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# Northfield News

*Quarterly Newsletter for the Friends and Clients of Northfield Information Services*

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## Dealing with “Non-Vanilla” Assets in the Everything Everywhere Model By Dan diBartolomeo

When we conceived our Everything, Everywhere risk model, we believed that it would serve two useful purposes within the investment industry. The first would be to provide an effective risk model to managers running global, balanced portfolios. With EE’s security level coverage of 150,000 stocks, bonds, convertible instruments, and currencies in forty-eight countries, this model has received an excellent reception from our clients. The second purpose would be to provide a tractable analytical framework for the assessment of risk across all assets of within the aggregate portfolio of a financial institution.

To satisfactorily fulfill this second purpose, we have to make provisions in the EE model for a wide variety of financial assets that are outside the realm of traditional stocks and bonds. Over the next year, we expect to have the means in place to reasonably handle almost any sort of financial asset. In other cases such as direct ownership of real estate, we will be providing templates that clients will be able to use to input the non-public information that is required to include these assets in the analysis provided by EE. Here is a brief discussion of how we are attacking the analytical challenges associated with additional types of investment asset. This ongoing effort is in the capable hands of Northfield staff member Emilian Belev, who is based in Toronto.

### Portfolio Assets: Indices, Mutual Funds and ETFs

There are two ways in which “portfolio assets” such as mutual funds, ETFs and index futures contracts can be included in the EE model. The currently available (and analytically best) method is to use the “composite asset” function of our software to represent the asset as a portfolio of its underlying constituents. This method provides the greatest accuracy but requires that the underlying constituents of the portfolio be known.

Given the estimation process used in the EE model, it is also possible to estimate factor exposures on a fund or index by directly by time series regression analyses. This methodology provides a more approximate answer for two reasons: the first is it effectively looks at the average properties of the asset back through time, while the “composite asset” method can look at the underlying securities of the portfolio asset as they exist today. The second is that once the regression analysis is completed, the stock specific returns of the asset are presumed to be uncorrelated with the stock specific returns of other assets. For example, if an investor held IBM stock in their portfolio and also held an S&P 500 ETF (SPDR), the asset specific risks of the two holdings would have been presumed to be orthogonal when they would actually be slightly correlated because IBM is a constituent of the S&P 500.

However, the time series regression method is quite suitable for cases where the underlying securities have low levels of asset specific risk. For example, a municipal bond index containing bonds of similar quality and maturity is an efficient alternative to building a composite asset consisting of all the individual municipal bonds within the index. The

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same rationale would apply to “generic” mortgage backed securities. As such, Northfield will be adding regression-based representations of wide variety of fixed income indices to the EE model in the near future. Suitably chosen fixed income indices also make excellent proxies for actual investor portfolios in those security types.

#### **Exogenously Determined Contingent Cash Flow Fixed Income at the Security Level**

Within the fixed income world, there are a variety of fixed income instruments such as mortgage “pass through” securities where the likelihood of prepayment is impacted by factors other than interest rates. For example, prepayment of home mortgages is affected by the rate of new home construction, unemployment rates, and local economic conditions across different geographic areas.

Similar issues exist for related “exotic” fixed income securities with highly variable cash flow streams. Among these are collateralized mortgage obligations, and asset backed instruments such as credit card receivable pass-through securities. Due to the highly idiosyncratic nature of the instruments, they have to be analyzed at the security level. An index representation would be clearly insufficient.

We are nearing completion of our work to develop an in-house pre-payment model for the basic mortgages from which these more complex instruments are derived. Once the prepayment model of basic cash flows has been established, Monte Carlo simulation will be used to evaluate the likely evolution of the security through time under various interest rate path scenarios. To facilitate the faster processing the more than one million issues in the US alone, a method called “low discrepancy sequencing” is used to sample the range of possible outcomes over time in a way that is systematic, but produces computational results comparable to true random sequence generation. For a good introduction to these methods see Tan and Boyle (2000).

#### **Directly Owned Real Estate**

Real estate is a particularly difficult challenge because of its lack of liquidity. Typically, even published indices in real estate are based on annual appraisals of large properties, not actual transactions. This lack of transaction based pricing and the long periods between transactions has the statistical effect of smoothing the ups and downs of the real estate market, as compared to the actual but unobservable real market conditions. Traditional real estate indices such as NCREIF typically underestimate the true volatility of real estate, and have a high degree of serial correlation that arises from the smoothing. The problems with real estate measurement are well documented in Graff and Young (1996) and Geltner (1998). Partial solutions to these problems are proposed in Fisher (2000) and Fisher and Geltner (2000).

