November 2007

Northfield News

A Newsletter for the Friends and Clients of Northfield Information Services

Liability Driven Investing

By Dan diBartolomeo

In recent years, the phrase "Liability Driven Investing" (LDI) has come into popular usage, particularly in Europe. The common understanding of the LDI concept is that the asset allocation and investment management mandates of a defined benefit pension scheme should be measured directly against the liabilities of the fund. This is in contrast to typical practice today, where a pension scheme will create a strategic asset allocation (e.g. 60% stocks, 40% bonds), and the effectiveness of all investment activities will be judged relative to this strategic benchmark. The basis of LDI is a belief that risk associated with an investment for a pension fund is not just the volatility of returns from year to year, but is more specifically the volatility in the pension surplus, and the extent to which the value of the assets of the fund exceed the present value of expected future pension payments to beneficiaries.

Under both the legal regulations and accounting standards of most countries, there is a lot ambiguity around defined benefit plans. The usual structure assumes that the fund is a trust held on behalf of the beneficiaries. To the extent that the fund assets exceed the actuarially determined present value of expected future payments, the fund has a surplus.

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Special Points of Interest:

Optimizer Computational Enhancements

By Dan diBartolomeo

As Northfield users should already be aware, over the next six months we will be releasing a major series of Optimizer enhancements. The first stage of this process will be the introduction of a completely new GUI (graphical user interface) for the PC version of the system. Users will be able to get the new version as early as mid December and we hope that all PC users will make the transition to the new system during January.

The second round of enhancements will relate to some of the major analytical and computational methods used in the Optimizer. These changes will be done over the first few months of 2008. Once the changes have been implemented in the computational engine, they will appear immediately in the PC version. In the subsequent months, we will work with delivery partners such as Factset, Clarifi, and Market QA to bring those systems into conformity, so that all implementations take advantage of the improvements.

The largest change will be in the area of handling estimation error in optimization. While there is broad agreement in the investment community that estimation error in optimization is a serious problem and should be addressed by explicit means, there have been a

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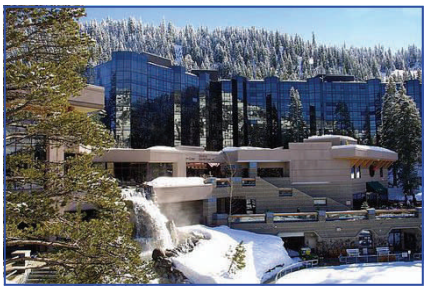
Inside This Issue:

Recent and Upcoming Events

2008 Northfield Annual Research Conference

Resort at Squaw Creek • Olympic Village, CA • March 25-28, 2008

We are pleased to announce our 21st annual research conference at the Resort at Squaw Creek, in Olympic Village, CA. The conference will officially begin on Tuesday, March 25th and end on Friday, March 28th.



Resort at Squaw Creek

As is customary at Northfield events, a complete recreational and social calendar will accompany the working sessions. The Resort at Squaw Creek is a full-service, luxury resort in an idyllic mountain setting. It rests at the base of Squaw Valley USA, site of the 1960 winter Olympics, and is just minutes from California's North Lake Tahoe. It features and exclusive on-property chair lift with ski-in/ski-out access to Squaw Valley USA's 4,000 acres of skiable terrain.

Further details and the complete conference agenda will be posted on the Northfield Website at http://www.northinfo.com/events.cfm as they become available.

CARISMA Center Events

Brunel University • West London

Northfield President Dan diBartolomeo is a Visiting Professor at the Center for the Analysis of Risk and Optimization Modeling Applications (CARISMA) at Brunel University in West London. The mission of the center is to be a center of excellence recognized for its research and scholarship in the analysis of risk, optimization modeling, and the combined paradigm of risk and return quantification.

The Center sponsors workshops and conferences throughout the year. Visit the Carisma website for upcoming event and registration information at http://www.carisma.brunel.ac.uk/conferences.html.

2007 Northfield Annual Research Conference Wrap-up

The Ocean Reef Club • Key Largo, FL • October 22-24, 2007

Northfield's 20th Annual Research Conference took place at the Ocean Reef Club, in Key Largo, Florida. Set in the tropical "Keys." the Ocean Reef Club is an exclusive, private 2,000-acre private club located on the northern tip of Key Largo. This beautiful venue made this year's conference an exciting one!

