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## Epilogue

### Afterthoughts and Opinions

You have traveled a long distance with me through this book. We have now reached the epilogue, where, by tradition, I am allowed to voice my own personal opinions—in effect, to pontificate. I want to leave you with some of my thoughts on finance theory versus practice, business and finance education, business school rankings, finance research, and what I hope you will take with you after having read this book.

Dilbert on Opinions: 2012-10-07

### Theory or Practice?

In finance, Yogi Berra's famous quote does not hold: *In theory, there is no difference between theory and practice. In practice, there is.* By nature, most good finance theory is very closely related to its practice. Quoting the famous sociologist Lewin, *There is nothing more practical than a good theory.* Finance theory and finance practice are ruled by the same ideas. As an academic myself, I am proud that the majority of financial management ideas were either invented or developed in academia first *before* they crossed over into practice.

### Academic Research—an Academic Question?

But finance research is not just for aspiring academics: Management consultants and economics consultants are basically researchers. Firms like McKinsey, Booz Allen (Hamilton), or Boston Consulting Group (BCG) may have different audiences, production speeds, team systems, and publication and evaluation processes, but they research the same issues that academics do and with the same methods. Similarly, many proprietary trading and asset-management firms are really best characterized as “academic research departments in disguise.” There is also much cross-fertilization: Many professors work regularly with major consulting or asset-investment firms—and some have even quit academia altogether to quadruple their pay. (If you want to become a management consultant or investment manager, my advice to you would be to try to work for a professor as a research assistant, paid or unpaid. Chances are you will learn as much or more from working on a research project as you have learned in your classes.)

Dilbert on PhDs: 2013-05-24

Dilbert on PhDs: 2013-05-23

Because finance is by its nature such an applied discipline, after reading this book, you should not need anything else to understand finance research today. In an ideal world, you should be able to read the current state-of-the-art research right now. Unfortunately, there is one little problem: Academic finance journals love intimidating jargon. (They also prefer algebra to our numerical examples as the means for expressing ideas.) Thus, you may need some extra training in “language” if you want to read original-source academic papers. Nevertheless, if you

Dilbert on Phd Economists: 2013-06-03

were to decide to learn just a little bit more jargon, you would probably have the background to understand many of the cutting-edge, interesting research ideas in finance journals today. Let me point you to some good initial sources to browse: Start with top academic journals (such as the *Journal of Finance*), top practitioners' journals (such as the *Financial Analysts Journal*), or good working-papers sites (such as [www.SSRN.com](http://www.SSRN.com)). References in their articles can in turn direct you to other good journals and resources.

### How Much Can We Really Know?

So, how good are we at understanding finance? I would give us a B-. All three parts of finance—valuation, investments, and financing—have simple conceptual underpinnings, but their applications in real life are fiendishly difficult. And for all three of them, there is no alternative: Finding the proper value, the proper portfolio, and the proper capital structure may be tough, but what are your alternatives?

Given our deficiencies—given that all our methods have their errors—what should you do? My best advice for you is to use common sense, to employ a number of different techniques to come up with a range of possible answers, and to then make a judgment at the end of the day as to what estimate appears most reasonable in light of different models. As I have noted many times, finance is art based on science. Fortunately, if everyone else is getting a C+ and you are getting a B-, you will still become the most knowledgeable and successful financier in the class.

If we research finance long enough, will we ever fully understand it? The answer is again no. It is the nature of the beast. Most financial economics is social science. It is only when there are good arbitrage conditions—when finance becomes more like physics—that prices can be pinned down. For many and perhaps the most important investments, this is not and will never be true. (The obvious example is the equity premium. What is it today?) In such cases, behavior and prices can and will deviate from the theory. On occasion, this leads some to conclude that finance is less worthy of study or even a lesser science than, say, physics. This is a mistake. Here is why:

