# Northfield News

September 2012

A Newsletter for the Friends and Clients of Northfield


## Factor Based Asset Allocation and Illiquid Investments

*By Dan diBartolomeo*

### Introduction

There have been two important trends in recent years with respect to the asset allocation practices of many large long-term investors such as sovereign wealth funds, pension schemes and university endowments. The first trend is that many have shifted their asset allocations to include very large commitments to illiquid investments such as real estate and private equity. Secondly, some asset owners are now thinking of asset allocation in terms of factor exposures (e.g. inflation) that transcend traditional asset class definitions. This trend appears to be a response to the extreme influence of macroeconomic factors during the financial crises of the past few years, and to the extremely large size of some funds which makes tactical shifts in asset allocation more difficult.

*It is our view that adopting a factor representation for asset allocation also has important advantages for all investors with a material commitment to illiquid assets.* When investors invest in illiquid assets they are now dealing with two new risks. The more obvious problem is that the asset owner may be unable to liquidate illiquid assets into cash to meet consumption expenditures. A more subtle but economically more important problem is that the investor is losing the "option to rebalance" the portfolio from time to time leading to sub-optimal allocations. In addition, these asset owners formally ignore the volatility and correlation of such asset classes as either irrelevant or unable to be reliably estimated, leading to sub-optimal asset allocations with arbitrary default weights (e.g. 5% for real estate and 5% for private equity). In almost all cases, the underlying economic drivers between illiquid and traded asset classes are equally left unexplored.

*Using a factor representation of the asset allocation can almost entirely eliminate the latter problem.* If we can specify our optimal asset allocation in terms of the desired factor exposures we can optimize our marketable security assets to achieve the desired exposures while holding illiquid assets constant. We can also adjust factor exposures with liquid ETFs or index derivatives, improving the opportunities to participate in tactical asset allocation strategies or to make time-varying decisions to hedge particular risk exposures of the overall portfolio. *To the extent that market participants believe there is a return premium paid to those investors willing to bear the disutility of illiquid assets, there may be an important opportunity to improve risk adjusted performance by obtaining this return premium while mitigating the related negatives.* We also assert that the factor approach presented here improves the asset allocation itself through better estimation of asset class volatility and correlation for both liquid (see related article in Northfield News September 2002) and illiquid asset classes.

Investors wishing to obtain the benefits of a factor approach to asset allocation can actually do so without changing their existing asset allocation practices to a large degree.

*(Factor, Continued on page 6)*

### Special Points of Interest:


- Main Article: Factor Based Asset Allocation and Illiquid Investments
- Asia Research Seminars Now Open for Registration
- London Research Seminar Now Open for Registration


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### Inside This Issue:


- Recent Events and Webinars
- Tech Tip: Calculating Utility in the Optimizer
- Staff Speaking Engagements
- Expanded Risk Model Coverage Coming Soon

## Recent and Upcoming Events

## Northfield Asia Seminar Series – Research on Investment Management and Risk

### Hong Kong • Singapore • Sydney • Tokyo

Northfield will be hosting four one day seminars in Hong Kong, Singapore, Sydney and Tokyo. 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.

### Sydney:

Tuesday, October 16, 2012, 9:00 am - 4:30 pm • The Quay Restaurant, The Rocks, Sydney

### Tokyo:

Monday, October 22, 2012, 9:00 am - 4:30 pm • Mandarin Oriental, Nihonbashi, Tokyo

### Singapore:

Tuesday, October 30, 2012, 9:00 am – 4:30 pm • The Raffles Hotel, Singapore

### Hong Kong:

Thursday, November 1, 2012, 9:00 am - 4:30 pm • Landmark Mandarin Oriental, Central, Hong Kong

### Agenda:

The agenda will consist of five presentations. Check **http://www.northinfo.com/events.php** for the detailed agendas that include the full presentation abstracts.

