more valuable and "truer" than simple average outputs.

If you were to ask a portfolio manager (PM) how he or she was doing, and the PM replied by providing equal-weighted return, you'd perceive the reply to be disingenuous. Who cares about a simple average of asset returns? Only the size-weighted return captures the true performance and, along with the change from opening assets under management (AUM), provides insight into how much money the PM made or lost.

As an analyst within a single industry or niche, you'll likely find yourself covering widely disparate companies based on their size and available market. The smaller companies are apt to throw off lots of "outlier" data points relative to larger and more staid enterprises; it's tough for small companies to stay in coverage if they don't meaningfully outperform. But if we simple-average these outlier performances, we likely overstate the strength of the available market in the up cycle and understate it during the down cycle.

In calendar 2Q09, Corning grew its revenues 41% sequentially; a much smaller rival experienced 32% sequential contraction. Corning's market cap is 26 times that of its smaller rival; should we allow the mirror-image performances to cancel each other out? The reason we are interested in market cap–weighted performance is that it gives a truer picture of activity in the available market, not just what the individual companies are doing. During 2Q09, the sequential revenue growth rate for 16 communications equipment companies was 3.8% on a simple average basis; but the market-weighted sequential growth was 8%. As these 16 companies represent a substantial portion of the communications equipment market, the 8% growth best represents the industry trend.

It's true that Corning's market cap is 26 times that of its smaller rival; were 2Q09 revenues 26 times higher? Actually, Corning's sales were more like 15 times higher than those of the small rival. So for this calculation, should we revenue weight the growth instead of cap weighting it?

Ideally, yes; but remember, we work in an office—maybe a cubicle, maybe a corner office—not an ivory tower. While we won't discourage the practice outright, using line-specific weights (e.g., revenues and EPS) to calculate line-specific returns is cumbersome and will clutter an already crowded industry matrix workbook. And, once again, market cap weighting is the industry convention, and asset values implicitly encompass this verity.

Market Cap Weighting: The Process

You've heard us say this one before: there are several ways to market weight returns, margins, ratios, and other data points. No matter which method you use, it will be cumbersome and have lots of footprint (i.e., it takes up lots of space). For each year and data series to be weighted, using our method you will need two columns. On our price performance page, we showed that market weighting can be fairly compact. Nonetheless, with so many data points to weight, we need to spread out.

So we dedicate an entire worksheet—actually two—to our weighting process. The original worksheet is called weightings; the spillover worksheet is called, cleverly, more weightings. Let's look at the elements of the weightings worksheet. Figure 15.7 shows a snippet of our weightings worksheet.

In columns A through E of the worksheet, we have the elements needed to begin the weighting process. In order, column A has company names; column B, tickers; column C, current price; column D, current-year shares outstanding; and column E, market capitalization, which is simply current price times shares outstanding. We use rows 22 through 36 in column E to display the individual percentages each company represents in the group.

The market caps of this group, as you can see, are a motley lot. Cisco is nearly half the market cap, but that was not always the case. Among the companies that have been knocked back several notches are Nokia and Motorola in particular. JDSU, which had a $100 billion market cap when it was admitted to the S&P 500, is now worth about $1 billion. The up-and-comers on a percentage basis include Juniper (nearly as big now as Motorola, by cap) and most notably Corning, approaching a 10% weight.

When we sum the market cap for the coverage group, we see that it is around $280 billion. At its peak near the century turn, the market cap for this group likely topped $1 trillion—at a time when the companies were immensely inefficient and profligate and the technologies they were hawking were wildly overhyped. Now that they deliver reliable and truly transformative technology, they are collectively worth about a quarter of peak value. Stepping off the soapbox, we brought up that summed or group market cap because that number, residing in cell E20, is instrumental in every cap-weighted calculation.

To begin the process, we need two elements for each data point: (1) the individual company data point itself, and (2) the data point multiplied by its individual market cap. Let's take a look at how we market cap–weight P/Es. The illustration shows historical P/Es from 2003 through 2008 in columns G through I (note that for presentation purposes we've truncated the years 2004 through

Figure 15.7

In this compacted view of a weightings page within the industry matrix workbook, we've cut out year 2010 and the interim years between 2003 and 2008. The actual worksheet sprawls across hundreds of columns. We market-weight so many data points, returns, averages, ratios, and growth rates on the industry matrix workbook that by necessity we've devoted two worksheets to the process.

Weighted Averages

		Price	Shares Out 2009 (mm)	Market Captlzn		2003 P/E		2008 P/E	5_year P/E	2009E P/E	Weighted 2003 P/E		Weighted 2008 P/E	Weighted 5-year P/E	Weighted 2009E P/E
ADC Telecom	ADCT	8.65	117	1,013		(49.97)		10.48	38.16	31.82	(50,614)		10,615	38,655	32,227
Adtran	ADTN	22.66	64	1,440		33.41		14.54	21.06	17.62	48,118		20,938	30,336	25,373
Alcatel	ALA	3.37	2,296	7,737		(7.53)		17.18	17.18	-	(58,268)		132,890	132,890	-
Big Band	BBND	4.04	64	258				15.10	15.10	52.84					
Ciena	CIEN	12.29	104	1,284		(14.32)		21.49	21.49	-	(18,380)		27,584	27,584	-
Cisco Systems	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		17.86	20.84	14.16	3,736,252		2,311,994	2,697,806	1,831,988
Ericsson	ERIC	9.30	3,193	29,695		(14.10)		16.43	15.43	14.33	(418,656)		488,030	458,098	425,614
Extreme Networks	EXTR	2.57	115	296		(41.24)		26.35	35.18	22.01	(12,225)		7,810	10,427	6,523
Corning Inc.	GLW	15.79	1,591	25,120		74.89		11.44	18.48	13.51	1,881,214		287,268	464,278	339,364
JDS Uniphase	JDSU	5.85	228	1,334		(17.94)		25.35	(59.72)	25.98	(23,940)		33,828	(79,689)	34,672
Juniper Networks	JNPR	24.47	556	13,615		90.94		19.68	32.57	28.68	1,238,211		267,900	443,446	390,447
Motorola	MOT	7.03	2,267	15,934		25.23		427.95	111.14	-	401,999		6,819,084	1,770,860	-
Nokia	NOK	12.95	3,778	48,926		18.43		14.53	15.47	14.53	901,456		710,773	757,007	710,773
Polycomm	PLCM	22.71	87	1,981		35.68		13.82	22.27	17.97	70,685		27,381	44,119	35,610
Sycamore Networks	SCMR	3.08	284	874		(15.81)		76.19	5.71	-	(13,817)		66,587	4,988	-
Tellabs	TLAB	6.59	410	2,705		-		21.88	23.12	22.45	-		59,171	62,522	60,715
				281,635							7,682,036		11,271,852	6,863,327	3,893,306

(continued)

Figure 15.7 *(continued)*

Weighted Averages															
		Price	Shares Out 2009 (mm)	Market Captlzn		2003 P/E		2008 P/E	5_year P/E	2009E P/E	Weighted 2003 P/E		Weighted 2008 P/E	Weighted 5-year P/E	Weighted 2009E P/E
Weight															
ADC Telecom	ADCT			0.4%											
Adtran	ADTN			0.5%											
Alcatel	ALA			2.7%											
Ciena	CIEN			0.5%											
Cisco Systems	CSCO			46.0%											
Ericsson	ERIC			10.5%											
Extreme Networks	EXTR			0.1%											
Corning Inc.	GLW			8.9%											
JDS Uniphase	[illegible]			[illegible]											
Juniper Networks	JNPR			4.8%											
Motorola	MOT			5.7%											
Nokia	NOK			17.4%											
Polycomm	PLCM			0.7%											
Sycamore Networks	SCMR			0.3%											
Tellabs	TLAB			1.0%											

2007 in blank column I). We show the five-year average in column J; and the 2009 P/E in column K. In Columns L through P we have multiplied the individual market cap times the P/Es for each of these historical and forward years and for the five-year period. And, importantly, we have summed the P/E times cap totals in columns L through P.

To execute our cap-weighted P/E, we jump back to the company comparisons worksheet. To calculate market-weighted P/E for each individual period, divide the P/E times market cap sum by the sum of total market capitalization. For 2008, for example, the formula looks like this: `=Weightings!Q20/Weightings!E20`, where Q20 is the sum of 2008 P/Es times current market caps and E20 is the summed market cap for the group.

