VOLATILITY B40.3105
Professor Robert Engle

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 Blackboard 8; 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 QQs 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 KMEC 2-60 at the following times:
Tues. 3/31/2009 6:00pm – 9:00pm
Tues. 4/7/2009 6:00pm – 9:00pm
Tues. 4/14/2009 6:00pm – 9:00pm
Tues. 4/21/2009 6:00pm – 9:00pm
Tues. 4/28/2009 6:00pm – 9:00pm
Tues. 5/5/2009 6:00pm –9:00pm

Computer Labs
Tuesdays will be in KMC 2-60
Saturdays will be in KMC 3-50
Tues 3/31/2009 9:00pm – 10:00pm (KMC 2-60)
Sat 4/4/2009 10:00am – 12:00am (KMC 3-50)
Tues. 4/7/2009 9:00pm – 10:00pm (KMC 2-60)

Sat 4/11/2009 10:00am – 12:00pm (KMC 3-50)
Tues. 4/14/2009 9:00pm-10:00pm (KMC 2-60)
Sat 4/18/2009 10:00am – 12:00pm (KMC 3-50)
Tues 4/21/2009 9:00pm – 10:00pm (KMC 2-60)
Sat 4/25/2009 10:00am – 12:00pm (KMC 3-50)

Grading
Final 48%
Homework 40%
QuickQuizzes 12%

Readings

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

2.   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

3.   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.

4.   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

5.   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(2004) "Testing and Valuing Dynamic Correlations for Asset Allocation", NYU Finance Discussion Paper.

6.   REVIEW