



proteom

Volatility Strategies

Technical Addendum

Proteom Capital Management Ltd
Canon's Court, 22 Victoria Street,
Hamilton, HM12, Bermuda

Tel: (888) 736-6650 Fax: (212) 208-2492

Email: info@proteomcapital.com

Disclaimer

All information herein is qualified in its entirety by the more detailed information contained in the relevant Confidential Private Placement Memorandum. This brochure does not constitute an offer to sell or a solicitation of an offer to purchase any investment product, which can only be made by the Confidential Private Placement Memorandum. An investment in the partnership and/or fund described herein involves significant investment considerations and risks which are described in the Confidential Private Placement Memorandum. Each potential investor should read the Confidential Private Placement Memorandum in its entirety and should carefully consider the risk warnings and disclosures set out therein before making an investment decision.

Past performance is no guarantee of future results.

While every effort has been made to provide data from sources considered to be reliable, no guarantee of accuracy is given. Contents of the brochure are subject to change and periodic revisions without prior notice.

Table of Contents

Key Concepts	4
Volatility Modelling	5
Model Type I	6
Model Type II	7
Long Memory	8
Example: Dow	9
Multifactor Models	10
S&P500 2-Factor	11
Management System	12
Volatility Forecasting	13
Cointegration	14
Dow Model	15
Risk Management	16
CrashMetrics	17
Summary	18
Further Information	19
Contact	20
Notes	21

Key Investment Concepts

- Returns are non-Gaussian
- Volatility is stochastic
 - Varies over time
 - Predictably
 - With 'long memory'
- Portfolio Construction
 - Cointegration
- Risk Management
 - Hedging extreme event risk

Volatility Modeling

- What is “volatility”?
 - Second moment of returns distribution
 - Unobservable
 - Not the standard deviation of returns
- Range-based volatility metrics
 - More efficient, less “noisy”
 - Normally distributed
 - Important characteristic for modeling purposes

Model Type I

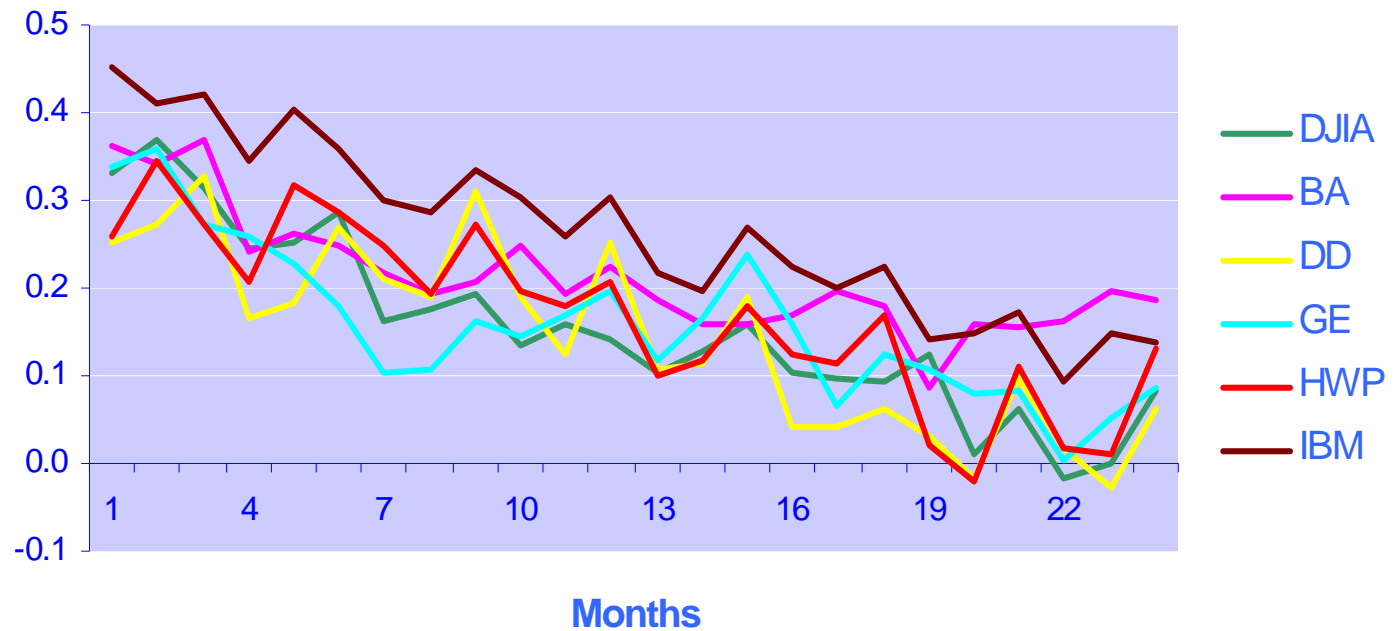
- Long Memory
 - Volatility persistence or trending behavior
- Mean Reversion
 - Short term transient behavior
 - Rapid mean reversion
- Multifactor Models
 - Persistent, long memory component
 - Transient component

