

I am studying futures and options because I will spend the rest of my life in the future and I want to improve my options.

Professor Avraham Kamara

FIN 561 - FUTURES AND OPTIONS

WINTER 2021 (offered via remote learning)

PROFESSOR AVRAHAM (AVI) KAMARA

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OFFICE HOURS: ON ZOOM, BY APPOINTMENT.

THIS IS A VERY CHALLENGING AND TIME-DEMANDING CLASS!

**THERE IS A HOMEWORK ASSIGNMENT EVERY MEETING.
THE ASSIGNMENTS ARE 20% OF THE GRADE, AND 80% OF THE
GRADE IS BASED ON 2 EXAMS.**

This course introduces you to the world of derivatives: futures, forwards, swaps, and options. Since the introduction of the first organized financial futures market in 1972, derivatives trading has grown tremendously, and derivatives have become central instruments in management of risk in investments and corporate finance. The Bank for International Settlements (BIS) estimates that in 2019, the average amount of futures and options traded on organized exchanges globally was 10 trillion dollars per day, and the total notional outstanding amount of over-the-counter derivatives (that is, derivatives that are traded directly between two parties outside an organized exchange) was about 600 trillion dollars. We now use derivatives to manage wide range of risks including: commodities (for example, agricultural, energy, and metals), financial securities (for example, individual equity, equity indices, long-term and short-term debt securities), interest rates, foreign currencies, real estate, and insurance, as well as weather, environmental, and entrepreneurial related risks.

We will study the pricing of futures and options relative to their underlying asset or interest rate, as well as the price relations between different derivatives. We will pay particular attention to the various risk management strategies using them, from both the academic and the practical viewpoints.

The subject matter requires relatively greater use of quantitative methods and theoretical reasoning than many other business courses. However, the emphasis in the course is not on math but on understanding how these contracts and markets work. While every effort will be made to limit the mathematical complexity, you should be aware that this is a very challenging and time-demanding course.

Because the concepts build upon each other, you should make sure to master the fundamentals as they are presented, by reading the lecture notes, doing the homework assignments that will be given for each and every class, etc. It is very helpful to do the reading before the class in which it is taught.

COURSE RESPONSIBILITIES

Students will be graded on the basis of:

- 1. HOMEWORK ASSIGNMENTS AND PROJECTS EVERY CLASS!
(A TOTAL WEIGHT OF 20%).**

You are encouraged to work with other students on the problems, but you must submit the solution **INDIVIDUALLY** on Canvas on its due day **BEFORE THE START OF THE MEETING!**

**THE HOMEWORK ASSIGNMENTS ARE ONLINE ON CANVAS
INSIDE “FILES” and also inside “ASSIGNMENTS.”**

I WILL ANNOUNCE THE DUE DATES DURING CLASS.

THERE IS NO LATE SUBMISSION!

- 2. TWO OPEN-BOOK EXAMS** (that must be done individually, of course...) for a **TOTAL WEIGHT** of 80%.

EXAM DATES and WEIGHTS

- 1. EXAM #1:**

On the weekend between CLASS 5 (on Feb. 2) and CLASS 6 (on Feb. 9). A WEIGHT OF 40%.

- 2. EXAM #2**

**On the weekend after the last class of the quarter.
A WEIGHT OF 40%.**

**EXAM 2 IS NOT A COMPREHENSIVE EXAM.
IT WILL COVER ONLY THE MATERIAL SUBSEQUENT TO EXAM 1.**

THERE WILL BE NO MAKE-UP EXAMS!

**YOU ARE RESPONSIBLE THAT YOUR EXAMS AND ASSIGNMENTS
ARE EASY TO READ!
NO CREDIT WILL BE GIVEN FOR ANSWERS THAT ARE NOT EASY
TO READ!**

How do you calculate the grade credit for your homework assignments?

CURRENTLY, ALL THE QUESTIONS AND ASSIGNMENTS ARE REQUIRED.

However, some homework assignments CAN have required and optional questions.

The change in the designation of a particular question from required to optional will be announced in class depending on the material studied in the class. **Otherwise, the question remains a required question.**

The optional questions give you bonus points. You will NOT lose any homework credit towards your grade because you did not answer any optional question. You will lose homework credit towards your grade ONLY IF you do not get full credit on the required questions of the assignments, and do not have enough bonus points to offset that loss.

The score that you will get for each homework assignment is your total points for that assignment. If you solve an optional question, your total points for that assignment can exceed the total required points. The bonus points for optional questions will help you in case you lose any required homework points on that assignment or any other assignment.