A few months ago, we did an extensive research project on trying to represent real estate returns and risks as long/short portfolios of traded securities. For example, let's assume we are a pension fund that is trying to evaluate the risks of owning a shopping mall in the UK that has no mortgage financing. We could represent this holding as a “composite asset” consisting of long positions in a portfolio of property companies (REITS in the US) that own shopping malls, a short position in the FT 100 to hedge away most of the stock market influence on the property companies, and short position in bonds (to reflect that our mall is owned free and clear, while those held by the property companies are typically mortgage financed). The idea of measuring real estate returns through a hedged REIT index began with Giliberto (1993), and was put into context of other assets by Liang and Webb (1996). Chatrath (1999) and Clayton and MacKinnon (2001) extended this line of research.

The tricky part of this process was to figure out how big a short position we should take in a broad equity index in order to hedge away the right amount of general stock market influence. Our research suggested that something in the range of 30% was a pretty good figure on average. Determining the short position would have been easier, except the poor measurement of actual real estate returns makes the entire process rather uncertain, as you don't know exactly what you are trying to replicate.

We are currently engaged in a consulting project to develop even more detailed ways of representing real estate within the EE framework. In this method, each leased section of space with a commercial property is represented as a variable stream of cash flows over time, including interruptions for vacancy and tenant default somewhat like a junk bond. Observed rent volatility over time for various property types and geographic locations is also included in this method, as is a provision for representing mortgage financing of properties. Hopefully this methodology will prove very sound, and be made available to all EE clients at some future date.

#### **Hedge Funds**

Hedge funds, like any other portfolio asset, can be easily represented in the EE model if the holdings of the hedge fund are known. Unfortunately, many hedge funds prefer to keep their holdings secret so as to prevent market participants from understanding their intended strategies. A very insightful view of the analytical problems this creates appears in Weisman (2002) that had been previously presented at our client conference at Coronado in 2001.

Again, we have developed methods to work around this difficulty so that hedge fund holdings can be suitably included in the EE system. Our approach is to represent a

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hedge fund with unknown holdings as a composite asset, just like those with known holding. In order to do so, we must come up with our best estimate of the unknown holdings of the hedge fund. To “guess” at the holdings of a hedge fund, we can analyze the past returns of the hedge fund using the method of returns-based style analysis. In such an analysis, we find a weighted portfolio of selected market indices that best replicates the return history of the hedge fund. Since the constituent securities of the indices are known, we can then form a large portfolio consisting of the weighted sum of the all of the index constituents. This portfolio of index constituents will have the same average style loadings over time as the hedge fund, but is apt to consist of a very large number of securities, and hence is much more diversified than a hedge fund is likely to be. The next version of our PACO asset allocation suite will contain two particularly powerful variations on style analysis. The first is the inclusion of confidence intervals on the style weights using the method of Lobosco and diBartolomeo (1997). The second is the use of Kalman filtering that was presented at our Yosemite conference, from Swinkels and Van Der Sluis (2001). This method makes the analysis more responsive changes in the effective asset mix, an important consideration for analyzing hedge funds.

We now turn to our optimization system. We can set the portfolio of index constituents as a benchmark and also as a starting portfolio, but with the provision that the number of securities in the portfolio must be reduced to some finite level (say 100). Once that optimization has been completed, we can compare the expected total volatility of the optimized portfolio to the observed total volatility of the hedge fund. We now repeat this process, varying the number of securities in the optimized portfolio until the ex-ante total volatility of the optimized portfolio equals the historic volatility of the hedge fund.

Our optimized output portfolio will not necessarily have the same securities as the hedge fund, but the optimized portfolio will have style loadings similar to the hedge fund, and will have a level of security diversification comparable to the hedge fund. As such, the holdings of the optimized portfolio will represent our best estimate of the unknowable content of the actual hedge fund portfolio.

### **Private Equity**

For private equity funds, we once again represent the fund position as a composite asset consisting of publicly traded small (and micro-cap) stocks that are similar to the enterprises in which the private equity fund is invested. The lack of liquidity of the private equity fund position can be represented as an increase in asset specific risk at the composite asset level.

We believe this approach provides much more realistic risk estimation than would looking at the historic volatility of a private equity fund index or the observed risk of the private equity fund in question. Like real estate, private equity fund returns are based on appraisals, not actual transactions and are calculated infrequently. Both factors contribute to the smoothing of returns, and a considerable downward bias in the observable volatility.

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## Nick Cutler Joins Northfield

We are pleased to announce that Nick Cutler joined Northfield full-time in July, 2003. Nick has been working with Northfield assisting in the product development side of our business since April, '03 as an outside consultant. Prior to Northfield, Nick was a partner for the last eight years at Darby Overseas Investments, Ltd., ("Darby") a private equity firm based in Washington, DC. Upon the sale of Darby to Franklin-Templeton this past summer, Nick returned to Boston where he had previously worked for Putnam Investments from 1987-1994 in the institutional consultant relations area and before then, the Boston Financial Group, a real estate focused investment bank where he was a member of its capital markets team.