- The questions are different. Finance is not interested in the Big Bang, and physics is not interested in the behavior of CFOs or investors. The study of one is not a substitute for the other. We just have to bring the best tools to each question we want to study.
- Moreover, the perception that there is always more science and accuracy in physics is a misunderstanding, too: Some questions permit more precise answers than others. In physics, some systems (e.g., the weather or earthquakes) are by nature chaotic and difficult to predict, while others (e.g., Newtonian mechanics or planetary orbits) are more exact. It is the same in finance: Some questions are difficult to answer (e.g., the appropriate equilibrium rate of return on a stock), while others are relatively precise (e.g., option and fixed-income pricing).
- Economics and finance ask many questions to which the answers are more difficult and complex than those often pondered in mathematics and physics. For example, economic agents can react to economic forecasts—a fact that makes predicting the stock market even harder than predicting the weather. Imagine how much more difficult it would be for meteorologists to forecast if the weather could read its own forecast and then change its behavior *because* it read the weather forecast!
- Physics and finance even share another property: Real-world constraints may prevent us from doing certain research. In physics, particle colliders have become so expensive that physicists can no longer study certain particles. In finance, our financial institutions have come to consider their data to be their proprietary competitive advantage. They also fear the legal liability that public disclosure and study could bring—and given the litigiousness of U.S. society, justly so. In other cases, it is the desire of powerful lobbies to

prevent academics from shining a light on conflicts of interest. Sadly, as in physics, many interesting questions in finance may therefore no longer be researchable or answerable.

The fact that we do not have all the answers is both good news and bad news. The bad news is that we will never fully understand financial markets and individuals. The good news is that our knowledge will continue to improve and that there is plenty of space for new and exciting research in finance. For me, this means finance is still intellectually challenging enough to remain “fun.” For you, if you go into practice, this means there is enough art involved so that computers will only help but never replace you.

Dilbert on Replacable by Robots?:  
2013-05-03

### Becoming a Researcher?

The most exciting area in economics and finance today is the availability of large household data sets. Unfortunately, many of them are effectively proprietary. But with this new data, some of us can now learn how individuals behave. It’s as if our profession suddenly invented electron microscopes, whereas we only had optical microscopes in the past.

The skill set for economic data analysis is almost the same as it is in finance: learn how to program and analyze large data with an economic mindset. Any of these skills alone is not that useful. It is the combination that matters. Don’t fall into the trap of thinking if you have one, you don’t need to learn much about the others.

PhDs in economics, finance, and data sciences are much more difficult degrees. Fortunately, they are also not austerity degrees. In fact, the starting salary in academic departments is around \$250,000 per year. However, because it takes more than 5 years on average to get a good PhD, it is still not an NPV-maximizing choice to get one. You have to love the challenges that come with it.

You also won’t get paid for cruising. The work is hard. Being an academic professor is a 60-hour-per-week job—the 20 hours of teaching that the average student sees consumes only one-third of the time of a full-time professor. Even the classroom time is only a fraction thereof, similar to the amount of time a lawyer would spend in a court room. The other two-thirds are consumed in roughly equal parts by research (to come up with the ideas that make it into books like mine), service to the university (to run the school), and service to the academic profession at large (e.g., to help weed out good ideas from bad ideas). Of course, part-time professors often have the luxury of focusing only on the teaching part. (My colleague, Bhagwan Chowdhry, has written an excellent piece about what it takes to publish an academic paper in the Huffington Post: [huff.to/ocresc](http://huff.to/ocresc).)

### Thoughts on Business and Finance Education

Let me move on to some thoughts about how we teach. I began teaching in 1989. Since then, I believe the gap between faculty and MBA students has slowly but steadily grown. I must admit that we faculty were partly to blame. We have often been guilty in not selling our ideas to our students. Sometimes, we think that our ideas are too difficult to communicate, or we have simply not yet worked them out well enough for ourselves. Of course, the dense curriculum rarely leaves us much time to talk about current academic research in the classroom, too.

