



November 2004

# Northfield News

Quarterly Newsletter for the Friends and Clients of Northfield Information Services

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## Investment Style and the Choice of Risk Model Specification

By Dan diBartolomeo

There are a number of factor based risk models that are available to investors from Northfield. One thing in common across all models is the formula by which the expected return variance of a portfolio is calculated:

$$V_p = E[\sum_{i=1 \text{ to } n} \sum_{j=1 \text{ to } n} B_i B_j \sigma_i \sigma_j \rho_{ij} + \sum_{k=1 \text{ to } m} \epsilon_k^2]$$

$V_p$  = expected return variance of the portfolio

$n$  = number of factors in the model

$B_i$  = the exposure of the portfolio to factor I

$\rho_{ij}$  = the correlation of returns to factor j

$\sigma_i$  = the standard deviation of returns to factor I

$\epsilon$  = asset specific standard deviation of security k

$E$  = the expectations operator

There are three standard methods used to estimate the parameters of such a model. The most popular type of model is an *endogenous* specification. These models are also known as “fundamental models” because the factors used in such models are typically observable fundamental characteristics of stocks (e.g. market cap, dividend yield, P/E ratio). In such a model, we can observe the exposure values (the B’s) in an unambiguous fashion. For example, we can readily observe that a high P/E stock is a high P/E stock and a low P/E stock is a low P/E stock. We can equally observe that a large market capitalization company is large and a small capitalization company is small. While we may choose to put both P/E and market capitalization on a common scale (such as cross-sectional Z-scores) as a matter of convenience, the key issue is that we are not making any estimates of the B values. These can be calculated with exactness.

In an endogenous model, we do need to statistically estimate the factor return volatility (the  $\sigma_j$ ) values and the correlations ( $\rho_{ij}$ ) among the factor returns. The estimation process is usually done as a cross-sectional regression analysis, the result of which is a set of returns to the chosen factors during a particular time period. By repeating this process over a series of time periods, we obtain our needed parameters. As such, any errors in our factor risk estimates will arise in these factor covariance terms.

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## Recent and Upcoming Events

### Allocation Research Toolkit, (“ART”) Seminar Series

Over the past few months, Northfield has hosted ½ day seminars in Boston, Chicago and New York with the last of the year scheduled for December 3, in San Francisco. The seminar series was designed to introduce a new Northfield product offering that has been under development for the past two years – a significant upgrade from our prior asset allocation system, ART is a more comprehensive application for investment advisors, plan sponsors and consultants. Innovative analytical techniques have been developed for Manager Search, Asset Allocation and Style Analysis.

Northfield is using the Analytical Hierarchy Process, (“AHP”) for asset class and manager selection in ART. We believe AHP is a significant innovation in asset allocation work for both the individual and institutional marketplaces. Essentially, AHP allows the investment expert to specify and weight data factors allowing for greater flexibility in determining suitable portfolios or Managers. ART also has improved historic simulation that includes tactical rebalancing using historic expected returns and returns based style analysis that features the usage of confidence intervals to improve the interpretation of sample results.

#### ART Features:

- Incorporates data for U.S. Mutual Funds, Institutional managers, Separately managed accounts, Hedge Funds, Global Indices and more...
- AHP for Manager Search and/or Individual financial planning
- Optimization
- Historic simulation/back-testing
- Style Analysis with or without confidence intervals

Please contact your Northfield Sales Representative if you are interested to learn more about ART. Also, if you are interested in attending the **ART Asset Allocation, Style Analysis and Manager Search Seminar** in San Francisco, see the details below.

#### When and Where:

Friday, December 3, 2004, 8:30 am – 12:00 Noon • Hotel Monaco, 501 Geary Street, San Francisco, CA 94102

#### Who should attend: Plan sponsors, consultants and asset managers

Dan diBartolomeo, President, Northfield Information Services, Inc., will discuss new, innovative analytical approaches to asset allocation, style analysis and manager search work. We'll also touch on how these techniques have particular relevance to hedge fund investing. The session will be classroom setting with Q&A after each topic. There is no cost of participation; however we do accept donations on behalf of the Boys and Girls' Club of the San Francisco Bay Area. The number of attendees will be strictly limited to just forty, so a prompt RSVP is suggested.

The complete seminar Agenda has been posted to:

[http://www.northinfo.com/events/agenda\\_sanfran.pdf](http://www.northinfo.com/events/agenda_sanfran.pdf)

Please RSVP by telephone **617.208.2020**, fax **617.451.2122**, or email, [kathy@northinfo.com](mailto:kathy@northinfo.com). We look forward to seeing you!