Nick will be wearing a few different hats at Northfield including playing an internal venture capitalist role as it relates to NIS product and/or new business development while also serving as project manager for the NIS consulting group.

Nick has over twenty three years in the investment industry and we all look forward to his contributions to Northfield and our clients as we continue to strive for a reputation of excellence in the money management community.

## Northfield Community Service Activities

If you are a regular listener to National Public Radio, you may be hearing a Northfield "commercial" in early November. The radio spots will air on NPR affiliates. Actually they really aren't commercials but rather are public service announcements that encourage students to stay in school and complete their educations.

Northfield continues to expand its contributions of both money and volunteer time to a number of non-profits organizations. This year we had record participation in our United Way campaign, and our staff volunteered time to help United Way (<http://www.uwmb.org/>) sign on new firms in the Boston area.

As usual, our summer seminar in Newport, Rhode Island was not only educational and fun for our guests, but also raised several thousand dollars in donations for the Pine Street Inn (<http://www.pinestreetinn.org/>), Boston's largest homeless shelter. We are particularly proud of this effort, as much of the funds are donated by seminar attendees to show both their giving spirit and their appreciation of the event.

Another organization for Northfield is a major contributor is the American Computer Foundation ([www.acfdn.org](http://www.acfdn.org/)). The mission of the ACF is to assist grassroots community efforts to build universal computer literacy in our society. In that Northfield and its clients are prime examples of our

computer-driven society, we sometimes forget that a large portion of the general population is still unable to have efficient access to personal computers and the Internet. Among the ACF's most interesting programs is the Charles River Public Internet Center (<http://www.crpic.org>) in Waltham, Massachusetts. The CRPIC is a state-of-the-art public computing facility with a cyber-café, and multiple computer training classrooms. A wide variety of low cost training classes are offered, and the computer labs are available for rental by private firms for doing training events. In a strange twist of fate, the center is located in the original building of the American Manufacturing Company. Founded by the Lowell family, AMC was the vanguard of the industrial revolution in the United States. Its cotton mill was the first firm in the US to pay hourly wages, and to have transferable stock shares.

Other recipients of donations from Northfield include the Inner City Scholarship Fund in Boston (<http://www.csfboston.org>), and Woodbury College of Montpelier, Vermont (<http://www.woodbury-college.edu>).

## Northfield Staff Speaking Engagements

Northfield President Dan diBartolomeo will be speaking at the Factset Portfolio Analytics conference on November 7, 2003 in Torrey Pines California. The topic is "A Risk Model Approach to Everything, Everywhere." For more information, go to <http://www.factset.com/pa2003/index.htm>

On December 3rd, Dan will be speaking at the Boston Economics Club. The topic is "The New Paradigm for Taxable Portfolio Management."

## Tokyo Office Officially Open

We are excited to announce that as of September 2003, our new Tokyo office has officially opened, bolstering our ability to support clients in Australia, Hong Kong, Japan, Singapore, and the rest of the Pacific Rim.

As previously mentioned in *Northfield News*, Nick Wade (formerly Director of Product Development and Consulting) has taken on the new role of Marketing for Asia.

We look forward to being able to better serve our Asia clients with this new office, and trust that you will welcome Nick at your offices soon.

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## Dan diBartolomeo Featured in New Book

Northfield president Dan diBartolomeo wrote a chapter, on the management of taxable portfolios for the new book "Advances in Portfolio Construction and Implementation."

The book was published by Butterworth-Heinemann of Oxford, England. It was edited by Professor Steven Satchell of Trinity College, Cambridge University, and Northfield client Alan Scowcroft of UBS Warburg.

## Northfield Partnership Activities

### Instinet

Northfield has formed an alliance with Instinet, the world's largest electronic agency broker, to provide trading desks at large investment managers and hedge funds with tools for risk measurement, hedging, trade prioritization and trade scheduling through Instinet's Newport trading platform. These tools will assist traders in better managing the risks and reducing the trading costs of their open orders. The Newport trading platform is a web based system that provides real time status of orders and executions routed through it's own and other electronic crossing networks. <http://www.instinet.com>

### Haugen Custom Financial Systems

Northfield has signed an agreement with Haugen Custom Financial Systems to jointly market both Northfield tools and Haugen's expected return factor modeling expertise. Haugen Custom Financial Systems has provided alphas to money managers since 1997. We believe that Haugen's alpha modeling compliments our existing portfolio construction and risk management tools. <http://www.newfinance.com>

