VOLATILITY

Professor Robert F. Engle

DRAFT SYLLABUS

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Course Content

The most fascinating aspect of financial market prices is how they change. Students will learn how to measure and forecast financial volatility. They will become proficient with ARCH/GARCH models, exponential smoothing and historical volatilities. These tools will be used to measure risk and analyze alternative approaches to calculating Value at Risk. Implied volatilities from options will be introduced and compared statistically and economically. Then the course will turn to the multi-asset problem and discuss traditional and new approaches to measuring and forecasting correlations. These tools will be applied to the problem of dynamic portfolio selection and risk control.

The course will be run on NYU Classes; all assignments and course materials will be posted there. The course will have four homework problems. These will be submitted electronically. There will be a final exam and in-class QuickQuizzes. These QQ's will take about 5 minutes at the beginning of every class and cover the previous lecture. There are no make-ups.

Prerequisites:

Foundations of Finance and a familiarity with simple probability and statistics including least squares regression. There will be substantial use of the EViews econometric software which is available in the computer labs and on the Stern server.

Topics - One per Class

1. Financial Volatility - Causes, Consequences, and Global Patterns
2. ARCH/GARCH Models and their extensions
3. Value at Risk Estimation, Downside Risk and Credit Risk
4. Options Implied Volatility and its properties. And now Variance Swaps
5. Correlation Models – Applications to Portfolio Choice
6. High Frequency Volatility and Trading

Class Schedule

This course will meet in KMC 4-80 at the following times:

T 03/27	06:00pm - 09:00pm	KMC 4-80
T 04/03	06:00pm - 09:00pm	KMC 4-80
T 04/10	06:00pm - 09:00pm	KMC 4-80
T 04/17	06:00pm - 09:00pm	KMC 4-80
T 04/24	06:00pm - 09:00pm	KMC 4-80
T 05/01	06:00pm - 09:00pm	KMC 4-80

Lab

Location: KMC 4-80

*Attend one session for each lab

Lab 1: Tues 3/27, 9-10 pm OR TBD

Lab 2: Tues 4/3, 9-10 pm OR TBD

Lab 3: Tues 4/10, 9-10 pm OR TBD

Lab 4: Tues 4/17, 9-10 pm OR TBD

Lab 5: Tues 4/24, 9-10 pm OR TBD

Grading Policies

Final Exam: 50%
Homework Assignments: 40%
QuickQuizzes: 10%

TF's

Scott Hampson (sah715@stern.nyu.edu)

Michael Ruddy (mfr336@stern.nyu.edu)

Readings

CLASS 1:

Jones, Charles and Jack Wilson,(1989) "Is Stock Price Volatility Increasing?" *Financial Analysts Journal,* November, pp20-26

Johnson, Robert and Philip Young,(2002) "Bond Market Volatility Compared with Stock Market Volatility: Evidence from the UK", *Journal of Asset Management, pp 101-111*

Turner, Andrew and Eric Weigel,(1992) "Daily Stock Market Volatility: 1928-1989", *Management Science, 1586-1609*

Campbell, John, Andrew Lo and Craig MacKinlay, (1997) *The Econometrics of Financial Markets* , Princeton University Press, Chapter 1, pp. 1-25

**Homework 1 assigned, will be available on NYU Classes after class*

CLASS 2:

****Due: Homework 1***

Engle, Robert (1982), "Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of UK. Inflation", *Econometrica*

Engle, Robert (2004) "Risk and Volatility: Econometric Models and Financial Practice", *AER*, also posted on nobel.se

Engle, Robert, and Andrew Patton,(2001) "What good is a volatility model?" *Quantitative Finance*

Brooks, Chris, *Introductory Econometrics for Finance*, Cambridge University Press, pp441-468

**Homework 2 assigned, will be available on NYU Classes after class*

CLASS 3:

****Due: Homework 2***

Hull, John and Alan White (Fall 1998)"Incorporating Volatility Updating into the Historical Simulation Method for Value-at-Risk", *Journal of Risk*

Kaplanski and Kroll,(Spring 2002), "VaR Risk Measures *vs* Traditional Risk Measures: An Analysis and Survey" *Journal of Risk*

Engle, Nobel Lecture op.cit.

Brooks pp.468-501 op.cit.

Engle, (2009), "The Risk that Risk will Change", Vol 7, No. 4, pp 1-5

**Homework 3 assigned, will be available on NYU Classes after class*

CLASS 4:

****Due: Homework 3***

Hull, John (2003) *Options, Futures and Other Derivatives, Fifth Edition*, Chapters 8 and 15

"VIX White Paper"(2003), CBOE

Derman, Emanuel (2004) "Trading Volatility as an Asset Class", Columbia University

Barone-Adesi, Giovanni, Robert Engle and Loriano Mancini,(2008) "A GARCH Option Pricing Model with Filtered Historical Simulation", Review of Financial Studies, Vol 21, Issue 3, pp 1223 -1258

**Homework 4 assigned, will be available on NYU Classes after class*

CLASS 5:

****Due: Homework 4***

Engle, Robert and Joseph Mezrich (1996): "GARCH for Groups," Risk 36-40.

Engle, Robert, (July 2002), Dynamic Conditional Correlation - A Simple Class of Multivariate GARCH Models, Journal of Business and Economic Statistics, "V20N3

Engle, Robert and Riccardo Colacito (2006) "Testing and Valuing Dynamic Correlations for Asset Allocation", Journal of Business and Economic Statistics, Vol 24, No2, pp 238-253.

**Final Exam Review in Lab after class.*

CLASS 6:

****In-class Final Exam***

Engle, Robert F, Magdalena E. Sokalska and Ananda Chanda (2005) "High Frequency Multiplicative Component GARCH."

Engle, Robert F, Robert Ferstenberg and Jeffrey Russell (2006) "Measuring and Modeling Execution Cost and Risk."