NEW YORK UNIVERSITY STERN SCHOOL OF BUSINESS

Derivatives (FINC-UB 43)

Spring 2023, Tuesdays and Thursdays, 9:30-10:45am

Instructor: Bruce Tuckman, btuckman@stern.nyu.edu
Class Meetings: KMEC [redacted], Tuesdays and Thursdays, 9:30-10:45am
Office Hours: Tuesdays and by appointment
Teaching assistant: [redacted]

Course Description

This course is about how market participants hedge, manage risk, and invest using derivatives. The course's wide-angle focus on how end users solve business problems with derivatives includes contract specifications, pricing and hedging methodologies, margin, some accounting, the role of intermediaries, and regulatory frameworks.

Lectures present material through a wide range of real-world applications, described in the detailed course outline below. Each broad topic area includes a breakout session, which allows students to apply their knowledge and to prepare for the course exams. Breakout sessions are also used to discuss two formal case studies.

Course Materials

Lecture slides and supplementary materials (e.g., links to articles or papers) will be posted to NYU Brightspace throughout the semester. A packet of two case studies will be available for purchase from the NYU Bookstore. Instructions for purchasing the cases will be distributed before the first class. The course will not use a textbook. Students interested in pursuing the quantitative aspects of the course more deeply might consult John Hull's Options, Futures, and Other Derivatives, 11th Edition, Pearson, 2021.

Exams and Grading

There will be three (non-cumulative) multiple-choice/short-answer exams:

Exam #1: Thursday, February 23
Exam #2: Tuesday, April 4
Final Exam: TBD, during exam period (Wednesday, May 10 – Tuesday, May 16)

STUDENTS MUST BE PRESENT AT ALL THREE EXAMS. NO MAKE-UPS WILL BE SCHEDULED APART FROM PERSONAL MEDICAL AND FAMILY EMERGENCIES.

The semester grade will be the average of the scores on the three exams.

Detailed Course Outline

I. Introduction

Tues 24 Jan and Thurs 26 Jan

Derivatives from ancient to modern times; overview of derivatives markets; how derivatives are used to hedge business risks; the implicit leverage of derivatives

Reading: Tuckman, B. (2015), "In Defense of Derivatives: From Beer to the Financial Crisis," Policy Analysis, CATO Institute, pp. 1-14

Breakout sessions: ETFs, CME Lithium Futures

Reading: https://www.wsj.com/articles/cme-seeks-to-tap-electric-car-demand-with-lithium-futures-11617899631

II. Commodity Futures, Swaps, and Options

Tues 31 Jan, Thurs 2 Feb, Tues 7 Feb, and Thurs 9 Feb

Commodity forwards, futures, swaps, and options; product descriptions; hedging; cross-product hedging and basis risks

Applications:
Airline hedging of jet fuel costs
Global oil futures markets
Negative May 2020 WTI crude oil futures prices

Breakout sessions: Copper futures, Collars

III. Interest Rate Swaps (IRS)

Tues 14 Feb, Thurs 16 Feb, and Tues 21 Feb

Review of corporate bonds, pricing, and risk metrics; interest rate swaps; clearing and CCP risk management; uses of IRS to hedge and transform corporate bond positions

Applications:

UK Pension Funds in Sep 2022

Formal case study:

Dominion Gas (2012)

"Companies Lock in Low Rates for Future Debt," *The Wall Street Journal,* June 1, 2020. https://www.wsj.com/articles/companies-lock-in-low-rates-for-future-debt-11591040702

Breakout sessions:

"Greece slashes rates exposure with €35 billion swap programme," Risk.net, November 28, 2018

"Corporates sprint to lock in low rates," Risk.net, March 25, 2020

EXAM #1: Thurs 23 Feb

Covers: Overview; Commodity Futures, Swaps, and Options; Interest Rate Swaps

IV. Credit Default Swaps (CDS) and their Tranches

Tues 28 Feb, Thurs 2 Mar, Tues 7 Mar, and Thurs 9 Mar

Definitions and mechanics; market size and composition

Applications:

Replication (Synthetic Asset) Transactions (RSAT) for life insurers

The London Whale (2012)

SPRING BREAK: Tues 14 Mar and Thurs 16 Mar

V. FX Derivatives

Tues 21 Mar, Thurs 23 Mar, and Tues 28 Mar

Exchange rates; FX futures, forwards, NDFs, swaps, cross-currency swaps; hedging with FX derivatives; the violation of covered interest rate parity and non-zero cross-currency basis swap spreads

Applications:

Reverse Yankee Issuance
Reserve Bank of Australia's investment of reserves

EXAM #2: Tues 4 Apr

Covers: Credit Default Swaps and their Tranches; FX Derivatives

VI. Arbitrage Pricing of Contingent Claims

Thurs 30 March, Thurs 6 April, Tues 11 April; Thurs 13 April, Tues 18 April, Thurs 20 April

Static and dynamic replication; put-call parity; arbitrage pricing with binomial trees; the Black-Scholes-Merton model; volatility smile/skew; Black's model; interest rate term structure models; Monte Carlo simulations

Formal case study: Principal-Protected Equity-Linked Notes (2014)

Applications:

Options on SPX
Options on five-year U.S. Treasury futures
Valuing a callable bond
Asian options on Oil

VII. Hedging Options in the Real World

Tues 25 Apr, Thurs 27 Apr, and Tues 2 May

The Gamma-Theta trade-off; hedging with trading costs; some practical recommendations.

Applications:

The P&L from delta hedging a call option on a stock in discrete time
GameStop stock in Jan 2021

VIII. Interest Rate and Equity Volatility Products

Thurs 4 May

Swaptions; fixed rate mortgages; mortgage-backed securities (MBS); mortgage servicing rights (MSR); callable bonds.

Applications:

Hedging MBS and MSR: AGNC Investment Corp, Two Harbors Investment Corp, Cherry Hill Mortgage Investment Corporation

Formosa bonds

Summary of Class Calendar

Class	Date	Unit; Other	Class	Date	Unit; Other
1	Tues 24 Jan	History and Overview	15	Tues 21 Mar	FX
2	Thurs 26 Jan	History and Overview	16	Thurs 23 Mar	FX
3	Tues 31 Jan	Commodity Futs & Swaps	17	Tues 28 Mar	FX
4	Thurs 2 Feb	Commodity Futs & Swaps	18	Thurs 30 Mar	Arbitrage Pricing
5	Tues 7 Feb	Commodity Futs & Swaps	19	Tues 4 Apr	**EXAM #2**
6	Thurs 9 Feb	Commodity Futs & Swaps	20	Thurs 6 Apr	Arbitrage Pricing
7	Tues 14 Feb	Interest Rate Swaps	21	Tues 11 Apr	Arbitrage Pricing
8	Thurs 16 Feb	Interest Rate Swaps	22	Thurs 13 Apr	Arbitrage Pricing
9	Tues 21 Feb	Interest Rate Swaps	23	Tues 18 Apr	Arbitrage Pricing
10	Thurs 23 Feb	**EXAM #1**	24	Thurs 20 Apr	Arbitrage Pricing
11	Tues 28 Feb	CDS	25	Tues 25 Apr	Options in Real World
12	Thurs 2 Mar	CDS	26	Thurs 27 Apr	Options in Real World
13	Tues 7 Mar	CDS	27	Tues 2 May	Options in Real World
14	Thurs 9 Mar	CDS	28	Thurs 4 May	Vol Markets

TBD: Final Exam (during final exam period, Wed 10 May – Tues 16 May)