The conference presented recent research and technical advances to a sold out audience of Northfield clients and friends. The agenda consisted of twelve presentations. Topics included: "Alternative Beta Strategies," "Comprehensive Risk and Performance Attribution," "Liquidity and Investment Styles," "Optimal Trading Strategy with Optimal Horizon," "Who, if Anyone, Reacts to Accrual Information?," "The Potential Impact of Housing Derivatives," "If You Had Everything Computationally…Where would you put it, financially," "Capacity Analysis: Applying the Fundamental Law of Active Management," "Dynamic Portfolio Optimisation," "I'm Not Dead Yet! A Traditional Asset Manager's Response to Hedge Fund Mania," "Market Returns without Downside Risk or The Difference Between Beta and the Equity Premium," and "Short Term Risk from A Long Term Model, Parts I and II."

The conference started on Sunday evening with the "unofficial" welcome reception which featured an evening dinner cruise on a yacht. Monday morning was reserved for recreational pursuits. Conference attendees had a choice of golf, bone fishing, snorkeling, Hobie Cat sailing, or taking an eco-kayak tour. Monday evening featured the traditional Northfield elegant "black tie" gala. This year's dinner featured a "Casablanca" themed evening. During dinner the famous movie played on a large screen in the background and professional actors circulated in the crowd performing as Rick Blaine and Ilsa Lund, the movies main characters. Following dinner, the party kicked into high gear with music, drinks and dancing.

The final evening on Tuesday featured an ocean front dinner and beach party with a classic rock band providing the music. Complete seminar proceedings have been posted at http://www.northinfo.com/papersearch.cfm.

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. 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:
November 30, 2007, 9:00 am - 4:30 pm • Mandarin Oriental, Hihonbashi, Tokyo

- Distinguishing Between Being Unlucky and Unskillful
- A Market Impact Model that Works
- Risk Containment for Hedge Funds
- Measuring and Targeting Efficiency to Optimize the use of Turnover
- Improving Returns-Based Style Analysis
- Alpha Scaling Revisited

A complete agenda has been posted soon to http://www.northinfo.com/event.cfm.


Mandarin Oriental, Tokyo

Hong Kong:
December 4, 2007, 9:00 am – 4:30 pm • Mandarin Oriental, Central, Hong Kong

- Distinguishing Between Being Unlucky and Unskillful
- A Market Impact Model that Works
- Risk Containment for Hedge Funds
- Measuring and Targeting Efficiency to Optimize the use of Turnover
- Improving Returns-Based Style Analysis
- Alpha Scaling Revisited

A complete agenda has been posted soon to http://www.northinfo.com/events.cfm.


Mandarin Oriental, Hong Kong

Sydney:
December 7, 2007, 9:00 am - 4:30 pm • The Observatory Hotel, Kent Street, The Rocks, Sydney

- Distinguishing Between Being Unlucky and Unskillful
- A Market Impact Model that Works
- Risk Containment for Hedge Funds
- Measuring and Targeting Efficiency to Optimize the use of Turnover
- Improving Returns-Based Style Analysis
- Alpha Scaling Revisited

A complete agenda has been posted soon to http://www.northinfo.com/events.cfm.


Observatory Hotel, Sydney

Space is still available for all three seminars. Contact Nick Wade in Tokyo if you would like to attend, +81 3 5403 4655 or e-mail: nick@northinfo.com.

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As time passes, our responsibility for future payments is closer in time, so the discounted present value of the payments rises. In addition, the projected magnitude of the future payments will rise as employee benefits increase through salary increases, inflation and greater seniority. New employees may also be added to the plan. Assets of the plan will increase (decrease) with investment earnings (losses) and with contributions from the sponsoring company or governmental entity. Outgoing payments to current retirees decrease both the plan assets and liabilities as funds are expended to discharge the obligation.

To the extent that the plan surplus is deemed by actuaries to be an insufficient "cushion," the sponsoring entity will be required to increase contributions and therefore the expense of the plan to general operations. This gives companies an obvious incentive to minimize the required pension contributions in their normal effort to decrease expenses and thereby increase profits. It should be noted that under the regulations and accounting standards of most countries, negative "contributions" are not permitted. That is, if the investments of a pension scheme were to do so well that the surplus became excessively large, the sponsoring entity can still not take back any of the funds that are expected to be unnecessary to meet future obligations.