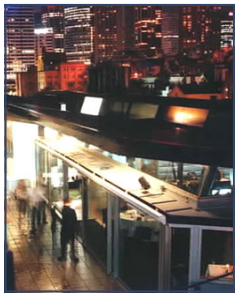
#### Hong Kong, Singapore and Tokyo

- Risk Management for International Equity Investors
- Macro Factors in Corporate Governance, presented by Lloyd Kurtz, Nelson Capital
- Portfolio Formation with Illiquid Assets
- Wealth Management, Investor Suitability, Fiduciary Requirements and Financial Regulation
- A Structural Model of Sovereign Credit Risk

#### Sydney

For the Sydney Seminar, "Macro Factors in Corporate Governance" will be replaced with "The Real Risk of Pension Funds: Funding Guarantees."

To register, visit **http://www.northinfo.com/events.php,** or contact Nick Wade in Tokyo if you would like to attend, **+81.3.5403.4655** or e-mail: **events@northinfo.com**. There is no cost for registering for any of the seminars.



Quay Restaurant

Mandarin Oriental

Landmark Mandarin Oriental

Raffles Hotel

## Northfield's London Research Seminar

**Vinopolis • No. 1 Bank End • London • November 7, 2012**

Northfield will be hosting our annual one day London Research seminar at Vinopolis in London on November 7th. The purpose of the seminar is to showcase our research on various topics in investment and risk management to our European clients and prospects.

### Agenda:

The agenda will consist of five presentations. Check **http://www.northinfo.com/events.php** for the detailed agendas that include the full presentation abstracts.

- Risk Management for International Equity Investors
- Downside Risk, presented by Louis Scott, Kiema Advisors
- Wealth Management, Investor Suitability, Fiduciary Requirements and Financial Regulation
- Third Generation Northfield Risk Models
- A Structural Model of Sovereign Credit Risk

There is no cost to register, however, donations to The Prince's Trust are strongly encouraged. You can donate on-line at **www.justgiving.com/Northfield.**

To register, visit **http://northinfo.com/events.php**. Contact Kit MacInnes-Manby in London for further details, **+44-(0)-20-7801-6250**, **kit@northinfo.com.**

## 2012 Northfield Annual Research Conference Wrap-up

**The Grand Del Mar Resort • San Diego, CA • August 7-9, 2012**

Northfield held its 25th annual research conference at the Grand Del Mar Resort in San Diego, California. The Grand del Mar is serenely nestled in a canyon preserve and seamlessly combines the old-world charm of a Mediterranean estate with the modern luxury of a elegant resort.

The conference presented recent research and technical advances to a sold out audience of Northfield clients and friends. The agenda consisted of eleven presentations. Topics included: "A Structural Model of Sovereign Credit Risk," "Asset Allocation and Risk Assessment for Pension Schemes Inclusive of Funding Guarantees," "Creating Dynamic Pre-Trade Models: Beyond the Black Box," "Diversification Return and Leveraged Portfolios," "Diversifying Risk Parity," "Downside Risk Management in Emerging Markets." "Guaranteed Active Management," "Macro Factors in Corporate Governance," "Mismanagement of Municipal Debt Puts a Hole in Everybody's Pocket," "Quantitative Asset Management for Turbulent Markets" and "Time Varying IC, Conditional Risk Model and Optimal Portfolio Turnover."

The conference started on Monday evening with the "Unofficial" welcome cocktail party and dinner. Tuesday morning was reserved for recreational pursuits. Conference attendees had a choice of Northfield sponsored activities including kayaking, golf, a tour of the U.S.S. Midway, jet skiing, and admission to the San Diego Zoo Safari Park.

Tuesday evening featured the traditional Northfield elegant "black tie" gala. The final dinner on Wednesday was held at the Marine Corps Air Station at Miramar which was made famous in the movie Top Gun. Prior to dinner, conference attendees were allowed to view the jets and speak to several of the pilots stationed there. The complete seminar proceedings have been posted at **http://www.northinfo.com/research.php**.