The MAXIMUM grade credit that you can get for your homework assignments, even with bonus points, is 20% (= 20 grade points of 100 total grade points).

Example: Suppose we have two homework assignments only. Each has a required 100 points, and the first assignment also has 20 bonus points. The maximum number of required homework points is 200.

As long as you get a total of **AT LEAST** 200 homework points (required plus bonus), you will get the maximum of **20 grade points, and no more than 20 grade points.**

Suppose you get 120 points (100 required points + 20 bonus points) on the first assignment and 100 points on the second assignment. You will have a total of 220 points. You will get **20 grade points, and no more than 20 grade points.**

Suppose you get 100 (required or required plus bonus) points on the first assignment and 100 points on the second assignment. You will have a total of 200 points. You will get **20 grade points.**

Suppose you get 120 points on the first assignment and 80 points on the second assignment. You will have a total of 200 points. You will get **20 grade points.**

Suppose you get a total of 100 points (required or required plus bonus) on the first assignment and 80 points on the second assignment. You will have a total of 180 points. You will get $20 \times (180/200) = 18$ grade points.

It is important to understand that the bonus points on homework assignments count towards the 20% homework part of the grade only. They cannot be used towards any other part of the grade. That is, they will not help you with points lost on an exam.

Solving optional questions and getting bonus points is a good risk management (and learning ☺) strategy. It reduces the risk of not getting the full 20 grade points.

"Wise people realize how little they understand about life, themselves, and the world around them."

"Improve yourself by learning from others knowledge, so that you shall gain easily what others have labored hard for."

Socrates (469–399 B.C.E.)

Socrates was a Greek philosopher from Athens, who lived in the 5th century BC, and is credited as one of the founders of Western philosophy. He authored no texts and is known mainly through the accounts of writing composed after his lifetime by his students Plato and Xenophon. Socrates has become renowned for his contributions to the ethics and knowledge branches of philosophy.

"Teach your tongue to say 'I don't know' and you shall progress."

Moses Maimonides (1135 or 1138 – 1204)

Moses Maimonides (Rabbi Moshe Ben Maimon, also called RAMBAM) – A Jewish rabbi, physician, and philosopher in the Middle Ages, who also influenced the non-Jewish world. Although his writings on Jewish law and ethics were met with Jewish opposition during his lifetime, he was posthumously acknowledged as one of the foremost philosophers in Jewish history. Today, his works and views are considered a cornerstone of Jewish thought and study.

FERPA

This course is scheduled to run synchronously at your scheduled class time via Zoom. These Zoom class sessions will be recorded. The recording will capture the presenter's audio, video, and computer screen. Student audio and video will be recorded if they share their computer audio and video during the recorded session. The recordings will be accessible only to students enrolled in the course to review materials. These recordings will not be shared with or accessible to the public.

The University and Zoom have FERPA-compliant agreements in place to protect the security and privacy of UW Zoom accounts. For more information about the University's FERPA policy, please visit the [Office of the University Registrar's Page](#).

Learning Remotely: Facts and Information

The move to remote instruction this quarter is a way to protect the health of our community while mitigating the effects of the [COVID-19 public health crisis](#) on students' academic progress. The Office of the Provost is providing answers to frequently asked questions at
<https://www.washington.edu/coronavirus/autumnquarter/>.

As a student in FIN 561, you acknowledge that you are a member of a learning community in the Foster School of Business that is committed to the highest academic standards. As a member of this community, you agree to uphold the fundamental standards of honesty, respect, and integrity, and you accept the responsibility to encourage others to adhere to these standards.

REQUIRED READINGS:

FIN 561 – LECTURE NOTES:

- 1. VOLUME I - FUTURES, FORWARDS AND SWAPS.**
- 2. VOLUME II - OPTIONS.**

The two volumes have my lecture notes for the entire course (Vol. I - for Exam #1 and Vol. II - for Exam #2).

**THE LECTURE NOTES WILL BE AVAILABLE ON CANVAS INSIDE
“FILES.”**

Please let me know if you wish to purchase a hard copy of either volume.

**BY DOWNLOADING A LECTURE NOTE, YOU AGREE NOT TO
SHARE IT WITH ANYONE OUTSIDE THE FIN 561
COMMUNITY (THE STUDENTS IN SECTIONS A AND B)!**

**PLEASE READ THE ASSIGNED LECTURE NOTES
BEFORE and, AGAIN, AFTER THE LECTURE!**

THERE ARE NO REQUIRED OR OPTIONAL TEXTBOOKS.