Model Type II

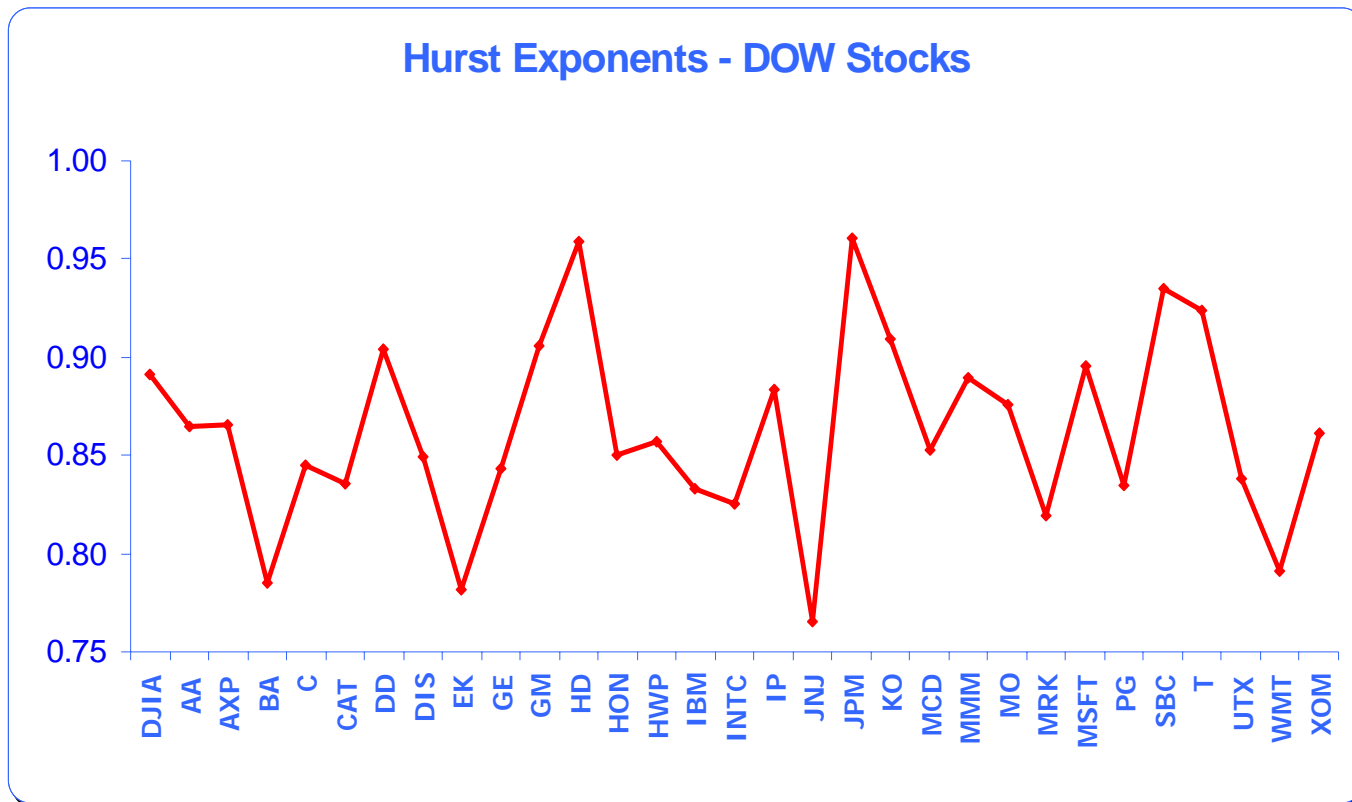
- Skewness and Kurtosis Models
 - Interaction between the volatility and returns process
- Asymmetry Models
 - Captures important asymmetry effects
- Markov State Models
 - Multiple “regimes” of volatility
 - Transition probabilities