But allowing this gap to develop has been a mistake. After all, excitement about new knowledge and research is exactly what has drawn us academics to business schools rather than to practice—with the opportunity to convey our ideas to our students and to the world at large. If we do not incorporate our current academic research into the curriculum, then we should not be surprised if our students sometimes wonder about its value. *As a profession, we need to do better.*

I am as guilty as others. However, I have tried to take some steps in the right direction. In addition to sneaking in many novel ideas into this book, I have tried to find the time to give a special final lecture in my own classes: I pick five current working papers from my department and talk about the questions they address and the answers they provide. Every time, even those students who were dead bored of me in my other lectures woke up and started asking questions, often coming up with interesting and different interpretations themselves. This last class session has always been the most fun both for myself and for my students. Maybe you can suggest such a class session to your instructor.

### Vocational or Research Training?

It is also important that you understand how higher education in the United States is structured. A good explanation appears in the California Master Plan for Higher Education, which set out the mission for its three branches of higher education. Let me quote it nearly verbatim (not my English!):

- The University of California is designated the State's primary academic research institution and is to provide undergraduate, graduate and professional education. UC is to select students from among the top one-eighth (12.5%) of the high school graduating class.
- California State University's primary mission is undergraduate education and graduate education through the master's degree including professional and teacher education. Faculty research is authorized consistent with the primary function of instruction. CSU is to select students from among the top one-third (33.3%) of the high school graduating class.
- The California Community Colleges have as their primary mission providing academic and vocational instruction for older and younger students through the first two years of undergraduate education (lower division)...and workforce training services.

The vocational model—teaching job-specific skills—belongs with community colleges. This is not the domain of my book. A book following a simpler step-by-step approach, without trying to explain underlying rationales, would likely work better. The community college model has an important place. Many of its graduates are smart and will go on to become top executives, but their career paths will be much harder than those of the graduates from the other two categories. Eventually, to reach the next step, they will have to pick up a book like mine, anyway.

My book is geared towards students in the two higher categories. (The top 20 business schools in the world all fall into the research category.)

Again, each category suits many students. And again, there is a lot of overlap. Many students and professors in the middle category are smarter and better (and will often be more successful) than many students and professors in the top category. It is only on average that the quality is higher in the top category.

### Teaching or Teaching-and-Research Professors?

Over the years, the common lack of exposure to (and thus appreciation for) research has made some students question whether research is not just a distraction from something that they are paying for—their education. In this perspective, business schools exist primarily to enhance job opportunities, and as such, they should provide “vocational education.” In a vocational context, the best teachers are often adjuncts and lecturers, who can share plenty of war stories, vouch for the importance of their own teaching in their past business environments, and may even help some students to get jobs with their own or their friends' businesses. The intellectual curiosity here is also often modest. This model works best in the community colleges. In the mid-tier schools, there is often a healthy mix of research faculty on the one hand, and adjuncts,

lecturers, and full-time teaching faculty without research backgrounds on the other. A top-tier university that wants to remain such in the long run must primarily be based on research, with thought-leading scholars and emphasis on intellectual depth.

The more ambitious business schools provide an intellectual experience, where both research and teaching are important. Such an experience allows students to take a fresh look at the world, to explore other business areas for the first time, to learn how to think in economic and business terms, to consider the intellectual foundations of business, and to learn about the most novel ideas—those that have not yet permeated practice. Yes, real-world CFOs possess a lot of knowledge and skill that neither finance professors nor you possess. But do you really want to learn *only* what current CFOs know *today*? Chances are that many of their practices are based on what they learned in their own education *20 to 30 years ago*. Here is an example that should make this clear. The UK's City & Guilds Institution released its study of 405 random financial directors. One in seven needed help switching his or her computer on and off. One in five struggled to save a document. More than one in five needed assistance in printing. And a quarter could not understand spreadsheets—invented almost 25 years earlier for the purpose of financial analysis. You should not aspire to learn just what CFOs do know—instead, you should aspire to learn also what they do not know!