## Northfield Asia Seminar Series – Research on Investment Management and Risk Tokyo • Sydney • Hong Kong

Northfield will be hosting three one day seminars in Tokyo, Sydney, and Hong Kong in the month of December. The purpose of the seminars is to showcase our research on various topics in investment and risk management to our growing list of Australian and Far East clients and prospects.

The presentations for each are listed below. The complete agendas have been posted to our website.

### Tokyo:

December 10, 2004, 8:30 am - 4:30 pm • Century Hyatt Tokyo, 2-7-2, Nishi-Shinjuku, Shinjuku-ku, Tokyo

- Credit Risk Modeling Using Market Implied Measures
- Equity Risk Modeling: Innovations in Methods & Best Practices
- Subtleties for Long/Short Investing
- The New Paradigm for Taxable Portfolio Management
- CUSUM Analysis for Manager Evaluation & Monitoring



Century Hyatt Tokyo

Complete Agenda posted to [http://www.northinfo.com/events/agenda\\_japan.pdf](http://www.northinfo.com/events/agenda_japan.pdf)

### Sydney:

December 15, 2004, 8:30 am - 5:30 pm • Park Hyatt Sydney, 7 Hickson Road, The Rocks, Sydney

- Credit Risk Modeling Using Market Implied Measures
- Equity Risk Modeling: Innovations in Methods & Best Practices
- Subtleties for Long/Short Investing
- The New Paradigm for Taxable Portfolio Management
- CUSUM Analysis for Manager Evaluation & Monitoring
- Realistic Inclusion of the Market Impact of Large Trades
- Investment Decisions: An Epistemological Perspective



Park Hyatt Sydney

Complete Agenda posted to [http://www.northinfo.com/events/agenda\\_sydney.pdf](http://www.northinfo.com/events/agenda_sydney.pdf)

### Hong Kong:

December 21, 2004, 8:30 am – 5:00 pm • Mandarin Oriental, Central, Hong Kong

- Credit Risk Modeling Using Market Implied
- Equity Risk Modeling: Innovations in Methods & Best
- Subtleties for Long/Short Investing
- Growth/Value/Momentum
- CUSUM Analysis for Manager Evaluation & Monitoring
- The Dual Benchmark Problem



Mandarin Oriental Hong Kong

Space is limited, so a prompt RSVP is suggested. Please RSVP to Nick Wade in Tokyo, +81 3 5403 4655 or e-mail: [nick@northinfo.com](mailto:nick@northinfo.com).

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Alternatively, we could use an *exogenous* specification of the model. In such a model, we observe the returns to observable driving factors. These could be macroeconomic in nature such as interest rates or oil prices, or they could be represented by market variables such as the spread in monthly returns between two stock indices (e.g. the spread between the Russell 1000 and Russell 2000 as a measure of the relative performance in the US of large capitalization and small capitalization portfolios. In such a case, we can directly observe the factor returns for each time period from which we can immediately calculate the factor covariance terms. In this case, we need to do statistical estimation of how these driving factors impact the return behavior of individual stocks. This is normally done by doing a separate time series regression analysis of the returns of a particular stock (dependent variable) against the returns of the chosen factors (independent variables). In this method, errors arising from statistical estimation will occur in the exposure coefficients (the B values).

The third method of estimation is the use of a *blind* factor model, also called an *implicit* factor model. In this model we make no preconceived choice of factors. We simply carry out a statistical analysis that will estimate both the exposure coefficients (the B values) and the factor return covariance terms. There are a number of different statistical techniques for carrying out such a process. The best known of these techniques is called principal components analysis. In order to make a functional model without imposing any external views as to the nature of the factors, we are required to make the assumption (probably heroic) that all the correlations among the different factors are zero. This is called orthogonality.

At Northfield, we use all of the different approaches to risk modeling. Our Fundamental US model is an endogenous specification, while our Macroeconomic and our Single Country US Model are exogenous specifications. Our Global model and our models for other single country or regional markets are also of the exogenous type. Our US Short-Term model is a blind factor specification.

The reason we use different specifications in the different models is not because one type of model is inherently superior to another. We use the different specifications for three reasons: (1) market conditions in different countries are different, and often dictate differing degrees of diversification within portfolios, (2) the availability, quality, and accounting standards for fundamental data varies greatly from country to country, and (3) investors may have high or low turnover portfolio strategies. The right choice of model specification will maximize the advantages and

minimize the disadvantages, conditional on the market and strategy being pursued by the investor.

