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Northfield News

Quarterly Newsletter for the Friends and Clients of Northfield Information Services

Inside this Issue

- ▶ **In Depth Article - Northfield and the High Net-Worth Investor**
- ▶ **Tech Support Tip: Concentrated Position Portfolios**
- ▶ **Asia Seminars Wrap-up**
- ▶ **Northfield Staff Speaking Engagements**
- ▶ **Dan diBartolomeo's Recent Publications**

Special points of Interest:

- ▶ **Northfield Product Updates**
- ▶ **Northfield Partner Update**
- ▶ **Northfield Community Activities**
- ▶ **Northfield Exhibiting at the MMI Convention**
- ▶ **Prof. Paul Bolster Joins Northfield**

Northfield and the High Net-Worth Investor

By **Dan diBartolomeo**

Over the years, Northfield has been on the forefront of both methodology and technology appropriate to asset management for high net-worth individuals. The issue of high net-worth investing was included on the agenda at our very first client conference (Venice Italy, 1989). In 1996, we introduced the first commercially available tax-sensitive portfolio optimization.

A new book on wealth management authored by Dan diBartolomeo, Jarrod Wilcox and Jeffrey Horvitz is now in print and will soon be available from the CFA Institute. Originally commissioned by the CFA Research Foundation in 2004, *Investment Management for Private, Taxable Wealth* is a comprehensive treatment of the complex issues of asset management for individuals. Portions of the book are being reviewed as curriculum material for future CFA examinations.

We encourage our clients to read the entire book. A summary of the book was presented at our 2005 client conference at Montebello, Canada. The entire presentation can be downloaded from our website at: <http://www.northinfo.com/documents/186.pdf>.

The book's chapters cover topics such as:

- The challenge of private clients
- Finance theory and the private investor
- Changing preference functions through the life cycle
- Lifestyle and wealth transfer considerations in asset class selection
- Overview of taxation of investments
- Techniques for improving after-tax performance
- Key differences between managing institutional assets and high net worth clients
- Portfolio management as a manufacturing exercise
- Integration of tax deferred (i.e. retirement plans) and taxed assets
- Dealing with concentrated positions

A lot of good theory and "best practices" have been developed in recent years on how to manage taxable private clients, and these are detailed within the book. The book also demonstrates that the correct asset allocation and security portfolio strategies can reliably obtain economically substantial "tax alpha."

(Continued on page 5)

Asia Seminars Wrap-up

November 2005 • Tokyo, Hong Kong and Sydney

In November, we hosted our annual Asia Seminar Series, with three highly successful events in Tokyo, Sydney and Hong Kong. The seminars showcased our research on key topics in investment and risk management to our growing family of Australian and Far Eastern clients and prospects and broadened awareness of the range and depth of Northfield products, services, and research.

The presentations were given by Northfield President Dan diBartolomeo and Northfield's Asia Marketing Director Nick Wade. Topics included: "Risk Factors, Models and Techniques," "Optimal Algorithmic Trading," "Active Returns through Passive Management: Portfolio Formation through Cointegration," "Estimation Error in Portfolio Optimization" and "A New and Unified Method for Evaluating and Monitoring Managers."

We plan to host a similar series of events on an annual or more frequent basis with the same Northfield signature format; a relaxed and informal series of topical and detailed presentations encouraging lively discussion in a relaxing venue accompanied by excellent food and wine. To request seminar proceedings, send an e-mail to staff@northinfo.com.

Dan diBartolomeo's Recent Publications

Northfield President Dan diBartolomeo published "The KLD Catholic Values 400 Index" in the Fall 2005 issue of the Journal of Investing. This work was co-authored with Lloyd Kurtz. The article compares the relative performance of the Catholic Values 400 index over the period from inception (5/31/1998 through 12/31/2004). The research found no statistically significant differences in performance. This indicates that the investment restrictions on US stock market investing employed by most Catholic church related organizations do not represent a meaningful impediment to performance.

Dan also wrote a chapter for an upcoming book entitled "Life-cycle Funds: Investment Policy, Portfolio Construction and Rebalancing, Risk and Performance Measurement." This will appear in a forthcoming textbook title "Portfolio Analysis: Advanced Topics in Performance Measurement, Risk and Attribution." The book is being edited by Tim Ryan and is being published by UK publisher RiskBooks.