Moreover, not everything that is useful for success is best taught in business schools. Adult height is correlated with success. Taller people seem more regal. Alas, we cannot make you taller, so we may as well not try teaching what we do not know how to teach.

In the top category model, a good business school is a center of thought and research. If you expect primarily vocational training from your business school, skip the UC and CalState institutions, go to a good community college, and read another book.

### Good and Bad Topics

So what should research-and-teaching business schools teach you? In my opinion, the answer is that we need to focus on subjects that we can teach better than practitioners can. If we do it right, you have to be patient: You should not receive much job-specific training from us. You should realize that this is not a problem. If you get a job in Goldman's fixed-income department, Goldman will explain to you in its own training program the specialized fixed-income and institutional knowledge that it will require. If you get a marketing job at Pfizer, its orientation program (and your partnered salespeople) will show you how to "market" Lipitor. I am not belittling sales. Selling products (or ideas) is a skill of first-order importance. However, even if we could teach such subjects in business schools, firms can simply teach them better and faster than we can. It's not what we in business schools do best. Rather, our job must be to provide businesses with students who are smart, flexible, open-minded, and suitably critical, with a solid understanding of fundamental ideas—of forests, not of trees. Exhibit 1 is my perspective on who does what better. In closing, please do not expect to learn *everything* you need for success only from practice or only from school. If you do, you will be disappointed.

### But, but, but... What about Finding a Job?

If you want to design the next car for Tesla or run Ferrari, you need to learn engineering concepts in a university course taught by a research professor first. It is not enough to have learned from a car mechanic. You still want to learn from the car mechanic, but only after you have learned the principles first. You would not learn engineering from a car manufacturer, and you would not learn car mechanics from a university.

This analogy transfers seamlessly to business schools. Naturally, like most students, you probably feel a great deal of anxiety about your first job prospects. Should you select your classes

Some Examples of:	
What Business School Teaches Better Than Practice	What Practice Teaches Better Than Business School
General, universal knowledge	Job-specific knowledge
Concepts of business	The specific business
General tools (statistics, data, economics, etc.)	Specific tools (e.g., a particular accounting system)
Marketing methods	The company's specific product or service marketing
Method of thinking	Methods of <i>this</i> company's practice
Concepts of ideas for the next 20 years	Implementation of ideas from the last 10 years
Knowledge for a lifetime	Knowledge tailored to this year's business climate
Leadership principles and theories	Learning how to lead a particular set of people
Source of conflict	Conflict resolution with a specific person
Learning by study	Learning by doing
Reflection	Action
Selling principles	Selling the company's specific product or service
Negotiation principles	Negotiating with specific customers
"Forests"	"Trees"

**Exhibit 1:** *Advantages and Disadvantages of Business Schools over Business Practice.*

based on how "practical" you think they are? Is this not the "practical knowledge" that your recruiters expect?

Actually, the answer is mostly no. Recruiters are rarely looking for specific business practice knowledge. Employers first and foremost want to hire smart, curious, and enthusiastic individuals who are solid on the basic concepts *and who can think of how to apply them to new situations*. (The rest are probably replaceable by robots sooner or later, anyway.) To quote Hannibal Lecter, what matters is, "First principles. Simplicity. Read Marcus Aurelius. Of each particular thing ask: What is it in itself? What is its nature?" If you can take a business scenario and simplify it—analyze it in the context of the theories that you have learned—you will do well. This process is really very similar to what this book has been trying to teach. I did not write my book as training for an interview—it is just that the skills that I consider to be important are also the skills that are important in the interview process. On the flip side, if you try to skip the basics in favor of more "applied classes," my guess is that you will fail your interviews.