Much of the interest in LDI is centered on accounting theory. Starting with Financial Accounting Standards Board Rule 87 enacted in the US in the 1980s, the accounting standards of many countries require that some or all of the changes in actuarially determined pension surplus be accounted for in a company's financial statements. FASB 87 also required that the rate used to discount expected liabilities to present value be "appropriate" for financial market conditions. This is generally interpreted as meaning that the discount rate should be equivalent to the yield on investment grade bonds. See Zuber (1988) for details. To the extent there are large declines in pension surplus at a firm, the negative accounting impact on the firm's profitability, balance sheet and credit rating can be profound.

Let us consider a hypothetical pension scheme with current assets of one billion Euros. The expected future obligations of the fund are such that when discounted at a rate of the current market rate of 7% (the current bond yield), we obtain a present value of liabilities of nine hundred fifty million Euros. For the moment, the fund has surplus of fifty million Euros. Now lets assume that bond yields drop such that the current market rate is 5%. What does the surplus of the pension fund look like now? Given the lower discount rate, the present value of the liabilities will rise. How much it will rise will depend on the duration of the payment obligations. If the expected payments are due in the near future, the present value will change little, just as short term bond prices are relatively insensitive to yield changes. If the expected payments are in the distant future, the present value of the liabilities will grow greatly, as the price of a long term bond moves greatly with changes in yield. A decline in market interest rates is also likely to increase asset prices, but depending on the funds mix of stocks, bonds and property, the expected magnitude may not be comparable to the change in the value of liabilities. If the duration of the liabilities was 20 years, the present value of the liabilities would increase roughly 35%, increasing the present value of liabilities to 1.3 billion Euros. To the extent that asset values do not improve a comparable amount, the pension fund surplus could become a huge deficit in a short time, placing considerable financial stress on the sponsoring entity.

LDI approaches to investing are meant to address this kind of concern. In its simplest form, the goal of LDI is to match the duration of the fund assets to the duration of the fund liabilities. One way to do this is to simply have the pension fund hold all of its assets in bonds, with portfolio duration equal to the duration of the liabilities. However, duration matching in practice usually requires that a fund hold a much higher proportion of long term bonds than is customary today. The offsetting decline in equity and property holdings normally reduces the expected return on the portfolio, thereby increasing the amount of required contributions from the sponsoring entity in the long run.

An interesting twist on this idea was presented a long time ago in a paper by Fischer Black (1980). This paper argues that companies could get the money to put into their pension bond portfolio by issuing bonds themselves. To the extent that interest expense is tax deductible to companies, while pension funds typically pay no taxes on income, a firm could generate a government subsidy for its pension plan. One obvious difficulty with the idea is that if companies borrow extensively for pension purposes, they many not have sufficient borrowing capacity to fund operational expansion as needed.

To the extent that growth stocks pay little or no dividends, one might expect that growth stocks would actually be a long duration asset, much like a portfolio of zero coupon bonds maturing in the distant future. Empirically, this is not the case, with equities in general being a relatively short duration asset, and even shorter in the case of “growth oriented” stocks. There is an extensive literature in equity duration including Lewis (1989), Leibowitz and Kogelman (1993), Hurley and Johnson (1995) and Cornell (2000). In general, these studies find that much of the valuation of equities is driven by the perception of future

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growth opportunities that are not sensitive to interest rates. In addition to the extent that stocks are valued as the discounted present value of projected future cash flows, changes in the discount rate applied are dominated by the changes in risk premium demanded by equity investors for the uncertainty of future cash flows, rather than changes in interest rates. The assessment of duration for illiquid investments, such as directly owned property is even more problematic as the "market value" of the assets is updated infrequently, usually through an appraisal process that has a long time lag built into it.

There are several other challenges associated with implementing an LDI process. The first is to understand the differences between value of surplus as defined by pension actuaries in various jurisdictions, and the value of surplus as would arise from a full economic "mark to market." Pension actuarial practice recognizes that investment returns on assets fluctuates greatly from year to year. To the extent that fund returns are less than expected in a given period, actuaries employ various data smoothing techniques in recognition that returns are likely to recover to normal levels in the future. This data smoothing reduces fluctuations in surplus, relative to the volatility that pension surplus would exhibit if all assets and liabilities were analyzed at true current market value.