Dan's two part article on Northfield's real estate models titled "A New Approach to Real Estate Risk" appeared in The Institutional Real Estate Letter. The first part was co-authored with Rick Gold and appeared in the September 2005 issue. The second part was co-authored with Rick Gold and Ken Baldwin, appeared in the November 2005 issue. Dan also presented a more formal related paper at the Southern Finance Association meeting in Key West, Florida in November.

To summarize the article, directly owned real estate has gotten little respect from institutional portfolio managers despite its generally strong performance in recent years. Burdened by lack of liquidity, and the absence of a trusted benchmark, institutional investors tend to discount the role of real property in a mixed asset class portfolio. The paper covered a new analytical method that treats each real estate property as a portfolio of synthetic liquid securities. These synthetic securities are fashioned to represent cash flows from leases, cash outflows for financing, lease defaults, inflation and variations in rent levels across property types and geographic markets. In that each synthetic security has a publicly traded cohort (e.g. cash flows from a tenant lease could be viewed as an extendable corporate bond), this approach can be used to integrate real estate risk into the current enterprise-wide risk frameworks of large investment institutions. An empirical case demonstrating preliminary application of the method to a portfolio over fifty large real estate properties concludes the paper. The paper has been posted to <http://www.northinfo.com/documents/191.pdf>.

Professor Paul Bolster Joins Northfield

Professor Paul Bolster, chairman of the finance department at Northeastern University in Boston, has joined Northfield as "academic in residence" during his 2006 sabbatical. Dr. Bolster has been extensively published in investment finance, and is a leading researcher in the application of the Analytic Hierarchy Process to investment decision making.

Technical Support Tip: Concentrated Position Portfolios

By Howard Hoffman

A concentrated position portfolio is a portfolio with a large weight in a few securities. In the case where a client wants to reduce the large positions, usually no special action needs to be taken. The optimizer will want to reduce the position to reduce risk. However, in a tax-aware optimization, some constraints must be chosen carefully.

In a recent case, we had a starting portfolio of roughly \$1 Million, with a large concentration in one security (roughly 25%), a tracking error of about 8 and a "max capital gain" limit of \$20,000. The ultimate objective was to lower the risk of the portfolio down to about 4 (typical for an actively managed US equity account). When we ran this setup, the optimizer kept bumping up against the "max capital gain" constraint and would not reduce the concentrated position. We investigated why this was.

Let's start the analysis assuming that the investor is comfortable with a risk level of 8, and see if the \$20,000 capital gain limit makes sense. A risk level of 8 implies a RAP level of approximately 48 (see Optimizer FAQ section for the details of this).

$$U = R - (TE^2/RAP) - (C * A)$$

Where

U is the utility

R is the benchmark relative return

TE is the tracking error

RAP is risk acceptance parameter

C is current costs

A is the rate of amortization of the costs

In this case, all values of R are zero, and A = 100% or 1.

At a TE of 8, we have a tracking variance of 64, so the risk penalty (middle term in the objective function) is 64/48 or 1.33%. If we lower the TE to 4, we have a tracking variance of 16, so the risk penalty is 16/48 or .33%. So reducing the risk of the portfolio is the equivalent of about 1% return. On a \$1M portfolio, 1% is \$10000. So we should be willing to pay \$10000 (in taxes or trading costs) to get that much risk reduction. At a 20% capital gain tax rate, this is the equivalent of \$50,000 in net long term capital gains.

The \$50,000 figure is really the absolute minimum value of

Open Optimizer Penalties Window

capital gains we should be willing to take. In reality, we should be willing to take a lot more. This is because if we pay the taxes now, they are over and done with (our cost basis steps up to the purchase price of whatever we buy with the proceeds of these sales). On the other hand if we defer the taxes, we don't actually avoid paying the taxes permanently (unless you get stepped up basis by dying). While deferring the taxes to a later date has economic value, it's clearly not as valuable as avoiding the tax altogether. So if the risk reduction is worth taking \$50,000 in gains, the risk reduction is certainly worth a lot more than deferring \$50,000 of gains to a later date.

The problem is even worse if we assume that the investor is so risk averse that we need to get the risk level down to a TE of 4. This implies a RAP of 24, so the risk penalty at 8 TE is 64/24 or 2.67%. At a TE of 4, we get 16/24 or .67%. At this RAP, the risk reduction is worth about 2% per year, or \$20,000 in taxes paid. So we should be willing to take at least \$100K in capital gains for this much risk reduction. Given the above argument about the relative value of taxes deferred as compared to taxes paid, it's conceivable that this investor should be willing to take something like \$200K in capital gains to achieve the risk reduction.