Your value, as a university graduate—even to your first employer—is not your immediate business knowledge. Instead, your value is your intellectual ability and flexibility; your knowledge of the fundamentals, of the basic theories, of their application, and of cutting-edge ideas; your human skills, team skills, and sales skills; and so on. Some of these skills are innate, but most can be taught or at least improved upon by studying. In the end, it is your versatility and curiosity, your ability to generalize and synthesize, your ability to apply theories to practice, and your talent for bringing a novel perspective to specific problems that will allow your degree to be of value for you for many years to come.

Having said all this, we have a real problem that we cannot fix. We have a rat race where all schools compete to get their students in the doors of employers first, and all employers want first dibs on the best students. For some students, business school feels more like one great placement venture than like an academic experience. At UCLA, some finance interviewing even begins before most students have completed their first finance course! It's insane. But no school can escape it.

## Finance, Economic, and Data Degree Programs

### MBA Programs and Business-School Rankings

Now indulge me for a moment. If you are an MBA student, you are surely familiar with the biannual influential *Business Week* (*BW*) rankings, first published in 1998. This rankings issue has become one of *BW*'s top sellers. Unfortunately, the quality of the *BW* rankings is only mediocre. Worse, their influence on business education has been both enormous and negative.

The not-so-secret sauce in *BW* rankings is what they describe as “customer satisfaction” measures of students and recruiters. But do these measures really make sense for a ranking?

- Is student happiness really a measure of the quality of student education? We could make life much happier for you—if we pretend we teach you a lot but teach you nothing in the end. For example, consider another prominent survey: *Playboy*'s party school rankings. How do you think students at a perennially top-rated party school (California State University at Chico) would respond? They would probably rate their educational satisfaction very highly—but this does not necessarily make Cal State Chico a great school. (I do not know how good Chico is. But you get my point.)
- Is recruiter evaluation the appropriate measure of student education? Most recruiters are themselves alums of *one* of the schools they are asked to rank. (They also see themselves reflected in the students from their own alma maters.) Most business school alums have never studied at any school other than their own—a fact that naturally makes them relatively ill-equipped to make comparisons. Because larger schools have more alums that are sampled, the size of the alum pool ends up being the primary predictor of “recruiter opinion” in the *BW* survey. The result is inevitable: The average recruiter ranks his or her own alma mater highest (or at least very highly). As a consequence, the correlation between the historical size of a school's graduating classes and its *BW* ranking is very high.
- Can *BW* expect truthful answers? It turns out that all schools, students, and alums are now catering to and manipulating the *BW* rankings. Students and alums now know that if they do not rank their own schools highly, the values of their degrees will go down. And at almost every school, someone will explain this basic fact to the dimmer students who did not grasp this.

At best, I would consider the *BW* rankings today to be measures of familiarity and size. But as a measure of educational quality, I can hardly imagine a worse methodology. Still, let's pretend for a moment that this is not the case. There is an even more fundamental error in these rankings: They treat education as if it were a consumption good sold by (business school) vendors. *It is not!* You are *not* a customer. Instead, your education is something that is coproduced by the school *and* you.

In other words, the usefulness of the MBA degree is largely determined by the depth of student engagement. A student who coasts through classes that were selected to be easy and entertaining will learn little, no matter how good the school is. Yes, there are some quality differences, but the *BW* rankings do not reflect them well and they are not very large. The pool of good schools, faculty, and students is very deep. Nowadays, most business schools teach similar curricula. In my opinion, my book is just as suitable to the #1-ranked school as it is to the #100-ranked school. My personal guess is that the educational quality difference (and average student quality difference) between the #1 school and the #10 school is quite small (as it would be between #10 and #30, or between #30 and #100). In contrast, there is great variation among students in the same school. *The variation in what any one individual gets out of a particular MBA program just swamps the average quality variations across schools.* Most business schools are reasonably local. Go to UCLA or USC if you want to work in Southern California, Northwestern or Michigan if you want to work in the midwest, and Columbia, NYU, or Wharton

if you want to work in New York. The education will be similar, but the recruiting environment will suit you better.