In the 2008 figure, we immediately see the value of analyzing the group based on its weighted P/E versus its simple average P/E. The nearly 60 times simple P/E has been distorted by Motorola's 400-plus P/E for the year. The more reasonable P/Es for the industry giants—Cisco, Ericsson, Nokia, and Corning—show that investors in the group were really on average paying 40 times for pro forma earnings in 2008. Even that number is high by industry standards, as the 2008 average price for each equity held up relatively better than the earnings trend, which was decimated by the global economic collapse; 2H08 performance actually canceled much of 1H08's EPS.

Let's take a careful look at 2009 P/Es, which at first blush seems awfully low. On an unadjusted basis, deep pro forma losses for Alcatel-Lucent, Ciena, and Sycamore Networks have dragged down not just the simple average but the weighted average as well. If we eliminate those negative P/Es on the comparisons sheet, it will eliminate them from the weighted calculation as well.

But, because only Alcatel-Lucent among them has much market cap, eliminating those three deeply negative P/Es raises simple and weighted P/Es by a few percentage points. The 2010 market-weighted group average P/E is likely a truer picture of how much investors are willing to pay for the group. At about 15 times, the group—with low debt, lots of cash, few pension obligations, broad global exposure, and positioning squarely in a secular growth area—trades at a slight discount to the market.

The Big Five comparable historical valuations—price to earnings, sales, book value, cash flow, and relative P/E—look much the same as the other industry valuation grinds. Each has historical data for the individual companies for at least the preceding five years; forward P/Es for the next two years for all members of the group; simple and weighted group averages for each years individual company five-year averages; and the simple average of the individual five-year averages.

What's different is that *we've taken time to calculate a weighted average of the five-year average for these five valuation measures*. In this entire worksheet, which runs nearly 500 lines and includes about 20 data groupings, we've only done this last step for the Big Five historical comparables.

We've done so because we need this information for the final piece of our valuation puzzle, called Peer Derived Value.

Chapter 16

PEER DERIVED VALUE

Confronting the Peer Value Problem

If you read enough research reports, every so often you'll come across a sentence like this: "The XYZ shares, which typically trade at a premium to the peer group, now trade at a discount." Okay, now what?

Intuitively, we know this observation has captured a useful discrepancy and *perhaps* (emphasis mine, doubled) represents a value opportunity. But is it an investable discrepancy? If we don't act on that observation within one week, is it still valid? What caused the discrepancy, by the way: Has the peer group P/E moved? Or was it the asset itself? More to the point, is this value discrepancy *in and of itself* sufficient justification to act?

The fact is that this kind of observation amounts to a tip or a hunch, and one with a very uncertain shelf life. Yet if we have a means to quantify this observation and to do so in real time, it can provide powerful information that informs valuation analysis and the asset decision.

Most investors don't have access to useful tools for quantifying this observation or for trading on it. In a world awash in financial volumes on comparable historicals, DFCF, and DDM, you would be hard pressed to unearth a volume devoted to deriving or adjusting asset value based on the peer group relationship.

Many analysts and investors seeking valuation information from these kinds of relationships rely on the familiar or, conversely, on exotic formulations they concoct in their own labs.

The most common methodology for identifying valuation discrepancies is to use relative P/Es. The problem with relative P/Es, of course, is they encompass not just the peer group but the whole market. To tortuously paraphrase Groucho, we wouldn't want to join a club insufficiently indiscriminate to include us along with everybody else.

So why not replicate the relative P/E process but on a smaller and more focused scale? It can be done, but it is a far from simple process. Implicit in relative P/Es, remember, is a benchmark—the S&P 500—as well as benchmark earnings. Industry indexes abound, but none is likely a perfect match for your exact coverage. And even if it were, the most we could get is industry index earnings; we regard earnings as insufficient for the valuation decision.

How about building your own index? It would be simple enough to build a weighted earnings scale for a given peer group; we pretty much weight everything we come across. But we would also need to build a cap-weighted index, and that is far from simple. We need to declare a base-line value and beginning point in time, determine a divisor, accommodate member changes, and deal with a range of other issues. Moreover, operating in a vacuum, we would lack the validation of the market and investing public; we might never know if our baseline or divisor assumptions were correct.

After considering these limitations and challenges, we concluded we needed to build our own methodology. Fortunately, all the groundwork we've laid so far in the individual company workbooks and the industry matrix steers us almost directly to the solution. The wealth of data and links to real-time pricing enable us to create the solution and keep it current efficiently and painlessly.

As the previous paragraph implies, if you've skipped ahead in hopes of snaring the latest valuation magic bullet, we've got bad news. The essential inputs in this process are contained—embedded, really—in all the prior work. That is not to say publicly available information cannot be used to make this technique work. But we would argue that to attain maximum flexibility and veracity in the process, it is best to control the inputs.

The Elements of PDV

Let's revisit the earlier statement that triggered this exercise. "The XYZ shares, which typically trade at a premium to the peer group, now trade at a discount."

If we break it down, we see that the subject and dependent clause in this sentence contain an historical observation: XYZ typically trades at a premium to the peer group. There is also the current circumstance that captures the value discrepancy: XYZ now trades at a discount to the peer group.

There are a few other things implicit in such a casual observation. Though not stated, the value discrepancy has likely been identified based on price to earnings, the market's most common and familiar valuation measure. We know that actual stock movement is sometimes contrary to P/E trends; in the early days of the 2009 recovery, high P/E stocks hugely outperformed low P/E stocks because investors preferred to buy future, not present, earnings. In designing our peer group valuation process, we did not want to rely solely on P/E. We knew that if we wanted to flesh out this suggested value discrepancy, we would have at a minimum five comparable historical metrics to pull from the value kit. The Big Five historical comparables used almost universally are price to earnings, price to sales, price to book value, price to cash flow, and relative P/E

The *historical* relationship between an equity and its peer group, the first part of this puzzle, is static. Both the prices at which the peer group stocks traded and the financial statement data (e.g., earnings, revenues, and book value) included in the historical comparables are frozen in time. In our industry matrix, we calculated five-year average P/Es, price to sales, and other comparables for each company. We did the same for the peer group. And, for this subset of Big Five historical comparables, we also calculated a weighted five-year average, in order to minimize the impact of fast-growing or troubled outliers.

Armed with that knowledge, it is straightforward to calculate and quantify the relationship between a company's five-year average price-based metric and the peer group's five-year average weighted price-based metric. For simplicity's sake in the following example, we'll let P/E stand in for each of the Big Five.

Now that we've quantified the historical relationship of each individual P/E to the group's weighted average, we need to quantify the relationship between the current (i.e., two-year forward) P/E for each company with that of group current (i.e., two-year forward) weighted average. That is a slightly more elusive set of circumstances, in that the values and thus the value relationships are moving around based on changes in the inputs (i.e., sales and earnings) and in the asset prices. Because future events can't be pinned to the board like butterfly wings but are ever shifting, this set of relationship needs to be informed by real-time pricing and real-time adjustments to the individual company inputs.

Fortunately, we link our peer group valuation model to the industry matrix, which in turn is linked to the individual workbooks. We also have real-time pricing on both the individual company models and within the industry matrix workbook. Thus our peer group calculation can capture these adjustments in real time. While we've been using the term P/E in the above discussion, we know the peer group relative value assessment needs to be comprehensive. So we need to scale a model that adds valuation color based on revenue, book value, cash flow, and relative P/E.

We have identified the specific challenge. Basically, we need to quantify the historical relationship of the asset to its peer group, quantify the current relationship (which necessarily has some forward elements) of the asset to its peer group, quantify the relationship *between* the historical relationship and the current relationship, and adjust the current price accordingly.

Note that while we seek to quantify the relationship between relationships, we are indifferent to the actual content of any valuation in and of itself. In other words, the fact that one stock traded at a P/E of 22 times for the preceding five years and another traded at 11 times has no bearing on our PDV value calculation. In using Peer Derived Value, all we care about is the degree to which the first stock currently varies from its 22 times historical P/E and the second stock currently varies from its 11 times historical P/E.

All that remains is to erect the infrastructure required to establish this set of relationships. While this set of relationships may seem esoteric, I am not exaggerating when I say the required elements are staring us in the face.