Volatility Long Memory

Volatility Autocorrelations



DOW Stock Volatility – Long Memory



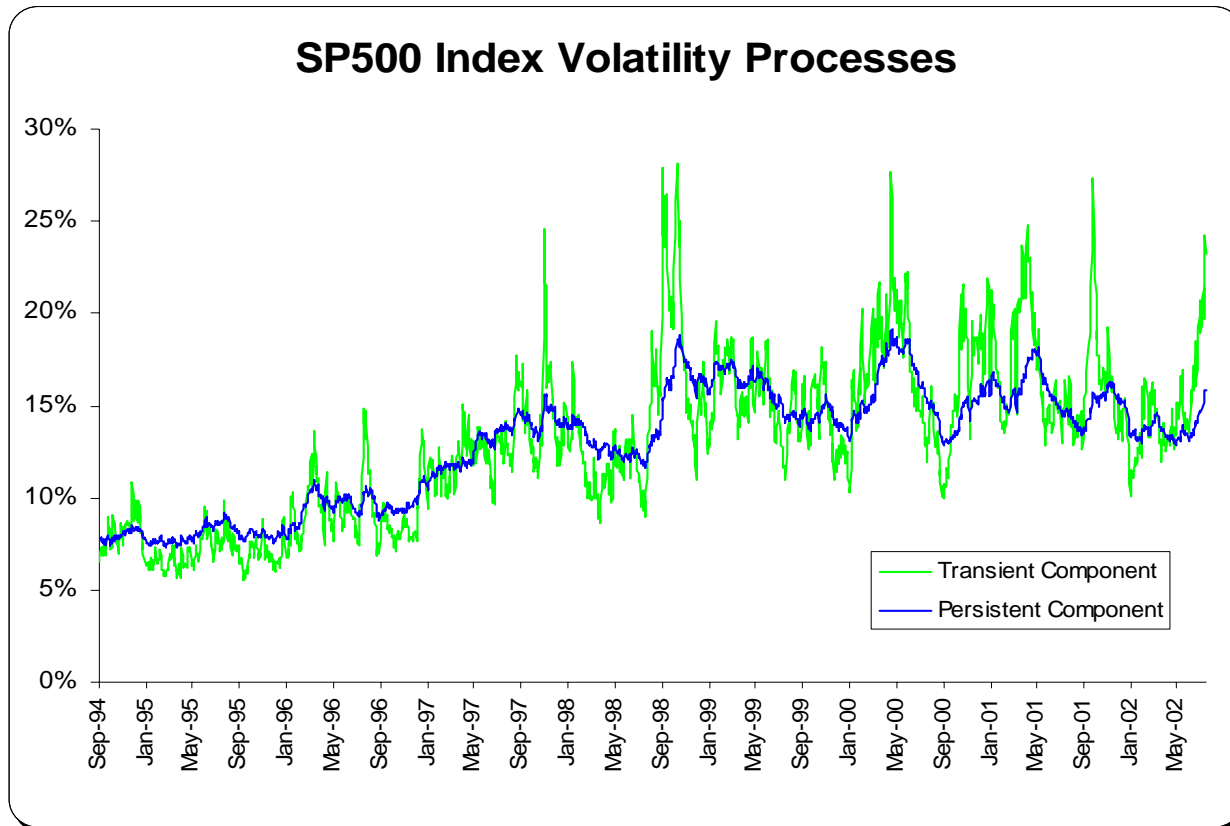
Multifactor Models

- Transient (h_t) & long term (q_t) components
- Volatility asymmetry (δ)

$$\ln h_t - \ln h_{t-1} = k_h (\ln q_{t-1} - \ln h_{t-1}) + \phi_h X_{t-1}^D + \delta_h R_{t-1} / h_{t-1}$$

$$\ln q_t - \ln q_{t-1} = k_q (\mathcal{I} - \ln q_{t-1}) + \phi_q X_{t-1}^D + \delta_q R_{t-1} / h_{t-1}$$

