**Equity Derivatives – B8384-001-20201**

**Spring 2021**

**Mondays & Wednesdays, 12:10pm –1:40pm**

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**REQUIRED COURSE MATERIAL**

Equity Derivatives: Corporate and Institutional Applications
Neil C. Schofield, 2017

Some selected cases can be accessed by control/clicking on the syllabus, some readings are on electronic reserve and accessible through the Library Reserves tab in Canvas (LR), and in PDF files under “Miscellaneous” in the Files tab in Canvas (PDF).

**REQUIRED PREREQUISITES: CAPITAL MARKETS AND INVESTMENTS
CONNECTION WITH THE CORE**

This course builds on knowledge from the Capital Markets and Statistics courses (B8306). Specifically, statistical techniques are used to estimate parameters of option pricing models, data are used to develop scenarios for risk analysis; and are used to understand simulation output when pricing and hedging derivative securities.

**COURSE DESCRIPTION AND OBJECTIVES**

Successful investing in Equities Markets requires more than just picking stocks given the wide array of products at a portfolio manager's disposal. Through a combination of lectures, guest speakers and a final project, this course is intended to provide firsthand experience on how products like Options, Swaps, Futures, ETFs, Structured Notes, and Convertible Bonds are structured, valued, and used by all types of investors globally. Although the majority of the course relates to Equities, there will be a few classes on Fixed Income and Commodities Derivatives.

The course is designed from both the perspective of a practitioner who has to account for the real costs of trading derivatives and how the derivative can improve the return and/or reduce the risk of his/her portfolio. The course is broken into the following sections:

**Products** - The course starts with a discussion of ”Delta 1” Equity Derivatives like Exchange Traded Funds, Futures, and Swaps. These products trade dollar for dollar with the underlying security. We then explore options based Equity and Credit products, like Equity Options, Structured Notes, Credit Default Swaps and Convertible Bonds.

**Strategies** – The second component of this course will revolve around how investors use these products through the combination of class discussions, guest speakers and your final project. Toward the end of the course, we will try to identify future trends that may affect the market. We also look at historical events that shaped the markets.

 **ASSIGNMENTS**

**All assignments must be completed in writing with hard copies handed in before class.**Some assignments will be Type A, some Type B.

For Type A assignments, each student must participate in a group discussion regarding the assignment before submission and review and if needed edit the final submission.
**Collaboration across groups is not allowed.**

For Type B Assignments, each student should attempt to answer the questions on their own before collaborating with other students. Each student should hand in their own submission for Type B Assignments.

**METHOD OF EVALUATION**

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| --- | --- |
| Class Participation and Assignments | 40% |
| Take-Home Exam | 35% |
| Final Project | 25% |

An important component of Class Participation is attendance which will be tracked. I reserve the right to downgrade (including failing) any student who misses a significant number of classes or does not complete all of the assignments. It is expected that your camera is on during class, unless there are special circumstances which you should discuss with me in advance.

For the Final Project, each group will work with an industry practitioner on a project they define or complete a case study I create. The practitioner-based projects will be presented to the class, the case study just to me. In either case, every student (without exceptions) must attend their group’s presentation.

**Course Outline**

**Section 1 Products**

1. Course Introduction/Indices (01/11)

After a quick overview of the class, we introduce the measurement of trading costs, a concept that will be used throughout the course. This is followed by a discussion of Indices, focusing on the ways they are constructed and traded.

Readings:

* Chapter 1, pp. 3-7
* Not All Commodity Indexes Are Alike (PIMCO) (LR)
1. Indices/Exchange Traded Funds (01/13)

After completing Indices, we explore Exchange Traded Funds, addressing how they are created, what forces impact the way they trade and how they compare to other index products.

Readings:

* ETFs for the Single Stock Manager: Correlations, Myths, & Realities (PDF)
* [The Evolution and Success of Index Strategies in ETFs](http://www.cfapubs.org/doi/pdf/10.2469/faj.v72.n5.2) (Hill, Joanne M.) (<http://www.cfapubs.org/doi/pdf/10.2469/faj.v72.n5.2>)
1. ETFs/Stock Index Futures (01/20)

After completing ETFs, we move on to Stock Index Futures, describing how the markets operate and how futures are valued. We then compare the cost, return, and risk of futures to ETFs.

Readings:

* Chapter 1, pp. 16-19; Chapter 4, pp. 73-78, Chapter 9, pp. 273-276
1. Futures/Equity Index Swaps (01/22)

After completing Futures, we review Equity Index Swaps, comparing them to ETFs and Stock Index Futures.

