Time Series Variation in Risk Levels and What To Do About It

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When investors usually think of market volatility, they are concerned with the times series variation in the returns to securities or market indices.

With respect to active management, of equal or greater importance is the cross-sectional dispersion, or variety of returns.

Consider the historical trends in variety for a number of major equity markets.

Introduce a simple use of variety statistics that meaningfully improves risk forecasts.

Review the implications of the times series of changes in variety on various styles of equity management.
The Origins of the Variety Concept

- Solnik and Roulet (2000) examine the dispersion of country returns as a way of estimating correlations between markets.
- Lilo, Mantegna, Bouchard and Potters use the term Variety to describe cross-sectional dispersion of stock returns.
  - They also define the cross-sectional dispersion of CAPM alpha as idiosyncratic variety (noted as $v(t)$).
  - They find that the average correlation between stocks is approximately:

$$C(t) = \frac{1}{1 + \frac{v^2(t)}{r_m^2(t)}}$$

- diBartolomeo (2000) relates periods of high cross-sectional dispersion to positive serial correlation in stock returns (i.e., momentum strategies working).
Global Equities Idiosyncratic Variety of Local Currency Returns

![Global Equities Idiosyncratic Variety of Local Currency Returns Chart]
Europe Idiosyncratic Variety of Local Currency Returns
A Simple Improvement to Risk Forecasting

- If there was no cross-sectional dispersion of stock returns, all portfolios would have zero tracking error.
- So let's condition our forecast tracking errors on the level of idiosyncratic variety.
- Let's try a simple moving average adjustment:

\[ E[TE \text{ (adjusted)}] = TE \times \frac{\text{MA}[IV, 12]}{\text{MA}[IV, 60]} \]
Europe Tracking Error Bias

Risk Numbers

EstTrkErr  RlzTrkErr  EstTrkErrAdj
UK Tracking Error Bias

Risk Numbers

EstTrkErr  RlzTrkErr  EstTrkErrAdj

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Global Model Tracking Error Bias

Risk Numbers

- EstTrkErr
- RlzTrkErr
- EstTrkErrAdj

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Experiment Results

- The level of average tracking error forecast is universally improved for our UK, Europe, Global and US models.
- The key indicator is the time series standard deviation of the average bias statistic per period across a large set of portfolios at each time point. This value is reduced an average of about 20%.
Different Active Management Styles Represent Differential Responses to Price Movement

“Price-sensitive active management strategies can be replicated by option payoffs”

Jarrod Wilcox, Better Risk Management, JPM, 2000
Value and Volatility

- Value approaches are often referred to among hedge funds and trading desks as “convergence strategies” as they depend on the convergence between the market price and a manager’s definition of the fair price of some security. The greater the noise in the market environment, the more obfuscation and impediments to the convergence process.
Momentum and Volatility

- Momentum strategies buy stocks on price strength and sell on price weakness. This is similar to a Constant Proportion Portfolio Insurance (Black and Perold, 1992) applied to the cross-section of stock returns.

- CPPI mimics being long a put option on the underlying asset (plus a long position in the underlying). Option buyers are advantaged when realized volatility is greater than the volatility expected when the option was established.

- If momentum strategies are comparable to being long an option, then anti-momentum strategies (value?) must be comparable to being short an option, so low volatility conditions would be most favorable.
Defining Variety as the Basis of Style

- We could just take the cross-sectional dispersion of securities in a particular market on a period by period basis.
- Beta differences will cause cross-sectional dispersion in volatile (market index across time) conditions.
- So let us define our dispersion measure as the cross-sectional standard deviation of alpha (residual returns, net of beta effect).
- Think of idiosyncratic variety as the “excess standard deviation” (standard deviation of stock returns) minus (the product of the absolute value of the observed market risk premium times the cross-sectional dispersion of the beta values).
Summing Up the Idea

• Value strategies should work best in periods of low excess cross-sectional dispersion of stock returns. Another way to characterize this is periods when correlations among securities is highest.

• Momentum/growth strategies should work best in periods of high excess cross-sectional dispersion as they are like being long an option.

• Strongin, Petsch, Segal and Sharenow (2002) find value strategies work best when confined within sector (small cross-sectional dispersion), while growth strategies work best with no sector constraints (high dispersion).

• This is the basis of definition of the value/momentum factor in many Northfield models (beta to idiosyncratic variety).

• May also explain the “value premium”, see Harvey and Siddique (2000).
Prior Empirical Test on UK Data

- Compute the monthly “excess” cross-sectional standard deviation of stock returns using beta values from the Northfield UK Risk model
- Compute the “Growth-Value” return spread from the Salomon Smith Barney UK Primary Market indices
- Data from January 1998 through September 2002
- Correlation coefficient of .48 with significant T statistic
- Comparable results to data for the US
- Captures the build and collapse of the late 1990s “bubble” nicely. Consistent with Derman (2002)
Monthly UK Style Returns Versus Excess Dispersion
January 1998 through September 2002
New Results with Data From 1990 through 2005

- **United States**
  - Slope coefficient = .161, T-Stat 2.49
- **Global**
  - Slope coefficient = .186, T-Stat 3.37
- **Europe**
  - Slope coefficient = .078, T-Stat 1.49
- **Weaker than in the 1998-2001 period but still very significant including the long periods of low idiosyncratic variety values**
Monthly US Style Returns Versus Excess Dispersion
January 1990 through December 2005
Conclusions

• Idiosyncratic variety is an important aspect of market conditions that has shown strong trends over time
  - Current values are comparable to the early 1990s and are less than one third the peak values seek during the “tech bubble” period surrounding the year 2000
  - Tracking error forecasts can be improved by including information about variety

• Popular equity management styles such as value, growth and momentum can be viewed as bets on the future excess dispersion of the cross-section of stock returns
  - Risk controls for portfolios defined as style neutral can be viewed as being neutral to future movements in the volatility level
References

More References