CORPORATE FINANCE

4th Edition for the Master of Finance and Master of Data Sciences Degrees

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There have been numerous contributors to this book, far too many to mention individually. I appreciate the input of every one of them and apologize for not formally acknowledging their contributions here. However, I have to single out one individual: Without Mary Clare McEwing, the executive development editor in charge of the first edition and the editor on the fourth edition, this textbook would have not come together. There is no better editor in the business.

Moreover, although Prentice Hall (Pearson) no longer publishes this book, their team (led by Donna Battista) were absolutely first-rate in all respects. I appreciate their help along the way.

Website: book.ivo-welch.info

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About the Author

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This book is dedicated to my parents, Arthur and Charlotte Welch,
my wife Lily, and my three children, Arthur, Leonard and Greta.

Preface

Most corporate finance textbooks cover a similar canon of concepts, and my book is no exception. A quick glance at the table of contents will show you that most—though not all—of the topics in this book overlap with those in traditional finance textbooks and syllabi. That said, this book is intentionally different. It features many innovations in approach and emphasis. I firmly believe that it is the best introductory corporate finance book available anywhere *and at any price*. After you have used this book once, you will not want to go back. As far as I know, no one who has used this book has ever switched back unless forced to do so by a committee.

This book is also an experiment in pricing. All major economics book publishers believe that professors do not care how much their textbooks cost. This book puts this belief to the test: its competitors cost $300 plus. This edition remains priced at $60 in print, and it is also available for free on the web. (This price is low enough to allow many students to keep this book even after they have completed the course.) Of course, professors should adopt this book not because of its price, but because it is simply the best corporate finance textbook today, with full instructor support materials, including a free course management and equiz website.

Basic Organization

Essential Corporate Finance covers all the topics of the usual corporate finance curriculum. However, as noted above, the organizing principle of moving from perfect to imperfect markets unifies the core chapters. This progression from financial "utopia" to the complex real world is especially apparent in the first three parts of the book and is revisited multiple times in the remaining parts.

Part I: Value and Capital Budgeting shows how to work with rates of return and how to decide whether to take or reject projects in a perfect market under risk neutrality. Five chapters lay out the basics of the time value of money, net present value, valuation of perpetuities and annuities, capital budgeting, interest rates, uncertainty, and debt and equity in the absence of risk aversion.

Part II: Risk and Return introduces risk aversion and shows how it creates a relation between risk and expected returns in a perfect market. It first provides a historical backdrop of rates of return on various asset classes and some institutional background. It then proceeds to the key concepts of risk, reward, and diversification from an investor's perspective; moves on to benchmarked costs of capital; and culminates with a discussion of the Capital Asset Pricing Model (with warts included).

Part III: Value and Market Efficiency in an Imperfect Market describes what happens if the perfect market assumptions do not hold in our messier real world. Although the perfect market assumptions form the basis of most finance formulas (such as NPV and the CAPM) and have facilitated the development of finance into a modern science, they are not always realistic. Thus, in this part, two chapters examine the reality of information differences, noncompetitive markets, transaction costs, and taxes. The chapters also explain differences between efficient and inefficient markets, and between rational and behavioral finance.

Part IV: Real-World Application puts the theory to work in three chapters. It shows that although the financial concepts may be simple, their application can be complex. This part examines a wide range of issues and pitfalls to consider when putting NPV and IRR to work, looks at financial statement analysis from a finance perspective, and considers the valuation technique of comparables.

- **Part V: Capital Structure and Payout Policy** considers the capital structure that firms should choose. It starts again with a perfect-market theme and then shows in five chapters how this should play out in an imperfect world of corporate taxes and other issues. Some market imperfections should push firms toward more equity and others toward more debt.
- **Part VI: Projecting the Future** shows how to think about the construction of pro formas. In a certain sense, it is what much of corporate finance is all about.

The Companion

This edition of the book is disciplined in keeping only enough content to fit the essential first course in finance. This keeps the book short. Other material—even important material as long as it is impossible to cover in a first course—is now in a "Companion" book. This book is also available for free. Instructors can also print and distribute individual chapters. Formatting is the same as it is in this primary book, but update are only ever other edition or so. The companion includes such chapters as "International Finance," which are a necessary checkbox for AACSB accreditation—but which no introductory finance course has *ever* found time to cover.