Readings:

* Making Alpha Portable (PDF)
1. Single Stock Swaps (01/25)

After completing Index Swaps, we discuss Equity Finance which is the business of lending money to investors and facilitating short sales, and describe how swaps on individual stocks are employed in that business.

Readings:

* Mechanics of the Equity Lending Market (PDF)
* Chapter 1, pp. 10-14, 19-20
* Chapter 10, pp. 287-292
1. Introduction to the Options Market (01/27)

With Delta 1 products completed, we move to Equity Options. We start with a discussion on how the market operates and liquidity is provided using the ISE case study as background. Please read the case and be prepared to discuss it.

Readings:

* Chapter 1, pp. 20-23
* [The International Securities Exchange: New Ground in Options Markets](https://hbsp.harvard.edu/tu/65e9ba07) (<https://hbsp.harvard.edu/tu/65e9ba07>)

Assignments:

* Assignment (1) – ISE Questions/Comparing the use of ETFs, Futures and Swaps
(Type A)

7& 8. Options Valuation (02/01 & 02/03)

Options Valuation, a topic that can get fairly complex, is where we head next. Although options pricing cannot be explained without any formulas, I start by providing intuition on what drives pricing leaving out the higher mathematics.

After teaching you how to price options using a spreadsheet, we then review the commonly used Options Models like the Binomial and Black-Scholes Models.

Readings:

* Chapter 5, pp. 105-119, Chapter 6, pp. 139-142
* Introduction to Binomial Trees - PDF
* Valuing Stock Options: The Black-Scholes Model – PDF

9& 10. Practical Considerations in Pricing Options (02/08 and 02/10)

To move from the theoretical to the practical, we start by discussing how the cost of trading stock influences the price of an equity option and why the interest rate used to price a particular option depends on how the trader hedges that option. We then introduce the volatility relationships that drive Equity Options trading.

In the index options market there are historical relationships between implied and historical volatility, implied volatility for options with different strike prices (skew) and terms (term structure). Relying on historical data, this class discusses those relationships.

Readings:

* Chapter 6, pp. 143–172, 190-196

Assignments:

Assignment (2) – Options Valuation (Type B)

**Section 2 – More Products and Strategies**

1. Single Stock Options Strategies (02/15)

In this class we will discuss how Active Asset Managers tie their knowledge of the underlying company to develop options strategies on individual stocks.

Readings:

* Chapter 11, pp. 315-322
* Tutorial on Using Options in Active Strategies (Tsu, Maria E.) (PDF)
* Covered Call Strategies: One Fact and Eight Myths (Israelov, Roni) (LR)

Assignments:

Assignment (3) – Options Skew and Term Structure / Stock Options Strategies (Type B)

1. Portfolio Hedging and Structured Notes (02/17)

Fund Managers use index options to change the Equities risk on their overall portfolio. To begin this class, we explore the strategies they follow and how to arrive at an appropriate hedge.

Structured Notes are fixed income securities that combine bonds issued by an investment bank with options to provide equity exposure with different risk than conventional equities. This class discusses how structured notes are created, what factors determine their pricing and how they are used by institutional and individual investors.

Readings:

* Chapter 12, pp. 347-351

**Exams: Exam handed out**

1. Fixed Income Derivatives (03/08)

For the next few classes we move away from Equities into Fixed Income, Credit, Currencies and Commodities.

A guest speaker provides an overview of Fixed Income Derivatives products and describes how his company uses them.

Guest Speaker: t/b/d

**Exams: Exam due**

1. Credit Derivatives and Convertible Bonds (03/10)

A guest speaker will explore the inner workings of the Credit Derivatives Market. Towards the end of the class, I will introduce Convertible Bonds, describing their structure and valuation

Guest Speaker: t/b/d

Readings:

* [Convertible Securities](https://cb.hbsp.harvard.edu/cbmp/pl/60215778/60215782/374b4072483c8cf19f2041a34cc301d2)
(<https://hbsp.harvard.edu/tu/7d387760>)
1. Currency Derivatives (03/15)

A guest speaker will explore how investors use Currency Derivatives to control risk
Guest Speaker: t/b/d

* Assignment (4) – Convertible Bond/Structured Notes (Type B)
1. Commodity Derivatives (03/17)

A guest speaker will provide an overview of the Commodity Derivatives Market.