Ultimately, it is up to you to make your education top-ranked. Fortunately, although deciding on the right school is a tough problem, there are really many good choices to pick from. Many schools that never show up in these rankings offer excellent business educations today. Again, by selection of classes and instructors, you can sometimes get a better business education at the #100 school than many students can get at the #1 school.

### Other Degree Programs in Finance, Economics, and Data Science

Not all is well in MBA programs. One worrisome trend is that in their quest to improve on their *Business Week* MBA rankings, many schools have made curriculum changes that I deem to have been counterproductive. These have often substituted happiness over content—but good teaching is neither an entertainment nor a popularity contest. The course material has to be relevant, tough, and challenging, even if it makes the experience less fun. They have also made some odd choices, such as selecting students with high incoming salaries so that they can advertise high outgoing salaries.

Perhaps as a result of curriculum and student changes over the decades, I am hearing more complaints from more and more top recruiters that a good undergraduate bachelor or graduate master of finance candidate can be as good at finance as the (twice-as-expensive) MBA counterpart. This needs to change, or MBA programs will all end up in dire straits. The answer must be to make the MBA curriculum tougher and more rigorous again. If MBA students are paid twice the money, they have to be twice as good! MBA programs can't have their cake and eat it, too.

There is another alternative that students should consider. Many business schools are now offering more specialized masters degrees, often as extended one-year programs. The finance and data sciences are particularly popular. These degrees often sacrifice general management education (breadth) in favor of more specialized expertise (depth). They are now serious alternatives to the MBA for anyone who wants to go to business school to study economics, finance, and data.

And please, anyone: the future belongs to data analysis. Everyone who wants to be prepared for it needs to learn how computers are programmed. Everyone needs to know how to analyze data. If you do not, take a computer science course and an econometrics introductory course before you graduate. You do not have to become a programmer, but you do need such knowledge to develop an appreciation for what data analysis really is—and especially if you want to be in charge of a company that relies on data analysis at some point in your future.

### Bon Voyage

Our book has covered the principles of finance in some depth and breadth. You should be well-prepared now for the next steps in your finance/business education. You can probably choose your next courses à la carte: investments, derivatives, advanced corporate finance, fixed income, financial institutions, international finance, or something else. If you are still curious to learn more from or about me, then you can also visit the book's website at [book.ivo-welch.info](http://book.ivo-welch.info).

I would even recommend branching out from finance. Take good economics, statistics, and computer programming courses. Synthesize them all. This will not only serve you better in the long run, but will also be intellectually more engaging.

By now you should no longer be surprised by one of my quirkier obsessions. It was as important for me to try to teach you how to approach problems as it was to teach you finance. When you are confronted with a new problem, please think in terms of the easiest numerical



example that you can come up with. Only gradually work your way up. That is, address your full problem only after you have understood simpler examples. Hey, you may not even have to remember any of the formulas in this book—given time, you should now be able to “reinvent” them. Giving you the skills to (re)create and innovate would be my greatest victory.

I have enjoyed writing this book in the same way that I enjoy writing my academic research papers, and pretty much for the same reason: It has been like solving an intriguing puzzle that no one else has figured out in quite the same way—a particular way to see and explain finance. Of course, writing it has taken me far longer than I had anticipated—almost ten years by now.

But my effort will have been worth it if you have learned from this book. If you have studied it, you should now know about 90% of what I know about finance. Interestingly, there were a number of topics that I thought I had understood, but had not—and it was only my having to explain them to you that clarified them for me, too. And this brings me to a key point that I want to leave you with—never be afraid to ask questions, even about first principles. To do so is not a sign of stupidity—on the contrary, it is often a sign of deepening awareness and understanding.

I have no illusions: You will not remember all the fine details in this book as time passes—I know I won’t. But more than the details, I hope that I will have left you with an appreciation for the big ideas, an arsenal of tools, a method for approaching novel problems, and a new perspective. You can now think like a financier.

Ivo Welch

UCLA

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