

# Introductory Remarks

## Scope

This course of lectures introduces students to elementary concepts of corporate finance using a more systematic approach than is generally found in other textbooks. Axioms are first highlighted and the implications of these important concepts studied afterwards. These implications are used to answer questions about corporate finance, including issues related to derivatives pricing, state-price probabilities, dynamic hedging, dividends, capital structure decisions, and risk and incentive management.

The main thing to note about this book compared to more standard texts in corporate finance is the level of abstraction. We are arguing in an abstract manner to make the unifying themes, represented by the axioms, clear. But this does not mean that we are using advanced mathematics. While we are not afraid of using mathematical expressions where it will simplify understanding, the emphasis is on basic algebra. No advanced calculus or stochastic processes is used. We provide an extensive set of examples in this book. Most of them are relatively simplistic, they are used to clarify a single point.

We are on purpose not trying to be encyclopedic in our coverage of finance. This book is mainly on *principles*, little about the nitty-gritty of institutions, in which many finance text abounds.

In order to understand the concepts in this book it is essential to work with numerical problems. End of chapter problems are provided for most chapters. Each problem has an indicated level of difficulty, ranking from 1 (simple) to 10 (very hard). If there is a lot of work involved with a problem, this will also push it up the scale.

## Acknowledgment

Numerous students have gone through the first edition of the book, and we owe much to them for pointing out typos and suggesting improvements in the exposition. We would also like to thank Steinar Ekern for his constructive criticism of our handling of capital budgeting under CAPM, and Chester Spatt for suggesting a simple example that illustrates the power of the usage of state price probabilities.

## A Roadmap (Where are we going?)

Introductory chapters, setting the stage. We present some of the “axioms” that we rely on in the later analysis. Like all axioms, they sound reasonable.

- “Axioms” of Modern Corporate Finance.
- On Value Additivity.  
The finance equivalent of Lavoisier’s law. An implication: The value of a firm.
- On The Efficient Markets Hypothesis.  
Loosely stated, it claims that securities prices should not be “too” predictable, because otherwise there is money on the table.

Basics chapters, covered in all finance books.

- Present Value.  
Prices of future cash flows are expressed in terms of interest rates. To value a stream of cash flows, you “discount” using these interest rates. The terminology is strange, but the principles are no different from what grocery stores use.
- Competing Valuation Methods.  
People have been proposing lots of alternative valuation methods, some of which are merely restatements of standard present value analysis, others deliver investment decisions that range from sometimes the same (as present value) to always incorrect, at least if you buy the axioms of modern corporate finance.
- Valuation Under Uncertainty: The CAPM.  
One popular way to distinguish between classes of *risky* future cash flows is to compute “betas” (covariances with the market portfolio). Cashflows get

discounted on the basis of a class-specific, risk-adjusted discount rate. The idea comes from a simple, intuitively appealing, equilibrium asset pricing model, the Capital Asset Pricing Model (CAPM). Even far more elaborate (and realistic) models basically deliver the same insights as the CAPM, namely that only covariance with “aggregate risk” is priced. To put it differently: one is not rewarded for all the uncertainty that an investment project or security carries, only the “systematic” uncertainty.

Multiperiod pricing and derivatives.

- Valuing dated, risky cash flows based on an enumeration of states.

The CAPM or APT does not work well to value such cash flows, because they are not symmetric in good and bad states. So, we need a novel approach.

The valuation approach for this part is incredibly simple. We divide the world into possible future “states.” We then price cash flows in each state separately, using “state-price probabilities,” before we add everything together, using the axiom of value additivity.

- Basics of derivatives.

We will start with some basic facts about the quintessential derivative products, call and put options.

- Valuing derivatives

Many cash flows *derive from* the future value of some underlying asset, and, hence are really derivative products. We will look how the state price approach generates sensible prices for call options and equity, including a real-life example.

- Where To Get State-Price Probabilities?

It is often obvious what the states are. If not, the most straightforward procedure obtains states from the average and the volatility of the payoff on the underlying asset. Since any derivative (including the underlying asset itself) should have the same implicit state-price probabilities, we can *back out* the state-price probabilities from their prices.

- The Dynamic Hedge Argument.

Why are these state-price probabilities the same for all derivatives written on the same underlying asset? As we shall see, it is because there would otherwise be free lunches... We do not really believe such a thing exists, do we? A variation of the arguments leads us to discover the way that the

pricing formula was historically developed by Cox, Ross, and Rubinstein (1979) who called it the binomial option pricing model.

- More on the binomial option pricing model.

The power of the binomial approach becomes clear when we increase the number of periods.

- An Application: Pricing Corporate Bonds.

The best way to understand the derivatives valuation approach is to look at applications. We already looked at call options, equity and warrants. We will get more sophisticated, and consider “fixed income” securities that may not seem to be derivatives. We will see how the resulting valuation gives the shareholders the incentive to “screw” the bondholders by changing the risk of the company.

### Corporate Finance

- Are Capital Structure Decisions Relevant?

Until now, we have been pricing corporate liabilities (equity, warrants, debt) as derivatives written on the assets of the firm. Their value derives from the value of the firm. That is fine, but we have been taking the latter to be exogenous. Is the value of the firm (as defined in Chapter 2) *really fixed*? Can we not change it by changing the financing mix (ratio of debt to equity)? F. Modigliani and M. Miller convincingly argue: no.

- Maybe They Are?

Third-party creditors on the corporate scene, like lawyers and tax collectors, will overturn the celebrated “Modigliani–Miller” irrelevance result.

- Valuation Of Projects Financed Partly With Debt.

We will contrast the derivatives valuation approach with others that have been suggested to tackle the problem.

- And What About Dividends?

Should a company pay dividends? Sounds awful, because the only to benefit is the tax collector! Why, then, do so many firms pay dividends?

### Risk And Incentive Management.

- Since derivatives valuation is based on *hedging*, it suggests plenty of ways to *manage risk*. That is nice for bondholders and shareholders alike, but also for employees! In particular, it suggests a way for Sun Microsystems

to keep their engineers in the face of potential redundancy when Microsoft manages to kill Java...

Insights.

- We summarize the insights of the book.

Longer Examples.

- To make sure we understand what we have been doing, here are some specific examples.