Guest Speaker: t/b/d

Readings:

* [Commodity Investments: The Missing Piece of the Portfolio Puzzle](file:///C%3A%5CUsers%5Cev2142%5CDownloads%5CSSRN-id2153319.pdf)? (Kang, Xiaowei) (LR)
* [PIMCO, the Quiet Giant Among Commodity Investors: Kemp](https://www.reuters.com/article/us-column-kemp-commodities-pimco/pimco-the-quiet-giant-among-commodity-investors-kemp-idUSBRE87T0GO20120830) (LR)
1. Exotic Equity Derivatives (03/22)

Exotic Equity Derivatives is the focus of this class, concentrating on Path Dependent Options and Correlation Options. Cecilia and I start by explaining each product and comparing its benefits and risks to more conventional derivatives. We end each class by discussing how investors use Exotic Equity Derivatives in their portfolios.

Guest Speaker: Cecilia Manzolillo, Columbia Business School

Readings:

* Chapter 7, pp. 203-206, Chapter 8, pp. 247-260

18. Trading Volatility (03/24)

A guest speaker will start by sharing current research he has done on strategies using the VIX.

Guest Speaker: t/b/d

Readings:

* Chapter 14, pp. 426-436

 Assignments:

* Assignment (4) – Convertible Bond/Structured Notes (Type B)

19. Tax Considerations in Using Equity Derivatives (03/29)

Individuals and corporations, before using derivatives need to be well versed in tax issues related to their overall strategy. In this class we cover the tax laws most relevant to Equity Derivatives transactions and introduce strategies to enhance After-Tax returns.

Readings:

* Chapter 10, pp. 293-294

20. Legal and Accounting Issues/Corporations and Insurance Companies (03/31)

We start the class with a discussion of the relevant legal and accounting considerations in hedging a concentrated stock position.

We then discuss how corporations use Equity Derivatives in Share Repurchase and Capital Formation strategies and how insurance companies use Equity Derivatives in Asset and Liability management.

Readings:

* Chapter 11, pp. 322-326
* [Rule 144: Selling Restricted and Control Securities](http://www.sec.gov/investor/pubs/rule144.htm) (<http://www.sec.gov/investor/pubs/rule144.htm>)
* Diversifying Concentrated Stock Positions Through Equity Collars (PDF)

###### Section 3 – Learning From History

1. Learning from Ancient History (04/05)

To help project the future impact of Equity Derivatives on the Equities Market it is useful to understand history. In this class we discuss situations in history where Equity Futures and Options were misused.

Prior to 2008, two stand out, Portfolio Insurance and the 1987 crash and Long-Term Capital Management. Today we will focus on Portfolio Insurance and the crash of 1987 and LTCM.

Guest Speaker: t/b/d

Readings:

* The Demons of ’87 - PDF
* [Leland O'Brien Rubenstein](https://cb.hbsp.harvard.edu/cbmp/pl/60215778/60215784/e9d383654bc9688e3359825e26fc027d)
(<https://hbsp.harvard.edu/tu/9eaf4ca2>)
* Long-Term Capital Management, L.P. (A)
(<https://hbsp.harvard.edu/tu/d97f2df8>)
* Long-Term Capital Management, L.P. (C)
(<https://hbsp.harvard.edu/tu/07cf0b88>)
* Long-Term Capital Management, L.P. (D)
(<https://hbsp.harvard.edu/tu/a9254226>)
* Bank of Volatility (PDF)

Assignments:

* Assignment (5) – LOR/LTCM (Type A)
1. Learning from Recent History (04/07)

In this class we will discuss events in 2008, the Flash Crash of 2010, and the ETF Mini-Crash on August 24, 2015. We end with a discussion of some of the market events that took place in 2018.

Readings:

* [Findings Regarding the Market Events of May 6, 2010](http://www.cftc.gov/idc/groups/public/%40otherif/documents/ifdocs/staff-findings050610.pdf) (CFTC & SEC),
Executive Summary only, pp. 1-8
([http://www.cftc.gov/idc/groups/public/@otherif/documents/ifdocs/staff-findings050610.pdf](http://www.cftc.gov/idc/groups/public/%40otherif/documents/ifdocs/staff-findings050610.pdf))
* Enhancing Our Equity Market Structure (White, Mary Jo) (LR)
* From Free Lunch to Black Hole: Credit Default Swaps at AIG (PDF)

Assignments:

* Assignment (6) – AIG/ Flash Crash Questions/ V|X (Type A)
1. Derivatives – The Future (04/12)

In this class we focus on new products in the Derivatives world as well as regulatory items that could affect Derivatives markets.

Guest Speakers: TBD

24. Final Project (04/14)

Each group will be asked to present their Final Project to the class and their Advisor, followed by a brief discussion by the Advisor.