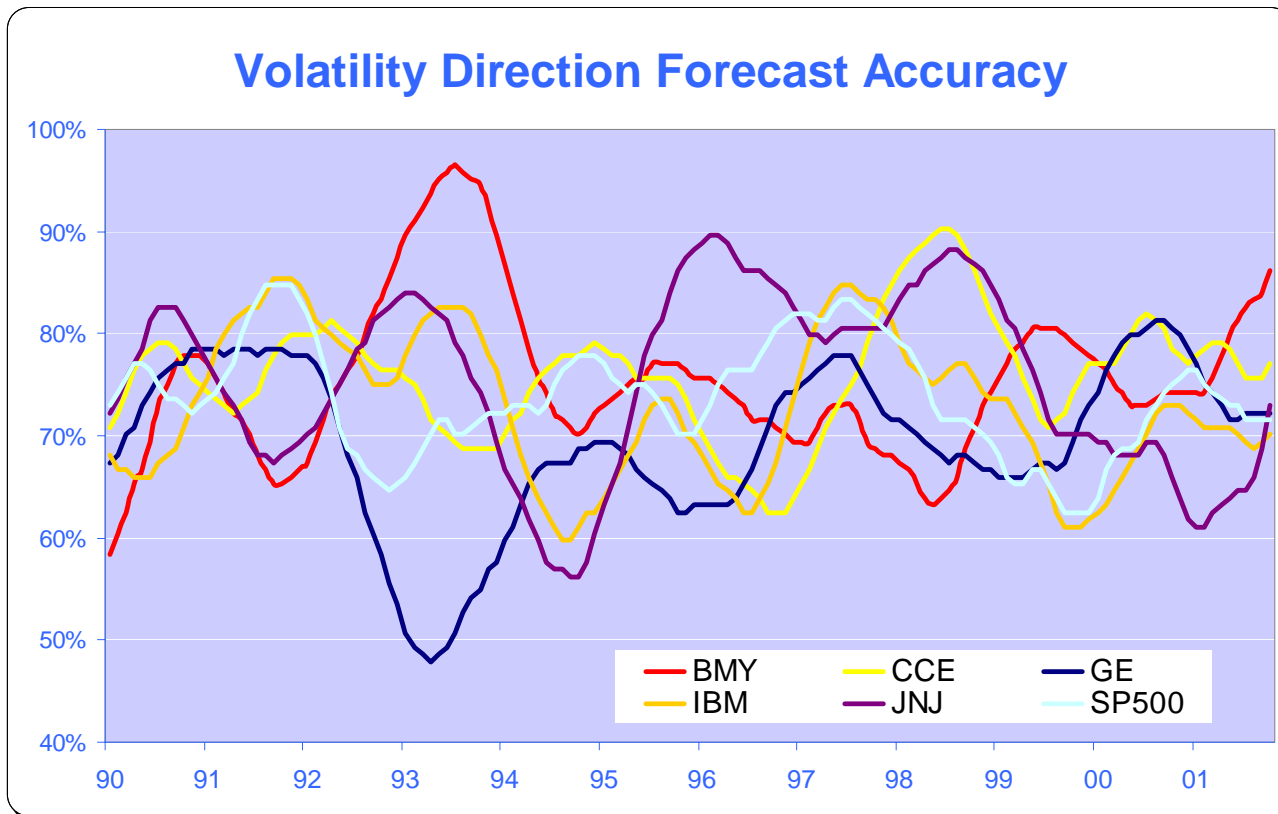
Two-Factor Model for SP500 Index Volatility