Physical Structure of the PDV Worksheet

Historical Variation versus Weighted Average

For convenience, our PDV calculations occur on a worksheet within the industry matrix workbook. Later, the individual company conclusions will be linked from the industry matrix workbook back to the individual company workbooks to influence valuation and the asset decision.

Take a look at the PDV worksheet represented in truncated form in Figure 16.1. The area at top left shows our conclusions. The area at the right shows the process; and the area below shows the calculations that support our processes. So, working forward rather than backward, it makes sense to begin in the lower area, approximately around row 22.

Rather than start with P/Es, as the market always seems to, we will first look at price to sales. But before we begin, we want to be sure to incorporate the most up-to-date comparable historical ratio information. Accordingly, we want to open each individual workbook and refresh the price, which in turn refreshes the valuation reading. We also want to refresh prices on the industry matrix itself.

Figure 16.1

Peer Derived Value (PDV) is an original and proprietary valuation methodology that seeks to value an equity based on current variation from its historical relation to a user-specified peer group. The process, which sprawls across and particularly down its worksheet, is necessarily compacted in Figure 16.1.

Peer Derived Value (PCV)

Companies		PDV	Current Price	Premium/ Dscnt to current price		P/S	P/BV	P/CF	P/E	Rel P/E		Calculated Value (Average)
ADC Telecom		12.68	8.65	1.47		14.56	5.59	22.90	9.61	10.76		12.68
Adtran		20.83	22.66	0.92		21.58	15.45	23.11	20.80	23.20		20.83
Alcatel-Lucent		4.20	3.37	1.25		6.72	2.53	3.35	-	-		4.20
BigBand		4.93	4.04	1.22		5.03	5.19	8.14	1.37	-		4.93
Ciena		7.89	12.29	0.64		22.83	8.72	-	-	-		7.89
Cisco Systems		[illegible]	[illegible]	[illegible]		22.80	20.96	25.63	21.74	22.74		22.77
Ericsson		9.52	9.30	1.02		12.46	9.57	8.97	8.03	8.57		9.52
Extreme Networks		5.21	2.57	2.03		4.72	2.55	5.85	3.68	9.26		5.21
Corning Inc.		17.30	15.79	1.10		13.43	18.24	20.23	16.43	18.20		17.30
JDS Uniphase		4.79	5.85	0.82		18.28	6.34	(8.57)	-	7.90		4.79
Juniper Networks		19.97	24.47	0.82		25.04	13.87	14.28	22.45	24.20		19.97
Motorola		7.55	7.03	1.07		7.90	6.58	2.98	11.51	8.78		7.55
Nokia		13.64	12.95	1.05		18.73	14.74	13.26	12.22	9.25		13.64
Polycomm		23.56	22.71	1.04		24.13	15.85	29.65	23.02	25.16		23.56
Sycamore Networks		1.20	3.08	0.39		2.00	2.11	-	0.28	1.63		1.20
Tellabs		5.63	6.59	0.85		6.91	3.93	6.14	5.34	5.83		5.63
Average				**1.05**								

(continued)

Figure 16.1 *(continued)*

Peer Derived Value (PCV)

		5-Year Avg Multiple	Historical Variation vs. Wghtd Avg	Frwrd (09-10) Multiple	Current Variation vs. Wghtd Avg	Preemium/ Discount of Historical Variation to Forward Variation	Price
Companies		**Price to Sales**					
ADC Telecom		1.83	0.48	0.74	0.29	1.68	8.65
Adtran		3.71	0.98	2.67	1.02	0.95	22.66
Alcatel-Lucent		0.99	0.26	0.34	0.13	2.00	3.37
Tellabs		[illegible]	0.61	1.52	0.58	1.05	6.59
Simple Average		[illegible]		**2.55**		**1.40**	
Weighted Average		**3.80**		**2.60**			
				-32%			
Companies		**Price to Book Value**					
ADC Telecom		2.58	0.59	2.25	0.91	0.65	8.65
Adtran		4.06	0.93	3.35	1.36	0.68	22.66
Alcatel-Lucent		2.01	0.46	1.51	0.61	0.75	3.37
Tellabs		1.48	0.34	1.39	0.57	0.60	6.59
Simple Average		**3.27**		**1.99**		**0.87**	
Weighted Average		**4.38**		**2.46**			
				-44%			

Figure 16.1 *(continued)*

Peer Derived Value (PCV)

		5-Year Avg Multiple	Historical Variation vs. Wghtd Avg	Frwrd (09-10) Multiple	Current Variation vs. Wghtd Avg	Preemium/ Discount of Historical Variation to Forward Variation	Price
Companies		**Price to Cash Flow**					
ADC Telecom		31.22	2.05	10.01	0.77	2.65	8.65
Adtran		18.24	1.20	15.17	1.17	1.02	22.66
Alcatel-Lucent		13.61	0.89	11.62	0.90	0.99	3.37
Tellabs		13.00	0.85	11.83	0.92	0.93	6.59
Simple Average		[illegible]		**14.23**		**0.95**	
Weighted Average		**15.24**		**12.93**			
				-15%			
Companies		**Price to Earnings**					
ADC Telecom		38.16	1.92	24.76	1.73	1.11	8.65
Adtran		21.06	1.06	16.53	1.15	0.92	22.66
Alcatel-Lucent		17.18	0.86				3.37
Tellabs		23.12	1.16	20.54	1.43	0.81	6.59
Simple Average		**15.39**		**16.81**		**0.87**	
Weighted Average		**19.89**		**14.33**			
				-28%			

Figure 16.1 *(continued)*

Peer Derived Value (PCV)

		5-Year Avg Multiple	Historical Variation vs. Wghtd Avg	Frwrd (09-10) Multiple	Current Variation vs. Wghtd Avg	Preemium/ Discount of Historical Variation to Forward Variation	Price
Companies		**Relative P/E**					
ADC Telecom		2.26	2.13	1.35	1.71	1.24	8.65
Adtran		1.28	1.21	0.93	1.18	1.02	22.66
Alcatel-Lucent							3.37
Tellabs		1.39	1.31	1.17	1.48	0.88	6.59
Simple Average		[illegible]		**0.99**		**1.16**	
Weighted Average		**1.06**		**0.79**			

We begin, as we always seem to, with a list of our covered companies in column A. In Figure 16.2, we focus on the first part of the equation: the individual equities' variation from the historical weighted average for price to sales. In column C, for each company we link to that company's five-year average price/sales ratio; these are available on the company comparisons worksheet within the industry matrix. In our example, we are showing 16 companies within the column. In the seventeenth row in this array, we link to the simple average of all companies' five-year price to sales, and in the eighteenth row we link to the weighted average of all companies' five-year weighted average. We see that the five-year average P/S is 3.82.

In other words, for the preceding five years, you could buy this group on average for just less than four times annual revenue. Given that there are few "specials" and surprises in revenue, the weighted average is remarkably close at 3.80. The other valuation measures will be loaded with (mainly unhappy) sur-

Figure 16.2

Communications equipment companies traded at an average four times revenue during 2004–2008. In column D, we quantify each company's variation from that average over the time period.

Peer Derived Value (PDV)			
		5-Year Avg Multiple	**Historical Variation vs. Wghtd Avg**
Companies		**Price to Sales**	
ADC Telecom		1.83	0.48
ADTRAN		3.71	0.98
Alcatel		0.99	0.26
BigBand		3.28	0.86
Ciena		4.67	1.23
Cisco Systems		5.07	1.33
Ericsson		1.94	0.51
Extreme Networks		1.71	0.45
Corning Inc.		5.56	1.46
JDS Uniphase		4.66	1.22
Juniper Networks		6.08	1.60
Motorola		1.15	0.30
Nokia		1.68	0.44
Polycomm		3.01	0.79
Sycamore Networks		13.48	3.54
Tellabs		2.32	0.61
Simple Average		**3.82**	
Weighted Average		**3.80**	

prises and specials; for that reason in PDV we will always measure variation off the peer group on a cap-weighted basis.

In column D, for each stock we calculate the variation to the historical group-weighted average P/S. Assuming group-weighted average historical P/S is in cell C45, beginning in cell D28 and on through cell D43, we divide each company's five-year average P/S by the weighted average.

