API 141
Finance

SYLLABUS
September 8, 2017

Akash Deep
COURSE DESCRIPTION

This introductory (but fast-paced) course provides a general survey of finance and investments. It emphasizes an intuitive, logically rigorous understanding of the theory and practice of financial markets, illustrating the concepts through examples and cases drawn from the public, private, and non-profit sectors. Topics covered include: present value analysis and discounting, diversification, the tradeoff between risk and return, market efficiency, pricing of stocks and bonds, the capital asset pricing model, term structure of interest rates, the principle of arbitrage, pricing of derivative securities (forwards, futures, and options), the use of derivatives for hedging, risk management, and the regulation of financial markets.

AUDIENCE

The course is intended for students who are interested in learning the basic tools and techniques of finance and how they are employed for the valuation of complex securities. While an intuitive appreciation of the principles will be the primary objective, mathematical tools will be employed to illustrate the implementation of these principles to practical cases. Any advanced mathematics that is used will be developed in lectures and review sessions.

PREREQUISITE

It is assumed that students will be familiar with introductory concepts in economics (e.g. API 101) and basic (high school level) mathematics. Students with concerns about their backgrounds are welcome to speak to the instructor. Basic computer spreadsheet skills will be expected, and required to complete some of the assignments.
**REQUIREMENTS**

*The course must be taken for credit. No auditors please.*

**Attendance:** An alert, inquisitive presence in each and every class is mandatory. Attendance in review sessions is strongly advised but not required.

**Readings:** Students will be expected to have completed the assigned readings *before class* and review them after class. Note that there are required readings for the first day of class.

**Assignments:** Weekly problem sets will be assigned throughout the course to illustrate and reinforce the concepts presented in class as well as in preparation of the case discussions to follow.

**Exam:** There will be in-class, closed book and closed notes midterm and final exams. *No make-up exams will be held.*

**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Class Participation</td>
<td>10%</td>
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<tr>
<td>Written assignments</td>
<td>20%</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
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<td>Final Exam</td>
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**MATERIALS**

The textbook for the course, *Essentials of Investments*, 10th edition by Zvi Bodie, Alex Kane and Alan Marcus, McGraw-Hill Irwin, 2017. The textbook can be purchased in hard copy or digitally through McGraw-Hill Connect. Limited copies of the textbook are available on Reserve at the HKS Library.

Readings and cases are available online on the Canvas site for this course. Non-Harvard students may need to get a Harvard XID, following instructions on courses.harvard.edu.

Regular reading of financial news in publications such as *The Wall Street Journal, The Financial Times* or the Business pages of *The New York Times* is strongly recommended.

**OTHER RECOMMENDED (BUT NOT REQUIRED) FINANCE TEXTS**

The following are some good introductory finance texts that overlap in parts with the material covered in the recommended text for this class:


# TOPICS AT A GLANCE

<table>
<thead>
<tr>
<th>No</th>
<th>Date</th>
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<th>Assignment due</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 31 (Th)</td>
<td>Introduction to finance and financial markets</td>
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<tr>
<td>2</td>
<td>Sep 5 (Tu )</td>
<td>Arbitrage and the Time value of money</td>
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<tr>
<td>3</td>
<td>Sep 7 (Th)</td>
<td>Valuing financial securities: Bonds</td>
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<tr>
<td>4</td>
<td>Sep 12 (Tu)</td>
<td>Case: <em>Tombstones</em></td>
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<td>5</td>
<td>Sep 14 (Th)</td>
<td>Valuing financial securities: Equity</td>
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<tr>
<td>6</td>
<td>Sep 19 (Th)</td>
<td>Diversification, risk, and return measures</td>
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<td>7</td>
<td>Sep 21 (Th)</td>
<td>Choosing a portfolio</td>
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<td>8</td>
<td>Sep 26 (Tu)</td>
<td>Case: <em>The State of South Carolina</em></td>
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<td>9</td>
<td>Sep 28 (Th)</td>
<td>The Capital Asset Pricing Model</td>
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<td>10</td>
<td>Oct 3 (Tu)</td>
<td>Case: <em>Communications Satellite Corporation</em></td>
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<td>11</td>
<td>Oct 5 (Th)</td>
<td>Efficient markets</td>
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<td>12</td>
<td>Oct 10 (Tu)</td>
<td>Midterm Exam</td>
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<td>13</td>
<td>Oct 12 (Th)</td>
<td>Case: <em>Long Term Capital Management</em></td>
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<td>14</td>
<td>Oct 17 (Tu)</td>
<td>Introduction to risk management</td>
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<td>15</td>
<td>Oct 19 (Th)</td>
<td>Forward and futures contracts</td>
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<td>16</td>
<td>Oct 24 (Tu)</td>
<td>Case: <em>Dozier Industries</em></td>
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<td>17</td>
<td>Oct 26 (Th)</td>
<td>Options</td>
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<td>18</td>
<td>Oct 31 (Tu)</td>
<td>Case: <em>BASIX</em></td>
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<td>19</td>
<td>Nov 2 (Th)</td>
<td>Pricing of options</td>
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<td>20</td>
<td>Nov 7 (Tu)</td>
<td>Real options</td>
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<td>21</td>
<td>Nov 9 (Th)</td>
<td>Case: <em>Bidding for Antamina</em></td>
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<td>22</td>
<td>Nov 14 (Tu)</td>
<td>Case: <em>Federal Deposit Insurance Corporation</em></td>
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<td>23</td>
<td>Nov 16 (Th)</td>
<td>Case: <em>Subprime Meltdown</em></td>
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<td>Nov 21 (Tu)</td>
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<td>25</td>
<td>Nov 28 (Tu)</td>
<td>Financial institutions and policy</td>
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<tr>
<td>26</td>
<td>Nov 30 (Th)</td>
<td>Review</td>
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Dec 6 Final exam (3 to 6pm)
INTRODUCTION TO FINANCE AND FINANCIAL MARKETS

Required Readings

**Introduction to finance and financial markets**


Chapters 1 and 2, *Essentials of Investments*, 10th edition, Bodie, Kane & Marcus, 2017. (Optional reading: Chapters 3 and 4)

**Further Reading**


TIME: TIME VALUE OF MONEY

The three pillars of finance are time, uncertainty and information. This section focuses on the first of these pillars – time – to examine how the occurrence of cash flows at different points in time affects their value. The resultant concept of present value (and future value) is then used to value general investment opportunities and securities, and in particular bonds and stocks.

Required Readings

Arbitrage and the Time value of money


Valuing financial securities: Bonds

Chapter 10, Essentials of Investments, 10th edition, Bodie, Kane & Marcus, 2017.

Case: Tombstones

HBS case # 9-211-063
How did six firms – Microsoft, Coca Cola Enterprises, Norfolk Southern, IBM, Ford Motor, and Cephalon – raise money in US capital markets just after the financial crisis and recession of 2008-09?

Valuing financial securities: Equity

Chapter 13 and Section 14.1, Essentials of Investments, 10th edition, Bodie, Kane & Marcus, 2017.

Further Reading


UNCERTAINTY: PORTFOLIO SELECTION

The future embodies risk and this section explores the ramifications of uncertainty in the cash flows from securities on investors who, by nature, are risk averse. The risk embedded in securities is measured by viewing them as part of a diversified portfolio. The result is not only a theory about the relationship between risk and return but also a surprisingly simple portfolio investment strategy. These concepts are used to ask the question: should the state of South Carolina invest its public employees’ pension savings in stocks?

Required Readings

Diversification, risk, and return measures

Chapter 5, Essentials of Investments, 10th edition, Bodie, Kane & Marcus, 2017.