Model Management System

- MMS updates each model daily
 - 800+ models in total!
- Rates model performance
 - Around 30 statistical criteria
 - Current vs. historical performance for each model
 - Relative performance of each model
 - Regime shift detection
- Produces forecasts
 - Automatically biases in favor of best performing models
 - Makes system very robust to changing market conditions
- Creates trading sheet
 - Identifies option mispriced by 50% or more
 - 30-40 opportunities daily

Volatility Forecasting

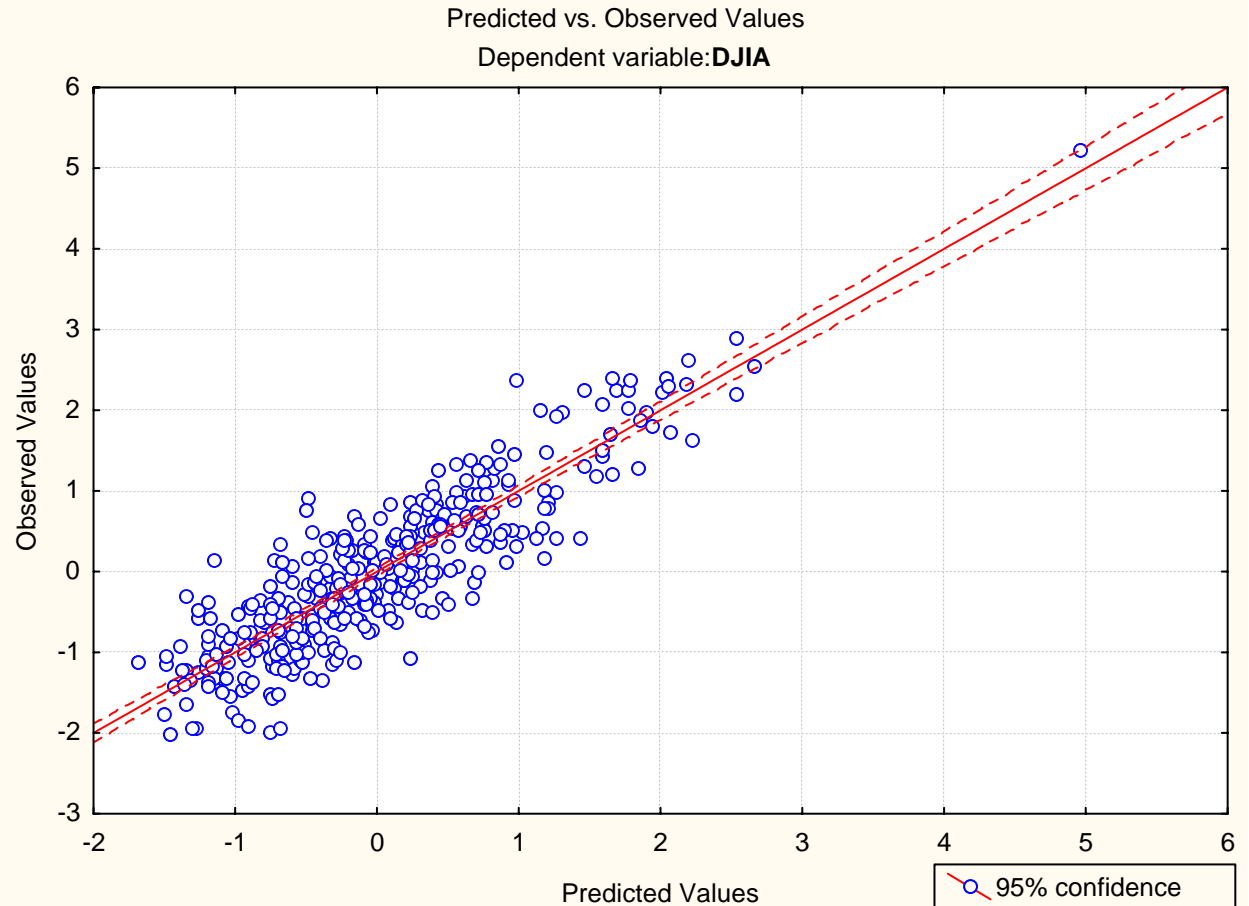


Volatility Cointegration

- Baskets of volatility move together
- Stable, long term relationships
 - Much more important than correlation
- Example:
 - Volatility in NYMEX vs IPE