Let's take a look at a few examples to see what the data—and the data relations—tell us. The first two stocks in the column are ADC Telecom, principally a provider of connectivity solutions for carrier, enterprise, and cable networks; and ADTRAN, a technology fast-follower and price leader for carrier and enterprise customers. We did not choose these two because they are next to one another (nor for the near-fantastic coincidence that both have a CFO named James Mat(t)hews). We chose them because one has had a stable last few years and the other has effectively reinvented itself and taken some bumps in the process. Presumably, the market will have weighed in on these very different experiences.

Without delving too deeply into each company's situation, we note that investors have always liked ADTRAN—and evidently like it now a bit more—because it has an unparalleled customer base of top-tier telecommunications companies (telcos), executes well when it attacks new markets such as enterprise networking, and (here's the "like it more now" part) a pricing strategy in which new products are priced at discounts to the market and new iterations of older products go out at successively lower price points.

ADC, under CEO Robert Switz, has in our view followed a courageous path to forge itself anew. ADC used to serve lots of traditional telco equipment niches, though not particularly well; rather than remain a second-tier player with an unfocused strategy, the company repositioned itself as a connectivity and access player. Along the way, some missteps occurred; investors were not happy with a failed all-stock bid for a rival. More specifically to the price/sales equation, investors may perceive the company as now playing in lower-margined niches and thus are less willing to pay what they once did for revenues.

ADC's five-year historical price/sales ratio of 1.83 is less than half the group average; specifically, ADCT traded at 48% of the group's weighted average five-year P/S. ADTRAN's historical P/S was right around the average at 3.71; that is 98% of the five-year weighted peer group price/sales ratio. Before we delve into the reasons for the market's very different treatment of these industry peers, let's see how these relationships to the peer group hold up in the current environment.

Current Variation versus Weighted Average

In column E of Figure 16.3, we link from the company comparisons worksheet within the industry matrix to get the forward (2009 and 2010) P/S ratios for our 16 companies. Because we need an average in this column, our formula is an average of the two links. For ADC Telecom, the formula would be something like `=('Cmprsn Tlcm'!N410+'Cmprsn Tlcm'!O410)/2`, where cell N410 on Cmprsn Tlcm is the 2009 calculated price/sales (based on our income statement modeling and linked originally from the ADCT individual workbook) and cell O410 is the 2010 value. We proceed down line with the two-year forward average P/S for each company. In cell E44, we link to the simple average in this series, which is 2.55; in cell E45, we link to the weighted average in this series, which is 2.60.

Figure 16.3 shows the "new reality," or at least the reality as it stood in midsummer 2009. The entire market has been through a very rough patch. For our group, whereas investors were once willing to pay nearly four times sales for the group, they are now only ponying up 2.6 times sales—a 32% discount to the five-year average.

In column F, we replicate the value relationship calculations we used in column D, but instead of determining for each stock the variation to the *historical* group-weighted average P/S, for each stock we want to calculate the variation to the *forward* group-weighted average P/S.

How are our sample companies holding up in this brave new world? Specifically, how are their value relationships to the peer group faring? ADC Telecom, we learn, is trading at a two-year average P/S of just 0.74, or just under 30% of the group average. ADTRAN, by contrast, has retained its value relationship to the group. Whereas ADTRAN traded at 98% of the group average for the preceding five years, its current (forward) two-year average P/S ratio is 2.67, or 102% of the group average.

In other words, despite the gyrations in the market, investors have more or less maintained ADTRAN's historical relationship to the peer group, at least on a price/sales basis. ADC has not been so lucky. Despite beginning at a substantial discount to the peer group on P/S, ADC's discount has increased to the point at which its P/S—once half the group average—is now less than one-third.

Premium/Discount of Historical Variation to Forward Variation

While ADC has not fared well with investors, perhaps investors are misreading the stock and a value discrepancy has been created. In column G of Figure 16.4,

Figure 16.3

The economic recession and stock market collapse may have wracked some sectors harder, but technology was not spared; the group at midsummer 2009 traded at just 2.6 times sales or at a 32% discount to its preceding five-year average.

Peer Derived Value (PDV)					
		5-Year Avg Multiple	**Historical Variation vs. Wghtd Avg**	**Frwrd (09-10) Multiple**	**Current Variation vs. Wghtd Avg**
Companies		**Price/ Sales**			
ADC Telecom		1.83	0.48	0.74	0.29
ADTRAN		3.71	0.98	2.67	1.02
Alcatel		0.99	0.26	0.34	0.13
BigBand		3.28	0.86	1.80	0.69
Ciena		4.67	1.23	1.72	0.66
Cisco Systems		5.07	1.33	3.20	1.23
Ericsson		1.94	0.51	0.99	0.38
Extreme Networks		1.71	0.45	0.64	0.24
Corning Inc.		5.56	1.46	4.48	1.72
JDS Uniphase		4.66	1.22	1.02	0.39
Juniper Networks		6.08	1.60	4.07	1.56
Motorola		1.15	0.30	0.70	0.27
Nokia		1.68	0.44	0.79	0.31
Polycomm		3.01	0.79	1.94	0.75
Sycamore Networks		13.48	3.54	14.23	5.47
Tellabs		2.32	0.61	1.52	0.58
Simple Average		**3.82**		**2.55**	
Weighted Average		**3.80**		**2.60**	
				-32%	

we seek to quantify the relationship of the historical to the forward P/S with a hope of discovering such discrepancies. Figure 16.4 quantifies the change in the historical peer group relationship to the current peer group relationship.

In column G and beginning in cell G28 in our example, for each company we divide the historical variation to the weighted average, by the current variation to the weighted average. In ADC's case, its 0.48 historical variation divided by its 0.29 current (forward) variation results in a premium of 1.68. A value below 1 in this column signals that, on this measure alone, a stock is overvalued relative to its peers. A value above 1 suggests that the stock is undervalued relative to peers.

In other words, based solely on the variation from its historical norm in price/ sales, ADC seems significantly undervalued. ADTRAN sends a different

Figure 16.4

Our peer-derived calculation suggests that, on a price/sales basis, ADTRAN has very much maintained its historical relationship with its peers, while ADC Telecom trades at a discount to its normal spot in the pecking order.

Peer Derived Value (PDV)						
	5-Year Avg Multiple	**Historical Variation vs. Wghtd Avg**	**Frwrd (09-10) Multiple**	**Current Variation vs. Wghtd Avg**	**Premium/Discount of Historical Variation to Forward Variation**	**Peer Derived Value (PDV)**
Companies	**Price/Sales**					
ADC Telecom	1.83	0.48	0.74	0.29	1.68	8.65
ADTRAN	3.71	0.98	2.67	1.02	0.95	22.66
Alcatel	0.99	0.26	0.34	0.13	2.00	3.37
BigBand	3.28	0.86	1.80	0.69	1.24	4.04
Ciena	[illegible]	[illegible]	1.72	0.66	1.86	12.29
Cisco Systems	5.07	1.33	3.20	1.23	1.08	21.04
Ericsson	1.94	0.51	0.99	0.38	1.34	9.30
Extreme Networks	1.71	0.45	0.64	0.24	1.84	2.57
Corning Inc.	5.56	1.46	4.48	1.72	0.85	15.79
JDS Uniphase	4.66	1.22	1.02	0.39	3.12	5.85
Juniper Networks	6.08	1.60	4.07	1.56	1.02	24.47
Motorola	1.15	0.30	0.70	0.27	1.12	7.03
Nokia	1.68	0.44	0.79	0.31	1.45	12.95
Polycomm	3.01	0.79	1.94	0.75	1.06	22.71
Sycamore Networks	13.48	3.54	14.23	5.47	0.65	3.08
Tellabs	2.32	0.61	1.52	0.58	1.05	6.59
Simple Average	**3.82**		**2.55**		**1.40**	
Weighted Average	**3.80**		**2.60**			
			-32%			

signal. After trading at a five-year P/S fractionally below the weighted group average, it currently trades at a P/S fractionally above the group average. Its discount of historical variation to forward variation is 0.95, suggesting on this metric alone that it is a tad, or half a tad, overvalued.

In any event, the PDV calculation appears to have uncovered a value discrepancy for ADC based on price/sales, while suggesting that ADTRAN's value relationship with the peer group is largely unchanged.

Replicating the Process

By this point, you've learned that we want to apply as much information as possible to inform the value decision. That's because every valuation metric has a "yeah, but" element. We analyze P/Es, but with the caveat that P/Es can sometimes be counterintuitive, given investors' anticipatory impulses and desire to purchase future earnings rather than current earnings. Price/sales has information value, but companies can sometimes sacrifice margin to maintain or expand sales. Price/book value has information value, but we've discussed the way mandated impairments and aggressive business development can distort stockholders' equity. Price/cash flow has value, but depreciation schedules can sometimes mislead on cash progress.