## Webinar Wrap-up: Wealth Management, Investor Suitability, Fiduciary Requirements and Financial Regulation

**September 19, 2012 • 11:00 A.M., E.D.T.**

Northfield's Dan diBartolomeo hosted a webinar on September 19th where he discussed recent SEC rules that went into effect which mandate much higher standards for financial services firms to ensure that investor suitability guidelines are followed in dealing with individual investors. The discussion focused on three analytical methods that Northfield has pioneered in our wealth management practice.

The presentation slides are available at **http://www.northinfo.com/documents/520.pdf.** Contact your Northfield Sales Representative if you are interested in viewing the full presentation recording of the event.

# Tech Support Tip: Calculating Utility in the Optimizer

*By Kit MacInnes-Manby*

The objective of the Northfield optimizer is to maximize portfolio utility. The optimization summary report illustrates how the utility has changed from the initial portfolio to the optimal portfolio.

| | Initial | | Optimal | |
|---|---|---|---|---|
| | Return | Risk(v) | Return | Risk(v) |
| Factor | 0.00 | 20.73 | 0.00 | 52.95 |
| Stock Specific | 0.54 | 6.14 | 0.74 | 7.27 |
| Total | 0.54 | 26.87 | 0.74 | 60.21 |
| Tracking Error | 5.18 | | 7.76 | |
| Portfolio Utility | -0.38 | | -0.11 | |

What it doesn't show is how each of the components of utility have contributed to the over-all number.

Recall that a portfolio's utility is calculated from the objective function:

$$\text{Max } U = \alpha - (\sigma_s^2 / RAP_s) - (\sigma_u^2 / RAP_u) - ((C + T) * A) - P$$

## Where:

- $\alpha$ = forecasted portfolio return
- $\sigma_s^2$ = portfolio variance risk due to common factors (systematic)
- $\sigma_u^2$ = portfolio variance risk due to stock specific risks (unsystematic)
- $RAP_s$ = systematic risk acceptance parameter
- $RAP_u$= unsystematic risk acceptance parameter
- C = transaction costs for the optimization
- T = capital gain taxes for the optimization
- A = amortization constant
- P = quadratic penalty cost

For more information please see "Technical Support Tip: Northfield Portfolio Optimization Methodology" http://www.northinfo.com/Documents/496.pdf.

A utility decomposition may be calculated with the necessary numbers. In our example we take the S&P 500 equally weighted as our portfolio with the market cap S&P 500 as the benchmark. All of the parts of the utility function can be found or calculated from the numbers provided in Nisopts various reports as follows:

## Alpha

A set of alphas are given to the constituents, with the total predicted return for the two portfolios shown in the summary report above (a more detailed breakdown of returns can be found in the returns decomposition tab). In this case we have values of 0.54% and 0.74% for the initial and optimal portfolios respectively.

## Total Variance and RAP

RAP or the risk acceptance parameter, is a user defined value that equates to the user's risk tolerance. In this example we use the default value of 100% for both systematic and unsystematic risk. For more information on RAP please see http://www.northinfo.com/Documents/413.pdf.

The total tracking variance (systematic + unsystematic) of both the portfolios compared to the benchmark can also be found in the optimization summary report, again the values in this case are $26.87\%^2$ and $60.21\%^2$ for the initial and optimal respectively. A more detailed breakdown of the risk characteristics can be found in the risk decomposition tab.

**Risk Decomposition**

**Initial Portfolio**

| | Factor | PortExp | BenchExp | ActiveExp | FactorVar | VarContr |
|---|---|---|---|---|---|---|
| 1 | Beta | 1.1402 | 1.0178 | 0.1224 | 443.5170 | 6.6397 |
| 2 | Earnings/Price | 0.2098 | 0.2985 | -0.0887 | 2.4399 | 0.1204 |
| 3 | Book/Price | -0.1502 | -0.3061 | 0.1559 | 15.2478 | 0.3759 |
| 4 | Dividend Yield | 0.1280 | 0.1941 | -0.0661 | 4.6803 | 0.0969 |

| | |
|---|---|
| Factor Tracking Variance | 20.7335 |
| Stock Specific Tracking Variance | 6.1381 |
| Total Tracking Variance | 26.8716 |
| Tracking Error | 5.1838 |
| Total Risk of Portfolio | 24.2894 |
| Total Risk of Benchmark | 22.5745 |
| R-Squared | 0.9568 |

Here we can see the factor tracking variance (systematic) and stock specific (unsystematic) Variances for the initial portfolio. As we are using the same RAP for both systematic and unsystematic risk we can combine these in to the total displayed in the summary for our calculation of utility. If different values were used we would have to use the numbers displayed here and dived them by their respective RAPs.