In addition, it is still common actuarial practice to discount liabilities based on a single rate of discount, irrespective of maturity. On the asset side, the pricing of fixed interest securities obviously takes account of the term structure of interest rates. Consider a potential LDI investor who holds a portfolio of zero coupon riskless bonds that will mature with exactly enough cash flow on exactly the right future dates to fund all needed payments. To the extent that the liabilities are valued based on a single discount rate and the zero coupon bond assets are priced off the current term structure, we could have the bizarre result of the fund being viewed as having either a large surplus or a large deficit in funding.

In the 1990s, Northfield developed a detailed method for what is now called LDI investing, including using LDI type benchmarks for performance measurement. The approach projects the potential range of pension surplus into the distant future using an arbitrage-free binomial tree pricing model as is commonly used for valuing the call features in bonds. In addition, this methodology accounted for the influence of inflation on pension payments, such as "cost of living adjustments," and provides a means of reconciling the single discount rate versus term structure issue. See diBartolomeo (1997) for details.

A less radical approach to LDI investing is to use traditional mean-variance optimization to form the usual strategic asset allocation, but change the degree of risk acceptance from period to period in a way that is sensitive to the fraction that surplus represents the total assets. The usual mean variance formulation is:

$$U = E[R - S^2 / T]$$

Where:

U = investor utility
E = the expectations operator
R = the portfolio return in %
S = the standard deviation of portfolio return in %
T = the investors risk acceptance parameter

We can also write this equation with risk aversion

$$\text{Let } L = 1/T = (B / M * .005)$$

$$U = E\,[L * (R - S^2)]$$

Where:

M = value of pension surplus
B = value of total pension assets

The formal derivation for this relationship appears in Wilcox (2003). The intuition is that as our liabilities become a smaller fraction of our total assets, M will approach B and the ratio of B/M approaches one. At B/M = 1 we would be investing for maximum long term growth with all of our capital, which minimizes pension expense in the long run. If liabilities become a larger and larger fraction of our total assets wealth, M will approach zero so the ratio of B/M will approach infinity. As such, we would take an increasingly conservative investment posture, until we became so intolerant of risk that we would hold a riskless portfolio, until contributions put the fund back into surplus. Similar to portfolio insurance strategies this approach maximizes the median, rather than mean of expected portfolio outcomes.

Liability Driven Investing is an important concept that should be in the lingua franca of asset managers, corporate financial officers and actuaries. While the implementation of LDI can take many forms, the analytical tools already available to the investment community appear sufficient for successful implementation. The greater challenge is the formulation of regulatory and accounting policies at the company level that can give appropriate guidance in making the tradeoffs between minimizing the volatility of surplus and long term pension expense.

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Northfield Partner Update

LTSave - Northfield signed an agreement with LTSave to integrate the Northfield optimization engine and risk models within LTSave's Retirement Wealth Management Platform. LTSave is an independent investment firm offering outsourced retirement planning and portfolio management services to Employers, Banks and Banking Platforms, and Affinity Groups delivered via the internet. The integration was completed this summer and recently released to the first client. This relationship is further evidence of the growing demand for institutional level portfolio construction tools designed for use by the individual investor. Please contact LTSave at www.ltsave.com for more information.

Northfield Staff Speaking Engagements

Northfield President Dan diBartolomeo will be speaking at Hitotsubashi University, Tokyo, on November 29th. The topic will be on hedge fund risk containment.

Dan will be presenting "Using An Epistemological Perspective on Investment Decisions" at the Standard & Poor's Computstat User Conference, in Boston on January 22nd.

At the January 29th FRA Hedge Fund Conference in New York, Dan will be presenting "Hedge Fund Replication as a Risk Management Tool."

The UBS/Alpha Strategies Conference will take place March 17-18th at, Duke University. Dan will be presenting "Highly Non-Linear Security Selection Models."

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 Wednesday, December 12th, from 5:30 to 8:30.

Complimentary cocktails and and Hors d'oeuvres will be served and entertainments will be provided. Guests are welcomed to this informal gathering.