We have calculated a wealth of individual asset and peer group valuation analysis, and we need to bring all of it to bear to minimize any distortions from any single valuation technique. Once we've set up the grid for price/sales, we can replicate the process for price/earnings, price/book, price/cash flow, and even relative P/E. (I once saw a sign in a beach house: "Relatives of relatives may not bring relatives"—but this is not a beach house.)

It is in fact simple to replicate the process for those other inputs. Let's move through the other price-based historical comparables. Along the way, we'll check in with ADC Telecom and ADTRAN to see how their historical value relationships are holding up.

PDV Price/Book

The grid to determine PDV price/book is identical to the grid we set up for price/sales PDV. The only difference is that we import and link to the price/book value information on our company comparisons worksheet rather than P/S data. In Figure 16.5, the companies are in column A. Historical price/book value is in column C; the historical variation to the weighted group average is in column D. The forward two-year average P/BV multiple for each company and for the group is in column E. The current variation to the weighted group average is in column

F. And the premium or discount of historical variation to forward variation is in column G.

With this metric, we begin to see the value of using weighted group average. The very low price/book ratios of a couple of outliers (Sycamore Networks and Tellabs) distorts the simple average, which is 3.27 on an historical basis; on a weighted basis, the average is 4.38. Similarly, for the forward P/BV multiple, the weighted average of 2.46 better represents the group in total than the simple average of 1.99. The difference between historical weighted group P/BV and current weighted group P/BV is –44%, a meaningfully larger decline than the –32% decline we recorded between historical weighted group P/S and current weighted group P/S. Why the discrepancy? Not a dollar of revenue has been impaired, but lots of stockholders' equity (the underlying value in book value) has been impaired under FAS 142. So the 44% decline represents not just the market price decline but also the smaller collective pool of equity against which price is assessed.

As for our sample companies, ADC Telecom has a five-year average P/BV of 2.58, representing 0.59 of the group weighed P/BV. Looking forward, ADC's two-year forward price/book is 2.25; that represents 0.91 of the forward group-weighted P/BV of 2.46. That would seem to suggest investors have bid up the stock. How does that jibe with the P/S experience, which seemed to imply the opposite?

Let's look under the covers; specifically, we go to the R&V worksheet within our ADC Telecom individual workbook to examine the balance sheet. We see that the five-year average dollar value of stockholders' equity for ADC from 2004 through 2008 is $846 million. But the two-year average of actual (2009) and forecast (2010) stockholders' equity is $377 million. In other words, more than all of the increase in investors' seeming willingness to pay up for the ADCT stock is explained not by price movement, but by retained-earnings decline flowing from asset impairment. This is a stark example of why we do not rely on any one input in determining PDV.

As for ADTRAN, its five-year average P/BV of 4.06 captures 0.91 of the group-weighted average. Looking forward, its current (two-year forward) P/BV of 3.35 has declined, though not as much as the weighted group P/BV has declined. Accordingly, ADTRAN's current variation versus the weighted average is 1.36. Within the G column, where we derive the premium or discount of historical variation to forward variation, ADTRAN scores a 0.68. To reiterate, any value below 1 in this column signals that a stock is overvalued relative to its peers. A value above 1 suggests that the stock is undervalued relative to peers.

On this measure alone, ADTRAN and ADC appear overvalued relative to their peers.

Figure 16.5

On a price/book basis, ADTRAN and ADC Telecom each appear to trade at a similar discount to their normal relationship to the peer group.

Peer Derived Value (PDV)							
		5-Year Avg Multiple	**Historical Variation vs. Wghtd Avg**	**Frwrd (09-10) Multiple**	**Current Variation vs. Wghtd Avg**	**Premium/Discount of Historical Variation to Forward Variation**	**Peer Derived Value (PDV)**
Companies		**Price to Book Value**					
ADC Telecom		2.58	0.59	2.25	0.91	0.65	8.65
Adtran		4.06	0.93	3.35	1.36	0.68	22.66
Alcatel		2.01	0.46	1.51	0.61	0.75	3.37
BigBand		4.15	0.95	1.82	0.74	1.29	4.04
Ciena		[illegible]	[illegible]	2.26	0.92	0.71	12.29
Cisco Systems		5.31	1.21	2.99	1.22	1.00	21.04
Ericsson		2.90	0.66	1.59	0.64	1.03	9.30
Extreme Networks		2.64	0.60	1.49	0.61	0.99	2.57
Corning Inc.		3.97	0.91	1.93	0.78	1.15	15.79
JDS Uniphase		2.68	0.61	1.39	0.56	1.08	5.85
Juniper Networks		2.22	0.51	2.20	0.89	0.57	24.47
Motorola		2.87	0.66	1.73	0.70	0.94	7.03
Nokia		5.00	1.14	2.47	1.00	1.14	12.95
Polycomm		2.27	0.52	1.82	0.74	0.70	22.71
Sycamore Networks		1.08	0.25	0.89	0.36	0.69	3.08
Tellabs		1.48	0.34	1.39	0.57	0.60	6.59
Simple Average		**3.27**		**1.99**		***0.87***	
Weighted Average		**4.38**		**2.46**			
				-44%			

PDV Price/Cash Flow

Again, for price/cash flow (P/CF) we replicate the PDV grid in columns A through H. Here for the first time we have to deal with outliers with values that are so severely distorting that we need to exclude them from the grid. Both Ciena and Sycamore had negative cash flows for most of the historical comparison period. These (necessarily subjective) exclusions prevent our PDV system from functioning like a true closed loop.

We see in Figure 16.6 that the historical (five-year) peer group–weighted P/CF ratio is 15.24. The forward peer group–weighted P/CF is 12.93, about 15% below the historical peer-weighted P/CF. How do we square that with the much larger declines of 32% for P/S and 44% for P/BV? Simply, the group has begun to earn better; that is supplementing the steady contribution to cash flow from depreciation and amortization and is driving down P/CF ratios more quickly than the market is driving down prices.

ADC Telecom, with weak earnings in the historical period, has a historical P/CF ratio of 31.22, slightly more than double the historical weighted peer group average P/CF ratio of 15.24. As its earnings have recovered, its forward P/CF ratio has been cut to one third that level, or to about 10 times; its current variation to the current weighted average is 0.77. It then follows that its relation of historical variation (2.05) to forward variation (0.77) results in a premium of 2.65. Given that a value above 1 suggests that the stock is undervalued relative to peers, on this measure ADC appears to represent good value.

Well-behaved ADTRAN has a historical P/CF of 18.24, representing 1.20 of the group historical weighted mean. ADTRAN's forward P/CF multiple of 15.17 represents 1.17 of the group forward mean. ADTRAN's premium of historical variation to forward variation is 1.02, suggesting that on P/CF the company is trading right around where it always has in relation to the peer group; there is no value discrepancy here.

PDV Price/Earnings and Relative P/E

Let's construct the now-familiar PDV grid a fourth time, to accommodate PDV price/ earnings. We've actually combined both P/E and relative P/E in Figure 16.7. In column C, we see that historical peer group–weighted P/E is 19.9 times. Net income in the technology space is a fungible number, we've learned. Our P/Es are based on pro forma earnings, consistent with the consensus practice for this technology niche. For our five-year time frame, the 20-times multiple really borrows from two eras: (1) the first few years (2004 to 2006), when technology was

Figure 16.6

The decline in the group's price/cash flow from historical levels to the present has been much less than similar declines in P/S and P/BV. We think that is because these companies now have more predictable and stronger earnings.