Choosing a portfolio

Chapter 6, Essentials of Investments, 10th edition, Bodie, Kane & Marcus, 2017.

Case: The State of South Carolina

HBS case # 9-201-061
South Carolina, State Treasurer's Office, 1998. Until last year the state pension fund, with over $17 billion in assets, was barred by the state constitution from investing in equities. After the constitution was amended, the state government has to decide how much to invest in equities, and what assets to choose.

Study Questions:
1. What is the problem that South Carolina faced in 1999 with regard to the management of its pension funds? How do you know that there is a problem?
2. What are the potential solutions?
3. What should the objectives of pension investing be?
4. How do stocks versus bonds rank on these dimensions?

Further Reading


UNCERTAINTY: THE CAPITAL ASSET PRICING MODEL

The Capital Asset Pricing Model is the most widely used model in finance. It provides a simple relationship between risk and return that is useful in addressing a range of different problems in finance such as portfolio selection, valuation of projects and securities, and performance appraisal. The Communications Satellite Corporation case uses this model to ascertain the rate of return that this regulated monopoly, which was set up to launch the first communication satellites, should be allowed to earn.

Required Readings

The Capital Asset Pricing Model


Case: Communications Satellite Corporation

HBS Case No. 276-195

In January 1975, the Federal Communications Commission (FCC) concluded an 11-year investigation of the appropriate regulation of Comsat. One of the most important of these was the determination of the fair rate of return on Comsat's capital. Both the qualitative assessment of risk and the use of analytical techniques had been suggested by eminent experts.

Study Questions:

1. How risky is the investment in Comsat compared to an investment in AT&T and other companies? Which of these risks can be classified as systematic and which as unsystematic?
2. By what methods can the cost of equity and cost of capital be estimated for Comsat (or any other company)?
3. How convincing is the argument of the trial staff? What are the implications of its reasoning and recommendation for all parties concerned and for future government regulated companies such as Comsat?
4. What relation, if any, should there be between a firm’s cost of capital and its investment decisions?

Further Reading


INFORMATION: EFFICIENT MARKETS

The third pillar of finance is information. The prices of financial securities also reveal information about underlying factors that need not be only economic but also political and social. How quickly and appropriately prices reflect information is referred to as a measure of efficiency of markets. No topic in finance is more contentious, and none more important. Not surprisingly, the Nobel Prize in Economics for 2013 was awarded to two economists – Eugene Fama and Robert Shiller – who hold seemingly opposite views on the subject.

Required Readings

Efficient markets


Case: Long-Term Capital Management


Even with the market tremors of the preceding weeks, no one foresaw the earthquake about to rock Greenwich, Conn., one summer morning…LTCM's biggest bets were blowing up, and no one could do anything about it. By 11 a.m., the fund had lost $150 million in a wager on the prices of two telecommunications stocks involved in a takeover. Then, a single bet tied to the U.S. bond market lost $100 million. Another $100 million evaporated in a similar trade in Britain. By day's end, LTCM had hemorrhaged half a billion dollars … The carnage that weekend set off events unprecedented in the world of high finance, culminating with a $3.625 billion bailout funded by a consortium of 14 Wall Street banks and engineered by the Federal Reserve. LTCM lost more than 90% of its assets by the time it was bailed out, and the markets were roiled for weeks. Longer term, it forced many of the world's most sophisticated institutional investors to redefine the ways they manage risk…

Study Questions:

1. Identify some the main investment strategies adopted by LTCM.
2. What was the role of arbitrage in these investment strategies?
3. What was the source of risk in these investment strategies?
4. What does the LTCM experience tell you about market efficiency?


Further Reading


Extraordinary Popular Delusions and the Madness of Crowds, Charles Mackay, 1841.


Thinking, Fast and Slow, Daniel Kahneman, Farrar, Straus and Giroux, 2011.