IF YOU NEED ADDITIONAL HELP FROM TEXTBOOKS, LET ME KNOW.

The derivatives exchanges and associations have interesting educational material online (often free of charge) on pricing and trading strategies using futures, swaps, and options.

Chicago Mercantile Exchange (CME Group), Chicago Board of Options (CBOE), Futures Industry Association (FIA), Options Clearing Corporation (OCC), and Options Industry Council, at:

www.cmegroup.com, www.futuresindustry.org, www.cboe.com,
www.optionsclearing.com, www.optionseducation.org.

In particular, CBOE has interesting educational material online (at no cost), including an **Options Calculator** that calculates the prices of the American and European options that we will study in this course.

EMANUEL DERMAN is one of the world's leading experts on financial-derivatives modeling. He had a very distinguished career on Wall Street, at Goldman Sachs and briefly at Salomon Brothers, from 1985 until he retired in 2002.

He is currently a professor at Columbia University and the Director of its program in financial engineering (he received a Ph.D. in theoretical physics from Columbia University in 1973.)

He writes about financial-modeling and risk management related issues on his site:

<http://www.emanuelderman.com>

The following "Opinion" from January 29, 2014, is a nice, simple, way to describe most of what we will study in this course.

In Fin 460 and 560 – Investments, you study points #1 and #2.

In our course, we will study point #3 (Hedging) and the sentences below it.

Financial Valuation Modeling in a Nutshell: Dilution, Diversification and Hedging

Every couple of years I make some attempt to condense the principles of financial modeling:

All securities bear risk.

The essential problem of financial modeling is to determine the expected return that goes with a given estimated (future) risk.

To determine the expected return of a given risky security, note that there are three ways of lowering its risk:

1. **Dilution**: combining the security with a **riskless** bond.
2. **Diversification**: combining the security with other **uncorrelated** securities.
3. **Hedging**: combining the security with another **anti-correlated** security to cancel one aspect of its risk.

If by these means you can lower the estimated risk of a portfolio that contains the security to zero, it is logical that you should expect to earn the return of a riskless bond, assumed known. The expected return of the given security can then be pinned down from this constraint.*

[The paragraph above describes "The No-Arbitrage Pricing Method."]

* - All of this is perfectly reasonable *a priori*. Where it fails in real life is that one cannot estimate risk correctly.

[It is crucial to remember this footnote when working with financial models to price securities and manage risk.]

COURSE OUTLINE

WE WILL DEVIATE FROM THE OUTLINE DEPENDING ON THE PACE THE CLASS FEELS COMFORTABLE WITH.

**PLEASE READ THE ASSIGNED MATERIAL BEFORE AND,
AGAIN, AFTER THE LECTURE!**

Articles, which I have written on issues related to class topics, are designated by an asterisk. They are available on Canvas. They are **NOT** required for the class.

PART 1 – FUTURES, FORWARDS AND SWAP CONTRACTS

LECTURE NOTES FOR ALL THE TOPICS IN PART 1 ARE IN FIN 561 – VOLUME 1.

EXAM #1 WILL COVER EVERYTHING THAT WE WILL STUDY FROM PART 1.

1. Introduction to Futures, Forwards and Options Contracts.

- * Kamara, “Delivery Structure of Futures Contracts.” In *The New Palgrave Dictionary of Money and Finance*, edited by P. Newman, M. Milgate and J. Eatwell, Macmillan Press Limited, London, 1992.

Lecture Notes 2 and 3 below are very important because they develop the foundations of the pricing of derivatives contracts and their usage in risk management. Consequently, they are long (cover several classes) and very challenging.

2. The Pricing of Futures Contracts.

Arbitrage strategies in Futures and Spot Markets.

- * Kamara, “Market Trading Structures and Asset Pricing: Evidence from Treasury Bill Markets,” *Review of Financial Studies*, Winter 1988, pp. 357-375.
- * Eldor, Hauser, Kahn and Kamara, “The Nontradability Premium of Derivatives Contracts” *Journal of Business*, Vol. 79, no. 4, July 2006, pp. 2067-2097.
- * Kamara, “The Behavior of Futures Prices”, *Financial Analysts Journal*, July-August 1984, pp. 68-75.
- * Kamara, “Forecasting Accuracy and Development of a Financial Market: The Treasury Bill Futures Market”, *Journal of Futures Markets*, August 1990, pp. 397-405.