(Continued on page 4)

(Tech Support tip, continued from page 3)

The problem just doesn't make sense. If the investor is really this risk averse, the potential reductions in risk are worth paying five or ten times as much in taxes as is allowed in the Max Capital Gain constraint of \$20K.

We did the analysis with TE to the benchmark as the risk measure. We'd get an entirely different answer if we used absolute volatility to cash. This actually makes for a cleaner analysis, as taxes are charged against absolute gains, not index relative gains.

The reality is probably that the investor cares about both absolute return and index relative return. We can easily accommodate that by using a benchmark that is a mixture of the regular benchmark (S&P 500) and cash. Presumably, the manager cares more about TE, because it's indicative of their risk of underperforming the benchmark (i.e. being fired as managers). It's exactly these kinds of conflicting preferences that can cause this kind of irrational problem.

Here's another support tip for these types of problems. An optimization is done in steps or iterations. Each iteration is a swap between two securities that increases utility. The swap size is determined by an algorithm in the optimizer. However in a concentrated portfolio problem, it is some times advantageous to reduce the swap size so that the optimization takes finer steps. This can be done by turning on non-linear transaction costs, turning off the cross market impact and then pressing shift+F10. Choose the second choice and reduce the Y value. Now join and run the problem.

The Northfield Technical Support Staff is always available to answer any questions. To contact Technical Support in Boston send your e-mails to support@northinfo.com or call 617-208-2080 between the hours of 8am and 6:30pm EST Monday through Friday.

European clients can contact Christine Milne in the London office by sending e-mail to christine@northinfo-europe.com or call +44-(0)-20-7801-6250.

For Asian and Australian clients, contact Nick Wade, nick@northinfo.com, +81.3.5403.4655.

Northfield in the Community

Participation in civic, academic and charitable community affairs should be an important part of the activities of any company. At Northfield, we are very proud of the way in which both the firm as an entity, our employees as individuals do many things that make our communities a better place to live, and to help those in our society that are less fortunate.

The first aspect of our support of good works is direct financial support. The firm's financial contributions to a wide variety of charitable efforts was approximately 1% of the firm's revenues in 2005. Our largest single support recipient was the American Computer Foundation, an organization that provides computer literacy education and job training to economically disadvantaged individuals in the Boston area. We think the ACF's mission is of particular interest, given the tremendous positive impact that computers have brought to the area of quantitative finance through which we all earn our livelihood.

The second part of our community support arises in the form of seminars that we run for our clients and other interested persons. While the seminars and the related activities are provided free of charge, we ask that attendees make donations of their choosing to a designated charity. Many thousands of dollars have been donated by our clients to organizations such as Boston's largest homeless shelter, The Pine Street Inn, and to The Prince's Trust in the UK.

Another aspect of this process is the support of broad community support agencies such as the United Way. It is pleasing to note that there is essentially 100% participation in support of United Way among our US staff. Northfield also maintains significant support for the academic finance community by providing free use of our software and data to many college programs, as well as sponsorship of events at schools such as Boston University and MIT. In 2006, we will be co-sponsor with UBS of a lecture series at The London School of Economics.

Finally, we remain acutely interested in the issues of social responsibility for the investment community. Our president, Dan diBartolomeo, has published several papers on SRI, including a recent article in the Journal of Investing on the impact of investment restrictions imposed by the Catholic church on its investment activities. Dan continues to serve as a judge for the Moscowitz Prize. This prize is awarded through the University of California, Berkeley for outstanding papers related to socially responsible investing.

(High Net Worth Investors, Continued from page 1)

One of the key conclusions of the book is that good asset management for high net worth individuals requires lots of intellectual effort on the defining client needs and preferences, as well as investment market opportunities. Another key conclusion is that the heterogeneity of private clients can be cost effectively handled through the “portfolio manufacturing” paradigm in which automated (and therefore cost efficient) analytical methods are used to customize each client’s portfolio to their specific needs.

Many of the “best practices” and analytical techniques covered in the book have been incorporated into Northfield’s MARS software platform that was co-developed with SoftPak Financial Systems (<http://www.softpak.com/>). The MARS environment allows asset managers to efficiently handle many thousands of taxable accounts in a customized fashion, allowing for the heterogeneity of tax circumstances and personal preferences that make wealth management such a challenge. MARS has now been implemented at a significant number of major wealth management organizations. For clients preferring an ASP solution to improve their operations, Northfield’s risk and tax optimization technology has also been incorporated into the INVESTEDGE (<http://www.investedge.com/>) wealth management platform.