RISK MANAGEMENT: INTRODUCTION

If it is risk that begets return, then managing risk is what finance is all about. Risk Management seeks not only to provide tools for how to reduce (or take on) risk but also provides guidance of when risk management might add value. Derivatives help make the job of the risk manager, and the speculator, easier!

Required Readings

Introduction to Risk Management


Further Reading


RISK MANAGEMENT: FORWARD AND FUTURES CONTRACTS

Forward contracts simply lock in the price for transactions in the future. This simple innovation that gets rid of price uncertainty thus becomes the most obvious and powerful tool for hedging risk. But how much should you pay for this innovation? The Dozier case examines this question in the context of currency markets, the largest financial market by notional volume.

Required Readings

Forward and Futures Contracts

Sections 17.1-17.4, Essentials of Investments, 10th edition, Bodie, Kane & Marcus, 2017.


Case: Dozier Industries


A US company has just secured its first international sales contract in the UK. But the CFO of the company is concerned that if the value of the pound sterling depreciated, the viability of the project could be impaired.

Study Questions:
1. What risk/s does Dozier face?
2. What other financial instruments or derivatives could Dozier have used to hedge its risk exposure? What would the benefits and costs be?
3. What changes would you recommend for Dozier with regard to the manner in which it bids for international contracts?

Further Reading


RISK MANAGEMENT: OPTIONS

Financial option contracts constitute some of the most advanced derivative products traded in financial markets today. At the same time they resemble insurance contracts that are some of the earliest financial contracts recorded in history. The celebrated Black-Scholes option pricing is simply an application of the principle of arbitrage pricing but it represents a breakthrough in financial engineering and risk management that has remained unmatched by any other development in the theory of finance. Yet this so called “rocket science” can be deployed to effectively address the age old and widely pervasive policy challenge of insuring crops against the vagaries of weather as illustrated in the BASIX case.

Required Readings

Options


Case: BASIX

HBS Case # 207-099

BASIX, an Indian microfinance corporation, must decide whether to continue to sell weather insurance to its clients. A brand-new financial product, weather insurance pays if measured rainfall during the growing season falls below a pre-specified limit. Mr. Sattaiyah, managing director of the BASIX's bank, considers a revised insurance policy for the coming season, weighing the costs and potential risks of expanding the product against the potential benefits.

Study Questions:
1. What fundamental risks do BASIX customers face? How exposed are they to weather risk?
2. How well did BASIX’s earlier efforts to offer rainfall insurance fare? Why?
3. As a BASIX Customer Service Agent, how would you explain and sell the proposed policy to farmers?
4. A simulation based on the rainfall distributions shown in Exhibit 6 of the case suggests that a Rs. 125 policy would have an expected payout of Rs. 83. Is the proposed price appropriate?
5. Is this a product that BASIX should be selling to farmers? If not, how might you modify it to make it better serve farmers’ needs?

Pricing of Options


Further Reading


REAL OPTIONS

Real world opportunities are very similar to financial options because they represent choices that are not necessarily obligations. Furthermore, these choices can be made based upon the availability of new information. Viewing real opportunities as real options allows one not only to exercise these choices more judiciously but also permits the valuation of information itself. In the Antamina case, the Peruvian government devises a novel risk-sharing mechanism to privatize a mine that also seeks to skew the investment incentives of the developer.

Required Readings

Real Options


Case: Bidding for Antamina

HBS Case # 297-054

In June 1996, executives of the multinational mining company RTZ-CRA are contemplating bidding to acquire the Antamina copper and zinc mine in Peru. The Antamina project is being offered for sale by auction as part of the privatization of Peru's state mining company. RTZ-CRA has to determine what the mine is worth, and to recommend whether and how RTZ-CRA should bid in the upcoming auction. The bidding rules put in place by the Peruvian government dictate that each company's bid contain two components: an up-front cash amount and the amount the bidder will invest to develop the property, if development is warranted after further exploration is completed.