### Factset Research Systems

Factset Research Systems is now offering Northfield's Run0 risk and performance attribution using Northfield risk models through their Portfolio Analytics offering. This offering is available separately from the Northfield optimizer on Factset or as an add-on at a lower price point for those clients who also subscribe to the Northfield optimizer on Factset. The expansion of Northfield functionality on Factset gives large managers the ability to better control costs by providing only the appropriate portfolio analytic services required to each of the various functional parts of their organization. <http://www.factset.com>

## Client Services Upgrades

The Northfield website (<http://www.northinfo.com>) is being substantially upgraded. Most important is the installation of a new search engine so that users can search through all of our online content including research papers, product documents and conference proceedings. We

are also adding more online content including past conference proceedings back to 1989 and a "frequently asked question" section. The staff contact information and biographies are also being reorganized to make it easier to identify the right staff member to help with any particular situation.

As there are now Northfield clients in nearly twenty countries around the world, we are making provisions for the potential need for our sales and support staffs to communicate in languages other than English. Northfield has arranged to have "on-call" interpreters available to our staff via conference call, twenty-four hours a day, seven days a week. The system will go into effect on New Years Day. While the interpreters cannot be expected to be familiar with specialized vocabulary of quantitative portfolio management, we do believe this capability will be of great help in many client service situations.

## Northfield's Global Expansion Continues

Over the past two years, Northfield has experienced continued growth in our client base in both the US and Europe. With the opening of our London office in August 2001, and the official opening of our Tokyo office in September 2003, Northfield now has offices on 3 continents, with clients spread out over five continents in nearly 20 different countries.

Our client list now totals 148 companies with many having multiple user licenses. Clients range from small startups, to the largest asset management firms in the world. Of the 500 largest asset management firms in the US, 62 are current clients giving Northfield a total market penetration of 12% in these firms. 27 of these clients fall within the largest 100.

## 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 9th., 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 Back Bay Chorale, a prominent Boston choir.

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).

## Technical Support Tip: Extracting Output Reports from the Optimizer

By Jennifer Gerber and Howard Hoffman

There are various ways in which Northfield Portfolio Optimizer Users can save and view output reports in other programs. Below are the options and instructions on how to perform each. Saving output files does not save project files. If you have made any changes to a project file then you will need to save the project file by clicking on File > Save Project As...

Users can copy output from the Output Tables tab and paste it into another program. After a Run0 or Run has been completed, simply click on Output Tables to view the reports and select the one you wish to copy. The first step is to change the file format from TEXT to TAB. Next click on the [‘Copy Table’ button](#) and then paste the copied table into the program of your choice. Please note that you must have the program you want to copy into open prior to copying information from the Optimizer.



A second way to get output information into another program is to have the Optimizer automatically save the information after a Run is complete. This option will allow you to save all of the files or a selection of files to a specific directory with file names determined by the user. To set up the automatic saving click on the Output Tables tab and set a Default Path where the output files will be saved. Next, set file names for the reports you would like to save and change the file format to CSV. Users can either give each report a unique file name or the user can give each report the same file name. The latter option will produce one file which will contain all the reports in which the file name was typed.

If you have already completed a run and wish to save multiple files, you can perform all the steps mentioned above and then click on the [‘Save Output Tables’](#) button located near the top of the



Optimizer window. If you want to save only one file then click on the [‘Save Table’](#) button located directly above the report. Be sure to set a Default Path where all the files will be saved.



Finally, if you are using Nisbatch then you will need to edit your project file manually. Open the project file in Notepad or some other text editor and search for the section labeled “[OPTLIB: Output Files Additional Specifications]” and “[OPTLIB: Debug log section Additional Specifications]”. At the end of each line you will see “No, No, No”, the middle “No” corresponds to ‘Save After Run’ and should be changed to “Yes” in order to automatically save files after a run. The following is an example of what to look for and what to change:

[OPTLIB: Output Files Additional Specifications]  
Optimal portfolio=CSV,Portrait,9,No,**No**,No

Change To:

Optimal portfolio=CSV,Portrait,9,No,**Yes**,No

For further inquiries, a Technical Support Representative can be reached between the hours of 8am to 6:30pm EST-Monday through Friday. To contact Technical Support, please send e-mails to [support@northinfo.com](mailto:support@northinfo.com) or call (617) 208-2080.

European clients can contact Christine Milne in our London office, [christine@northinfo-europe.com](mailto:christine@northinfo-europe.com) +44 (0)20 7801 6260.

**If you have any suggestions of what you would like to see covered in upcoming issues, please e-mail your ideas to [staff@northinfo.com](mailto:staff@northinfo.com)**

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