Peer Derived Value (PDV)					
	5-Year Avg Multiple	**Historical Variation vs. Wghtd Avg**	**Frwrd (09-10) Multiple**	**Current Variation vs. Wghtd Avg**	**Preemium/Discount of Historical Variation to Forward Variation**
Companies	**Price to Cash Flow**				
ADC Telecom	31.22	2.05	10.01	0.77	2.65
Adtran	18.24	1.20	15.17	1.17	1.02
Alcatel	13.61	0.89	11.62	0.90	0.99
BigB[illegible]nc	[illegible]63	1.75	11.21	0.87	2.02
Ciena	[illegible]	-	22.04	1.70	-
Cisco Systems	17.39	1.14	12.11	0.94	1.22
Ericsson	12.27	0.80	10.80	0.83	0.96
Extreme Networks	27.41	1.80	10.22	0.79	2.27
Corning Inc.	14.50	0.95	9.61	0.74	1.28
JDS Uniphase	(8.01)	(0.53)	4.64	0.36	(1.46)
Juniper Networks	20.70	1.36	30.11	2.33	0.58
Motorola	10.04	0.66	20.12	1.56	0.42
Nokia	13.27	0.87	11.00	0.85	1.02
Polycomm	26.30	1.73	17.09	1.32	1.31
Sycamore Networks	-	-	20.17	1.56	-
Tellabs	13.00	0.85	11.83	0.92	0.93
Simple Average	**15.00**		**14.23**		**0.95**
Weighted Average	**15.24**		**12.93**		
			-15%		

still being accorded giddy multiples even as the trend was receding and (2) the latter stage (2007 to 2008), when technology—cash rich, low debt, lacking pension obligations, and with globally dispersed markets—was emerging as one of the more stable and thus market-mimicking niches.

Even within this increasingly positive climate, not every company could exploit the favorable trends in this space. For the five-year period, we had to discard JDSU, which was mainly producing losses. We also excluded Motorola's 2008 P/E, which was in the midhundreds.

Among our two test cases, ADC—in the midst of completely reinventing itself in the 2004–2008 period—was predictably earnings starved. Its historical P/E of 38.16 times equates to 1.92 in relation to the historical peer group–weighted P/E. Stable ADTRAN, adding new assets at this time (e.g., NetVanta) but not really disturbing its equilibrium, traded at a 21.06 P/E, or at 1.06 of the peer-weighted average.

The forward peer group average weighted P/E drops to 14.33, actually below the market P/E when this calculation was made. The submarket P/E for this niche reflects sound balance sheets and relatively consistent earnings at a time when earnings in other sectors were falling apart. Investors in the current period have again made technology the largest weighting in the S&P 500. While investors are plainly drawn to technology's stability, its growth in overall S&P 500 weighting is equally a function of the sectors—financial and consumer discretionary, mainly—from which investors have recoiled.

ADC Telecom's 24.8 P/E for the forward period amounts to 1.73 of the forward peer group average P/E. ADTRAN's l6.5 times P/E is 1.15 times the peer average. ADC has a 1.11 premium of historical variation to forward variation; ADTRAN has a 0.92 discount of historical variation to forward variation. ADC is just a little bit cheap compared to its normal P/E relationship to the group, and ADTRAN just a bit pricey.

Our final PDV grid, relative P/E, also requires some adjustments. We have had to eliminate the negative forward inputs from Alcatel-Lucent and Ciena; we have had to exclude a few inputs from Motorola's historical and forward years. Mainly because of very low relative P/Es for large-cap foreign names (Nokia and Ericsson) along with Cisco's low relative P/Es, the historical peer group–weighted relative P/E is 1.06, or barely more than the market's. The forward period is even more intriguing; sub-1 relative P/Es are rife in the group, and the forward peer group–weighted relative P/E is 0.79.

ADC had twice the relative P/E in the historical period, at 2.13, and it has less than two times the group average for the forward period, at 1.71. By now we know that this will result in a plus-1 premium of historical variation to forward

Figure 16.7

Among our sample companies, ADC was starved for earnings in the preceding five years, resulting in high historical P/Es; as earnings have risen, its P/Es have come down, suggesting a possible value discrepancy. ADTRAN has maintained its stability within the peer group by most measures, and EPS is no exception.

Peer Derived Value (PDV)							
		5-Year Avg Multiple	Historical Variation vs. Wghtd Avg	Frwrd (09-10) Multiple	Current Variation vs. Wghtd Avg	Preemium/Discount of Historical Variation to Forward Variation	Price
Companies		**Price to Earnings**					
ADC Telecom		38.16	1.92	24.76	1.73	1.11	8.65
Adtran		21.06	1.06	16.53	1.15	0.92	22.66
Alcatel		17.18	0.86				3.37
BigB[illegible]nc		[illegible]	[illegible]	32.14	2.24	0.34	4.04
Ciena		21.49	1.08				12.29
Cisco Systems		20.84	1.05	14.54	1.01	1.03	21.04
Ericsson		15.43	0.78	12.87	0.90	0.86	9.30
Extreme Networks		35.18	1.77	17.69	1.23	1.43	2.57
Corning Inc.		18.48	0.93	12.80	0.89	1.04	15.79
JDS Uniphase				24.02	1.68	-	5.85
Juniper Networks		32.57	1.64	25.58	1.79	0.92	24.47
Motorola		31.93	1.61	14.05	0.98	1.64	7.03
Nokia		15.47	0.78	11.81	0.82	0.94	12.95
Polycomm		22.27	1.12	15.83	1.10	1.01	22.71
Sycamore Networks		5.71	0.29	45.66	3.19	0.09	3.08
Tellabs		23.12	1.16	20.54	1.43	0.81	6.59
Simple Average		**15.39**		**16.81**		**0.87**	
Weighted Average		**19.89**		**14.33**			
				-28%			

Figure 16.7 *(continued)*

Peer Derived Value (PDV)							
		5-Year Avg Multiple	Historical Variation vs. Wghtd Avg	Frwrd (09-10) Multiple	Current Variation vs. Wghtd Avg	Preemium/Discount of Historical Variation to Forward Variation	Price
Companies		**Relative P/E**					
ADC Telecom		2.26	2.13	1.35	1.71	1.24	8.65
Adtran		1.28	1.21	0.93	1.18	1.02	22.66
Alcatel							3.37
BigBand		0.86	0.81	1.70	2.16	0.37	
Ciena							12.29
Cisco Systems		[illegible]	1.13	0.83	1.05	1.08	21.04
Ericsson		[illegible]	[illegible]	0.74	0.93	0.92	9.30
Extreme Networks		4.46	4.19	0.92	1.16	3.60	2.57
Corning Inc.		1.15	1.08	0.74	0.94	1.15	15.79
JDS Uniphase		2.50	2.35	1.37	1.74	1.35	5.85
Juniper Networks		1.94	1.82	1.45	1.84	0.99	24.47
Motorola		1.57	1.47	0.93	1.18	1.25	7.03
Nokia		0.64	0.60	0.66	0.84	0.71	12.95
Polycomm		1.34	1.26	0.90	1.14	1.11	22.71
Sycamore Networks		1.92	1.80	2.68	3.40	0.53	3.08
Tellabs		1.39	1.31	1.17	1.48	0.88	6.59
Simple Average		**1.65**		**0.99**		**1.16**	
Weighted Average		**1.06**		**0.79**			

variation; indeed, at 1.24, ADCT's relative P/E makes the stock attractive compared with that of its peer group. ADTRAN, fittingly, has maintained its peer group relationship based on relative P/E better than any rival. ADTRAN's 1.28 historical relative P/E is 1.21 times the historical peer group–weighted relative P/E of 1.06; its forward relative P/E of 0.93 is 1.18 times the forward peer group–weighted relative P/E of 0.79. Altogether, with a 1.02 premium of historical variation to forward variation, ADTRAN is almost exactly where it has always been in relation to its peer group.

Finishing the PDV Calculation

Notice that the current price for each stock is repeated in each of the PDV grids. To determine our PDV value, we need to adjust the price by premium or discount of historical variation to forward variation for each of the five inputs (P/S, P/BV, P/CF, P/E, and relative P/E). We will then average the five adjusted prices to determine our PDV. The process is illustrated in Figure 16.8.

In the following discussion, remember that the exhibit shows a truncated version of our normal PDV worksheet; typically these values would be 12 to 20 rows to the right, and the column values would be much further along in the alphabet. In the upper right of this PDV worksheet snippet, in column A we repeat our company names. In the next five columns, B through F, for each company we multiply actual price times our premium/discount of historical variation to forward variation

In the actual worksheet as opposed to this truncated snippet, for each company we multiply actual price times our premium/discount of historical variation to forward variation for price to sales in column J), price to book value (column K), price to cash flow (column L), price to earnings (column M), and relative price to earnings (column N).

Returning to our exhibit, to calculate Peer Derived Value for each company, in column H we average the five values in columns B through F. In column I we show the actual price, and in column J we quantify the relationship between PDV and actual price.