One consideration is the asset specific risk (the  $e$  terms) that is typical in a market. In large, transparent markets like the US, the degree of stock specific return (and risk) is much greater. Another way to say this is that the explanatory power of market movements over individual stock returns ( $r$ -squared) is much less. In short, we actually can explain less of what is going on, so we need to be more cautious in our assumptions about how well our model works. While there is more volatility in emerging countries our models explain it pretty well. In such a market, we would like our estimates of risk for individual to be somewhat upward biased.

In addition, this means that there is more potential for active managers to produce superior returns by picking individual stocks, rather than market timing. This leads us to assume that our active manager clients may be taking far more concentrated "bets" in a market like the US as compared to other countries where asset specific risk is lower. In a market where asset specific risks are low, the returns of all stocks tend to be bunched relatively closely together. There is therefore little to be gained by taking big bets on individual stocks, so more diversified portfolios are sensible.

We now have a reason to prefer one type of model specification to another. If we are running a highly concentrated portfolio, an endogenous specification is preferable. The exposures of even a single stock are known with exactness. As all the potential for errors reside in the factor covariance matrix, the risk estimates of a diversified portfolio or a concentrated portfolio are apt to have about the same level of correctness.

On the other hand, an exogenous specification puts the potential for errors in the exposure coefficients of the individual stocks. If our interest is running a concentrated portfolio with only a few names, the potential for errors in the exposure coefficients is substantial. However, since our exposure coefficients are normally BLUE (best linear unbiased estimators), the errors in the exposure coefficients will diversify away as the portfolio is diversified. This means we may prefer an exogenous specification for broadly diversified portfolios.

Since most countries in the world have relatively low asset specific risk behaviors, we assume our clients will hold more diverse portfolios leading to a preference for an exogenous specification in most parts of the world. In the US, the asset specific risk of the market is sometimes very large, so it can make sense to hold a concentrated portfolio. As such, we offer an endogenous specification for the US.

The accuracy of accounting data is suspect in many countries to the point where local investors won't rely on it. This lack of willingness to believe company specific information drives the differences in r-squared across markets. This issue is more fully explored in:

a) Morck, Randall, Bernard Yeung and Wayne Yu. "The Information Content Of Stock Markets: Why Do Emerging Markets Have Synchronous Stock Price Movements?," *Journal of Financial Economics*, 2000, v58(1-2,Jan), 215-260.

b) Jin, Li and Stewart Myers. "R-Squared Around the World: New Theory and New Tests", Harvard/MIT Working Paper, February 2004.

When we are operating in a global context, another property of fundamental data often makes an endogenous model less attractive. There are wide differences in accounting standards across countries. For example, pension liabilities are handled very differently in Germany and Japan, making comparison of price/book ratio values for stocks in these two countries problematic. One way around this is to normalize the price/book ratio within country. Unfortunately, "in country" normalization leads to other problems. If we normalize something like market capitalization within country, we would get the puzzling result that the largest stocks in Poland would be considered to have extremely large capitalization, while in a global context these stocks would be considered quite small.

Proponents of implicit factor models argue that all of these specification issues can be simply avoided by using a blind factor specification. In effect, we are going to let the data tell us what factors we need to use. While this is a very appealing idea, there are three possible downfalls that must be carefully weighed. First, in order to estimate an implicit factor model we must make the assumption that the driving factors just happen to be uncorrelated with one another. If you asked a group of professional investors what they think are important drivers of stock behavior you would likely get answers like P/E ratios, dividend yields, growth rates, beta and sector membership among others. None of these happen to be uncorrelated with the others.

The second problem with blind factor models is that they do not give us any intuition as to what the actual underlying drivers of the market may be. Few active managers are prepared to take large bets on something like "factor 6" without knowing what factor 6 is in the real world. While it is possible to map implicit factor exposure coefficients onto real world factors using a statistical estimation akin to returns-based style analysis, the accuracy of mapping orthogonal factor loadings onto non-orthogonal real world factors is quite limited.