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## Transaction Costs, Capital Gains Tax and Amortization constant

In the example we have set a simple transaction cost of $0.10 to buy and sell with no non-linear transactions costs. The analysis summary gives an overview of the amortized transaction cost, in our example we have 0.04%.

**Analysis Summary**

| | Initial | | Optimal | |
|---|---|---|---|---|
| Value | 10000000.00 | | 10000000.00 | |
| Count | 500 | | 439 | |
| Weight% | 100.00 | | 100.00 | |
| | Long | Short | Long | Short |
| Value | 10000000.00 | 0.00 | 10000000.00 | 0.00 |
| Count | 500 | 0 | 439 | 0 |
| Weight% | 100.00 | 0.00 | 100.00 | 0.00 |
| Highest Weight % | 0.20 | | 1.68 | |
| Lowest Weight % | 0.20 | | 0.04 | |
| Iterations | 397 | 0 | 0 | |
| Number of Transactions | 126 | | | |
| Turnover % | 27.47 | | | |
| Amortized Transaction Cost $ | 4400.46 | | | |
| Amortized Transaction Cost % | 0.04 | | | |
| Gross Equity Exposure | N/A | | | |
| Net Equity Exposure | N/A | | | |

## Penalties

Finally we have penalties, in this example we have set a market factor quadratic penalty as shown below, with a goal of 1.5 and a scale of 5.

**Attributes**

| Filename | Name | Goal | Scale | MinVal | MaxVal | | ID | Value |
|---|---|---|---|---|---|---|---|---|
| Beta.csv | Market Factor | 1.5000 | 5.0000 | -INF | +INF | 1 | A | 1.3700 |
| | | | | | | 2 | AA | 1.7700 |
| | | | | | | 3 | AAPL | 1.0100 |
| | | | | | | 4 | ABC | 0.7700 |
| | | | | | | 5 | ABT | 0.5500 |
| | | | | | | 6 | ACE | 0.9100 |
| | | | | | | 7 | ACN | 0.6500 |
| | | | | | | 8 | ADBE | 1.1400 |
| | | | | | | 9 | ADI | 1.0700 |
| | | | | | | 10 | ADM | 0.8700 |
| | | | | | | 11 | ADP | 0.6800 |
| | | | | | | 12 | ADSK | 1.3400 |
| | | | | | | 13 | AEE | 0.4600 |
| | | | | | | 14 | AEP | 0.5000 |

From the attributions summary we find the values for the initial and optimal portfolio.

**Attributes Summary**

| Penalty | Goal | InitVal | InitDiff | OptVal | OptDif |
|---|---|---|---|---|---|
| Market Factor | 1.500 | 1.140 | -0.360 | 1.297 | -0.203 |

The calculation for P is simply $P = Dif^2 * Scale$.

So here we have;

$P_{init} = (-0.360)^2 * 5 = 0.65\%$

And

$P_{opt} = (-0.203)^2 * 5 = 0.21\%$

For more on quadratic penalties please see **http://www.northinfo.com/Documents/190.pdf**.

## The Calculation

We now have all the values we need to calculate the utility of both the portfolios using the equation stated:

| | Alpha (%) | Variance/ RAP (%) | Amor-tized T-Costs (%) | Quadratic Penalties (%) | Utility(%) |
|---|---|---|---|---|---|
| Initial Port | 0.54 | 0.27 | 0.00 | 0.65 | -0.38 |
| Optimal Port | 0.74 | 0.60 | 0.04 | 0.21 | -0.11 |

As you can see, our final utility value agrees with the one stated in the summary report.

