Several years in the making, the next (3rd) generation of Northfield risk models ships with the March 31, 2013 release. The release includes all Northfield models except the US Short-Term model (revised in 2010) and EE and REIT models (coming later in the year). For the first three months, live update will deliver both 2nd and 3rd generation models in parallel.

Many have asked, “The models have worked well. Why change anything?” First, increasing coverage called for minor structural changes. Twelve emerging markets – Bulgaria, Croatia, Kazakhstan, Kenya, Lebanon, Mauritius, Nigeria, Serbia, Trinidad & Tobago, Ukraine, United Arab Emirates, Vietnam – are now among the 80 countries covered by the Global model. To accommodate these and future additions, the model’s set of region factors was re-cut and expanded. Likewise, investor interest and trade across markets have tightened their global link.

The chart below shows the percentage of variance explained by the market for region indices that appear as factors in the 2nd generation global model.
The Third Generation Northfield Risk Models

Regions have become more alike. The same holds true for sectors, excluding minerals:

To better capture current security behavior, the 3rd generation Global model has market as its first factor and redefines sector and region factors to be stripped of market. A side benefit: the form, market then sector, parallels that of the both 2nd and 3rd generation Northfield Single Market models; risk comparisons across models become easier and clearer.

To understand other changes, consider that a risk model serves four essential functions:

1. differentiating between high and low volatility portfolios
2. capturing volatility changes over time
3. informatively identifying what sources contribute to a particular portfolio’s risk
4. acting as a risk measure for portfolio construction (optimization)

Managers, particularly those holding fully invested long only portfolios, are perhaps most interested in the first. Both the 2nd and 3rd generation models do this well, so it’s enough to say its importance has not been forgotten.

In 1998 (US Short-Term Equity\(^1\)) and 2008 (Adaptive Near Horizon models\(^2\)), Northfield introduced models that incorporate instantaneous data - e.g. option implied volatilities - to forecast behavior over a few days. With market regimes ever more varied, such information becomes increasingly relevant to the long-term manager navigating current conditions. Moreover, properly attenuated, it improves forecasts over a long (1 year) window. With the release of the 3rd generation models, Northfield offers managers both.

Clients can blend any long-term model with its most recent month-end Near Horizon counterpart. Setting the blend to 100% Near Horizon forecasts risk as it is now. A softer blend\(^3\) works for a longer window. (For those content with the existing, 0% Near Horizon yields the familiar long-term model).
The Third Generation Northfield Risk Models

A good risk model tells a manager not only how risky but where the risk comes from. As mentioned earlier, the 3rd generation Global model has a global market factor to correctly identify risk common to all markets. Its region factors (previously numbering five: Continental Europe, English Speaking Countries, Scandinavia, South America & Mexico, Asia) have grown to eight: USA/Canada, Latin America/Caribbean, Developed Europe, Emerging Europe, Middle East/Africa, Japan, Developed Asia/Asia Pacific, Emerging Asia/Asia Pacific. The Technology & Health sector factor of the Global and Single Market models has separated into two to better capture and label risks.

Portfolio optimization places another imposition: the model needs to be bullet proof. Statistical estimates are unavoidably made with error. A portfolio made by hand doesn’t react to the errors of the risk model; errors wash out. In contrast, an optimizer dynamically adjusts portfolio weights to the numbers. Errors both affect composition and propagate to portfolio forecasts. To increase accuracy and robustness at the individual security level, 3rd generation models (US Fundamental model excluded4) estimate factor exposures via Bayesian instead of frequentist inference.

The difference between the two techniques: A frequentist uses only observations. A Bayesian combines observations with prior beliefs about how likely things are. From a distance seeing a 10’ tall giant, a frequentist reports the person is 10’ tall. A Bayesian would think 1) the average person stands 5’10” ± 8” and 2) her not perfect eyesight adds around 1’ of error to the measurement, so she reports someone 6’5”.

In our case, we are measuring not a man’s height but a stock’s sensitivities to risk factors. Based on goodness of fit, number of observations, and variation within peer group – estimated numbers fall somewhere between the raw observations and the prior belief. Illustrating what a difference it makes, the following charts show the distribution of stock betas to the market for the 2nd and 3rd generation models. Notice the drop in number of extreme betas, above 2 and below 0.
The Third Generation Northfield Risk Models

This brief overview leaves out many other, often subtle but well thought through, technical changes. A detailed and graphical presentation is online. The improvements are the result of extensive testing. We expect that clients, even those very satisfied with the existing models, will find – in increased coverage of emerging markets, in capturing time varying volatility and accurately forecasting long-term and short-term risk, in more informatively describing the sources of risk, in stock level accuracy and the performance of optimized portfolios – significant improvement in the 3rd generation release.

Endnotes


3 Empirical tests suggest a blend of ~20% Near Horizon for forecasting over 1 year

4 In all generations of the US Fundamental model, factor exposures are estimated from financial statement data