While many firms have a long history in wealth management, many investment firms that are now providing services to high net-worth individuals have a primarily institutional background. Here are a few key considerations for institutional firms that are undertaking private client assignments:

- Private client objectives are not easily summarized in conventional benchmark indices. What is the economic meaning of “after-tax” tracking error? “Suitability” means as much as optimality.
- Taxes are a key driver. Use effective tax rates for asset allocation decisions. Run security portfolios with tax-efficiency in mind. Tax “alpha” is real, consistently available and large (30 to 100 bps).
- Asset managers have a fiduciary duty to advise clients sensibly. What’s your realistic expectation of your active management alpha after taxes? If it’s negative, passive management is the way to go.
- The volatility of after tax returns is reduced proportionately to the effective tax rate

- Performance measurement of taxable accounts is problematic. CFA standards require that if you report after-tax returns you have to count tax payments as costs, and changes in contingent tax liabilities ought be communicated to clients. Some people advocate “full liquidation” performance calculations. After-tax return is the percentage change of periodic after-tax liquidation value.
- Risk management policies matter even more for taxable investors. It can be very expensive to revise asset allocations.
- Private clients often have large concentrated positions as a result of inheritance or business ownerships. Any transition strategy must weigh taxes carefully against the improved compounding through lower risk.
- Private clients care a lot about absolute return and risk. You need cash for spending. Taxes are levied on absolute profits, not index relative profits.
- Operating in the wealth management arena is especially challenging because it not only requires dealing a broad range of heterogeneous client needs, but often doing so in massive scale for thousands of accounts. To aid in organize such processes efficiently, many firms are embracing the concepts of “portfolio manufacturing.”
- “Mass customization” is the key to managing large volumes of high net worth clients. Separate the investment process into three distinct roles. Client relationship to define client needs and wants. Investment research and formulating “best ideas” investment models is a different role. A third separate role is the adaptation of “best idea models” to individual client needs. This is the usual bottleneck for large volumes, but it can now be effectively automated.
- Most firms do a poor job with private client accounts. Taxes are often ignored, or treated as a last minute after-thought. Or they use taxes as an excuse to do “pseudo passive” management at active management fees.
- Using “tax aware optimization” to index track the “best ideas” model portfolios to different clients. Adjust alphas to reflect expected after-tax dividend stream. Treat capital gain taxes as big transaction costs. Amortize taxes to reflect portfolio turnover, compounding value of tax deferral, and likelihood of stepped up cost basis.

(Continued on page 6)

(Continued from page 5)

- Consider realistic client preferences. Adjust risk aversion to absolute and index relative risks. Adapt number of stock names to different portfolio sizes. Build in compliance constraints such as social responsibility restrictions.
- Exploring the tax/risk efficient frontier to maximize long term wealth accumulation for transition of legacy portfolios.
- Emphasize tax aware strategies. Value strategies sell what went up. Bad for taxes compared to momentum strategies at the same turnover. Quant strategies are more flexible than bottom up stock picks. Stock universes with higher cross-sectional dispersion (e.g. small cap) increase the value of the tax deferral option.
- You can “manufacture” some very sophisticated cases. Offsetting capital gains and losses across asset classes. Provide a “tax efficiency overlay” service for clients with external managers, even finding the *globally optimal solution* across the multiple portfolios of an entire family, each with its own tax circumstances and constraints.
- You can also use the manufacturing paradigm to help marketing with “what if” examples with prospective clients with legacy portfolios. It also allows for cost effectively managing smaller accounts to broaden client basis and handle small accounts of big clients.
- Portfolio manufacturing is a win-win. Better investment results for the clients and lower operating costs for the asset management firm.

Northfield Exhibiting at the MMI Show

Northfield will be exhibiting the Managed Accounts Rebalancing System (MARS), at the upcoming MMI Annual Convention in Boston, March 15-16, 2006. Visit <http://www.moneyinstitute.com> for more information.

Northfield Partner Update

DSTi

Northfield signed an agreement with DST International Limited, a global financial services software company, to initially provide use of Northfield’s risk models within DSTi’s HiRisk powered by Askari enterprise risk management system that is marketed to asset managers, trading and securities lending clients globally. Trading risk is about avoiding disasters on a daily basis; management of the absolute risk of both the firm’s money and the trades of their clients. Asset managers on the other hand need to understand their risks in order to build a sound strategy for accumulating wealth for their clients and are normally evaluated on their performance relative to a benchmark over a longer time horizon. Use of Northfield’s multi-factor risk models when combined with DSTi’s simulation based risk analytics will provide a suite of best practices for risk management as well as allowing portfolio managers and risk personnel to view risk in the same way. These features will better position DSTi’s enterprise risk offering to the asset management community. This initial integration effort will also provide a springboard for integration of other Northfield portfolio analytics within other DSTi products as the relationship evolves and gives Northfield a presence in the enterprise risk space. Please contact DSTi at www.dstina.com for more details.