The most serious problem with blind factor models is that we have a great amplification in sample period dependence. When we estimate a risk model, we always do so over some past sample period. If we use a specified factor model, whether endogenous or exogenous, we can estimate the model over many past periods of time in order to come up with our best estimates of future factor volatilities and correlations. In an implicit factor model, there is little likelihood that factor 6 estimated over the past five years, and factor 6 estimated during the five years from 1990 to 1995 would represent the same real world economic driver. As such, all of our information about future factor covariance values is solely dependent on the most recent sample period.

Consider a sample period of time when growth stocks and value stocks had little difference in their relative returns. An implicit factor model would simply say that growth/value simply didn't matter any more and it would not be represented in the model. In a specified factor model, we could consider the factor that the growth/value relationship (however you choose to define) did matter a lot throughout many prior sample periods. We can therefore make an informed judgment as to how much volatility to expect in growth/value factor in the future, rather than simply assume it drops out because it wasn't important in the most recent sample.

Our belief is that generally the most satisfactory factor specification is a hybrid of the exogenous and implicit factor methods. The Northfield Global, EE and Single Market models use an exogenously specified model to capture all the aspects of investment risk that we believe are persistent across time and across markets. We then take the small amount of risk not explained by selected factors and try to use implicit factors to estimate the risk of emerging new factors (e.g. Internet stocks) or other transient effects in the markets.

Time horizon is also an important factor. Imagine a situation where the CEO of an important company were killed in a plane crash. This tragedy might have only a small impact on share volatility in the long run, the effect could be very substantial in the short-run. In our US Short-Term model, we use changes in the implied volatility from stock options to adjust our stock level and factor level volatility estimates from day to day. In this case, a blind factor structure is key to being able to incorporate the option based information.

## Northfield Staff Speaking Engagements

Northfield President, Dan diBartolomeo gave two presentations, September 13, 15, at the Alpha Strategies/UBS Seminar in Oxford, England. The first topic was “Estimating Market Impact for Large Trades,” and the second was “An Epistemological Perspective on Investment Decision Making.”

Dan gave two presentations at Boston Security Analysts events. On October 20, he spoke at their Trading Methods and Technology Seminar on “Market Impact and Optimal Trade Scheduling.” On October 22, he spoke at one of their half-day seminars, the topic was “Risk, the Dark Side of Return.”

Dan recently worked with a student group at MIT. On October 7, they made a presentation at the MIT Pro-Seminar in Financial Engineering. The topic was “A New Approach to Market Impact Estimation.”

On October 27th, Dan was one of four panelists at the International Association of Financial Engineers "How I Became A Quant" career night for graduate students which was held at MIT.

On November 11, Dan presented at the FactSet Conference, in Miami. The topic was on “Innovations and Best Practices in Equity Risk Modeling.” On December 2, Dan will be speaking at the QWAFEFW meeting in San Francisco. The topic is still to be announced.

Dan diBartolomeo and Northfield’s Sandy Warrick have been the featured presenters at the Northfield ART Asset Allocation, Style Analysis and Manager Search Seminars in Boston, Chicago, New York, and the upcoming seminar in San Francisco. Dan and Northfield’s Nick Wade will be the featured presenters at the upcoming Northfield Asia Seminar series in Tokyo, Sydney and Hong Kong. The presentations for all of these seminars will be posted to <http://www.northinfo.com> as they become available.

## Northfield Annual Holiday Party

Friends and clients of Northfield Information Services are cordially invited to attend our annual holiday party. The party will be held in Northfield’s Boston offices on Tuesday, December 7, from 5:30 to 8:30.

Complimentary cocktails and and Hors d’oeuvres will be served and the evening’s entertainment will be provided by a four piece band playing assorted jazz and holiday music with vocal accompaniment.

Guests are welcomed to this informal gathering. If you would like to attend, please RSVP to Kathy Prasad, 617.208.2020, [kathy@northinfo.com](mailto:kathy@northinfo.com).

## Open Performance Troubleshooting Tips

The most common errors that occur when using Northfield’s Open Performance Attribution can be fixed by performing a few quick simple checks. The tips outlined below will not only work with Performance Attribution, but can be utilized with the Northfield Portfolio Optimizer as well.

If you generate errors during a run, here are a few troubleshooting tips and strategies.

- Open all the files created for use in the application. Start with the portfolio and benchmark files being used for the duration of the run. We recommend using any text editor for this and check the file for any blank lines, extra spaces, odd characters, etc.
- Be sure when saving any files created that they are saved as CSV (comma separated text) type files.
- If an error message is generated indicating a file does not exist, double-check the file paths to be sure the files listed do exist. Also, check to make sure the appropriately named file exists in the directory.
- The structure of the Global Model was changed and users should be watchful to either use the old style or the new style over the duration of the run, but be sure not to “mix” them up.
- Performance also provides a Log file which keeps an ongoing record of the run. If a run should fail, the log is very useful as it will report where and when the run failed. This will help narrow down the problem(s) that need to be fixed.

