Trading Market Volatility

Volatility Trading in a Nutshell

• **Long volatility**: buy call option, sell shares
  buy put option, buy shares

• **Short volatility**: sell call option, buy shares
  sell put option, sell shares
Theoretical Value

1-day P/L for Long Call/Short Stock

(Constant volatility=16%)

\[ P/L = \theta \cdot (n^2 - 1) \]

\( \theta = \) daily time-decay, \( n = \) percent index change \( \div \) expected daily volatility
Assuming an implied volatility drop of 1%

Vol=15%

3.80 loss if stock does not move and volatility drops 1%

A closer look at the profit-loss due to a change in volatility

1% move in vol => 8% move in premium for a 6m ATM option
Book-keeping: profit/loss from a delta-hedged option position

\[ P/L = \theta \cdot (n^2 - 1) + V \cdot d\sigma \]

or

\[ P/L = \frac{1}{2} \Gamma \cdot \left( \frac{dt}{t^2} - \sigma^2 dt \right) + V \cdot d\sigma \]

Return Characteristics

- **Implied volatility** is a market forecast of the future volatility of the underlying stock (level-dependent)

- **Long volatility** positions gain when realized volatility (over the lifetime of the option) is higher than implied volatility at inception

- **Changes in implied volatility** affect the MTM of the position
S&P500 Implied and Realized Volatilities

Are current levels of volatility justified?

- Market volatility is at a historical low
- We believe that these levels of volatility are associated with the "investment cycle" in equities
- The crash of 2000-2002 diminished the public’s appetite for equities
- The volatility environment resembles the early 1990’s (somewhat)
VIX: 30-day Implied Volatility index of S&P 100

This year’s VIX

1987 Crash: 160%

Madrid handover
Iraq
Unemployment
Can we forecast volatility?

- Volatility cannot be predicted over long periods of time
- Option markets in stocks and indices provide ``market forecasts'' for periods ranging from 1 month to 1 year
- Statistical models may be used to forecast volatility over short periods of time
- Importance of taking into account ``exogenous news'' and events, macro news

Equity Volatility Markets

- 3000 optionable stocks in the U.S., 500 names have liquid options
- Index options (SPX, OEX) and ETF options (QQQ)
- In Europe, liquid markets in Eurostoxx50 and DAX index options
- Moderate liquidity in single-name options in Europe
- Asia: Nikkei and Kospi200 are very active
Examples of trading strategies

• Think of volatility trading as trading in insurance premiums (against large moves in the underlying stock)

• Analyze market in options as an “insurance” market via normative models and build positions

• **Long-only strategies**: always buy volatility to capitalize on market dislocations. Typically proposed as an insurance overlay to other investments

• **Long-short strategies**: relative value approach. Capitalize on perceived mispricing of options. Originated from market-making activities in dealing rooms. Only recently adapted to asset-management

• **Macro strategies**: invest across asset classes (equity, fx, fixed income, currencies)

Long-Only Strategies

• Strategies are natural hedges/overlays

• **Performed well before 2001**

• **Performed less well after 2001** due to drop in levels

• P/L profile: many small losses (time decay), occasional large windfalls
Long-Short Strategies

- **Vega-neutrality** as hedge to changes in market volatility
- Sell AND buy volatility (like insurance/reinsurance)
- Adapted from dealing room (market-making) practice
- Use correlation models for the underlying assets and their volatilities
- Require strict control of exposure to single-name risk and market crash risk

Practical aspects of vol trading

- **Market structure**: specialist system in the US, OTC in Europe
- **Electronic versus voice trading**
- Reduction in trading costs and improved access allows hedge funds to compete with B&Ds
- **Liquidity** in single names and ETFs can be a problem
- **Technical infrastructure** for trade processing, risk-management, models, etc
Worst-case scenarios for volatility trading & remedies

• Short volatility positions are such that underlying stock moves considerably and implied volatility goes up

• Long volatility positions are such that stocks move moderately and volatility collapses

• Limit exposure by asset

• Limit sector exposure

• Limit correlation exposure (dispersion trading)

Links between volatility trading and primary markets

• Issuers of structured products (guaranteed principal with equity upside) are sellers of long term equity volatility and correlation

• Convertible bond issuers are sellers of equity volatility

• Institutional investors tend to be long converts and banks are short structured notes

• Hedging these exposures creates flows in listed options (Eurostoxx50, Dow, S&P) and basket trades (dispersion) which connect long-term volatility markets with listed markets

• Estimated exposure by issuers of structured products is EUR 200 MM per correlation point (RISK, May 2004)