New Frontier Advisors

Northfield and New Frontier Advisors, LLC have signed an agreement that gives New Frontier Advisors the ability to market Northfield’s risk models to New Frontier Advisors’ clients for use within New Frontier Advisors suite of portfolio tools. Please contact New Frontier Advisors at www.newfrontieradvisors.com for more information.

Northfield Staff Speaking Engagements

Dan diBartolomeo will be speaking at the FRA Performance Measurement Conference, Amelia Island, Florida March 20-22. Dan will be making two presentations at the event. The first on Northfield’s approach to evaluating and Monitoring of Active Managers (see article in our October 2005 newsletter, <http://www.northinfo.com/documents/190.pdf>). The other presentation will be "The Effect of Skew and Kurtosis on Performance Evaluation of Hedge Funds."

Dan will be speaking on April 7th at the CFA Institute Annual Asset Allocation Conference in Marina Del Ray California. The topic is "Portfolio Construction for High Net-Worth Investors."

Northfield Product Updates

Northfield Optimizer

The "Rounding to Round Lots" function for trades has been improved. The amount of cash left over after rounding has been dramatically reduced for small accounts. The new rounding procedure is controlled by a check box, so that users can still use the old process, if they prefer. However, in the near future, the Optimizer will be set to use the new methods by default. The user also has more flexibility as to whether to reserve (or not) cash to cover the outlays for transaction costs and taxes arising out of an optimization. We have added two important new capabilities to the Optimizer. The first is to allow the use of "flat ticket charge" transaction costs. Ticket charges are in addition to whatever other transaction costs may be specified. Another new capability is a "Maximum Number of Trades" parameter within an optimization.

There have been a number of other improvements to the Optimizer in the recent past of which users should take note. The speed of optimization has been improved for highly constrained problems. In addition, there have been improvements in some reports to make them more readable. The implementation of a revised methodology for addressing estimation error in optimization that has been previously announced to Optimizer clients is progressing well.

Performance Attribution

There will be two very important functional enhancements in the next upcoming release of the Performance Attribution system. The largest enhancement, the availability of multi-currency reporting for international portfolios has been under development for nearly a year. The user will be able to select the base currency of the investor from whom returns are being attributed. Various aspects of the system's reports are now provided in the investor's base currency or in local currency terms, or both. Coverage of possible investor base currencies parallels the Open Optimizer. In order to accommodate this change, the returns on risk free assets in the various currencies are now included in the security return file, rather than in the "distributional parameter file" where the local risk free rate had previously been reported. We believe the availability of multi-currency reporting is a major step forward in providing a complete attribution solution to our equity clients as the system is now compatible with full range of Northfield equity risk models around the world.

The second change in the Performance Attribution system is a change that provides more efficient handling of secu-

rity identifier changes within a return period. The file that contains security return information for each period has been expanded to include both current security identifier for security, and the identifier that was in force in the prior period for that same security. The application software has been changed to accommodate this additional information. This change will dramatically reduce the occurrence of a security being dropped out of the analysis (i.e. a data "exception") due to an identifier changes within a return period.

Over the months ahead, a new presentation quality set of both tabular and graphical reports will become available in the Performance system. The new reporting module will also make it more convenient for users to create custom reports.

ART

The Allocation Research Toolkit saw numerous changes during the last quarter. The important functional change is that the operation of the system is no longer in a client-server structure. All data for ART now resides at the client site but can be refreshed upon demand using Northfield's Live Update function. This change increases system reliability, eases use of the system for mobile computing and increases data access speeds.

The amount and variety of market index data in ART has been improved. The old Salomon Smith Barney global indices have been renamed the S&P/Citi indices. These indices are float weights, and are broken into Broad, Primary and Extended indices that account for 100%, 80% and 20% of the appropriate float in each index. These indices also include the S&P Global index that is the most comprehensive equity index, since it includes both small cap and emerging market equities. For many asset allocation problems, this index's comprehensiveness makes it part of an appropriate market index. The S&P/Citi indices include both growth and value subindices that can be useful for estimating the tilts of international and global equity managers. We include growth and value indices for the primary, extended and broad market of all of the major regions of the world. Another addition from S&P are their indicative and finalized Hedge Fund indices. Other additions to the index database include the Fama-French style and size indices, the Cambridge Associates private and venture capital indices, the NCREIF property index, and the Morningstar equity indices including growth, value, core and blend for small, mid, large and blend market capitalization. Fixed income data series have also increased with the including of Citigroup bond indices (both with and without currency hedging) for many countries, regions, duration ranges and levels of credit quality. Other fixed

(Continued from page 7)

income indices have been added from JP Morgan, Lehman, Merrill Lynch, and UBS.