Dow Cointegration Model

- DJIA
 - DD
 - GE
 - IP
 - MMM
 - MRK
 - UTX
 - XOM
- $R^2 = 78\%$



Risk Management

- Extreme Markets / Event Risk
 - Operate portfolio within stated Value-at-Risk limit
 - Stress test for 20% down move
 - Diversification (across stocks, option maturities)
 - CrashMetrics ® methodology to hedge tail risk
- Volatility Risk
 - Stress test for 50% increase in volatility
 - Attempt to remain Gamma positive or limit negative Gamma
 - Buy cheap wing protection
- Liquidity
 - Screen socks for liquidity
 - Invest in only most highly liquid SP500 names (plus SPX and QQQ)
 - Maximum allocation to any single stock is 4% of capital
- Execution
 - Monitor earnings
 - Screen out trades in stocks with M&A activity, FDA approvals, etc

CrashMetrics®

- Correlations unstable during market crashes
- Dataset & methodology for measuring exposure to extremes
- Finds worst outcome for portfolio
 - $\Delta P_{\text{worst}} = -\Delta_C^2 / 2\Gamma_C$
- Platinum Hedging
 - Optimal hedge under extreme scenario
 - Hedging is static
 - Minimize cost
 - Avoid illiquidity during crashes
 - Reduces model error
 - Unstable parameters such as volatility and correlation not used

Summary

- Unique quantitative approach
 - Advanced proprietary econometric models
 - Sophisticated model management
 - Portfolio construction using latest econometric theories
 - Built-in crash protection
- Proven track record
- Experienced, capable management team

Further Information

- Proteom Web Site: www.proteomcapital.com
 - User name: pinvestor
 - Password: proteom
- Go to the Proteom web site for:
 - Technical Presentation
 - Two Page Strategy Summaries
 - Zephyr Style Advisor Reports
 - Detailed Strategy Analysis
 - Due Diligence Information
 - Offering Documents

Contact

Proteom Capital Management Ltd

Contact: ***Jonathan Kinlay***

Canon's Court, 22 Victoria Street,
Hamilton HM12, Bermuda

Phone: (888) 736-6650

Fax: (212) 208-2492

Email: jkinlay@proteomcapital.com

Web: www.proteomcapital.com

Notes

1. Proteom Capital Management Ltd is the Investment Manager of the Proteom Fund Ltd.
2. Returns for the Proteom Fund, herein include the reinvestment of dividends, capital gains and other earnings.
3. Nothing herein should be construed as a solicitation of clients, or as an offer to sell or a solicitation of an offer to invest in the fund. Such activities may be made only pursuant to a private placement memorandum. As a matter of practice, Proteom Capital Management Ltd does not solicit clients.
4. NO REPRESENTATION IS MADE THAT ANY INVESTOR IN THE FUND WILL OR IS LIKELY TO ACHIEVE RESULTS COMPRABLE TO THOSE SHOWN OR WILL MAKE ANY PROFIT AT ALL OR WILL BE ABLE TO AVOID INCURING SUBSTANTIAL LOSSES.
5. While every effort has been made to provide data from sources considered to be reliable, no guarantee of accuracy is given.
6. The contents herein are subject to change without prior notice.
7. This brochure is typically updated as at the most recent calendar month end.
8. Historical data are presented for informational purposes only.
9. Except where stated, funds managed by Proteom do not attempt to track any index or benchmark.
10. Benchmark data are total returns for the indices for the periods shown and are for comparison purposes only.
11. Cumulative benchmark data and performance data are compounded monthly.
12. Volatility is measured by the annualized standard deviation of monthly returns.
13. Investment programs described herein contain significant risks.
14. Proteom Equity Fund LLC is an onshore fund generally open to qualified US investors, as defined.
15. Proteom Global Equity Fund Ltd is an offshore fund generally open to qualified non-US investors, as defined.
16. This presentation is provided for information purposes only and is subject to, and qualified fully by the funds Confidential Private Placement Memorandum (PPM) and related documents.