For further inquiries, contact Technical Support in Boston: **support@northinfo.com** or call 617.208.2080. European clients can contact: **support-europe@northinfo.com** or call +44 -(0)-20-7801-6222. In Asia, call +81(0)3 5403 4655 or +61 (0)2 9238 4284 or **support-asia@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**

(Factor, continued from page 1)

Our "recipe" will employ a traditional mean-variance asset allocation process. Risks and correlations across all asset classes, including illiquid assets will be estimated from a unified factor model (e.g. Northfield Everything Everywhere). Rather than use the history of index returns (as asset class proxies), for liquid asset classes asset class volatility and correlation estimates are done from the security level upward, using the current constituents and weights of the representative market index. For illiquid assets such as real estate and private equity, we will generate factor loadings from proxy portfolios of marketable securities with similar underlying economic drivers.

Expected returns for asset classes may be estimated in whatever fashion the investor chooses, however there is an important adjustment that should be considered for illiquid asset classes. In these cases, the expected return for the asset class is actually a function of the amount of capital allocated to the asset class. Consider the situation of a large investor who wishes to invest in real estate and that a hundred specific different properties are currently being considered for purchase. To the extent that the investor will naturally choose to invest in whatever they believe is the "best deal," the expected return for first dollars invested will be higher than the expectation for the asset class as a whole, but will decline as more capital is deployed in the "second best deal," the "third best" and so on. We refer to this problem as "liquidity drag."

If portfolio returns are a decreasing function of the capital employed, the usual expression for the expected return on a portfolio takes on a modified form:

$$E[R_p] = \Sigma_{i=1 \text{ to } n} w_i \alpha_i (1-k_i w_i^x)$$

- $R_p$ = the return on the portfolio
- $K_i$ = illiquidity coefficient estimated from the cost model for asset i
- $X$ = an exponent describing the market clearing process
- $W_i$ = weight of asset i
- $\alpha_i$ = return of asset i

For the special case of X = 1, the second term of the resultant expression is equivalent to an additive increment to specific risk component of a factor risk model for that asset. Estimates of k conditional on X can be derived from illiquidity risk premium described in Ang, Papanikolaou and Westerfield (2011).

Many advocates of illiquid investments have argued that the lack of transparency in the valuation of illiquid assets is actually a positive since it gives the asset owner the option to not recognize that the value of illiquid assets has declined unless the asset is actually sold. Our view is that this is intentional denial of reality. Effective November 15th, 2007, many entities are required to follow FASB Rule 157 which effectively requires a "mark to market" for all (including illiquid assets) assets. This puts investments in areas such as private equity and venture capital closer to the reporting of direct real estate where properties are independently appraised on a periodic basis.

With the factor approach, we can reasonably estimate the unobservable volatility and correlation of illiquid assets. Before describing the analytical process in some detail, we would make the important caveat that estimating factor exposures for illiquid assets can be a labor intensive process. Whenever possible, real estate is analyzed building by building. Private equity and venture capital are analyzed at the level of each end investment, and aggregated to the partnership level. Unfortunately, many asset owners participate in illiquid investments through partnership interests, where the general partners (asset manager) does not provide much detail about the underlying investments of the partnership, sometimes citing privacy concerns for the other limited partners.

We can think about rebalancing illiquid assets in the same framework as with liquid assets for whom transaction costs are non-zero. There is a large literature on optimal rebalancing in the presence of trading costs including papers by Constantinides (1986), Dumas and Luciano (1991), Dixit (1991) and Leland (1996). All of these papers reveal nuances of a central theme: There is a "no trade" band around the target asset allocation in the presence of trading costs. If you are outside the acceptable band one should rebalance as little as possible to get inside the band. *The "no trade" band becomes prohibitively large due to the very high transaction costs of illiquid assets.* Illiquid assets have another problem, lack of divisibility. You can't realistically sell one floor of an office building, it's all or none. This issue was addressed in a paper by Northfield's Rick Gold (Journal of Real Estate Portfolio Management, 1995). This paper used bootstrap re-sampling (as distinct from parametric re-sampling in Michaud, 1998) to form optimal asset weights are expressed as distributions rather than point values, subject to the limitation of summing to 100%.