Ease of use of the data browser has been improved with a find feature that can locate the next occurrence of a fund name or ticker. To make the search more flexible, we include the use of a wildcard. If the user doesn't know which sector has the fund, it is possible to search all of the sectors. In addition the find feature can use a pattern mask. For example, if you only want to see class A shares of Fidelity Advisor funds, you use a mask such as "Fid*Ad*/A."

We also added the construct of a "compound fund" to ART. For currency hedging or creating a benchmark portfolio, you may want to combine a number of funds into a compound fund, which is rebalanced to the assigned weights. To reduce the amount of head math, one fund can be assigned as the collector asset and its weight will be updated to ensure all the weights add to 100. To make it easy to browse to select funds for the compound fund, we can now show both the Browser and the System files sections of the Browser at the same time, which allows you to drag and drop funds from the Browser to the compound asset window area.

The optimization portion of ART was upgraded in several ways. First is the inclusion of historic, expected and adjusted returns. Adjusted returns apply both Bayes-Stein shrinkage estimators and applicable taxes (for taxable funds in taxable accounts). The other functional enhancement is extended ability to use leverage and short positions to accommodate currency hedging and long/short strategies. You can also now rearrange the main table more easily.

The style analysis and CUSUM functions have also been enhanced. If you supply a benchmark, you can run only the CUSUM without style analysis. This speeds the results for numerous funds. If you set the rolling period parameter to zero, the style analysis only estimates the entire period specified. A summary report contains the style weights, confidence intervals and CUSUM statistics for all the funds analyzed. The summary report, if used on a peer group, can be used to compute the Precision Weighted returns discussed in our last newsletter – this feature is coming soon.

Live Update

Our "Live Update" system is now fully functional and in widespread use. Live Update will gradually be expanded to keep both software applications and data fully up to date at all times, without any effort on behalf of our users. In ad-

dition to keeping both data and software up to date for the Open Optimizer, the Live Update function is now the primary method of data delivery for our ART application. Live Update functionality will also be added to our Performance Attribution System in the months ahead. All clients are strongly encouraged to use Live Update and to consult with their IT departments if necessary so that any firewall issues relating to the use of Live Update may be resolved efficiently.

Risk Models

Several developments with our Risk Models will be taking effect with the February 2006 (January data) update.

We will be providing files which support using Sedols as IDs for both the Optimizer and Performance Attribution system for the Fundamental, APT, Global and US Single country models. Previously, US equities could only be identified by ticker symbol or CUSIP.

The return files for all the models will support symbol bridging, meaning they will have an extra column for the ID used in the previous month in case the ID changed other wise they will have the ID used for the current month. Please note that this is a format change where an extra column is being added to the return files. This development will reduce a lot of exceptions generated while running Northfield's Performance Attribution Software. A complete set of historical files will be available by February end.

The return files for all the models will also include the risk free rate of the base currency using *\$\$\$ as the ID.

For our Global model, where we have the option to use other currencies as base, we will provide risk free rates for alternative currencies as well, namely (CAD, GBP, EUR, AUD, JPY).

The factor return files (_dpf files) will no longer include the risk free rate line. Please note that this is also a format change. The factor return files will now strictly correspond to the model files (.mdl)

We will be providing global split files for sedol, tickers and cusips to be used with our global, regional and single country models for our performance attribution system.

In order to avoid any duplicates and adhere to the ISO country code scheme in both ticker and cusip files for our global, regional and single country models, there will be ID changes for countries, and selected bond indices.

(Continued on page 9)

(Product Updates, Continued from page 8)

For backward compatibility, Northfield had been providing its own set of currency codes in the Global Model Data files, in addition to the ISO based currency codes. These Northfield assigned currency codes will no longer appear in the Global Model data files. Going forward, the ISO based currency codes will be the only currency codes that will appear in the Global Model data files. For example Australian Dollar appeared twice as *AUD (ISO) and as *AU\$ (Northfield) in the Global Model data files. From now on it will only appear once with the code *AUD.

