LECTURES ON CORPORATE FINANCE

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To Betty, Majanka and Frederik

PB.

To Ingeborg Helene and Arne Tobias

BAØ.

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Introductory Remarks

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.

A Roadmap (Where are we going?).

Introductory, 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, 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 et al. [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. . .

Longer Examples.

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

Introductory Remarks	vii
----------------------	-----

Contents	xi
----------	----

I Introduction to Finance	1
----------------------------------	----------

1 Finance	3
------------------	----------

1.1 What is Finance?	3
1.2 Corporate Finance	3
1.3 Financial Markets	4

2 Axioms of Modern Corporate Finance	6
---	----------

2.1 The Axioms	6
2.1.1 Financial Markets are Competitive	6
2.1.2 Value Additivity	6
2.1.3 No Free Lunches	7
2.1.4 The Efficient Markets Hypothesis	7

3 On Value Additivity	8
------------------------------	----------

3.1 Value Additivity	8
3.2 The Value of the Firm	8
3.3 A Couple of Brain Teasers	9

4 On the Efficient Markets Hypothesis	12
--	-----------

4.1 The Idea	12
4.2 Traditional Formulation of the Efficient Markets Hypothesis	12
4.3 What Information?	13
4.4 What Does "Correctly Reflected" Mean?	14
4.4.1 Rational Learning	14
4.4.2 Unbiased Beliefs	15
4.4.3 Adding Compensation for Waiting and Risk	15
4.5 Empirical Evidence	16
4.6 Some Implications of the Efficient Markets Hypothesis	16
4.6.1 One Cannot Time the Market	16
4.6.2 Average Returns in Excess of the Risk Free Rate are Solely Determined by Risk	17
4.6.3 Expected Returns Can Vary Over Time	17

II Basic Finance	21
-------------------------	-----------

5 Present Value	23
------------------------	-----------

5.1 Definition of Present Value	23
5.2 Pricing in Markets for Dated Riskfree Cash Flows	25
5.3 Interest Rates	25

5.4	Term Structure of Interest Rates	26
5.5	Net Present Value	28
5.6	Capital Budgeting	28
5.7	Perpetuities	29
5.8	Annuities	30
5.9	Compound Interest	31
5.10	Valuing Fixed Income Securities	32
5.11	Valuing Equities	33
5.12	Risky Cash Flows	35
6	Capital Budgeting	40
6.1	Capital Budgeting	40
6.2	Evaluating Projects using NPV	41
6.2.1	Calculation of NPV	41
6.2.2	Only Cash Flows	41
6.2.3	Accountants	41
6.2.4	After Tax Cash Flows	42
6.2.5	What are Relevant Cash Flows?	42
6.2.6	Inflation	43
6.2.7	Projects with Different Life Lengths	44
6.3	Alternative Valuation Methods	44
6.3.1	Payback Period	44
6.3.2	Internal Rate of Return	45
6.3.3	Profitability Index	49
6.3.4	Accounting Measures of Return	49
6.4	Some Fancy Acronyms	49
6.4.1	EVA (Economic Value Added)	50
6.4.2	MVA (Market Value Added)	50
6.4.3	TSR (Total Shareholder Return)	50
7	Valuation Under Uncertainty: The CAPM	53
7.1	Asset Pricing Theory	53
7.2	Portfolio Returns	54
7.3	Diversifiable and Nondiversifiable Risk	55
7.4	The Set of Efficient Portfolios	56
7.5	The Possibility Set with a Risk Free Security	57
7.6	The Capital Asset Pricing Model	57
7.7	Using CAPM for Pricing	59
7.8	Using CAPM for Capital Budgeting	60
7.9	Empirical Evidence	61
7.10	Experimental Evidence	61
7.11	The Arbitrage Pricing Theory	62
7.12	When the CAPM Would Fail	62