## Defining Factor Exposures

The biggest challenge of our process is how to determine risk factor exposures for illiquid assets that have unobservable movements in value. Our general approach is to proxy the illiquid asset with a portfolio of marketable securities that has been chosen so as to have what we believe is the

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same factor exposures as the illiquid asset. The particular procedures for analyzing a particular real estate property were covered in diBartolomeo, Belev, Gold and Baldwin (2004) in addition to an extensive review of the related finance literature. The risk exposures of each property are of three basic types: (1), risks based on "steady-state" cash flow assumptions for existing and expected leases, (2), risks based on volatility in inflationary influences on property value, (3) risks of future fluctuations in rents and occupancy and (4) risks related to mortgage financing.

In essence, commercial property leases are treated like corporate bonds with extension options. We do detailed analysis of major tenant credit ratings, lease lengths, renewal rates, times between rentals, and other "real estate" issues. Inflationary influence on rents and property value represented by inflation linked notes. The volatility of rents and occupancy is related to the employment make up of the local economy, as demand for space is modeled as lagged function of cumulative stock market sector returns. For example, if you are in Houston, Abu Dhabi or Calgary, the health of the local economy has a lot to do how the energy sector is doing. If you are in New York, London or Boston, the finance sector dominates, while it's technology in Silicon Valley. Financing of properties is included as a set of factor exposures to outgoing cash flows (mortgage payments), just as "steady state" net operating income is handled. The binomial interest rate model incorporated in our EE process is used to adjust the yield curve factor exposures of the financing for fixed/variable rates and prepayment options. Multiple mortgages on one property may be represented including cross-collateralization across properties.

For real-estate-like asset classes we follow a similar approach. Agricultural and timber land is modeled as a function of four components: (1) a basket of agricultural commodity contracts, (2) timber commodity contract (forestry competes with agriculture land, and residential development for land use), (3) a stock portfolio of traded agricultural and food processing firms and (4) a portfolio of house builders (who buy most lumber and land to build). Major infrastructure projects such as airports could be thought of like a retail shopping mall in a given city, plus gate leases (similar to airline corporate bonds or jet leasing notes) plus some exposure to the portfolio of the airline stocks that service a particular airport. More information on the analysis of these asset classes can be found in an article in Northfield News for December 2009.

Our approach to analysis of private equity and venture capital investments was presented in the June 2011 issue of Northfield News, inclusive of a review of the related literature. We look through to each underlying corporate investment made by a PE partnership

For each firm in which an investment is made, a publicly traded proxy firm is selected with matching on line of business, home country and size. Modest adjustments are made for the relative degree of balance sheet leverage between the private and matching public firm, while partnership level borrowing is accounted for a short position in a corporate bond portfolio. "Lock up" and other liquidity restrictions are modeled as per Ang and Bollen (2008).

Illiquid assets are often purchased over multiple years with explicit contractual commitments. For example, the investor will invest 50 Million GBP each year for four years to give the partnership management time to consummate transactions. Such forward commitments represent a kind of leverage similar to futures contracts but without the requirement to set the settlement price today. Future investments will *usually* be done at the then current market values so there is no profit or loss in the interim but may represent committed additional funding to existing projects or investments. Such forward commitments lead to a "term structure" of expected asset allocations as we may have to move money from liquid to illiquid asset classes to fulfill deal requirements

## An Empirical Illustration

Many academic studies have tried to estimate unobservable real estate returns by hedging away the stock market influence on REIT returns and attributing the remainder as real estate return. These papers include Liang and Webb (1996), Chatrath(1999), Clayton and Mackinnon (2001). Another paper, Kim (2004) is the basis of property indices introduced recently by FTSE.