3. Hedging with futures contracts.

- * Kamara, "Issues in Futures Markets: A Survey," *Journal of Futures Markets*, Fall 1982, pp. 261-270.
- * Kamara and Siegel, "Optimal Hedging in Futures Contracts with Multiple Delivery Specifications," *Journal of Finance*, September 1987, pp. 1007-1021.
- * Kamara, "Production Flexibility, Stochastic Separation, Hedging, and Futures Prices," *Review of Financial Studies*, Vol. 6, No. 4, Winter 1993, pp. 935-957.

MANAGING INTEREST RATE RISK:

4. Short-Term Interest Rate Futures.

- * Kamara, "The Relation Between Default-free Interest Rates and Economic Growth is Stronger Than You Think," *Journal of Finance*, Vol. 52, No. 4, September 1997, pp. 1681-1694.
- * Hess and Kamara, "Conditional Time-Varying Interest Rate Risk Premium: Evidence from the Treasury Bill Futures Market," *Journal of Money, Credit and Banking*, Vol. 37, no. 4, August 2005, pp. 679-698.

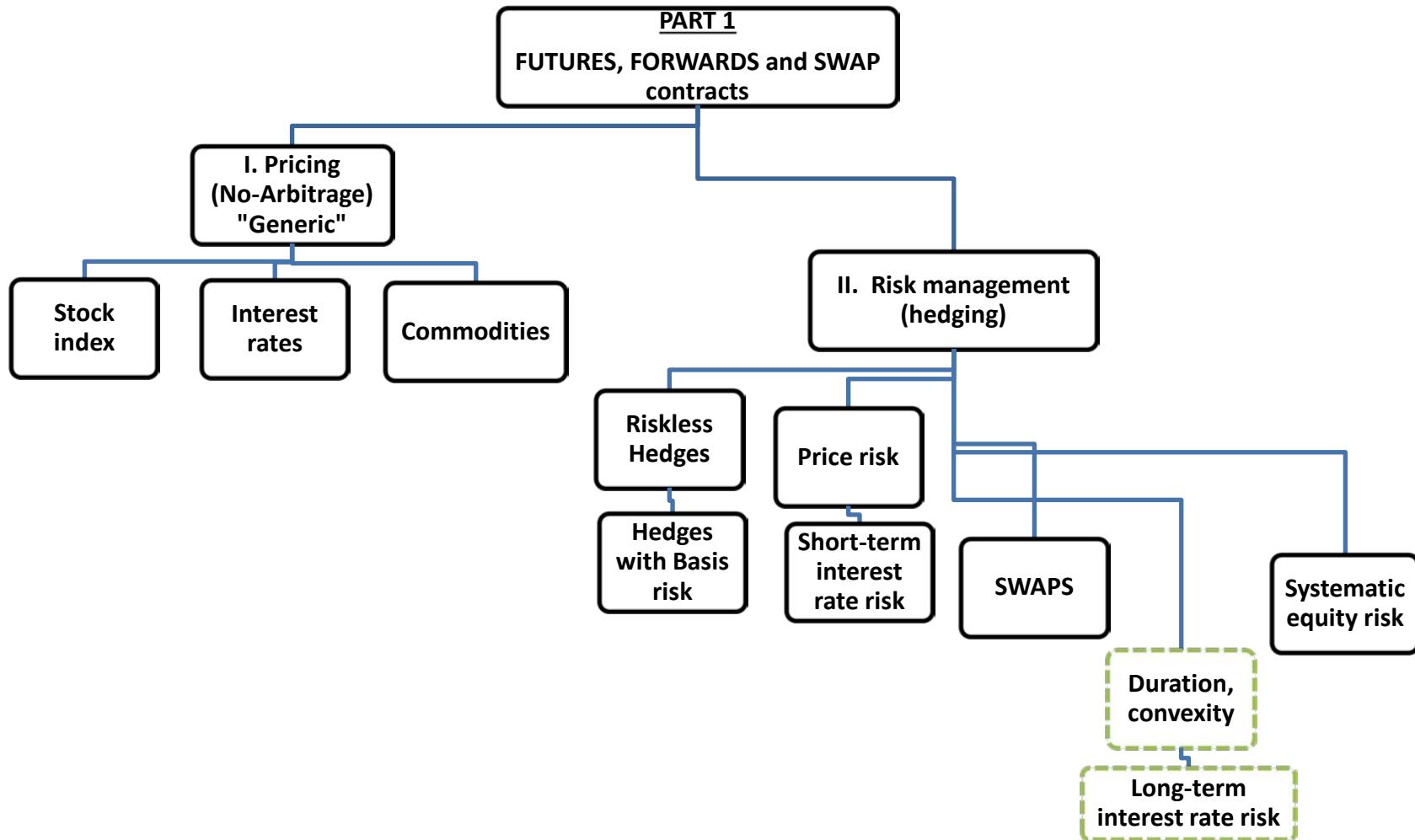
5. Interest Rate Swaps.