Study Questions:

1. If the winning bidder was legally forced to develop Antamina after completing the exploration phase, and was required to pay the Peruvian government upfront for this project, how would you determine the price that they would be willing to pay?
2. If the winning bidder could choose whether or not to develop Antamina after completing the exploration phase, but was required to pay the Peruvian government upfront for the right to develop the project, how would you determine the price that they would be willing to pay?
3. What are the incentives brought about by the different auction designs described above, and that chosen by the Peruvian government? Do the rules seem to meet what you perceive to be the goals of the government?

Further Reading


FINANCIAL INSTITUTIONS

In this final section, we use the tools developed in the course to analyze two of the most significant financial policy challenges of the last century: the Great Depression of the 1930s and the Great Recession of 2008. What did the policy makers do? Where did they succeed? Where did they fail? And what lessons can we learn?

Required Readings

Case: The U.S. Banking Panic of 1933 and Federal Deposit Insurance Corporation

HBS Case # 799-097

‘On March 3 banking operations in the United States ceased ... the government has been compelled to step in for the protection of depositors and the business of the nation’. As President Franklin D. Roosevelt spoke these words to Congress on March 9, 1933, the nation's troubled banking system lay dormant. More than 9,000 banks had ceased operations between the stock market crash in October 1929 and the banking holiday in March 1933. The economy was in the midst of the worst economic depression in modern history. Out of the ruins, birth was given to the FDIC three months later when the President signed the Banking Act of 1933.

Study Questions:
1. What do commercial banks do? Does this mix of activities make economic sense? How does this expose commercial banks to risks?
2. Recall from the BASIX case that any insurance contract can also be viewed as an option. Can this perspective be utilized to understand deposit insurance?
3. What regulatory measures can seek to mitigate the risks of banking?


Case: Subprime Meltdown: American Housing and Global Financial Turmoil

HBS Case # 708-042

“The Federal Reserve and the U.S. Treasury have lately widened the federal safety net more quickly and more aggressively than at any time since the New Deal era. Indeed, a recent front-page headline in this newspaper, “Confidence Ebbs for Bank Sector and Stocks Fall,” had distinctly Depression overtones. (You could almost envision the next line: “Hoover Urges Calm.”) And not since the Depression (under the Reconstruction Finance Corporation) has the government bought significant equity in private firms, as the Treasury has sought the authority to do in the case of Fannie Mae and Freddie Mac. At least during the 1930s, legislation followed months of deliberation and public hearings. The proffered fixes to today’s fast-moving crises are worked out hastily and in private.”

Study Questions:
1. Is residential housing a “safe” asset?
2. What is securitization? How was securitization used by policymakers in the United States to channel housing finance to homebuyers?
3. What were the major changes in the nature of housing finance markets from the 1990s until the onset of the financial crisis?


**Financial Institutions & Policy**

To prepare for this final case session, please review the last two cases:

- *The U.S. Banking Panic of 1933 and Federal Deposit Insurance*
- *Subprime Meltdown: American Housing and Global Financial Turmoil*

… and read the concluding chapters (read more if you wish) from two reports on the financial crisis:

  Find the full report at http://fcic.law.stanford.edu/report
- “Conclusion”, *The Squam Lake Report: Fixing the Financial System*, page 79-87 (9 pages), 2010

**Study Questions**

1. Should Roosevelt agree to deposit insurance? Are there alternatives to reforms of the banking system that might be preferable from an economic point of view?
2. How has deposit insurance worked in the United States and around the world over the last seventy years?
3. What regulatory measures have been used to mitigate the risks of banking?
4. In what ways did the structure and risks of Government Sponsored Enterprises – Fannie Mae and Freddie Mac – resemble those of commercial banks? How were they different?
5. Overall would you say that the housing finance system has functioned well or poorly through the last decade?
6. What changes would you recommend to the institutions that shape and regulate the housing finance system?

**Further Reading**