For our example we will use the following proxy portfolio to represent US direct real estate at each moment in time: 100% capitalization weighted US REIT universe, 30% cash and negative 30% an S&P 500 ETF. While we would normally use our Everything, Everywhere model for mixed assets portfolios, we will demonstrate the generality of the process by using our seven factor US Macroeconomic model that has remained largely unchanged since 1989. This model is an extension of the model proposed in Ross, Roll, Chen (1986). The factors are: Unexpected Inflation, Slope of Term Structure, Credit Risk Premium, Industrial Production, Housing Starts, Oil Prices, and FX Rates/US$. We will evaluate the risk factor exposures of our proxy real estate portfolio using this framework. Our results are presented in the table at the top of the next page:

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| 60 Months Ending Year End | Factor Variance | Total Variance | Volatility | % R-squared |
|---|---|---|---|---|
| 1996 | 10.23 | 28.77 | 5.36 | 35.56 |
| 1998 | 26.86 | 35.96 | 5.99 | 75.60 |
| 2000 | 49.20 | 59.50 | 7.71 | 82.69 |
| 2002 | 9.14 | 11.83 | 4.34 | 48.54 |
| 2004 | 22.45 | 30.69 | 5.54 | 73.15 |
| 2006 | 35.12 | 41.55 | 6.45 | 84.52 |
| 2007 | 60.75 | 69.30 | 8.32 | 87.66 |
| 2008 | 573.88 | 586.60 | 24.22 | 97.83 |
| 2010 | 312.35 | 337.12 | 18.86 | 92.65 |
| 2011 | 251.26 | 276.58 | 16.63 | 90.85 |

There is 71% correlation between the ex-ante volatility estimate and the factor ex-ante R-squared of the Macroeconomic factor model. During the GFC period of 2008, expected volatility rose to a very high level and *the R-squared approaches one*, evidencing widespread belief that "top down" macro considerations totally dominated return behavior. The R-squared has been consistently high since around 2005 for which the sample period begins in 2001. Given that the analytical model has been left essentially untouched for twenty three years, it seems illustrative that returns for real estate as an asset class can be effectively modeled in common factor models that were originally intended for securities markets.

## Conclusions

Many long term investors such as endowments and pension schemes are investing more heavily in illiquid assets. The key drawback of having a large exposure to illiquid assets *is the loss of the option to rebalance.* By focusing on a factor exposure representation of the asset allocation, *the loss of the option to rebalance is largely mitigated by the ability to rebalance or hedge in liquid markets.* With an appropriate model, robust estimation of common factor exposures of illiquid assets can be done either at the index level or more appropriately at the individual asset level and aggregated.

## Risk Model Data now Available US Mutual Funds and Many ETFs

Northfield would like to announce further extensions of coverage for our risk models. Effective in early November, an optional data set for our Everything, Everywhere model will provide factor loadings and other relevant risk information on almost all US open-end mutual funds. The analytical procedure used to estimate the factor loadings on funds is a combination of holdings data and a return history based estimation described in our January 2007 newsletter, http://www.northinfo.com/documents/233.pdf. In addition, we are now able to distribute (via FTP) holdings files at no charge for most popular ETFs. These holdings files can be used as "composite assets" within our risk analytic calculations, and may be used with most Northfield risk models.

## Northfield Speaking Engagements

Northfield Asia's Nick Wade spoke at the Monash/Qgroup Colloquium in Melbourne, Australia on July 27th. His discussion focused on Risk Models; the three standard approaches to estimating risk models, improved approaches such as simultaneous estimation and hybrid models, recent innovations such as the incorporation of forward-looking and alternative signals, and advances in multi-asset class risk.

Northfield President Dan diBartolomeo presented at the London Quant Group annual meeting in Oxford England on September 10th. The topic was "Portfolio Formation with Illiquid Assets."

Dan will be presenting "Asset Allocation and Risk Assessment for Pension Schemes Inclusive of Funding Guarantees" at the Quant Network Forum in Tokyo, on October 23rd.

Dan will be speaking at the first annual CQA Asia event in Hong Kong on October 25th. The topic will be "Perspectives in Risk Management." This meeting is open to all regular CQA members.

**For a complete index of all former Northfield News articles, visit http://www.northinfo.com/documents/314.pdf**

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