6. Stock Index Futures.

- * Kamara, "New Evidence on the Monday Seasonal in Stock Returns," *Journal of Business*, Vol. 70, No. 1, January 1997, pp. 63-84.
- * Kamara, "The Effects of Futures Trading on the Stability of Standard and Poor's 500 Returns," *Journal of Futures Markets*, Vol. 12, No. 6, December 1992, pp. 645-658 (with Thomas W. Miller Jr. and Andrew F. Siegel).
- * Kamara, Lou and Sadka, "Has the US Stock Market Become More Vulnerable Over Time?" *Financial Analysts Journal*, Vol. 66, no. 1, January/February 2010, pp. 41-52.

7. Duration (and convexity).

8. Long-Term Interest Rate Futures.



PART 2 – OPTIONS CONTRACTS

THE LECTURE NOTES FOR THE TOPICS BELOW ARE IN FIN 561 – VOLUME 2.

EXAM #2 WILL COVER EVERYTHING THAT WE WILL STUDY FROM PART 2.

CBOE has interesting educational material online (at no cost), including an **Options Calculator** that calculates the prices of the American and European options that we will study in this course.

9. Introduction to Options Markets. Basic Trading Strategies.

10. Hedging with Options.

11. Put-Call Parity.

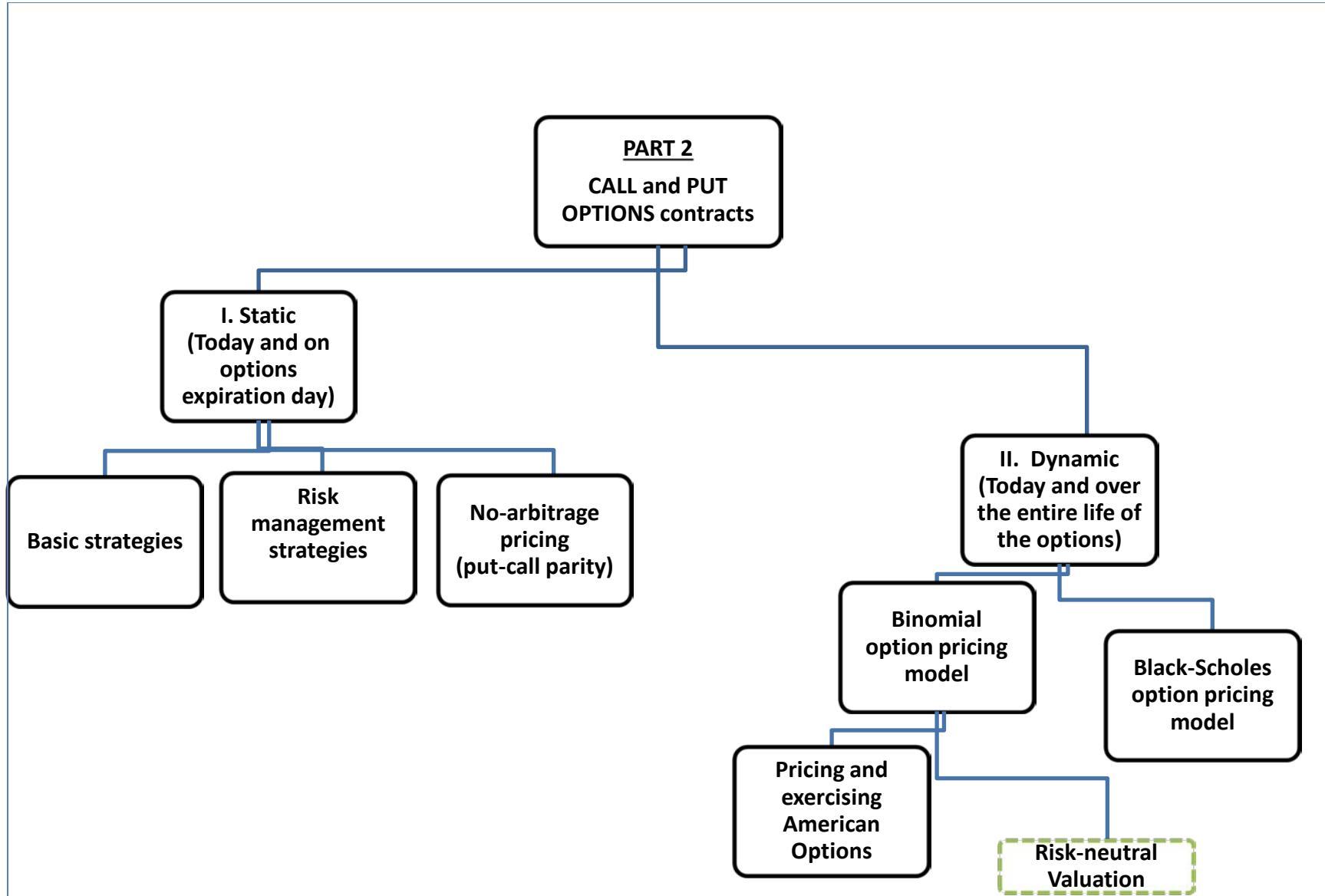
* Kamara and Miller, "Daily and Intradaily Tests of European Put-Call Parity," *Journal of Financial and Quantitative Analysis*, December 1995, pp. 519-539.