Let's return to our test case companies one last time. For ADCT, which at the time of this exercise was priced at $8.65, we have calculated a Peer Derived Value of $12.68. In cell J5, we see that this equates to 1.47, or a 47% premium to actual price. Based on our relational valuation work, ADC could well be that company we cited when we jumped off on this exercise: "The ADCT shares, which typically trade at a premium to the peer group, now trade at a discount."

Figure 16.8

Having laid the groundwork of assessing historical to current peer relationships on five metrics, within the PDV process we apply that information and use it to adjust the current price to uncover peer value discrepancies.

Peer Derived Value (PDV)								
	Mutiplied by Current Price					Peer Calculated Value	Current Price	Premium/Dscnt to Current Price
Companies	**P/S**	**P/BV**	**P/CF**	**P/E**	**Rel P/E**			
ADC Telecom	14.56	5.59	22.90	9.61	10.76	12.68	8.65	1.47
ADTRAN	21.58	15.45	23.11	20.80	23.20	20.83	22.66	0.92
Alcatel	6.72	2.53	3.35	-	-	4.20	3.37	1.25
BigBand	5.03	5.19	8.14	1.37	-	4.93	4.04	1.22
Ciena	22.83	8.72	-	-	-	7.89	12.29	0.64
Cisco Systems	[illegible]	[illegible]	[illegible]	21.74	22.74	22.77	21.04	1.08
Ericsson	12.46	9.57	8.97	8.03	8.57	9.52	9.30	1.02
Extreme Networks	4.72	2.55	5.85	3.68	9.26	5.21	2.57	2.03
Corning Inc.	13.43	18.24	20.23	16.43	18.20	17.30	15.79	1.10
JDS Uniphase	18.28	6.34	(8.57)	-	7.90	4.79	5.85	0.82
Juniper Networks	25.04	13.87	14.28	22.45	24.20	19.97	24.47	0.82
Motorola	7.90	6.58	2.98	11.51	8.78	7.55	7.03	1.07
Nokia	18.73	14.74	13.26	12.22	9.25	13.64	12.95	1.05
Polycomm	24.13	15.85	29.65	23.02	25.16	23.56	22.71	1.04
Sycamore Networks	2.00	2.11	-	0.28	1.63	1.20	3.08	0.39
Tellabs	6.91	3.93	6.14	5.34	5.83	5.63	6.59	0.85
Average								

ADTRAN, steady as a rock, trades pretty much where it normally trades within its peer group. We have arrived at a PDV of $20.83, compared with a current price of $22.66. This relationship equates to 0.92, or roughly an 8% discount to current price. While we have not uncovered an attractive value discrepancy with ADTN, neither have we uncovered an overvaluation situation.

Peer Derived Value of the Communications Technology Group

In our final illustration, Figure 16.9, we show a snippet from the upper left corner of the PDV worksheet. In it are our conclusions: a summary of the PDV for each stock in column C and the PDV's relation to its actual price in column E. At the bottom we have averaged this relationship for the 16 companies, and the average is 1.05. Give or take normal statistical variation, that's fairly close to 1. And that's because we've created an insular and near-perfect closed loop, right?

Yes, and *Hucklebery Finn's* the Duke and the Dauphin really are related to French Royalty. Our system is no more a closed loop than anything within the market, excluding perhaps the market itself. Along the way, we've had to throw out unprofitable or hysterically valued outliers; we begin with pro forma valuations, which are necessarily arbitrary. Our forward component is based on a cascade of estimates, not hard data.

Nonetheless, when we perform this exercise, we consistently arrive at an average value that is within 15% of 1.0, either to the upside or downside. We believe we have fashioned a somewhat closed loop. More broadly, we are confident that quantifying the historical valuation to forward valuation of a company within its peer group—in other words, establishing a relational valuation—has valid informational content to contribute to the valuation process.

Risks and Limitations of the PDV Process

Acknowledging (or positing) that PDV has valid informational content brings us to our next question: how much should PDV contribute to the calculation of dollar value of the asset and the asset decision? We'll cut to the chase by saying it should be something substantial, but something less than 25%.

While we can calculate a PDV value, we believe we should distinguish between dollar value largely determined by the company's own operations and values, and dollar value rendered purely from a relational situation. With comparable historical and DFCF, we are significantly reliant on carefully modeled data to help calculate value. With PDV, we are relying less on company-specific

Figure 16.9

Peer Derived Value can identify value discrepancies, but it is merely part of the overall valuation scheme, which also blends historical comparable and discounted free cash flow valuation.

Peer Derived Value (PCV)				
Companies		**PDV**	**Current Price**	**Premium/Dscnt to current price**
ADC Telecom		12.68	8.65	1.47
Adtran		20.83	22.66	0.92
Alcatel		4.20	3.37	1.25
BigBand		4.93	4.04	1.22
Ciena		7.89	12.29	0.64
Cisco Systems		22.77	21.04	1.08
Ericsson		9.52	9.30	1.02
Extreme Networks		5.21	2.57	2.03
Corning Inc.		17.30	15.79	1.10
JDS Uniphase		4.79	5.85	0.82
Juniper Networks		19.97	24.47	0.82
Motorola		7.55	7.03	1.07
Nokia		13.64	12.95	1.05
Polycomm		23.56	22.71	1.04
Sycamore Networks		1.20	3.08	0.39
Tellabs		5.63	6.59	0.85
Average				**1.05**

data (mainly that included in the Big Five comparables) and relying more on the relationship of the company to its peer group.

This heightens risk that we can misinterpret a value trap as an attractive value discrepancy. A company about to implode can "supernova" its earnings through reckless pricing, prize asset dispositions, and other forestalling actions that only intensify the final collapse. In a vacuum, a PDV much higher than the trading price might signal a huge value opportunity; in context, we might see the company is actually in a tailspin.

A related difficulty with relational valuation is simply that companies don't stand still in their industries. A company need not be in this supernova phase to send a false PDV signal; it may simply be struggling in the face of intensifying competitive headwinds. And a company that seems expensive on a relational valuation basis may be pulling away from its competition, thus earning more of a premium status than investors accorded the stock in the past.

Finally, and perhaps most importantly, the PDV process is based on actual price adjustment, not price calculation. An efficient market supporter might argue that the actual price already reflects all market inputs and that to further adjust it is a distortion. Our counterargument is that relational valuation is useful; that alternative methods (creating a peer group index) is complex, not validated, and dependent on unverifiable inputs; and that quantifying the intuitive, however imperfect, is superior to relying only on intuition.

Altogether, we believe it is appropriate to treat PDV as one aspect of the valuation equation. In practice, it represents about 15% to 20% of our valuation equation. Fairly, that begs the question: when is it 15%, and when is it 20%? While our answer is a bit arbitrary, it too is intuitive. When a PDV has great variation in its components and/or when the PDV varies significantly from actual price, we are at least somewhat suspect of the informational content, and we assign it a 15% weighting.

ADC Telecom's PDV is accorded a 15% weighting in the dollar value of the asset calculation. Its components send divergent signals ($14.56 from P/S, $5.59 from P/BV), and its PDV is 47% higher than its actual price. ADTRAN, by contrast, has remarkably steady PDV; four of the five price-based metric relationships are in the low $20s, or consistent with its price at the time of this exercise. Altogether, its PDV of $20.83 was within 8% of its actual price at the time of the exercise. In other words, ADTRAN is trading more or less where it always has in relation to the peer group.

If that were to begin to change, we would regard it as a significant event—much more so than a change in ADC's intrinsically less stable relationship to the group. Therefore, we give ADTRAN's PDV the higher weight of 20% in the dollar-value-of-the-asset process. Should ADTN's PDV begin skewing meaningfully up or down, we could consider going as high as 25%, because any significant change in this rock-steady relationship would be big valuation news indeed.

PDV in Valuation and the Asset Decision

Now that we've calculated Peer Derived Value for each asset, we take that information—calculated on the industry matrix workbook—and bring it back to the individual company workbook. At this point, you should be able to do so without excessive hand holding on our part.

We now have three individual contributors to our dollar value of the asset formulation: comparable historicals, discounted free cash flow, and Peer Derived Value. Our current (as of mid-2009) weighting in the valuation scheme is 55% DFCF, 30% comparable historicals, and 15% PDV. Shade it as you see fit.