If you would like to attend, please register on line at http://www.northinfo.com/events.cfm

James Williams Joins Northfield Tokyo Office

We are pleased to welcome James Williams to Northfield's Tokyo based office. As part of the client support team, James works closely with Nick Wade with Northfield's rapidly growing Asian client base. His responsibilities include providing support and training both internally and externally while developing strong client relationships to better understand client needs.

James brings a myriad of experiences, most recently as a Product Specialist with Starmine and has also held positions with Raymond James, Nikkei, and Schroders.

James graduated from the University of Southern California with a B.A. in East Asian Studies & Political Science. He also holds a M.B.A. degree in Finance & Corporate Accounting from the William E. Simon Graduate School of Business at the University of Rochester. James is an active member of the CFA society of Japan.

Please join us in welcoming James. He can be reached a james@northinfo.com.

(Optimizer Computational Changes, continued from page 1)

variety of competing methods (e.g. resampling, Bayesian shrinkage, "robust" optimization) put forward as being the most beneficial. Northfield has decided to use two different technologies for dealing with estimation errors. First will be a new module that will provide for automatic Bayesian scaling of user input expected returns (i.e. alphas). The second will be adding a quadratic penalty to the objective function that is designed to compensate for errors in the risk estimation.

In addition to these two procedures, Northfield will be introducing a very innovative new method that is meant to address the "single period" assumption in mean-variance optimization. Traditional optimization methods assume that the future is one long time period, during which our expectations about returns and risks cannot change. If transaction costs are zero, this assumption does little harm because we change our portfolio as often as we wish, even with the myopic view of a "no change" future. However, in the real world where transaction costs and taxes are not zero, this is a serious fault. Our approach addresses this conceptual shortcoming by adjusting the way in which returns and risks are traded off against transaction costs during the optimization. More information about all three of these methods can be found in our May 2006 newsletter, http://www.northinfo.com/documents/202.pdf.

Another area of big changes in the Optimizer computations will be in the way that cardinality constraints such as Maximum Number of Assets, Threshold and Minimum Trade Size are handled. For example, the current system uses position size as a criterion for deciding which positions to eliminate in order to meet a maximum number of asset constraints. Certain circumstances such as highly non-linear transaction costs can make using position criteria suboptimal as the criteria. The revision will use information on the size of the position and the marginal utility of buying or selling that security in order to reduce potential sub-optimality in the selection process. In addition, other changes to the Max Assets and related functions will greatly improve speed for optimization cases, where the user's Max Asset setting is much smaller than the size of the available security universe.

For Optimizer users managing taxable portfolios there will be a couple of important improvements. The first change will relate to how the "Max Capital Gain" constraint is applied. With the current system, an MCG violation will stop an optimization even if the initial portfolio was not feasible with respect to other Class I constraints (e.g. position sizes, factor exposures, etc.). Under the new approach, hitting a maximum capital gain constraint will stop an optimization only if the portfolio is feasible with respect to Class I constraints. Feasibility under Class II constraints such as Max Assets and Threshold will not be required for a maximum capital gain limitation to take effect. Another change relating to the MCG constraint has to do with the sequence of trades that make up an optimization. Normally, the size of each trade in the sequence is calculated to an optimal size given the return, risk and costs considerations of the trade. When an MCG constraint is active, it is more efficient to do the trades in a series of much smaller steps, which will be done automatically in the revised system. Computational methods are also being improved for rare cases where the marginal utility of an asset is positive in both the buying and selling directions. This can occur when a security position has a large expected return, but also a large embedded tax loss.

Another important improvement will be a function to allow for "nested" composite assets, so that a composite asset such as a mutual fund could hold another composite asset such as an index futures contract. There will also be a number of small refinements to functions such as Max Number of Trades.

In addition to the aforementioned computational changes, we are planning a large number of small functional changes to the GUI in the longer run. Most of these relate to increasing the flexibility for users in terms of how optimization preferences are specified. For example, we'll allow user defined quadratic penalties (i.e. penalty files) to be specified with benchmark relative goals and constraints, as well as being specified in absolute form. Additional functions will be added to the NISBATCH system that will streamline dealing with corporate actions for users when running back-tests. Other changes will simply increase the speed of optimizations.

As was mentioned during the recent client research conference in Key Largo, Northfield is preparing to introduce means of getting short horizon risk forecasts (e.g. 10 day VaR) from our existing risk models.