12. The Binomial Options Pricing Model – European Options. Delta. One period, two periods, and many periods binomial models.

13. The Black-Scholes Option Pricing Model. Implied volatility. Delta. The “Greeks.”

14. Pricing and Optimal Exercise of American Call and Put Options. American and European options on dividend paying stocks.

15. Risk-Neutral Valuation.



A Short Bio

AVRAHAM (Avi) KAMARA

Professor of Finance
William W. Alberts Professor
University of Washington, Michael G. Foster School of Business

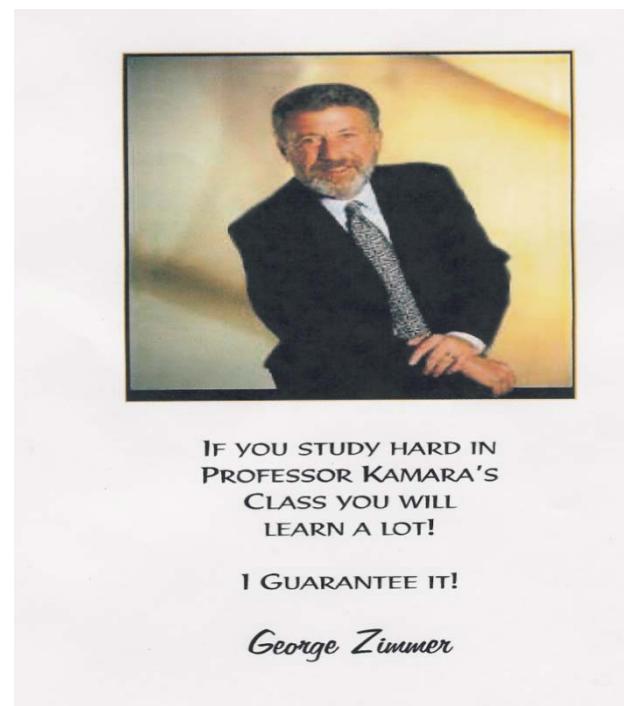
Ph.D., Columbia University, New York, 1986.

Professor Kamara has taught courses on financial risk management, futures and options contracts, real options, capital markets and security valuation in the MBA, executives, and undergraduate programs at the University of Washington. He also taught at Columbia University, UCLA, and overseas.

During 2002-2006, Professor Kamara served as the Chairman of the Department of Finance and Business Economics at the University of Washington.

Professor Kamara has served as an expert advisor on financial products and risk management for several companies and law firms (for example, locally, Safeco and Darigold, among others). He has also worked with the Commodity Futures Trading Commission in the USA, and with foreign governments/companies.

Professor Kamara has published articles in the *Financial Analysts Journal*, *Journal of Business*, *Journal of Finance*, *Journal of Financial and Quantitative Analysis*, *Journal of Financial Economics*, *Journal of Financial Markets*, *Journal of Future Markets*, *Journal of Money, Credit and Banking*, the *Review of Financial Studies*, as well as other outlets. Professor Kamara's research focuses on risk management, derivatives contracts (futures, swaps, and options), and commodities, equity, and fixed-income markets.



**Created by Tad Sommerville, a student in my Technology Management MBA course:
TMMBA 506 - Capital Markets, Security Valuation and Risk Management**