

Short Term Risk from A Long Term Model, Part I

Dan diBartolomeo
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Motivation for the Short Term Risk Forecast

- Our Everything, Everywhere model has become increasingly popular both large pension funds and also with multi-strategy hedge funds and “fund of funds”.
 - It offers much detailed analysis at the individual issue level than the most popular multi-asset class risk systems
- Hedge funds typically have a very short time horizon in their investments
 - High Turnover
 - Leverage (Gearing)
 - Think of risk in “dollar loss” terms, not volatility (VaR, CVaR)
- Many European mutual funds are required to provide VaR risk estimates over short horizons as part of UCITS3 regulations

One Approach to Short Term Modeling

- The usual answer:
 - Increase the frequency of observations (daily or shorter)
 - Use a shorter sample period
 - Generally need different factors
- There are serious problems with this approach at the individual security level
 - High degree of kurtosis in return distributions
 - Negative serial correlation due to short term reversal effects
 - Positive serial correlation on illiquid instruments
 - Asynchronous trading across time zones makes correlation estimation very difficult
- Address “shocks” through a GARCH process

What's the Problem with High Frequency Data?

- Financial markets are driven by the arrival of information in the form of "news" (truly unanticipated) and the form of "announcements" that are anticipated with respect to time but not with respect to content.
- The time intervals it takes markets to absorb and adjust to new information ranges from minutes to days. Generally much smaller than a month, but up to and often larger than a day. That's why US markets were closed for a week at September 11th.
- GARCH models don't work well on announcements
 - Market participants anticipate announcements
 - Volume and volatility dry up as investors wait for outcomes
 - Reduce volatility into the announcement and boost it after the announcement, so they are wrong twice

Investor Response to Information

- Several papers have examined the relative market response to “news” and “announcements”
 - Ederington and Lee (1996)
 - Kwag Shrieves and Wansley(2000)
 - Abraham and Taylor (1993)
- Jones, Lamont and Lumsdaine (1998) show a remarkable result for the US bond market
 - Total returns for long bonds and Treasury bills are not different if announcement days are removed from the data set
- Brown, Harlow and Tinic (1988) provide a framework for asymmetrical response to “good” and “bad” news
 - Good news increases projected cash flows, bad news decreases
 - All new information is a “surprise”, decreasing investor confidence and increasing discount rates
 - Upward price movements are muted, while downward movements are accentuated

Our Approach is Different

- Continue to use the existing risk models that are estimated from monthly return observations
- Use new information that is not part of the risk model to adjust various components of the risk forecast to short-term conditions
- This approach has multiple benefits
 - We sidestep almost all of the statistical complexities that arise with use of high frequency data
 - We get to keep the existing factor structure of the model so risk reporting remains familiar and intuitive
 - Since our long term and short term forecasts are based on the same factor structure, we can quickly estimate new forecasts for any length time horizon that falls between the two horizons
 - Can be applied to any of our existing models

One Form of Working with “External Information”

- Risk estimates in our US Short Term Model have been conditioned for years based on analysis of stock option implied volatility
 - Every day we look at the implied volatility of options on all US stocks
 - We keep a 30 day moving average of the ratio of implied volatility to historic volatility
 - If the implied volatility/historic ratio jumps because of an information flow to the market (e.g. Bill Gates gets run over by a bus), the specific risk of that stock is adjusted
 - If implied volatility ratio of many related stocks changes, the implied changes in factor variance are also made. This means that the risk forecasts change even for stocks on which no options trade
 - See Chapter 12, *Linear Factor Models in Finance*, Satchell and Knight, editors

"Variety" as External Information

- 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:

$$C(t) = 1 / [1 + (v^2(t)/r_m^2(t))]$$

- diBartolomeo (2000) relates periods of high cross-sectional dispersion to positive serial correlation in stock returns (i.e. momentum strategies working)

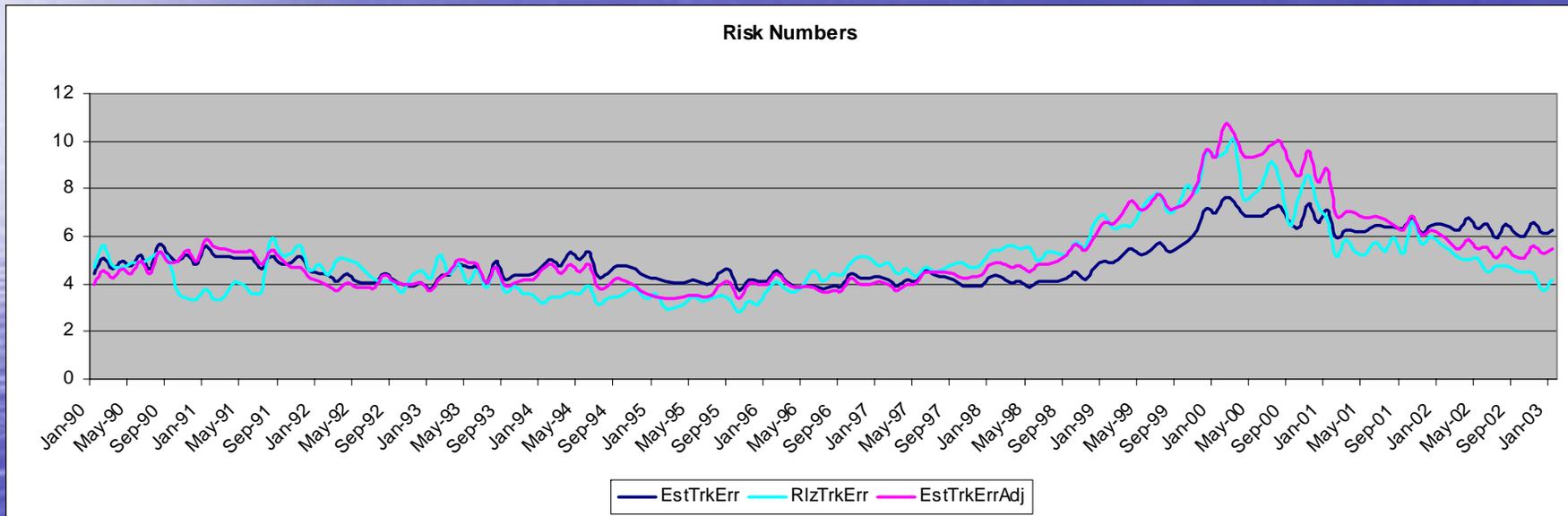
A Simple Improvement to Risk Forecasting

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

$$E[TE \text{ (adjusted)}] = TE * MA[IV,12] / MA [IV,60]$$

- 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%

Global Model Tracking Error Bias



Conclusions and Hand-off

- We think the best way to get a short term risk forecast is to adjust our long term forecast for current conditions, using new information that is external to the existing risk model.
- My colleague, Anish Shah will now do the hard part of this presentation showing you HOW the incorporation of external information is actually done.