The total risk column reported in the data file did not include the Parkinson Adjustment to Residuals. Hence, in very few cases where the Parkinson Adjustment was very large, the reported residuals were greater than the total risk of the security. This practice has changed now. The new reported total risk numbers will include Parkinson Adjustment.

Please note that above risk model developments are mainly cosmetic and do not affect in any way the analytics of the models. They incorporate feedback provided by many of our clients.

Everything Everywhere Risk Model

In an effort to ensure the highest analytical value, intuitiveness, and usability of our balanced portfolio risk model, we have reviewed some of the aspects of the EE model concerning model structure, input data, and security identification.

From an analytical standpoint, the essence of the changes is twofold: model structure changes relate to the way term structure risk is parameterized for fixed income instruments, while, ongoing input data utilization enhancement have a bearing on credit spread component of bond risk. From an operational perspective, we will revise the standard security ID types that we will utilize with model data to make it more practical to users. The changes are planned to take effect with the model update scheduled for April 30th, 2006. Below is a detailed description of the scope of modifications, that is aimed at giving users a thorough understanding of the nature and effects of the changes, as well as providing the basis for adjustments of technological systems and utilities residing at client's site that may be dependent on the output of EE model.

Term Structure of Interest Rates

Since the first prototype of the EE model was distributed 5 years ago, we have consistently followed two objectives. First, build a representation of security risk inherent in balanced (and henceforth fixed income portfolios) that is a true and logical description to the economics drivers of

significance to security risk and return. Second, utilize a framework that would make this representation as intuitive to users as possible, drawing on concepts close to investment managers, so that the model output is a practical and efficient aide to decision making. In view of these guidelines, we have come to the conclusion that a revision is necessary in the way the term structure of interest rates is represented in the model.

To review, the current representation is as follows:

$$y = a + b \cdot T + c \cdot (\sqrt{T})$$

where:

y – yield of bond – zero coupon, or boot-strapped
T – time to maturity
a, b, c – coefficients

The three coefficients are found by fitting the available yields from the points on the raw term structure of interest rates to the respective maturity horizons through a multivariate regression. In effect, these three coefficients become the parameters—unique descriptors of the term structure.

The relation of the parameters to the actual term structure factors of the model is simple. The interest rate factors for bond risk known as “shift”, “twist”, and “butterfly” are the absolute changes over a certain period of time of respectively the a, b, and c coefficient.

While the above representation has proved to be a good estimator of overall bond risk, it posed some questions of intuition. They stem primarily from the fact that the concepts twist (increase of slope) and butterfly (increase of curvature) are visual rather than defined with mathematical precision for a curve on an interval. As such they are open to subjective interpretation. Consequently, bond risk contributions can vary according to how the twist and butterfly factors are defined in different models.

As much as the interpretation of these elements of term structure of interest rates is subjective, there is a prevailing opinion that the primary contributor to a bond's risky return are changes in level (shift), followed in impact by changes in slope (twist), and lastly followed in significance by changes in curvature (butterfly). This view was formed through the application key-rate (rather than curve parameterization) approaches to model the term structure.

Key-rate approaches have serious limitations in the application to bond risk universally, but it is clearly more challenging to devise a curve parameter model that would ren-

(Continued on page 10)

(Product Updates, Continued from page 9)

der the same intuition. Yet, we have found that the following modified term structure polynomial is a matching incorporation of the shift/twist/butterfly risk contribution rule:

$$y = a + b \cdot (T - P) + c \cdot (T - P)^2$$

where P is a “pivot” maturity horizon.

The introduction of the pivot point serves as the event horizon around which non-parallel curve movements predominantly occur. Both the pivot point and the replacement of the square root function with a squared term function offer some incremental benefits in the goodness of fit of raw bond yield data.

Empirically, we have determined with historical treasury yield data that a value of P close to 7 years produces very good results in terms of rendering the appropriate risk decomposition. That is reproducing a representation of the shift, twist, and butterfly factor effects, which is more comfortably founded in the intuition of the bond-investing professionals.

In summary, we should stress, as it should have transpired, that the new term structure polynomial would not have a significant impact on the aggregate of bond interest rate risk, but rather on the rendition of its breakdown into comprising parts that is more intuitive and actionable for investment managers. We have also found the new curve polynomial results in slightly better fit of raw bond yield data, which while having only a marginal effect on the total risk numbers, would make them better honed estimates to those obtained in the current framework.