The directory C:\Northinfo\Perf32\Doc contains helpful documentation for all users. “AggFile.xls” and “SingleMonth.xls” are sample output files that contain useful details and the formulas used for each report. PERF file Walkthrough.doc provides descriptions of each input file while the “Open\_Performance\_Walkthrough.doc” is geared more towards the actual running of a project. Finally, the “Big Picture.doc” contains more detailed explanations of the output reports and provides definitions. All of the documentation available is filled with very useful information created to assist the user and answer a multitude of questions.

Of course, the Northfield Technical Support staff is always available to answer any questions. Please send e-mails to [support@northinfo.com](mailto:support@northinfo.com) or call 617.208.2080. European clients can contact our London office by e-mailing [christine@northinfo-europe.com](mailto:christine@northinfo-europe.com) or call +44 (0)20 7801.6260. For Asian clients, [nick@northinfo.com](mailto:nick@northinfo.com), +81 3 5403 4655.

## Northfield Partner Update

**FTSE** – In October, Northfield and FTSE, the leading equity benchmark provider, signed an agreement to leverage the Northfield and FTSE brands. Northfield developed versions of its global and single country equity risk models for the UK, Europe and China tuned to their respective FTSE equity indices; the All-World, All-Shares, Eurofirst 300 and Xinhua A 600 as part of the agreement. The new Northfield FTSE tuned risk models became available through Northfield and Factset with the November monthly update. Additional efforts as part of the agreement are planned for early next year.

**Reuters** – Northfield also signed an agreement with Reuters in October to provide Northfield with bond data to enhance the bond coverage within our Everything Everywhere cross asset class risk model. This will expand the bond coverage to 250,000 bonds to include greater coverage of international sovereign and corporate bonds. The additional bond coverage will be available in the January update of the EE model.

**Softpak MARS New Features** – Northfield and our partner Softpak Financial have continued to add improvements to the Managed Accounts Rebalancing System (MARS). MARS is a portfolio manufacturing solution focused on the separately managed accounts and wealth management space used to assist managers, sponsors and now private banking relationship managers in building and managing client portfolios through automation using imbedded Northfield tax efficient technologies. Recent significant enhancements include:

- **Overlay Accounts** – This utility provides users with the ability to combine multiple accounts that can be rebalanced against a given model – keeping market values constant - and then separated before the respective trades for each account are submitted to a trade order management system.
- **Portfolio Transitioning** – Assists managers in maximizing risk reduction vs. costs when transitioning new client accounts to the model portfolio or strategy or as part of the ongoing rebalancing process for existing accounts.

- **Portfolio Manufacturing Process Control** – MARS now provides more flexibility to better fit within the client's investment process by allowing for both centralized and decentralized management approaches to portfolio manufacturing or a combination thereof. MARS' new easy to use web templates provide relationship managers in the field with different levels of functionality while shielding them from the complexities of the underlying rebalancing process. The levels of functionality can be set by management to reflect the desired management approach.

**New Frontier Advisors** - New Frontier Advisors has announced the development of the Apex<sub>st</sub> Resampled Efficiency™ (RE) equity optimizer, a more user-friendly version of NFA's patented RE equity optimizer. The Apex optimizer replaced the NFA equity optimizer in the November release of the Northfield Open Optimizer.

NFA research has shown that many practices commonly associated with traditional mean-variance (MV) equity optimization design may limit or neutralize the benefits of RE optimization. Rigorous statistical analysis has shown that RE optimization provided improved investment value for the cases studied. The Apex optimizer sets user options and parameters to enhance investment value suitable for many equity portfolio optimizations in practice. Apex evaluates the inputs and a user alert appears if the system does not have confidence that enhanced value for RE, and therefore MV, optimization is likely.

The changes include:

- Forecast Confidence™ level set for typical equity optimization user
- Two simulation modes available: testing and refined
- Tracking error optimization mode only
- Maximum estimated return portfolio tracking error reported
- Alert if user desired risk is greater than optimizer confident is rewarded

Visit the New Frontier website for more information <http://www.newfrontieradvisors.com>.

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