Once those models have been introduced in mid 2008, a new function will be added to the Optimizer to allow the user to use a non-linear interpolation method to customize the risk forecast horizon to any value between the short horizon forecast and our traditional one year horizon forecast.

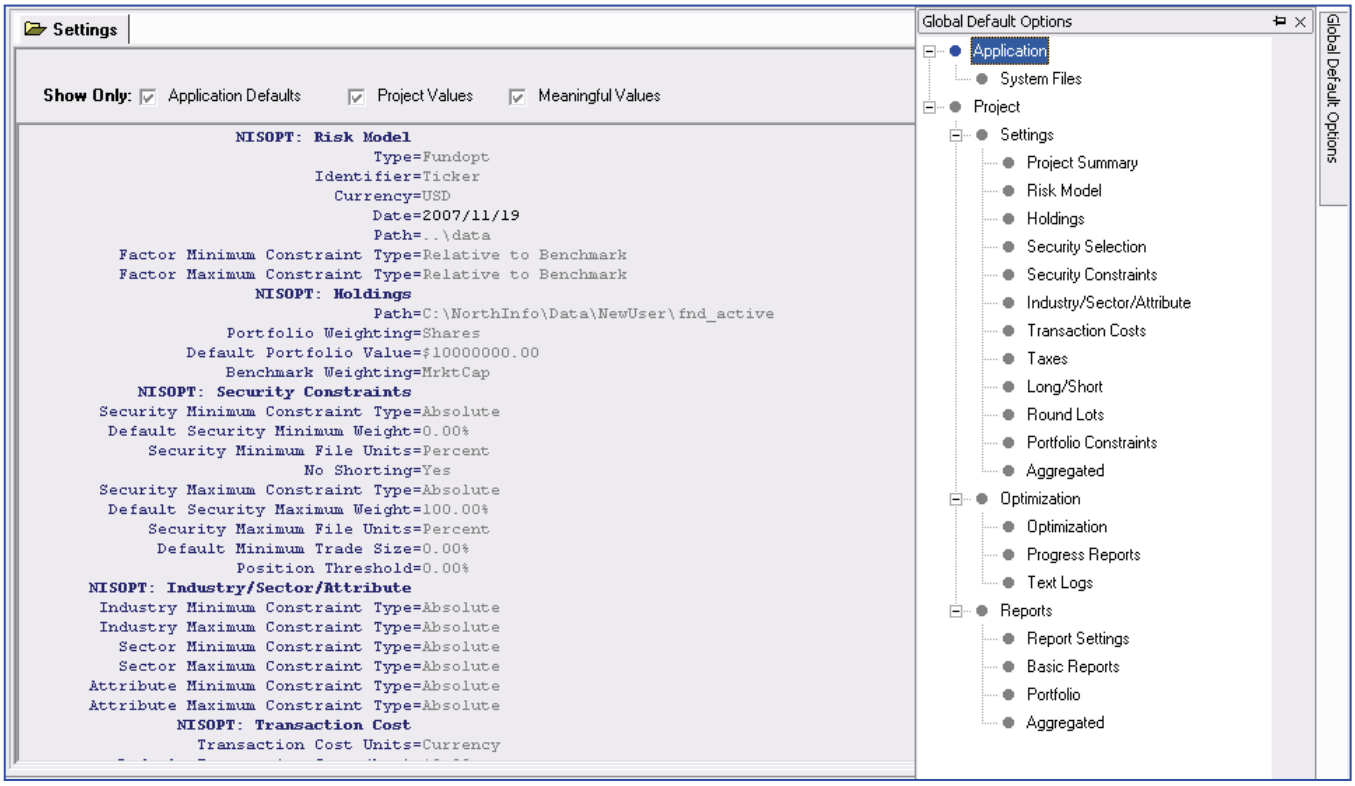
Technical Support Tip: Transitioning to the New Optimizer

By Mike Knezevich

Next month Northfield will release a re-vamped version of the portfolio optimizer. Although the newest version looks and feels very different, the primary objective for this release is to improve data import and setup. The workspace will have more of an explorer like look and feel. Inputs are supplied to a tree-like structure simultaneously constructing the corresponding project which is viewable in the workspace. Users have the ability to set default settings as well as project specific settings.