The companion includes more detailed coverage of capital-structure dynamics, capital-structure patterns in the United States, investment banking and mergers & acquisitions, corporate governance, international finance, and options and risk management. It also includes appendices to Chapter 5 (how to extract and lock in forward rates, how to calculate bond durations, how to hedge interest risk, how to compound continuously, and how Treasuries are quoted in the real world); Chapter 8 (more explanations for the efficient frontier); and Chapter 10 (certainty equivalence, two-portfolio separation, the relation between the mean-variance efficient frontier and the CAPM, and available CAPM alternatives, such as the APT); Chapter 12 (an event study); Chapter 13 (more real-option decision trees); Chapter 14 (the Coca-Cola financials); Chapter 17 (how CAPM, WACC, and NPV fit); and Chapter 18 (how to think of the discount factor on tax obligations and on the tax shelter effect of debt). Each chapter appendix is briefly previewed in the main text. Finally, the book's website (book.ivo-welch.info) has a chapter on quantitative real option implementation and a provocative chapter on ethics.

Instructor Preface

The instructor preface, which describes differences from other textbooks and changes from the third to the fourth edition, is now laid out onto the website, book.ivo-welch.info. The website also offers more information about additional instructor aids.

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PS: Please email any errata to the author. The website will keep an errata page.

To Struggling First-Course Finance Students

I would like to warn you ahead of time about one common issue in introductory finance classes that may end up frustrating you. This is especially the case if you take your first finance course in an MBA program. Chances are that you will find the tempo of the first finance course either too slow or too fast. This problem arises because MBA students typically come from very different backgrounds.

One large fraction come from finance-related jobs. Usually, their work experience has not left them with knowledge solid enough to skip the first finance core course. Previous exposure gives this group a useful road map that then makes it much easier to take in new finance-related knowledge. (Some also wrongly believe that they already know everything they need to know, fail to realize this and study, and are then shocked when they fail the course.)

Schadenfreude!

Another large fraction has not seen an equation for many years. They may even be less prepared now than they were when they graduated from high school. It is a challenge for them simply to keep up.

If you are in the second group, you will initially feel overwhelmed by the class experience. (And you will likely not do as well on the early exams—the world is not fair.) My advice to help you even the playing field is to read the book itself once ahead of the course. The idea is not for you to fully understand everything. The idea is to acquire the road map, the rough idea where the course is going. It will make understanding the material much easier.

And let me advise patience, practice, and reflection: New knowledge will eventually fall into place, and you should be able to do well *in the end*. Some of my best and brightest students felt frustrated during the course, but they kept at it, studied twice as hard, and ended up at the top of their classes. (One of my best and most memorable students was a D.J. in Lebanon before she joined the MBA program!) Struggling and anxiety along the way are necessary and maybe even desirable. Whether you like it or not, some angst will be unavoidable. Tough it out.

You may become tempted to blame your instructor for your frustrations. But instructors are caught in the same circumstances as you are. How would *you* gear an introductory finance class toward the different kinds of students in your class? See, despite the different levels of student preparedness, recruiters expect every graduating MBA to have a solid grasp of the finance basics. (And they often ask questions that could go right onto the midterm or final.) If there is a magic bullet, I have not found it. There are no easy solutions.

After having lamented our common dilemma, let me not disavow our instructor responsibility: We must make the first finance course a surmountable and interesting challenge for *all* motivated students, regardless of background. Every unprepared but willing student must be able to acquire a solid finance background. Every prepared student must find the class useful.

Yet let me also disavow one misconception. It is not an instructor's duty to be entertaining or even to be liked. In fact, a recent study at the U.S. Air Force Academy has shown that students randomly enrolled in classes did better in subsequent courses if their first instructor was less generous in grading and less well-liked. If you want to be entertained, skip the finance course and listen to TED lectures on pop culture, instead. Finance is not a passive or easy experience.

May the Force (of this book) be with you!

PS: If your instructor is not using a syllabus.space site, you can register yourself and work with the generic corporate-finance introductory webcourse.

Data and Programming for Masters Students

The Master of Finance / Data Sciences Edition

This version of the textbook contains additional data and programming pointers that are suitable for a "Master of Finance" or "Master of Data Science" degree. Unlike MBAs or BAs, Masters of Finance (and Masters of Data Science) are expected to be able to program, web-scrape, analyze, and interpret economic data. These resources appear at the end of each chapter.

Programming Languages

What are good programming languages? Actually, programming languages matter little. What matters is that a student (1) is fully comfortable in using at least one; and (2) can pick up new computer languages on demand. It may take a smart student about six months to learn programming in her first computer language. (https://www.codecademy.com/ is a good computer language learning resource.) The second computer language should take only six weeks. The third may require as little as six days. (No, the fifth does not take six minutes.)