Credit Spread Risk Input Data

In an initiative to parallel the improvements on the term structure segment of the model, we have revised the utilization of input data on which the credit spread component of risk is based. It comprises the simultaneous incorporation of new bond pricing data sources and better filters for inadequate input data.

One of the basic limitations of information available to bond investors is that, unlike equity securities, the majority of bond issues out of a global universe have pricing data, which is not a result of active trading, but rather an estimate through various external pricing models and services. Such third party functionality attempts to incorporate default risk as well as optionality in a fashion that is by definition non-uniform and unstandardized. This exposes any subsequent analysis that is based on such data to various kinds of shortcomings, including model risk. To make matters more challenging, outliers in credit spreads do exist

even for actively traded issues within the same geographic area, industry belonging, and agency rating band.

In the framework of the Everything Everywhere model, we are doubly cautious to such input data challenges. The EE model uses bonds’ Option Adjusted Spread (OAS) time series in conjunction with effective duration to capture the risk to bond investors arising from credit spreads changing. Any factor that would unduly affect the quality of the credit spread time series data would pose the risk that the quality of the credit risk regressions will be affected.

To counter the possibility of such problems, some time ago we fine-tuned our outlier OAS filtering procedures. The focus of this was the replacement of the duration-weighted mean as the OAS central tendency measure for a rating-sector-region bond bucket at a point in time, with the median OAS value for the same bucket. Clearly, this has been done to reduce the effect of outliers within a bond bucket. Additionally, protocols were implemented to eliminate bucket constituents that were not consistent with a normal pattern of credit spread across bond buckets of different credit ratings with the same industry and regional belonging.

Since then the initiative at data quality has become twofold. We have obtained historical price time series from a data source with paramount reputation in the area - Reuters Bond Bridge service - that complements the input data that we already obtain from our current data vendors. With the combined utilization of all bond price data sources, we have performed a recalculation of OAS time series that resulted in smoother data sets per rating-sector-region band.

The new dataset has also added several buckets that comprise solely of issues of sovereign debt of countries issued in the country’s own currency. Such buckets are introduced for issues denominated in USD, GBP, CHF, JPY, and EUR. It is understandable that a sovereign government has different levers at its disposal to effect a repayment of debt denominated in its own currency rather than debt denominated in another one, and as such these debt issues follow a separate credit risk profile.

Security Identifiers

Using the appropriate security identifier types across securities, categorically and regionally, is an operational issue that drastically facilitates the efficient use of most financial data sets. If not for anything else, this will certainly be true for a risk model that attempts to cover various asset types on a global basis.

Our goal has been to associate securities for which multiple

(Continued from page 10)

identifiers are available with the ID which arises naturally for the particular security based on its asset type and the location where it is issued/traded. E.g. most US/Canadian equities would typically be reported in conjunction with a CUSIP in industry sources; a bond issued in Germany would typically be reported with an ISIN, etc. Accordingly, we have structured our system so that:

- US-issued equities are reported with CUSIP
- Non-US-issued equities are reported with SEDOL
- US-issued bonds are reported with CUSIP if available; if only an ISIN is available through our data sources then “back out” a CUSIP out of an ISIN by trimming the first two and the last digit
- Non-US-issued bonds are reported with an ISIN if available; if an ISIN is not available, a CUSIP is reported.

The revision is in the way we treat security identifiers relating to US bonds for which an ISIN rather than a CUSIP is available. We will discontinue the practice of shaping a CUSIP out of an ISIN, but report in our database file the full ISIN instead. Although the current practice is based on the standard ISMA approach of taking a 9-digit local ID (CUSIP for US) and adding a double-digit country code in front and a check-digit at the end, it has become apparent that this does not hold true for a small percentage of US bonds. To ensure consistency of valid identifiers across the security universe we cover, we would adhere to the new practice as described.

Other ongoing EE developments

(details and release dates will be announced separately)

Municipal bonds - pending release of a universe of approx. 1.5 million US municipal debt issues; distribution will be done separately of standard coverage to ensure tractability of data delivery

Derivative module – the deployment of an analytical module that will process client investment positions in a wide array of derivative instruments – options, futures, forwards, swaps, so that they are incorporated in the overall risk analysis side-by-side with equity and fixed income investments.

Client exception reporting system – an automated system that will query our vendors’ databases and escalate for further investigation securities which clients have identified as exceptions in NisOpt analysis. This will reduce response time and attain the best possible model coverage.

If you have any particular questions regarding any of the upcoming modifications to the EE Model, please contact Emilian Belev at emilian@northinfo.com.

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

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