Default Settings:

A new Global Default Options window allows users to set defaults for projects. This window pops-up from the right hand side of the workspace.



Global Default Options Window

These defaults are saved as system files separately from the project file and are automatically uploaded into any new project. Users will have the ability to create default settings using the global default option, but also be able to change the specifics for any particular project. What is amendable and/or viewable within the project file can be controlled by an administrator.

Project Specific Settings:

Global default settings deemed amendable may be over-written in the in the project file. The new project file format will only contain those amendable settings. These settings can be changed using the left hand tree structure. ***(see picture at top of next page)***.

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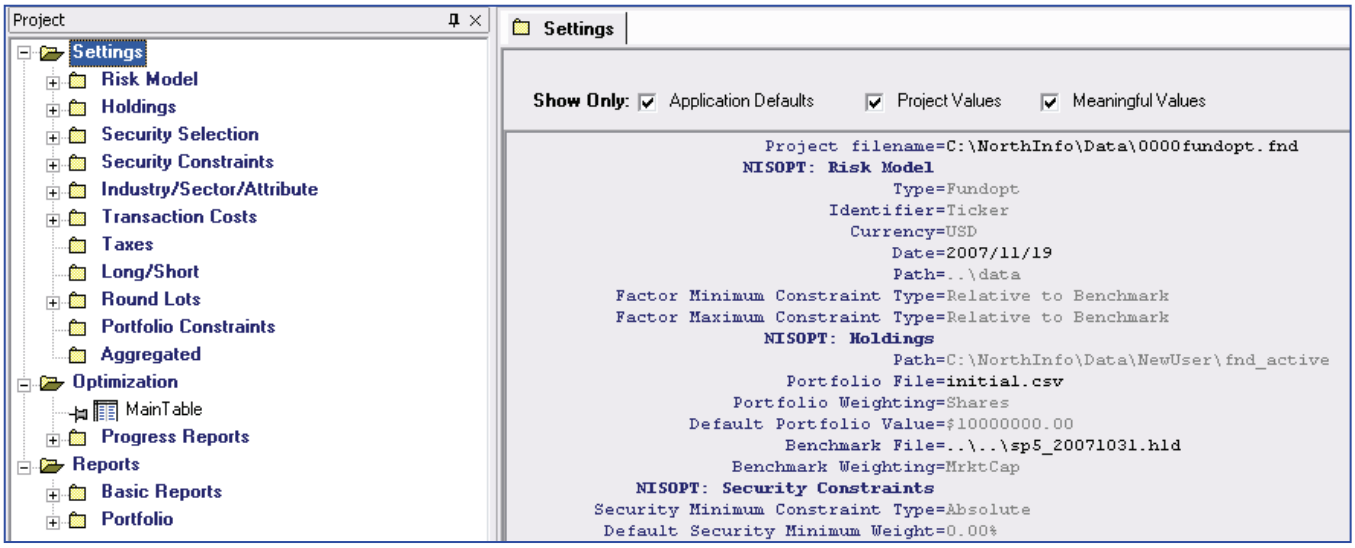

Project Specific Settings

Compatibility:

Given the newer format of the project files, backward compatibility would be a concern. Realizing the compatibility issue, an import/export wizard is included in the upgrade. This functionality will allow the user to import existing project files and export them back into the existing format for comparison across product versions or save them as the new project file format.

Transition:

A transition period of 3 months (the last update for the current version being available February 29th) will allow users to compare outcome from the two different versions. During this period both versions will be updated and supported. Since the majority of these changes are cosmetic and specific to data importing, major differences between versions are not anticipated. The sooner clients upgrade to the newer version, the sooner new planned analytical upgrades will be released. Support and updates will cease for the current version March 31st, 2008.

Upgrading:

- The new version will be available via LiveUpdate during the middle of December and via webinstall with the end of December update.
- An accompanying document describing differences in more detail will be supplied.
- Nisbatch upgrade will follow the release by 1 month.

Discrepancies:

If a discrepancy does exist for your project between the two versions, please send a detailed email to Northfield Technical Support. In Boston, **support@northinfo.com** or call 617.208.2080. European clients can contact: **support@northinfo-europe.com** or call +44-(0)-20-7801-6260. In Asia, contact James Williams, **james@northinfo.com**.

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