What might influence adjustments in the weighting scheme? When the market is running hot, it is presumably looking forward; greed is in the driver's seat, and investors want to know what firms plan to do tomorrow. We might shade the DFCF weighting slightly higher.

When the market is grinding to a halt or retracing, and fear takes over, investors scan past performance seeking proven earners. In this circumstance, we might shade the comparable historicals mix higher. In periods in which technological innovation is shaking the group and normal value relationships are dissolving and reforming, we could look a bit harder at PDV.

In our discussion of the stock value worksheet, we walked through the final adjustments steps, including determining target price and adjusting forecast performance for the market risk factor (beta). Recall we left a placeholder for PDV on each stock value worksheet, to be included (along with values for comparable historicals and DFCF) in the weighting scheme used in determining dollar value of the asset. Really, though, we're winding down the formal modeling process.

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CONCLUSION: DOLLAR VALUE OF THE ASSET

America is an entrepreneurial cornucopia, and over the decades I have watched countless companies come into being—and a fair amount fall away. The Internet represents that rare thing, a genuine secular earthquake that has been rearranging the business landscape. In a turbulent but nonetheless fruitful period for American capitalism, new firms have arisen to meet new needs, and technology has developed from being a discreet sector to a deeply embedded yet evolving process within each company. Along the way, investor interest in the stock market has surged.

Consistent with the experience across Wall Street, numerous analysts have jumped in and out of our firm over the years in pursuit of more lucrative opportunities. First as my firm's associate research director and later as director of research, I helped shepherd new analysts into the industry. Along the way, I participated in launching many new and existing companies into coverage. Given the investing excitement attached in particular to the Internet but really much more widespread, I found myself initiating coverage in nearly every industry and sector in preparation for or in assistance to industry-specific analysts.

Over these years, my first step has always been to build a model, survey and stress-test it, and only then issue an opinion on the underlying equity. In a second derivative variation on the journalist's aphorism—"I need to read what I've written in order to know what I'm thinking" —I discovered that I need to model in detail so I can determine what I'll write and only then learn what I am thinking.

Along the way, we've trialed all the different ways to skin a cat: top-down and bottom-up modeling and valuation; percentage-of-sales and segment-driven operating income statements; comparable historical and peer group valuation; dividend discount and discounted free cash flow valuation. Eventually, what emerged was a modeling and valuation template that was rigorous and consistent within the company composite but sufficiently flexible to accommodate new data inputs and new ways to skin those cats.

That said, this is the model now, and we're sticking to it. We find it works best, at least fresh out of the box, when it is constructed according to the template. Anecdote time: Three days before Christmas one year, I yanked the pieces of my son's bike from the box, too cheap to pay Toys"R"Us to assemble it for me. It looked simple enough, and I didn't have time to read what the manufacturer (what does he know?) had to say about putting it together. Two days later, in a frazzled state, I wheeled the semidilapidated bike under the Christmas tree. As the front wheel swung to the side into (wobbly) kickstand pose, the headlamp gave me a doleful look. At that point I realized I would have saved two days of work if I'd "wasted" a few minutes reading the manual. This is our manual, and we don't recommend straying from the script.

Analysts who've gone through any combination of formal and informal training have been saturated in financial theory, highly useful if at times conflicting. The conflicts in financial academia provide an interesting backdrop. But any such musings are dispelled by the ringing of the phone and the client wanting to know, simply: buy it or sell it? If it seems we demand an almost pedantic precision about the process, it's because we can't afford wasted motion if we are going to incorporate and integrate all our data on all our worksheets and get them talking among themselves while still giving the analyst time to talk to clients.

We hope our work over the preceding chapters has helped you answer that endlessly recurring question at the end of the phone line. Along the way, we've accomplished much: we have modeled the income statement and other financial statements, and we've used historical and modeled data for the company and its peer group to calculate value of the asset. We have made provisions to accommodate the cycle and the ever-widening schism between GAAP and non-GAAP results. We've incorporated and weighted all the market's valuation mechanisms, and we've done so in a disciplined and flexible manner. Hopefully, and this is paramount, we've left no loose ends in the valuation process.

For all that, permit yourself a sigh of satisfaction—but not much more. Wrapping up college days, I recall dropping off a final paper—*the* final paper, in fact—with a teaching assistant. I let loose a theatrical sigh of completion; college was really done. The TA snickered. "Your parents are allowed that sigh," he said. "You haven't finished anything." Two months later my sighs were more of the anguished variety as I scanned the employment pages and fretted landing an interview.

Your handful of models is really much like that sheepskin: (well done, by the way, for both, but . . .) only a start. Numbers assembly is merely the first step in modeling. Once the basic framework is constructed, the real work—calibration—begins. Eventually, what you are modeling is less the number itself and more the degree to which your process derives a value that varies from the number. Once you determine *consistency* for that variance, you're positioned to make the necessary adjustments. Now multiply this task by the line items in the individual model, and multiply again by the number of individual models. The finished model finds you not at the finish but at the starting line.

The role of modeling in asset analysis is significant, but it is far from the only element. When new analysts start at our company Argus, we tell them that the asset analysis process has four broad buckets: (1) financial statement modeling, (2) valuation analysis, (2) company knowledge, and (4) industry knowledge. Yet even that represents only a few tools in the tool kit. Beyond individual asset analysis lies the interrelations of assets: the balance of buy, sell, and hold ratings for the analyst; the asset management process for the portfolio manager. Simultaneously, investment professionals are charged with interacting with clients, a healthy dose of marketing, and maneuvering through the office politics and the back-office minutiae that never make it onto the job description but somehow eat up big chunks of the day.

In Michael Pollan's excellent *The Omnivore's Dilemma* (Penguin, 2007), the author introduced a lay audience to the concept of the Holon (which Wikipedia attributes to Arthur Koestler). The Holon is something that is a complete and integrated system in its own right yet simultaneously a subsystem or component of a greater whole. Koestler referred to Holons as autonomous, self-reliant parts. We've tried to approach modeling with the goal of creating a self-contained system, a "stable form able to withstand disturbances," but always within the knowledge that a model is an intermediate form contributing to "the proper functionality for the larger role" —that is, the analyst's role.

Throughout this process, we've been putting numbers on just about everything. So, here's the final question: what percentage of the analyst's job is modeling? For once, we defer. The financial services industry is simply too open ended for any one answer to suffice. I know a hedge fund trader who plays, not the bounce on the news, but the next day's rebound off the bounce; that's all he trades. I interviewed a prospective analyst who in his current job started each day in cash, traded equities all day, and ended in cash; worn out by his daily grind, he was 31 years old. I also know portfolio managers who change their holdings much less frequently than Standard & Poor's changes the constituents in the S&P 500, and others who still make pencil marks on charts.

Given the changes in the financial service industry in recent years, including the increase in high-velocity program trading and quant strategies based on complex algorithms, the meticulous modeler can feel a bit like Bartleby Scrivener, dipping his quill in the inkwell while computers whir in the background. The inkwell set may have felt some malicious glee when the quant "rocket scientists" drove their collateralized rockets straight into the mountainside—"without letting off the throttle," as one wistful PM said to me—in the summer and fall of 2008. Such smugness is out of place, as old-fashioned financial managers cannot point to much better performance in that historically bad period.

The nature of the game has changed, and a mere 58 percent market decline is no more likely to dislodge growing reliance on computer-driven trading and quant strategies than the slide rule is likely to take back the desktop from the personal computer. For all that, meticulous modeling is not just vital to the market; we'd argue that it is secure in the market.

Most quant strategies have an exhaustive backlog of data but only a wispy forward element. Dig through the algorithm for that forward element and you'll find the consensus—which even now is built on individually modeled expectations. There is the risk that cost cutting could squeeze the last few humans out of the process, and that digital trend compilation will replace the necessarily subjective mix of hard modeling and industry assessment that informs the analysis process. Should the outlook become purely dependent on machine-generated trend analysis, then no mountainside may be safe.

Our outlook is not so dire, if only because the bookends of the industry—greed and fear—need to find, respectively, confirmation and succor in a human face. The financial services industry—with trillions of dollars at stake, and even now with hundreds of thousands of employees—will remain a multifaceted world with a wealth of styles, approaches, theories, and gimmicks. Even though the financial data stream is now a binary blur, we think the industry will always find a place for those with a feel for the numbers.

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