III	Multiperiod Pricing and Derivatives	67
8	Valuing Risky Cash Flows	69
8.1	Valuation of Dated, Risky Cash Flows	69
8.2	States	70
8.3	States and Digital Options	70
8.4	Expectations and Digital Options	72
8.5	Trees	74
8.6	Summarizing	74
9	Introduction to Derivatives	77
9.1	Derivatives	77
9.2	Definitions	78
9.3	Option Cashflows	79
9.4	Bounds on Option Prices	81
9.4.1	Positivity	81
9.4.2	Simple Upper Bounds	81
9.4.3	European Call Lower Bound	82
9.4.4	Should American Options be Exercised Early?	84
9.5	Put-Call Parity	84
9.6	Rounding Off	86
10	Pricing Derivatives	90
10.1	Pricing Risky Cash Flows	90
10.2	Pricing Derivatives	91
10.3	Interpreting Equity as an Option	93
11	Pricing of Multiperiod, Risky Investments	97
11.1	Multiple States	97
11.2	Getting to Two States by Adding Time Steps	98
11.3	A Real-Life Example: Pricing An MCI Call Option	100
11.4	General Strategy	103
12	Where To Get State Price Probabilities?	106
12.1	Implementation	106
12.2	Generating the Possible Future States	106
12.3	Now the State Price Probabilities	109
12.4	Pricing Call Options: The MCI Example Again	110
12.5	State Price Probabilities and True Probabilities	112
13	Warrants	115
13.1	Definition	115
13.2	Firm Value and Warrants	115
13.3	Valuation	116

14 The Dynamic Hedge Argument	119
14.1 Pricing	119
14.2 Why State Prices must be Equal	119
14.3 The Binomial Option Pricing Model	120
15 Multiple Periods in the Binomial Option Pricing Model	128
15.1 Multiple Periods	128
15.2 The Binomial Formula and the Black Scholes Model	132
15.3 Early Exercise of Puts in the Binomial Model	132
15.4 Adjusting for Dividends in the Binomial Model	134
15.5 Implementing the binomial option formula	136
16 An Application: Pricing Corporate Bonds	139
16.1 Corporate Bonds	139
16.2 The Risky Part of Corporate Bonds	139
16.3 Risk Free Bonds with Put Option	141
16.4 Shareholder Incentives	145
16.5 A Solution: Convertible Bonds	146
16.6 Callable Convertible Bonds	148
 IV Corporate Finance	 153
17 Are Capital Structure Decisions Relevant?	155
17.1 The Capital Structure Problem	155
17.2 The Problem with "Assets In Place"	156
17.3 Shareholder Preferences for Firm Value	160
17.4 Implications for Cost of Equity Capital: MM II	161
17.5 What if Assets are Not In Place?	162
18 Maybe Capital Structure Affects Firm Value After All?	167
18.1 Only Through Changes in Assets	167
18.2 Corporate Taxes	167
18.3 Bankruptcy Costs	170
18.4 Agency Costs	173
18.5 Personal Taxes	173
18.6 General Equilibrium Effects Restore Irrelevance	174
19 Valuation Of Projects Financed Partly With Debt	177
19.1 Adjusting for Taxes	177
19.2 Three Strategies That Have Been Suggested	177
19.2.1 Adjusted Present Value	177
19.2.2 Flow To Equity	178
19.2.3 Weighted Average Cost of Capital	178
19.3 The General Principle: Net Present Value Again	179

20 And What About Dividends?	181
20.1 Dividends	181
20.2 The Miller and Modigliani Argument	181
20.3 Why Pay Taxes if Only the IRS Gains?	182
20.3.1 Double Taxation	182
20.3.2 Individual Preferences for Capital Gains	182
20.4 Does the Market Agree?	183
20.4.1 The Ex-day Drop	183
20.4.2 Looking Beyond the Border	184
20.4.3 The Evidence from Returns on Investment	184
20.5 Share Repurchases	184
20.6 So, Why do Firms Pay Dividends? The Signalling Hypothesis	184
20.7 Irrelevance Again	185

V Risk Management 189

21 Risk And Incentive Management	191
21.1 Hedging	191
21.2 Hedging with Readily Available Contracts	191
21.2.1 Forward and Futures Contracts	191
21.2.2 Pricing of Forward and Futures Contracts	192
21.2.3 Options	193
21.2.4 Other Derivatives	193
21.3 Synthetic Static Hedges	193
21.4 Synthetic Dynamic Hedges	194
21.5 The Metallgesellschaft Case	197
21.6 Value At Risk (VaR)	199
21.7 Should Corporations Hedge?	202
21.8 Managing Incentives	202

VI Longer Examples 207

22 Longer Examples	209
22.1 Determining the Maximum Bid on a Gold Mining License	209
22.2 Chippawhip	210

VII Appendix 217

A Notation and Formulas	219
A.1 Notation	219
A.2 Formulas	220

Index	224
--------------	------------

Bibliography	228
---------------------	------------