Why are there so many computer languages? Each computer language has its own strengths and weaknesses. For economic data analysis, I recommend that students master at least two languages: one for generic data and string manipulation; and one for statistical and matrix analysis.

Which languages would I recommend? English, of course!

Jokes aside, as of 2017, Python (https://www.python.org) is the best generic string and basic numerical language, with perl (https://www.perl.org) a reasonable alternative.

R (https://www.r-project.org/) is the dominant statistical language. Unfortunately, it is also quite painful. At first, R seems magic and simple—until it suddenly completely baffles its user. (R was originally designed as an interactive statistical environment, and never fully left its roots behind with all its plus'es and minus'es. Germans like to call such creatures "egg-laying wool-milk sows.") The semantics are not always orthogonal (meaning, programs may not do what one would reasonably expect). But this is not the worst part about R. The worst part is that its errors often appear too late (meaning they are difficult to locate), and its error messages are often incomprehensible, too. Errors do not even give a line number to tell you where the error occurred! R can also be either incredibly fast or excruciatingly slow, with no apparent reason to the novice. As to strengths, R exceeds not only in facilitating parallel access to many CPU codes and in its availability of statistical and other packages, but also in its ability to create beautiful graphics (often used in this book). And as of 2017, there is no way around it: R is the most common standard in academia and industry. A new language called Julia (https://julialang.org/) is coming on strong and will, I hope and pray, begin to replace R around the end of the decade.

As for other languages, most are not suitable for our purposes. C, C++, C#, and Java sadly do not work well for our main problems: string processing, and vector/matrix/graphics processing, or both. C has not been reasonably enhanced in 25 years, although it could become much better with very little effort (http://www.ivo-welch.info/tech/2016/05/15/C.html! sigh...). C++ is complex and error-prone. Java is too heavy, and bogged down by Oracle licensing.

Feel free to email suggestions (e.g., for particular data and programming resources or other tasks) to the author. I am particularly interested in promoting low-cost or free high-quality historical panel data sets. This edition only covers a few data sources. For a longer list, see https://quantpedia.com/Links/HistoricalData.

All major-purpose computing languages are free (and for good reason), leaving only a few other languages worth mentioning. Matlab can be an expensive R alternative with some optimization advantages. SAS and Stata can sometimes be used for statistical features, but they are neither free nor geared towards the kind of programming we typically need. Mathematica is too cumbersome for numerics and is also expensive.

Sometimes, small tasks can be handled in spreadsheets, but spreadsheets are really more suited to checking modest calculations visually than they to replicability of serious and complex tasks.

Operating Systems

Which operating system works best? A Unix operating system base (such as linux, macos, or ubuntu-on-windows) usually makes data programming a lot easier. One warning: from time to time, programmers run into problems with different end-of-line terminators on windows (CR-LF), linux (CR), and macos (LF), (see also https://en.wikipedia.org/wiki/Newline). The blame for this lies with Microsoft and Apple, who had dreams of walled gardens when they made their choices decades ago. Dealing with international characters (think UTF) can be painful, too.

Computer Hardware

What computer hardware is required? Nowadays, hardware costs and program running speed are usually dwarved by human hourly cost and programming development time. Therefore, I would advise all students to work primarily on an SSD rather than on an HDD. The former are at least an order of magnitude faster and can cost as little as $150 for a *good* large drive. (HDDs remain good choices for backup and large data set storage. And, by the way, despite rumors to the contrary, both tend to die at the worst possible moments. Backup!) It is also important to have plenty of RAM (especially for R programs; R snears when confronted with 8GB machines). Interestingly, the computer does not have to have the latest or highest-end CPU or GPU, however. A good 3-year old i5 or a Ryzen 5 should be sufficient.

Other Courses and Concepts

A good microeconomics background is sina-qua-non. An intuitive understanding of the concepts is far more important than a suffering through more tech-ed-up versions of such a course.

A good econometrics background is essential. This does not mean asymptotic theory (which can often be outright harmful), but good applied analysis of data—OLS and GLS, residual analysis (e.g., heteroskedasticity), errors-in-variables, time-series analysis, panel data, instrumental variables, Bayesian perspectives, etc.

The philosophical concepts of causality and correlation are at the heart of most data analysis—and often the source of bad inferences in applications and consequent disastrous business decisions..